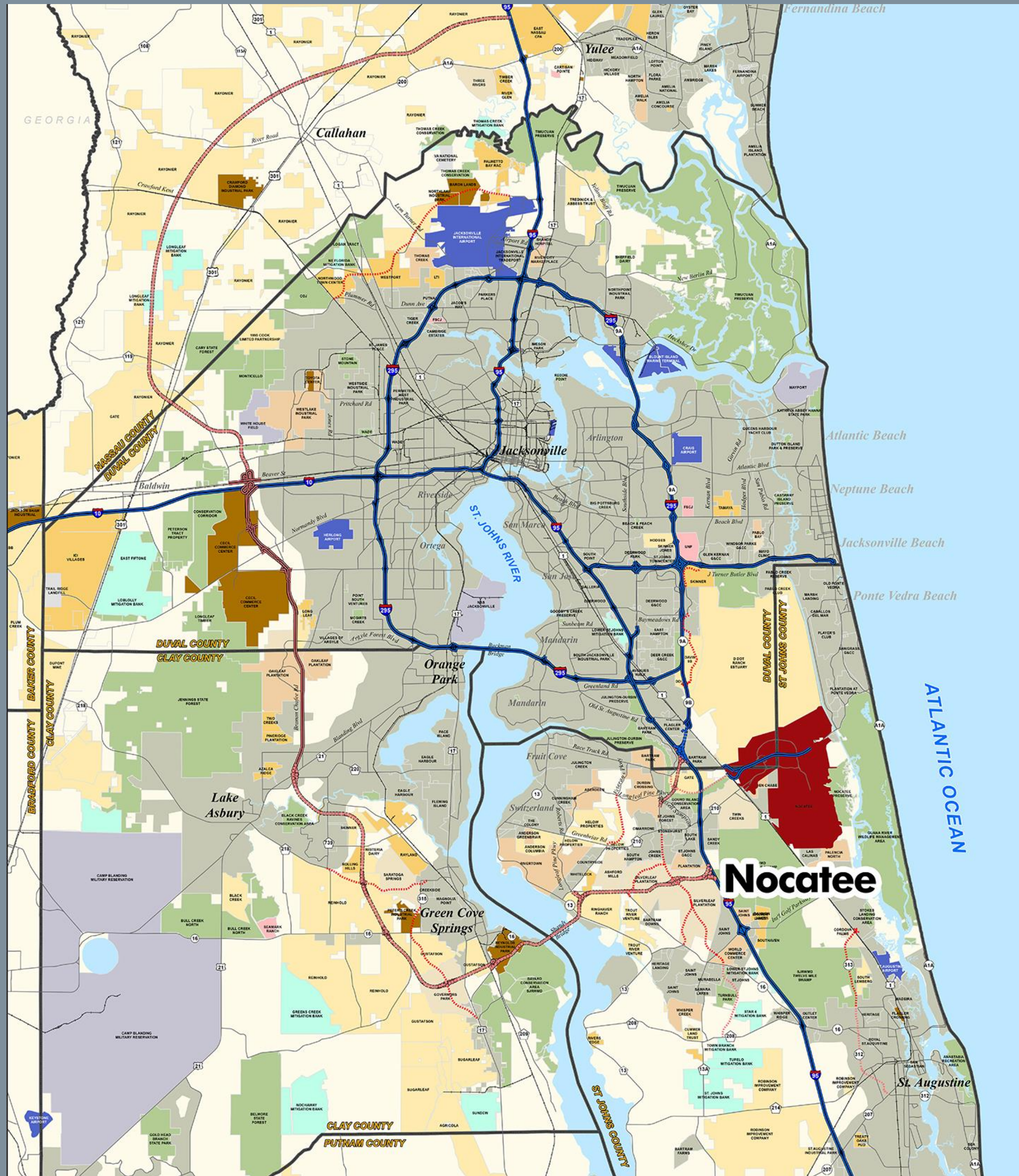
Stormwater Harvesting & Supplemental Reuse

A CASE STUDY

Presentation Outline

- Location
- Environmental & Water Resources Area Plan
- Management of Irrigation Sources
- Nutrient Loading to Receiving Waters
- Case Study Specifics
- Lessons Learned


