Water Management:
Rainfall Detention and Farm Drainage

Everglades Agricultural Area (EAA)
BMP training

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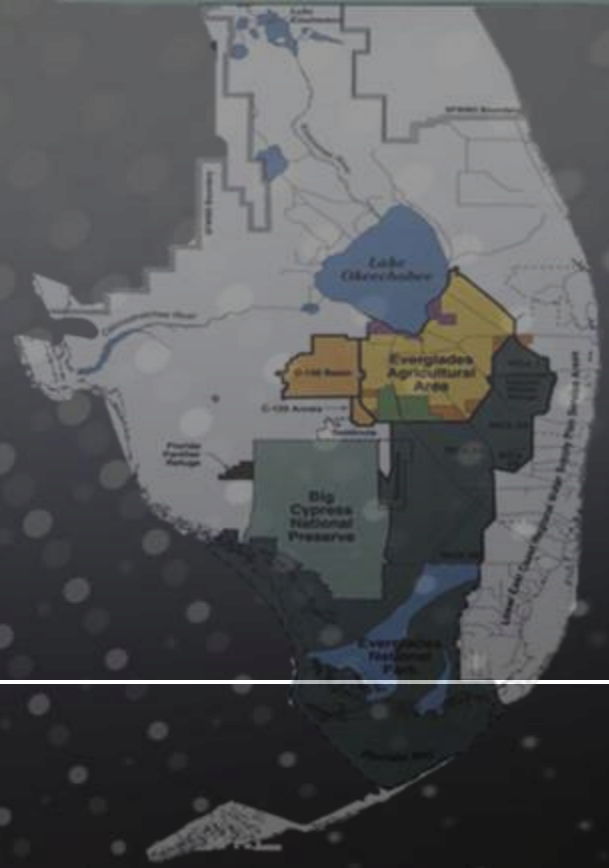
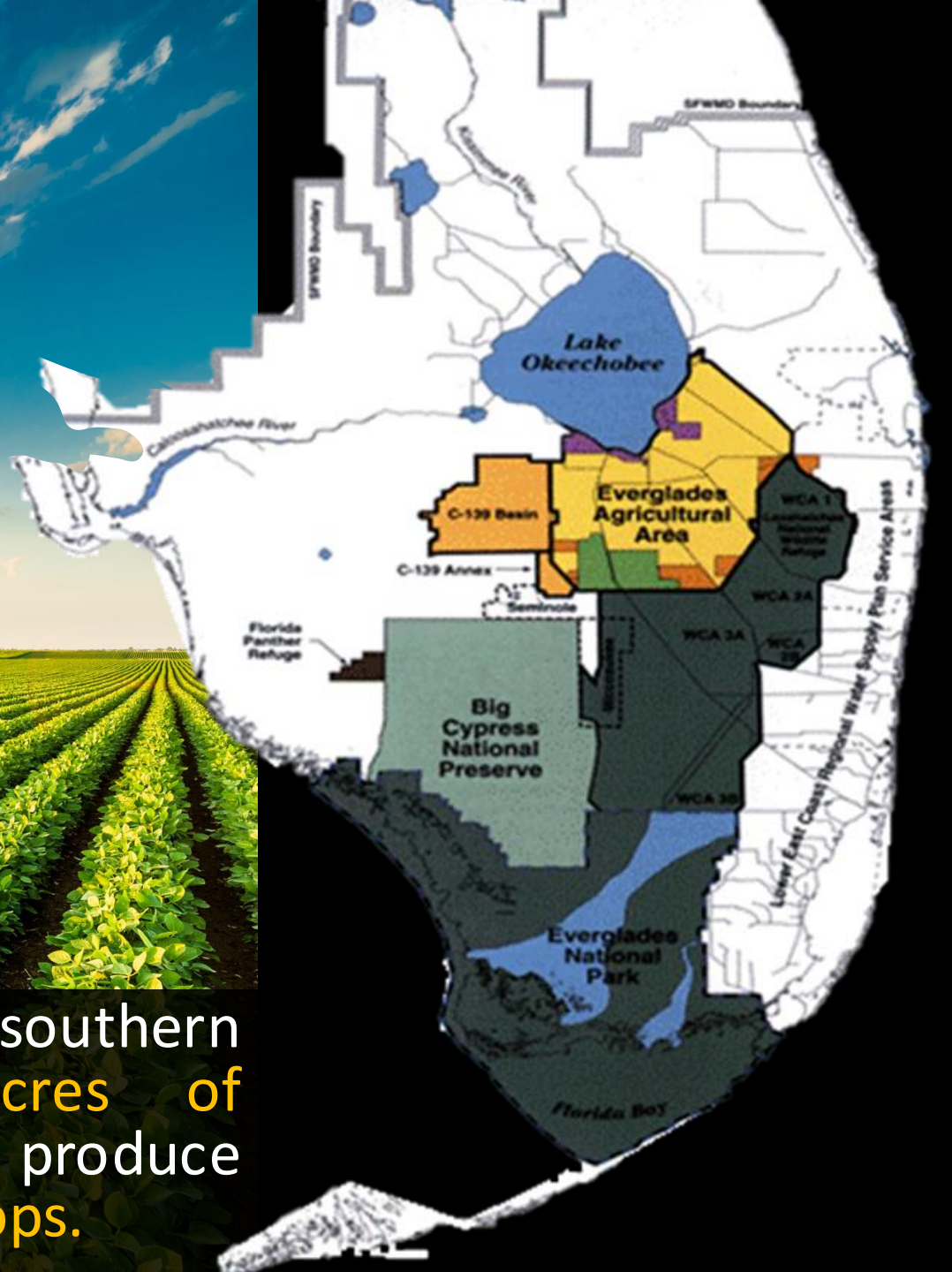
Overview:

- Introduction
- Definitions
- P characteristics
- Field Drainage Process
- Farm P Load
- Water detention methods

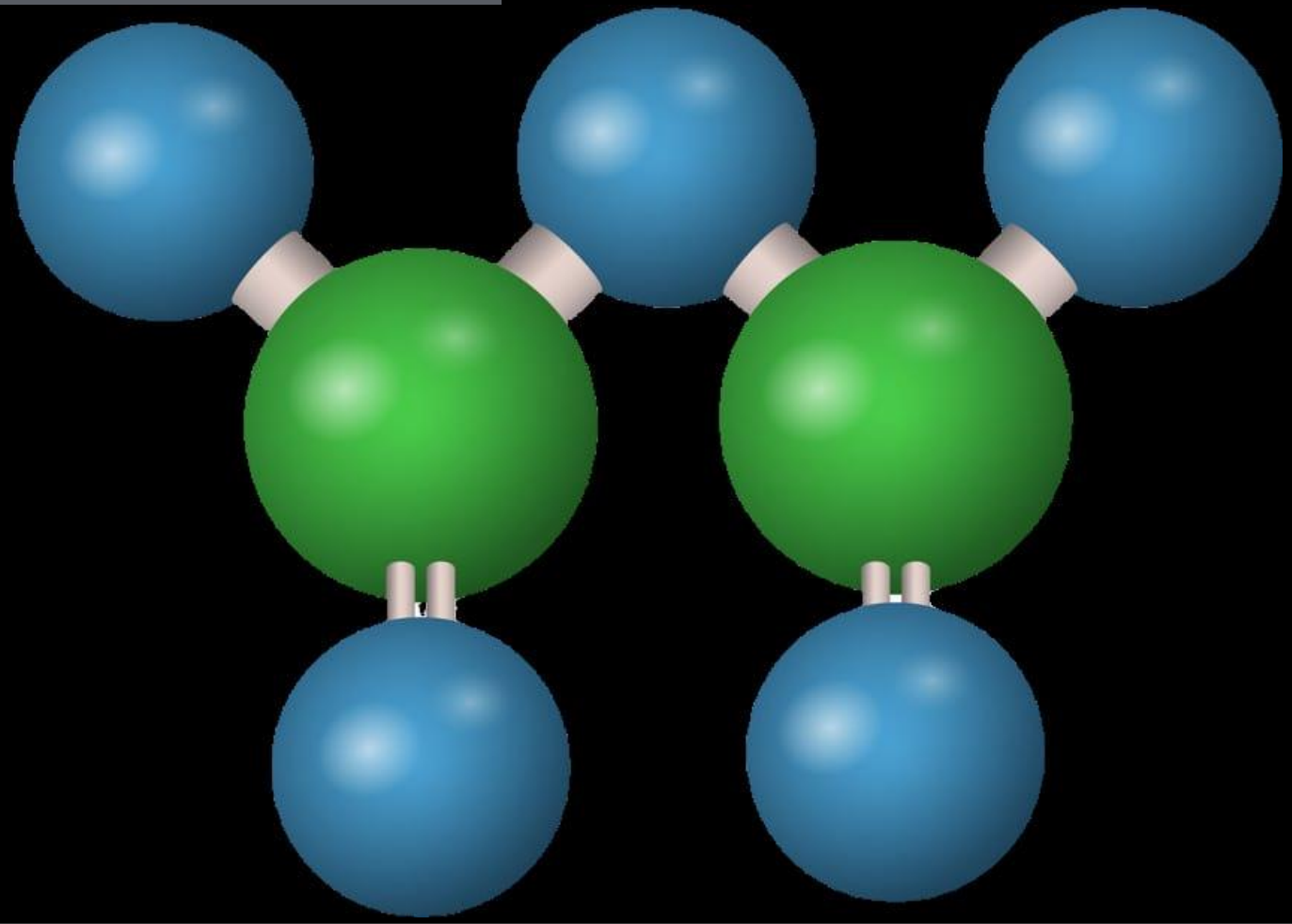


Introduction



- The Everglades Agricultural Area (EAA) in southern Florida covers approximately 470,000 acres of agricultural land , mainly dedicated to produce sugarcane, winter vegetables, rice, and other crops.

