



Meta-analysis of Carbon Storage in Gulf of Mexico Salt Marshes and Mangroves



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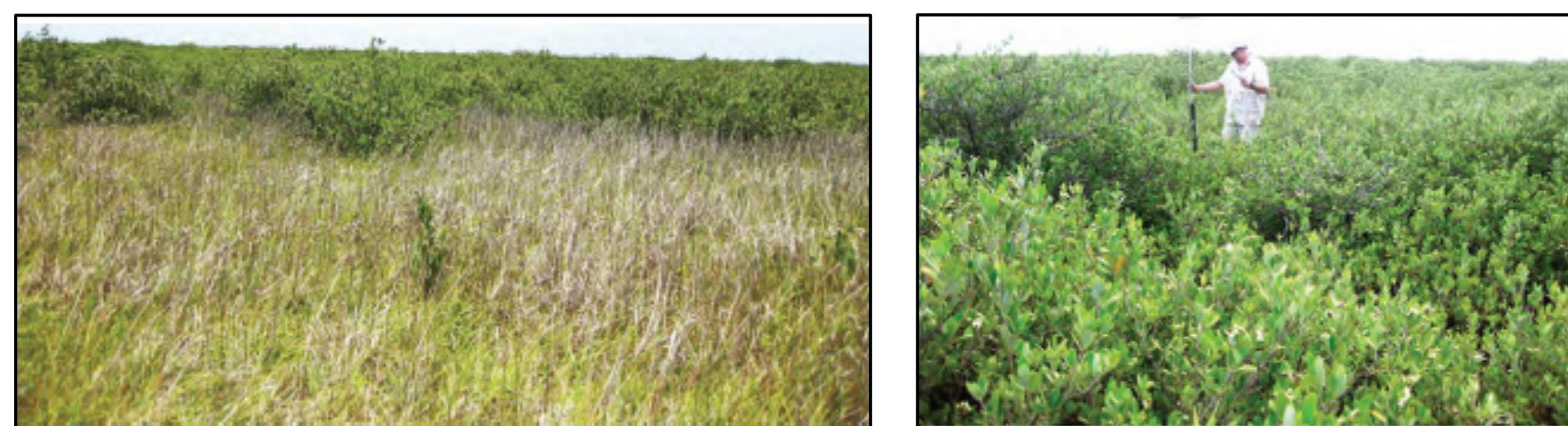
INTRODUCTION

- In the northern Gulf of Mexico, mangroves are expanding their range northward due to increasing temperatures and decreases in the frequency and duration of freezes.

- With a 2°C to 4°C increase in mean annual minimum temperature, 95-100% of salt marshes in Texas and Louisiana will be vulnerable to displacement by mangroves (Osland et al 2013).

- This projected transition from salt marsh to mangrove could have cascading ecosystem effects, thus affecting the supply and resiliency of ecosystem services.

