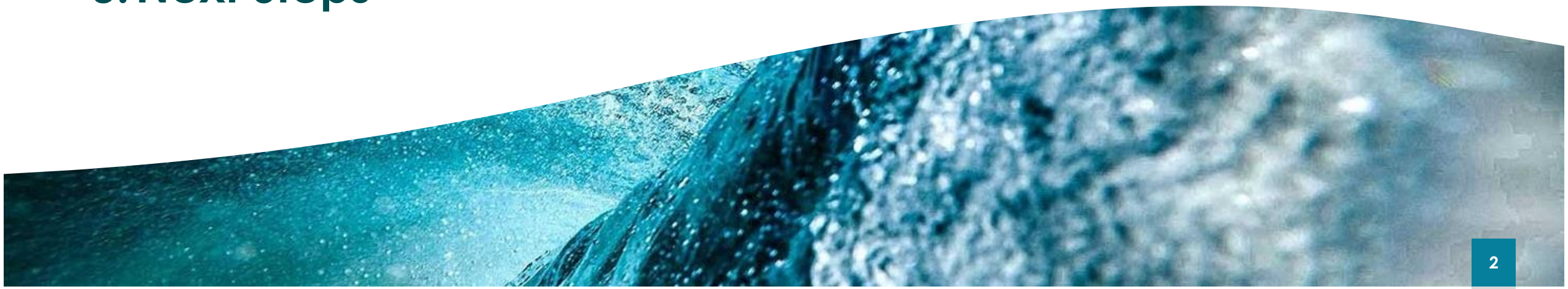
Caloosahatchee – North Fort Myers Nutrient and Bacteria Source Identification Study

Lee County Board of County Commissioners Workshop April 30, 2019

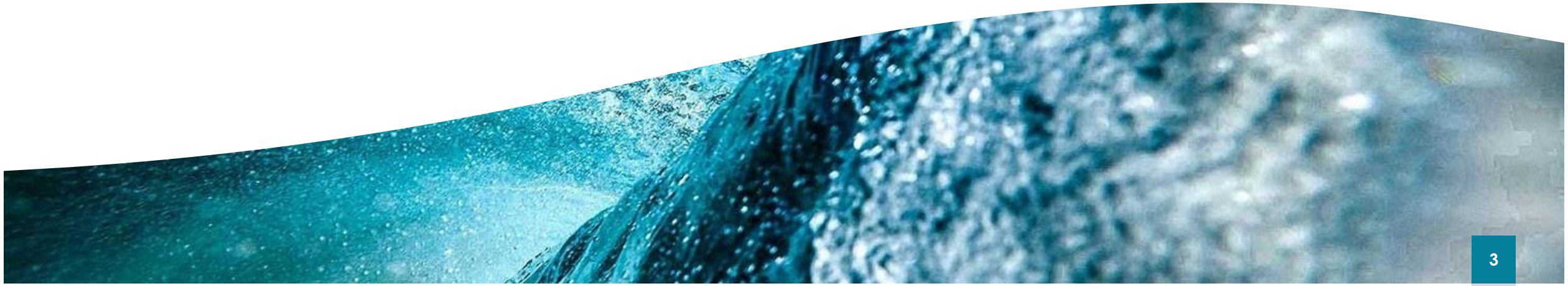
Agenda

1. Overview of Water Quality Impairments, Sources of Pollution, and Local Initiatives
2. Presentation of Nutrient and Bacteria Source Identification Study Results by Harbor Branch – FAU
3. Next Steps



Question

Based on results of the study, should we bring back targeted remedial options to address the water quality impairments identified?



Water Quality Impairments

Caloosahatchee Estuary impaired

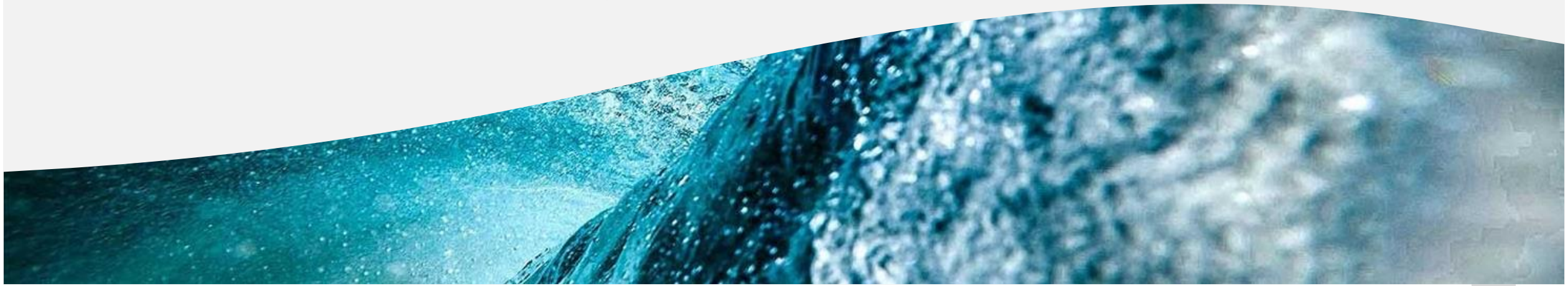
- Fecal Coliform
- Nutrients
- Total Maximum Daily Load (TMDL) and a Basin Management Action Plan (BMAP)for Total Nitrogen.

Source Identification Study Joint Effort

- Lee County Division of Natural Resources
- Florida Department of Environmental Protection (FDEP)
- Harbor Branch Oceanographic Institute-Florida Atlantic University
- Extensive monitoring and analysis incorporating latest scientific technology

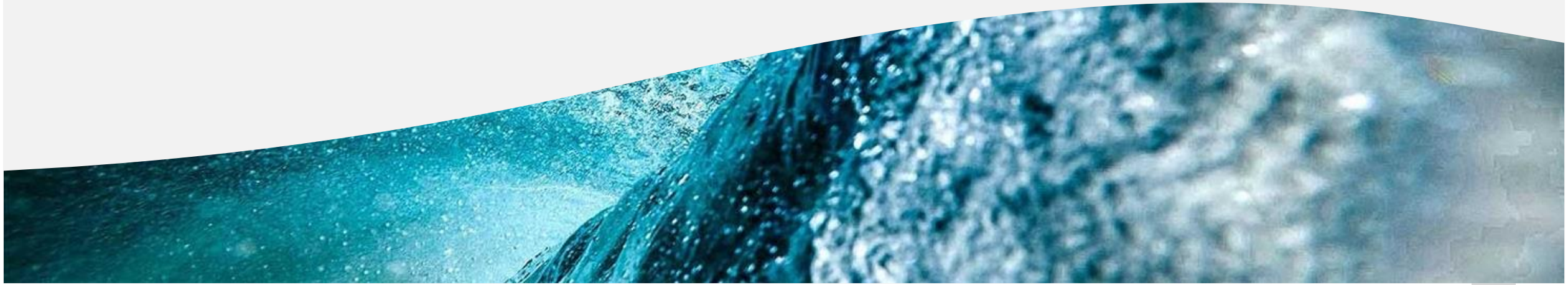
Common Sources of Nutrients and Bacteria

- Urban Runoff – fertilizers, impervious surfaces, pet waste
- Septic Tank Failures
- Agriculture Runoff – fertilizers, livestock
- Wildlife
- Wastewater and Industrial Sources

