

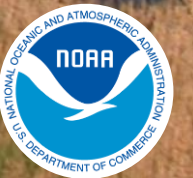


Establishing a Water Quality Baseline in the Impounded Guana River Estuary

Nikki Dix, Shannon Dunnigan, GTM Research Reserve

Jessica Lee, University of North Florida

Jimmy Tomazinis, Northeast Florida Aquatic Preserves





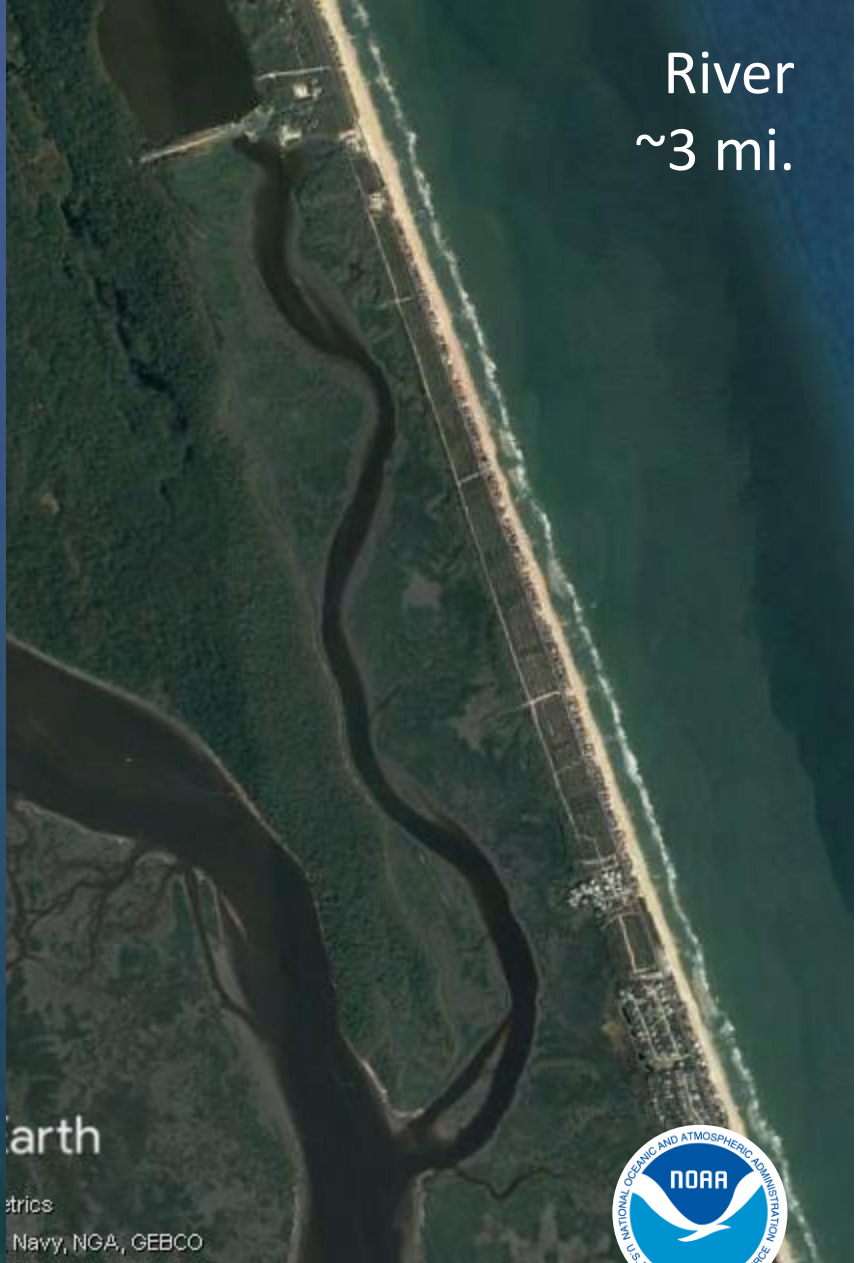
Headwaters
~7 mi.



Lake
~10 mi.



River
~3 mi.



Google Earth

© 2018 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google Earth

© 2018 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google Earth

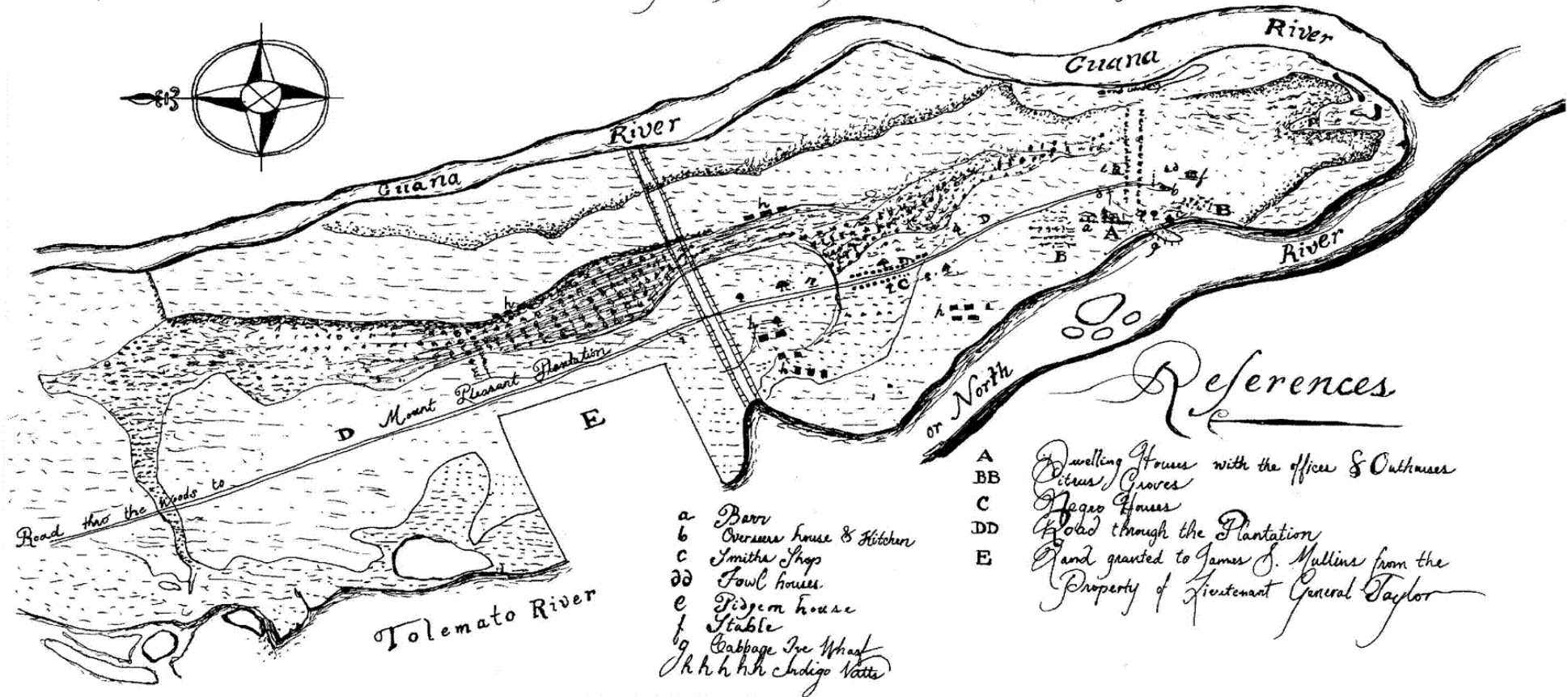
© 2018 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO





A PLAN

of 1450 Acres of Land on the Province of East Florida the Property of
 Lieutenant Gen James Grant called Grants Villa.



References

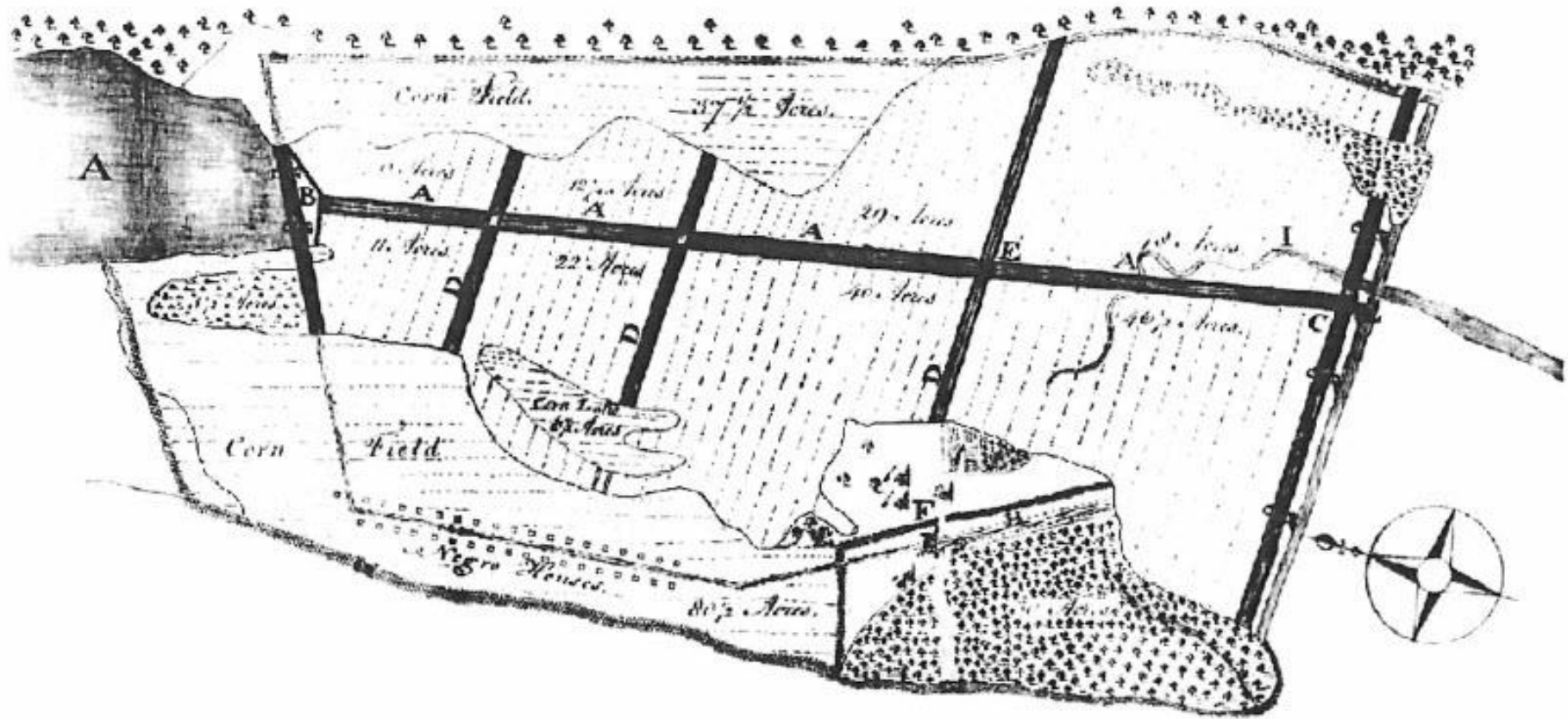
- A Dwelling House with the office & Outhouses
- BB Citrus Groves
- C Negro Houses
- DD Road through the Plantation
- E Land granted to James S. Mullins from the Property of Lieutenant General Taylor

- a Barr
- b Overseers house & Kitchen
- c Smiths Shop
- dd Fowl houses
- e Pigeon house
- f Stable
- g Cabbage Tree Wharf
- h h h h h Indigo Vats



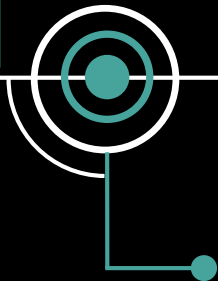


A PLAN of Mount Pleasant Plantation belonging to Genl James Grant in East Florida