TOWN OF
NOCATEE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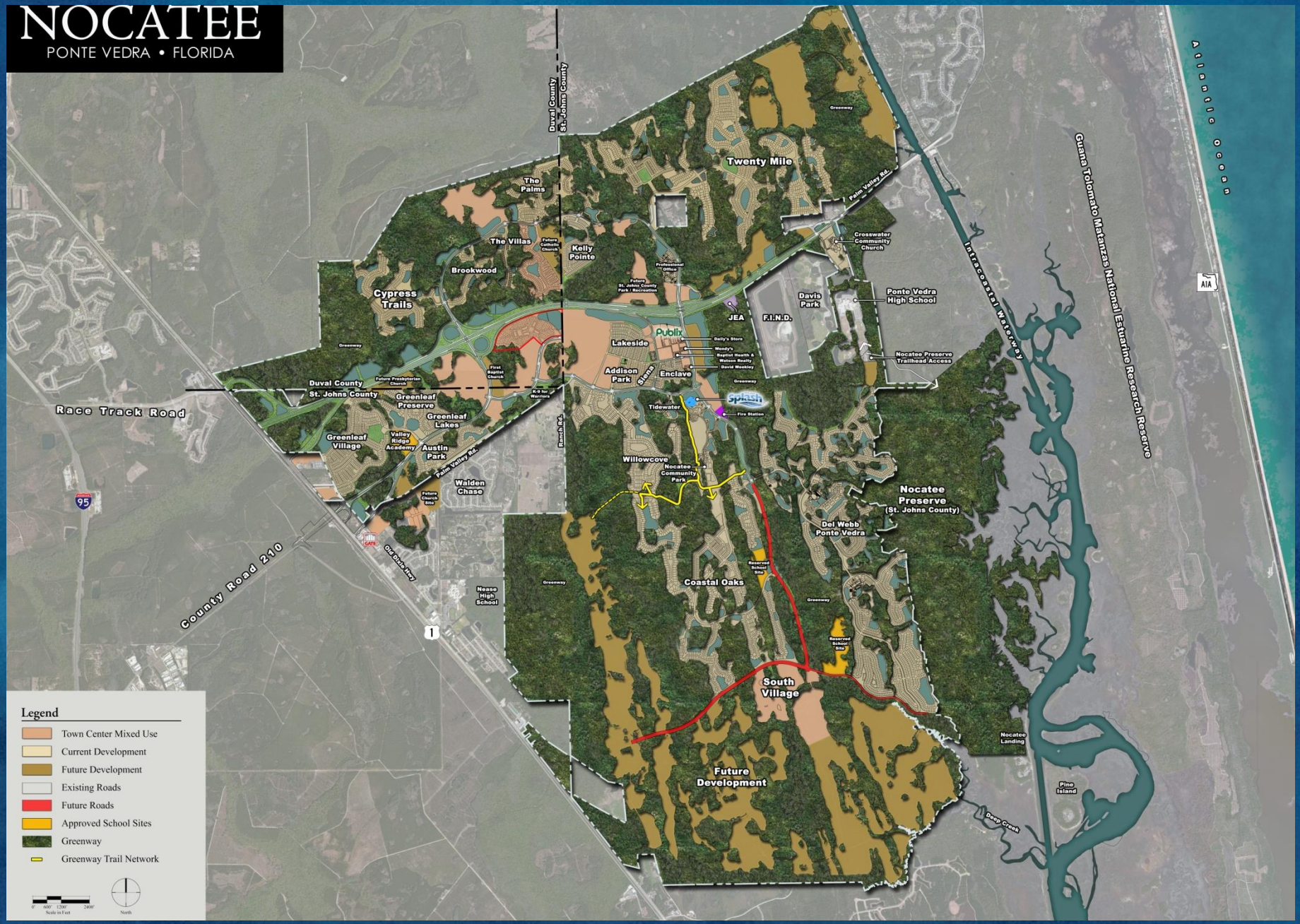
Yulee
GEORGIA
Callahan
Jacksonville
Arlington
Atlantic Beach
Neptune Beach
Jacksonville Beach
Ponte Vedra Beach
Baldwin
Riverside
Ortega
San Marco
San Jose
Mandarin
Orange Park
Fruit Cove
Switzerland
Lake Asbury
Green Cove Springs
St. Augustine
Nocatee
ST. JOHNS RIVER
ATLANTIC OCEAN
NASSAU COUNTY
DUVAL COUNTY
CLAY COUNTY
BAKER COUNTY
BRADFORD COUNTY
ST JOHNS COUNTY
PUTNAM COUNTY

- 15,000 Acres
- 8,000 Acres in Preservation
- 3 miles Preserved on ICW
- 14,000 Homes
- 1 Million SqFt Retail
- 4 Million SqFt Office
- Nine Public School Sites
- Three 18 Hole Golf Courses (none will be built)


NOCATEE
PONTE VEDRA • FLORIDA
Twenty Mile
The Palms
The Villas
Kelly Pointe
Brookwood
Cypress Trails
Crosswater Community Church
Davis Park
Ponte Vedra High School
F.I.N.D.
JEA
Publix
Lakeside
Addison Park
Sloane Enclave
Nocatee Preserve Trailhead Access
Tidewater
Fire Station
Willowcove
Nocatee Community Park
Nocatee Preserve (St. Johns County)
Del Webb Ponte Vedra
Coastal Oaks
South Village
Future Development
Nocatee Landing
Pine Island
Deep Creek
Duval County
St. Johns County
Race Track Road
Greenleaf Preserve
Greenleaf Lakes
Greenleaf Village
Valley Ridge Academy
Austin Park
Walden Chase
Palm Valley Rd.
Ponte Vedra Blvd.
Roscoe Blvd.
Nease High School
County Road 210
Old Dixie Hwy
Intracoastal Waterway
Guana Tolomato Matanzas National Estuarine Research Reserve
Atlantic Ocean
A1A
95
1
Legend
Town Center Mixed Use
Current Development
Future Development
Existing Roads
Future Roads
Approved School Sites
Greenway
Greenway Trail Network
Scale in Feet
North

RESIDENT'S HANDBOOK:
A GUIDE TO NOCATEE LIVING

We do not inherit the earth from our ancestors; we borrow it from our children.

~Native American Proverb

a PARC Community

TABLE OF CONTENTS

NOCATEE®
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Nocatee Environmental & Water Resources Area Plan (NEWRAP)

- **Goals**
  - No Floridan or Surficial Aquifer Withdrawals
  - Maximize Water Conservation
  - Preserve Water Quality

Irrigation Demand

- Public Access Reuse (80%)
  - Residential
  - Retail & Commercial
- Stormwater Harvesting (20%)
  - Common Areas
    - Parks
    - Right-of-Way

Managing Irrigation Sources

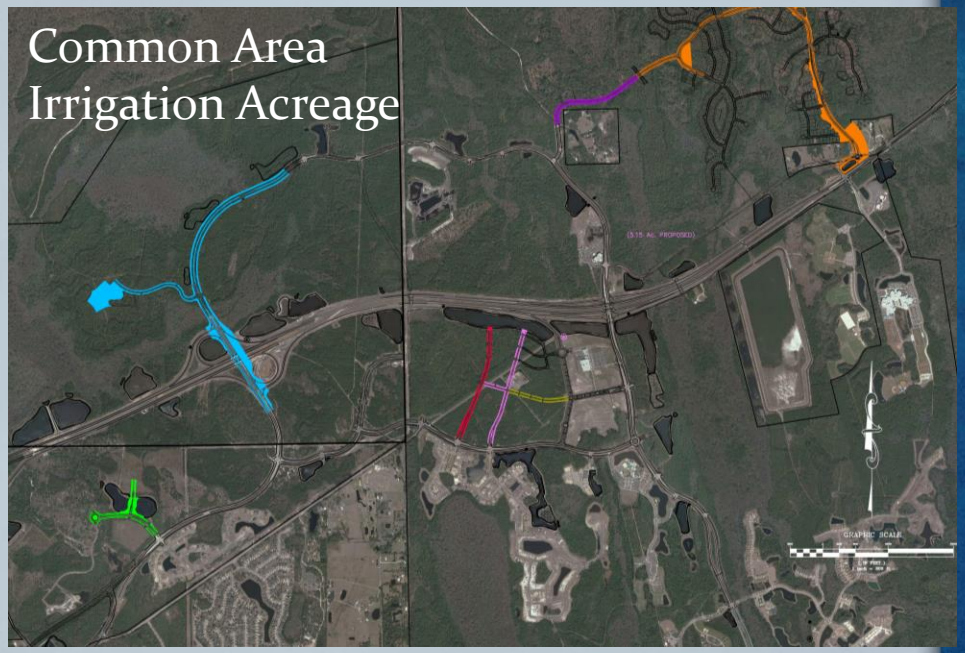
- **Public Access Reuse**
  - Utility (JEA)
- **Stormwater Harvesting**
  - Community Development District
    - Stormwater Runoff
    - Supplemental Supply
      - JEA Excess Reuse
        - Interruptible Supply
        - Priority to Public Access