Introduction



Phosphorus (P_2O_5) is essential for the growth of most crops.

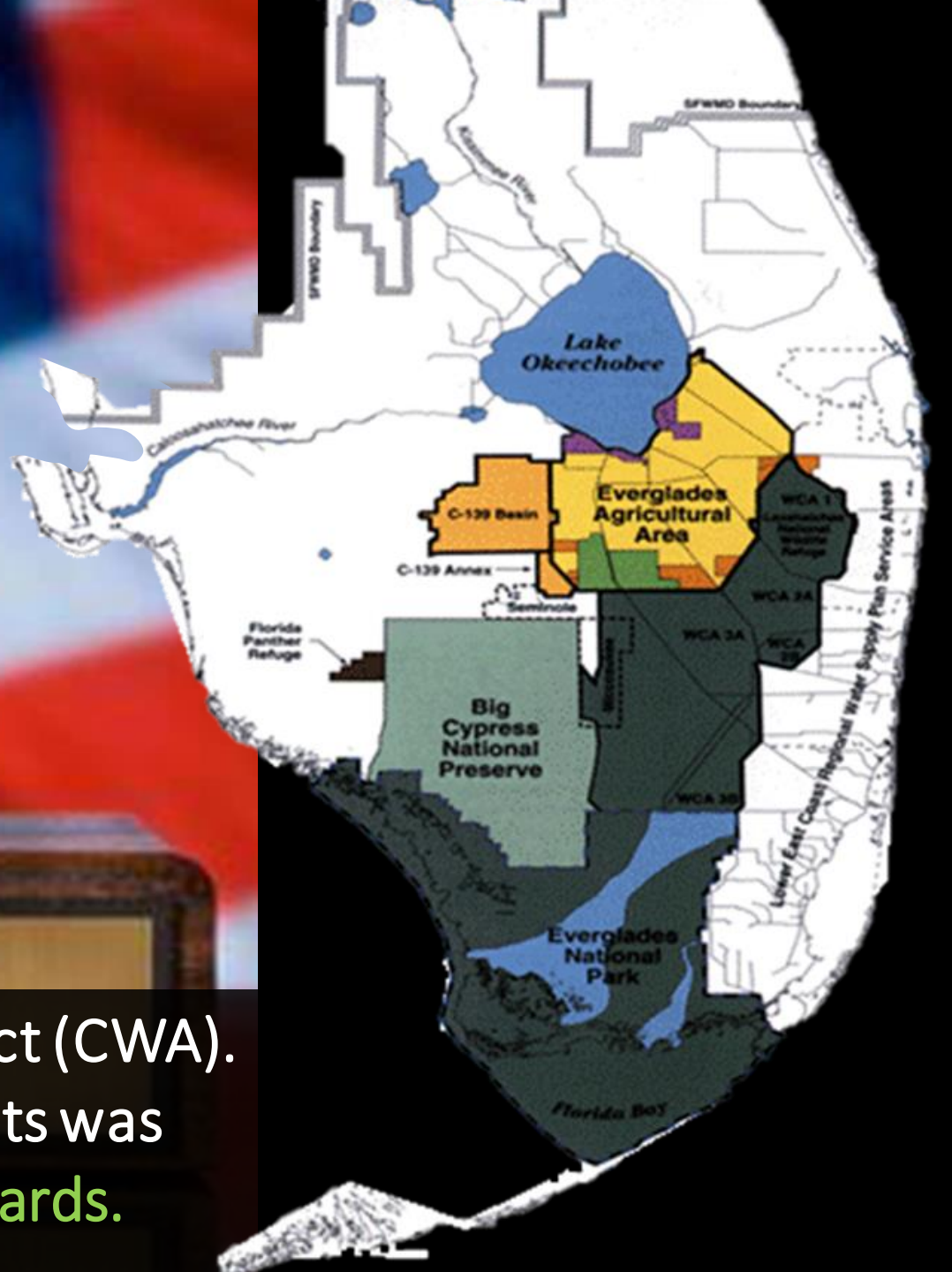
- Generally, crops that have extensive root systems
- Or are grown for their fruits, seeds, or tubers require phosphorus.

For example:

- Corn
- Rice
- Beans
- Radishes
- Lettuce
- Watermelons
- Sugarcane

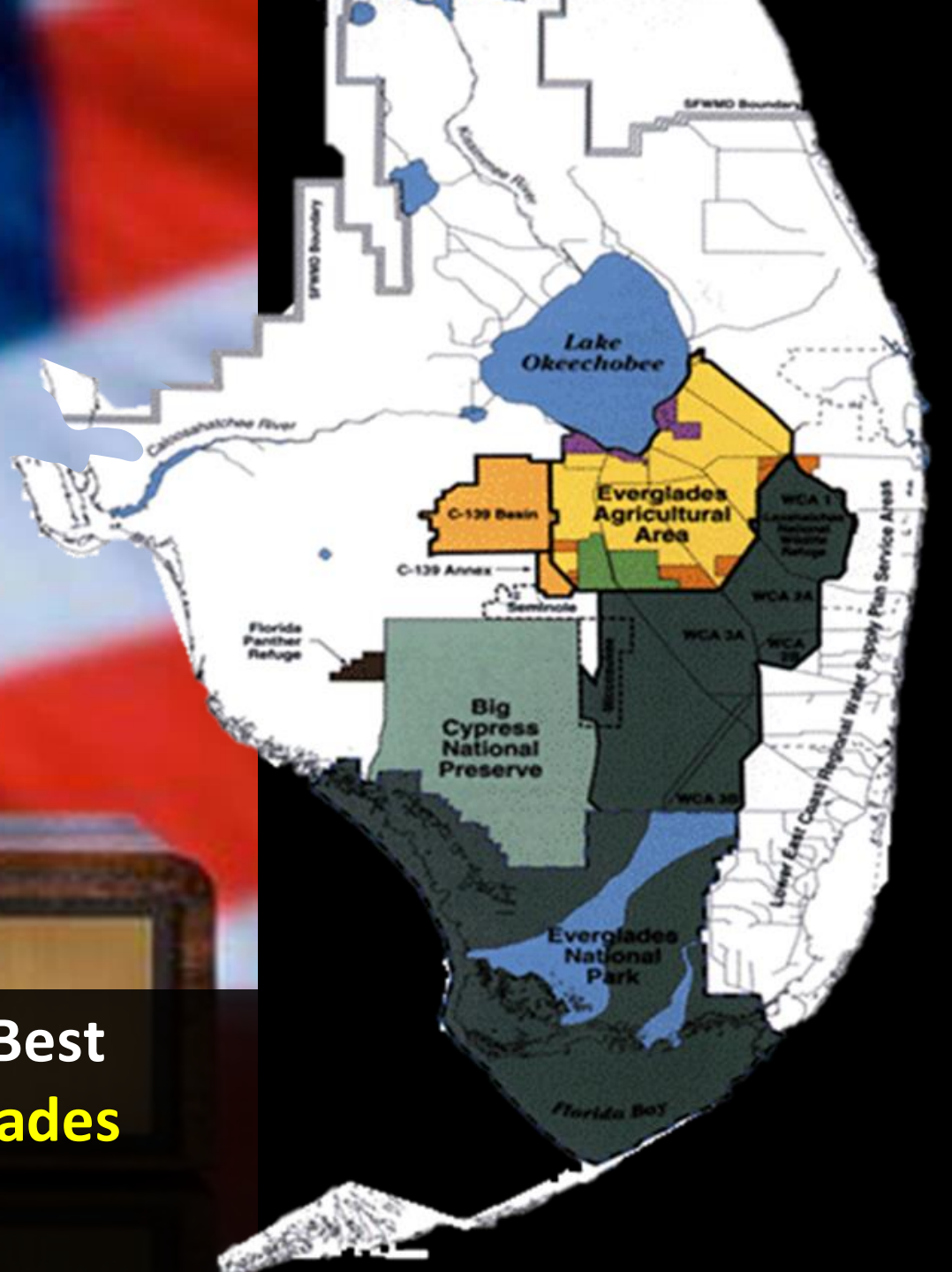
- **Adequate phosphorus availability is critical for maximizing crop yield and quality.**
- **It promotes robust root systems, which enhance nutrient and water uptake, leading to healthier plants and increased productivity.**

Introduction



In 1972 The congress approved the clean water act (CWA). A total maximum daily load (TMDL) of pollutants was established to ensure the water quality standards.

Introduction



In 1995, **the collective implementation** of Best Management Practices (BMP) **in the Everglades Agricultural Area (EAA)** began.