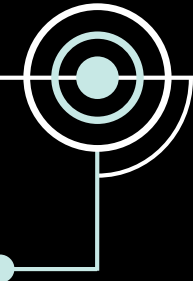


1911



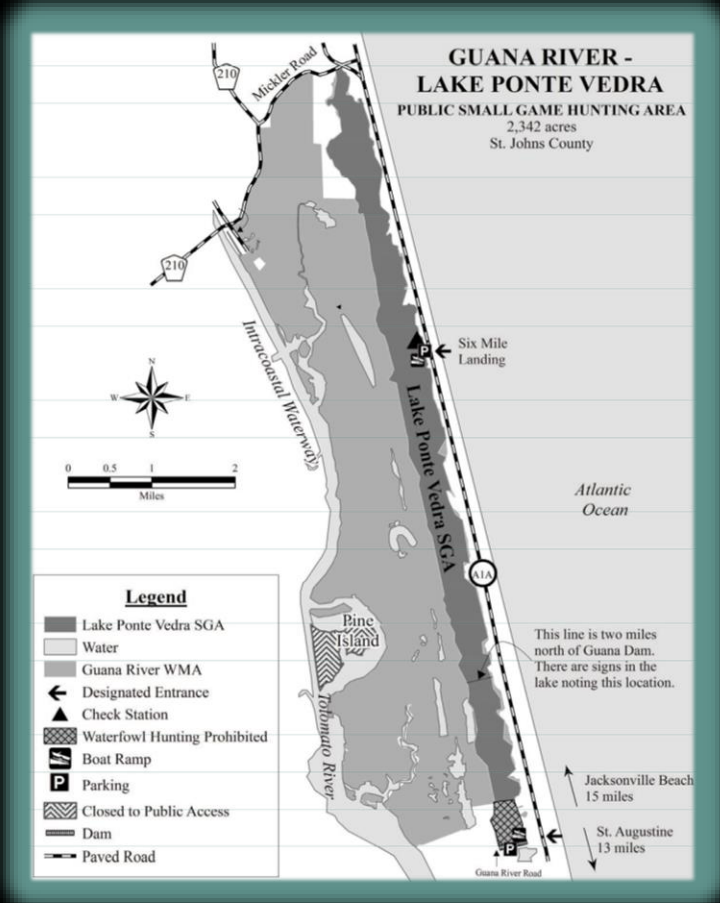
GUANA RIVER
DREDGED

DEVELOPMENT OF
PONTE VEDRA INN
AND GOLF COURSE



1920s





1950s



Creation of
Lake Ponte
Vedra

1961



Construction
of Guana
Dam



4- 4-42

CZA- 4C -29

1942

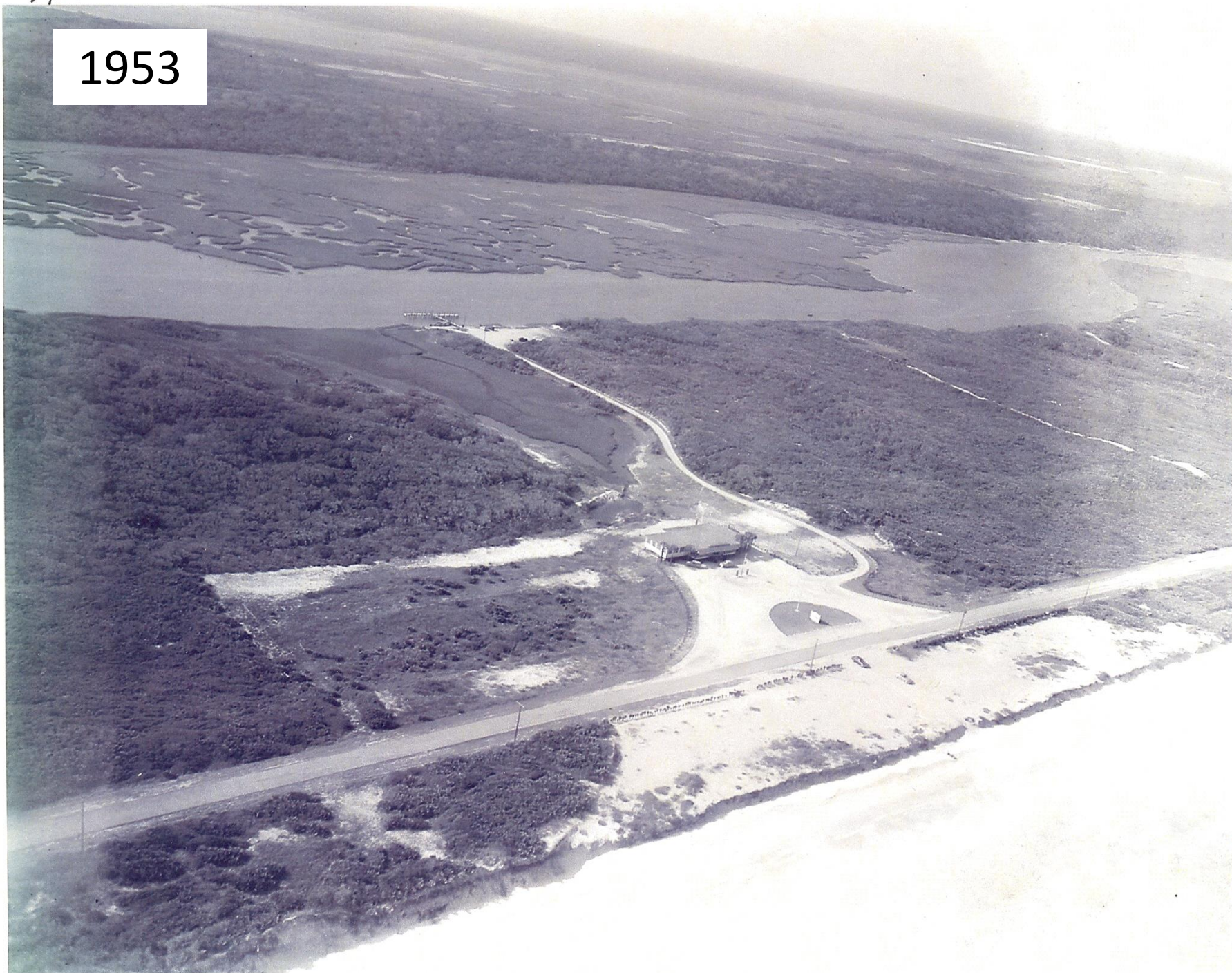


2019

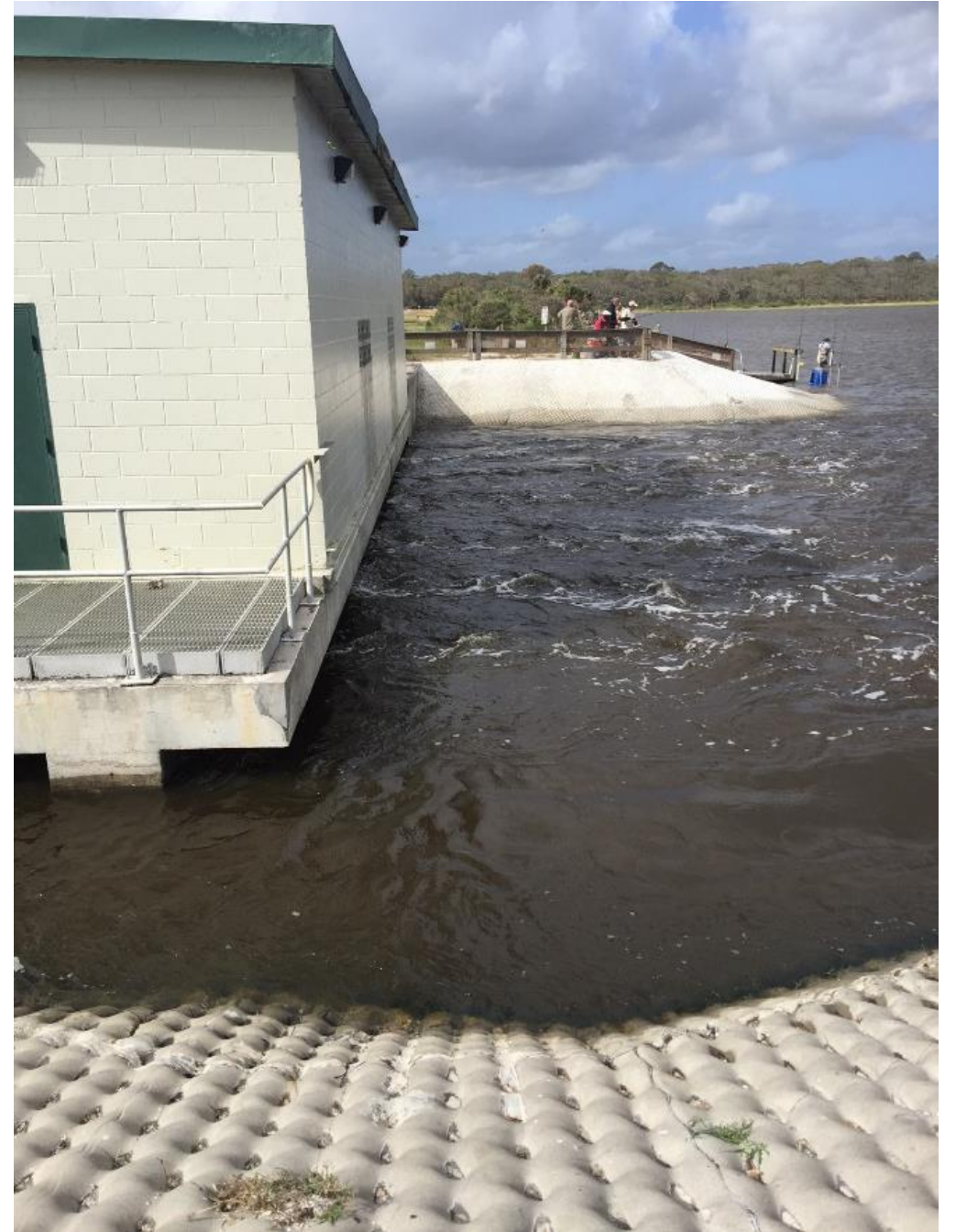




1953









1985



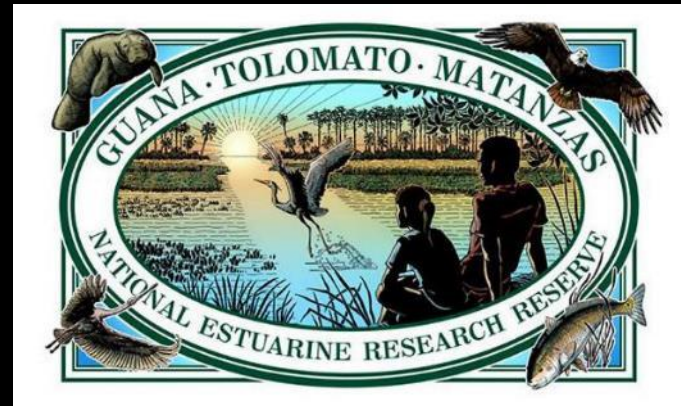
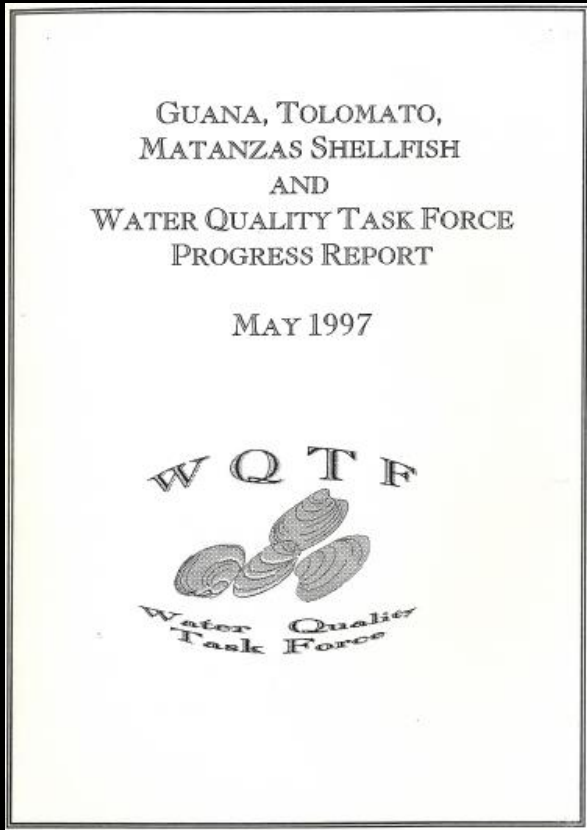
Shellfish
Harvesting
Restricted in
Guana River

1986



Guana River
Designated as
"Outstanding
Florida Water"





1995



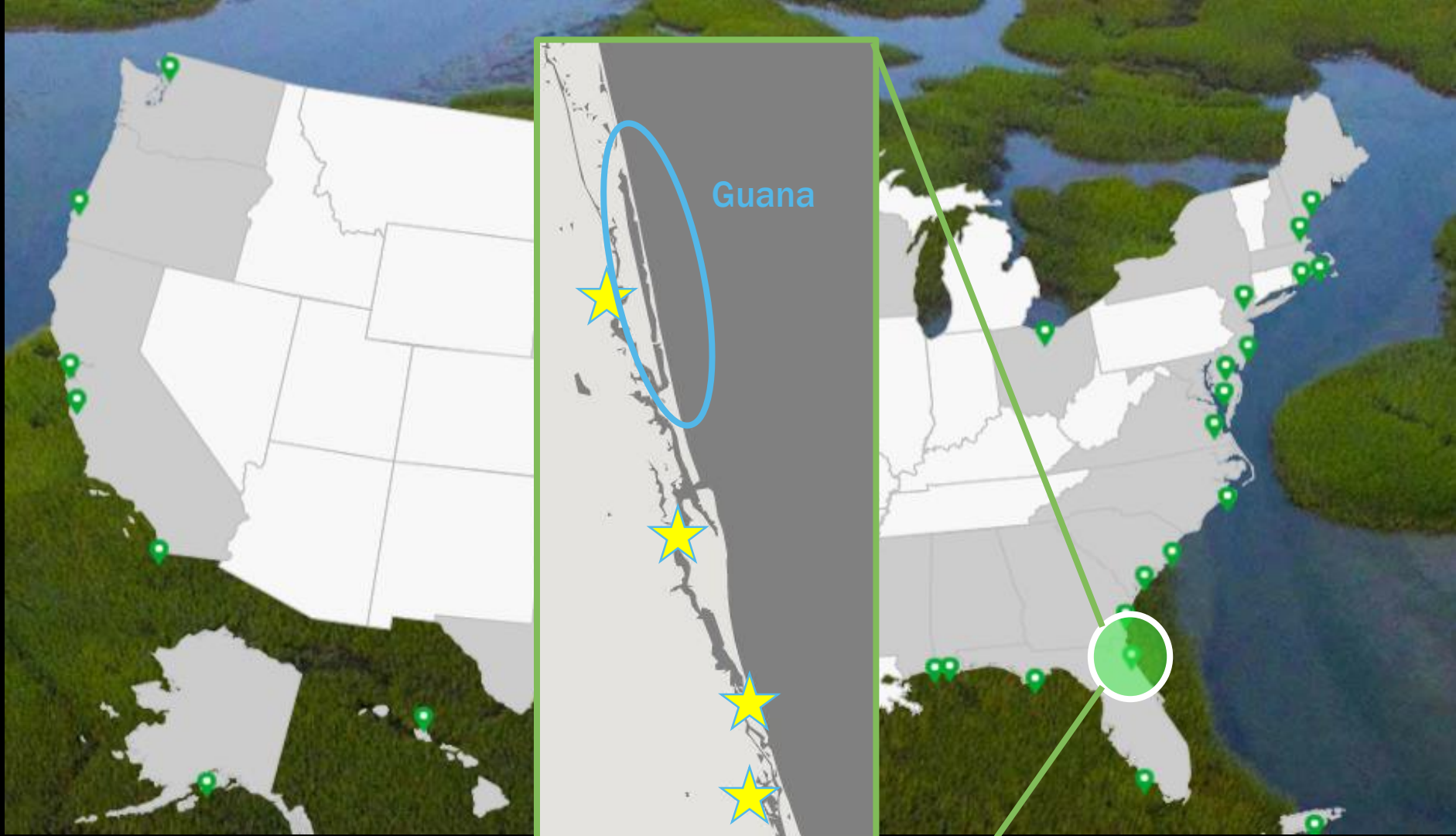
GTM Shellfish and Water Task Force Established