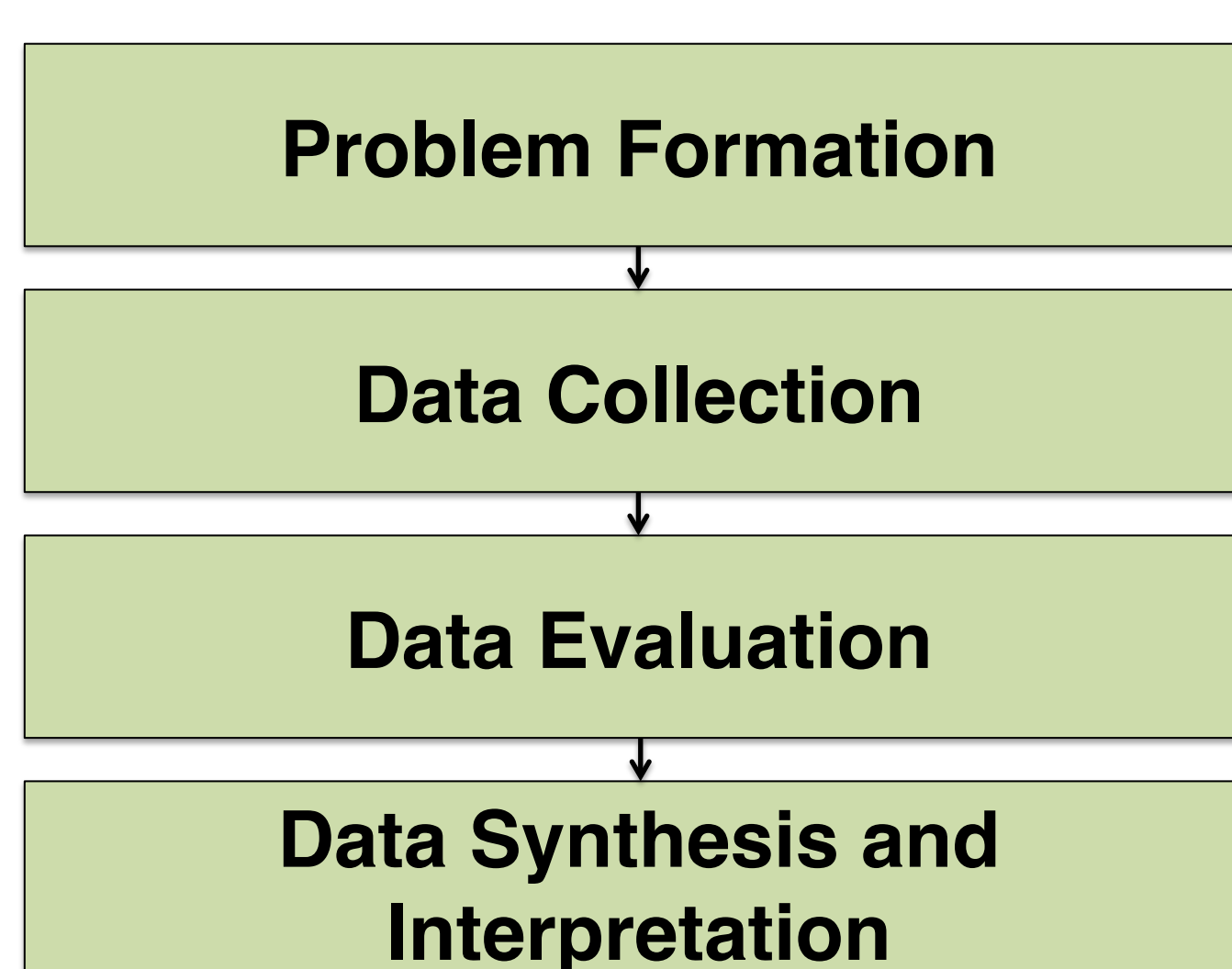
- We are conducting a meta-analysis to link structural and process-based attributes of Gulf of Mexico salt marshes and mangroves to the provision of ecosystem services.**



Mangroves encroaching on salt marsh in Texas (Comeaux et al 2012)