Definitions

TMDL:

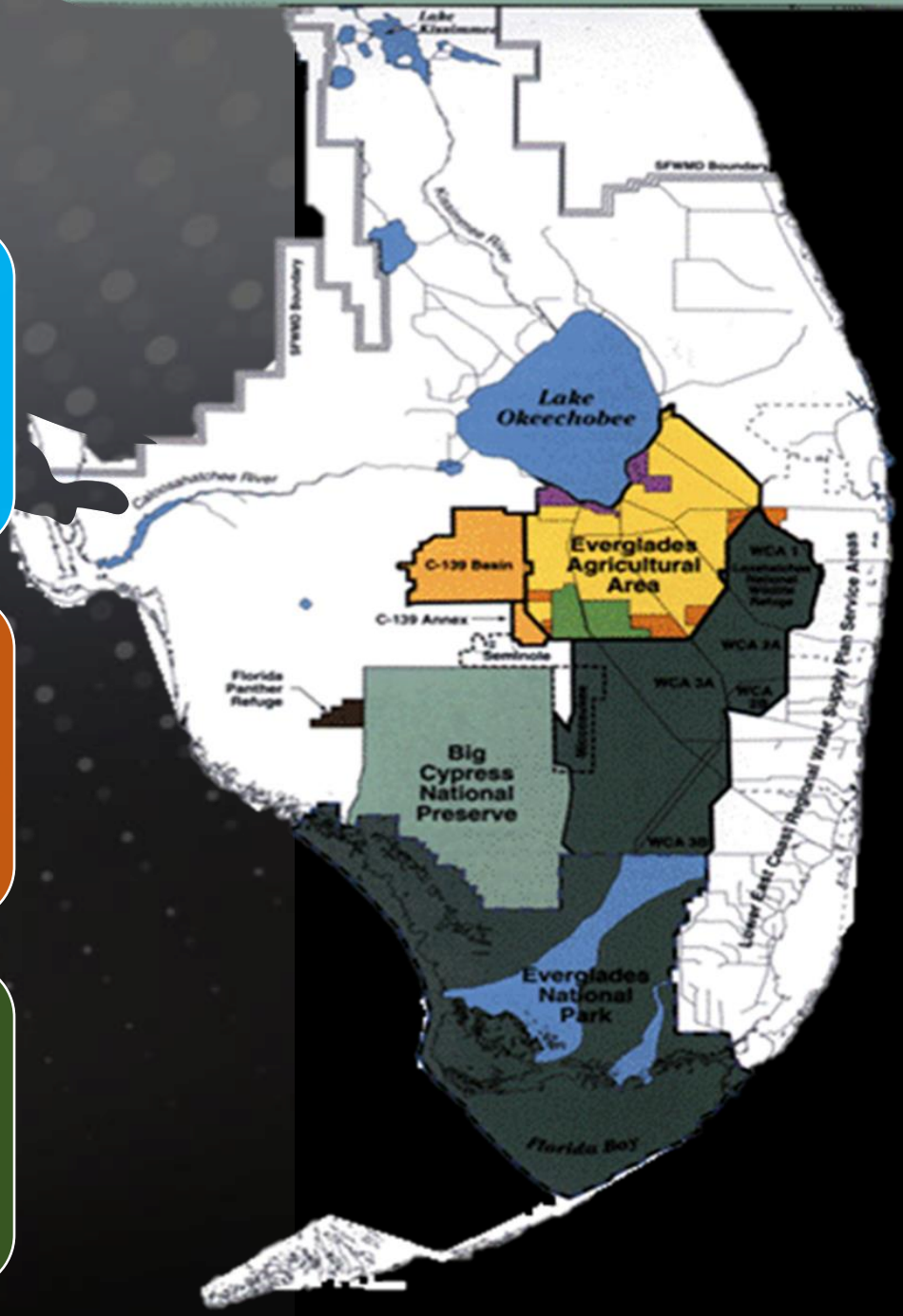
Total Maximum Daily Load. is the calculation of the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards for that particular pollutant.

Detention:

Temporarily holding water until conditions for release are met; the objective is to control discharge rates to reduce impact on downstream receiving systems.

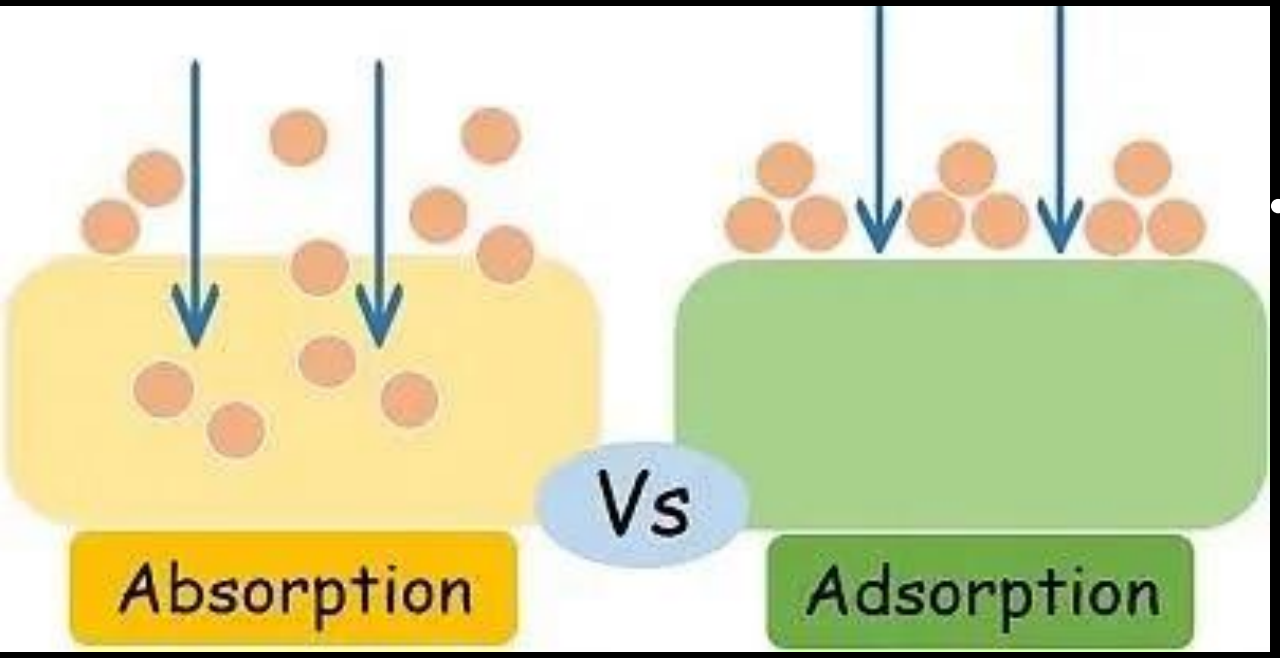
Retention:

Preventing water from discharging into receiving waters; water is held until it is lost to percolation, evapotranspiration (ET), or evaporation.



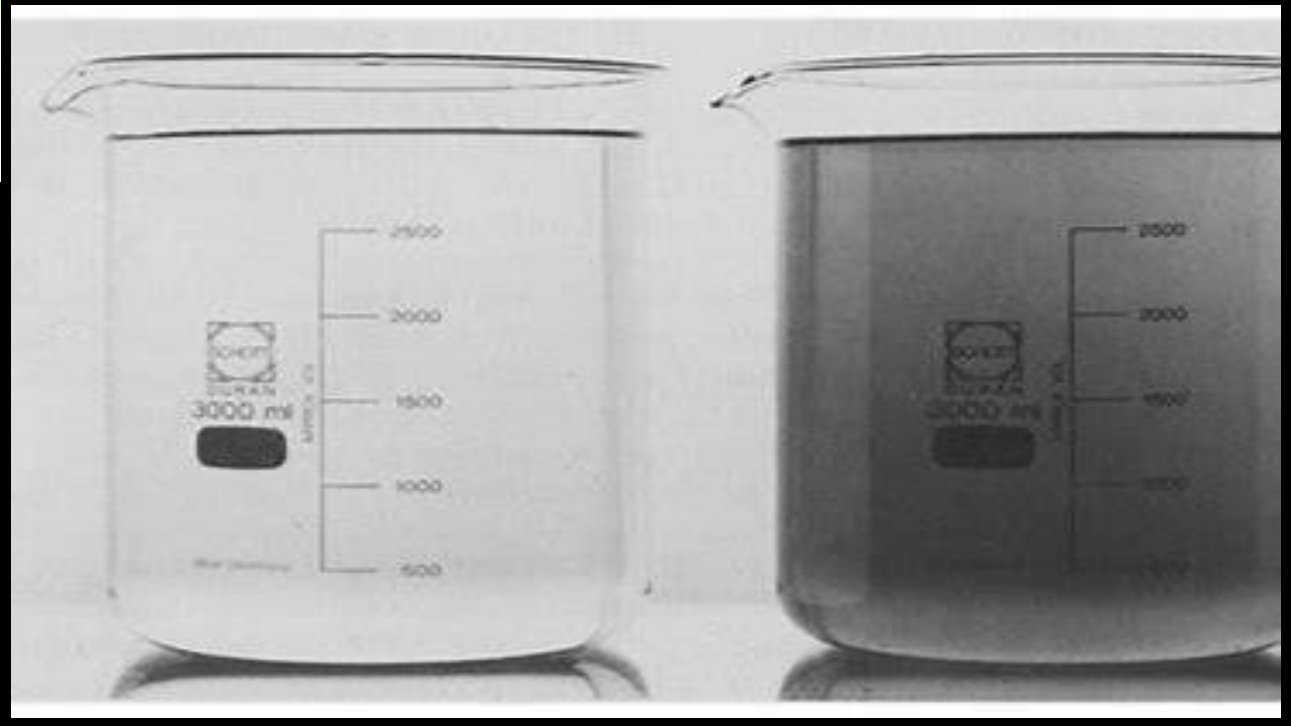
P characteristics

Phosphorus particulate matter can undergo processes of adsorption and desorption.



Depending on environmental conditions.

- In soils, phosphorus can **adsorb** onto soil particles, reducing its availability for plant uptake but **increasing its potential for transport** during runoff events.



