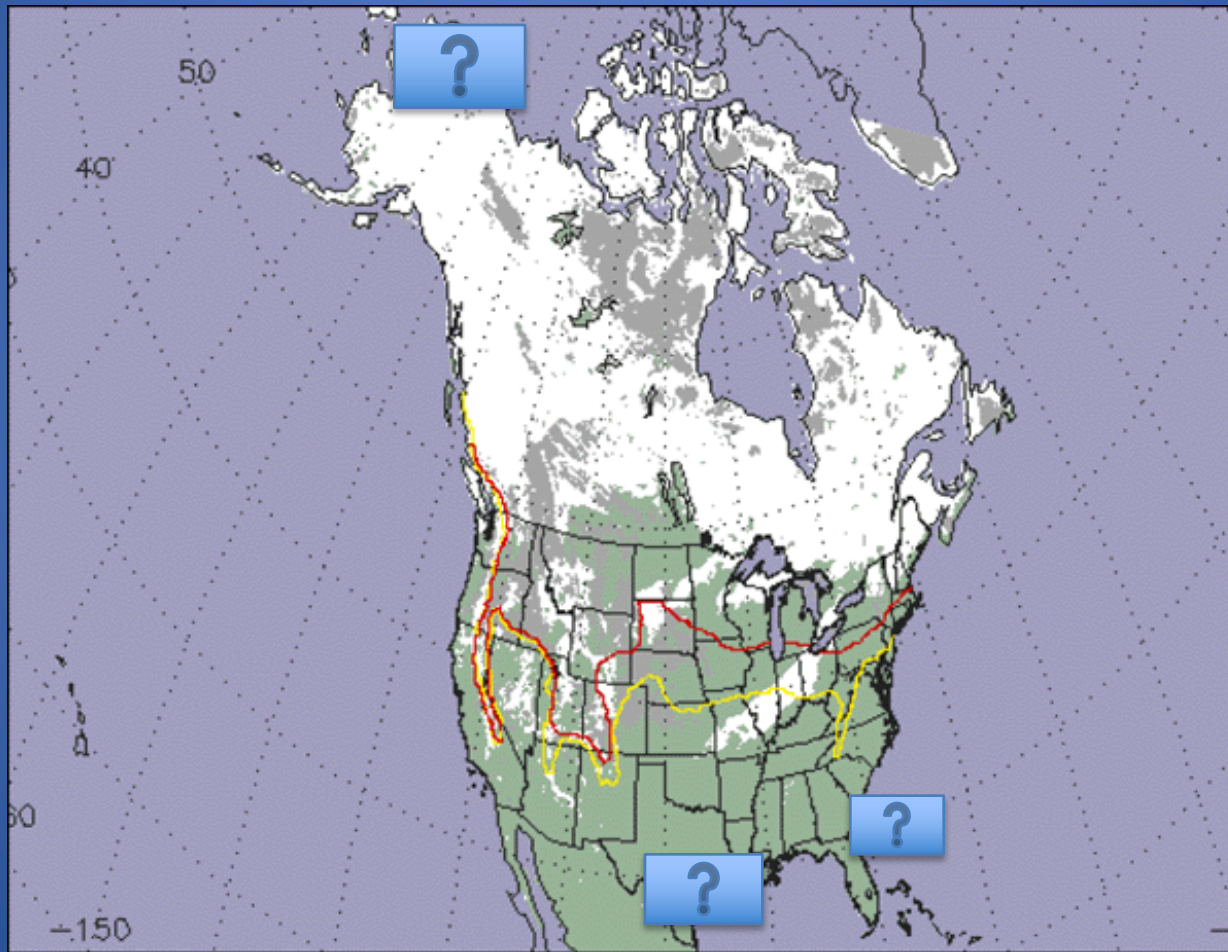


# The SMORE Project

A model for transforming  
authentic research into  
classroom curricula



What do students in Coastal Alaska, Texas and Georgia have in common?



They' re all part of the same ocean!!

























But our really big idea?





