ABSI Science Update

Sandra Brooke Ph.D.
ABSI Project Lead
Research Faculty, FSUCML

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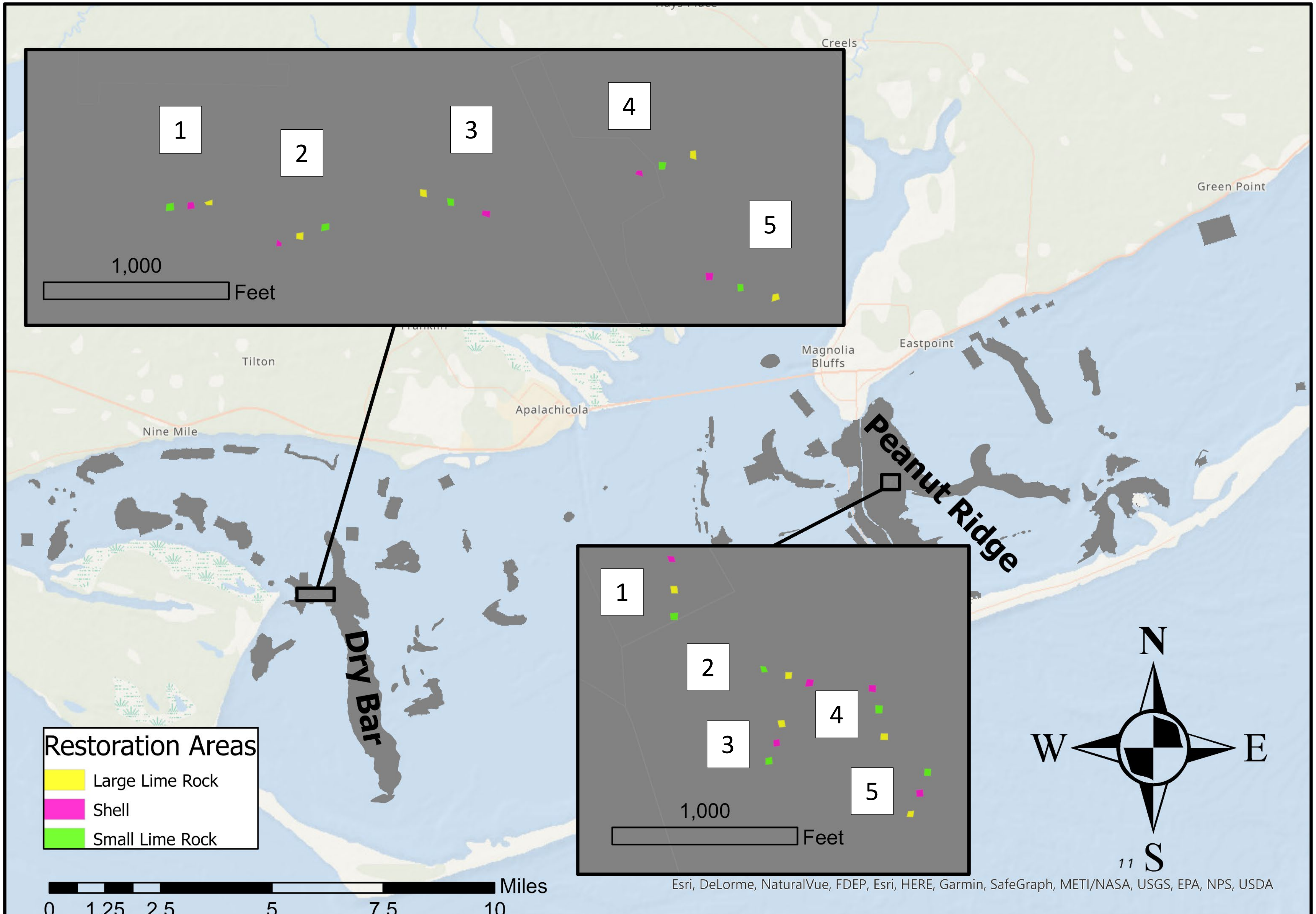
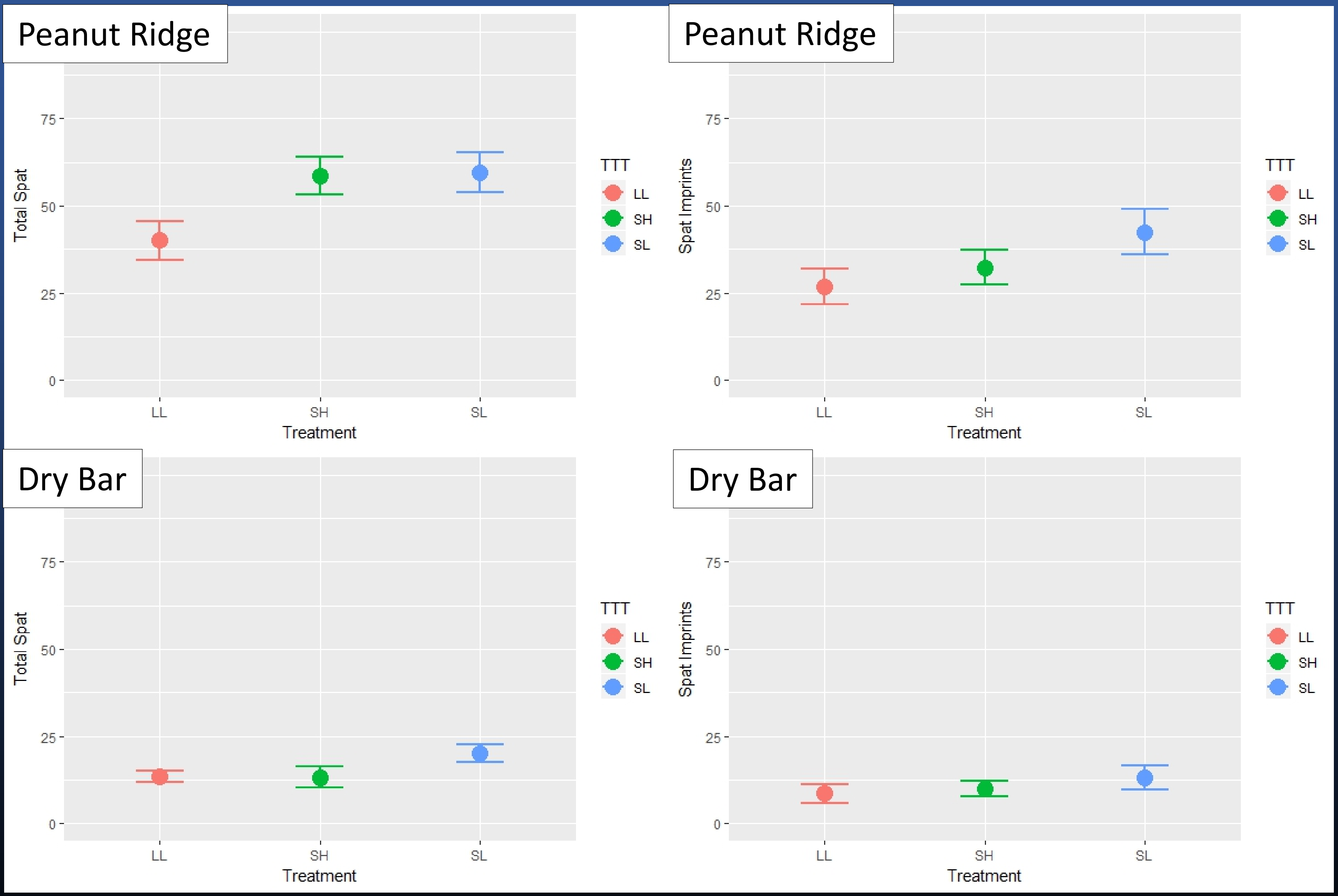
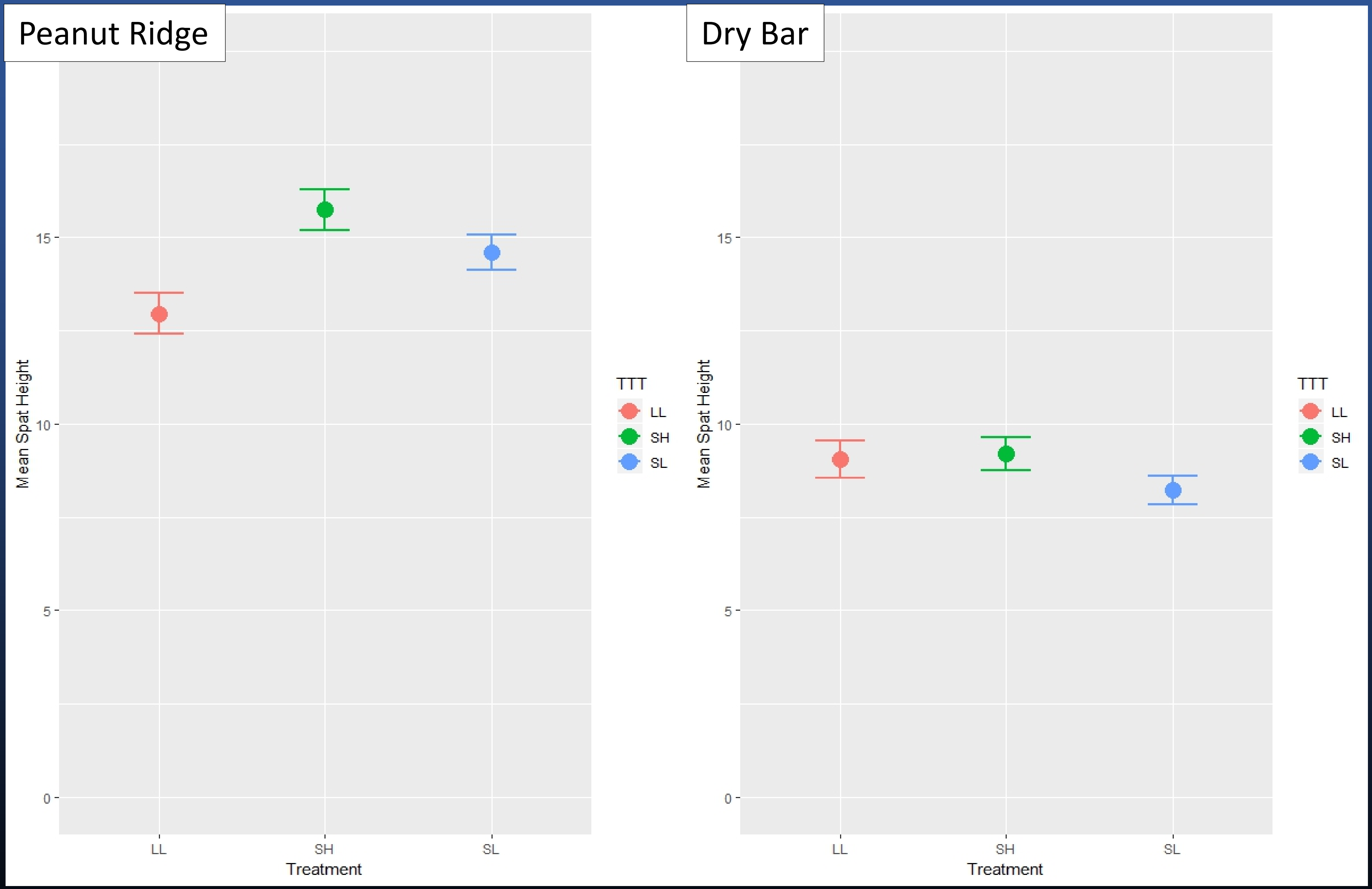
ABSI Experimental Oyster Restoration Sites