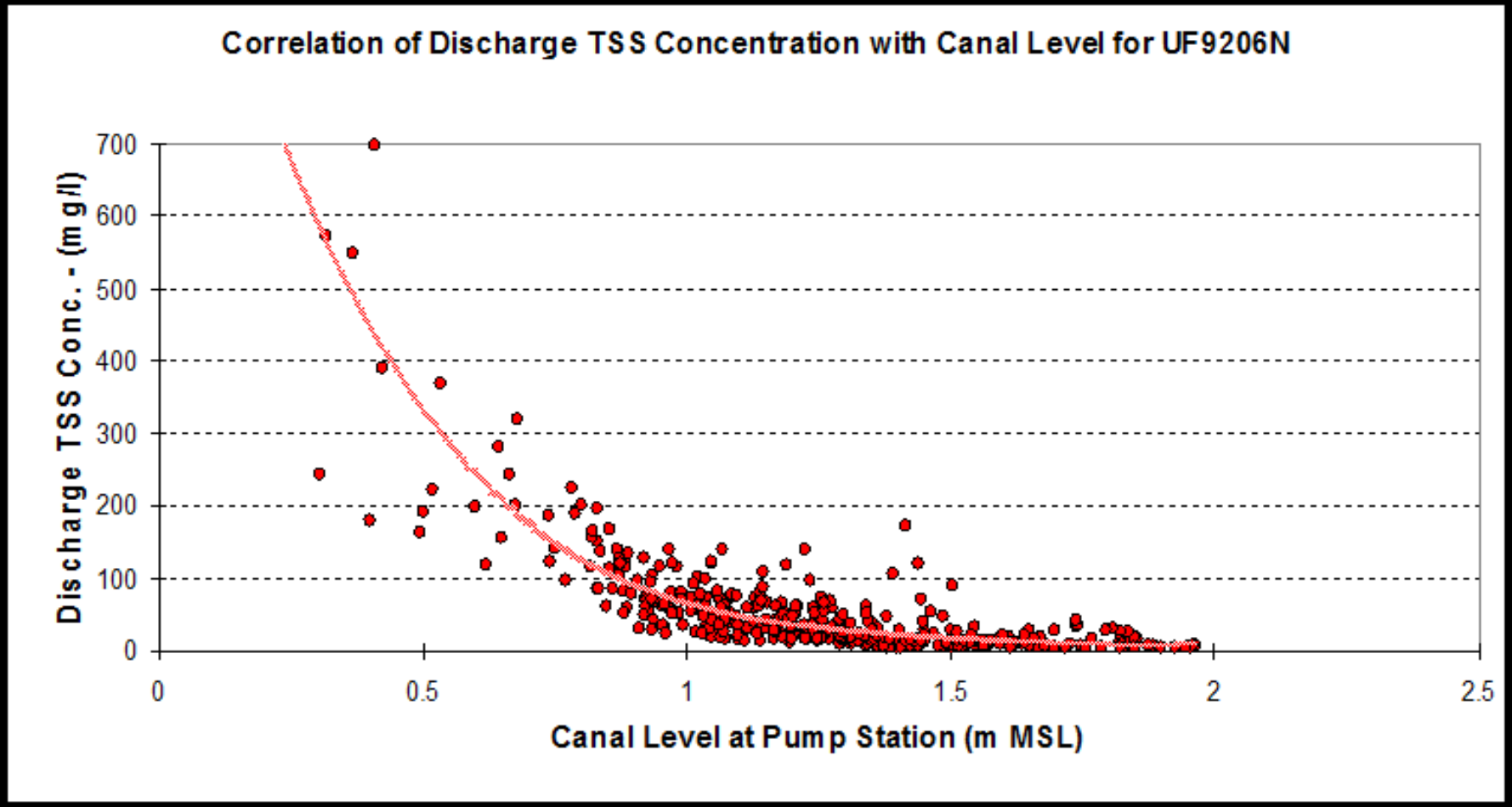
- In the other hand, under certain conditions such as changes in pH or the presence of **dissolved organic matter**, phosphorus can **absorb** soil particles, becoming more mobile in the environment.

What's a main cause of high dissolved organic matter in water samples?

P characteristics

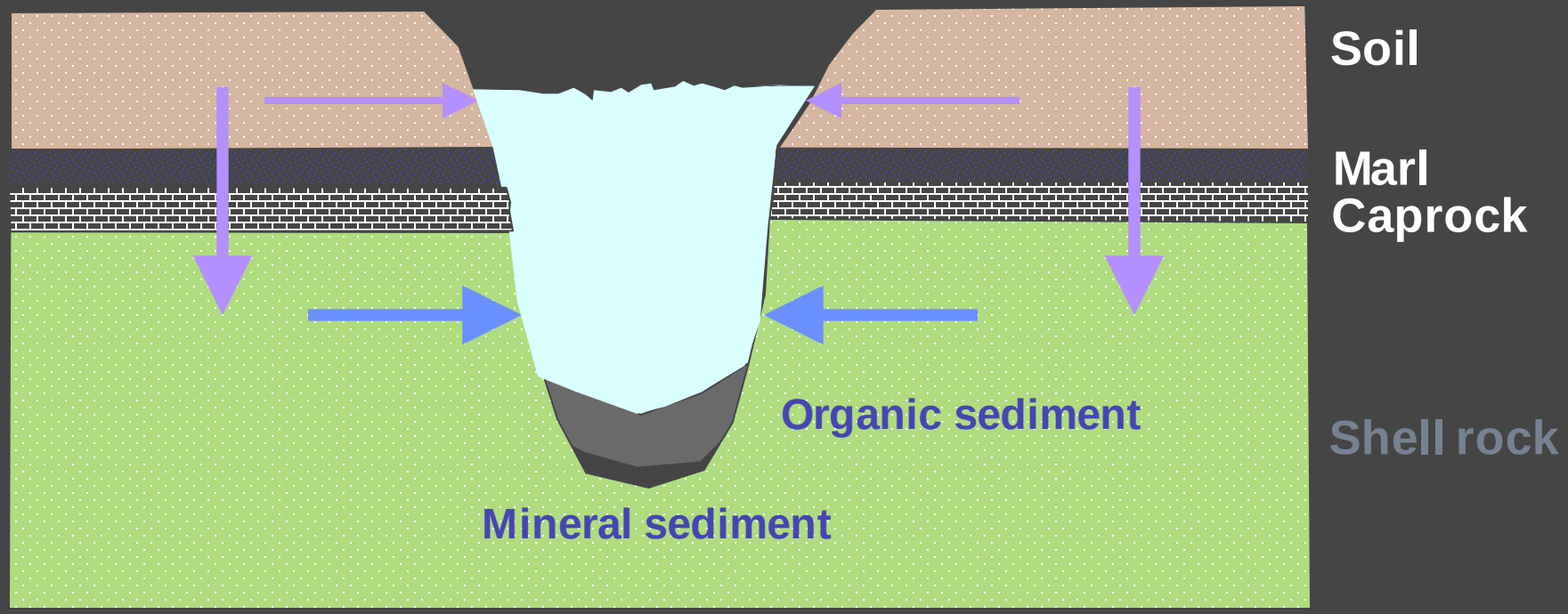
What's a main cause of high dissolved organic matter in water samples?

When we reduce the canal elevation at a constant drainage flow rate.



Field drainage process

Field Drainage Process



velocity = (drainage flow rate)/(canal cross-sectional area)

ft/sec = (ft^3/sec)/(ft^2)

That is why it is important

not to pump beyond the

“Stop Elevation”

Field drainage process

$(10\ ft^3/s) / (10ft^2) = 1\ ft/s$

$(10\ ft^3/s) / (5ft^2) = 2\ ft/s$

$(10\ ft^3/s) / (1ft^2) = 10\ ft/s$

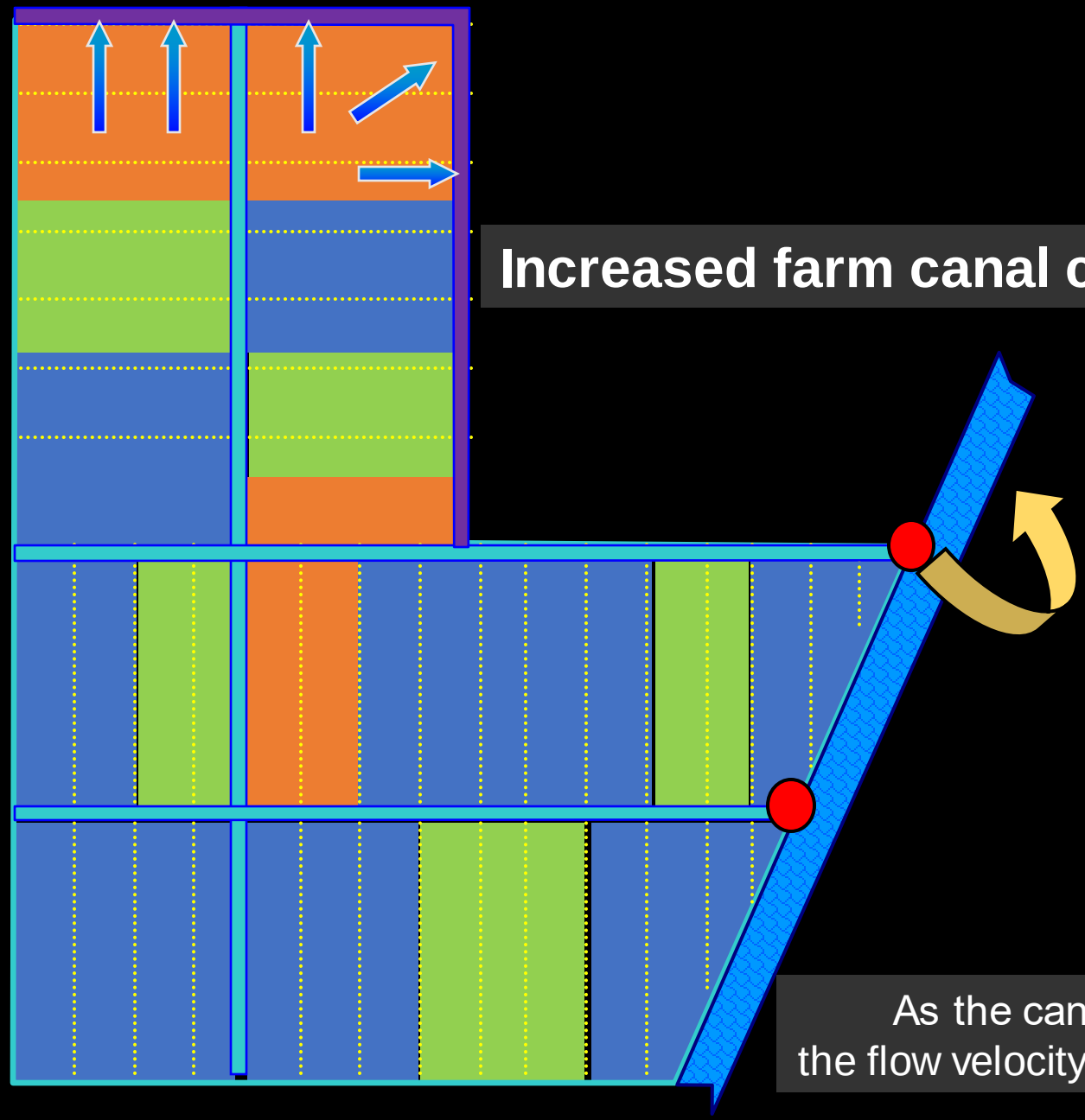
velocity = (drainage flow rate) / (canal cross-sectional area)
velocity = (Pump RPMs) / (Staff gauge elevation)

