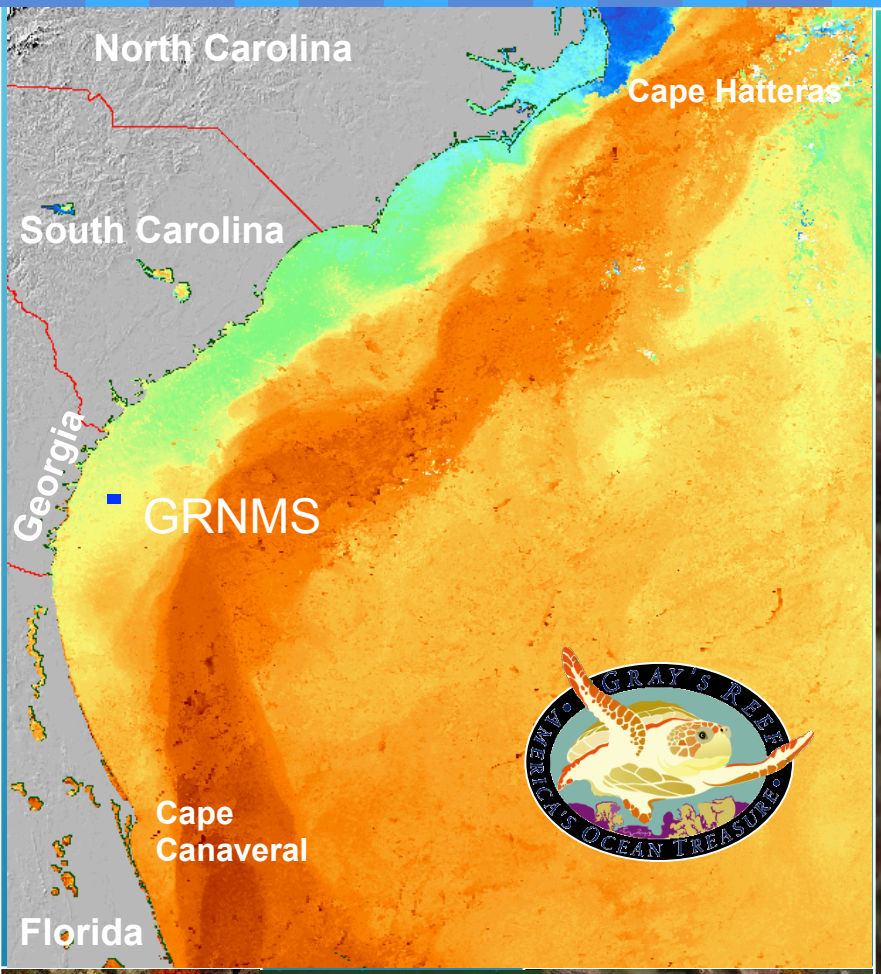
Gray's Reef National Marine Sanctuary



Rivers to Reefs
Connecting Land to Ocean through Watersheds

Cathy J. Sakas

Chair,
Gray's Reef National Marine Sanctuary Foundation

cathy@marinesanctuary.org
912.660.7164

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U.S. National Marine Sanctuary System

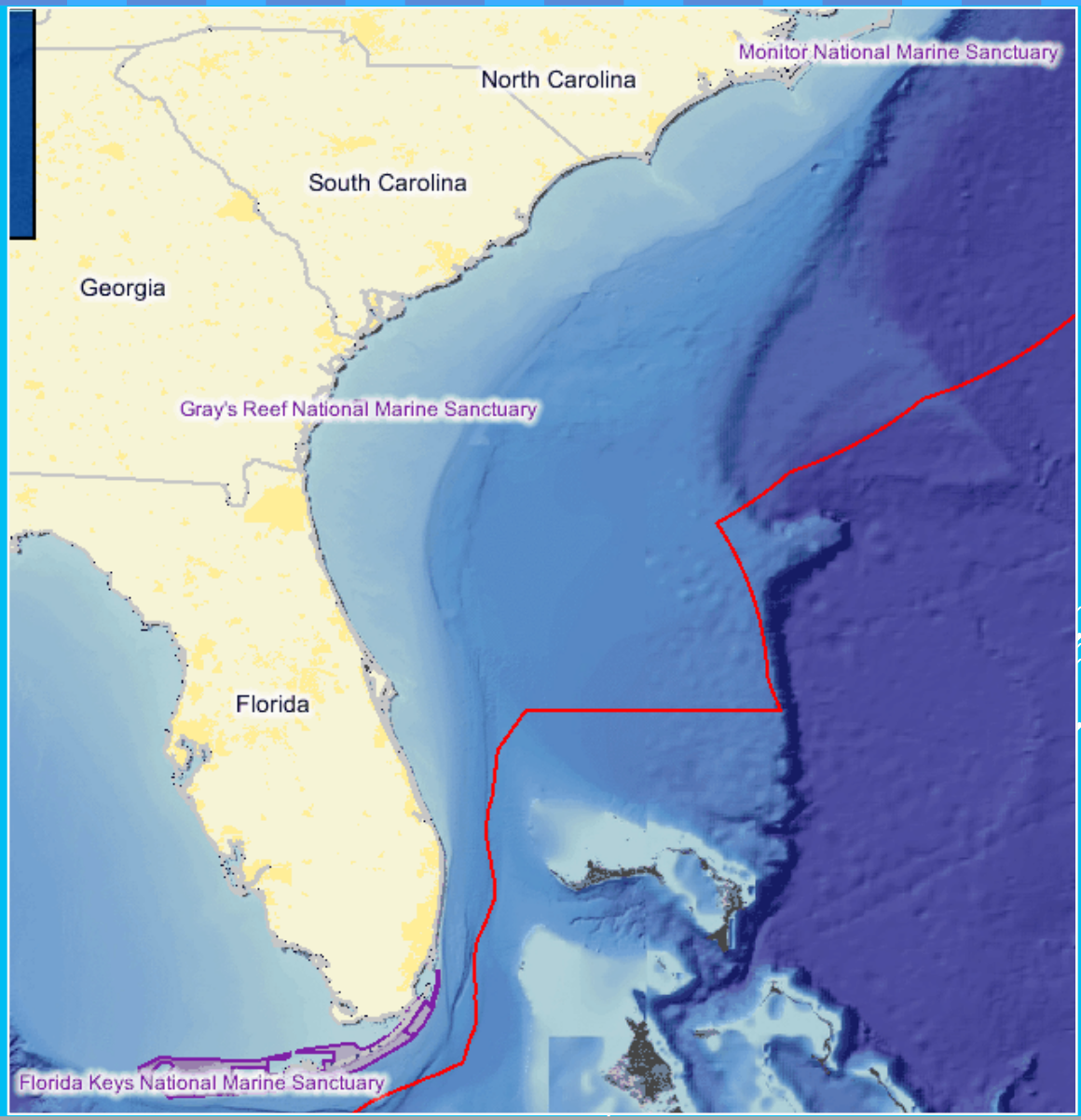
National Marine Sanctuaries Act and System Goals:

- Designate and manage areas of the marine environment with special national significance
- Primary objective to protect marine resources, such as coral reefs, sunken historical vessels or unique habitats
- Research and monitoring
- Enhance public knowledge
- Facilitate compatible use

Coastal and Ocean Sciences Trends

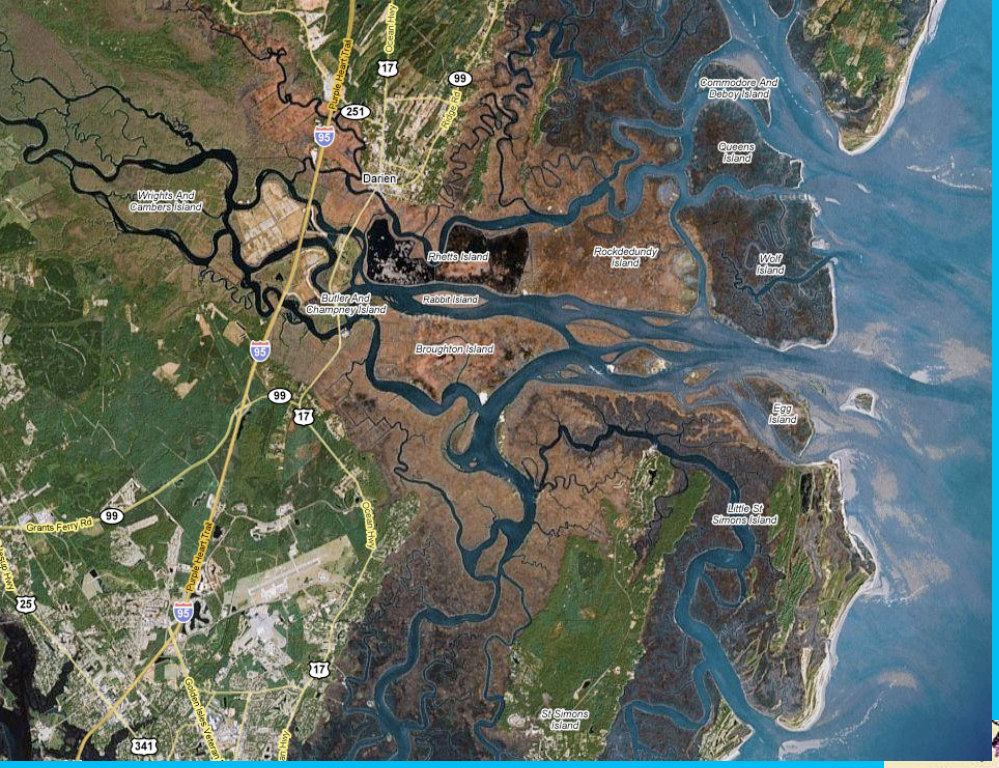
Research projects address current issues such as:

- *Overfishing*
- *Invasive species*
- *Marine debris*
- *Climate change*
- *Ocean acidification*
- *Biodiversity*
- *Non-point source pollution*

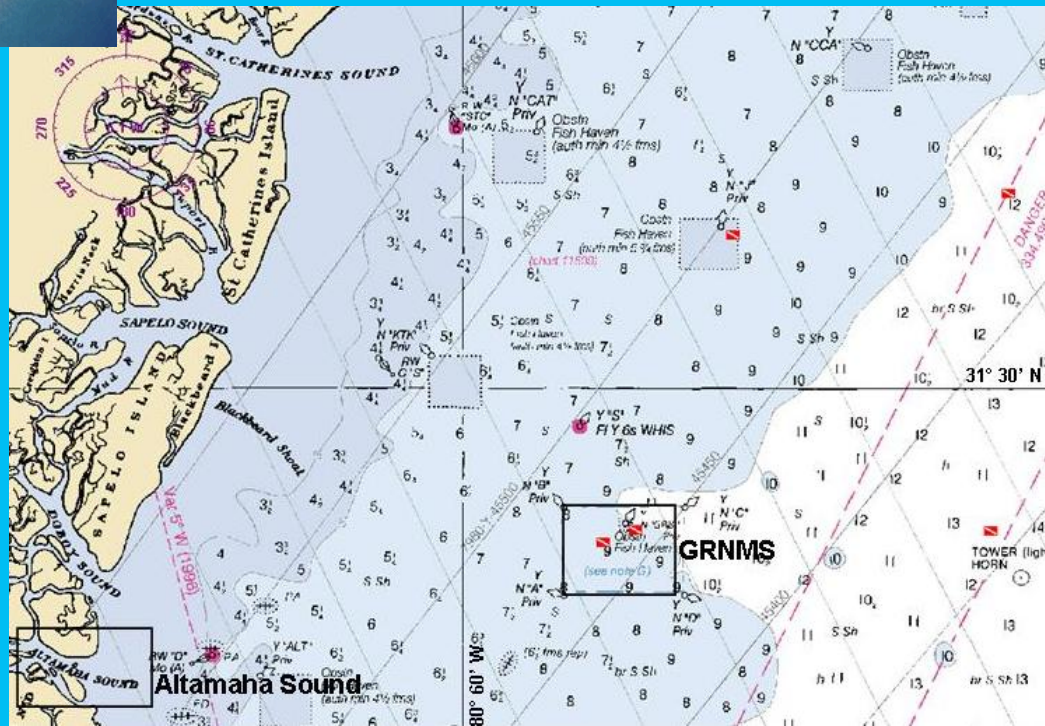


TRANSPORT OF WATERBORNE SUBSTANCES TO GEORGIA OFFSHORE REEFS

D.F. GLEASON & R.A COHEN
COLLABORATIVE AGENCIES: EPA REGION 4, GRAY'S REEF NATIONAL MARINE SANCTUARY

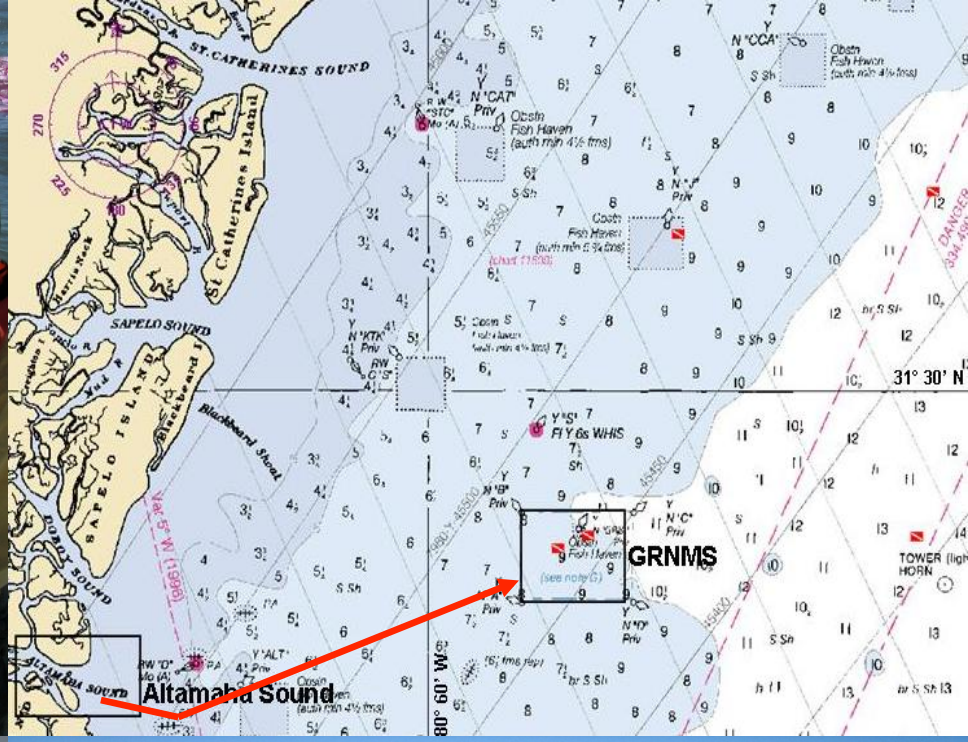


- Rhodamine WT dispersal
  - May 2011
- Analysis of organocontaminants
  - GSU - Chemistry
- Flow models
  - Mark Edwards, GSU - Physics



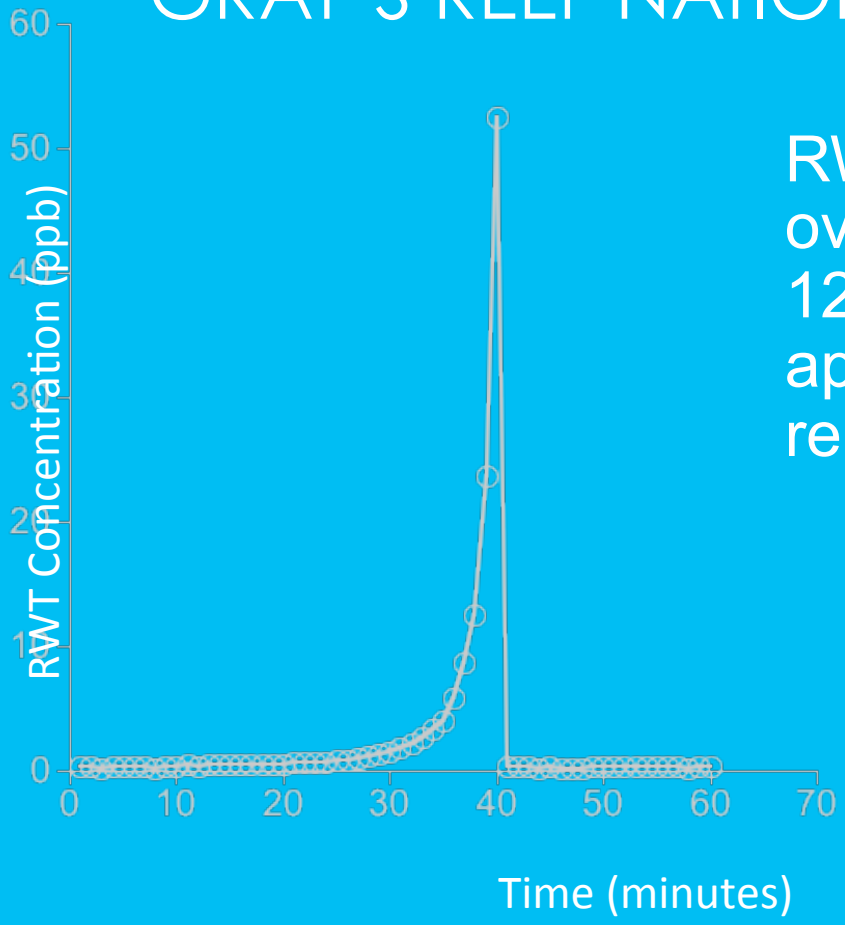
Dye Tracer Study

- Rhodamine WT is harmless to the marine environment
- Dye was detected from a constant flow raw seawater feed which was pumped on board the NANCY FOSTER
- The detector is specific to the wavelength of the Rhodamine dye which greatly reduces the chance of a “false positive” reading


ST. CATHERINES SOUND
St. Catherines Island
SAPELO SOUND
SAPELO ISLAND
Blackbeard Shoal
Blackbeard Island
Fl Y 6s WHIS
GRNMS
Altamaha Sound
31° 30' N
81° 00' W
80° 60' W
TOWER (light)
HORN


NOAA
R352

RHODAMINE WT CONCENTRATIONS AT GRAY'S REEF NATIONAL MARINE SANCTUARY



RWT concentrations increased over a 30 minute period between 1235 and 1305 on May 23, 2011, approximately 3 days post dye-release.