Spat abundance data from experimental reefs



Spat size data from experimental reefs



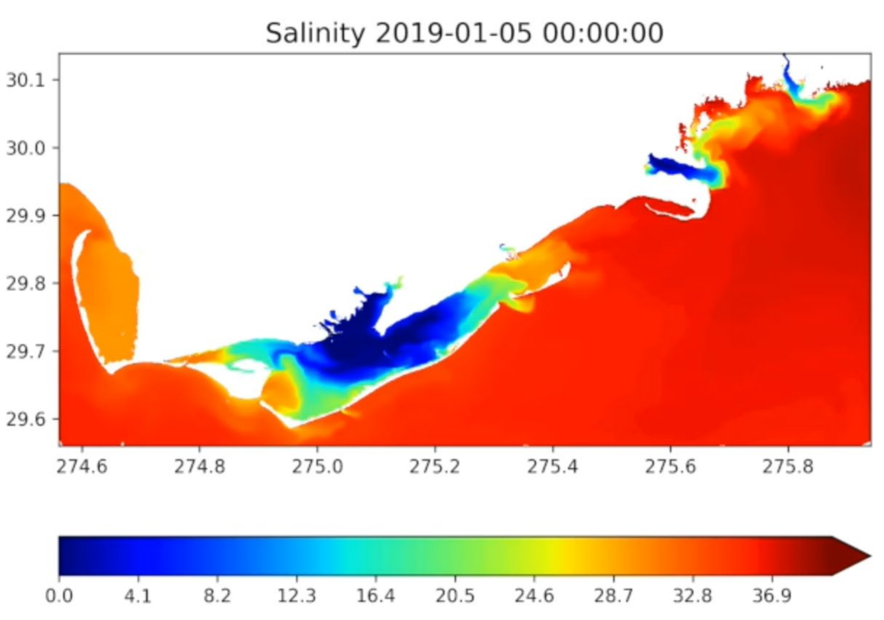
Bio~Physical Modeling for the Apalachicola Bay System Initiative