1999

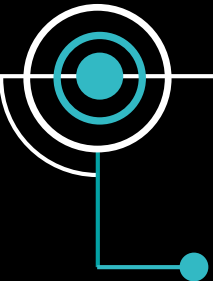


GTMNERR Established





2002



Long-Term Water
Quality Monitoring
Program





2014



Ecosystem Assessment
by NOAA & GTMNERR

Integrated Assessment of Ecosystem Condition and Stressor Impacts in Submerged Habitats of the Guana Tolomato Matanzas (GTM) National Estuarine Research Reserve (NERR)

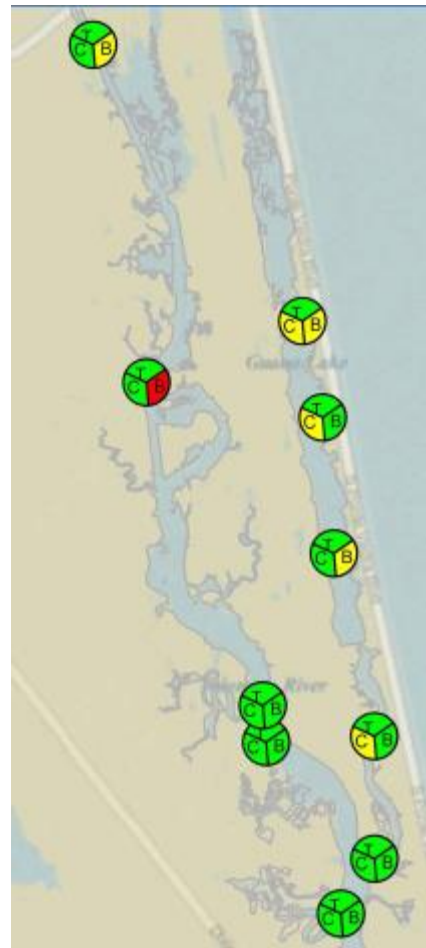


NOAA Technical Memorandum NOS NCCOS 231





- High Bacteria
- Intermediate Sediment Contamination
- Some stress in benthic community



	Healthy benthos	: B-IBI 3.0-5.0
	Intermediate/some stress:	B-IBI 2.0-2.5
	Unhealthy benthos	: B-IBI 1.0-1.5
	Low	: Mean ERM Quotient ≤ 0.02
	Intermediate:	Mean ERM Quotient $> 0.02 - 0.058$
	High	: Mean ERM Quotient > 0.058
	No toxicity:	Neither of 2 assays significant
	Moderately toxic:	1 of 2 assays significant
	Highly toxic:	Both assays significant

Fecal coliform (CFU/100ml)

	0 - 14
	14 - 28.5
	28.5 - 43
	43 - 114
	114 - 334





2015



Reestablishment of the Oyster & Water Quality Taskforce





<https://gtmnerr.wixsite.com/owqtf>

OYSTER & WATER QUALITY TASK FORCE

Of the Guana, Tolomato, and Matanzas Rivers

LEARN MORE

OYSTERS

WATER QUALITY

RESOURCES

MISSION

Recognizing the role that oyster habitat plays as an indicator of water quality, and the cultural importance of shellfish in our region, we seek to ensure the sustainability of oysters in the Guana, Tolomato, and Matanzas rivers by working to understand and improve the health of our estuarine waters.





Proposed 77-home development Vista Tranquila sparks opposition from residents, conservation groups



2017
- present

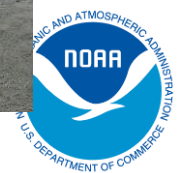


Development
Pressures





Community Support





Community Support



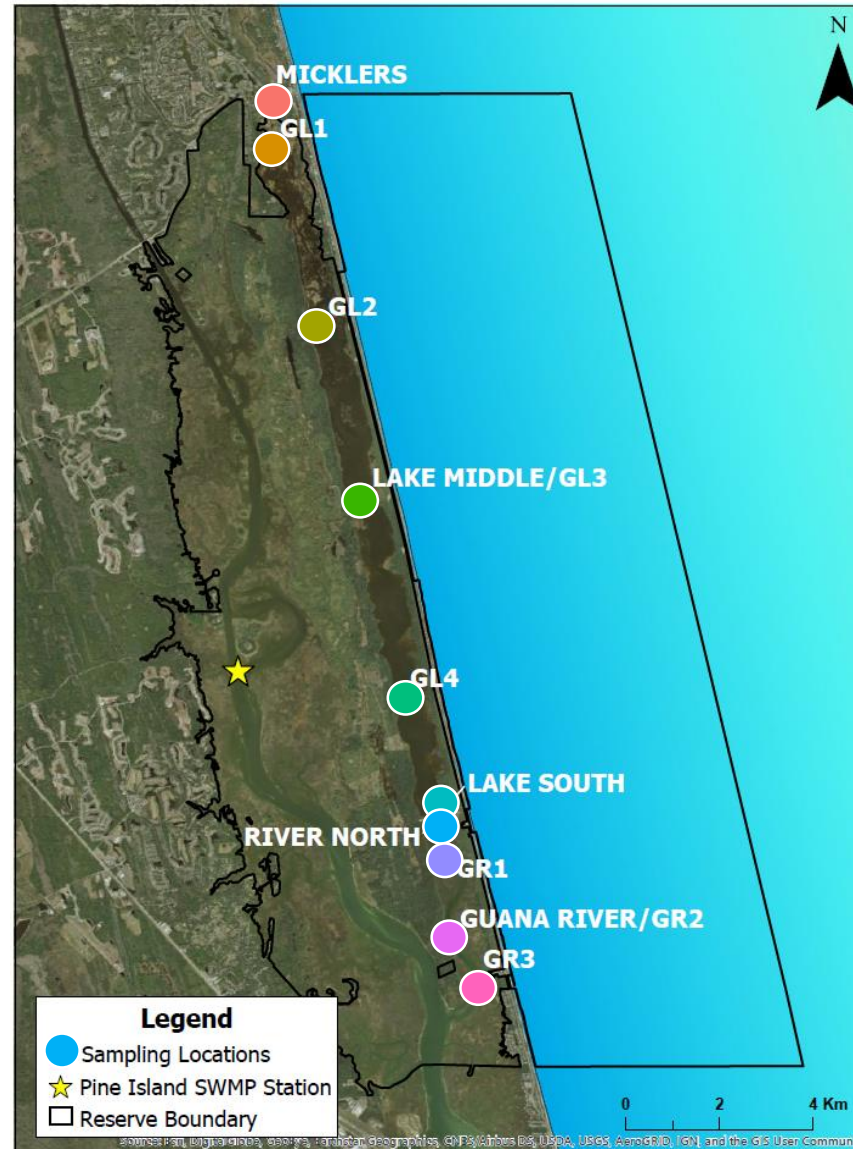


Preliminary Sampling





Extended Sampling





Water Quality Assessment

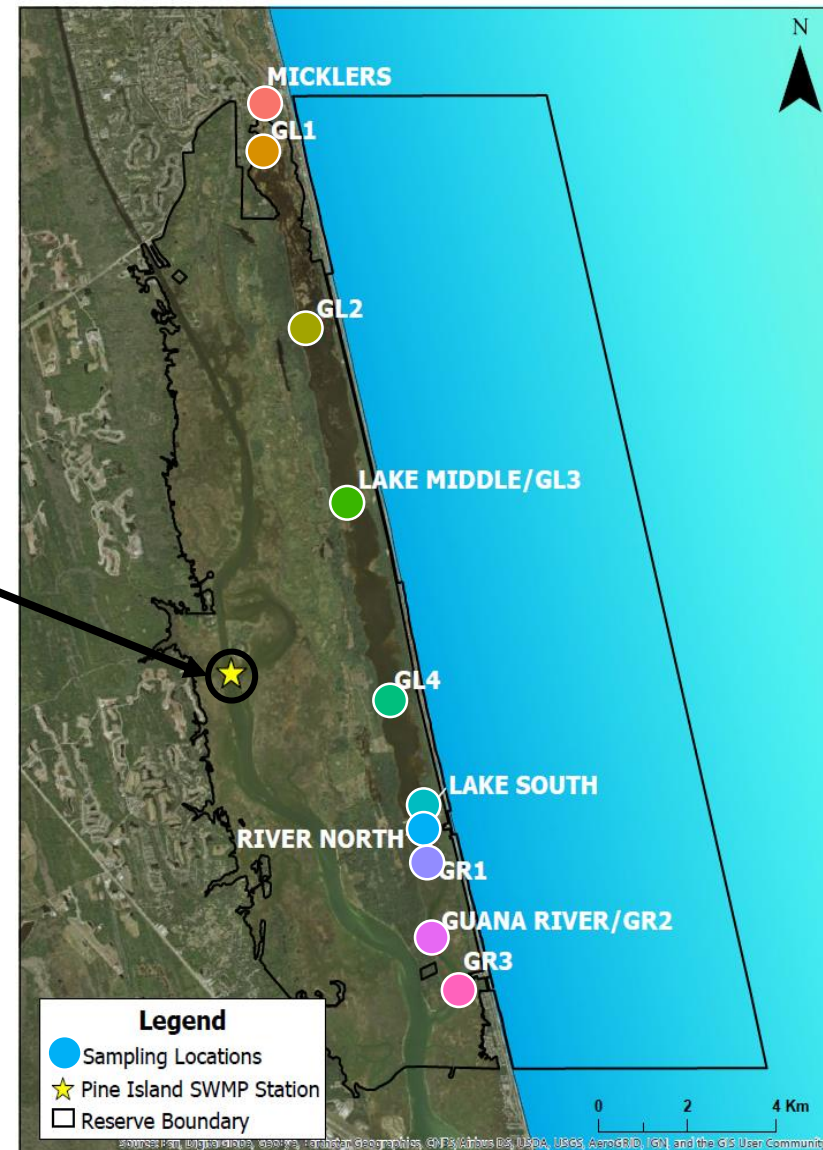
- **State (Clean Water Act) Standards**
- Reference Site
- Biological Responses





Water Quality Assessment

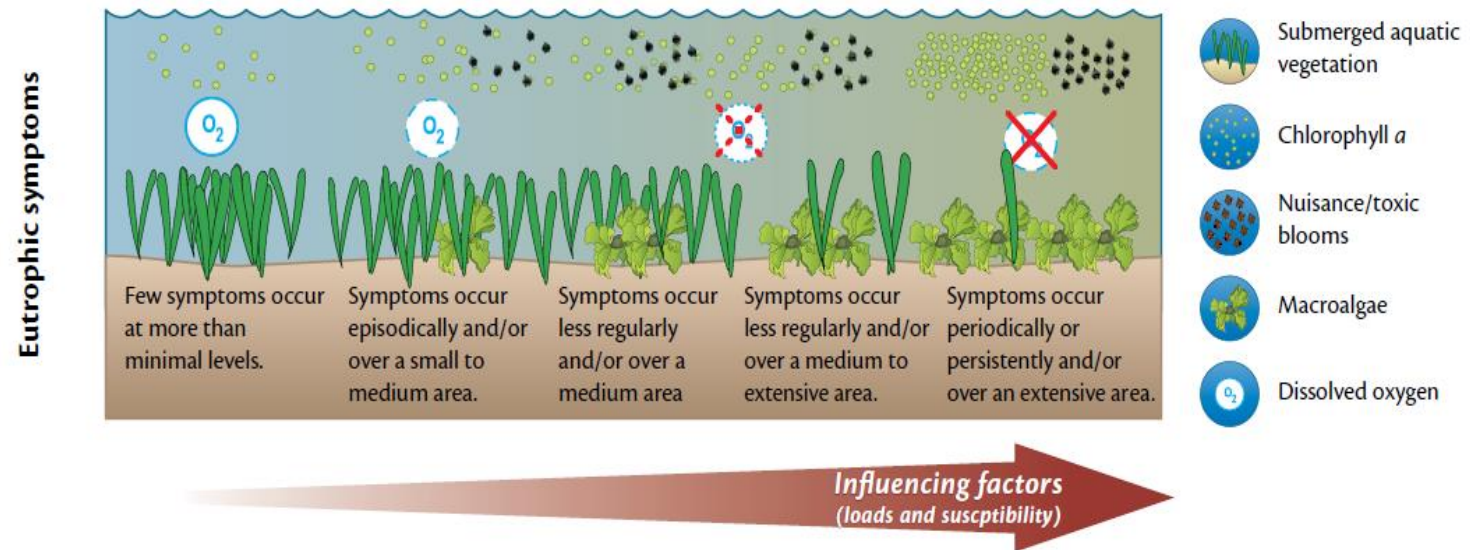
- State (Clean Water Act) Standards
- **Reference Site**
- Biological Responses





