New Hanover County's Long-Term Water Quality Monitoring Program

Using Data to Inform Management

NCBIWA's 26th Annual Conference

November 16, 2023

Brad Rosov
Senior Marine Biologist
brosov@coastalprotectioneng.com

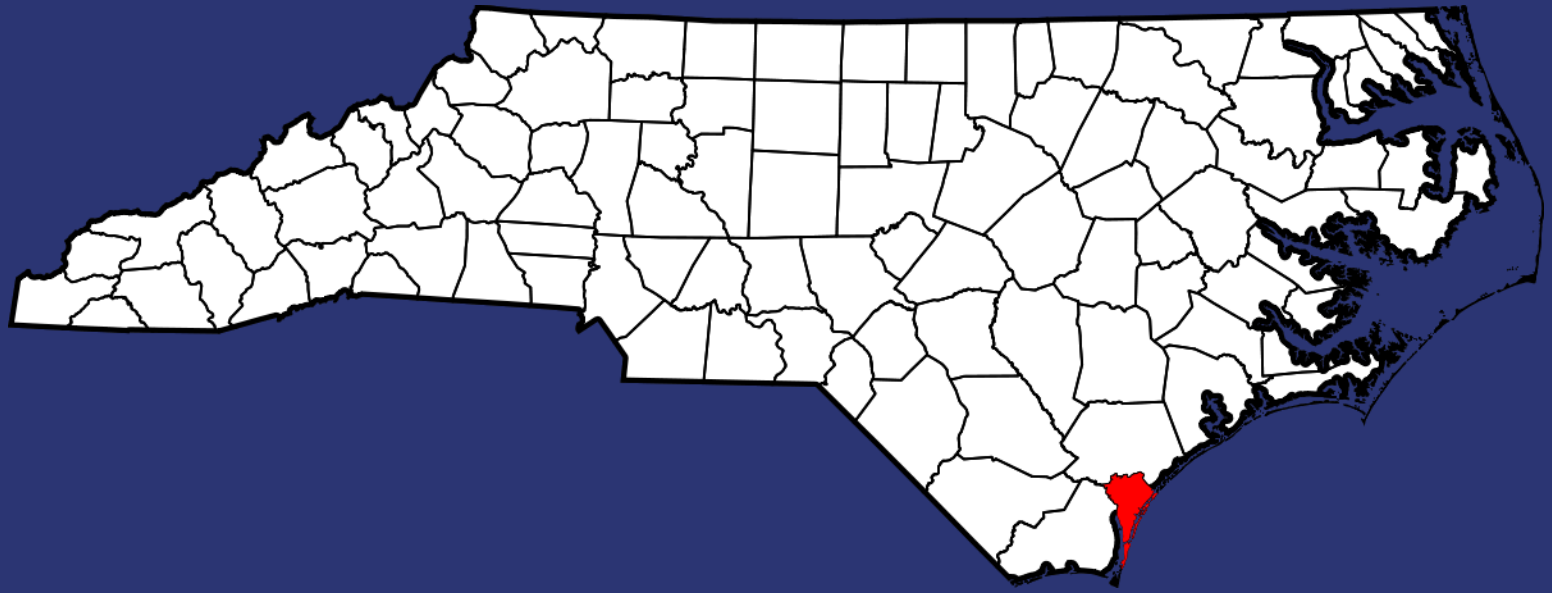
Coastal Protection Engineering

New Hanover County
Water Quality Monitoring Program

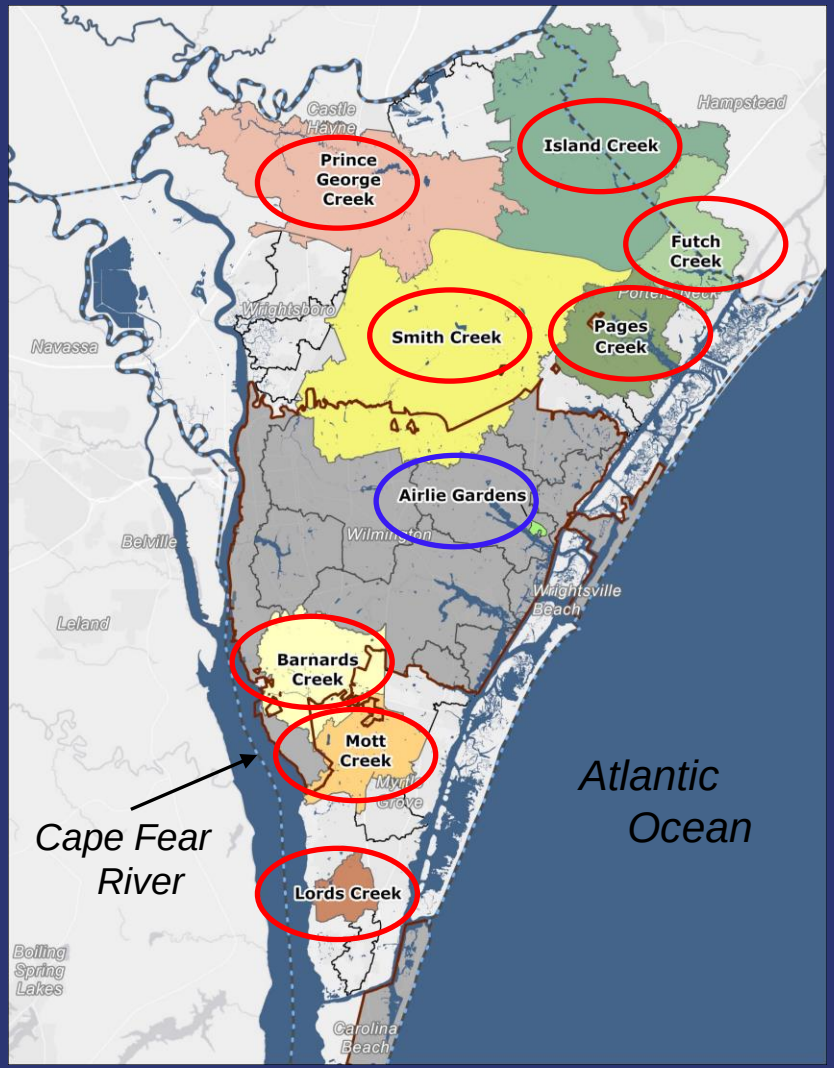
Goal: To gather water quality monitoring data within a network of tidal creeks and provide data to decision makers on a timely manner. This information will allow for proactive management of these watersheds which provide ecosystem services for residents and visitors.

Coastal Protection Engineering

Where is New Hanover County?



Coastal Protection Engineering



Scope of Program:

- 8 Tidal Creeks
  - ✓ 20 Sampling Sites
- Airlie Gardens Lake
  - ✓ 3 Sampling Sites

Coastal Protection Engineering

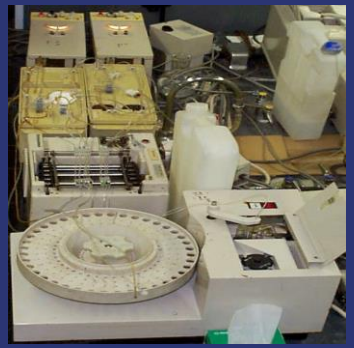
Methods

Biological Parameters

- *Enterococci* bacteria
- Chlorophyll-*a*

Chemical Parameters

- Nutrients
  - Nitrate/Nitrite
  - Orthophosphate



Physical Parameters

- Dissolved Oxygen
- pH
- Temperature
- Salinity
- Conductivity
- Turbidity

Coastal Protection Engineering

North Carolina State Standards

Parameter	Standard for C Sw Waters	Standard for SA Waters
Dissolved Oxygen	4.0 mg/l[a]	5.0 mg/l
Turbidity	50 NTU	25 NTU
pH	6.0-9.0[b]	6.8-8.5
Chlorophyll-*a*	40.0 ug/l	40.0 ug/l
Enterococci	Tier III Waters:<501 CFU/100ml Tier II Waters: <276 CFU/100ml	Tier III Waters:<501 CFU/100ml Tier II Waters: <276 CFU/100ml

(a) Swamp waters may have lower values if caused by natural conditions
(b) For swamp streams, pH may be as low as 4.3 if caused by natural conditions

Rating Scheme

- **<10%** of samples exceed the standard = GOOD
- **10% to 25%** of samples exceed the standard = FAIR
- **>25%** of samples exceed the standard = POOR