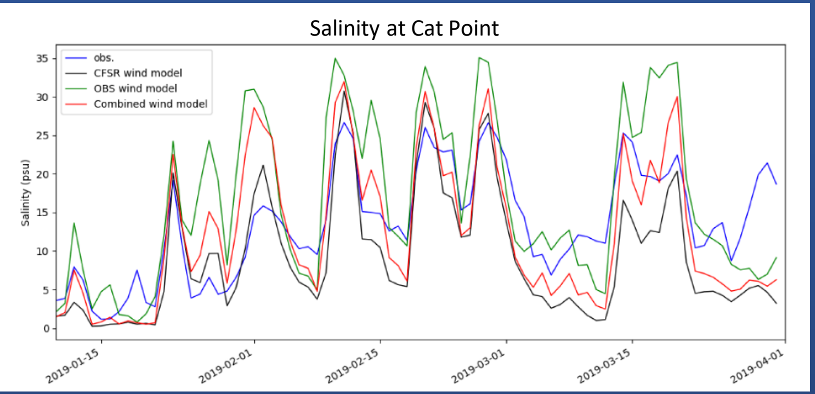
Dr. Steve Morey ; Dr. Xu Chen, Florida A&M University

Objectives

1. Configure a hydrodynamic model for the lower Apalachicola River, Apalachicola Bay and the surrounding coastal and inner shelf regions based on the latest bathymetric and topographic data.
2. Run hindcast and future climate and management scenario simulations.
3. Perform analyses of the simulations to characterize the variability of hydrographic properties throughout Apalachicola Bay.
4. Using a numerical particle tracking approach to simulate oyster larvae, conduct and analyze larvae transport simulations to quantify factors such as larval recruitment, retention and inter~estuarine exchange.

Results





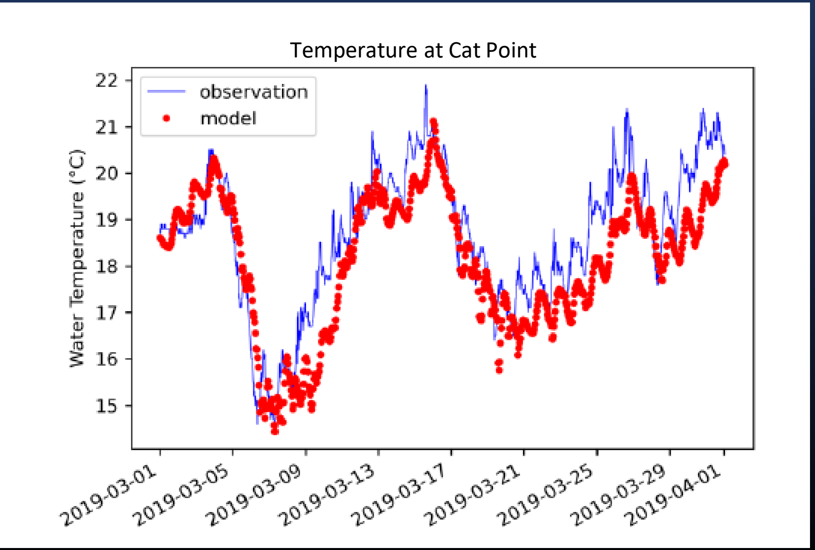
Salinity (above) and temperature (below) comparisons at ANERR stations are used to assess modifications to the model. In this case, a better simulation of salinity is achieved by modifying the weather model winds forcing the Apalachicola Bay model by superimposing larger high-frequency wind variability (sea breeze) from observations.

The hydrodynamic model has been configured for the bay and surrounding region. The model simulates:

- Water level and tides
- Flooding and drying of intertidal areas
- Effects of varying river flows (Apalachicola, Carrabelle, Ochlockonee, St. Marks)
- Response to atmospheric forcing
- Flow over and along high-resolution bathymetry and coastline geometry

The model has been run for one-year scenarios, including:

- 2019 – Climatologically "normal" year
- 2012 – Dry Year
- 2012 under future climate (linked to S. Leitman's model)



Next Steps

1. Continue refinement of model methodology to improve accuracy of simulations
2. Run additional climate and management scenarios
3. Conduct analysis of model output
4. Implement and run individual-based larval model

Trophic Analysis with Stable Isotopes

Objectives: Compare 2020-2021 stable isotopic trophic indicators with data collected for 1992-1994 to **Test the hypothesis** that the primary production supporting secondary production in Apalachicola Bay has shifted towards a proportion of organic matter of marine origin as opposed to river origin over 30 years.