SUMMARY

- Rhodamine WT appeared within sanctuary in 3 days
- Influence of river outflow on GRNMS resources significant, both positively and negatively

"GRNMS: SURVEY OF SOFT-BOTTOM BENTHIC ASSEMBLAGES AND LEVELS OF CONTAMINANTS IN SEDIMENTS AND BIOTA"

COMPONENT OF A COLLABORATIVE SITE-CHARACTERIZATION EFFORT BY THE GRNMS OFFICE & THREE NOAA/NCCOS CENTERS (CCMA, CCEHBR, CCFHR)

by J. Hyland, C. Cooksey, L. Balthis, G. Scott, & D. Bearden

OBJECTIVES

- Assess baseline condition of macroinfauna (> 0.5 mm), concentrations of chemical contaminants in sediments, and contaminant body-burdens in target benthic species (black sea bass and ark shells) within the sanctuary boundaries.
- Provide a quantitative basis for tracking potential changes in these properties with time due to either natural or human events.

INDICATORS:

General habitat conditions:

- **Water depth, temperature, salinity, pH, DO**
- **Sediment TOC, % silt-clay, % water content**

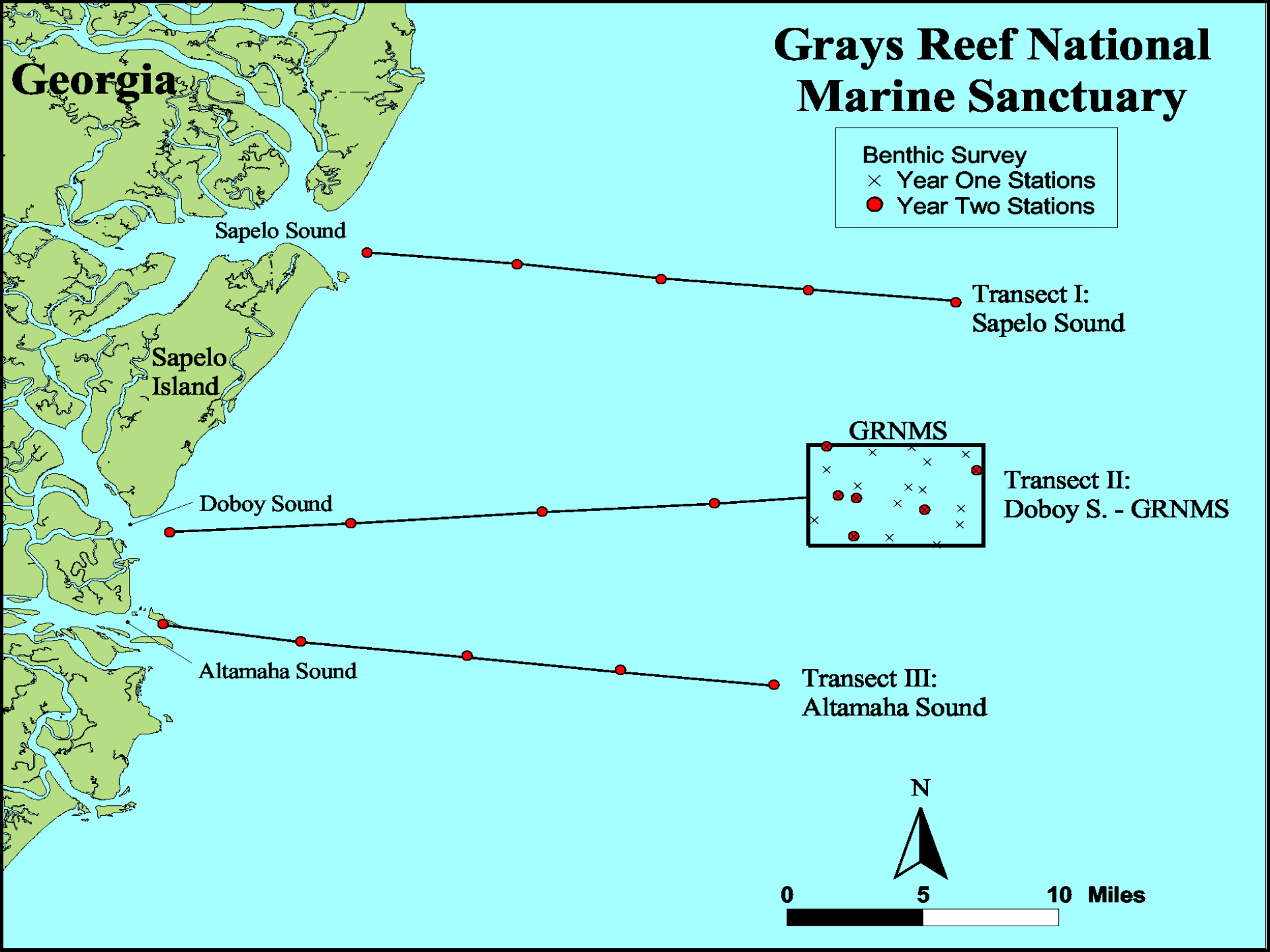
Contaminants (metals, pesticides, PCBs, PAHs) in surface sediments

Diversity and abundances of macroinfauna (> 0.5 mm)

Aesthetic quality:

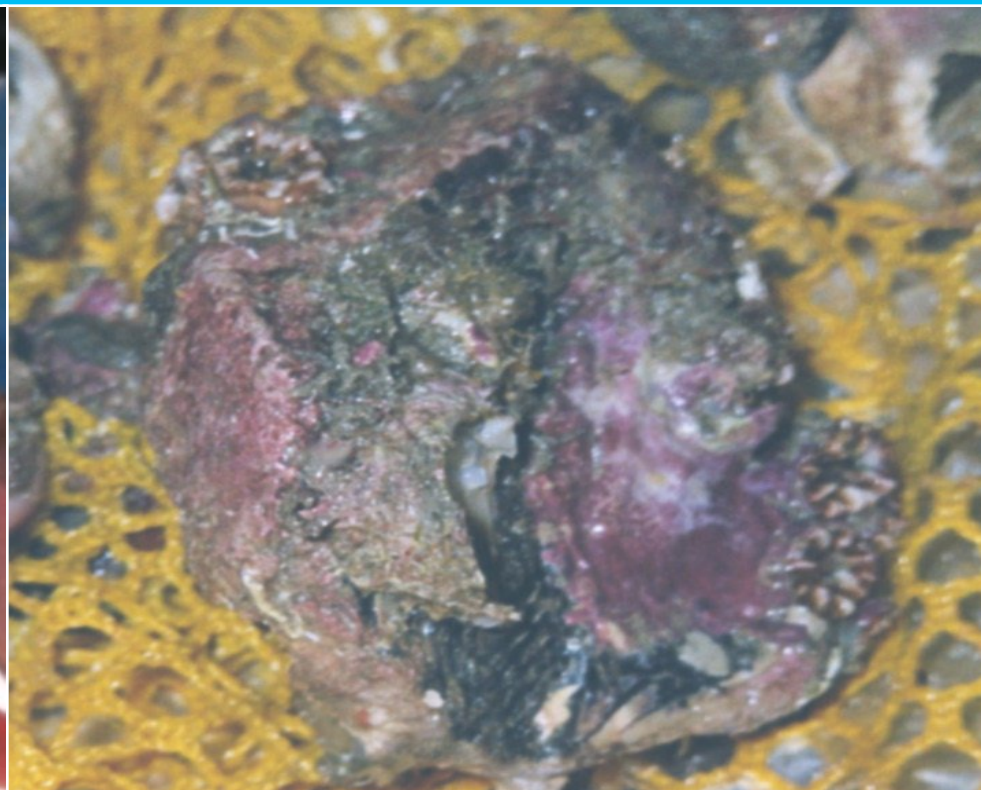
- **Anthropogenic debris (sea surface and sea floor)**
- **Visible oil sheens (sea surface and sea floor)**
- **Noxious sediment odor**
- **Water clarity based on secchi depths**

Contaminants in tissues of target benthic species (ark shells & black sea bass) at selected stations.