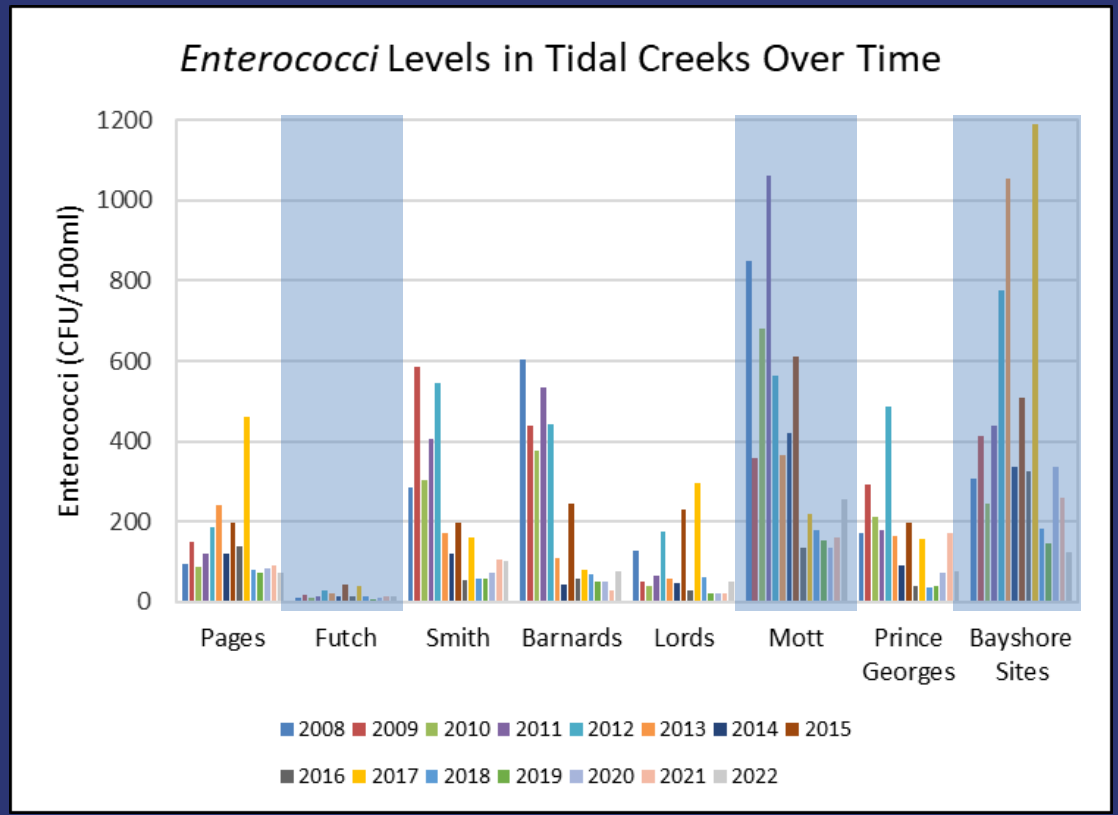
COASTAL PROTECTION ENGINEERING

Summary Results 2022-2023

Parameter	Barnards Creek	Futch Creek	Island Creek	Lords Creek	Mott Creek	Pages Creek	Prince George Creek	Smith Creek
Turbidity	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD
Dissolved Oxygen	GOOD	GOOD	POOR	GOOD	FAIR	FAIR	POOR	GOOD
Chlorophyll-*a*	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD
Enterococci	GOOD	GOOD	GOOD	GOOD	FAIR	FAIR	GOOD	GOOD