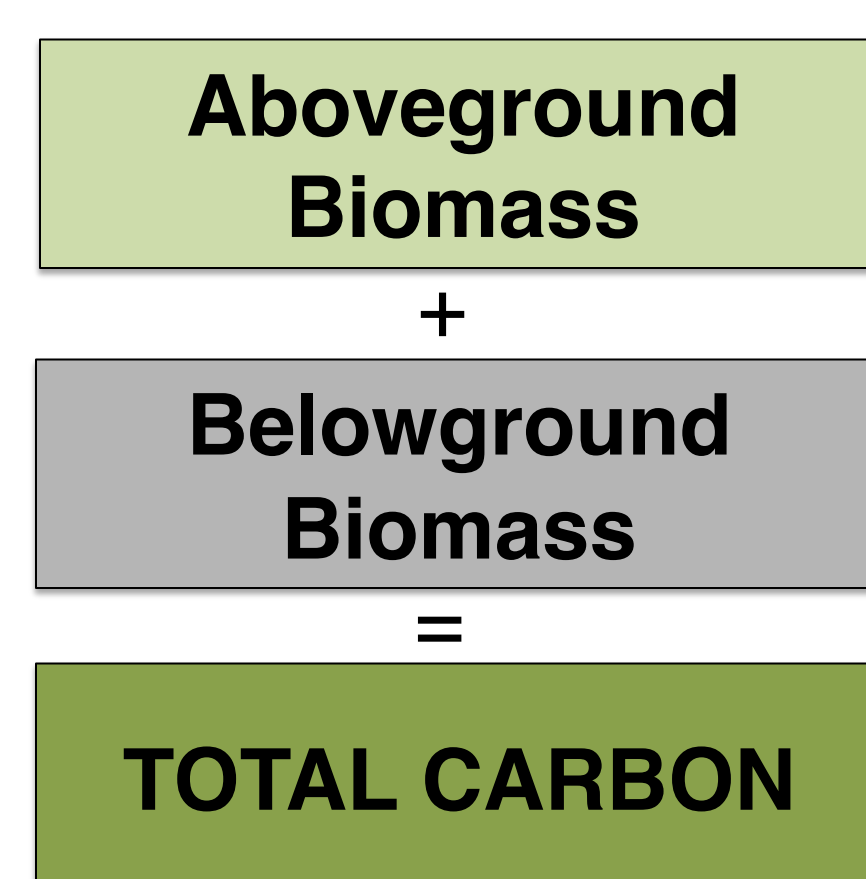
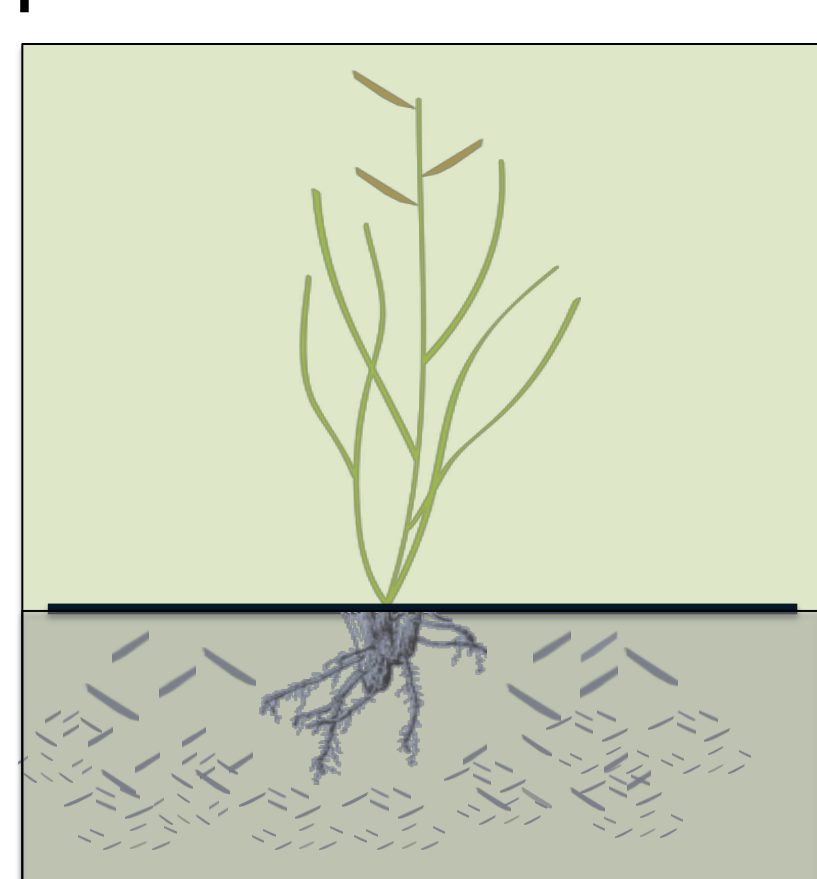
METHODS

- A meta-analysis was conducted in four stages of research synthesis (Hartung et al 2008).



- Data was collected for aboveground biomass (stems and leaves), belowground biomass (roots, rhizomes and soil organic matter) for salt marshes and mangroves in the northern Gulf of Mexico.

- To estimate total carbon storage, data was standardized to grams of carbon per meter squared.