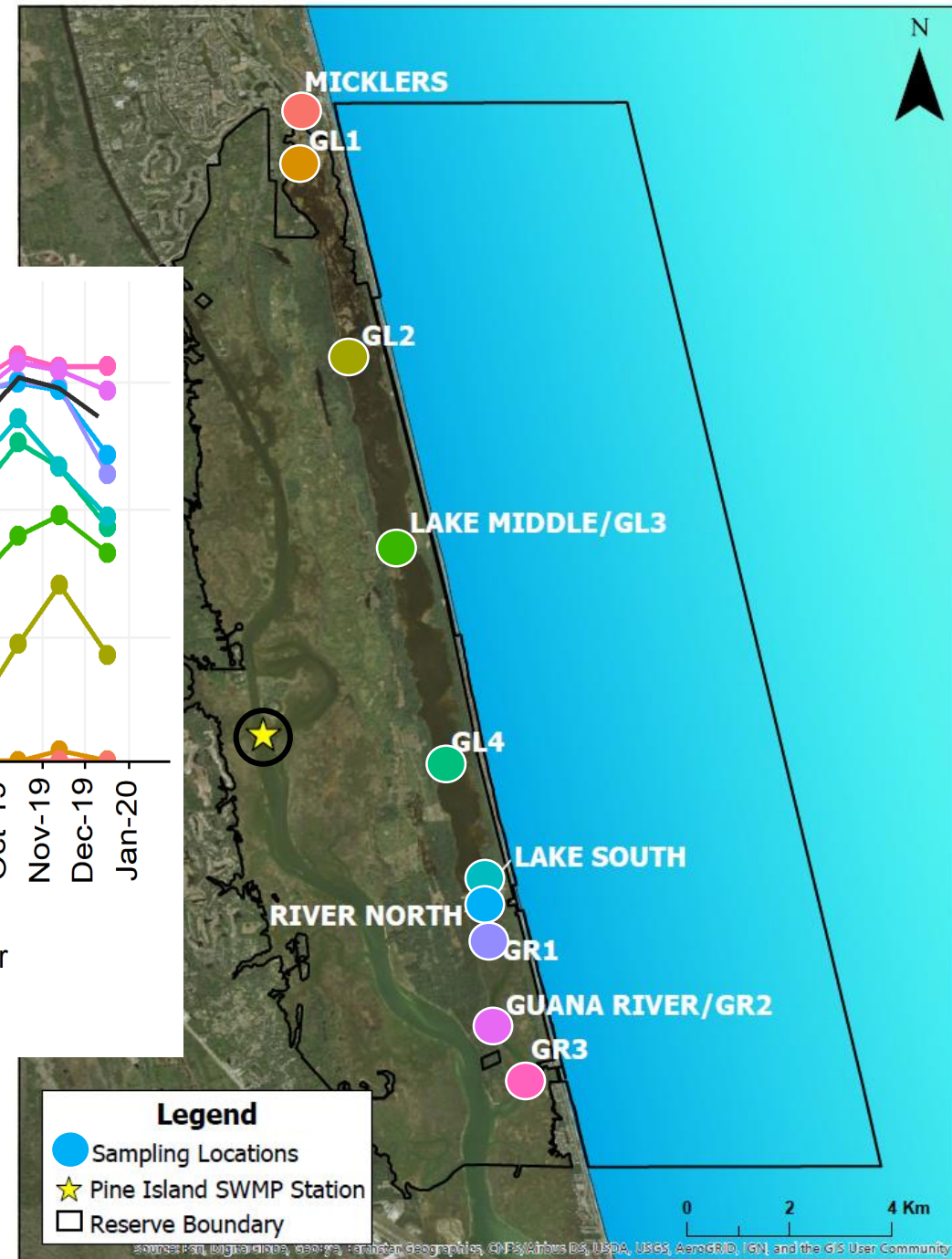
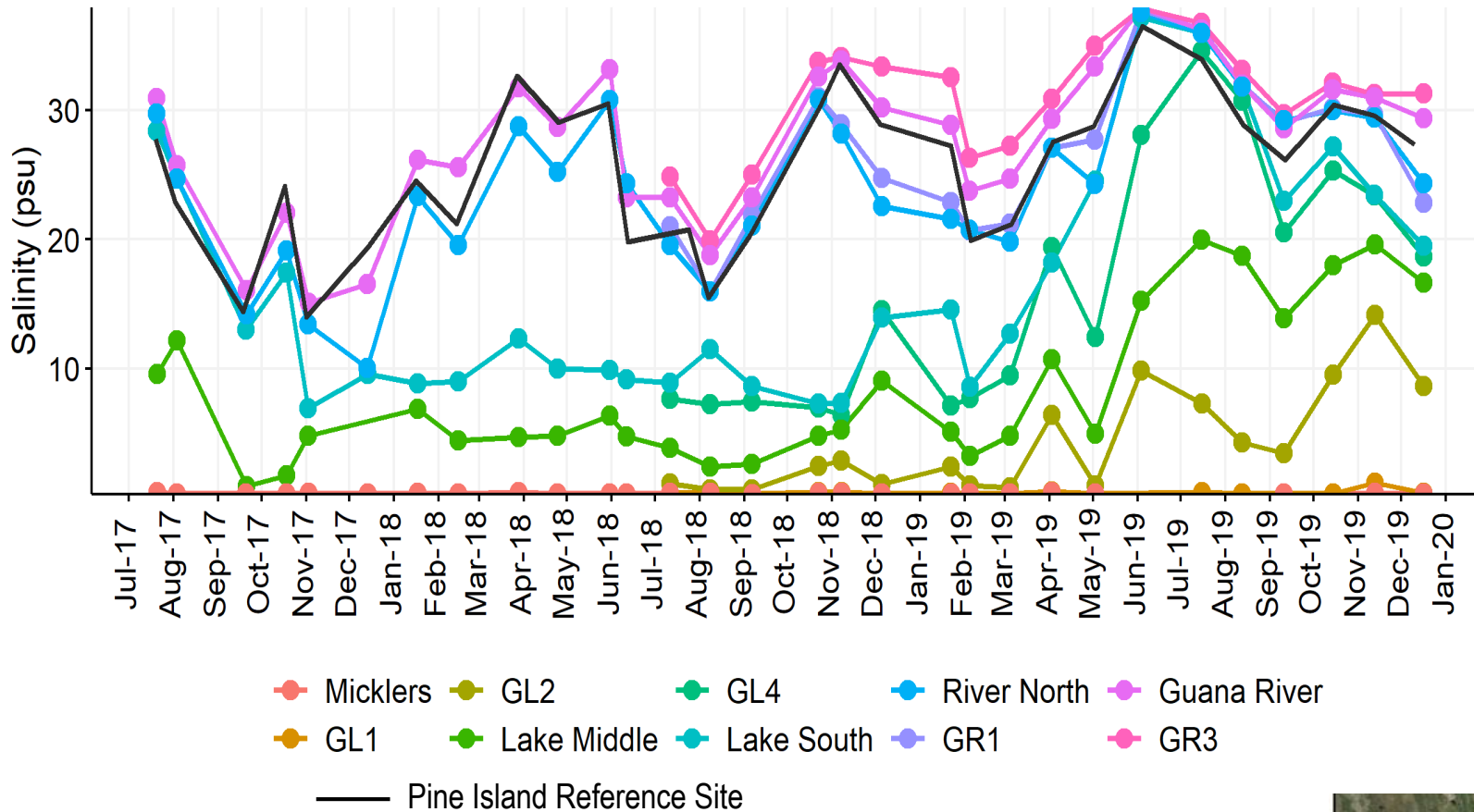
Water Quality Assessment

- State (Clean Water Act) Standards
- Reference Site
- **Biological Responses**



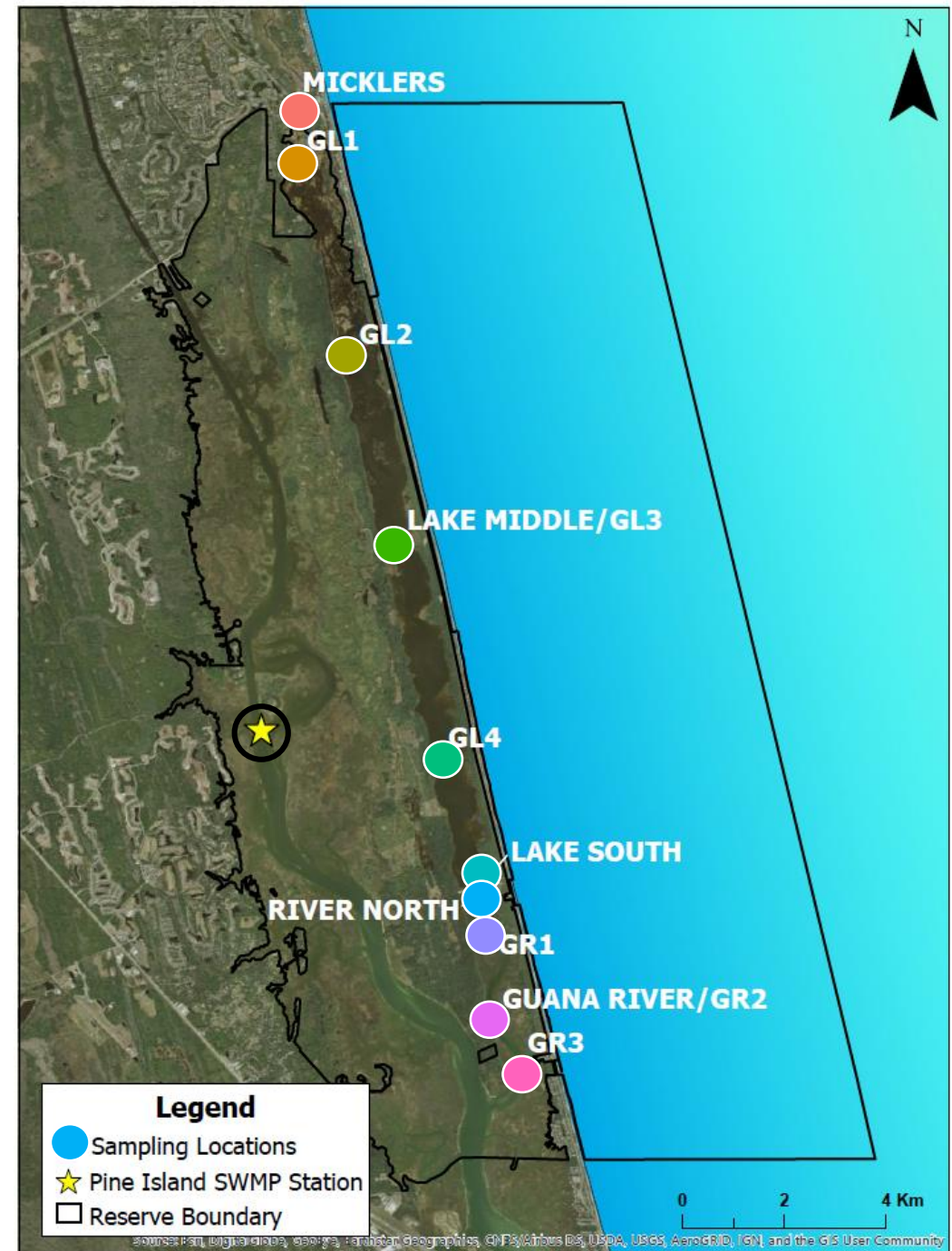
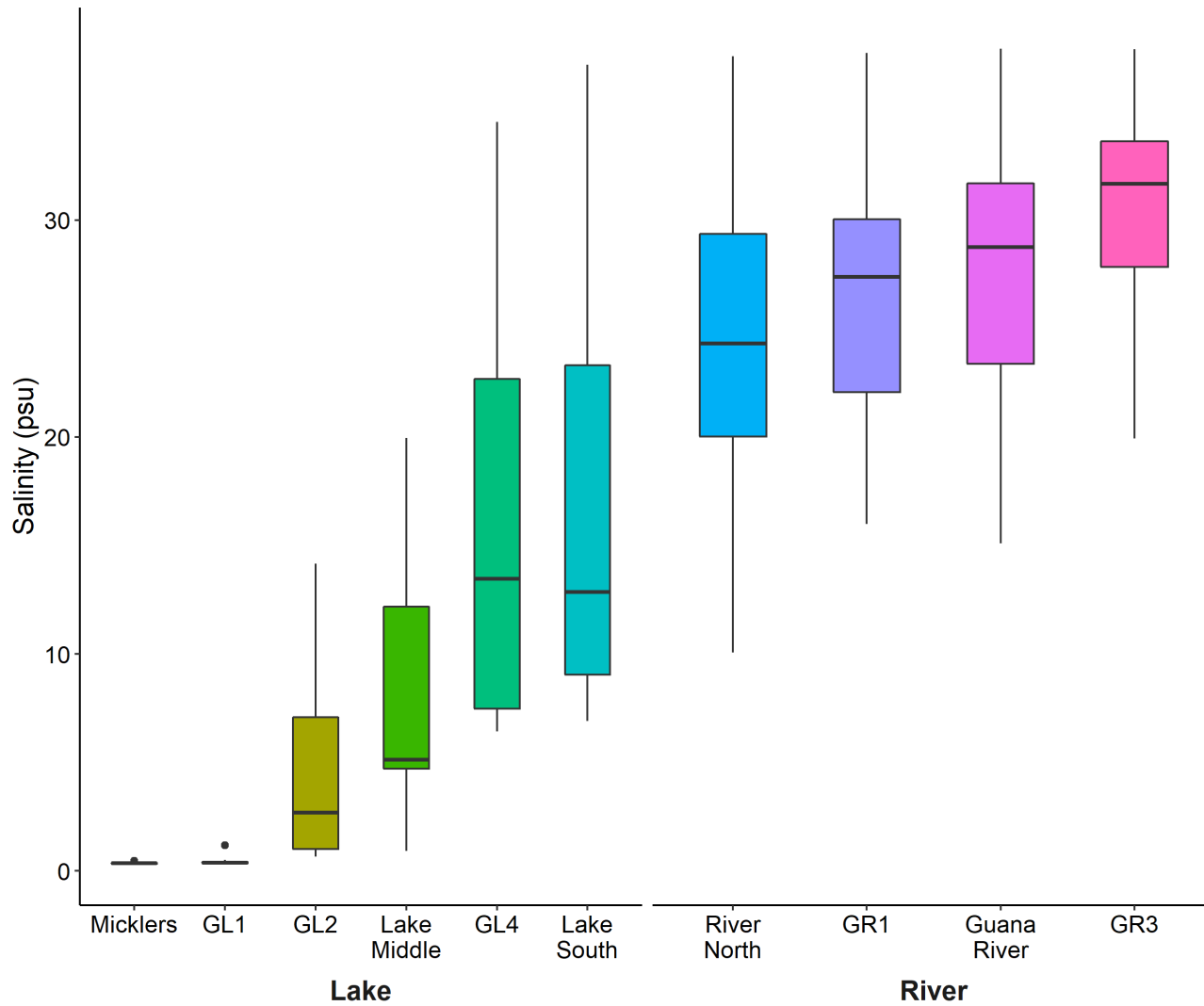