Devil is in the Details

- **Build Out (2025)**
  Public Access Reuse
  - 14,000± Residential Reuse Customers
  - 3,000 ± (ERC's) Commercial Reuse Customers
- **Stormwater Harvesting Common Area**
  - 500± ac. Irrigated
- **Current (2015)**
  Public Access Reuse
  - 4,000± Residential Reuse Customers
  - 500 ± (ERC's) Commercial Reuse Customers
- **Stormwater Harvesting**
  - 275± ac. Common Area Irrigated

Stormwater Harvesting

- **Current (2015)**
  - 276 Irrigated Acres of Common Area
  - 11 Stormwater Ponds
  - 9 Reclaimed Stations
  - 500,000 GPD Irrigation Demand



Annual Groundwater Volume Conserved

- **Current (2015)**
  - **Public Access Reuse** **381 MGY**
    Stormwater Harvesting **182 MGY**
    Total **563 MGY**

- **Project Build Out (2025):**
  - **Public Access Reuse** **1,620 MGY**
    Stormwater Harvesting **480 MGY**
    Total **2,100 MGY or 2.1 BGY**

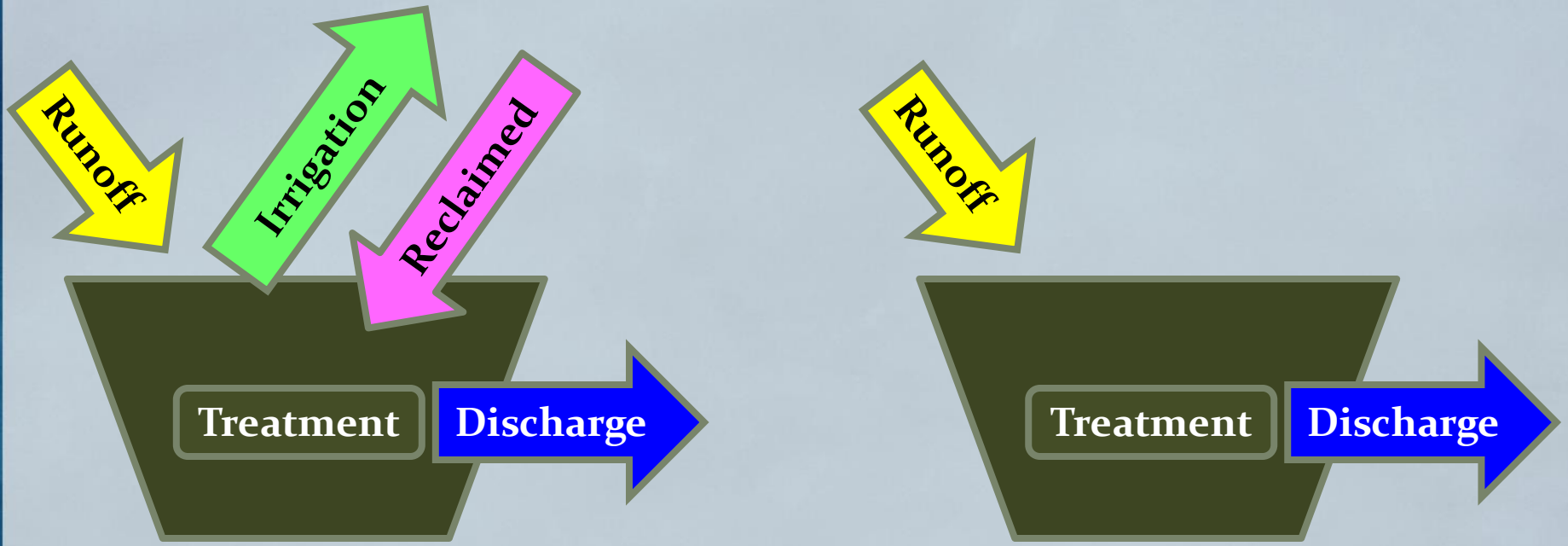
Challenges : Stormwater Harvesting

- Supply is Rainfall/Runoff Dependent.
- Phased construction of stormwater ponds coincident with irrigated common area development.
- Peak demand occurs when rainfall is low.
- Must have supplemental source.
  - Managing nutrients from supplemental source.

Nutrient Loading to Receiving Waters

SW Harvesting & Supplemental Reclaimed

MANAGING NUTRIENTS



Annual TP & TN <= Annual TP & TN

Supplemental ERP	Conventional ERP
Wet Detention	Wet Detention
w/ SW Harvesting & Reclaimed Supplement	