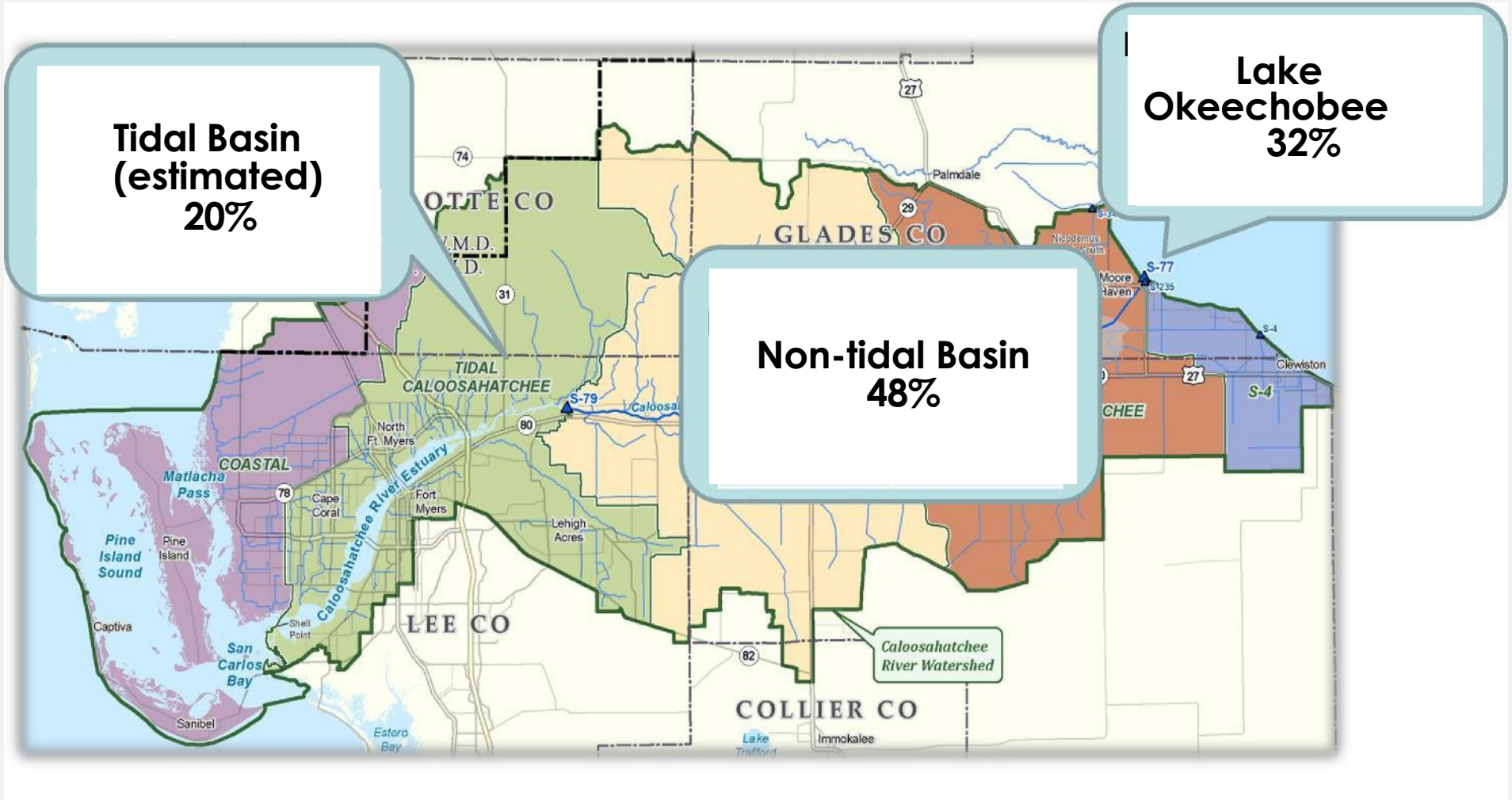


Local Initiatives

- TMDL Program – met ~50k lb per year reduction, 1/3 obligation
- Local Water Quality Projects - $62m investment since 2009
- Land Acquisition - C2020 28,983 acres, over $400m
- Source Identification and Control – fertilizer ordinance and pet waste campaign



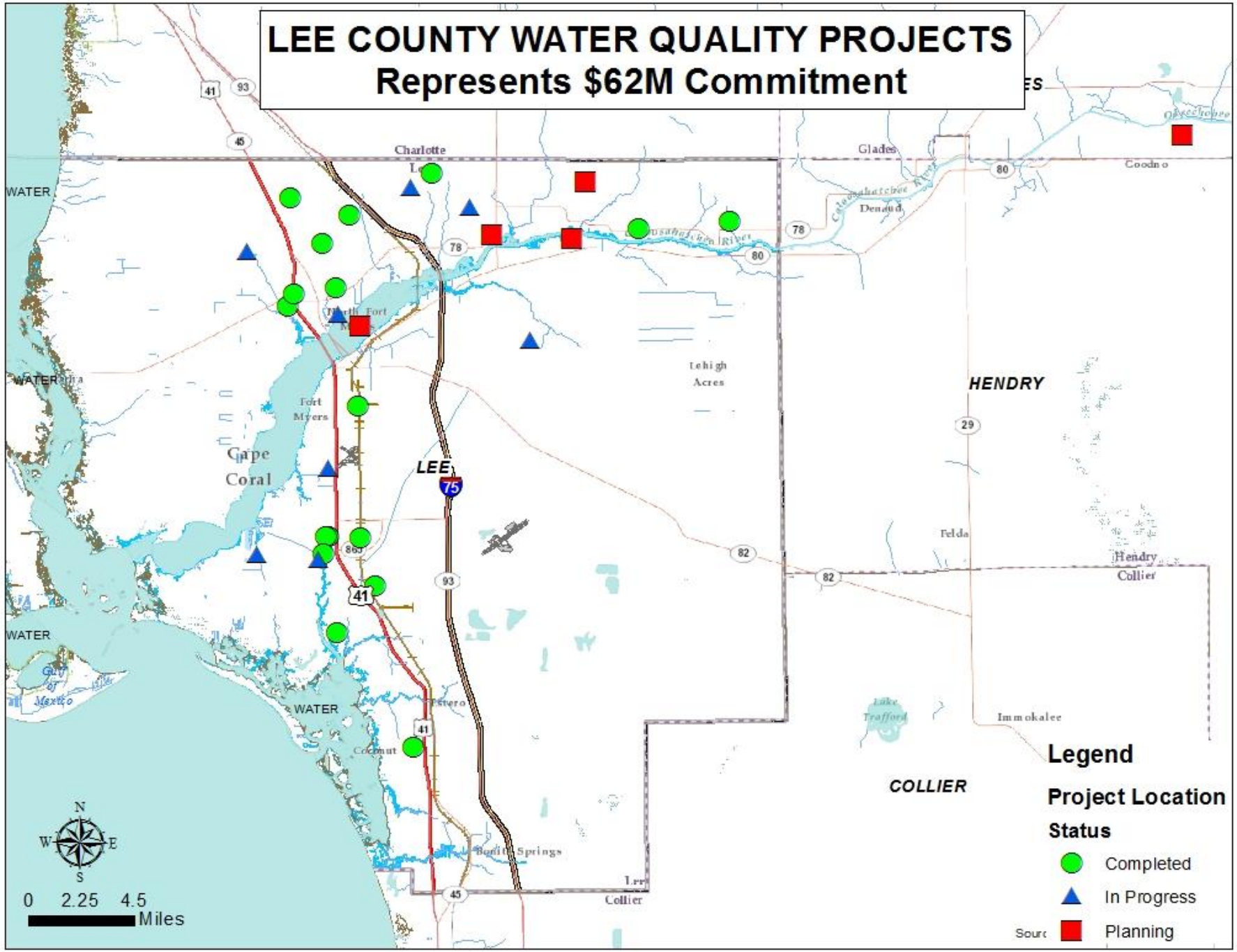
Where the nutrients comes from
(based on 2011-15 Nitrogen data)