Salinity



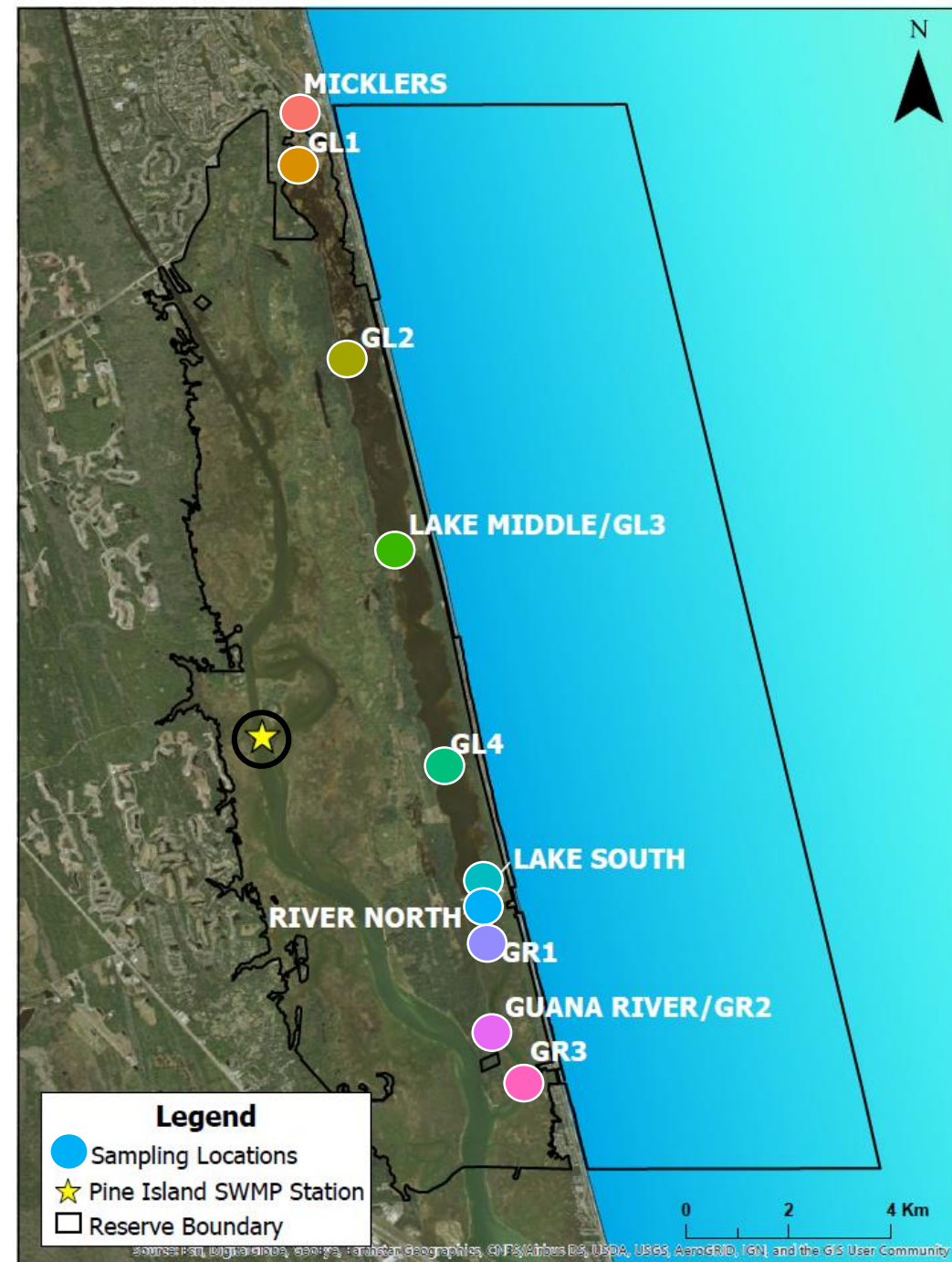
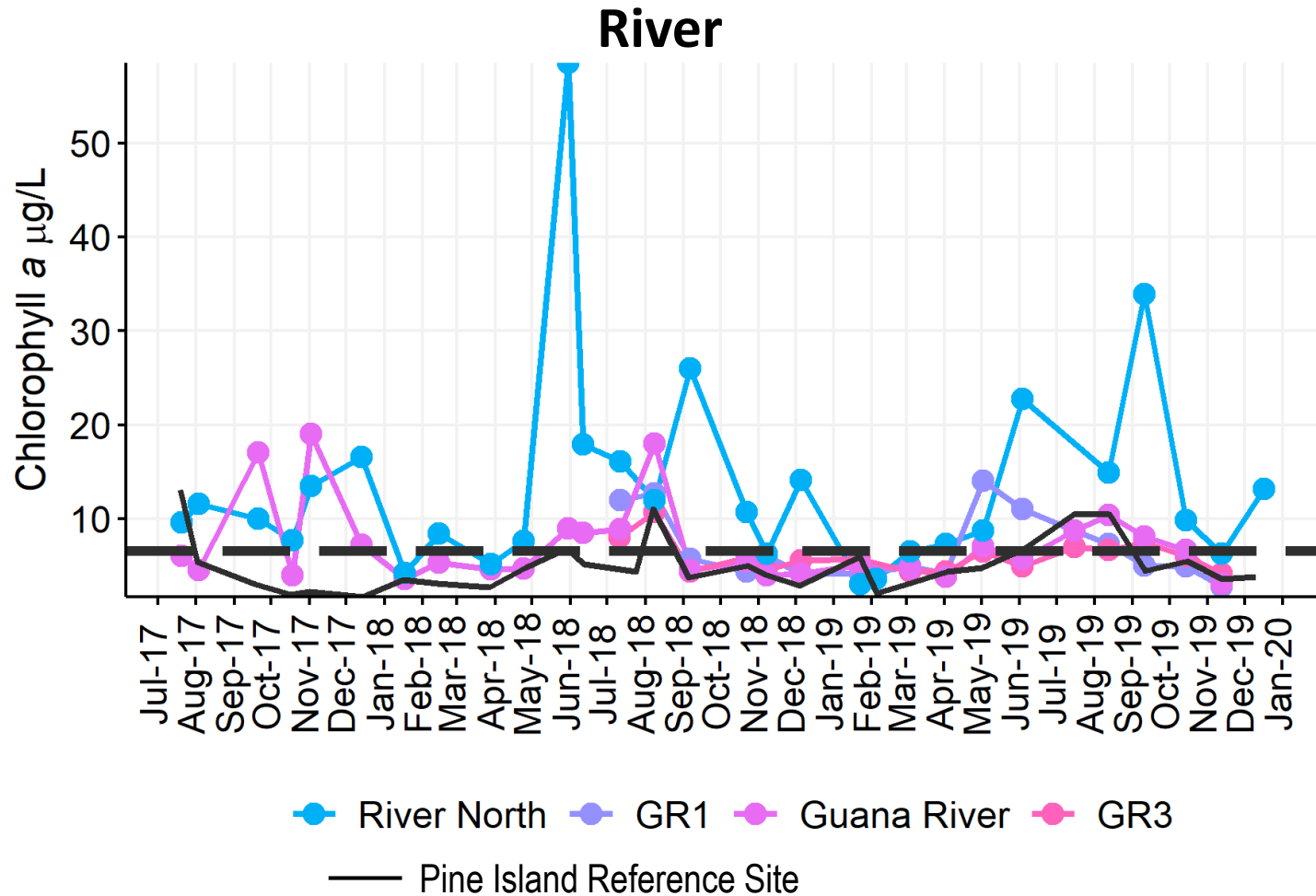