APPROACH

JANUARY

S	M	T	W	T	F	S
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30	31					

FEBRUARY

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27	28					

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JUNE

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JULY

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31						

AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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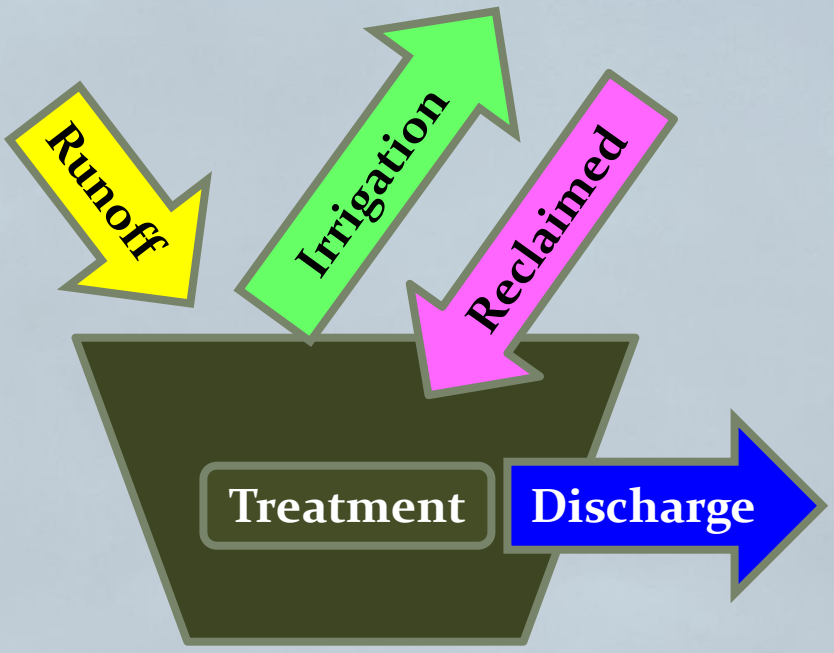


MONTHLY WATER BUDGET ANALYSIS

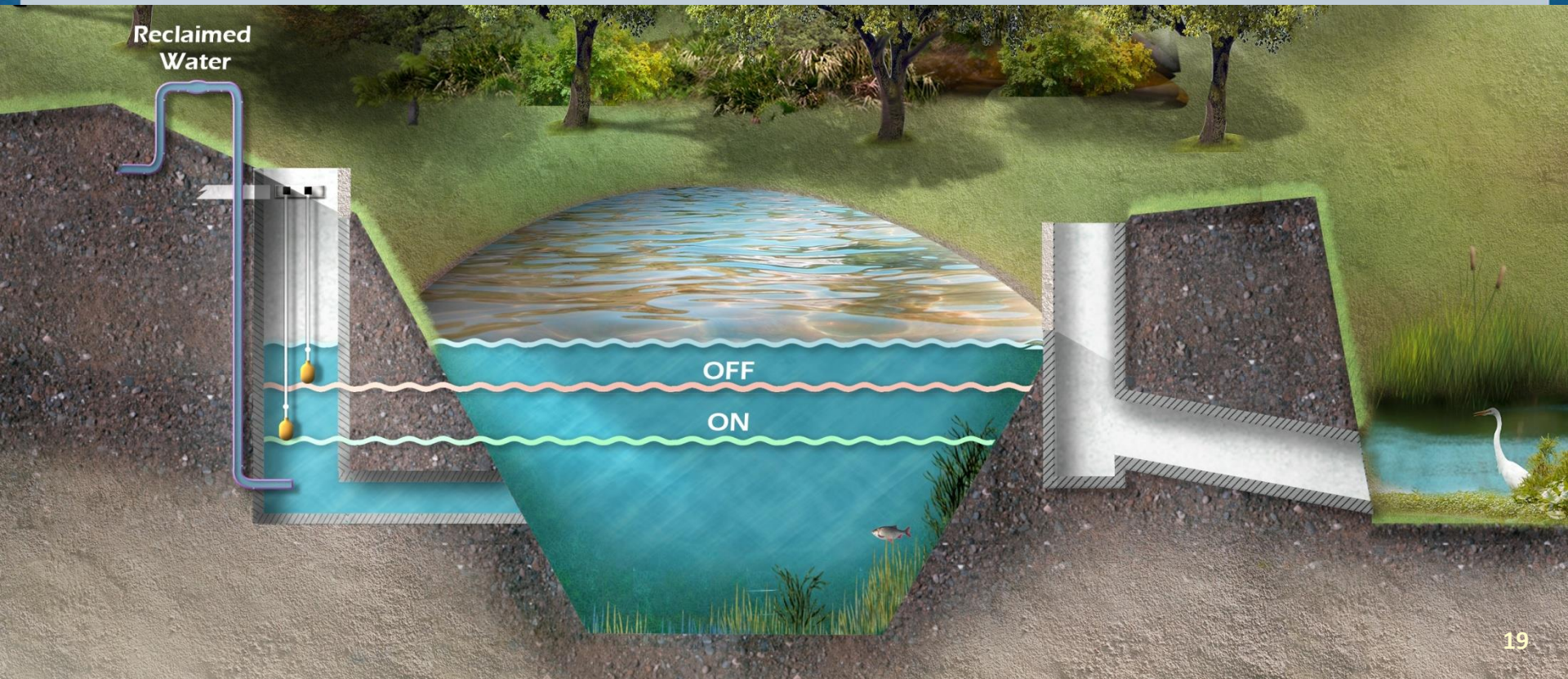
Seasonal Variability

- Rainfall Runoff
- Irrigation Demand
- Reclaimed Supplementation
- Pond Discharge

HARVESTING OPERATION

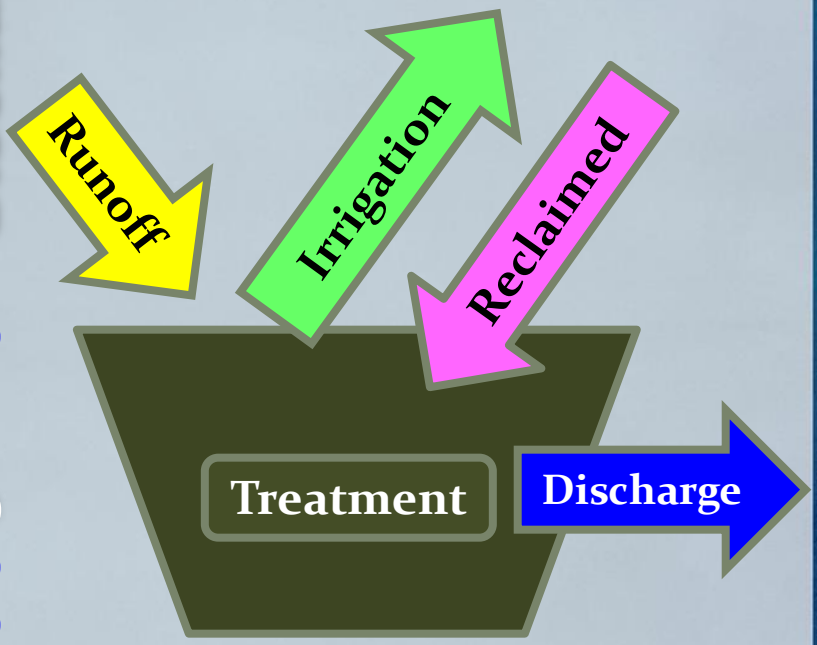
Runoff > Irrigation → **Pond Stage Rises** → **Vol > NWL Discharged** → **Reclaimed = o**