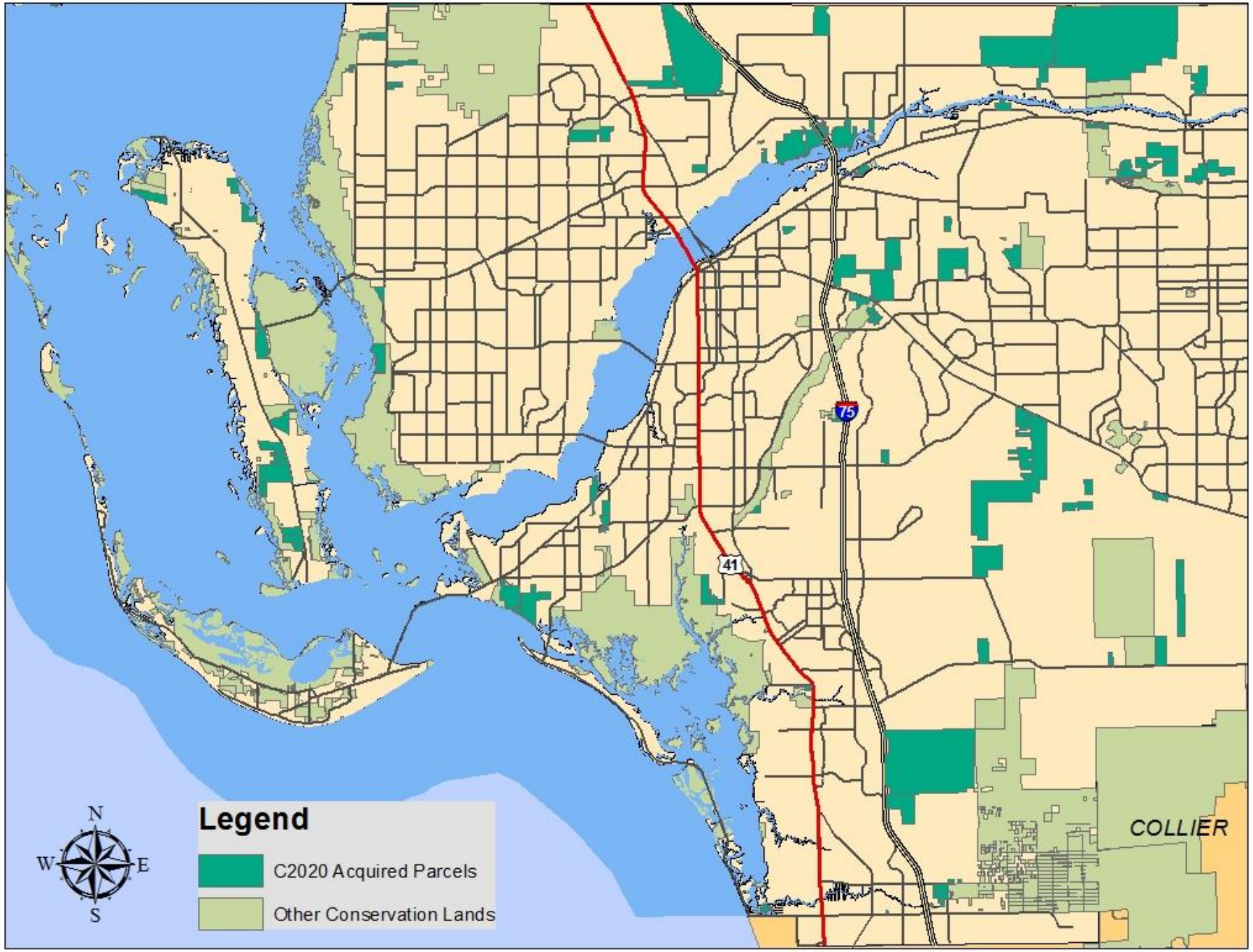


Powell Creek Preserve

Popash Creek Preserve

Local Water Quality Projects


LEE COUNTY WATER QUALITY PROJECTS
Represents $62M Commitment
Charlotte
Glades
Hendry
Lee
Collier
HENDRY
LEE
COLLIER
Cape Coral
Fort Myers
Lehigh Acres
Felda
Immokalee
Coconut
Bonita Springs
Lake Trafford
WATER
Legend
Project Location
Status
Completed
In Progress
Planning
0 2.25 4.5
Miles


75
41
COLLIER
N
W
E
S
Legend
C2020 Acquired Parcels
Other Conservation Lands

Source Control

Caloosahatchee River – North Fort Myers Nutrient & Bacteria Source Identification Study

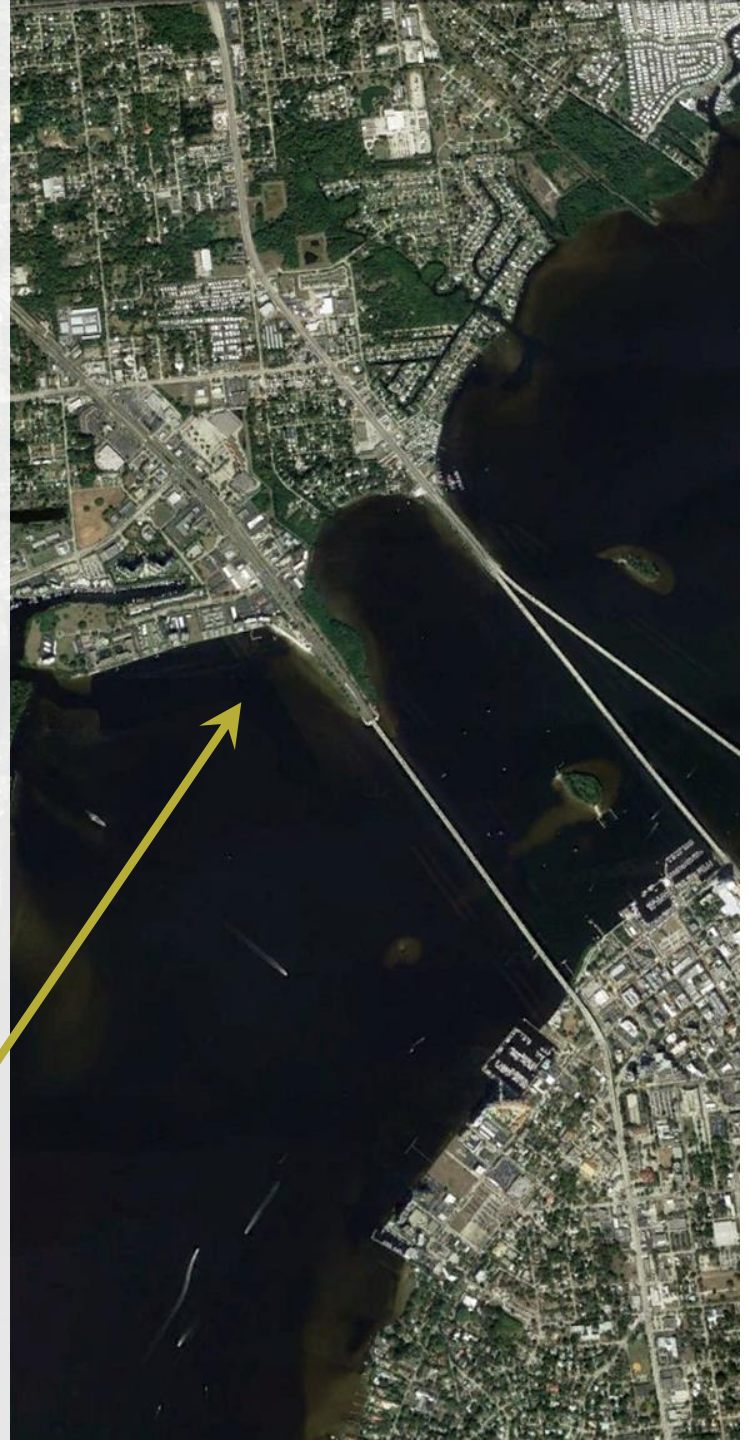
Brian Lapointe, Rachel Brewton,
Lynn Wilking, & Laura Herren