Coastal Protection Engineering

Long-Term *Enterococci* Results 2008-2023



Coastal Protection Engineering

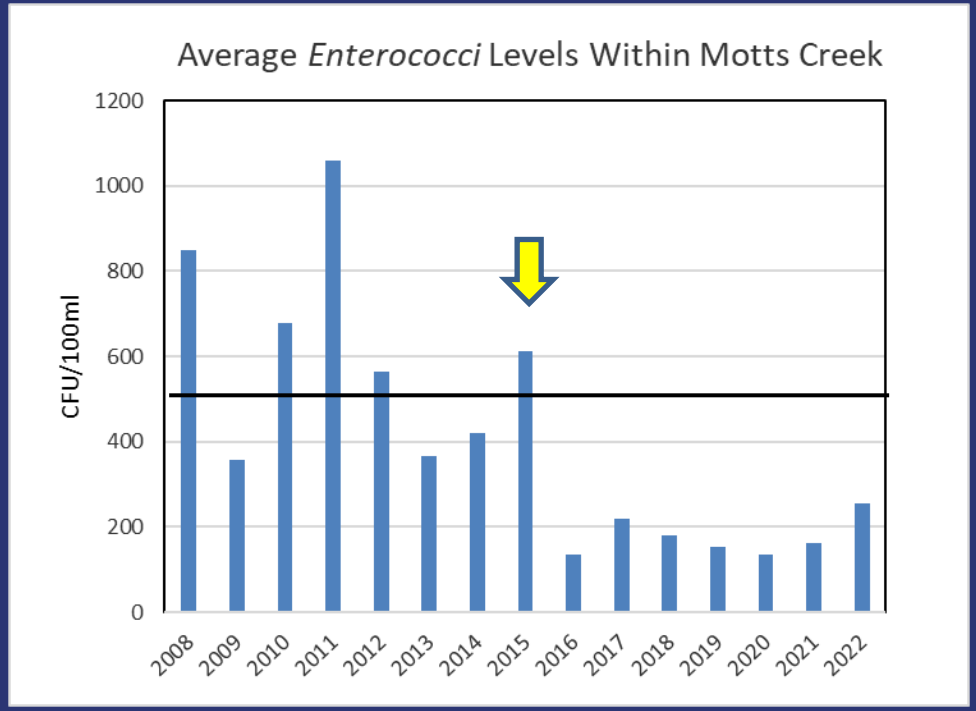
Long-Term Trends

- Turbidity and Chlorophyll-*a* levels continue to be deemed to be “good” in all creeks.
- Dissolved Oxygen levels fluctuate with water temperature throughout the year
- Overall, *Enterococci* bacteria have improved over the long-term study period
- *Enterococci* bacteria remain elevated at Pages Creek, particularly wthin the Bayshore community

Coastal Protection Engineering

Data Informing Management

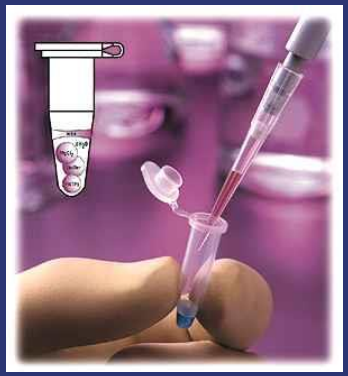
- **Mott Creek Watershed**
  - Problem: Elevated *Enterococci* bacteria
  - Cause: Septic tank failures from within the Marquis Hills subdivision
  - Solution: Installation of sewer infrastructure



Coastal Protection Engineering

Data Informing Management

- **Pages Creek Watershed**
  - 2008: County posted “Warning Sign”
  - 2009: Pilot Source Tracking Study
    2009: Optical Brightener Study
  - 2013: Expanded Source Tracking Study
  - 2021: Thermal Imaging Study
  - 2021: Source Tracking Study of “seeps”
  - 2023: Wide-scale Source Tracking Study