Irrigation > Runoff → **Pond Stage Falls** → **Discharge = o** → **Stage < ON** → **Reclaimed Added Up to OFF**



WATER BUDGET SPREADSHEET

Beg. of Month	Irrigation		Runoff		Reclaimed		Treatment		Discharge
Oct	I	+	Q	+	0	-	T	=	0
Nov	I	+	Q	+	R	-	T	=	0
Dec	I	+	Q	+	0	-	T	=	0
Jan	I	+	Q	+	0	-	T	=	0
Feb	I	+	Q	+	0	-	T	=	D
Mar	I	+	Q	+	R	-	T	=	0
Apr	I	+	Q	+	R	-	T	=	0
May	I	+	Q	+	R	-	T	=	0
Jun	I	+	Q	+	R	-	T	=	0
Jul	I	+	Q	+	0	-	T	=	0
Aug	I	+	Q	+	R	-	T	=	0
Sep	I	+	Q	+	0	-	T	=	D
									=



Annual Load TP & TN

Case Study Specifics

Twenty Mile Village

COMMON IRRIGATED AREA

Twenty Mile Village - St. Johns County

Developed = 25.57 ac **Land Use = SFR**

Pond TOB = 5.48 ac

- **Total Area = 31.05 ac** **Irrigated Area = 34.0 ac**

- **Runoff = 51.66 ac-ft/yr**
  - **TP [1] = 0.31 mg/L**
  - **TN [1] = 1.85 mg/L**