April 30, 2019

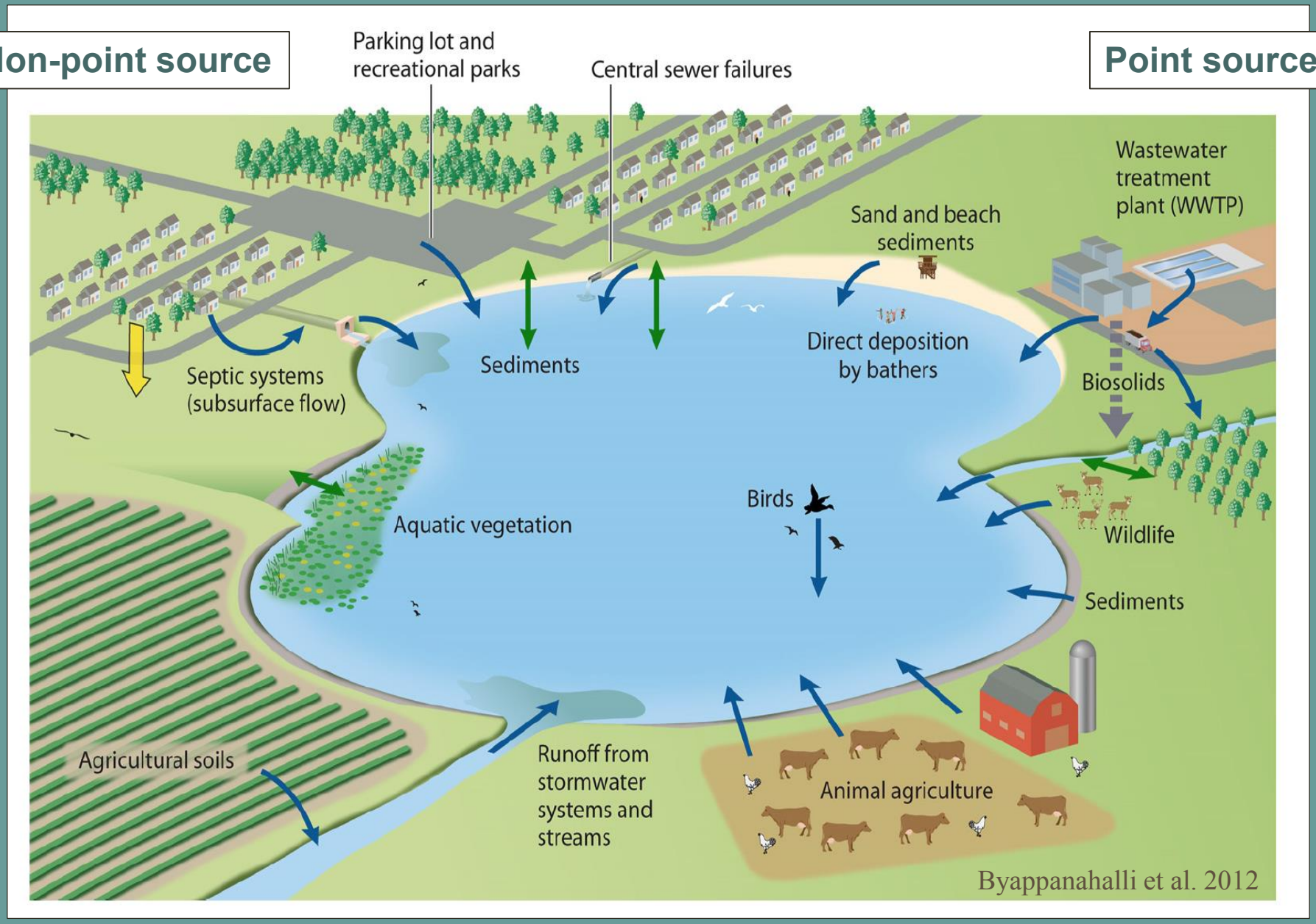
North Fort Myers Water Quality Issues

- Highly urbanized
- Urban water quality = global issue
- Complicated, evolving
- No single solution
- Caloosahatchee River Impaired
  DO, CHL*a*, fecals, N, & P
- North Shore Park