Approach – measure d^{13}C, d^{15}N and d^{34}S on organic matter from sediments, oysters, fish and plankton in 2020-2021 to compare with historical data, 1992-1994.

Preliminary Results – not all samples have been analyzed, but results are due soon.

Results to date do not support the hypothesis that trophic inputs have shifted over time.
Sediments, fish and plankton do not indicate increased marine influence on the food web.

Next Step: Obtain complete data set, thorough statistical analysis

Levels of Heavy metals and organochlorine pesticides in Apalachicola Bay

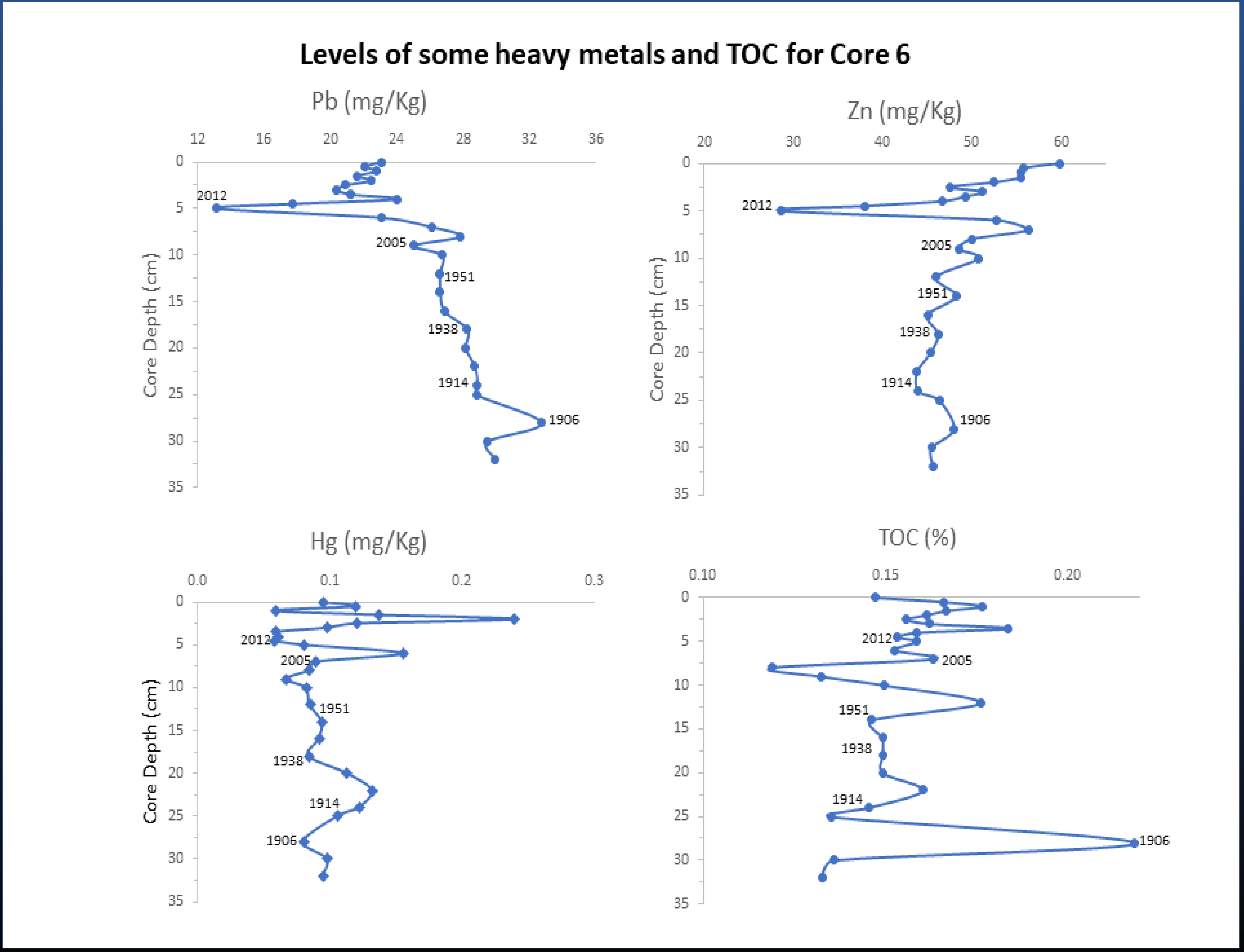
Objectives:

- To determine the distribution and bioavailability of heavy metals and their possible temporal and spatial distributions.
- To determine the distribution of organochlorine pesticides and their possible temporal and spatial distributions.
- Also, to use benthic foraminifers for pollution bioindicator for both heavy metals and organochlorine pesticides through time (<100 years) and across the Bay.