- **Reclaimed**
  - **TP [2] = 1.5 mg/L [3]**
  - **TN [2] = 4.0 mg/L [4]**

1 Table 3.4 FDEP March 2010 Draft SSTR AH

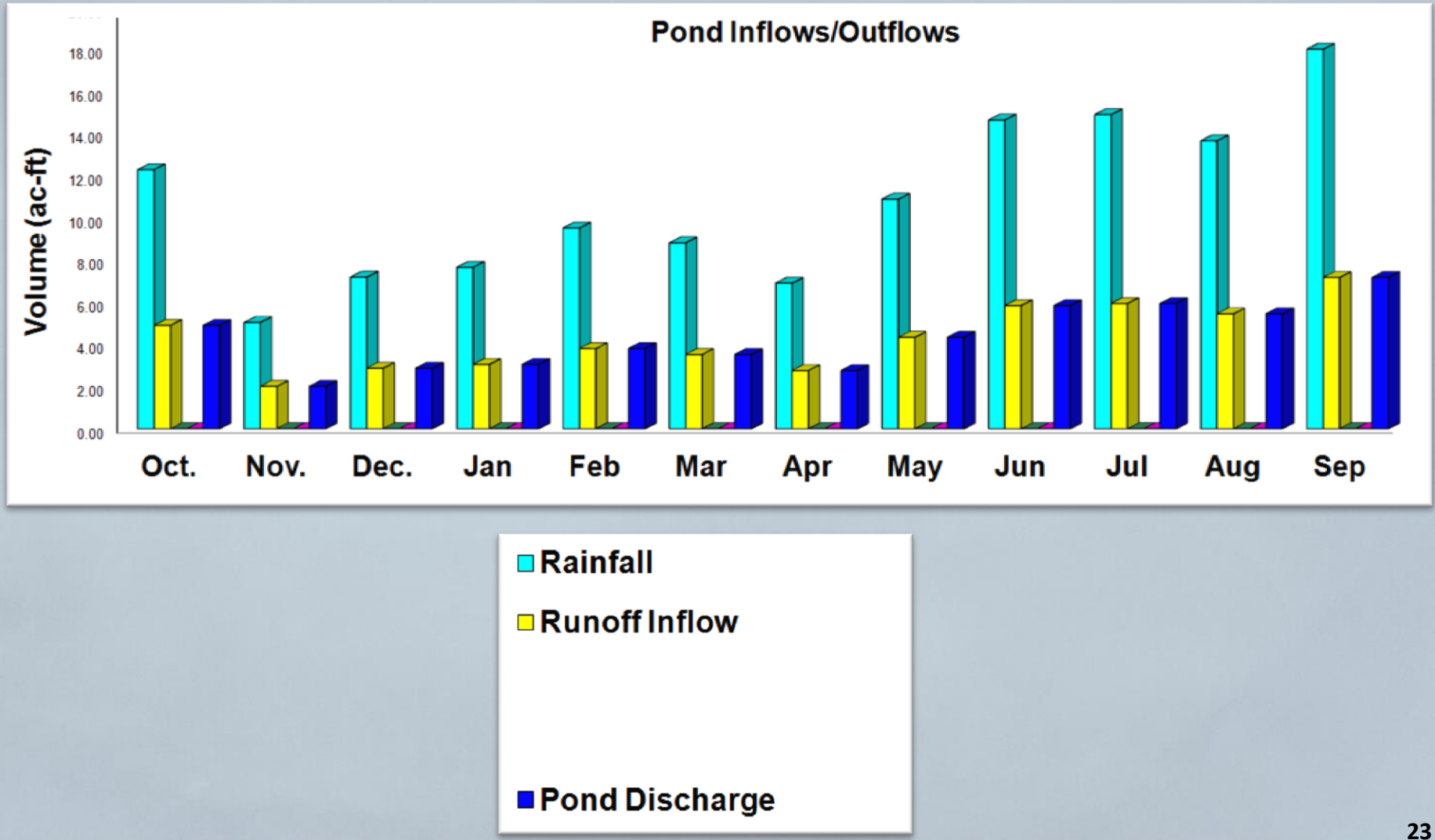
2 JEA Mandarin Plant, Avg. 2013-2015

3 TP (-) 50% last 5 years

4 TN (-) 15% last 5 years

CONVENTIONAL ERP

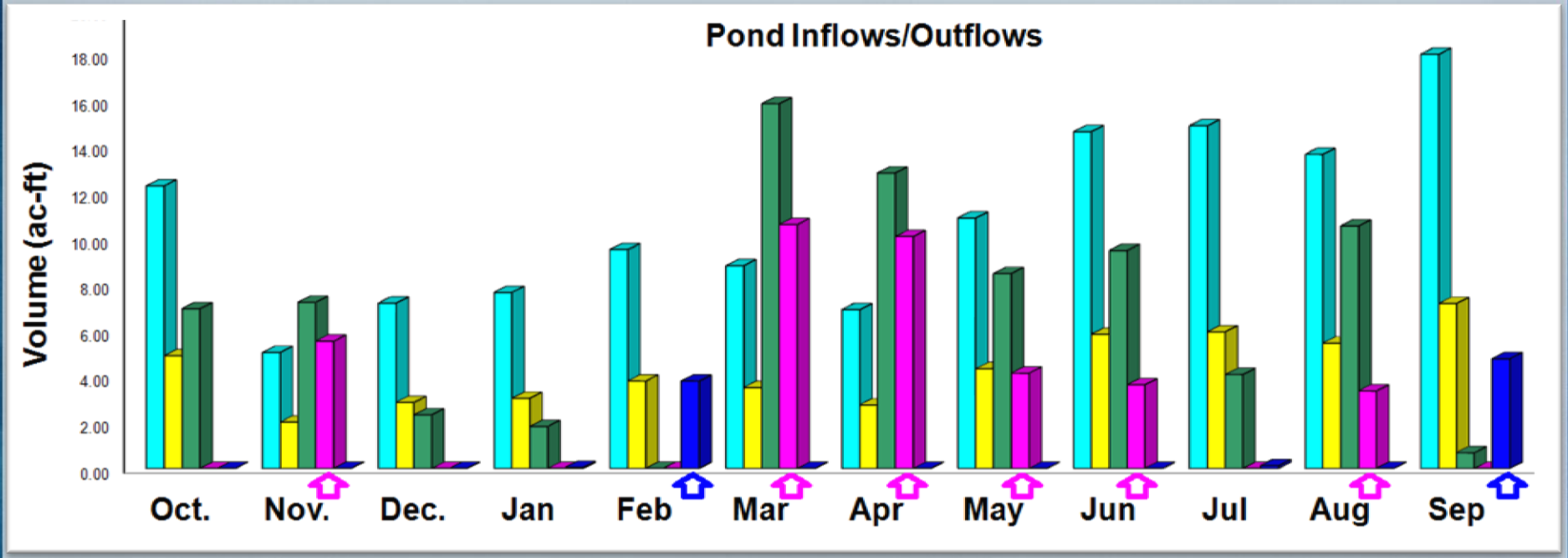
Wet Detention Alone



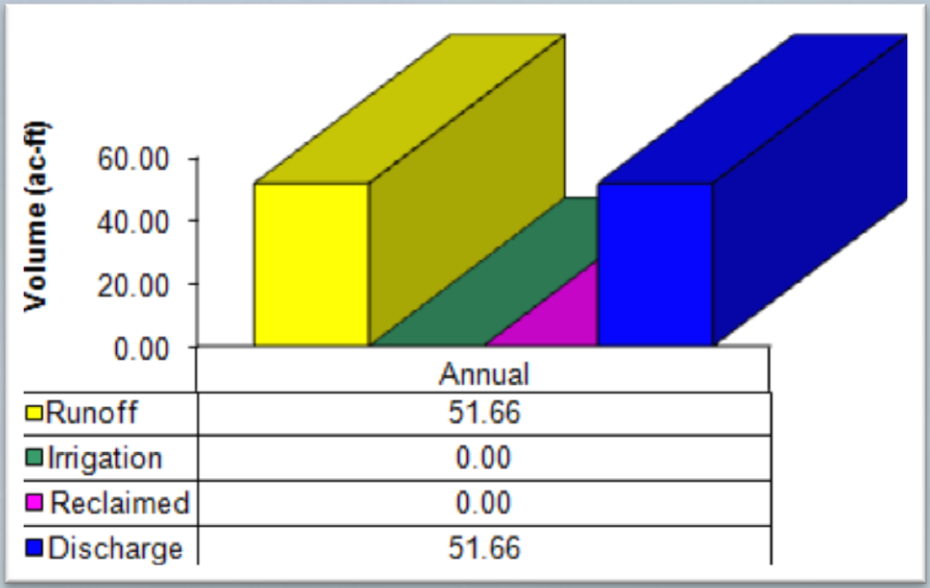
SUPPLEMENTAL ERP

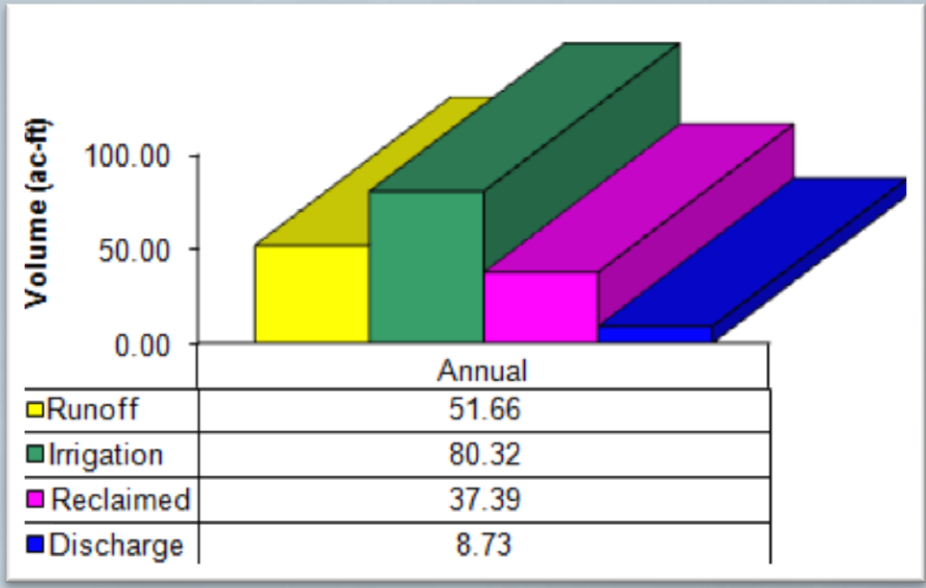
Wet Detention

w/ Stormwater Harvesting & Reclaimed Supplementation