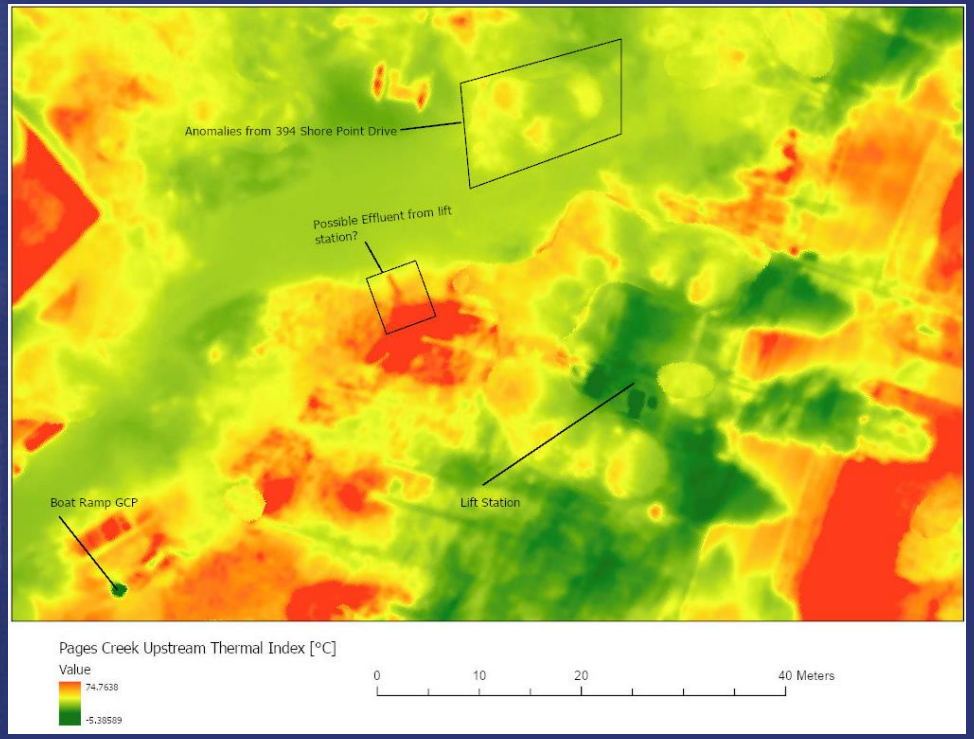
Coastal Protection Engineering

Source Tracking via Thermal Imaging at Pages Creek

- Deployment of a UAV (drone) in partnership with UNCW's Socio-Environmental Analysis Lab
- Temperature differentials detected (residential properties & areas adjacent to sewer infrastructure)
- Ground truthing ruled out some targets, others remained questionable

Coastal Protection Engineering

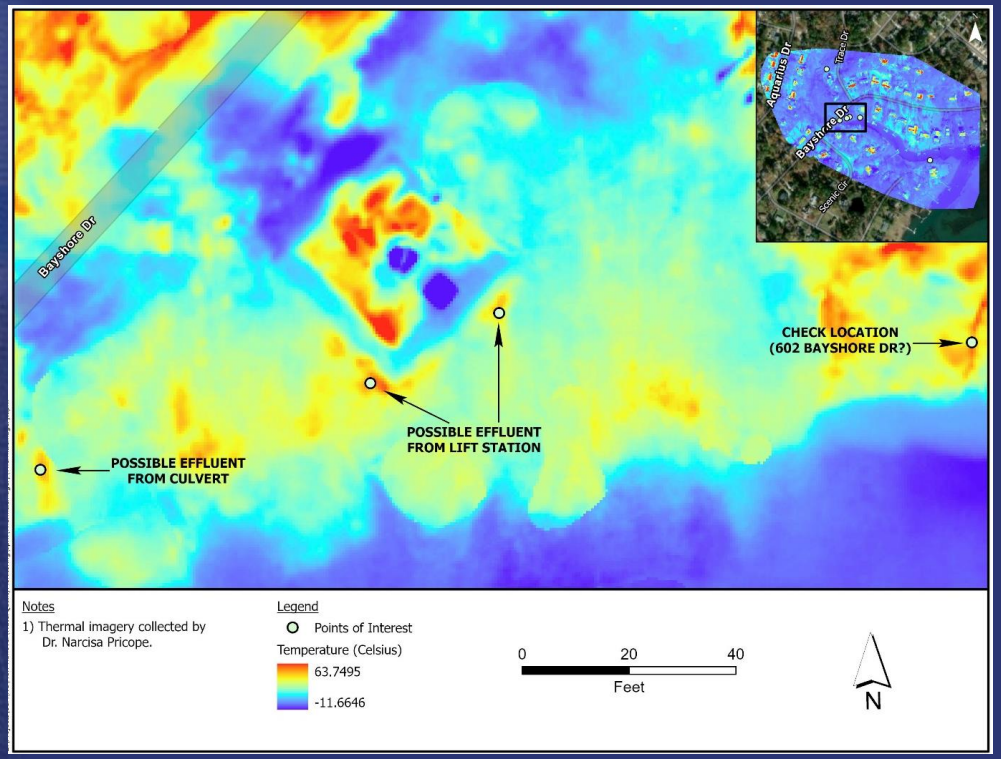
Source Tracking via Thermal Imaging at Pages Creek