# Introducing SMORE: Students Monitoring Ocean Response to Eutrophication





# SMORE GA –Bradwell Institute Hinesville



Teacher Joy McCook

# SMORE Alaska – Eben Hopson Middle School, Barrow



Teacher Deb Greene

# SMORE Texas – Redd School, Houston





# What are we looking for?



Evidence of human impact on  
eutrophication!



























How?





We cannot live only for ourselves. A thousand fibers connect us, and among those fibers, as sympathetic threads, our actions run as causes, and they come back to us as effects.

Herman Melville





# SMORE: STUDENTS MONITORING OCEAN RESPONSE TO EUTROPHICATION

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REDD SCHOOL, HOUSTON TEXAS

## WHO ARE WE ?

We are ROTREC, students of teachers' research experiences. In 2007 our teacher Lolie Garay was a PolarTREC teacher who went to Antarctica on an oceanographic expedition. She met marine scientist Dr. Patricia Yager (UGA) on that voyage. In 2010 they teamed up again to go to the Anastasia River Plume. In 2011 they traveled to Barrow Alaska.

Mrs. Lolie and Dr. Yager developed the SMORE Project to give classroom students a chance to do real time research. We are the 5<sup>th</sup> year of Redd Middle School students to conduct this study of the Galveston Bay watershed, doing what scientists do!



## WHAT DO WE DO?

We do seasonal sampling three times a year at 3 different sites – the freshwater Trinity River, the brackish estuary at Smith Point, and a coastal site on Bulwer Peninsula.

We are interested in finding out if the human activity surrounding the Bay is raising the levels of nitrates and phosphates. We measure and test for many things to help us understand how the biogeochemistry changes. Visual surveys give us the big picture of what is going on at each site.



Galveston bay is surrounded by large cities, industrial areas, refineries, and the Houston Ship channel. For this reason the environmental quality of Galveston bay concerns us. Fragile ecosystems and wildlife habitats are very important to the health of the bay as well as to the economy of its residents.

Sources of cultural eutrophication that can lead to increased levels of nitrates and phosphates include:

- Seven rivers empty into the Texas Gulf Coast; 2 major rivers, the Trinity and San Jacinto flow directly into the bay.
- A large system of creeks and bayous also empty into these rivers.
- Refineries, agriculture, construction surround the bay
- Discharging of treated and untreated municipal sewage
- Increasing populations all along the watershed

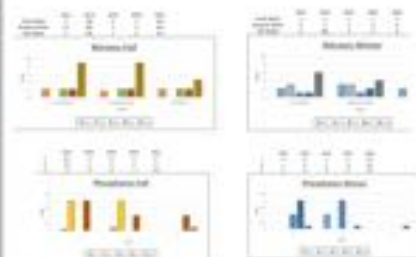
## HOW DO WE DO IT?

- We use the LaMotte system for chemical testing using titrations, sulfam bio-particles, and colorimetric tests.
- We test for dissolved oxygen, phosphates, alkalinity, nitrate, nitrogen, turbidity, and pH levels, as well as testing the soil chemistry.
- Yager technology allows us to use sensors and loggers for measuring salinity, gases, temperature, pH, and turbidity.
- For the first time SMORE has added ROVs to our arsenal for testing water. The ROVs were totally student built!



## WHAT DID WE FIND?

We compared our Fall and Winter data to measurements that were taken since SMORE began in 2011. Although we considered all of the tests that were done, we have only included the graphs for the nitrates and phosphate tests.



- Phosphate levels seem to be higher than nitrates.
- Nitrates are lower in the fall when there is still more photosynthesis going on.
- Overall, these measurements do not seem to indicate excessive nutrients in the water.

## CONCLUSIONS

- It is difficult to look at only two sets of measurements without considering the big picture of how all the different biogeochemical pieces fit together.
- The latest data from the Galveston Bay Status and Trends Report show improvement in levels of nutrients in the Trinity River and Bay area we sample from.
- We would like measurements to compare our data with.
- Seasonal changes like drought and flooding events affect water chemistry.
- We have many more questions we need to answer and more sampling to do.



## References

[www.galvestondata.org](http://www.galvestondata.org)  
[bit.ly/1uqps-gov](http://bit.ly/1uqps-gov)  
LaMotte – The Monitor's Handbook

## Acknowledgements

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