Results:

Samples analyzed: 11 surface samples, 1 Bay Core (27 slices) sample and River Core sample (13 slices). Total: 51 samples

Analyses completed: Heavy metals, grain size, and Total Organic Carbon



Next step:

Organochlorine pesticide analysis

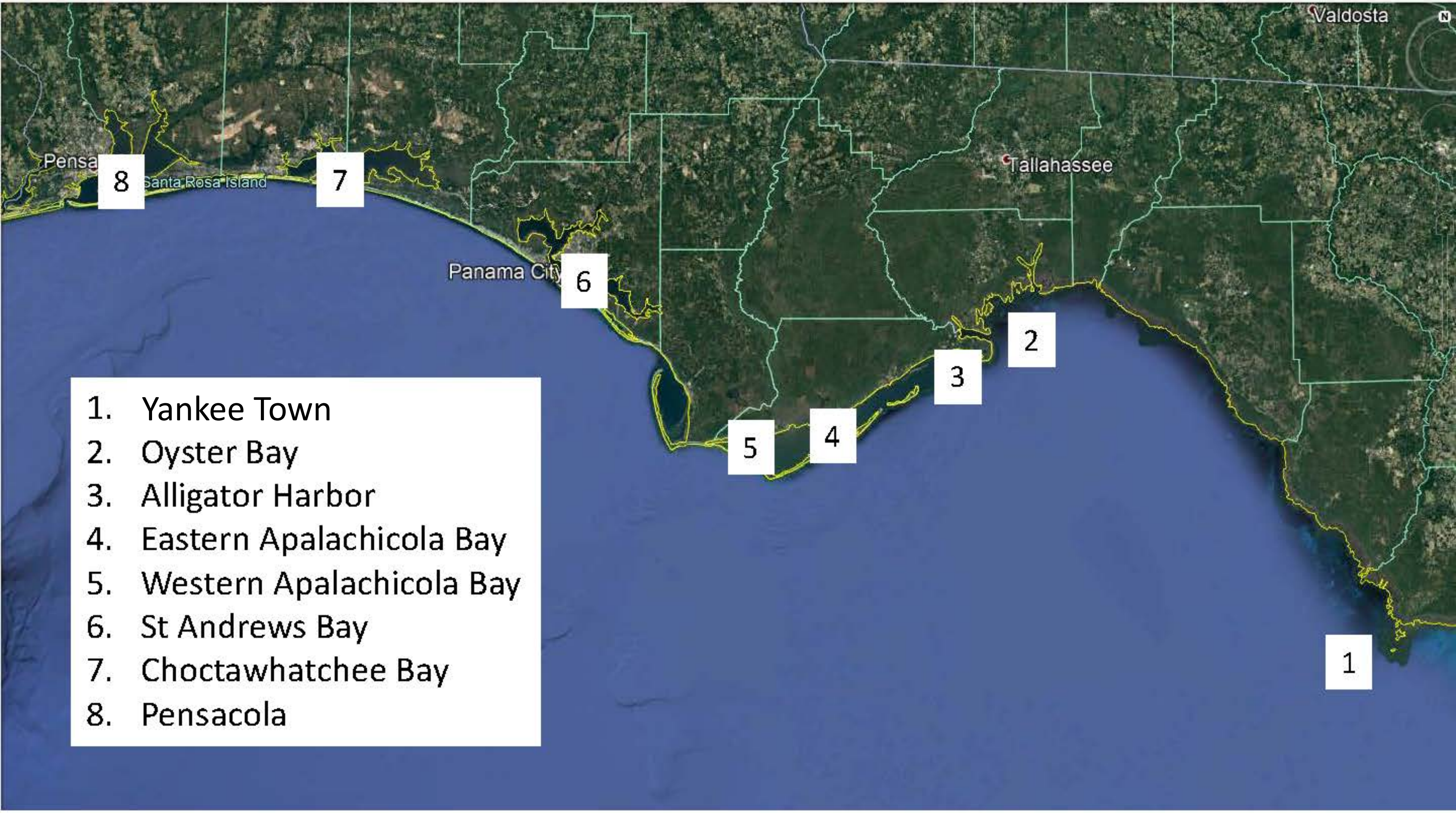
Genetic structure of oyster populations in the Florida panhandle