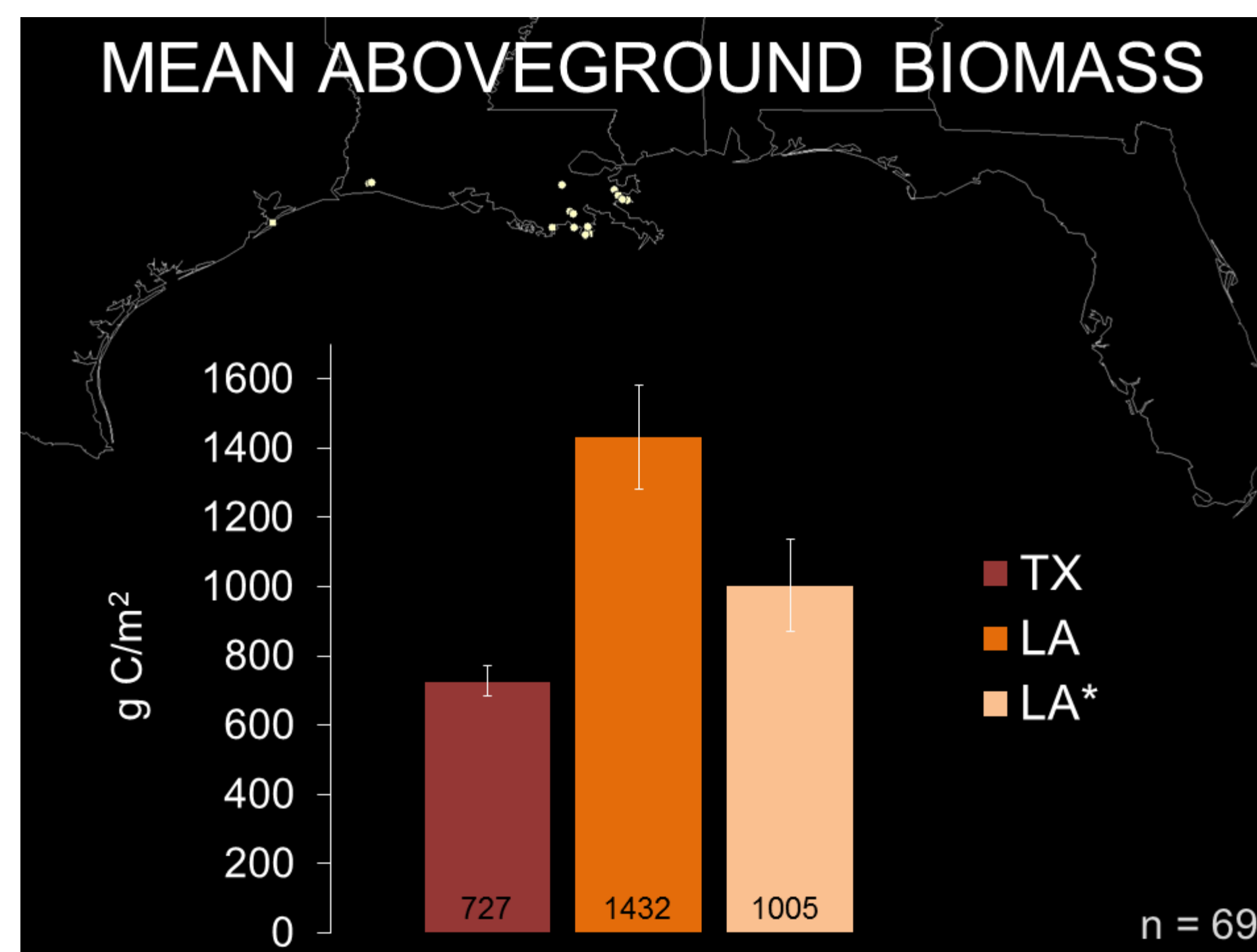
RESULTS

- Data from studies that met eligibility criteria were standardized and aggregated.

