Best Management Practices (BMPs) Regulatory Program

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Agenda

- What are “best management practices” (BMPs)?
- Why is there a BMP regulatory program in the EAA?
- How are BMP Plans and Discharge Monitoring Plans verified?
- Program performance – How is the Basin doing?
373.4592 Florida Statutes:

A practice or combination of practices determined by the South Florida Water Management District, in cooperation with the Florida Department of Environmental Protection, based on *research, field-testing, and expert review*, to be the *most effective* and practicable, *including economic and technological considerations*, on-farm means of improving water quality in agricultural discharges to a level that *balances water quality improvements and agricultural productivity*. 
The Everglades Ecosystem

- Natural drainage: Kissimmee River – Lake Okeechobee – Everglades – Florida Bay
- 1800’s – Drainage network for agriculture, flood control, and development
- 1988 – Conflicting priorities and lawsuits
- 1994 – Restoration plan is defined (Everglades Forever Act)
BMP Regulatory Program

- Permit for P discharges into SFWMD canals:
  - Comprehensive BMP Plan
  - Discharge Monitoring Plan
  - Training

- BMP research through EAAEPD

- EAA Basin Performance
  - District monitoring
  - Tracking trends
Comprehensive BMP Plans

- Nutrient Management
  - Fertilizer spill prevention
  - Fertilizer in root zone
  - Restricted Placement of Feeders

- Particulate Matter and Sediment Control
  - Systematic canal/ditch cleaning
  - Barrier upstream of structure
  - Forage Growth

- Water Management
  - Rain Gauge
  - Control structure
  - Staff Gauge
BMP Site Verifications

- **Prior**
  - Review permit, BMP annual report, previous visit reports, operation criteria, and farm data
  - Contact landowner or entity – Site verification checklist

- **During**
  - Review documentation
  - Field observations

- **After**
  - Follow up – Pending information or questions
  - Report (including recommendations, if applicable)
Nutrient Management BMPs

- **Objective**
  - Import only the amount of P necessary for the intended crops and at the intended location

- **Nutrient Management BMPs**
  - Nutrient Application Control
  - Nutrient Spill Prevention
  - Soil Testing
  - Split P Application
  - Slow Release Fertilizer
Nutrient Application Control

Banding (sugarcane & vegetables)

Vegetable Fertilization
(mulched beds)

Side dressing (ratoon & corn)

Pneumatic applicator (corn & sod)
Nutrient Spill Prevention
BMP Documentation

- **Nutrient Spill Prevention**
  - ✔ Formal Spill Prevention Protocol
  - ✔ Training attendance sheets
  - ✔ Record of spills reported

- **Nutrient Application Control**
  - ✔ If contracted, applicator invoices identifying fertilized areas, crop, and application method

- Observation of nutrient application and spill prevention practices by District staff typically occurs every three years or if there is a change to your applicator
Goal: Avoid excess P application by determining soil P levels and following recommendations

- Collect samples and review results and recommendations prior to P application
- Establish the P content of each of the materials to be applied (e.g., commercial fertilizers, soil amendments, compost, biosolids, etc.)
- Ensure total P application rate does not exceed the recommendation
- Where P application rate differs from soil test recommendations, keep notes on the logic for the difference
Laboratories use different methods (extractants) to determine soil P levels.

The use of the appropriate extrantant reduces the potential for over-application.

Ensure that the laboratory uses an extractant method representative of your soils and crops.

The goal is to provide recommendations based on yield response curves developed by correlating laboratory-measured soil P levels with yield responses measured in the field.
Soil Test BMP Documentation

- **Important:** This information is necessary for all lessees, even if they are short-term
  - Crop types and acreages
  - Soil sample analysis results
  - Recommended P application rates for each crop
  - Actual P application rates for all materials (i.e., fertilizer delivery receipts)
  - Technical basis if the recommendations are exceeded or if they exceed standard recommendations (e.g., crop response curves)

- Specific considerations for organic amendments may be needed. Requirements may vary based on the source, amounts applied, water quality, etc.
Water Detention

- Delayed discharge based on established criteria
  - Measuring daily rain events using a rain gage
  - Monitoring drainage canal elevations
- When multiple permittees within a Basin ID, each permittee is responsible for BMP implementation
- It allows for:
  - Runoff retention, and
  - Settling out of suspended solids
- Typical: 0.5 or 1.0 inch of rainfall
Detention plots – Tool to depict daily rainfall and flow

- Did discharges occur after the rainfall detention level was met?

Pump logs – Review includes:

- Were start elevations met?
- Were stop elevations met?
- Were deviations because of critical activities and were they in accordance with critical elevations?
- Are appropriate comments included for deviations?
- Are deviations recurring, suggesting that the water detention BMP cannot be consistently achieved?
Field Observation

There may be instances in which verification of staff gages being relative to each other is needed.
Particulate Matter and Sediment Controls

Objective:
Minimize the movement off-site of P in particulate matter and sediments by controlling the amount of eroded soil and plant matter in discharges.