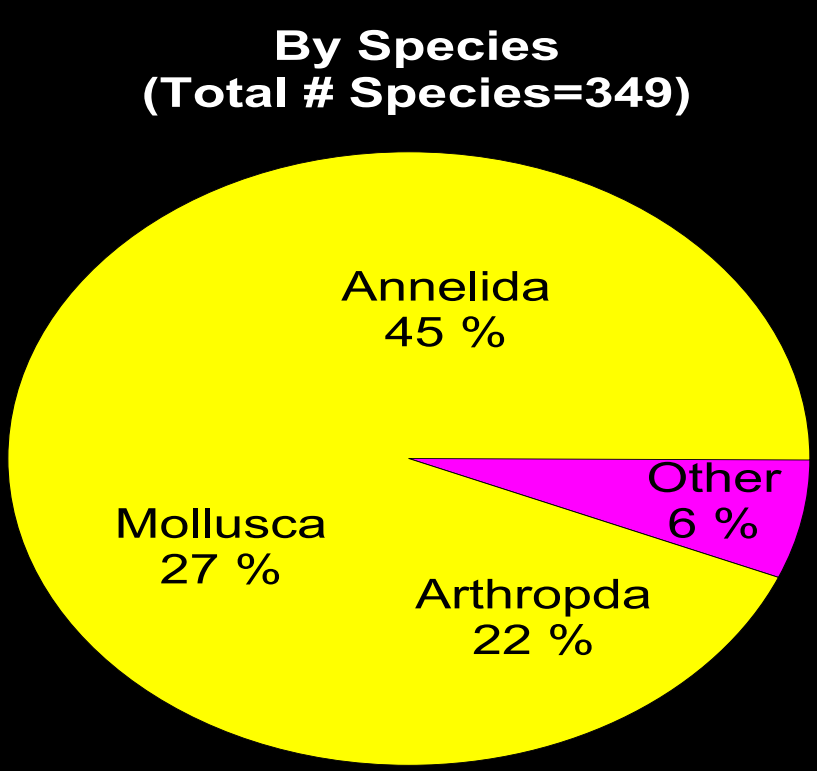

Grays Reef National Marine Sanctuary
Georgia
Benthic Survey
Year One Stations
Year Two Stations
Sapelo Sound
Sapelo Island
Transect I:
Sapelo Sound
GRNMS
Doboy Sound
Transect II:
Doboy S. - GRNMS
Altamaha Sound
Transect III:
Altamaha Sound
N
0
5
10 Miles

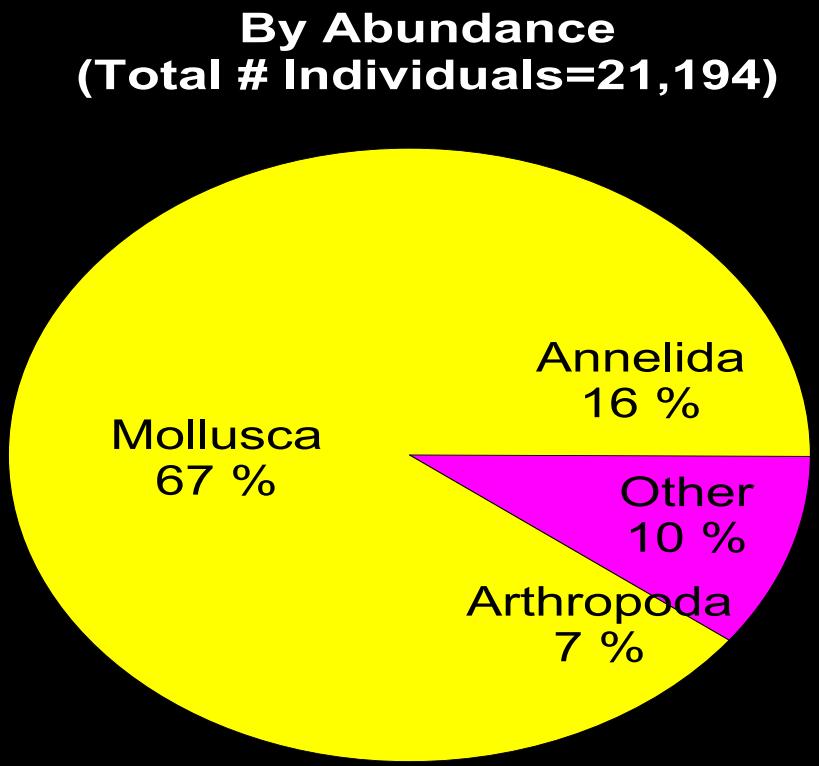
CONTAMINANT BODY BURDENS

All measured analytes in tissue samples (10 black sea bass, 10 ark shell composites) were below human-health guideline values.



RELATIVE COMPOSITION OF MAJOR TAXONOMIC GROUPS





Note: Data based on 3 replicate grabs (0.04 m^2) at each of 20 stations.

PRELIMINARY CONCLUSIONS

- In general, chemical contaminants in sediments are at background levels, below probable bioeffect thresholds, throughout sanctuary. Low-level spikes in some analytes (Ag & Cu) were seen at a few sites.
- Contaminants in tissues of target benthic species are below human-health guidelines (based on limited sample population of n = 20).

CONCLUSIONS (CONTINUED)

- Sandy substrates throughout sanctuary support a highly diverse and abundant infaunal community mostly of annelids, mollusks and arthropods
- Probabilistic sampling design provides a powerful quantitative tool for assessing current status in conditions of sanctuary and for using information as a baseline for tracking any future changes due to anthropogenic or natural influences.