Water detention methods

Sod

Leaf

Cane



Increased farm canal capacities

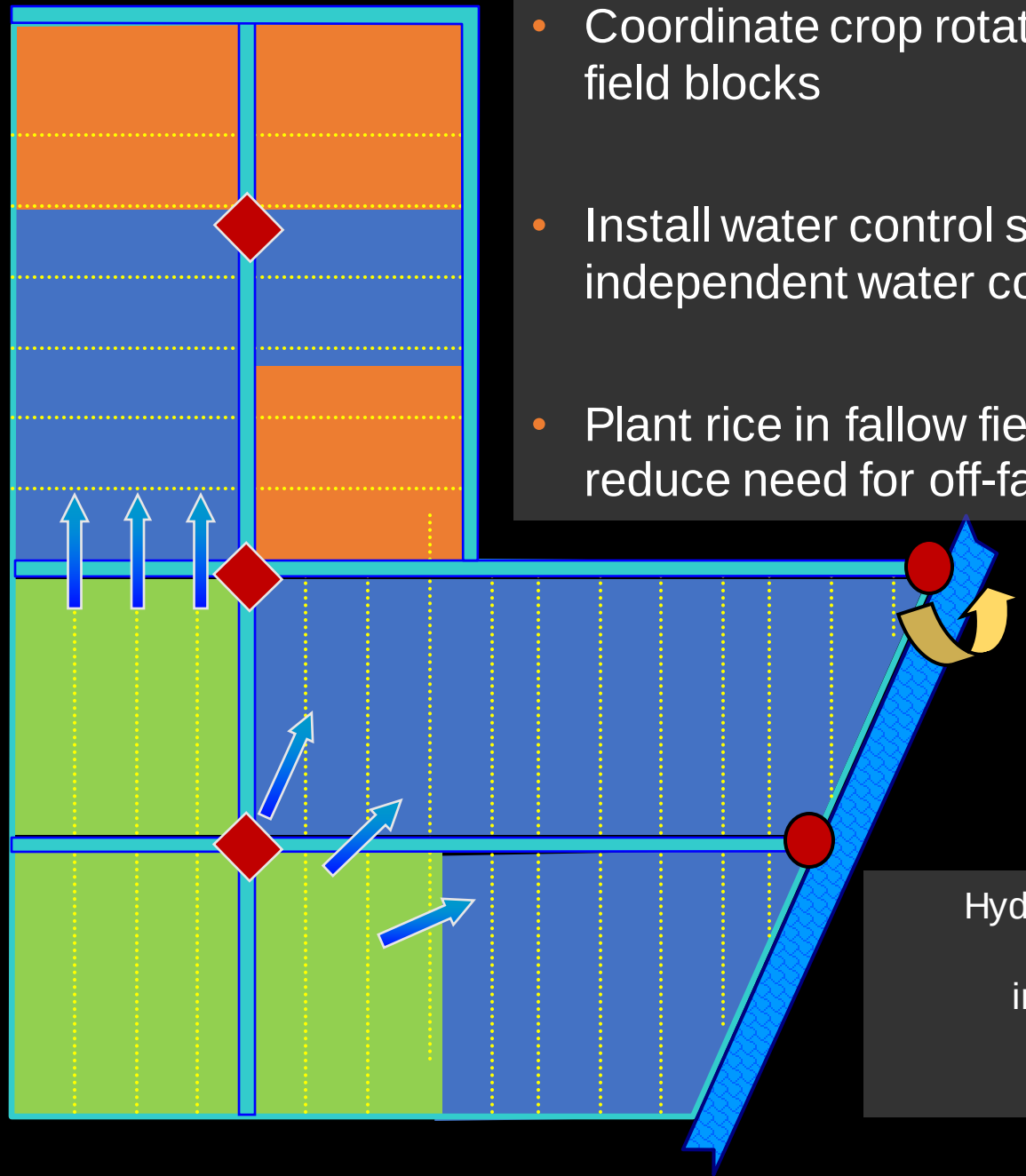
As the canal's capacity increases,
the flow velocity decreases = **Lower P loads**

Water detention methods

Sod

Leaf

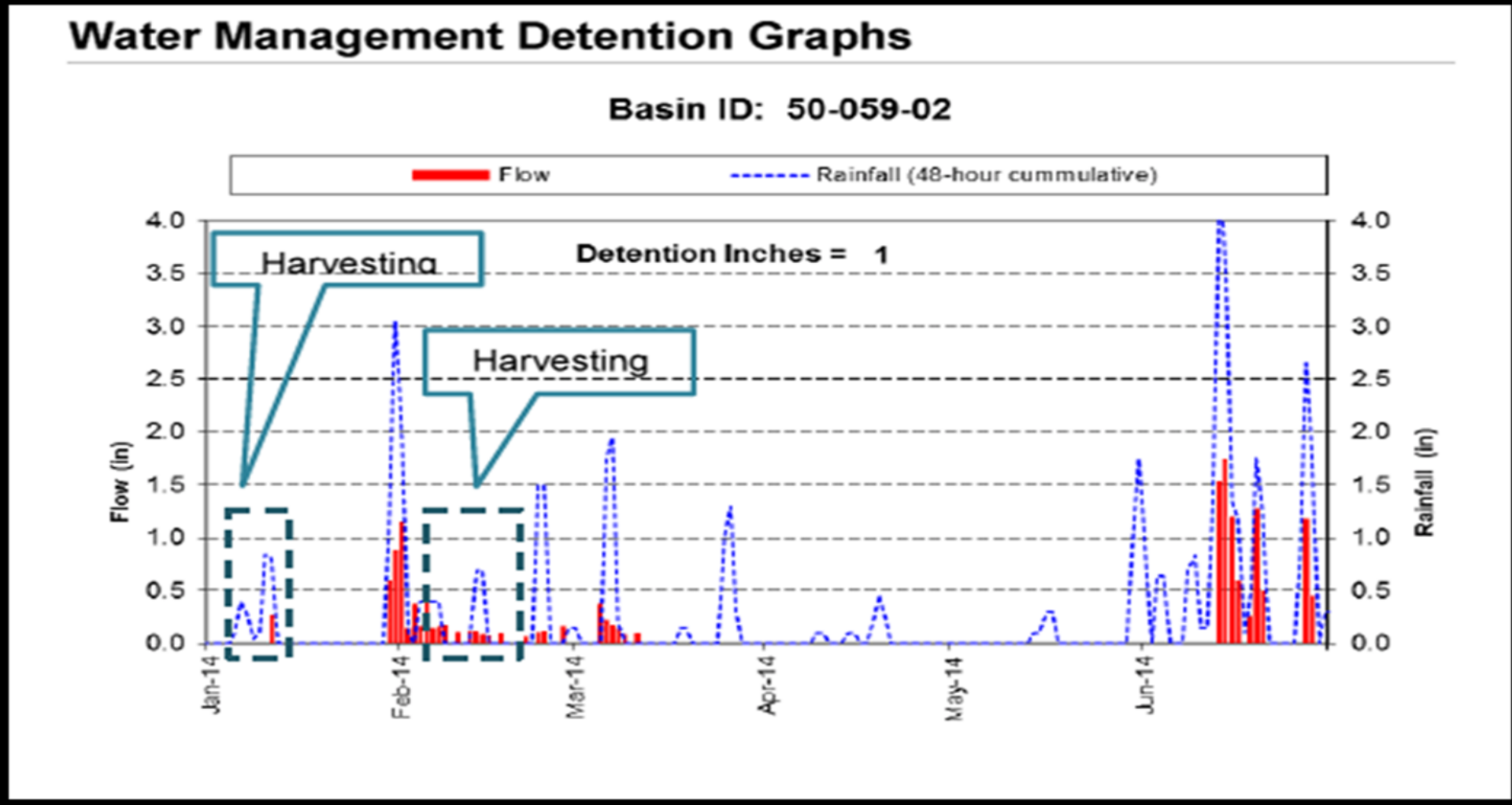
Cane



- Coordinate crop rotations within contiguous field blocks
- Install water control structures to allow independent water control management
- Plant rice in fallow fields during wet season; reduce need for off-farm pumping