Lift Station at PC-BDUS

Coastal Protection Engineering

Source Tracking via Thermal Imaging at Pages Creek



Lift Station at PC-BDDS

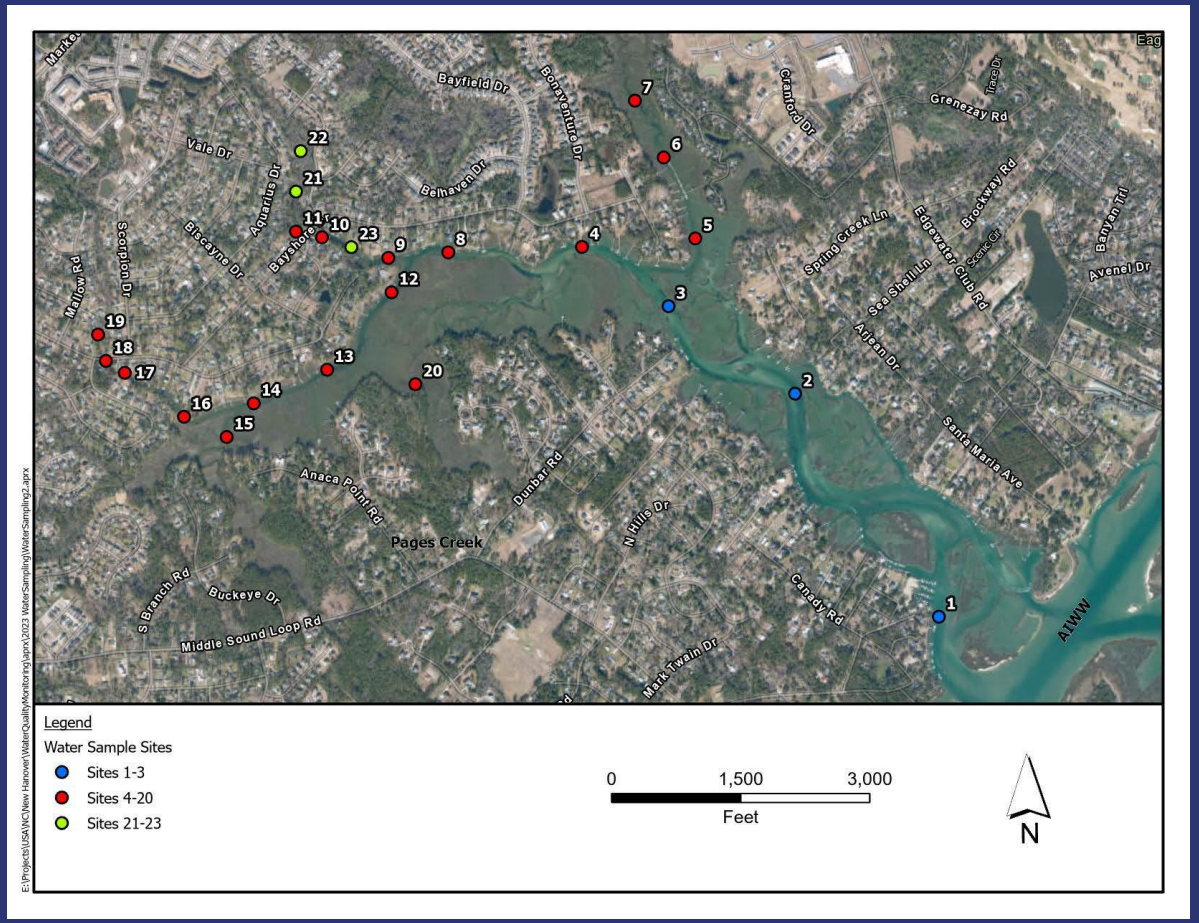
Coastal Protection Engineering

Source Tracking Efforts via Thermal Imaging at Pages Creek

Sample Date	PC-BDUS	PC-BDDS
6/13/22	ND	33.04 (DNQ)
7/11/22	ND	33.64 (DNQ)