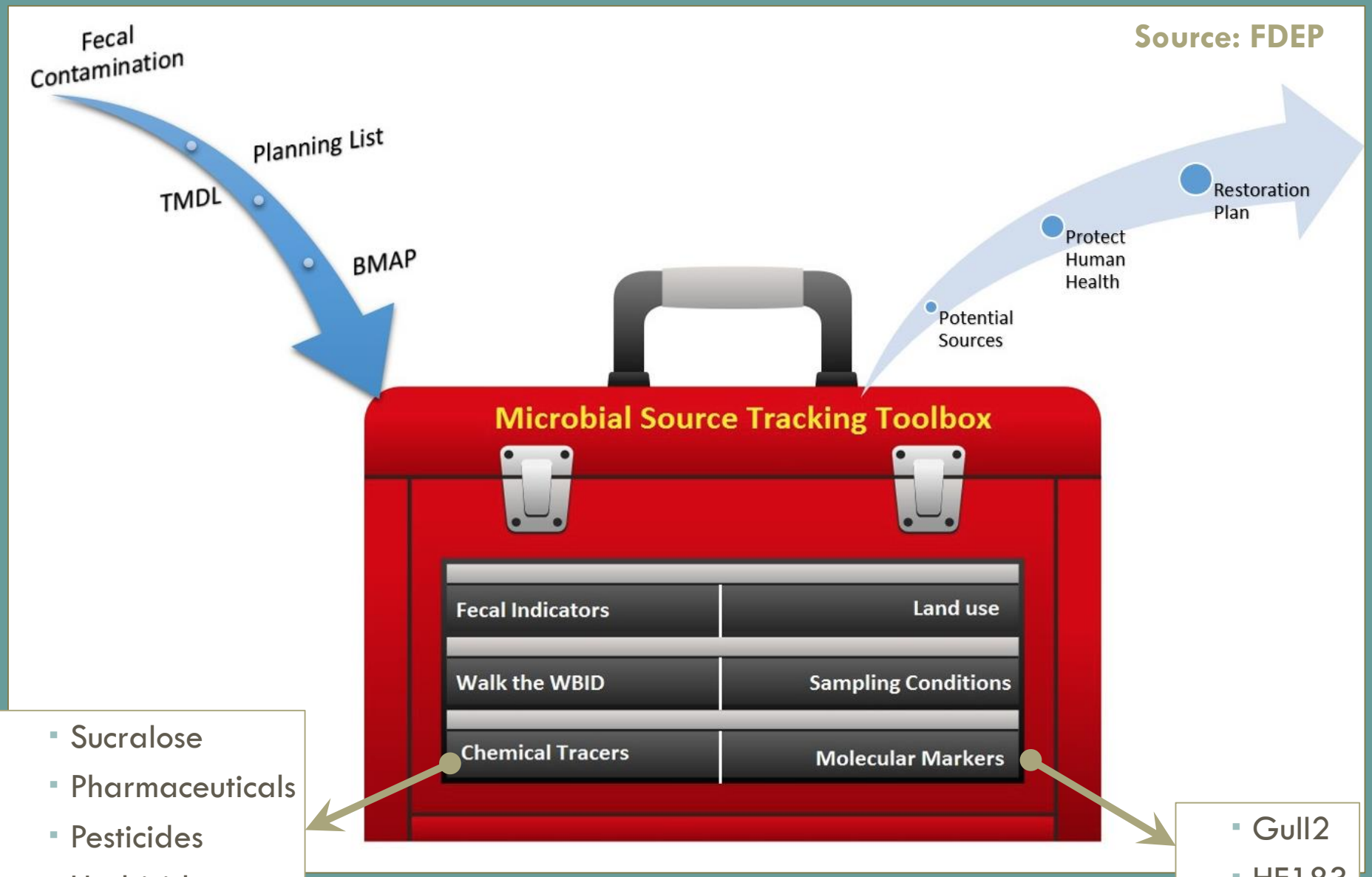
  Persistent Bacterial Pollution



Sources of Enteric Bacteria

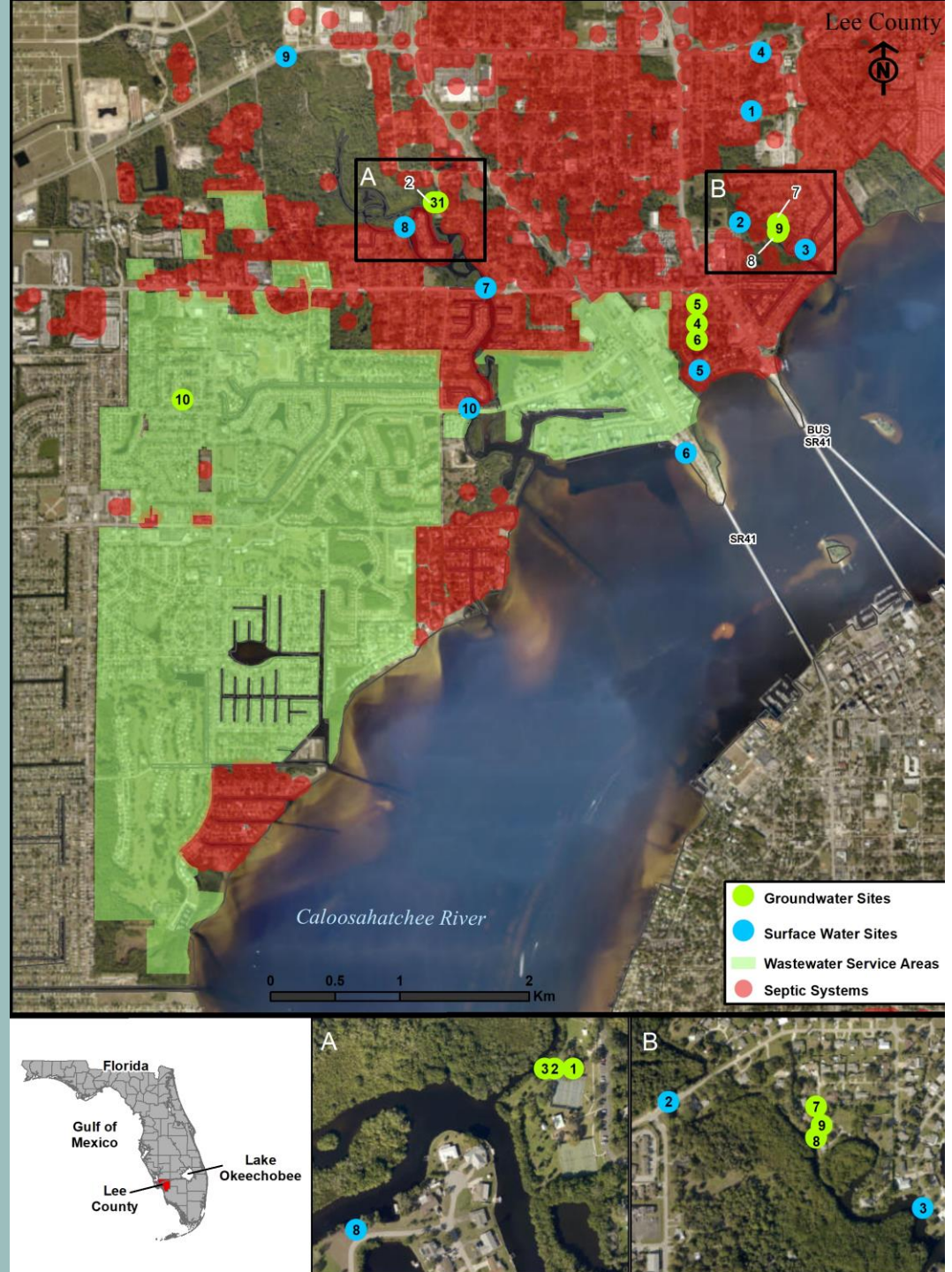


Microbial Source Tracking

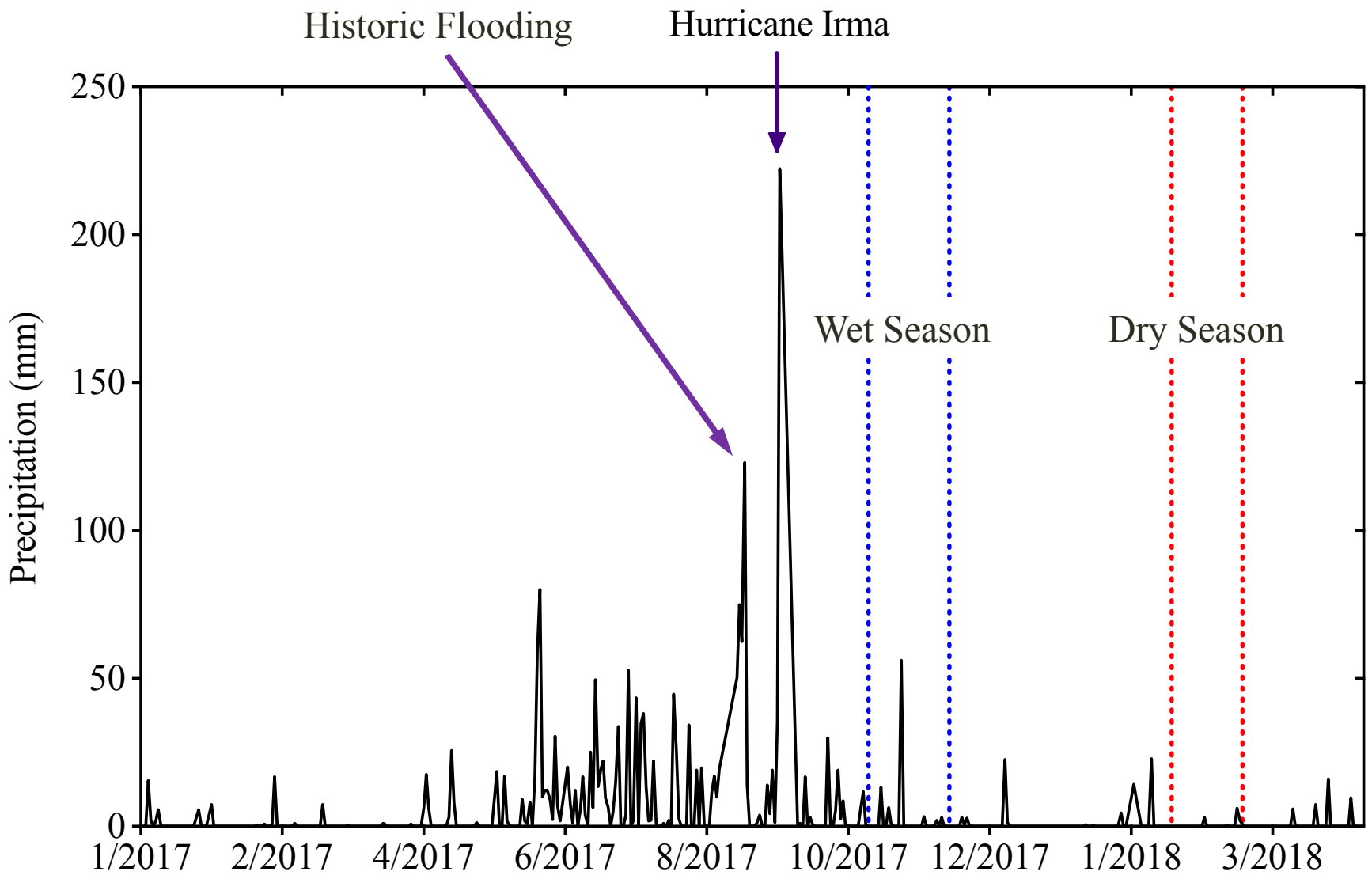


Study Design

