Agriculture and Water Quality

Water Quality Context

Under Section 303(d) of the federal Clean Water Act and section 403.067, Florida Statutes (the Florida Watershed Restoration Act - FWRA), total maximum daily loads (TMDLs) must be developed for all waters that are not meeting their designated uses and, consequently, are defined as “impaired waters.” A TMDL is the maximum amount of a given pollutant (nitrogen, phosphorus, mercury, etc.) that a water body can assimilate and still maintain its designated use (e.g., drinking water, fishing, swimming, shellfish harvesting). The Florida Department of Environmental Protection (FDEP) develops and adopts TMDLs and works with stakeholders to adopt basin management action plans (BMAPs) to achieve pollutant load reductions.

The TMDL program has become the key driver for addressing water quality in Florida. BMAP areas provide the main context for agricultural BMP implementation, along with other statutorily designated areas such as the Northern Everglades and Estuaries Protection Program and the Everglades Agricultural Area.

The Role of Agriculture in Water Quality

Agricultural Best Management Practices

The Florida Department of Agriculture and Consumer Services (FDACS) works with the agriculture industry, the FDEP, the water management districts (WMDs), the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS), and others to develop best management practices (BMPs) to address agricultural water quality and water use impacts, including the reduction of nutrient loads to help meet TMDLs. The FDACS Office of Agricultural Water Policy (OAWP) adopts BMPs for crop production and livestock. The Florida Forest Service has adopted a manual for silviculture BMPs and the FDACS Division of Aquaculture implements a certification program for aquaculture operations that requires BMP implementation.

BMPs are individual or combined practices determined through research, field testing, and expert review to be effective and practicable means for improving water quality, and are developed with economic and technological considerations. FDACS BMPs fall into three categories: nutrient management, irrigation and water table management, and water resource protection.

Nutrient Management practices help producers determine the appropriate source, rate, timing, and placement of nutrients (including both organic and inorganic sources) to minimize impacts to water resources. Irrigation and water table management practices address methods for irrigating to reduce water and nutrient losses to the environment and to maximize the efficient use and distribution of water. Water resource protection practices such as buffers, setbacks, and swales help to reduce or prevent the transport of nutrients and sediments from production areas to water resources.

FDACS has adopted BMPs in manuals addressing all major agricultural commodities in Florida. These manuals are located at: [www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy](http://www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy). Cost-share funds may be available from FDACS or other sources to assist with implementation of BMPs, plus advanced practices and technologies such as precision fertilization, soil-moisture-sensor technology; advanced irrigation controllers; center-pivot retrofits; variable-rate irrigation; Global Positioning Systems; new cropping systems; structural improvements; and dedicated treatment systems such as denitrification walls, and tailwater recovery systems (which may require taking land out of production).
Agricultural BMP Effectiveness

Agricultural BMPs have been in place in various programs for many years. FDACS BMPs are primarily based on USDA Natural Resources Conservation Service (NRCS) conservation practices and UF/IFAS research and recommendations. Over time, these practices have been demonstrated to be effective in reducing environmental impacts; however, the degree of effectiveness will vary according to the commodity type, soils types, topography, weather, combination of practices, and other factors. Consequently, the most practical expression of BMP effectiveness is as a potential range of nutrient reductions.

The FWRA requires that, where BMPs are adopted by rule, FDEP must verify their effectiveness by monitoring at “representative sites.” The FWRA also provides that FDEP shall make an “initial verification” using best professional judgment, that BMPs are reasonably expected to be effective in achieving pollutant reductions. Initial verification includes consideration of existing research/demonstration results, monitoring data, and modeling results relevant to BMP effectiveness. Subsequent verification by monitoring at representative sites is referred to as “confirmatory verification.” Confirmatory verification is complex and costly.

In a paper presented at the American Society of Agricultural and Biological Engineers, Thomas and Bailey (2016) described the process for developing BMP manuals that meet the legislative intent of pollutant reduction and environmental stewardship. Results from their work indicated that properly implemented BMPs can potentially reduce nitrogen and phosphorus loadings with an average reduction rate of approximately 30-percent. Nutrient reduction rates for individual farms can be even higher with the use of practices such as water control structures or retention/detention ponds. In most cases, these require cost share to be economically feasible for producers. OAWP provides funding each year to continue with BMP effectiveness research, as well as development of improved BMPs.

All FDACS-adopted BMP manuals have received initial verification from FDEP. In November 2008, FDEP provided confirmatory verification for the Ridge Citrus nitrate BMP, based on years of groundwater quality monitoring that demonstrated a 33% decline in nitrate concentrations.

BMP Results

A clear demonstration of the impact of BMPs on water quality is in the Everglades Agricultural Area (EAA) and the C-139 Basin in south Florida. In 2017, the South Florida Water Management District reported that, for the 22nd consecutive year, water flowing from farmlands in the 470,000-acre EAA achieved phosphorus reductions better than the 25-percent reduction required by law. The District reported a 70% reduction in the EAA in 2017 because of BMP implementation. Over a 22-year period, BMPs on EAA agricultural lands have prevented 3,208 metric tons of phosphorus from flowing to the Everglades. The C-139 Basin has also met its goal for phosphorus levels. Located west of the EAA, the 170,000-acre C-139 farming region consists primarily of pasture land, row crops, citrus and sugarcane. Results showed 26 metric tons flowing through the basin in the 2017 monitoring period, less than the limit of 32 metric tons.