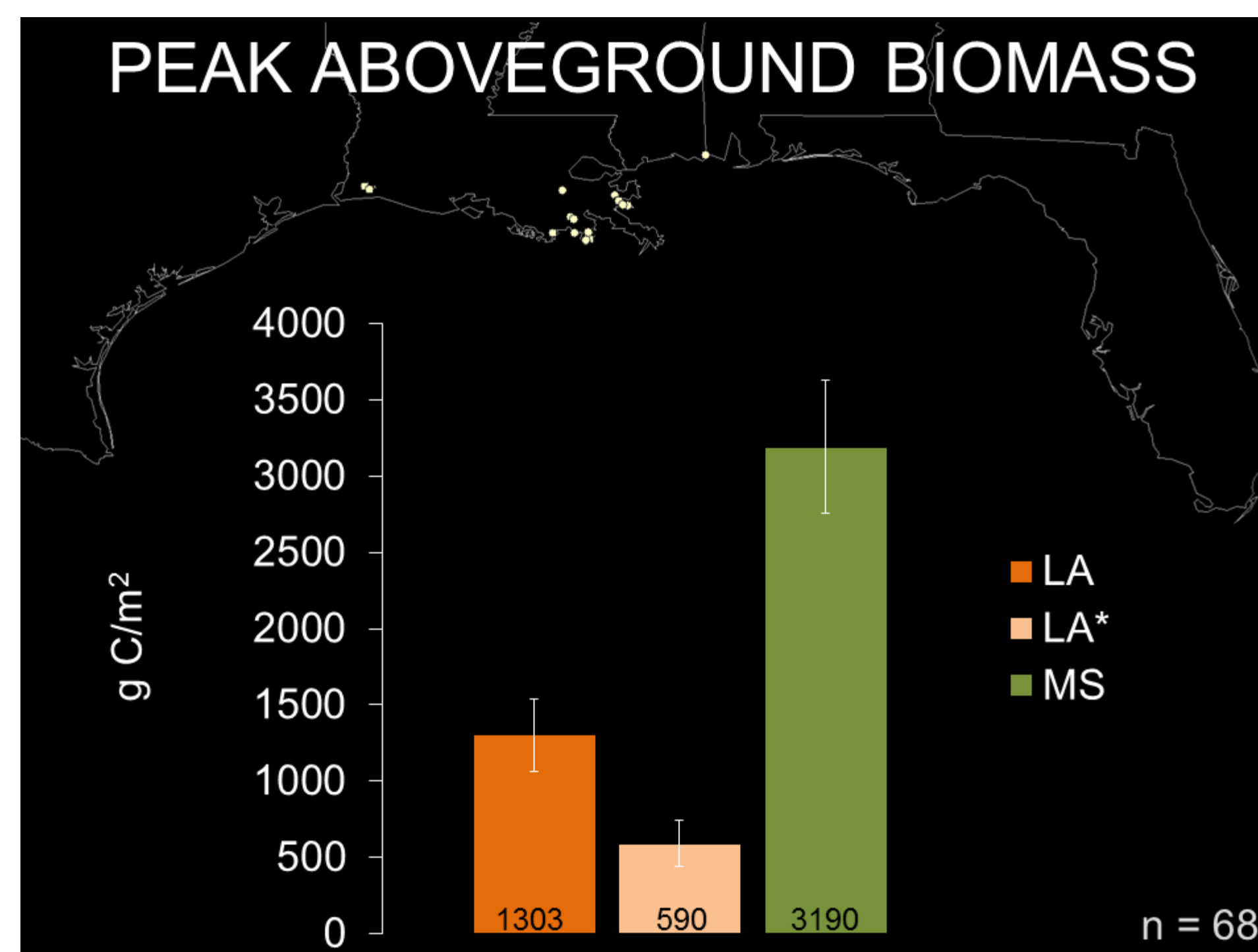
- Mean and peak values for aboveground and belowground biomass are presented below.

- Study sites for all above and belowground biomass samples are shown on map (right).