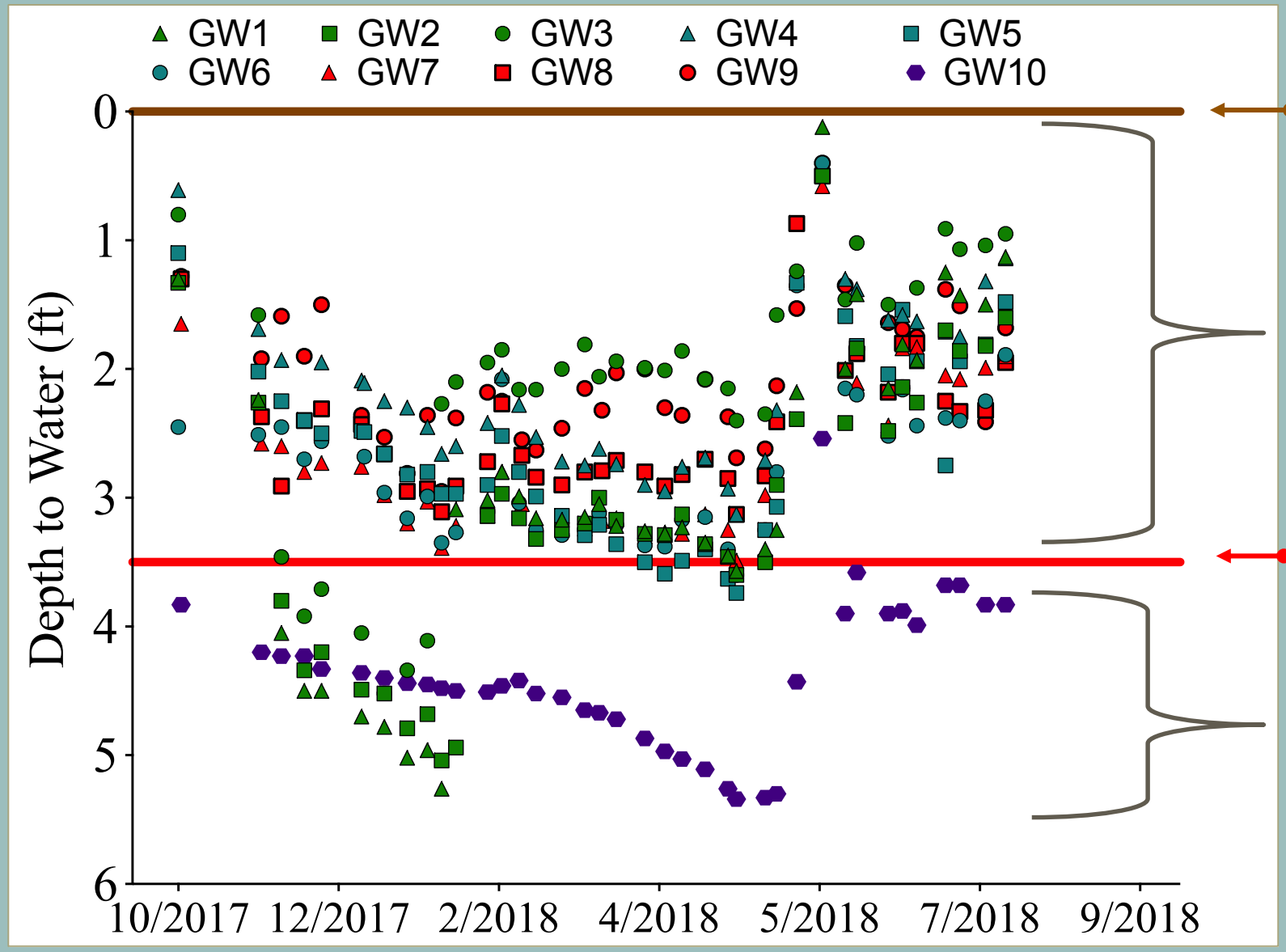
- 10 groundwater sites
  - 3 Hancock Creek
  - 3 Central Drainage
  - 3 Powell Creek
  - 1 Reference
- 10 Surface Water Sites
  - 5 Hancock Creek
  - 1 Central Drainage
  - 4 Powell Creek