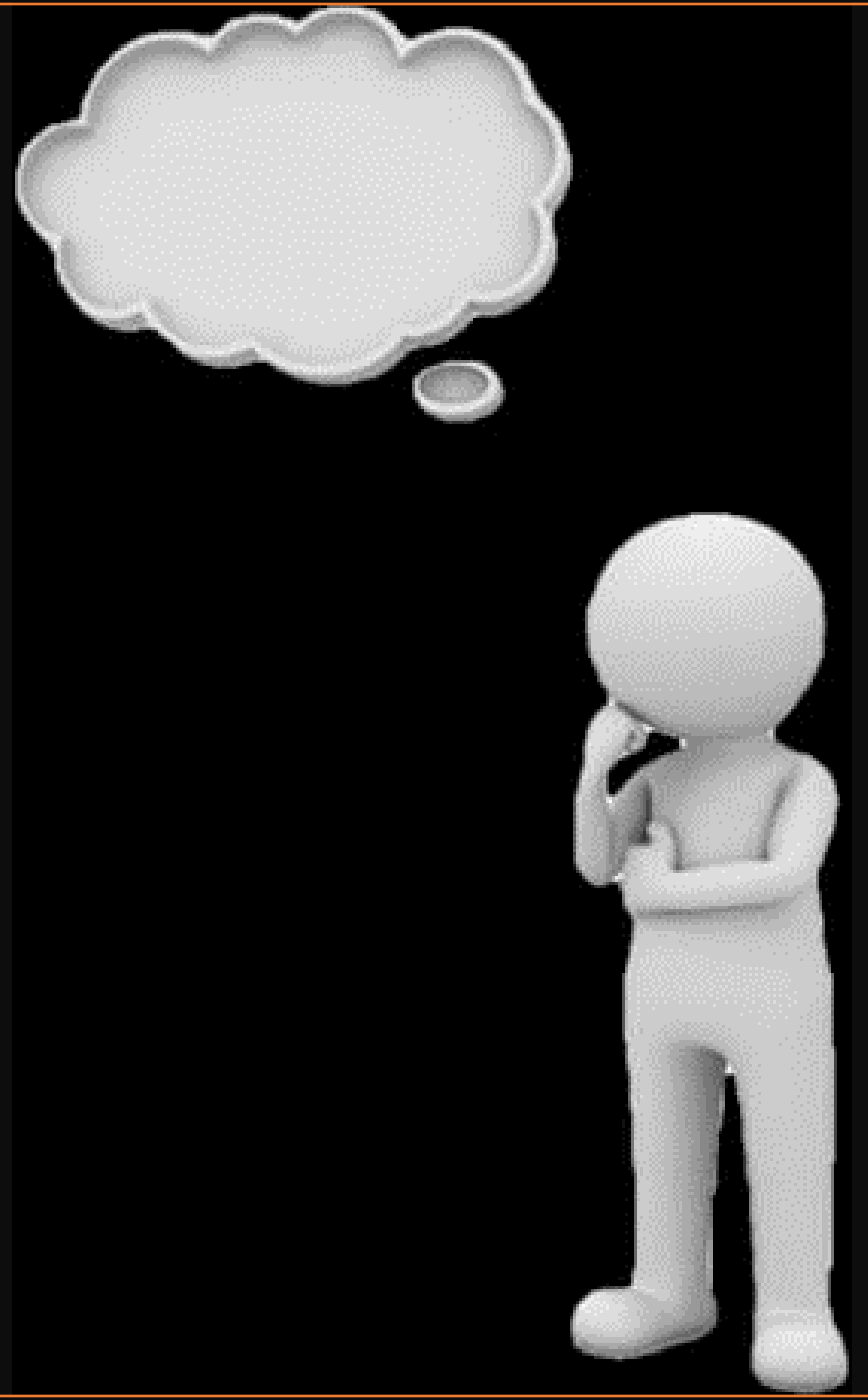
Hydraulic blocking of like crops
+
independent water control
=
Lower P loads

How does the South Florida Water Management District evaluate your pumping?

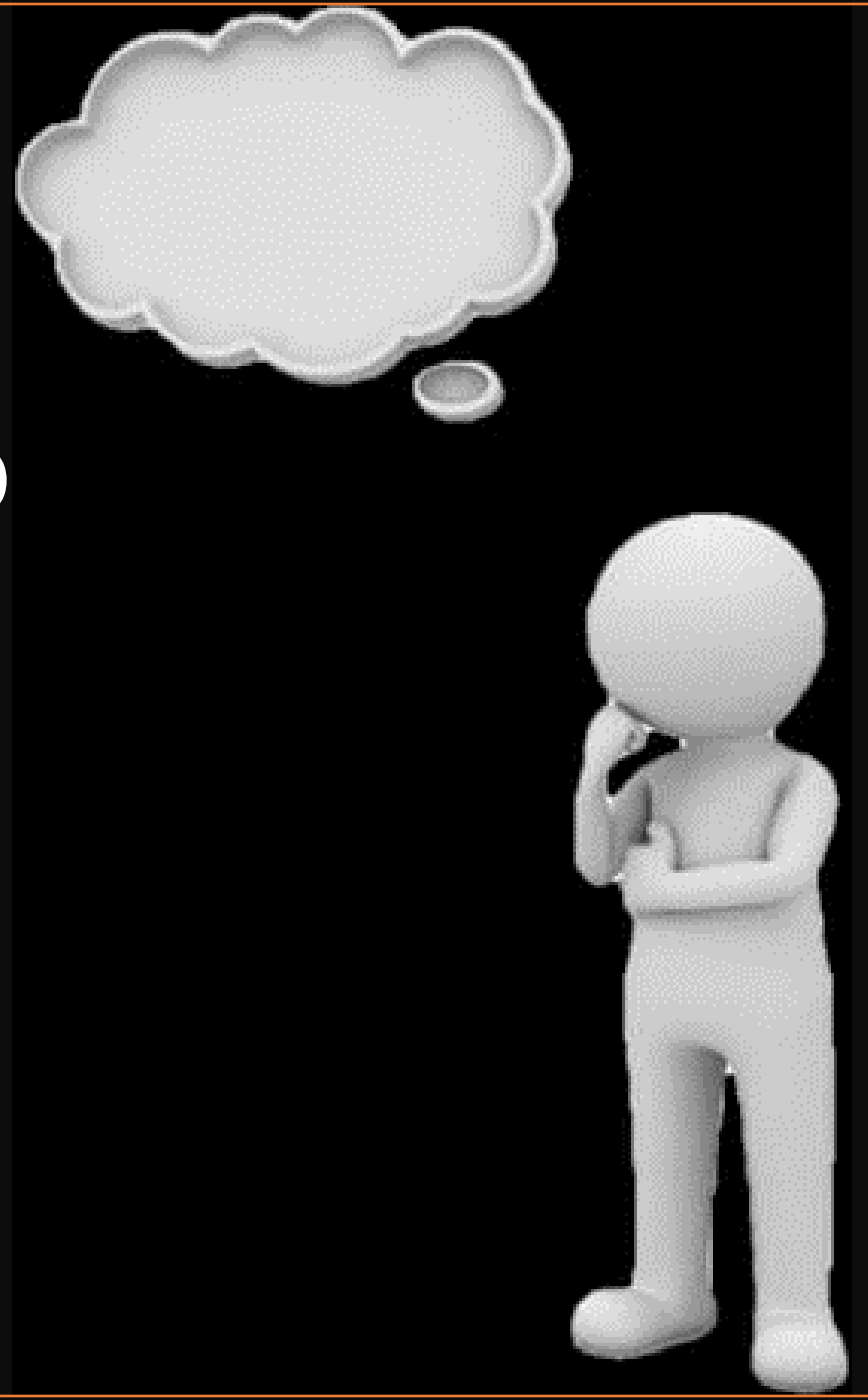


Why BMPs?

Because it is the law.



When can we pump?



When can we pump?

- 1 Inch (Most farms)
- ½ Inch (Some farms)

When can we pump?

- Named storm approaching

When can we pump?

- Start elevation reached.

When can we pump?