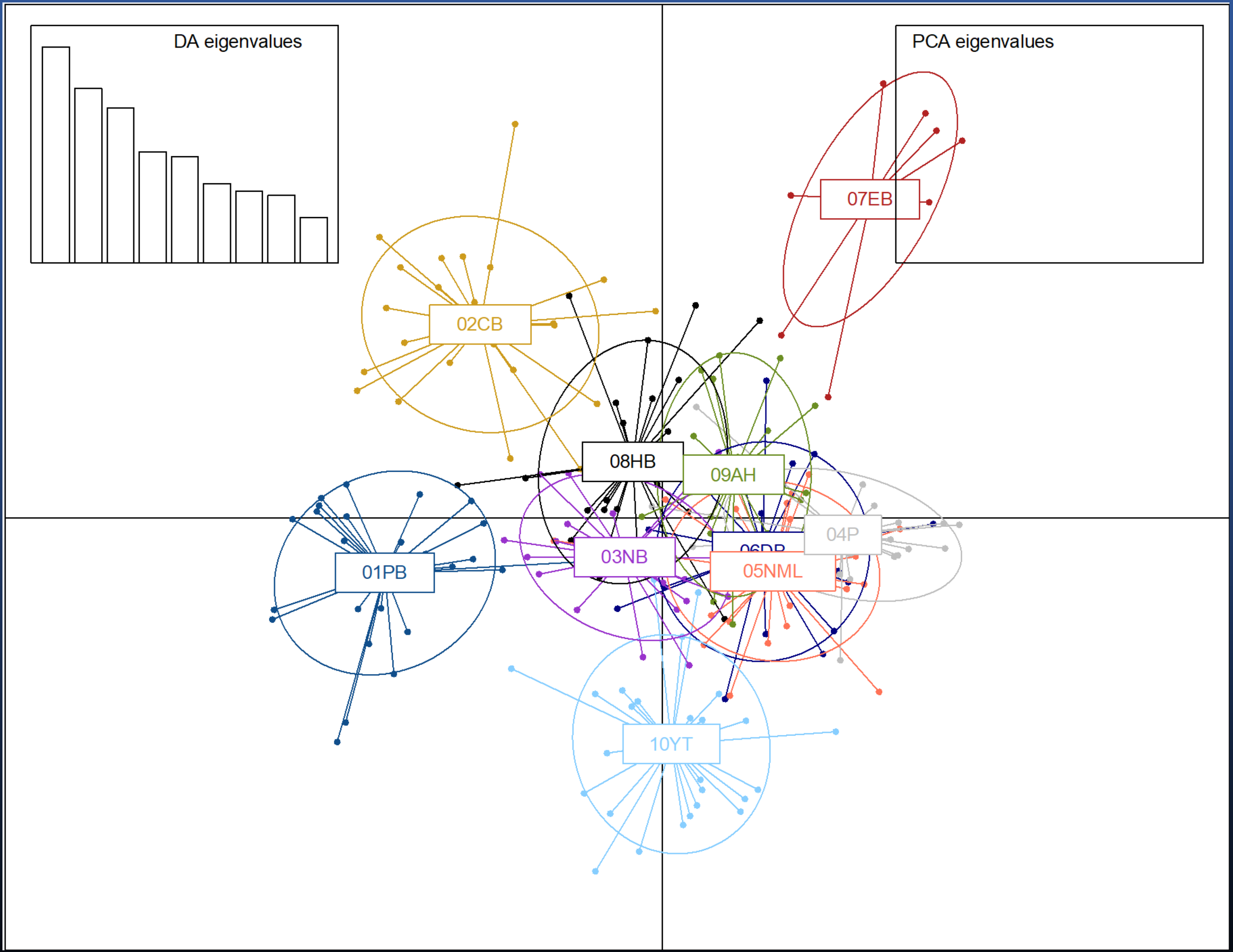
Objectives: determine connectivity of oyster populations in the Florida panhandle