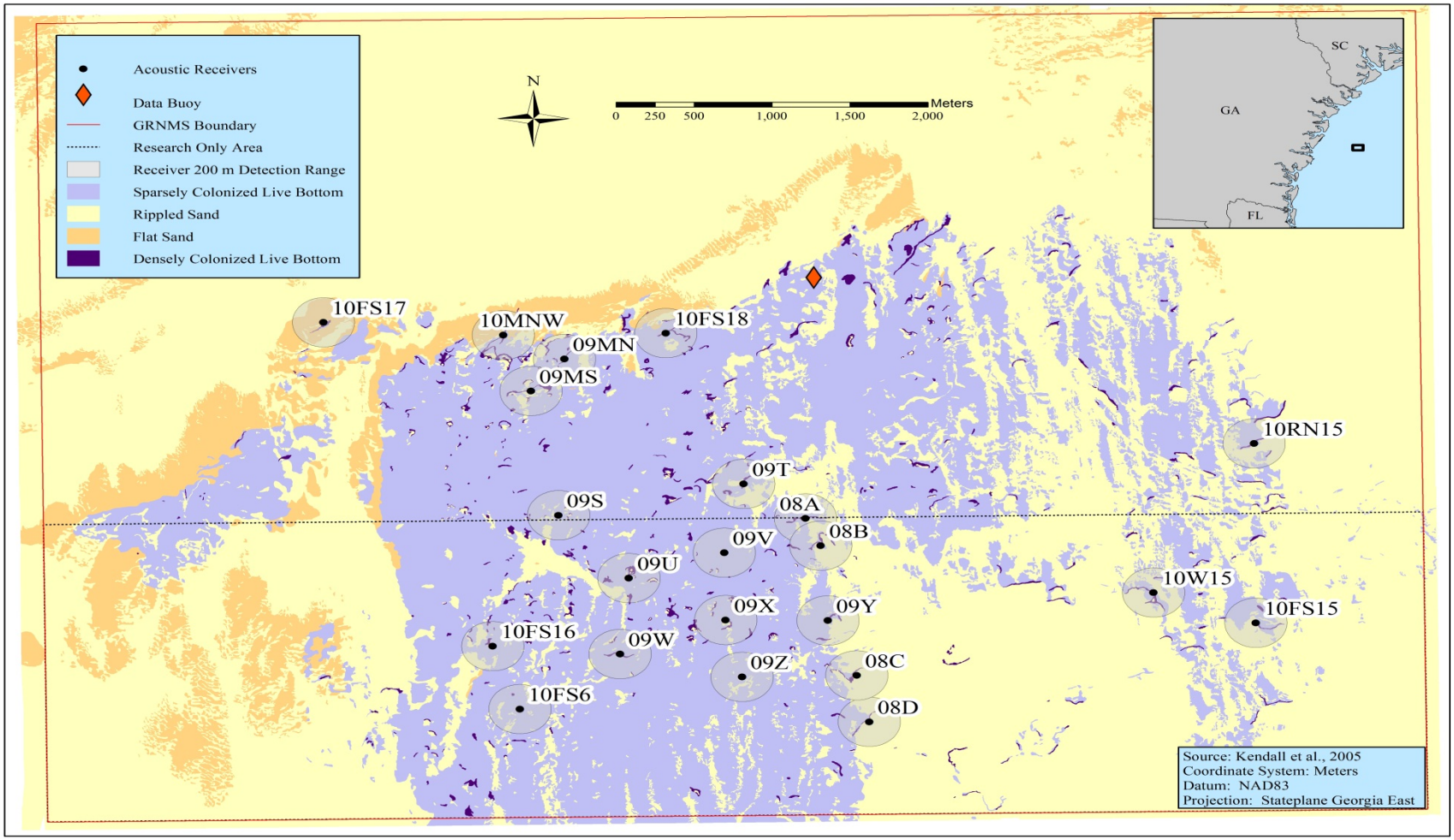
ACOUSTIC FISH TAGGING PROJECT


PRO

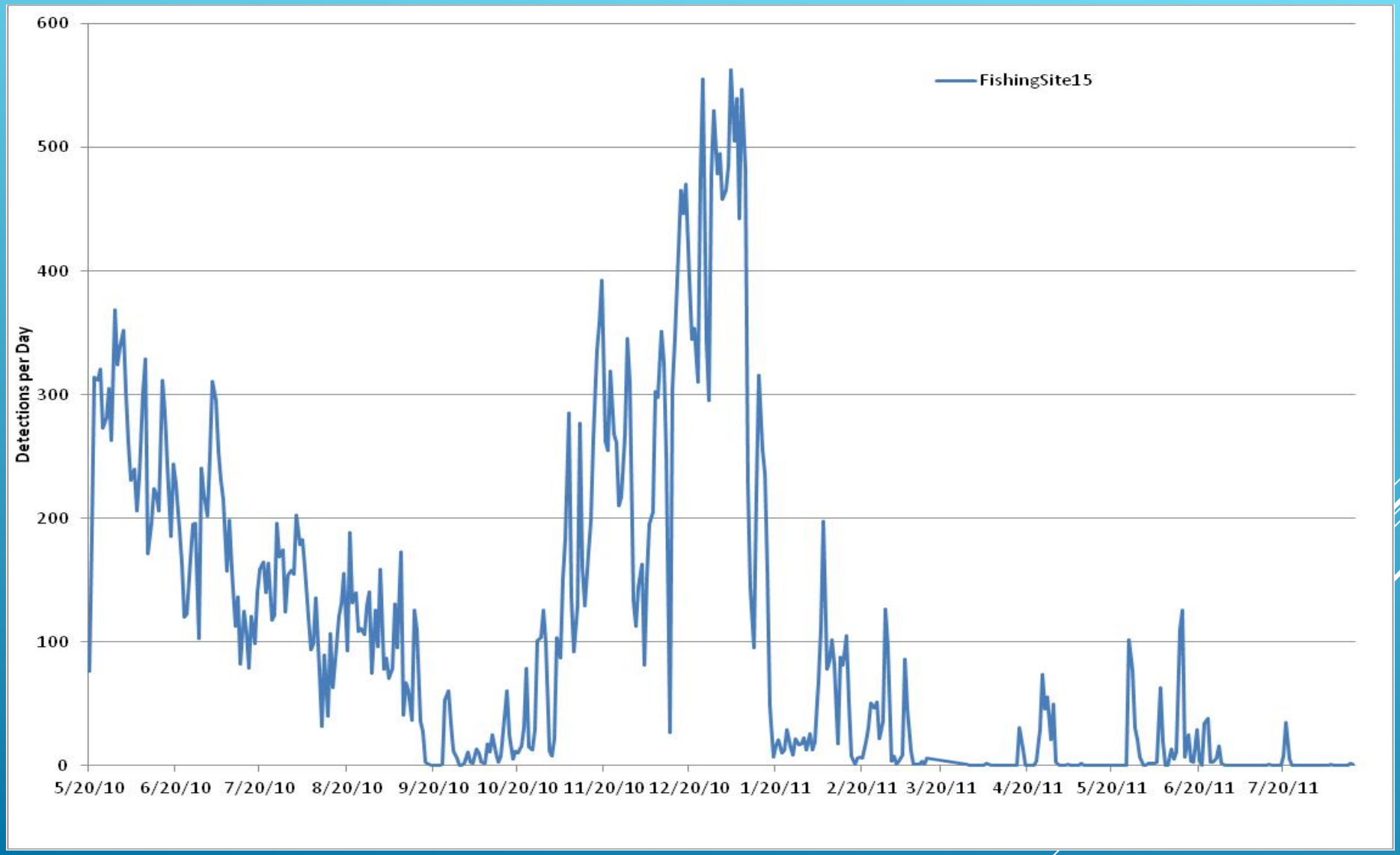
Gray's Reef National Marine Sanctuary

- Twenty acoustic receivers within sanctuary
- Fifty-four fish tagged by 2013 (6 rs, 6 bsb, 13 scamp, 29 gag)
- Placed in sand near rocky ledges
- Approximately five feet above sea floor
- Data downloaded quarterly