- Land prep

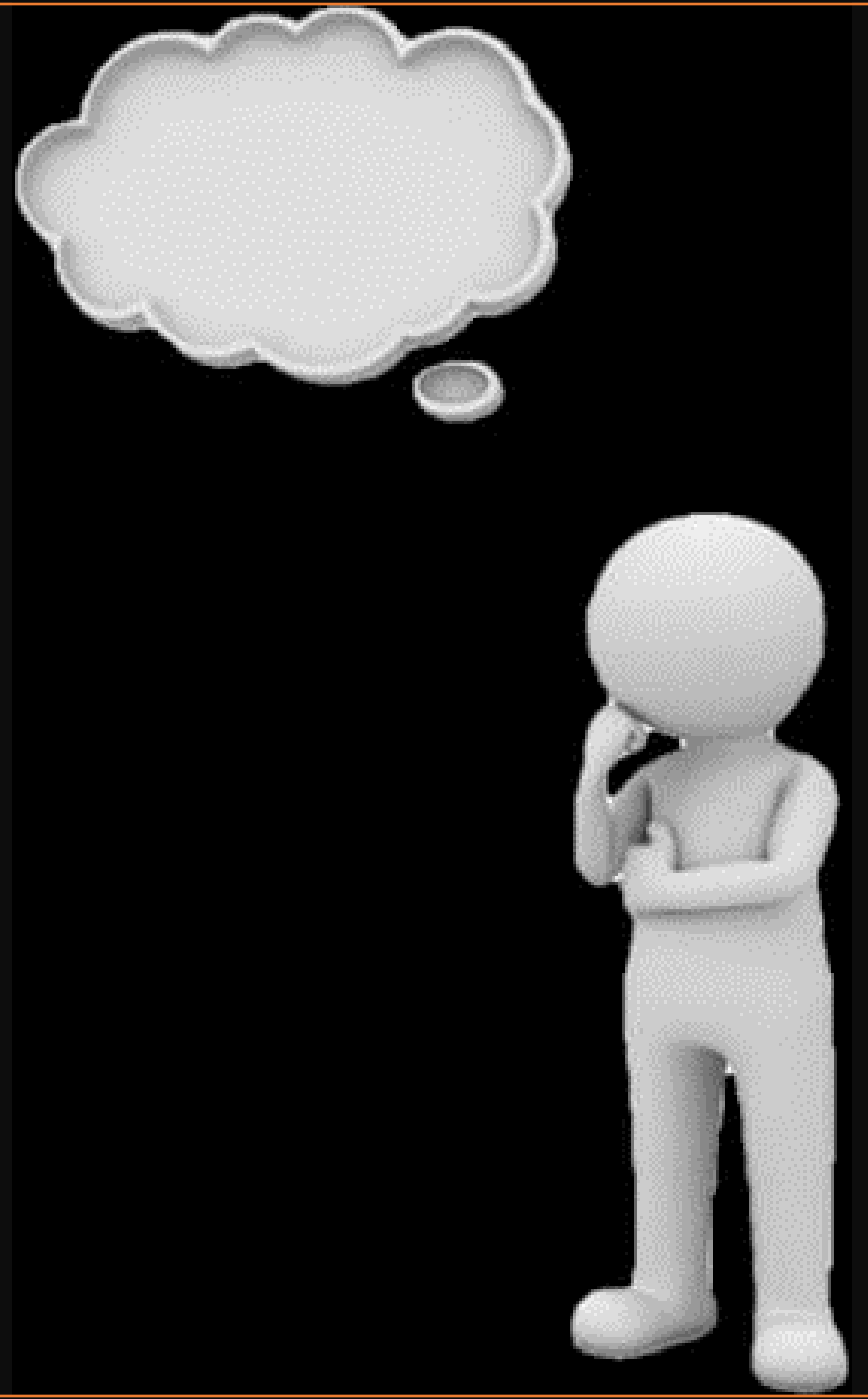
When can we pump?

- Planting

When can we pump?

- Harvesting

How?



How can we pump?

1. **Implementing a pumping protocol**

How can we pump?

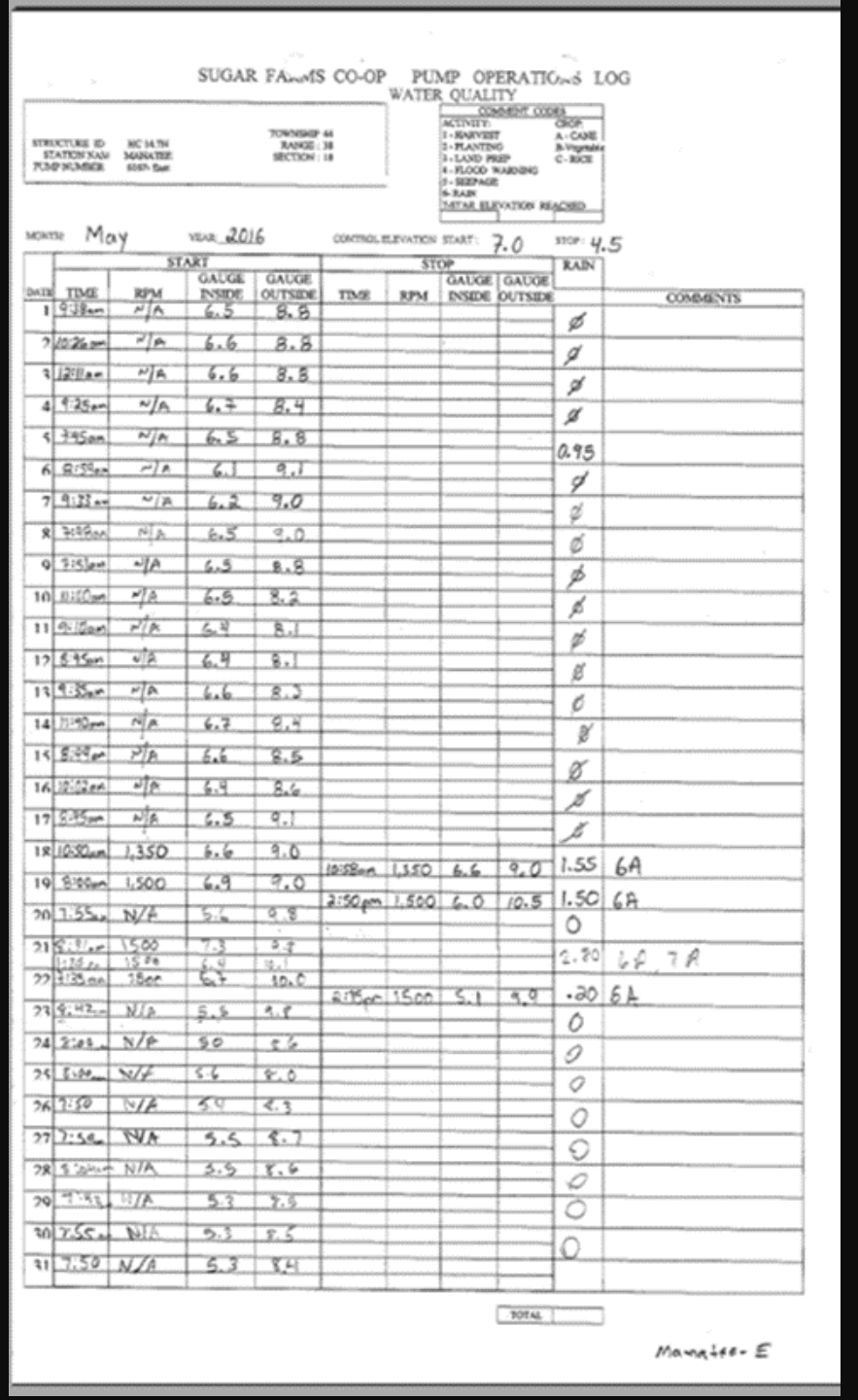
2. Monitoring water flow

How can we pump?

3. Monitoring the quality of water

How can we pump?

- **Filing data (PumpLogs)**



SUGAR FARMS CO-OP PUMP OPERATIONS LOG
WATER QUALITY

COMMENT CODES
ACTIVITY: 1 - HARVEST, 2 - PLANTING, 3 - LAND PREP, 4 - FLOOD WARMING, 5 - SEEPAGE, 6 - RAIN, 7 - TAIL ELEVATION REACHED
CROP: A - CANE, B - Vegetables, C - RICE

STRUCTURE ID / STATION NAME / PUMP NUMBER: MC 14.7N, MANATEE, 6187- East
TOWNSHIP: 44, RANGE: 38, SECTION: 18

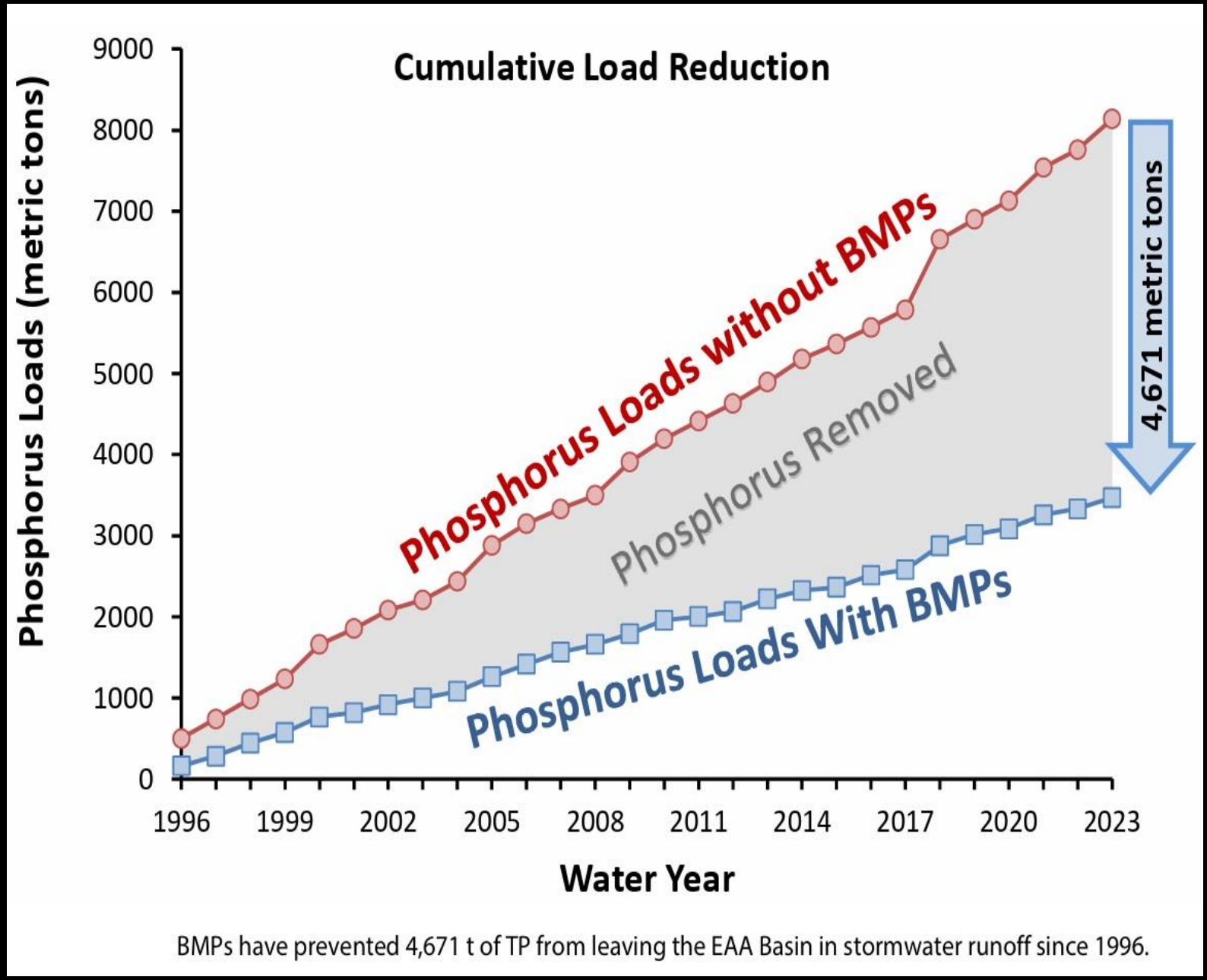
MONTH: May YEAR: 2016 CONTROL ELEVATION START: 7.0 STOP: 4.5