Salinity



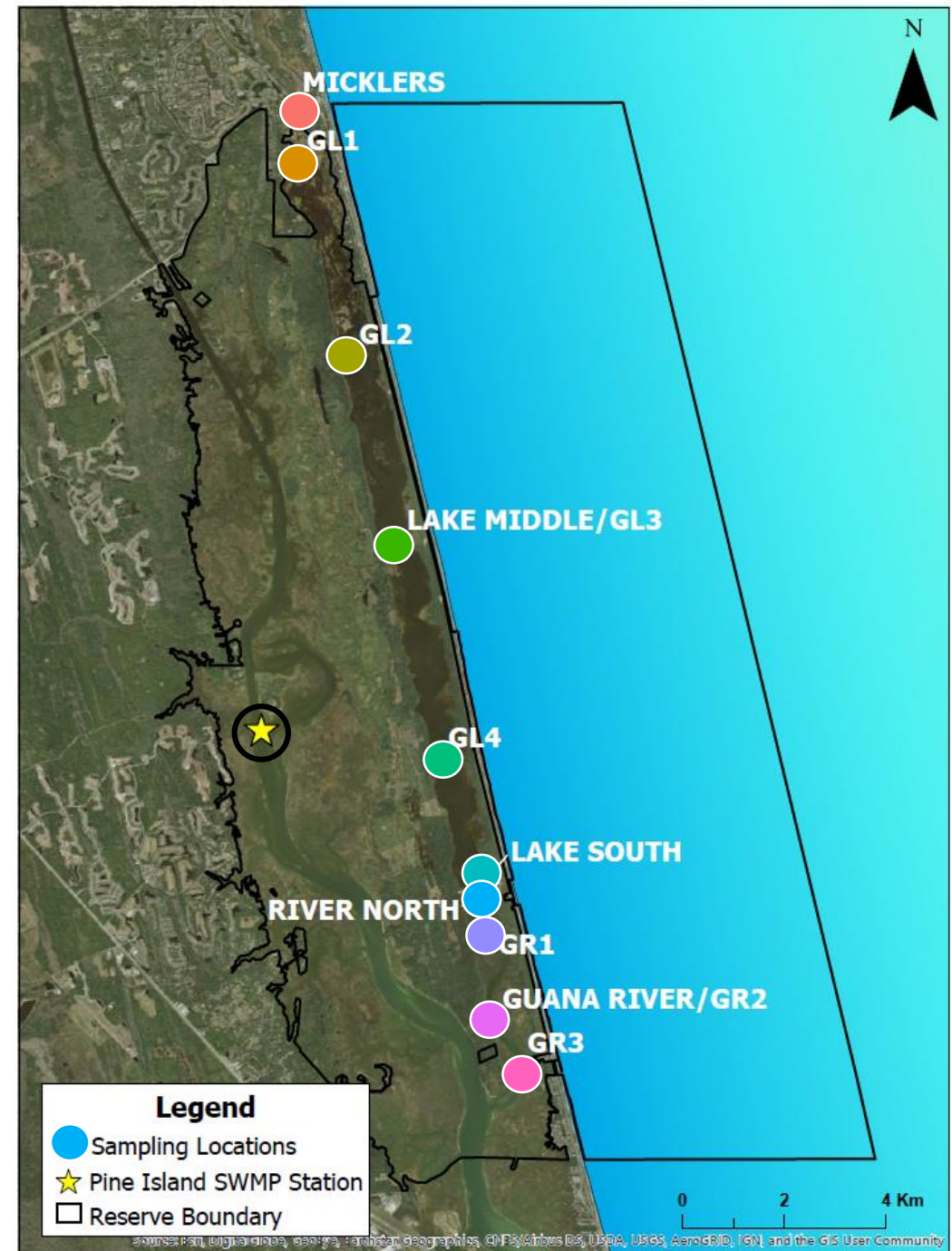
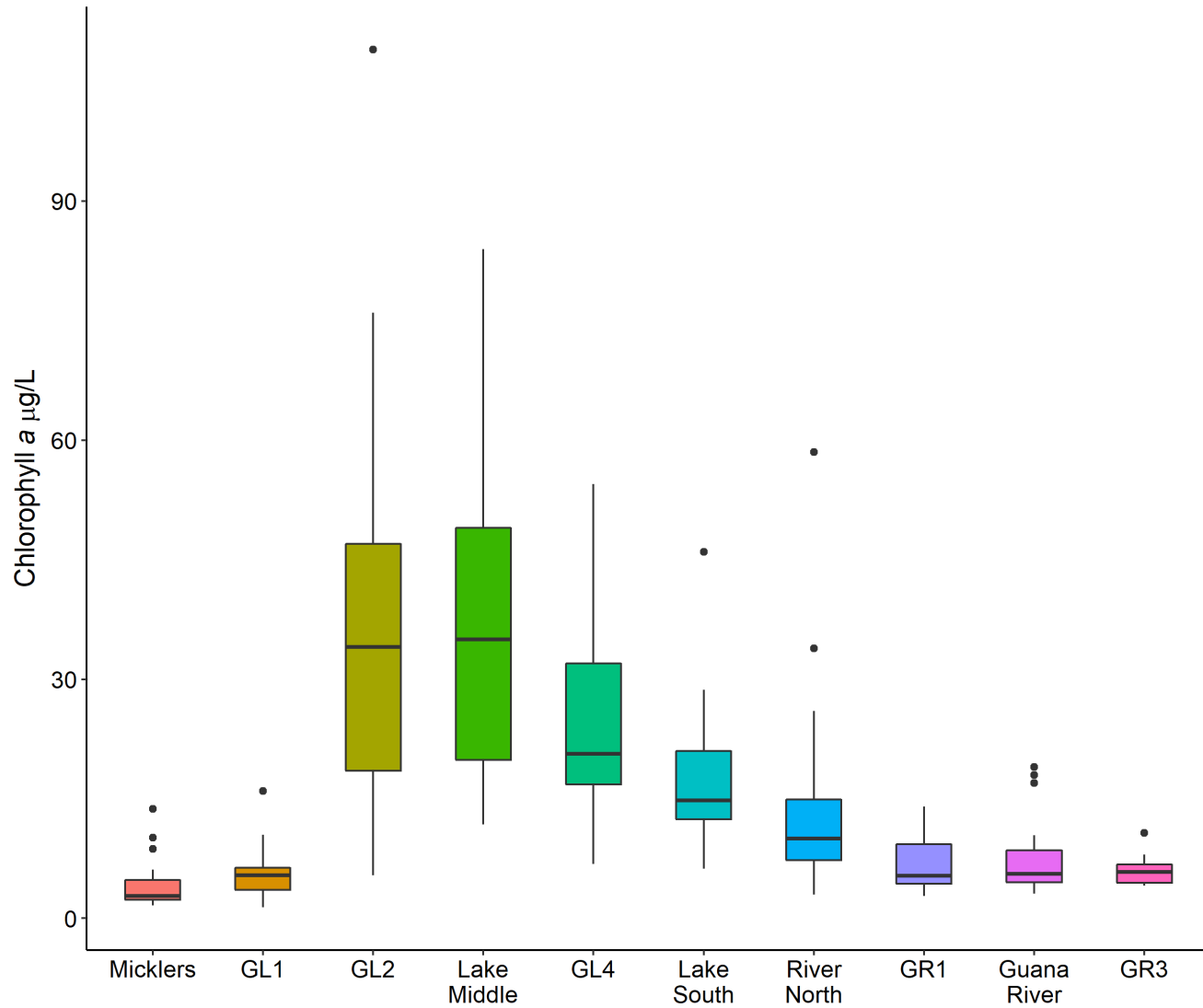


Chlorophyll



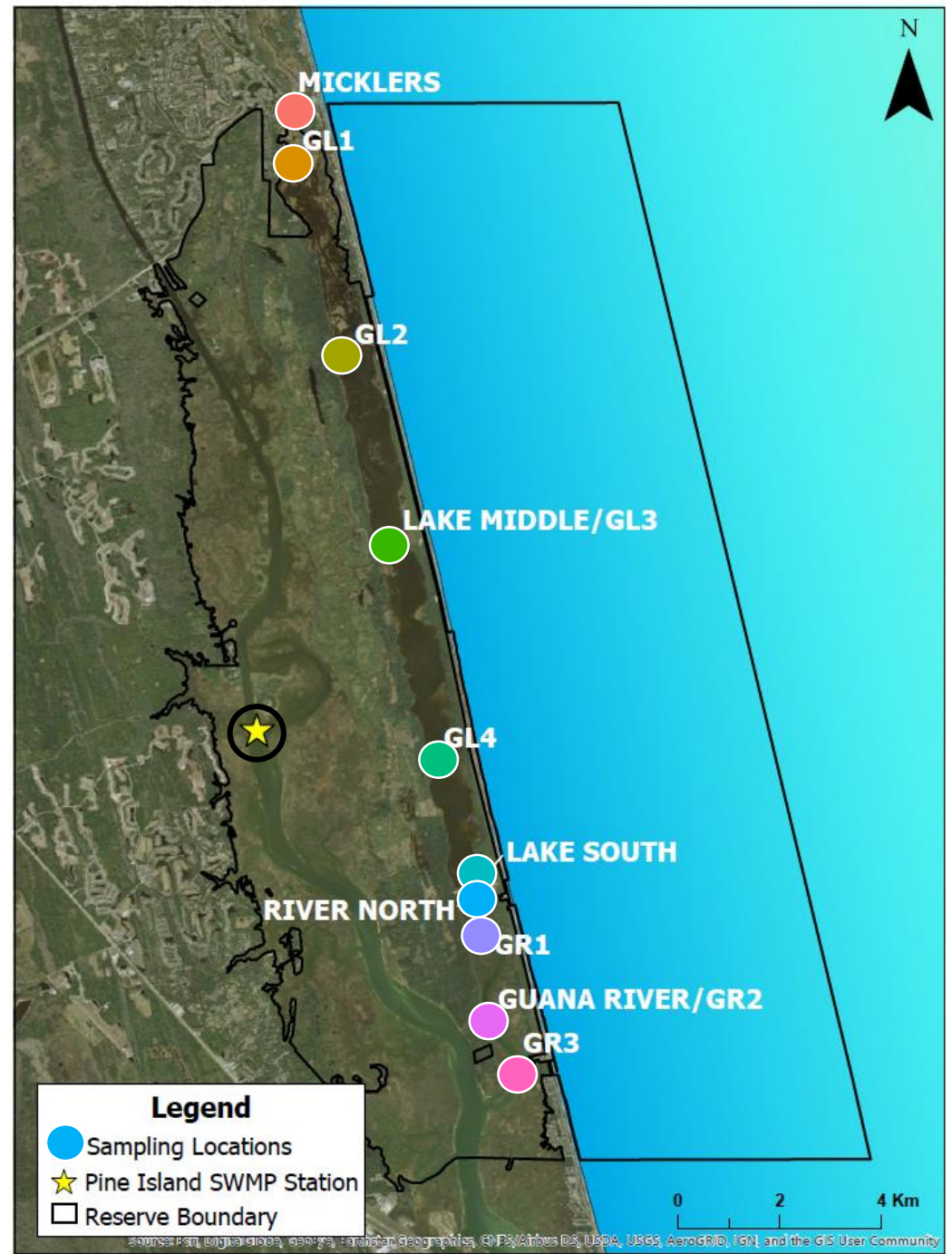
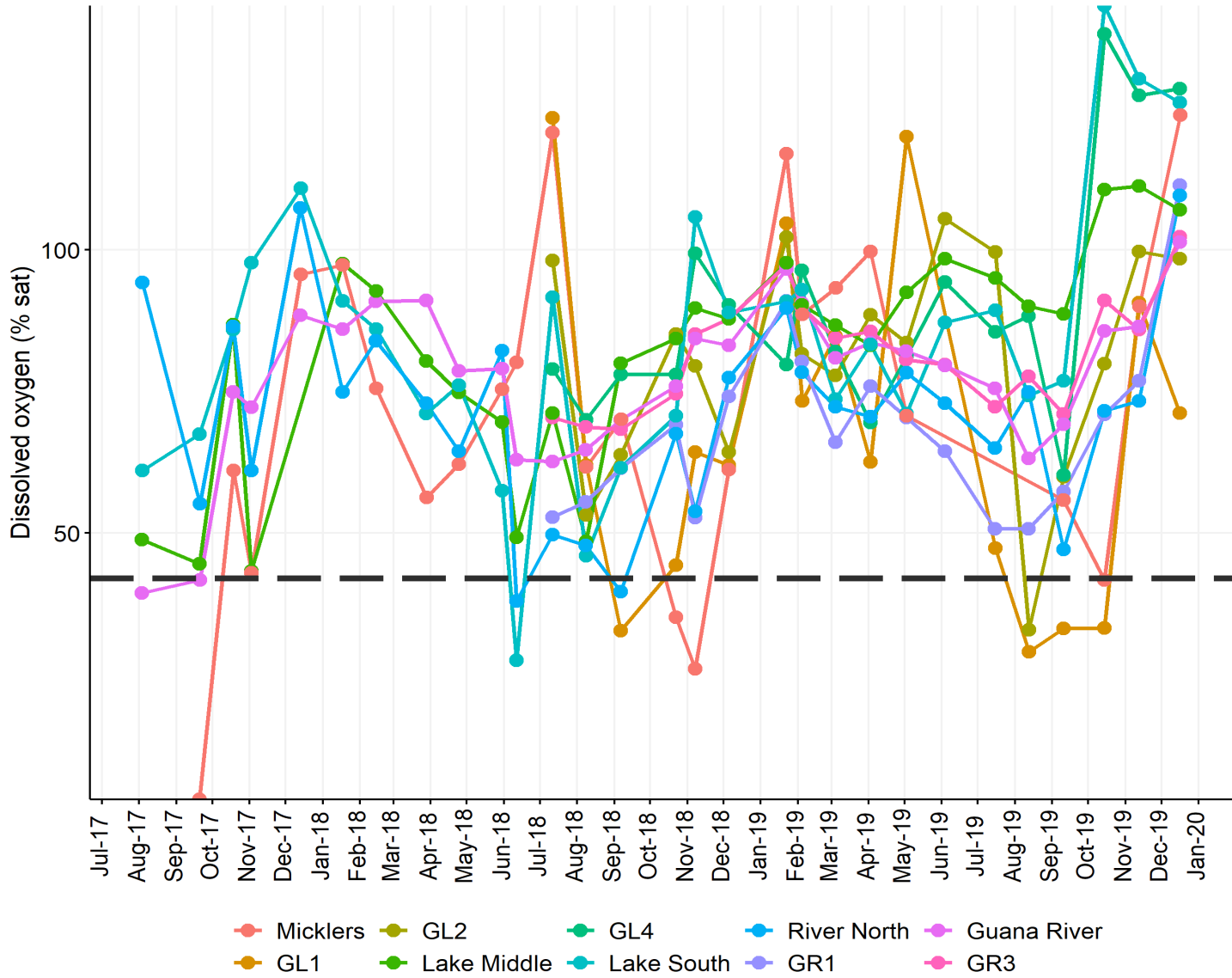