Seasonal Sampling



Depth to Groundwater



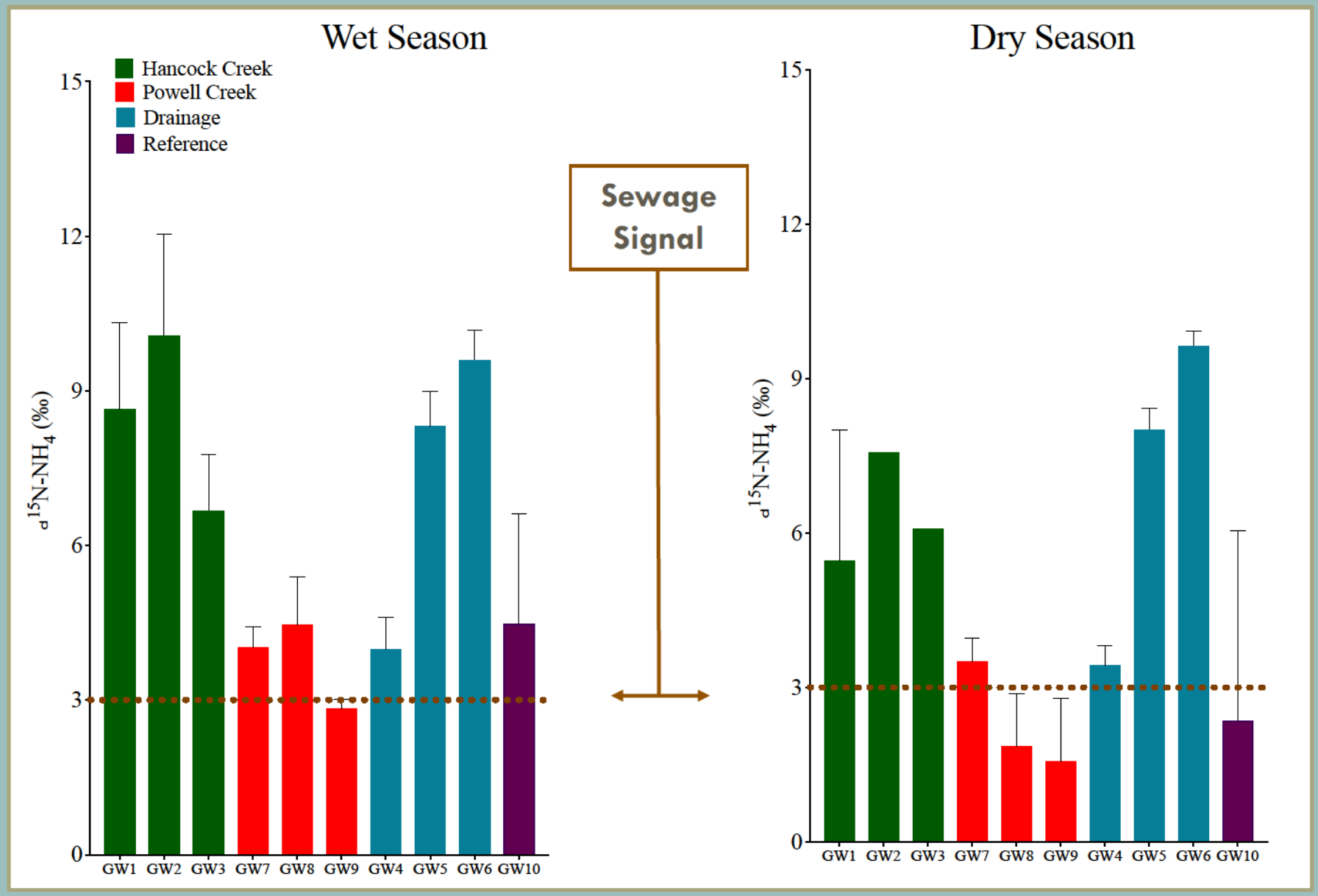
Ground Surface

91% Out of Compliance

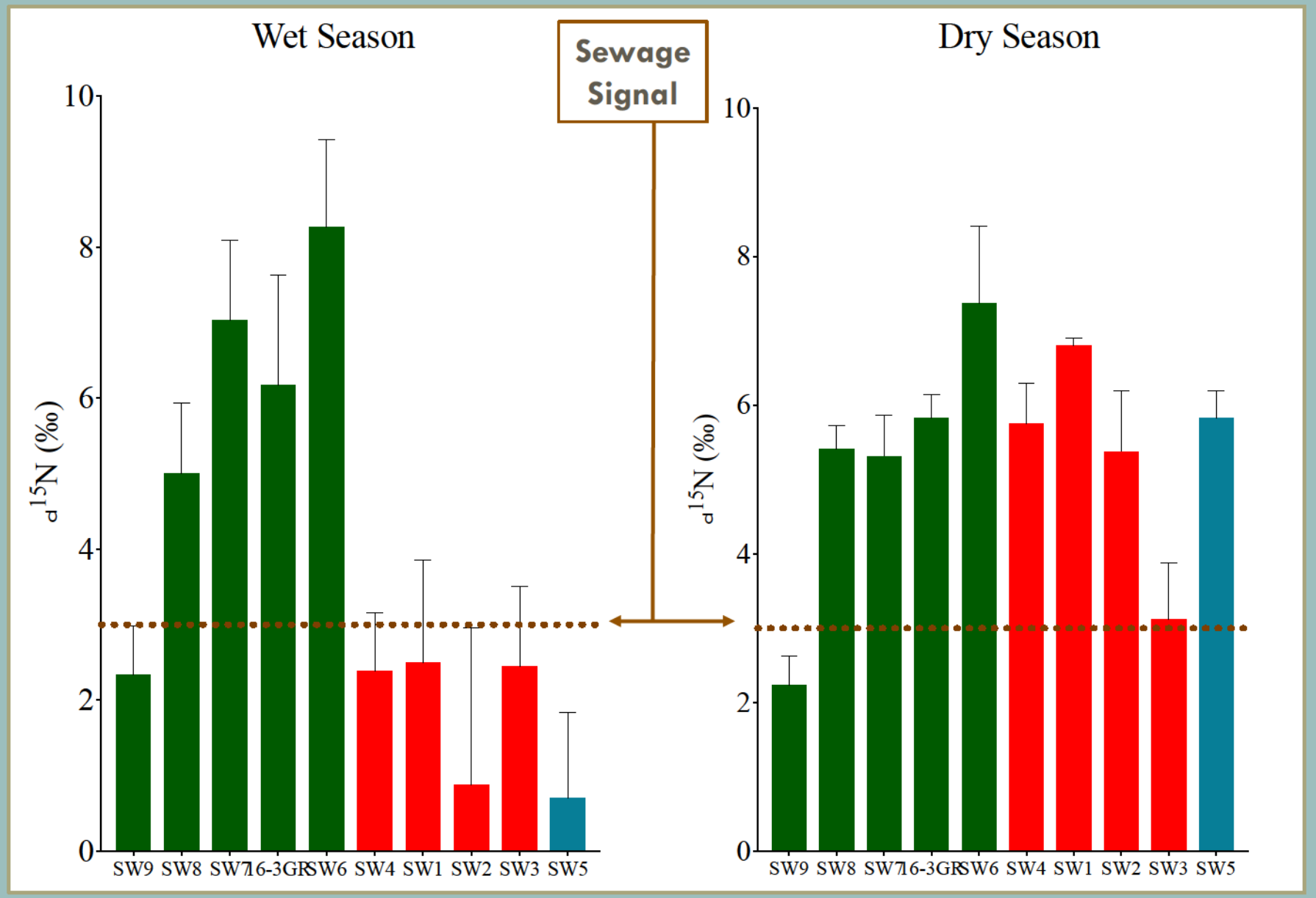
Minimum Separation

Mostly Reference Site- Out of Project Area

Groundwater Results: Nitrogen Isotopes



Surface Water Results: Phytoplankton N Isotopes



Groundwater Summary

-Fecal bacteria present
-High BOD

Indicate a human wastewater influence

High Nutrients

Drainage Basin	Site	Bacteria		Pharmecuticals			Artificial Sweetener	Dissolved Nutrients					
		Enterococci	Biological Oxygen Demand	Acetaminophen	Carbamazepine	Primidone	Sucralose	NH4	NO3	DIN	SRP	TN	TP
Hancock Creek	GW1			-									
	GW2		-	-									
	GW3			-		-							
Powell Creek	GW7				-	-							
	GW8			-	-	-							
	GW9			-	-								
Central Drainage	GW4		-	-					-				
	GW5			-		-							
	GW6			-		-							