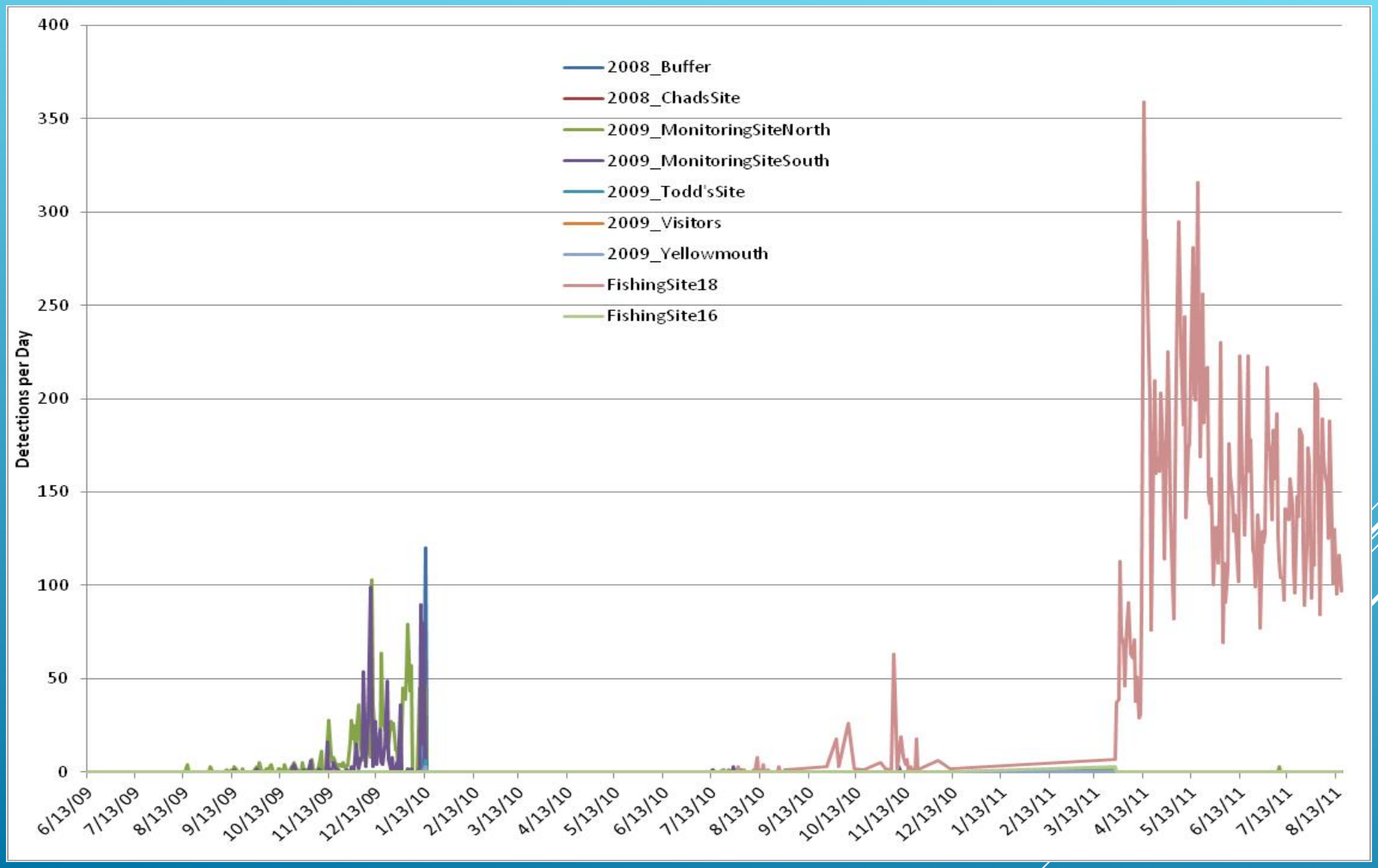
Gray's Reef National Marine Sanctuary



Gray's Reef National Marine Sanctuary



Gray's Reef National Marine Sanctuary



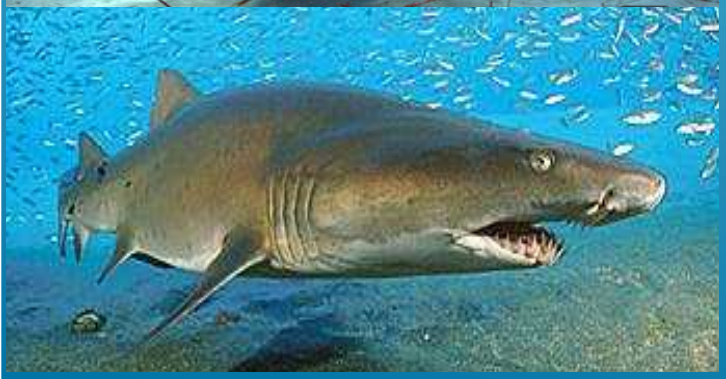
Gray's Reef National Marine Sanctuary

Lemon Shark

Atlantic Sturgeon

Bull Shark

White Shark

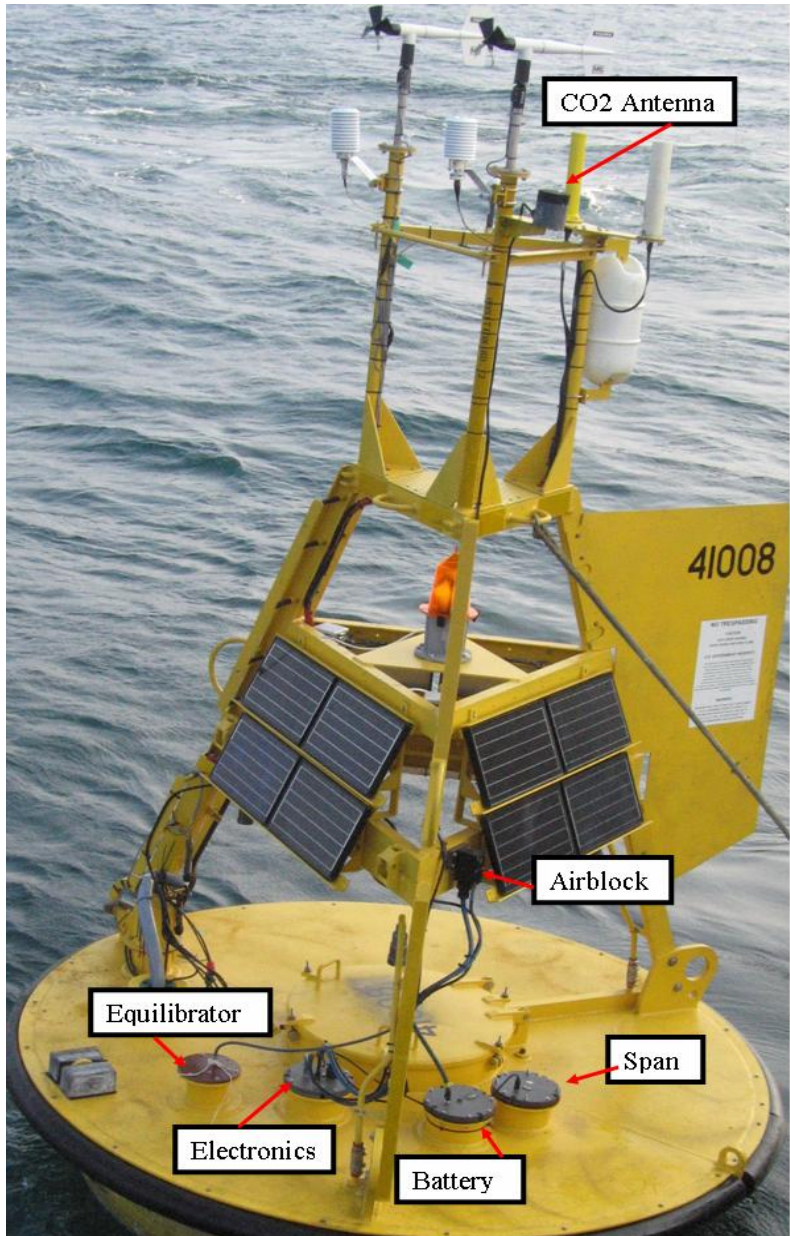


Sand Tiger

Hammerhead

CO_2 Monitoring Study

- Study initiated in 2007
- Monitors pH and CO_2
- Increase in atmospheric CO_2 by 0.789% per year
- Increase in seawater CO_2 by 2.4%
- Atmospheric increase same as in Hawai'i as expected
- Seawater CO_2 increase greater than expected
- Anticipated CO_2 increases for Atlantic ~0.5% per year



Gray's Reef National Marine Sanctuary

Wave Height
Wind Speed
Water/Air Temperature
Atmospheric Pressure

pCO_2 Sensor
(air/sea interface)

pH

Dissolved O_2

Temperature

Conductivity

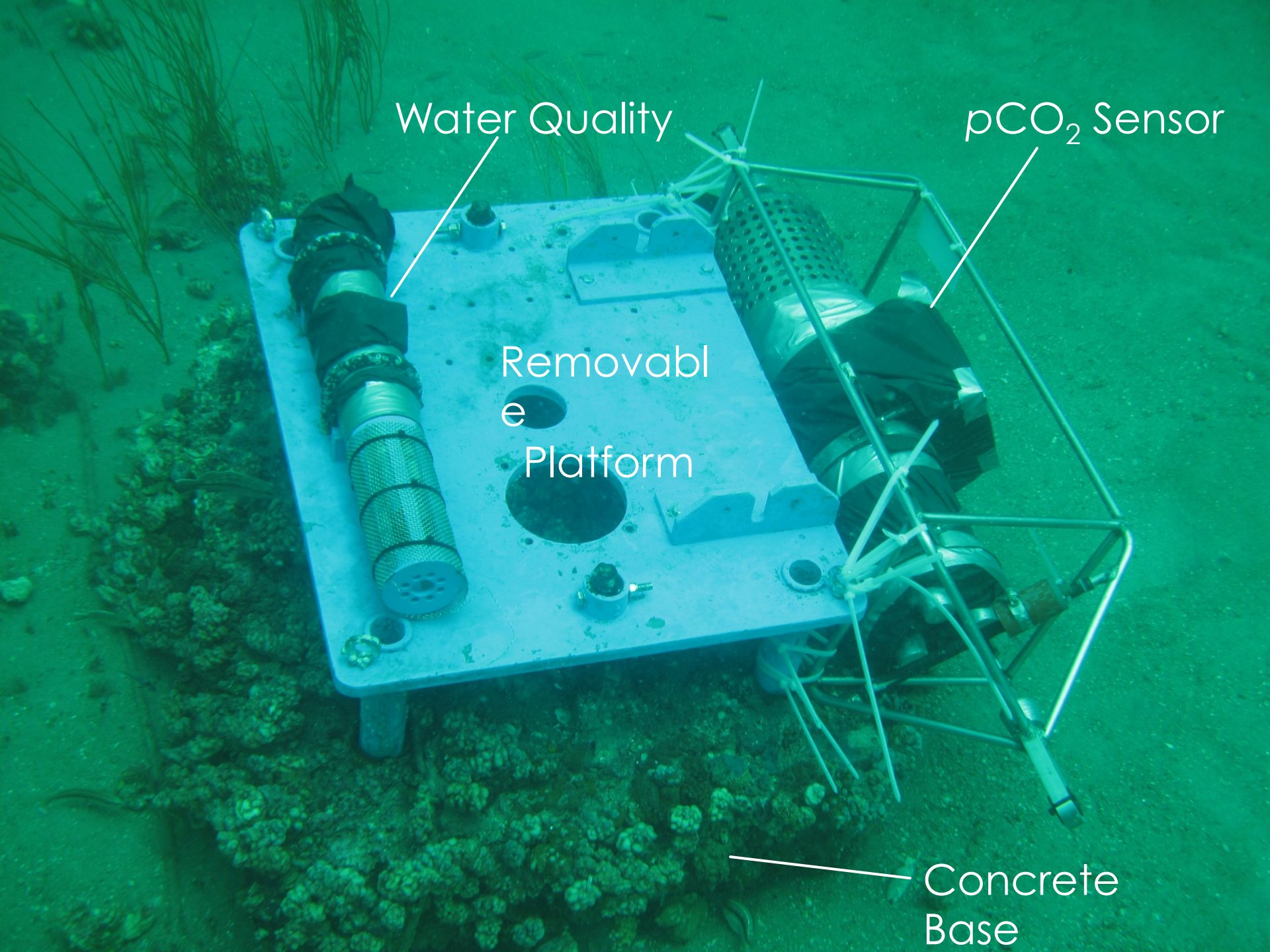
Salinity

pCO_2
Temperatur
e

Sea Surface Buoy

Station 41008 - GRAYS REEF - 40 NM Southeast of Savannah, GA
- Owned and maintained by National Data Buoy Center
3-meter discus buoy
ARES payload
31.4 N 80.87 W (31°24'8" N 80°52'14" W)

Site elevation: sea level
Air temp height: 4 m above site elevation
Anemometer height: 5 m above site elevation
Barometer elevation: sea level
Sea temp depth: 0.6 m below site elevation
Water depth: 18 m
Watch circle radius: 64 yards