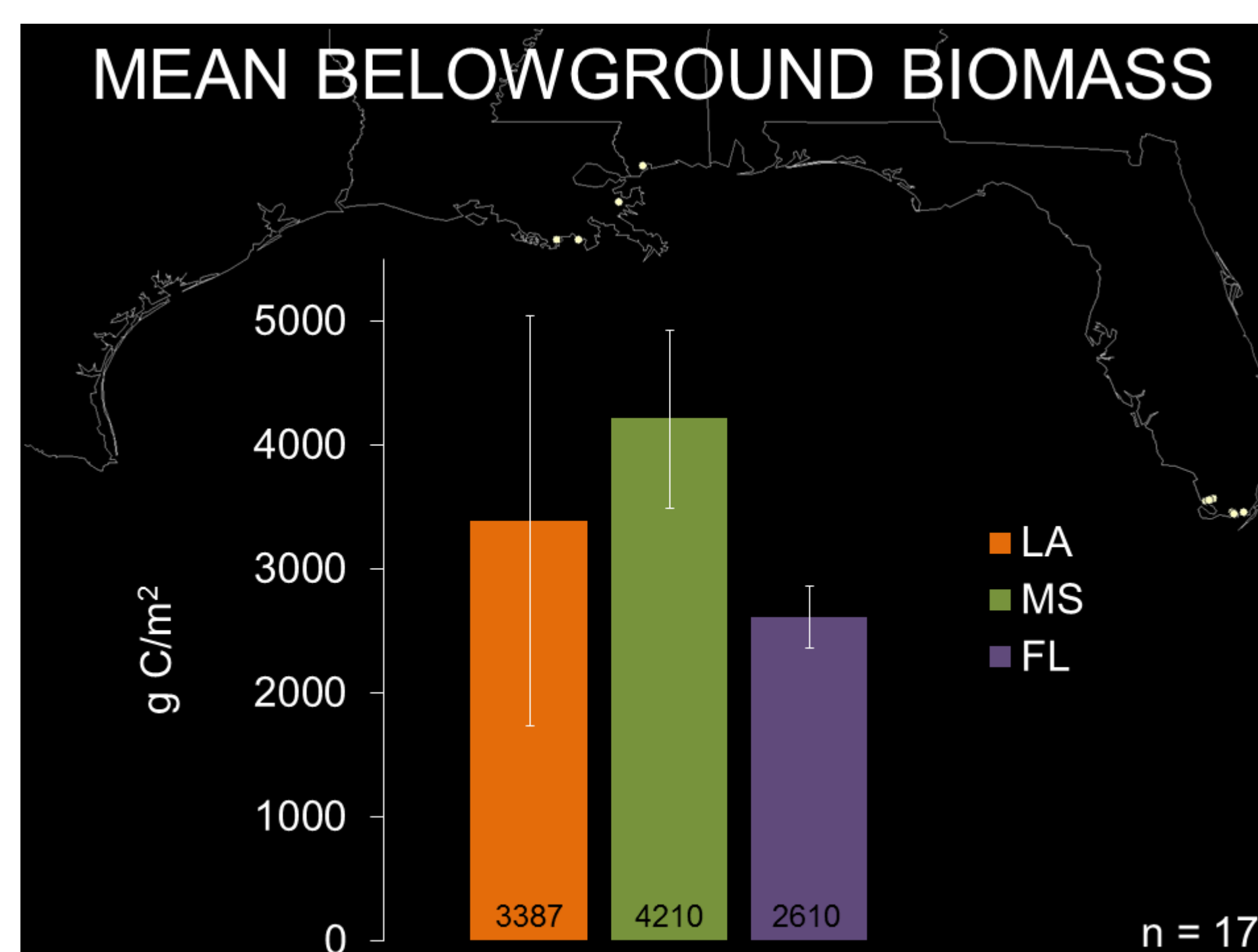
MEAN ABOVEGROUND BIOMASS



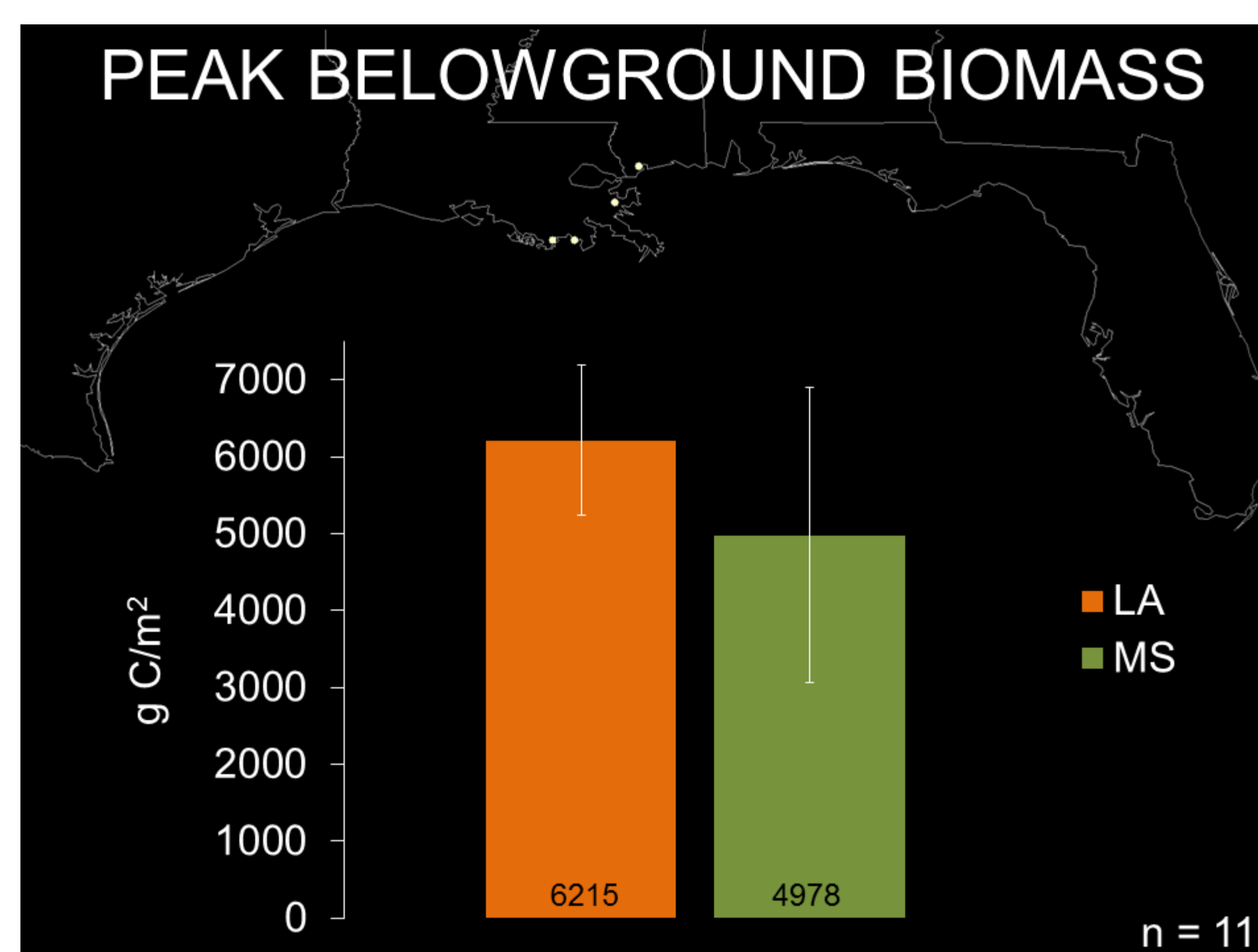
PEAK ABOVEGROUND BIOMASS



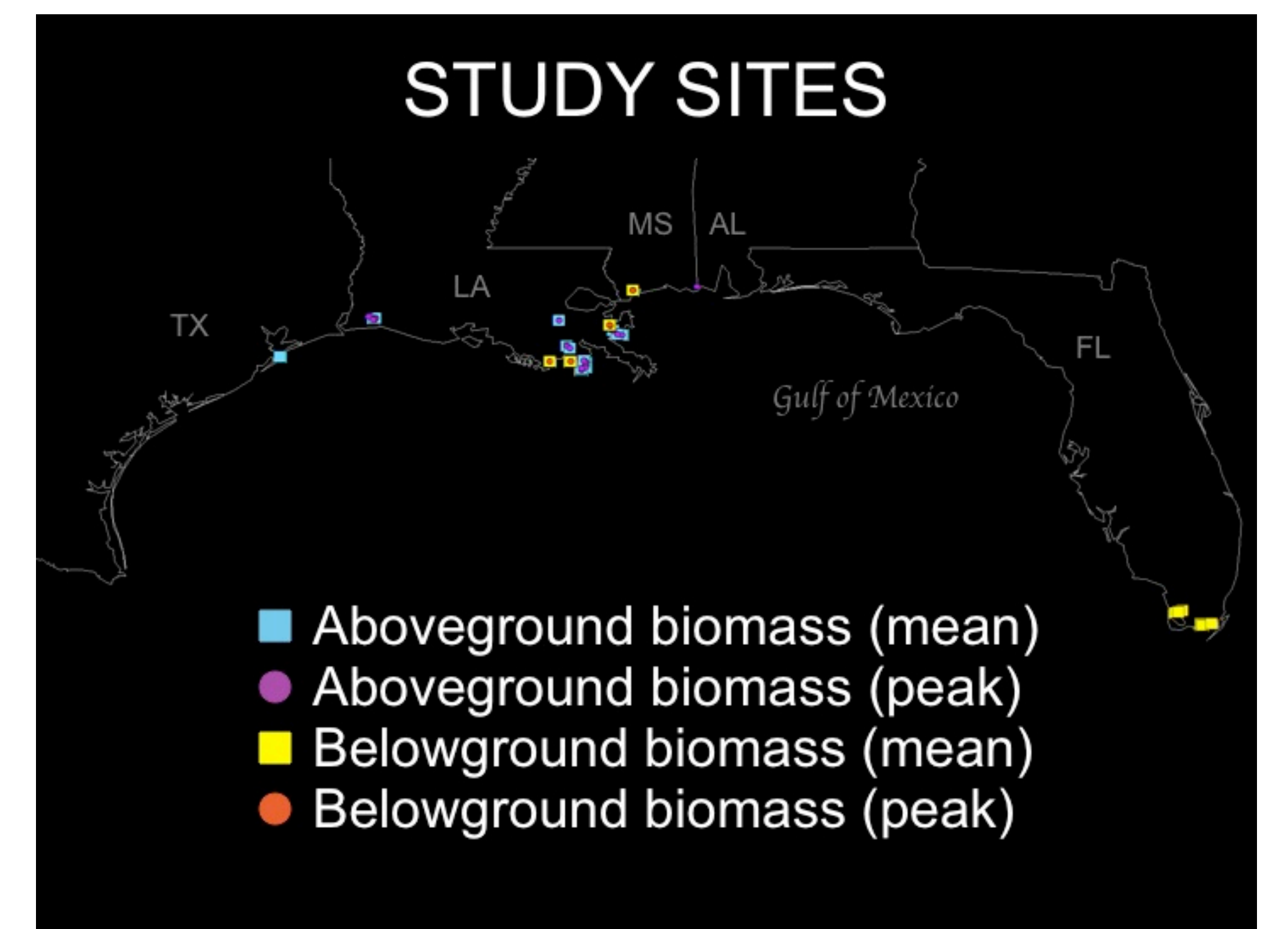
MEAN BELOWGROUND BIOMASS



PEAK BELOWGROUND BIOMASS



STUDY SITES



CONCLUSIONS

- Belowground biomass values > Aboveground biomass values.

- Lack of belowground biomass data.

- Lack of data outside of Louisiana, particularly in eastern Gulf of Mexico.

- Lack of mangrove data in the northern Gulf of Mexico. All data included in analysis represents salt marshes, except for belowground biomass data in Florida.

FUTURE WORK

- Standardize and incorporate soil organic matter data into analysis.

- Contact authors of an additional 23 studies for key pieces of information so their studies meet eligibility criteria and can be included in meta-analysis.

- Possible inclusion of additional publications and datasets.

- Assess variability of carbon storage according to factors such as: latitude, dominant species types, stage of colonization (restored vs. natural), etc.

- Connect carbon storage to ecosystem service provision of climate regulation.

REFERENCES

Comeaux, R.S., Allison, M.A., Bianchi, T.S., 2012. Mangrove Expansion in the Gulf of Mexico with Climate Change: Implications for Wetland Health and Resistance to Rising Sea Levels. *Estuarine, Coastal and Shelf Science* 96, 81-95.

Hartung, J., Knapp, G., Sinha, B.K., 2008. *Statistical Meta-Analysis with Applications*. John Wiley & Sons, Inc. Hoboken, New Jersey.

Osland, M.J., Enwright, N., Day, R.H., Doyle, T.M., 2013. Winter Climate Change And Coastal Wetland Foundation Species: Salt Marshes Vs. Mangrove Forests In The Southeastern United States. *Global Change Biology* 19 (5) 1-13.