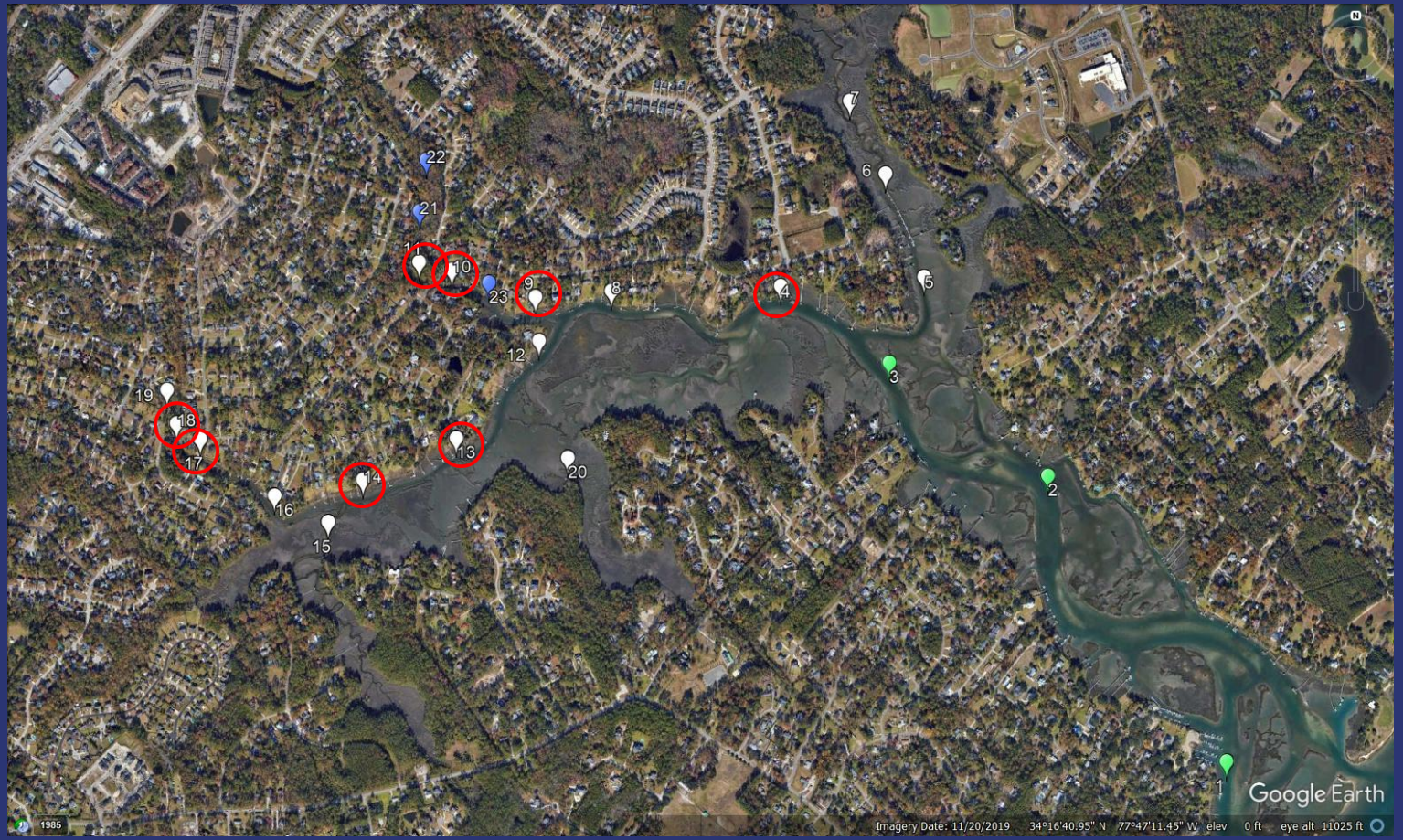
Coastal Protection Engineering

2023 Broad Source Tracking Efforts at Pages Creek



COASTAL PROTECTION ENGINEERING

2023 Broad Source Tracking Efforts at Pages Creek



Coastal Protection Engineering

Follow up & Next Steps

- Continue coordination with CFPUA re: water quality in the Bayshore community
- Continue monitoring following the replacement of the lift station at PC-BDUS

Coastal Protection Engineering

New Hanover County's Long-Term Water Quality Monitoring Program

Using Data to Inform Management

NCBIWA's 26th Annual Conference

November 16, 2023

Brad Rosov
Senior Marine Biologist
brosov@coastalprotectioneng.com

Coastal Protection Engineering