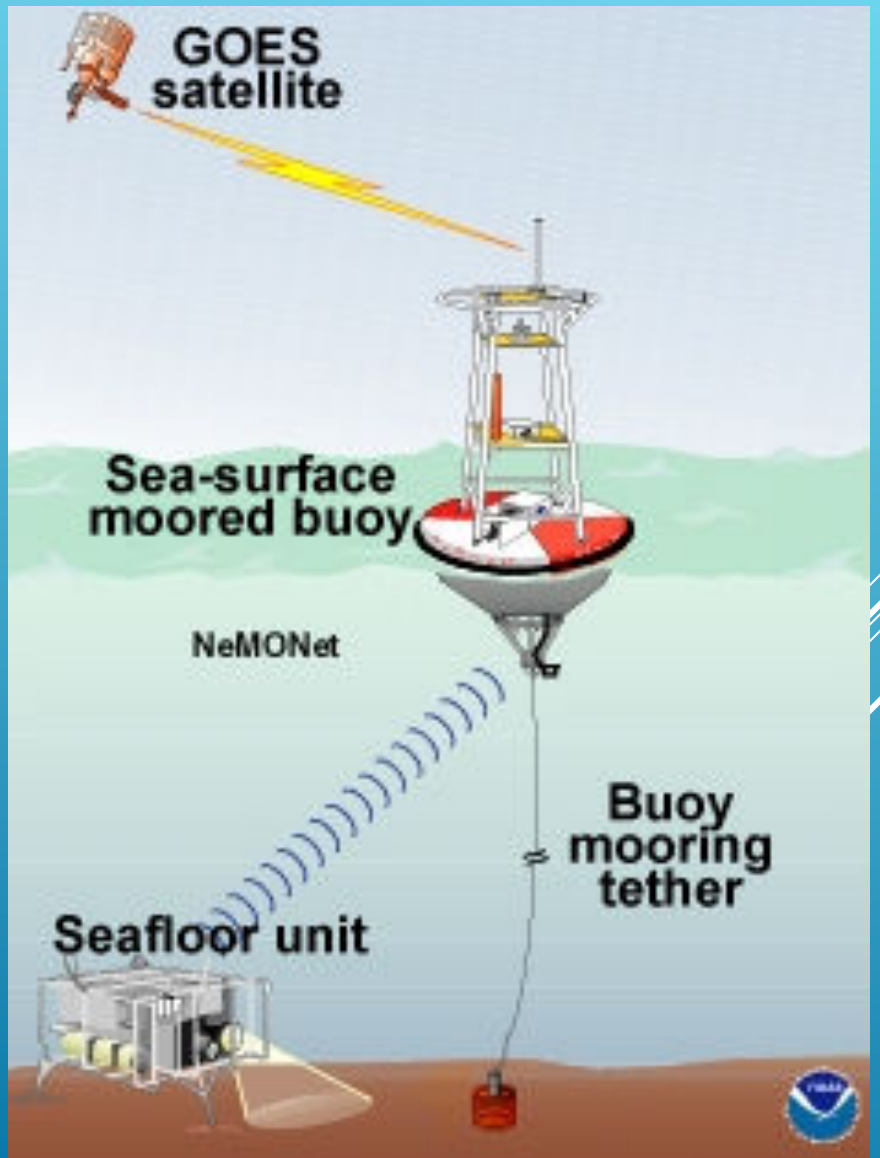

Water Quality
pCO_2 Sensor
Removabl
e
Platform
Concrete
Base

Sea Surface Buoys

NeMo Net System:

A camera on the seafloor images and measures temperature at a hydrothermally active area on the seafloor. Data are sent acoustically through the water to a surface buoy, and then via satellite to researchers on land.

Illustration courtesy of NOAA Pacific Marine Environmental Laboratory Vents Program



Storm Special! View the latest observations near Atlantic HURRICANE MATTHEW as of INTERMEDIATE ADVISORY NUMBER 37A @ 800 AM EDT FRI OCT 07 2016 and Atlantic TROPICAL STORM NICOLE as of ADVISORY NUMBER 14 @ 1100 AM AST FRI OCT 07 2016.

Station 41008 (LLNR 833) - GRAYS REEF - 40 NM Southeast of Savannah, GA

Owned and maintained by National Data Buoy Center
3-meter discus buoy
AMPS payload
31.400 N 80.868 W (31°24'0" N 80°52'5" W)

Site elevation: sea level
Air temp height: 4 m above site elevation
Anemometer height: 5 m above site elevation
Barometer elevation: sea level
Sea temp depth: 0.6 m below water line
Water depth: 18.288 m
Watch circle radius: 69 yards

This buoy is located in Gray's Reef National Marine Sanctuary

The southern third of NOAA's 22-square mile Gray's Reef National Marine Sanctuary has been designated a research area specifically designed for conducting controlled scientific studies where human activities cannot affect the results. Fishing and diving will be prohibited in the lightly used, 8-square mile research area. Vessels are permitted to travel through it without stopping. For complete information, go to the Gray's Reef website at graysreef.noaa.gov

LINK TO PMEL's pCO2 SITE for their data on this Station:
http://www.pmel.noaa.gov/co2/story/Grays+Reef

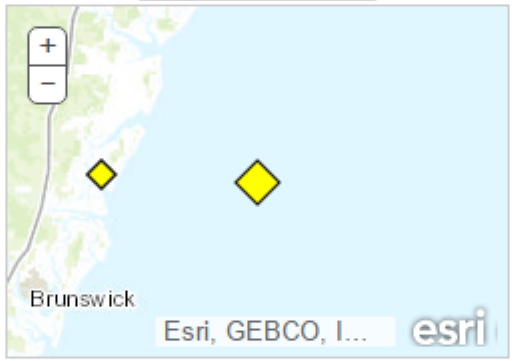
Right whales are active off GA from November to April. Speed restrictions of 10 knots apply to vessels 65 feet or greater within the vicinity of this station between November 15 and April 15. It is illegal to approach right whales within 500 yards. To learn more about right whales and rules protecting them, go to:
http://www.nmfs.noaa.gov/pr/shipstrike.

Latest NWS Marine Forecast

Important Notice to Mariners

Search And Rescue (SAR) Data

Oceans

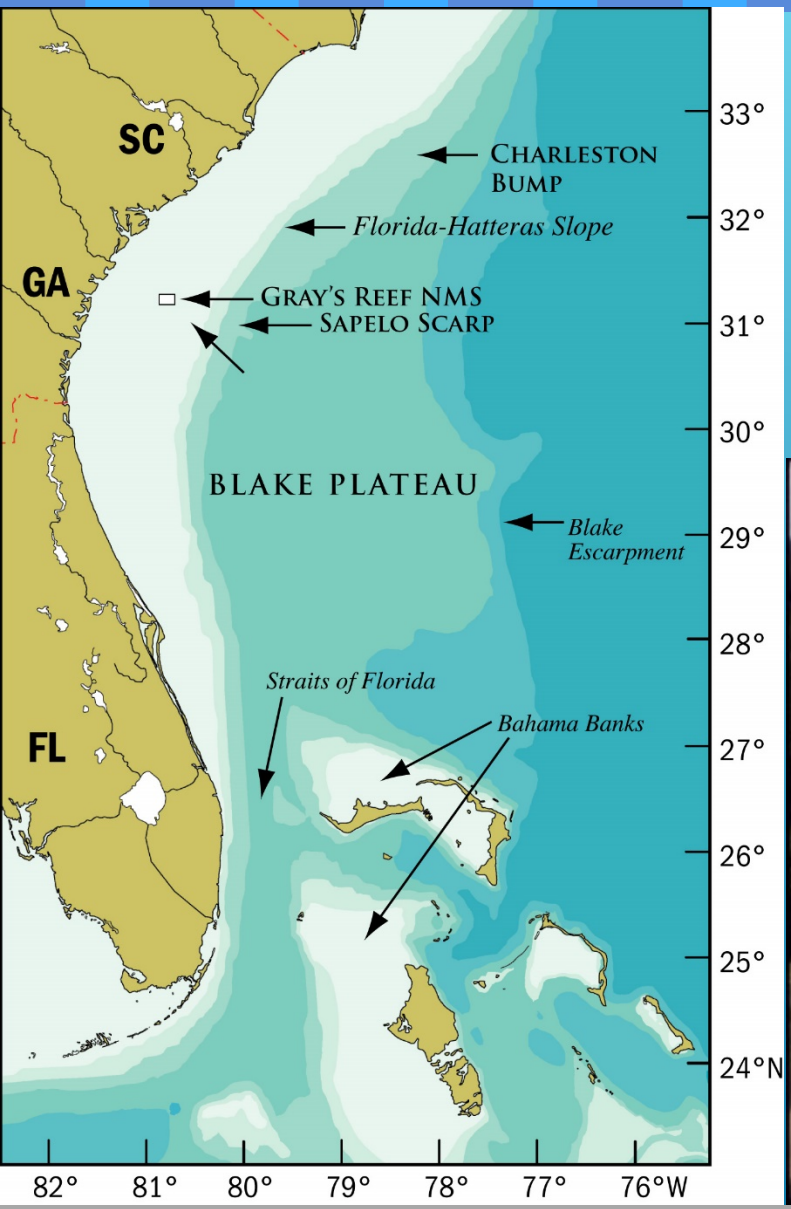


Large icon indicates selected station. Disclaimer
Stations with recent data
Stations with no data in last 8 hours
(24 hours for tsunami stations)

Gray's Reef National Marine Sanctuary

The Altamaha River Watershed is the seventh largest watershed on the eastern seaboard.