Particulate P sources:
- Soil and plant material transported into ditches and canals
- Canal sediments and plants growing in ditches and canals

Implement Erosion Control Practices

Reduce sediment and floating aquatic vegetation build-up in waterways
Particulate Matter & Sediment Controls

- Permits require between 4 and 6 practices:
  - Canal cleaning
  - Vegetation on ditch and canal banks
  - Ditch bank berms
  - Sediment sump in main canal and field ditches
  - Slow field ditch drainage
  - Leveling fields
  - Floating aquatic vegetation
  - Cover crops or flooded fields

- Practices are reported annually in BMP Annual Report
Particulate Matter & Sediment Controls

- Typically field verified, however, some practices require documentation (e.g., maps, work orders/invoices, photos)
- Practices are implemented consistently throughout the farm
- Important: Permittee is responsible for lessee’s implementation and documentation
Canal Cleaning and Floating Aquatic Vegetation (FAV) Control

- **Documentation**
  - ✓ Maps indicating dates and canal segments and ditches that were cleaned
  - ✓ If contracted, work orders/invoices
  - ✓ Criterion to determine cleaning needs and method
  - ✓ Important:
    - • Canal cleaning and pumping off-site at the same time is NOT a BMP
    - • Remove FAV mechanically, even if treated with herbicides
    - • Herbicidal control of FAV limited to spot spraying of weedy areas

- **Observation**
  - ✓ To verify methods and sediment disposal
  - ✓ Weed barrier location, FAV coverage at time of visit
Vegetation on Ditch and Canal Banks & Ditch Bank Berms

Observation

✔ Vegetated berms along canal banks
✔ Herbicide overuse can kill canal vegetation causing soil erosion
Sediment Control Practices

- **Leveling fields** – Work orders/invoices, maps

- **Sediment sump upstream of discharge structure** – Field observation; maintenance records (maps)

- **Field ditch drainage sump** – Field observation; consistently implemented throughout the farm
Sediment Control Practices

- **Slow field ditch drainage** – Field observation of culvert with risers (i.e., boards on)

- **Cover crops or flooded fields**
  Maps, work orders/invoices (e.g., cover crop seeds).
  No P is applied to cover crops
  Runoff from flooded and rice fields is not pumped directly off-site
Nutrient spill prevention: Protocols are up to date

Controlled application: Periodic field observation verifies implementation

Soil Testing: Proper methods and technical documentation. Application recommendations for P buildup or maintenance do not meet the goal of this BMP

Water management: Pump logs include appropriate comments when deviations occur. Follow rainfall and elevation criteria

Particulate matter and sediment controls: Uniform implementation and timing

Overall: Permittee is responsible for appropriate implementation by staff, contractors, and lessees
P concentration, flow, and load are reported electronically

Goal – Verify P loads are accurate:
- Equipment (autosampler, rain gage, staff gages)
- Flow verification
- Water quality submittal (up to date)
- Water quality audits (annually)

Laboratory results may be requested to verify consistency with levels reported

Site visits also include review of water quality data (e.g., trends, comparison among farms, etc.)

In cases where a relationship between P levels and farm activities is observed, refinement in BMP implementation may be needed.
Water Quality Permittee Data

Rain-Adjusted Unit Area Load (RAUAL) Summary Graph

TP Concentration Summary Graph

Flow (MGD)

DAILY FLOW

CONCENTRATION
TP data collected at EAA outflow points represent total TP load leaving the EAA

A mathematical model is used to calculate EAA runoff representative of permittee discharges from EAA. The model excludes inflow loads passing through from Lake Okeechobee and other sources (298 diversion areas and C-139 Basin)

EAA Basin compliance is based upon the entire EAA Basin runoff load for current water year vs. rainfall adjusted base period runoff load

EAA Basin runoff load requirement is to reduce at least 25% from the base period load, adjusted for rainfall
EAA Map of Inflows and Outflows
EAA Basin Historical Performance

Baseline Period (WY1980-1988)
Rainfall Adjusted Predicted Load: 206 mt

WY2016
TP Load Reduction: 27%
Measured TP Load: 151 mt

25% TP Load Reduction Requirement (Target)

TP Load Reduction from Base Period (%)
-50% -25% 0% 25% 50% 75% 100%

First Compliance Year
Pre-BMP Implementation
Partial BMP Implementation
Full BMP Implementation

Annual % TP Load Reduction
5-year TP Load Reduction

Load Reduction
Load Increase
Summary

- The BMP Regulatory Program continues to meet water quality requirements with a long-term reduction of phosphorus in runoff averaging 55%.
- The Program provides legally defensible verification of performance based on BMP implementation, field and records verification and water quality monitoring.
- Ongoing implementation is essential as the program is the keystone of one of the biggest restoration projects in the world.

*** ¡And your role is key to program success! Thank You! ***
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Questions?