Chlorophyll





Dissolved Oxygen

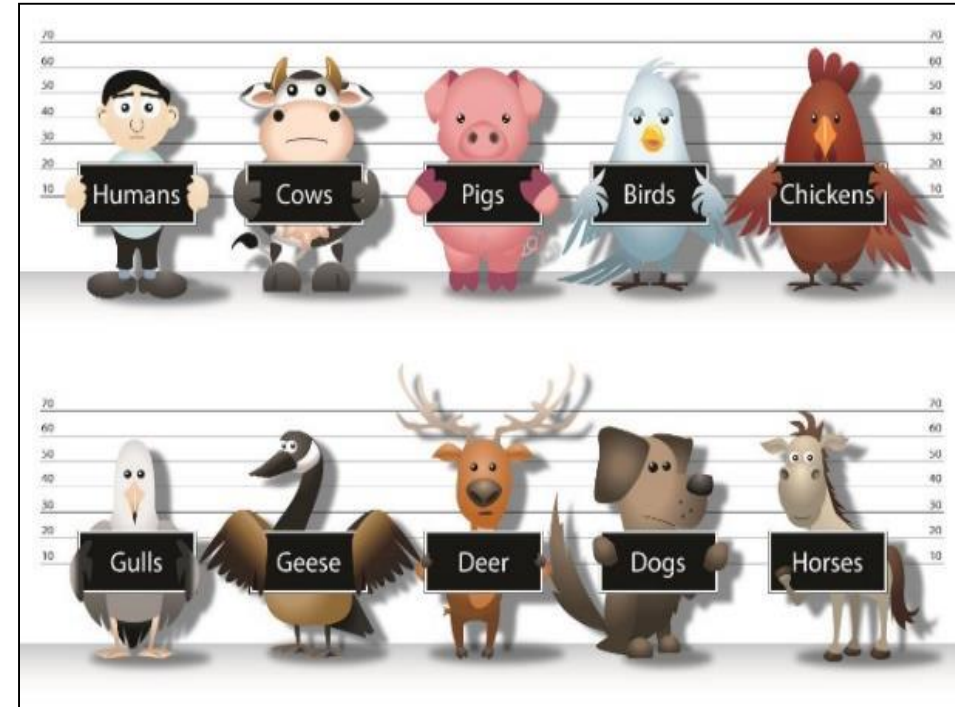




Bacteria & Source Tracking



Fecal bacteria

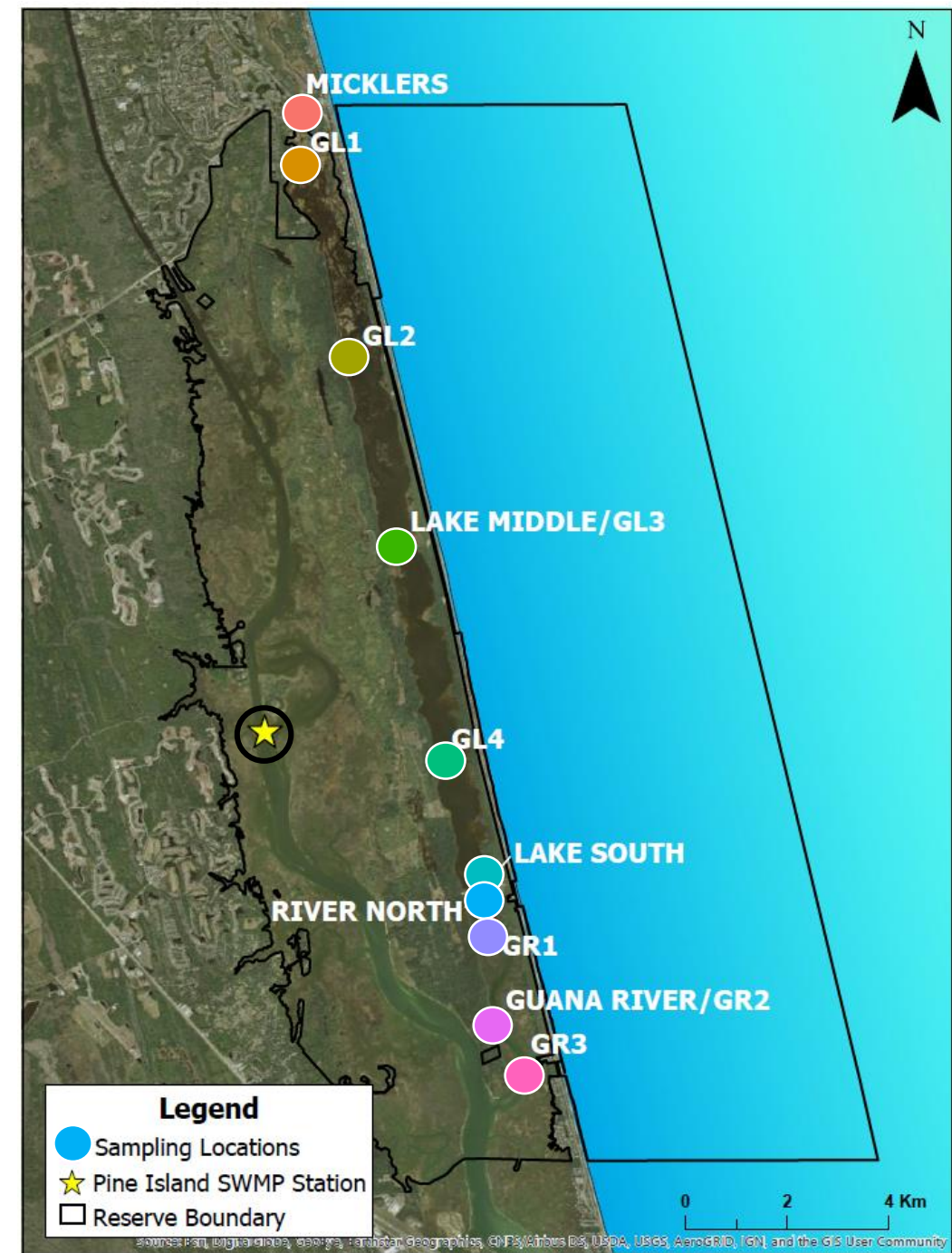
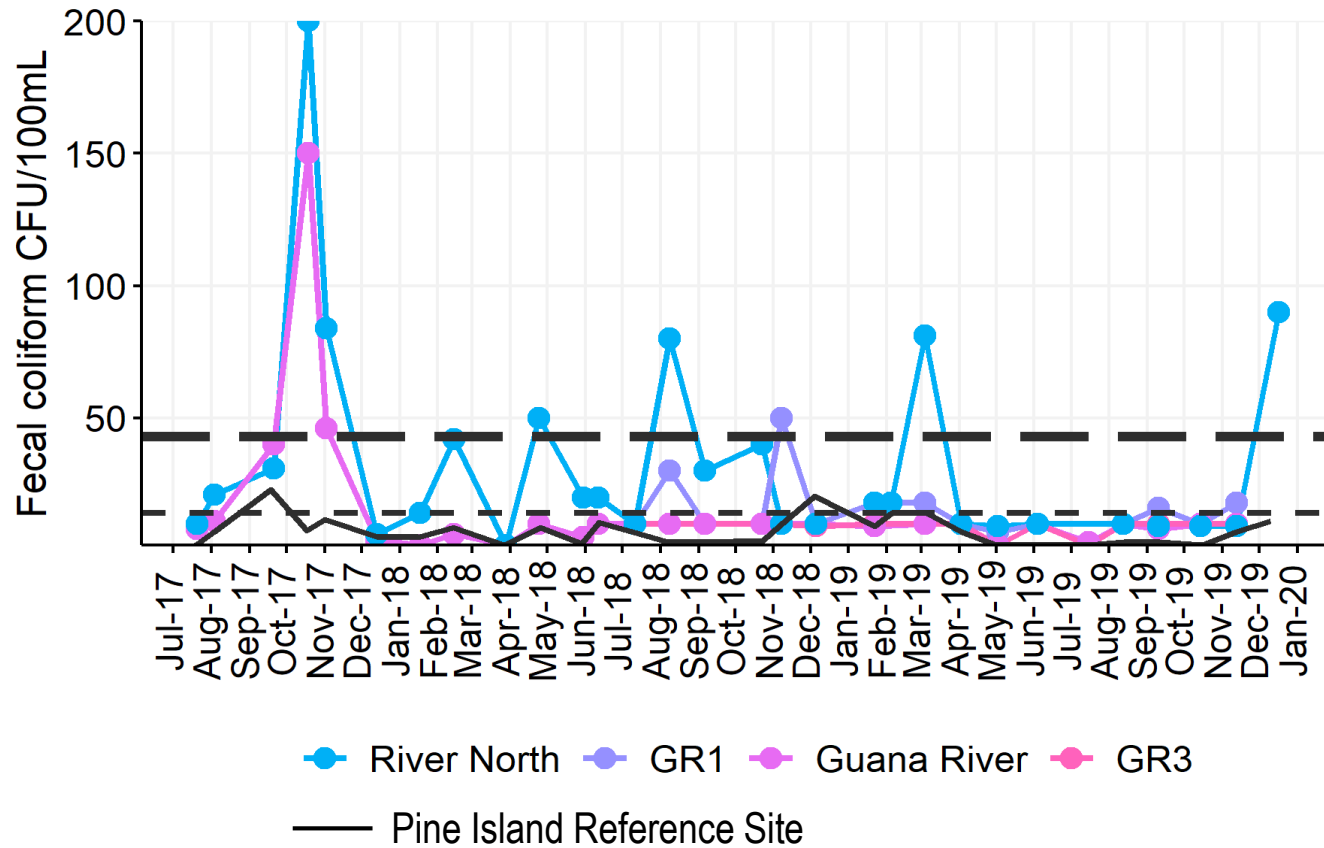


Genetic markers



Bacteria

River

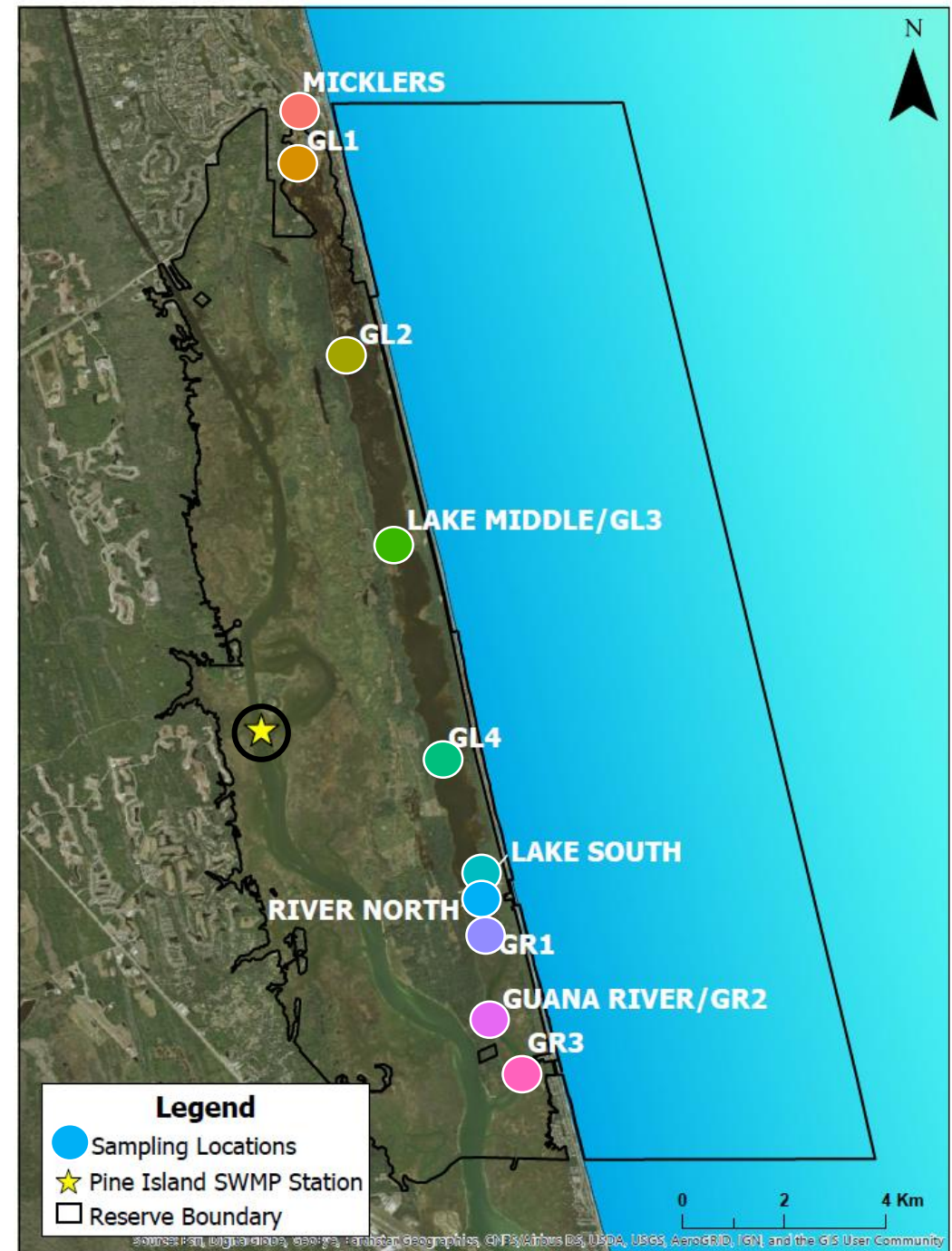
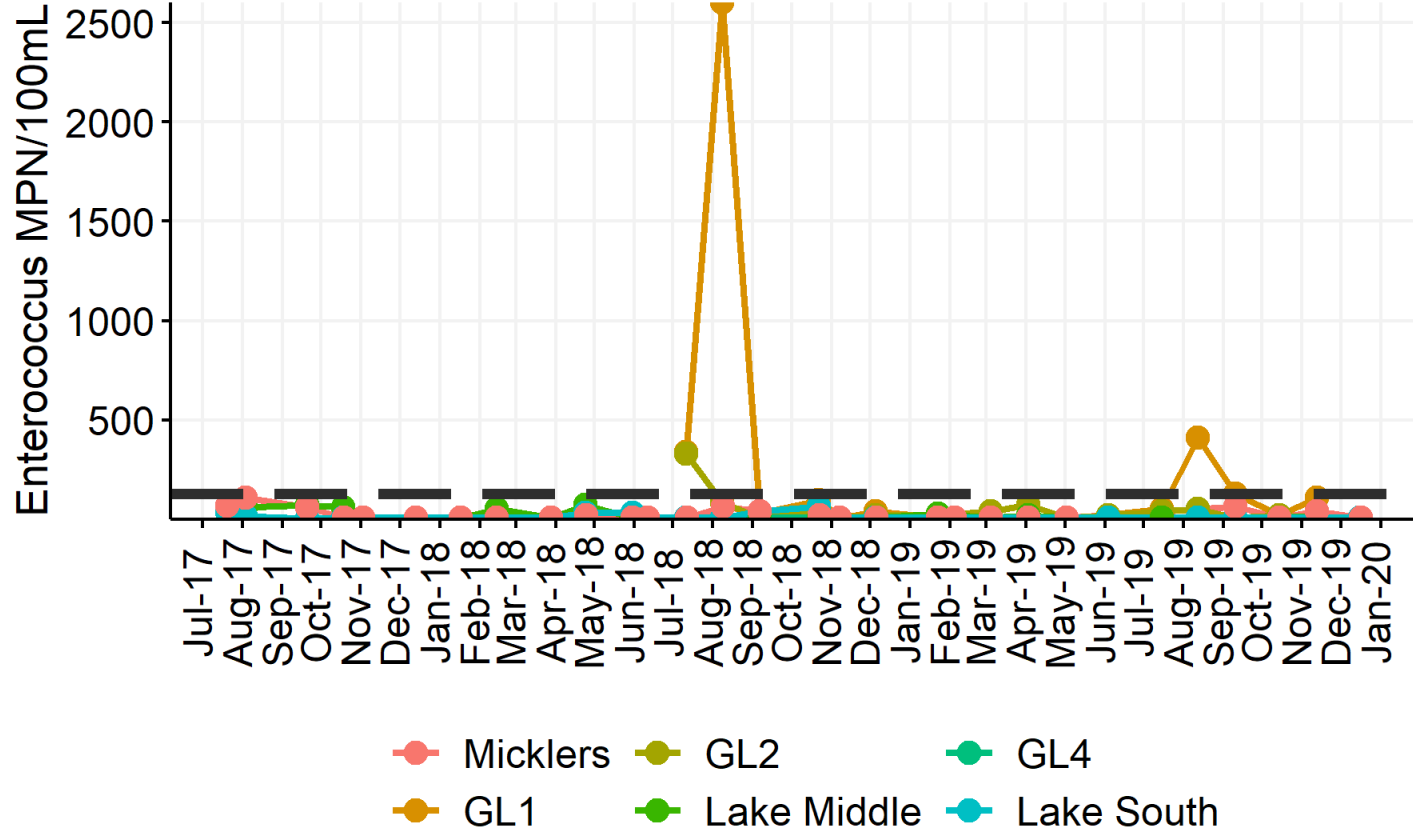