Gray's Reef National Marine Sanctuary



The Altamaha River Watershed drains one quarter of Georgia's landmass and contributes one sixth of the freshwater compliment to the South Atlantic Bight.

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One stream considered to be a headwater is Shoal Creek that begins in DeKalb County near Atlanta. It flows into the South River which in turn conjoins with the Yellow and Alcovy Rivers to become the Ocmulgee River.

Three other headwater sources, Lily Branch, Tanyard Creek and Steam Plant Stream, either originate on or flow through the University of Georgia campus in Athens, Georgia. These three streams flow into the Oconee River.

Gray's Reef National Marine Sanctuary

Gray's Reef National Marine Sanctuary

Georgia produces more broiler chickens than any state in the nation. The poultry industry contributes over $18.4 billion to the Georgia economy annually with 105 counties producing over $1 million worth of poultry products each year. On an average day Georgia produces 26 million pounds of chicken and 9.2 million eggs, which will feed over 22,000 people per year!

Georgia cattlemen own approximately 1.3 million head of cattle worth more than $676 million. Annual cash receipts total more than $262 million, making cattle the state's sixth largest cash crop.

Gray's Reef National Marine Sanctuary

America's metropolitan areas grew by more than 2 million people last year, meaning that U.S. cities are now home to 275.3 million people.

Long County -- 22.7 percent growth
* Forsyth County -- 21 percent growth
Bryan County -- 16.2 percent growth
Columbia County -- 16.1 percent growth
* Gwinnett County -- 11.2 percent growth

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Gray's Reef National Marine Sanctuary







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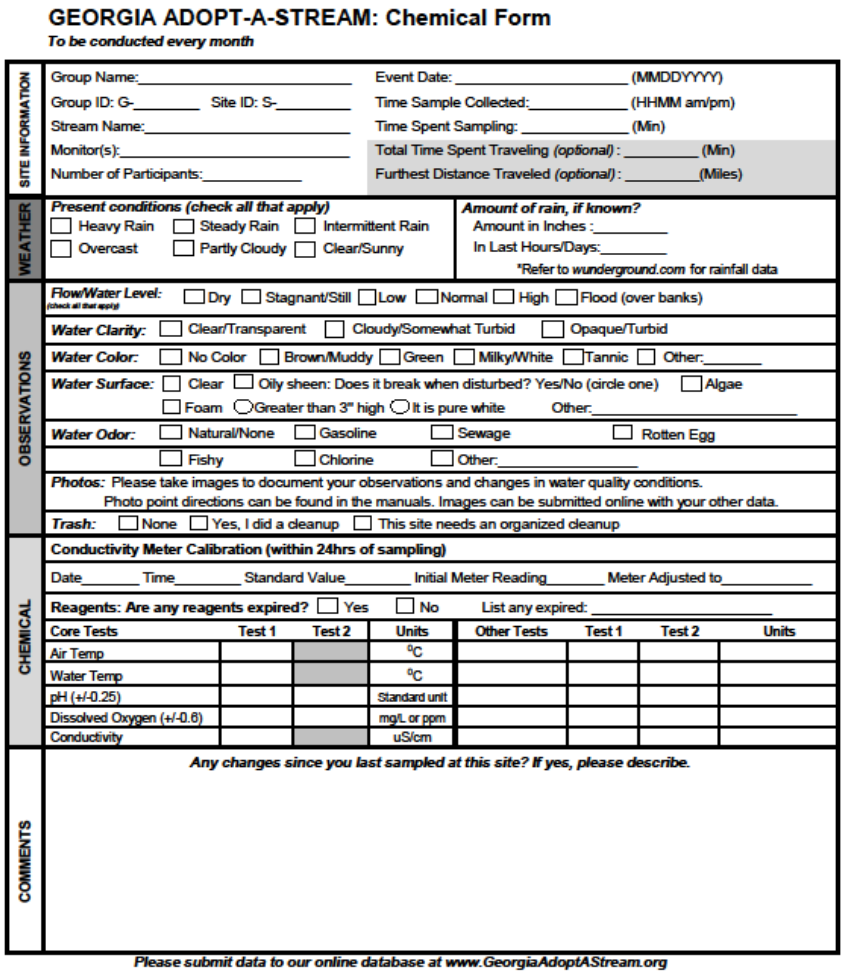
Rivers to Reefs Educators Workshop leaders train participants to become certified Adopt-A-Stream water quality monitors. Throughout the workshop at ten different points four teams of four teachers each perform the water chemistry protocol including testing for nitrates and phosphates as well as pH, water and air temperature, salinity or conductivity and dissolved oxygen. All four teams perform each test twice and their readings must fall within a narrow margin of error.



GEORGIA ADOPT-A-STREAM: Chemical Form

To be conducted every month

SITE INFORMATION

Group Name:_____ Event Date: _____ (MMDDYYYY)

Group ID: G-_____ Site ID: S-_____ Time Sample Collected:_____ (HHMM am/pm)

Stream Name:_____ Time Spent Sampling: _____ (Min)

Monitor(s):_____ Total Time Spent Traveling *(optional)* : _____ (Min)

Number of Participants:_____ Furthest Distance Traveled *(optional)* : _____(Miles)

WEATHER

Present conditions (check all that apply)

☐ Heavy Rain ☐ Steady Rain ☐ Intermittent Rain

☐ Overcast ☐ Partly Cloudy ☐ Clear/Sunny

Amount of rain, if known?

Amount in Inches :_____

In Last Hours/Days:_____

*Refer to *wunderground.com* for rainfall data

OBSERVATIONS

Flow/Water Level: (check all that apply) ☐ Dry ☐ Stagnant/Still ☐ Low ☐ Normal ☐ High ☐ Flood (over banks)

Water Clarity: ☐ Clear/Transparent ☐ Cloudy/Somewhat Turbid ☐ Opaque/Turbid

Water Color: ☐ No Color ☐ Brown/Muddy ☐ Green ☐ Milky/White ☐ Tannic ☐ Other:_____

Water Surface: ☐ Clear ☐ Oily sheen: Does it break when disturbed? Yes/No (circle one) ☐ Algae ☐ Foam ◯ Greater than 3" high ◯ It is pure white Other:_____

Water Odor: ☐ Natural/None ☐ Gasoline ☐ Sewage ☐ Rotten Egg ☐ Fishy ☐ Chlorine ☐ Other:_____

Photos: Please take images to document your observations and changes in water quality conditions. Photo point directions can be found in the manuals. Images can be submitted online with your other data.

Trash: ☐ None ☐ Yes, I did a cleanup ☐ This site needs an organized cleanup

CHEMICAL

Conductivity Meter Calibration (within 24hrs of sampling)

Date_____ Time_____ Standard Value_____ Initial Meter Reading_____ Meter Adjusted to_____

Reagents: Are any reagents expired? ☐ Yes ☐ No List any expired: _____

Core Tests	Test 1	Test 2	Units	Other Tests	Test 1	Test 2	Units
Air Temp			°C				
Water Temp			°C				
pH (+/-0.25)			Standard unit				
Dissolved Oxygen (+/-0.6)			mg/L or ppm				
Conductivity			uS/cm				

COMMENTS

Any changes since you last sampled at this site? If yes, please describe.

Please submit data to our online database at www.GeorgiaAdoptAStream.org

Gray's Reef National Marine Sanctuary

An important part of the workshop is to focus on coastal and barrier islands culture. Yvonne Grovner of Hog Hammock on Sapelo Island demonstrates traditional sweet grass basket making brought from Sierra Leone where her ancestors were enslaved.

At the end of each day, data sets are shared among the four groups and lessons learned are discussed. The leaders emphasize how the teachers might bring their experiences and newly acquired information into their classroom.

Gray's Reef National Marine Sanctuary

Cathy J. Sakas gratefully recognizes NOAA Gray's Reef National Marine Sanctuary staff for their direct and indirect support of the education program of which this presentation is a part.

Sarah Fangman – Sanctuary Superintendent
Chris Hines – Deputy Superintendent
LT Jared Halonen – NOAA Corps and Vessel Operations Officer
Debbie Meeks – Financial and IT Coordinator/Webmaster
Jody Patterson – Events and Volunteer Coordinator
Todd Recicar – Marine Operations Coordinator
Michelle Riley – Communications and Public Outreach Coordinator
Kim Roberson – Research Coordinator
Becky Shortland – Resource Protection Coordinator
George Sedberry, Ph.D. – Sanctuary Science Coordinator, NOAA ONMS Southeast, Gulf of Mexico and Caribbean Region