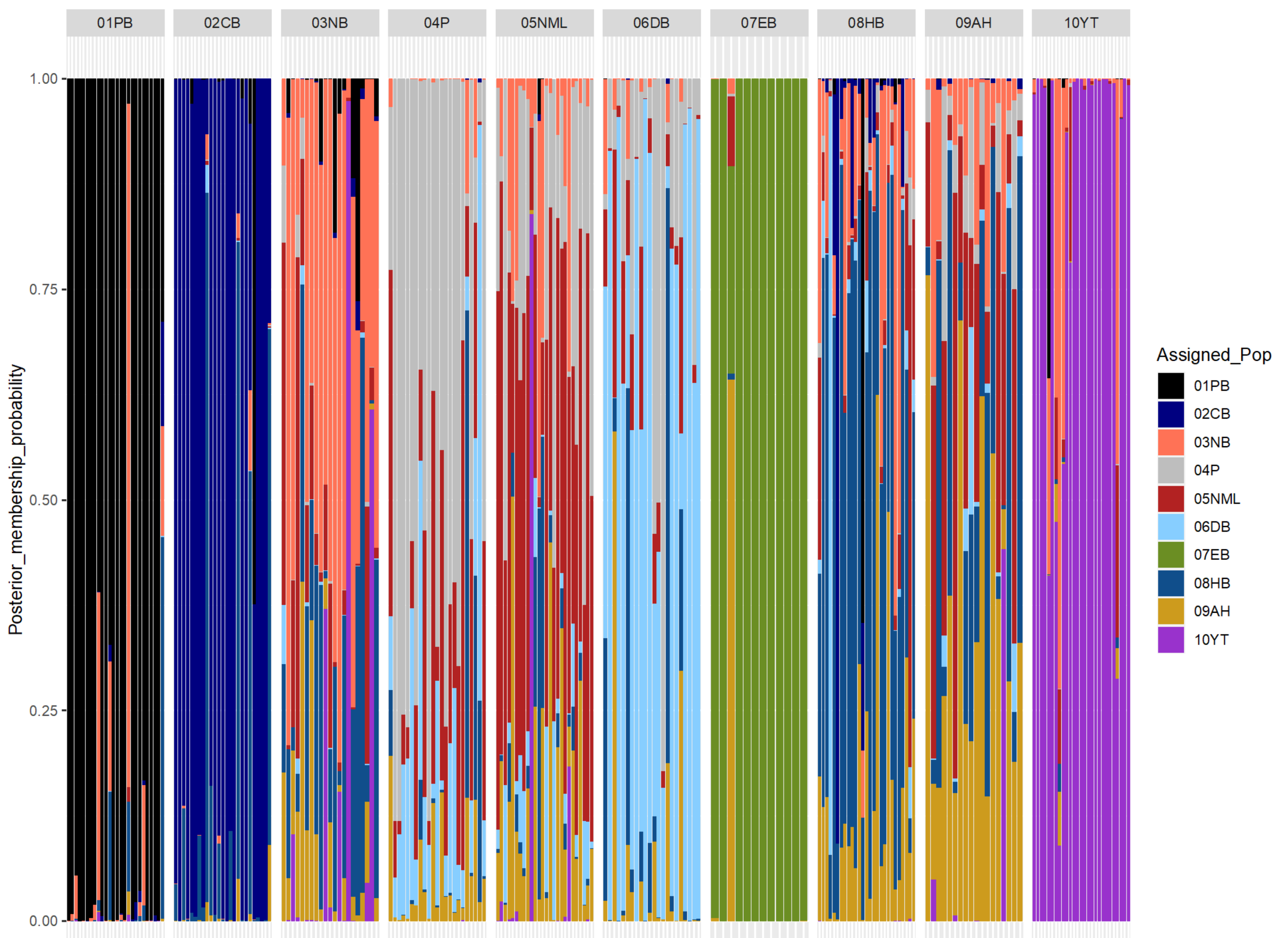
Results: Appears to be separation between western-most bays and central bays

Next steps: additional loci are being sequenced to increase analytical power for microsatellites

Proposed sampling sites for oyster genetic study




DA eigenvalues
PCA eigenvalues
07EB
02CB
08HB
09AH
01PB
03NB
06DP
04P
05NML
10YT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02CB
03NB
04P
05NML
06DB
07EB
08HB
09AH
10YT
1.00
0.75
0.50
0.25
0.00
Posterior_membership_probability
Assigned_Pop
01PB
02CB
03NB
04P
05NML
06DB
07EB
08HB
09AH
10YT

Other ongoing projects

Manuscript: Analysis of historical finfish communities in Apalachicola Bay, Florida, related to seasonality and river flow

Manuscript: An analysis of intertidal oyster population dynamics in the Apalachicola Bay area.

Sub-tidal oyster spat traps – started last month

Sub-tidal oyster tong sampling – this winter

Sampling FLDEP Restore sites to continue data collection

Collect water quality data from instruments


Questions?
Lynne Buchanan