Bacteria

Lake

A





September 2018

Bacteria and Genetic Markers

Site	Enterococcus (MPN)	Fecal Coliforms (CFU)	Human (copies/100ml)	Gull (copies/100ml)	Genetic Bird (copies/100ml)	Dog (copies/100ml)	Ruminant (copies/100ml)	Pig (copies/100ml)
GL1	31	40	ND	ND	ND	ND	ND	ND
GL2	ND	ND	ND	ND	ND	ND	ND	ND
GL3	ND	ND	ND	ND	ND	ND	ND	ND
GL4	ND	ND	ND	ND	ND	ND	ND	ND
GR1	ND	ND	ND	ND	ND	ND	ND	ND
GR2	HT	HT	ND	ND	ND	ND	ND	ND
GR3	ND	HT	ND	ND	ND	ND	ND	ND

ND = Not Detected

HT = Samples beyond holding time





February 2019

Bacteria and Genetic Markers

Site	Enterococcus (MPN)	Fecal Coliform (CFU)	Human (copies/100ml)	Gull (copies/100ml)	Genetic Bird (copies/100ml)	Dog (copies/100ml)	Ruminant (copies/100ml)	Pig (copies/100ml)
GL1	ND	QC	ND	ND	QC	ND	ND	ND
GL2	120	ND	ND	ND	QC	ND	ND	ND
GL3	ND	QC	ND	ND	QC	ND	ND	LOW
GL4	ND	QC	ND	ND	QC	ND	ND	ND
GR1	ND	QC	ND	ND	QC	ND	ND	LOW
GR2	30	QC	ND	ND	QC	ND	ND	ND
GR3	ND	QC	ND	LOW	QC	ND	ND	ND

ND = Not Detected

QC = Data Failed Quality Check

HT = Samples beyond holding time





Pollution Source Tracking



Sucralose

- Not metabolized in the body
- Not degraded in waste water treatment

Assessment of MST Markers and Tracers at WWTF in Florida. December 2018. Florida Department of Environmental Protection. Division of Environmental Assessment and Restoration.





Pollution Source Tracking



Acetaminophen

- Is degraded in waste water treatment
- Strong predictor of raw sewage

Assessment of MST Markers and Tracers at WWTF in Florida. December 2018. Florida Department of Environmental Protection. Division of Environmental Assessment and Restoration.

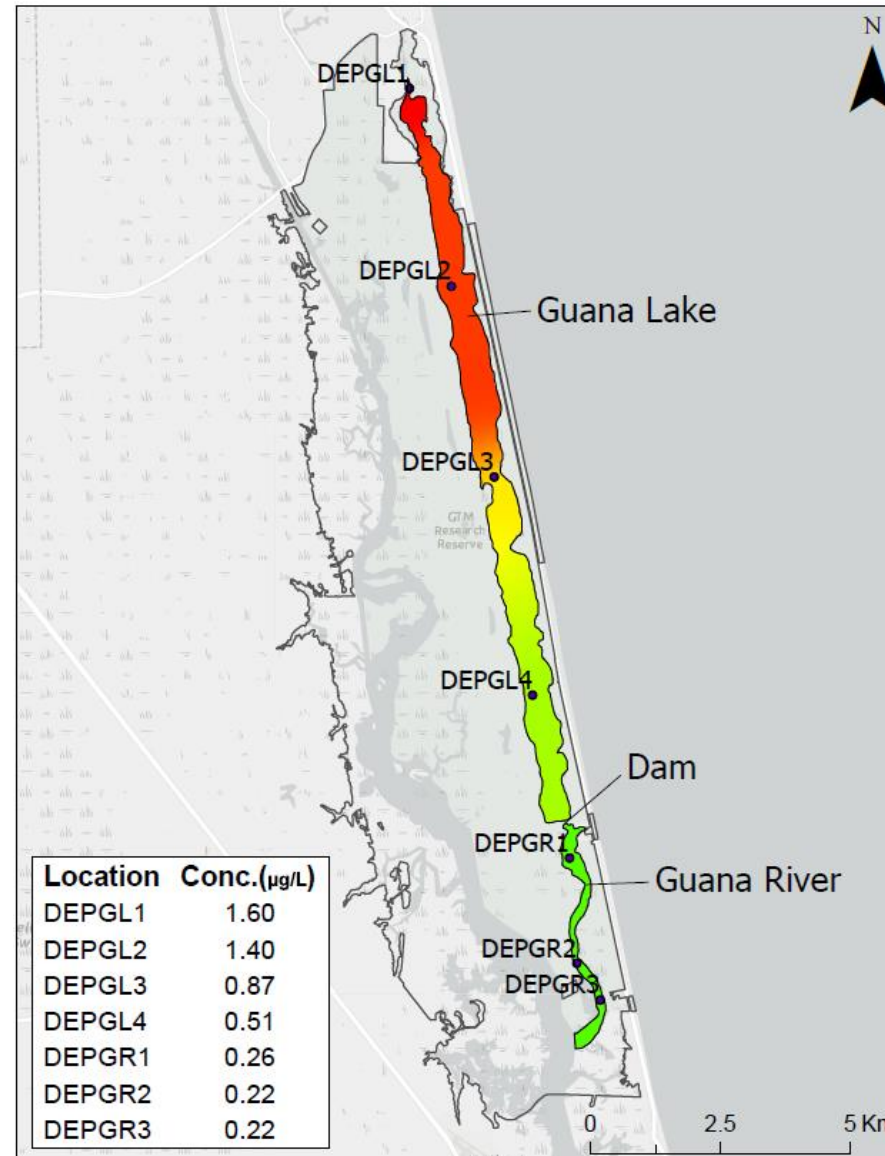




Pollution Source Tracking

Sucralose

Site	September 2018 ($\mu\text{g/L}$)	February 2019 ($\mu\text{g/L}$)
GL1	1.60	2.10
GL2	1.40	1.50
GL3	0.87	1.20
GL4	0.51	0.69
GR1	0.26	0.38
GR2	0.22	0.30
GR3	0.22	0.19





Biological Responses



excess algae and vegetation



*Prorocentrum
minimum*



fish kills





Water Quality Assessment

- **State (Clean Water Act) Standards**
- **Reference Site**
- **Biological Responses**





earth

etrics

. Navy, NGA, GEBCO

Google Earth

image © 2018 TerraMetrics

data SIO, NOAA, U.S. Navy, NGA, GEBCO

earth

etrics

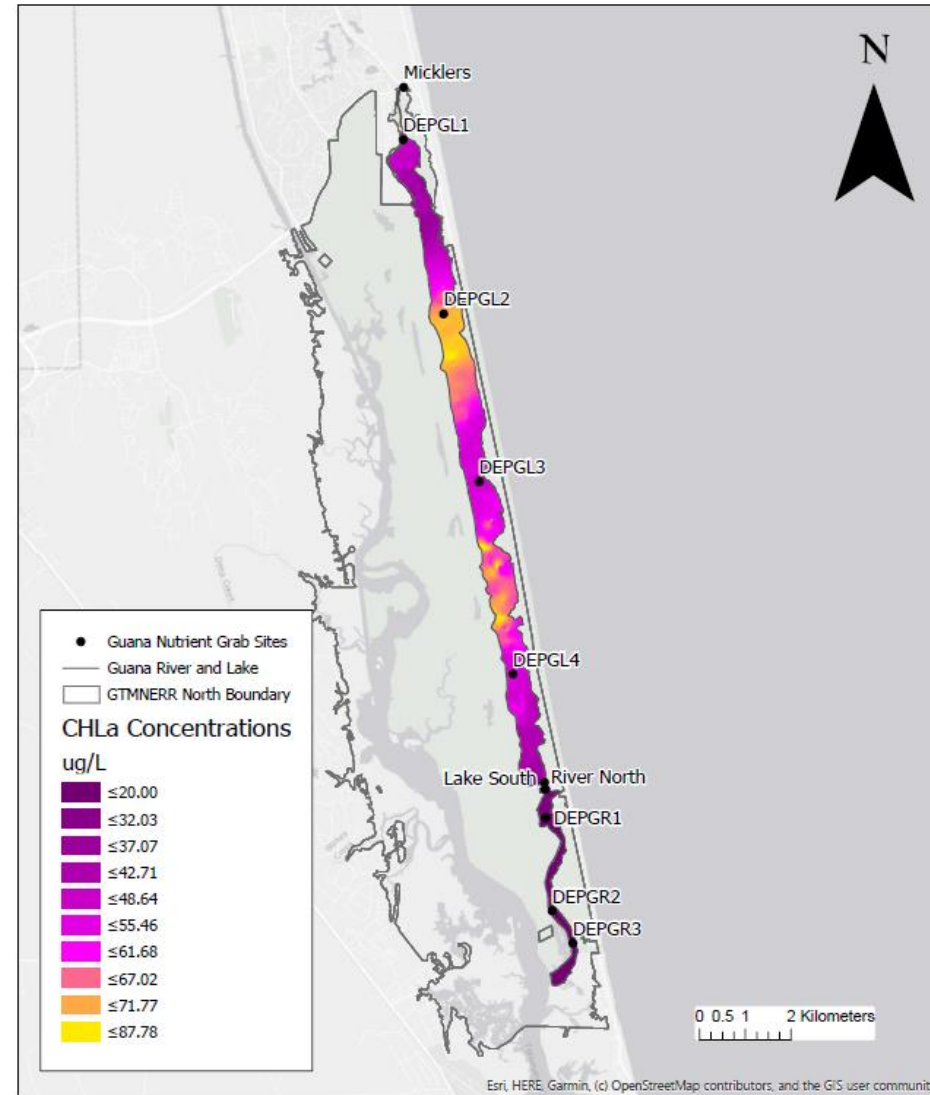
Navy, NGA, GEBCO





Ongoing Research

October 16, 2019 Chlorophyll a Concentrations
(Guana Spatial Survey)



Friends of **GTM**
RESEARCH RESERVE






Ongoing Research





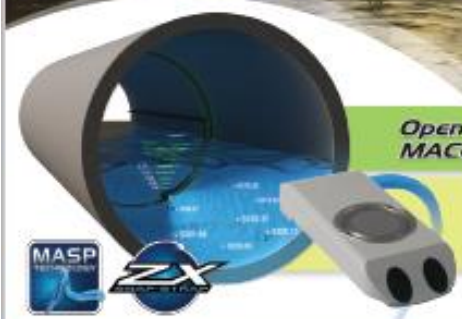
FloPro[®] Xci

Monitor wastewater, stormwater and industrial flows in full pipes, partially full pipes and open channels



Open channel flow measurement
MACE Area/Velocity Sensor

- ✓ Doppler ultrasonic area/velocity sensor with MASP technology
- ✓ Easy to install in existing pipe work with a MACE ZX SnapTrap
- ✓ Operates in regular and irregular cross-sections
- ✓ Reliable under difficult hydraulic conditions
- ✓ Replaceable ceramic diaphragm depth sensor





Thank You!

Nikki Dix, Ph.D.

Nikki.Dix@FloridaDEP.gov