RESULTS - VOLUME

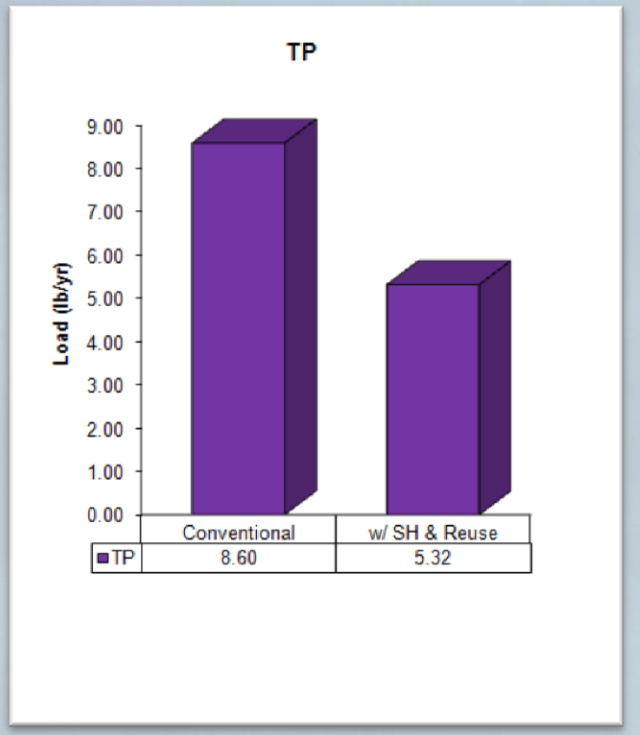


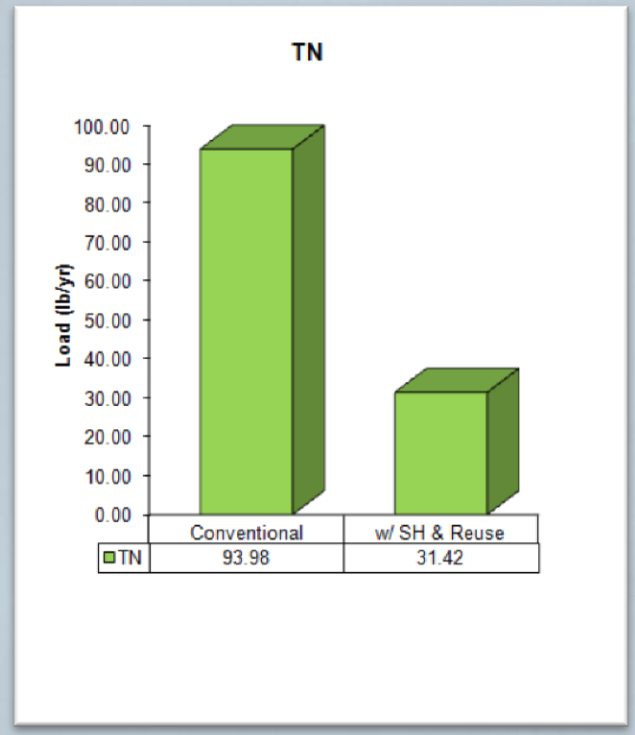


CONVENTIONAL ERP **SUPPLEMENTAL ERP**

83% Discharge Volume Reduction

RESULTS - NUTRIENTS





TP

(-) 38%

TN

(-) 67%

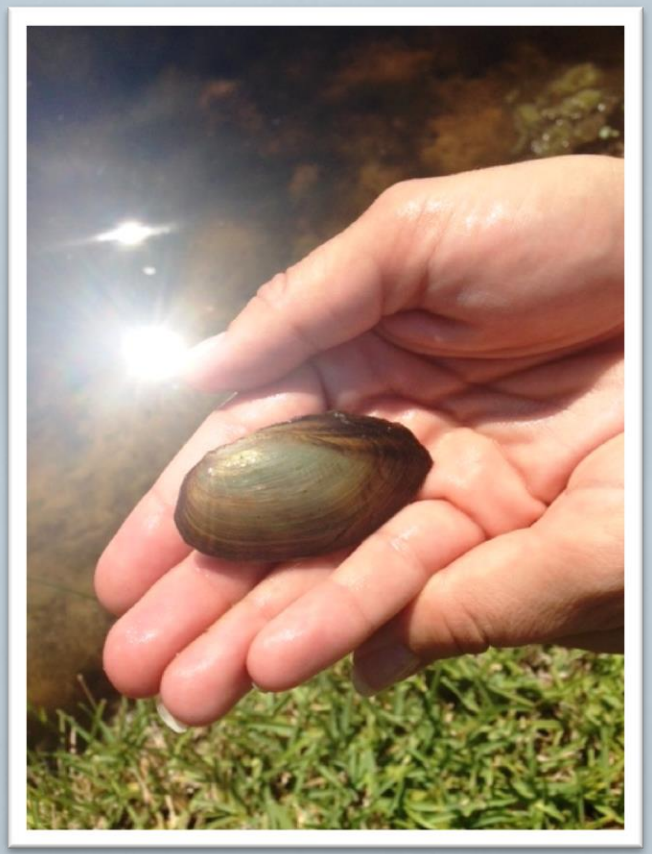
Annual Nutrient Savings

- **Current (2015)**
  - **Public Access Reuse** — 2.4 Tons/y (TP), 6.3 Tons/y (TN)
  - **Stormwater Harvesting** — 0.2 Tons/y (TP), 1.1 Tons/y (TN)
  - **Total** — 2.6 Tons/y (TP), 7.4 Tons/y (TN)