Conclusion: Groundwater influenced by wastewater

Surface Water Summary

-High fecal bacteria
-Human molecular tracers
-Elevated BOD

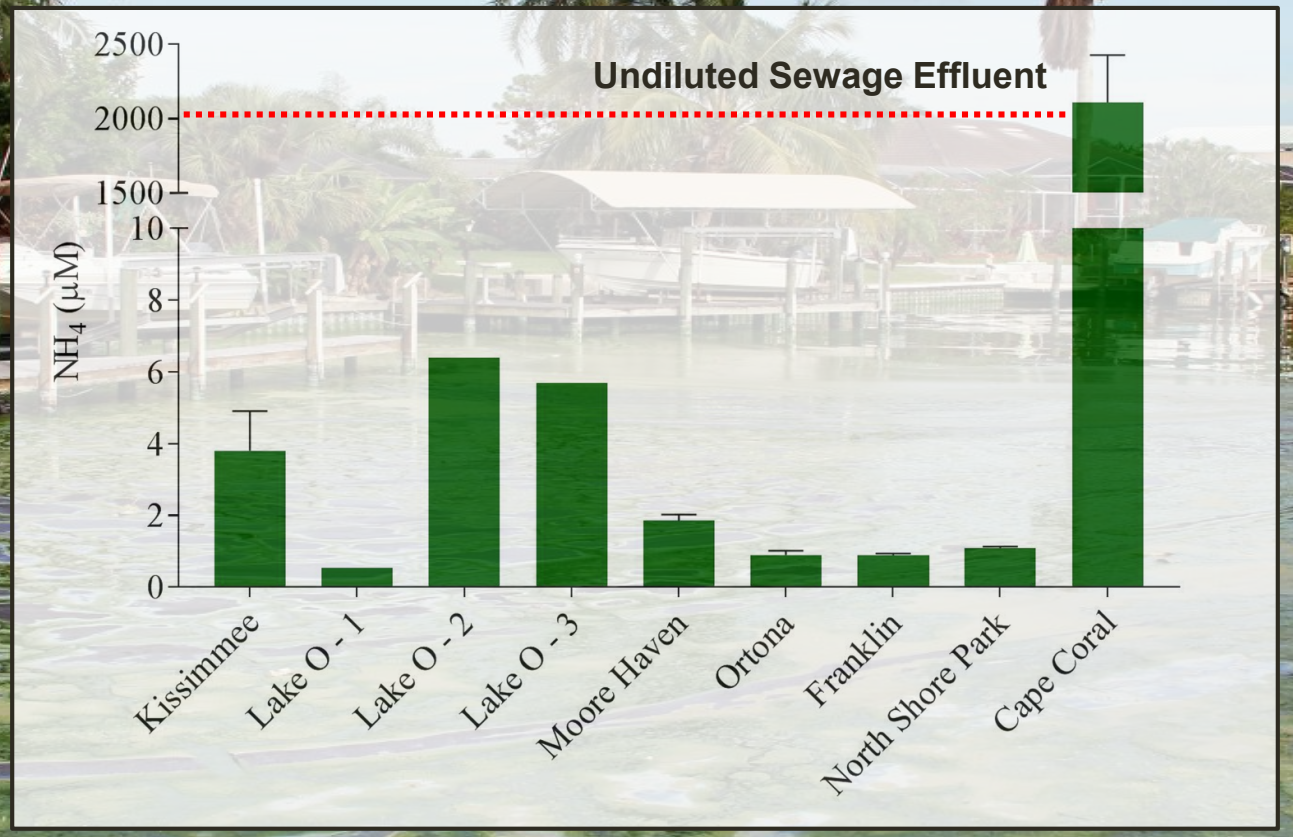
Indicate human wastewater & surficial runoff influence

High Nutrients

Basin	Site	Bacteria						Chemical Tracers										Dissolved Nutrients					
		Entero-cocci	*E. coli*	BacR-qPCR	GFD-purified-qPCR	HF183-qPCR	BOD	2,4-D	Acetami-nophen	Bent-azon	Carba-maze-pine	Primi-done	Sucra-lose	Diuron	Fluri-done	Imaz-apyr	Imida-cloprid	NH4	NO3	DIN	SRP	TN	TP
Hancock Creek	SW9							-	-			-		-			-						
	SW8			-					-														
	SW7								-														
	16-3GR								-														
	SW6					-			-														
Powell Creek	SW4			-				-	-					-									
	SW1			-				-	-					-									
	SW2			-										-									
	SW3			-										-									
Central Drainage	SW5											-											

Conclusion: Surface water influenced by wastewater & surficial runoff

Blue-Green Algae in Cape Coral Canals
July 2018



Summary

- High fecal bacteria
- Widespread wastewater tracers
- Multiple lines of evidence = septic effluent influence
  - Tidal pumping
- Surficial urban runoff
  - Herbicides
  - Pesticides
  - Fertilizers
  - Pet waste
  - Lawn clippings
- Seasonal variation = rainfall, water table, seasonal residents

Study Implications

- Local Basin Nutrient Inputs
  - Seasonal residents add to seasonal variation
- Groundwater [sucralose] = WWTP effluent
- [TN/TP] = sewage
  - North Shore Park & Powell Creek
- Downstream effects of localized nutrient enrichment
  - Red tide
  - *Microcystis* (seeded by Lake O)
  - Red drift algae

Conclusions

- Septic systems in the study area **NOT** protective of local water quality
  - Low elevation
  - High water table
  - Near Caloosahatchee
- Help improve water quality with:
  - Septic-to-sewer
  - Septic system retrofit
  - Better stormwater management

Ongoing Monitoring

- Summer 2019 = YR 2
  - YR1 heavy rainfall
  - YR1 lack of occupancy
  - Annual variability
- Groundwater wells
- Monitor SW hot spots
  - High bacteria
  - Chemical or molecular source tracers
  - Nutrient concentrations


Questions?
www.hboihablab.weebly.com

Next Steps

- The multiple lines of evidence in this study indicate an influence of human wastewater on local water quality.
- Supported by intensive data collection.
- An estimated 2,164 septic systems are located within the study area.
- Improperly designed, maintained, and failing septic systems are contributing to nutrient and bacteria loading to the Caloosahatchee.
- **Based on results of the study, should we bring back targeted remedial options to address the water quality impairments identified?**