Irrigation management is closely tied to nutrient management, as it helps target nutrient applications to plant root zones and reduces nutrient leaching and runoff. Mobile Irrigation Labs (MILs) provide free, site-specific irrigation expertise in analyzing irrigation systems and educating agricultural property owners on how to improve the efficiency of their water use. These multi-agency, partnership-based MILs are assisting agricultural producers throughout Florida. Presently, there are 13 Agricultural MILs providing service to all agricultural producers. Agricultural MIL staff estimate that, as of June 2018, producers conserved 11 billion gallons of water each year by implementing MIL recommendations; that number continues to grow as more operations are visited and recommendations implemented.
Agricultural BMP Implementation and Enforcement

Under the FWRA, agricultural nonpoint sources included in a BMAP either must implement FDACS-adopted BMPs or conduct water quality monitoring at their own expense, to demonstrate compliance with water quality standards. Implementation of FDACS-adopted BMPs that FDEP has verified as effective provides a presumption of compliance with state water quality standards for pollutants the BMPs address. FDEP also is precluded from recovering costs or damages for contamination related to the target pollutants.

The presumption of compliance is based on the expectation that producers understand and address the water quality and conservation issues on their operations.

The process of enrolling in FDACS BMPs includes on-site assessment by OAWP staff of opportunities for improving water quality and water conservation. The assessment includes a review of fertilization and irrigation practices, identification of water resource features through soil maps and aerial photography, and discussion of how to address observed concerns. The outcome of the assessment is completion of a checklist that records the BMPs applicable to the operation. The producer then signs and submits a Notice of Intent (NOI) to Implement BMPs, along with the completed checklist, to enroll the operation in the FDACS program. As of December 31, 2017, agricultural producers had submitted more than 11,040 NOIs, enrolling almost 3.7 million acres in FDACS BMP programs throughout the state, (not including silviculture BMPs).

The FWRA directs FDACS, FDEP, and the WMDs to assist with agricultural BMP implementation. The OAWP employs field staff and contracts with soil and water conservation districts, universities, and resource conservation and development councils to provide education and technical assistance, and to help implement cost-share programs. FDACS partners with FDEP, the WMDs, the NRCS, UF/IFAS, and others to coordinate cost-share funding and technical assistance for BMP implementation. Examples of these partnerships include:

- The Northern Everglades and Estuaries Protection Program
- The Northern Everglades Payment for Environmental Services Program
- The Suwannee River Partnership
- The Santa Fe Basin Ginnie-Gilchrist Blue Springs Restoration Focus Area
- The Tri-County Agricultural Area Water Management Partnership
- The Southwest Florida WMD Facilitating Agricultural Resource Management Systems (FARMS) and Mini-FARMS programs
- MIL Funding - MILs identify and demonstrate irrigation efficiency techniques to producers
- Regional team building with UF/IFAS Extension and UF/IFAS Regional Specialized Agents

Producers in a BMAP area who do not implement BMPs or monitor may be subject to enforcement actions by FDEP or the applicable WMD in accordance with FDEP or WMD rules.

BMP Implementation Verification

BMP Implementation Verification (IV) provides assurance to FDACS and to Florida's citizens that agricultural BMPs are being implemented by producers. Emphasis was given to BMP implementation verification in 2016 legislation (Chapter 2016-1, Laws of Florida) and among its provisions, this law requires enhancement and formalization of OAWP IV policies and procedures. The components of the revised IV program are 1) site visits; 2) common practices self-verification; 3) technical assistance; and 4) reporting. FDACS posted the first annual report on the status of BMP implementation in Florida on July 1, 2018. As of April 2017, slightly more than half of the identified agricultural acres in the State were enrolled.
in the BMP program, and BMP implementation was verified on nearly 75% of these operations. Of the enrolled operations, producers are implementing applicable practices at a high rate – more than 99%.

Following up with agricultural producers on the implementation of BMPs provides feedback on producer understanding of the BMPs, whether and how well the practices are being conducted, educational needs, and potential weaknesses in the drafting or content of the manuals. It also helps identify operations that have gone out of production, reduced production acreage, or had changes in agricultural activity. The annual report may be accessed at: www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy.

**BMPs and Beyond**

The implementation of agricultural BMPs is based on a watershed approach; collective implementation of applicable BMPs within a watershed addresses agricultural nutrient loadings as a whole. The FWRA provides that where water quality problems continue despite the appropriate implementation of BMPs (whether agricultural or urban), the BMPs are to be re-evaluated and revised if necessary, with a reasonable time-period allowed for implementing the revised practices.

FDACS re-evaluates and revises its BMP manuals as needed, to incorporate new practices and technologies. FDACS has revised several original BMP manuals and will continue to refine these into the future.

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Reference:

Thomas, M.T., and N.O Baily (2016). *Development and initial verification of effectiveness for agricultural best management practices (BMPs) in Florida*. Presented at the ASABE annual international meeting in Orlando, FL.