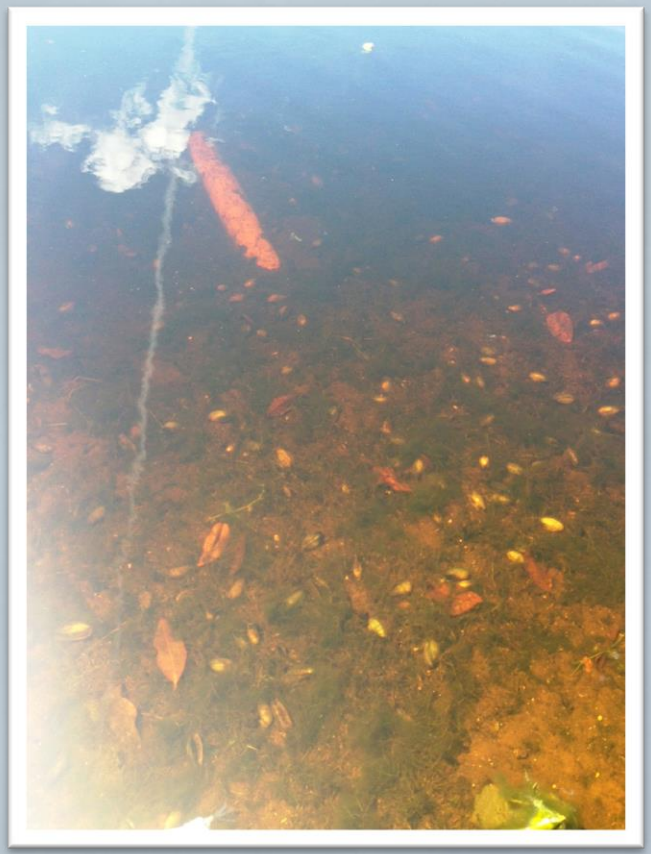
- **Project Build Out (2025):**
  - **Public Access Reuse** — 10.1 Tons/y (TP), 27.0 Tons/y (TN)
  - **Stormwater Harvesting** — 0.5 Tons/y (TP), 2.9 Tons/y (TN)
  - **Total** — 10.6 Tons/y (TP), 29.9 Tons/y (TN)

Paper Pondshell Mussel

Second Pond

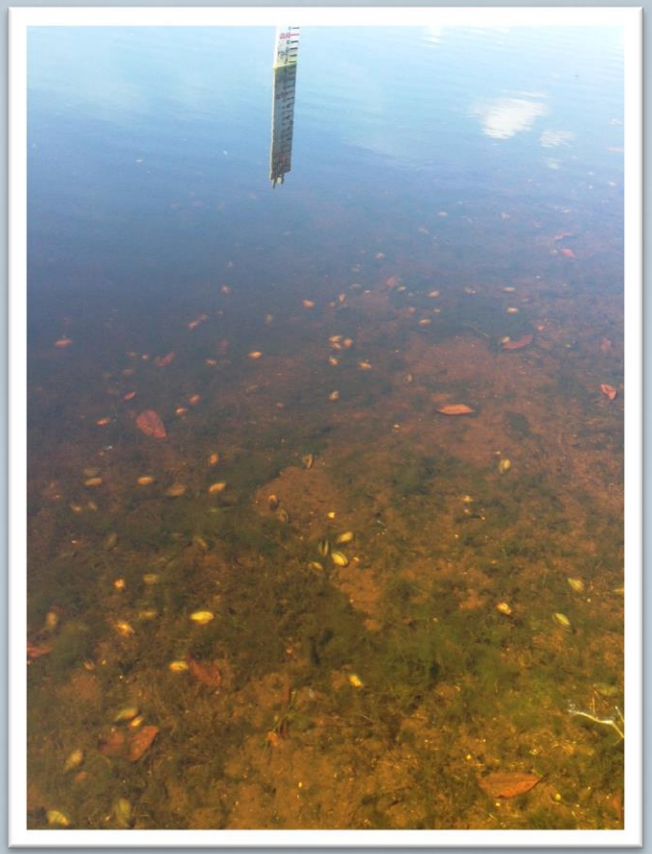


Reclaimed Water Pipe

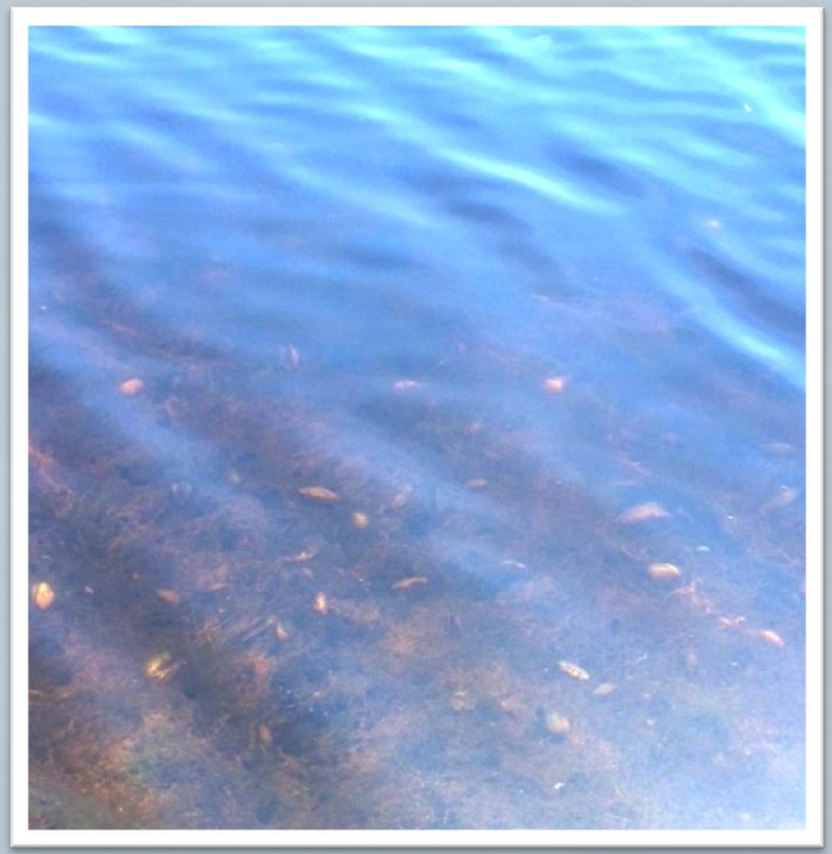


Mussels and Proximity Distribution

Near Pump Station



Near Weir



Lessons Learned

- Stormwater is a valuable resource, not to be wasted.
- Cost efficient to do stormwater harvesting.
- Drawback, demand is high when the volume is low. Need supplemental source.
- Nutrient management of supplemental source is critical.
- Proper nutrient management results in healthy system.

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