DATE	START TIME	START RPM	START GAUGE INSIDE	START GAUGE OUTSIDE	STOP TIME	STOP RPM	STOP GAUGE INSIDE	STOP GAUGE OUTSIDE	RAIN	COMMENTS
1	9:38am	N/A	6.5	8.8					Ø	
2	10:26am	N/A	6.6	8.8					Ø	
3	12:11am	N/A	6.6	8.8					Ø	
4	9:25am	N/A	6.7	8.4					Ø	
5	7:45am	N/A	6.5	8.8					0.95	
6	8:59am	N/A	6.1	9.1					Ø	
7	9:22am	N/A	6.2	9.0					Ø	
8	7:59am	N/A	6.5	9.0					Ø	
9	9:15am	N/A	6.5	8.8					Ø	
10	11:10am	N/A	6.5	8.2					Ø	
11	9:15am	N/A	6.4	8.1					Ø	
12	8:45am	N/A	6.4	8.1					Ø	
13	9:35am	N/A	6.6	8.2					0	
14	11:40am	N/A	6.7	9.4					Ø	
15	8:55am	N/A	6.6	8.5					Ø	
16	10:52am	N/A	6.4	8.6					Ø	
17	8:35am	N/A	6.5	9.1					Ø	
18	10:58am	1,350	6.6	9.0	10:58am	1,350	6.6	9.0	1.55	6A
19	8:00am	1,500	6.9	9.0	2:50pm	1,500	6.0	10.5	1.50	6A
20	7:55am	N/A	5.6	9.8					0	
21	8:31am	1,500	7.3	8.3					2.80	6A, 7A
	1:36pm	1500	6.4	9.1						
22	9:35am	1500	6.7	10.0	2:15pm	1500	5.1	9.0	.20	6A
23	8:42am	N/A	5.5	9.8					0	
24	8:08am	N/A	5.0	8.6					0	
25	8:00am	N/A	5.6	8.0					0	
26	7:50	N/A	5.0	8.3					0	
27	7:58am	N/A	5.5	8.7					0	
28	8:20am	N/A	5.5	8.6					0	
29	9:55am	N/A	5.3	8.5					0	
30	7:55am	N/A	5.3	8.5					0	
31	7:50	N/A	5.3	8.4						

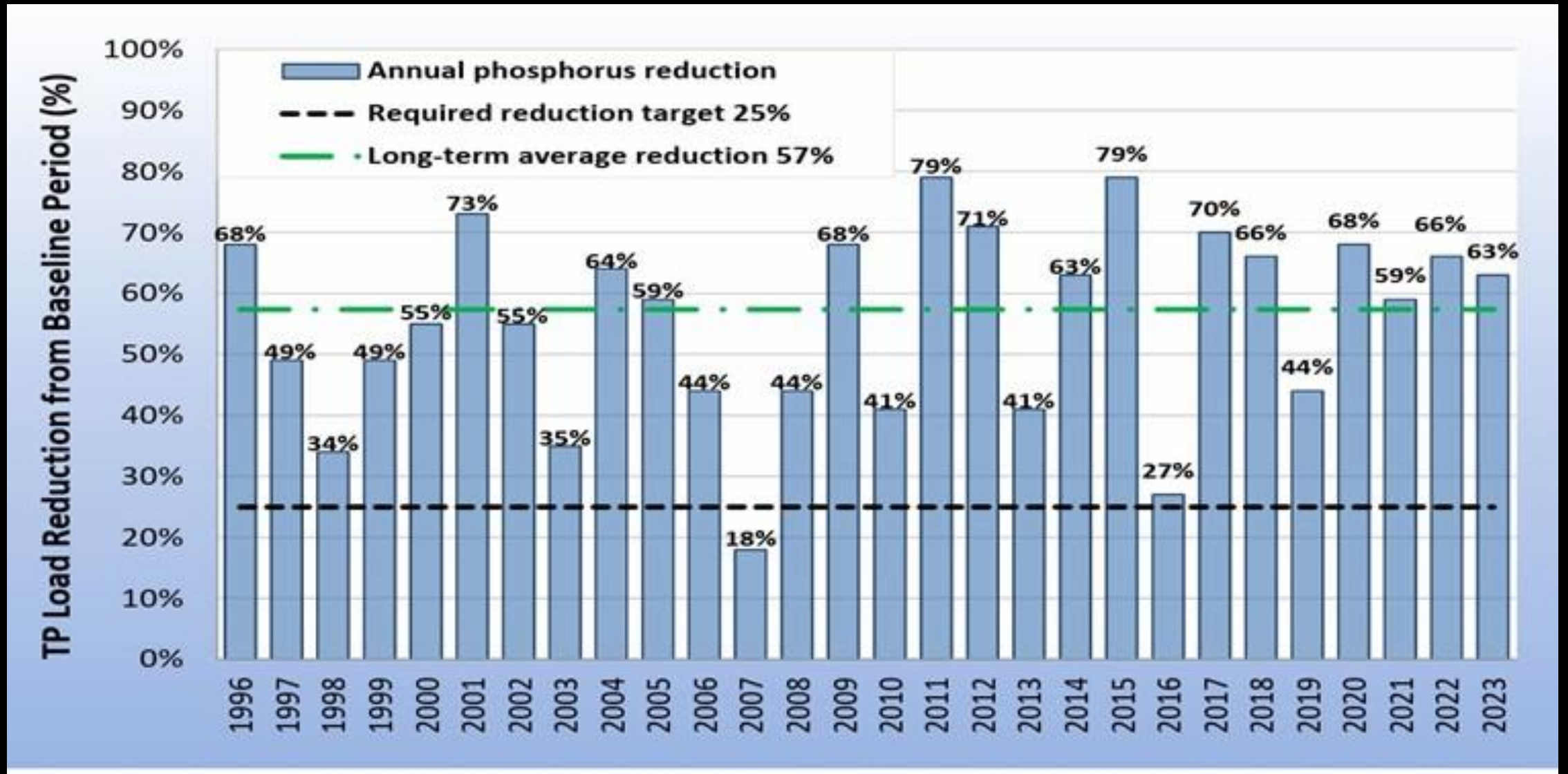
TOTAL

Manatee - E

EAA P reduction



EAA P reduction



WY1996–WY2023 EAA Basin percent TP load reduction from baseline period.

Thank you.!

EAA Best Management Practices (BMPs)

Typical BMP plan.

BMP Category	BMP Plan for Row Crops
Nutrient Management BMPs	✓ Nutrient Application Control ✓ Nutrient Spill Prevention ✓ Soil Testing
Particulate Matter & Sediment Control BMPs	✓ Canal Cleaning ✓ Land Leveling ✓ Sediment Sumps ✓ Vegetative Filter Strips
Water Management BMPs	✓ Detain 1.0 inch of rainfall prior to off-site discharge

Permit Number: **Date:**

Basin/Unit Area ID **Farm Name**

PARTICIPANT BMPs		PTS	MUCK CANE		SAND CANE		VEG	SOD	CITRUS	PASTURE	URBAN	OTHER
			PLANT	RATOON	PLANT	RATOON						
WATER MANAGEMENT PRACTICES:												
Water Detention:	½ inch	5										
	1 inch	10	★									
Improved Infrastructure		5										
NUTRIENT CONTROL PRACTICES												
Fertilizer Application Control		2 ½	★									
Fertilizer Spill Prevention		2 ½	★									
Soil Testing		5	★									
Plant Tissue Analysis		2 ½										
Split P Application		5										
Slow Release P Fertilizer		5										
PARTICULATE MATTER AND SEDIMENT CONTROLS												
Any 2		2 ½										
Any 4		5	★									
Any 6		10										
PASTURE MANAGEMENT												
Pasture Management		5										
OTHER BMPs												
Urban Xeriscape		5										
Detention Pond Littoral Zone		5										
TOTALS *(minimum 25 points)*												

NOTE: Points in shaded cells require ample justification.

Comments: