Decomposition Rates of *Spartina alterniflora* in Coastal Louisiana Brackish Marshes Influenced by a Freshwater Siphon

Introduction

The combined effects of sea level rise, subsidence, and the leveeing of the Mississippi River have led to a land loss crisis in coastal Louisiana. The construction of tidal marshes and freshwater sediment diversions that reconnect the Mississippi River to adjacent estuaries have become common strategies to mitigate land loss.

Fig. 1 - West Pointe a la Hache Siphon

Objective

Our study aim is to compare organic matter decomposition rates, and important ecological functions in wetlands, among brackish marshes at varying distances from a freshwater siphon connected to the Mississippi River during periods of siphon openings and closures. This data will be compared to assess how decomposition rates are influenced by freshwater supply in brackish marshes.

Methods

- Three sites (WPH1, WPH2, and PS7) near Port Sulphur, LA
- Five plots per site at 1, 10, 25, 50, & 100 m from marsh edge
- Five *Spartina alterniflora* litter bags per plot (25 grams per bag)
- Two-month deployments (May-July) in three years.
- Siphon off: 2018 & 2019; Siphon on: 2021
- Leaf litter was dried, weighed, and compared to initial mass
- ANOVA used to compare decomposition rates by site and year
- Linear regression used compare decomposition to inundation

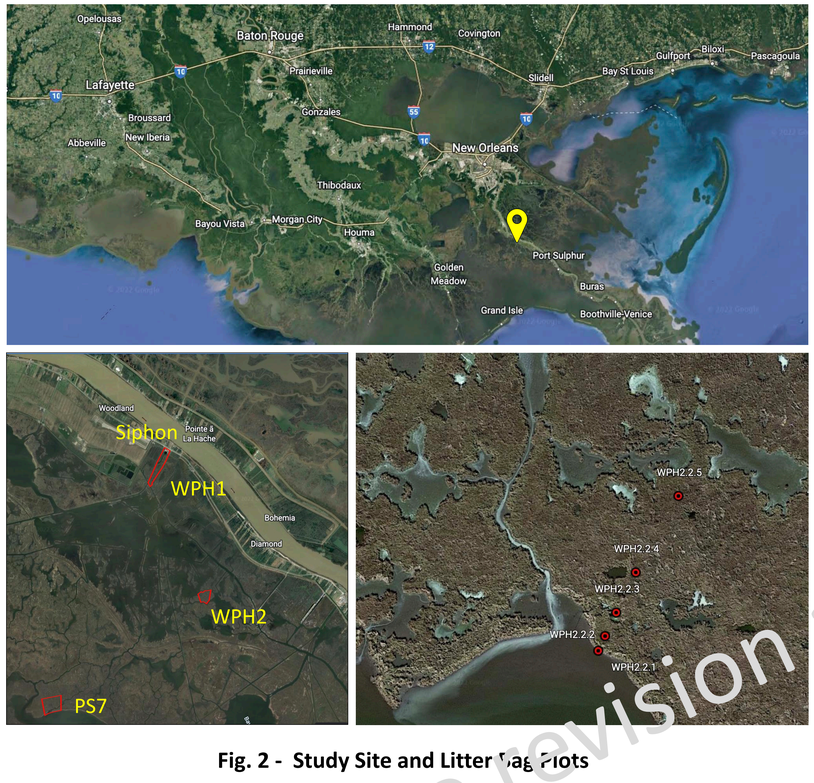
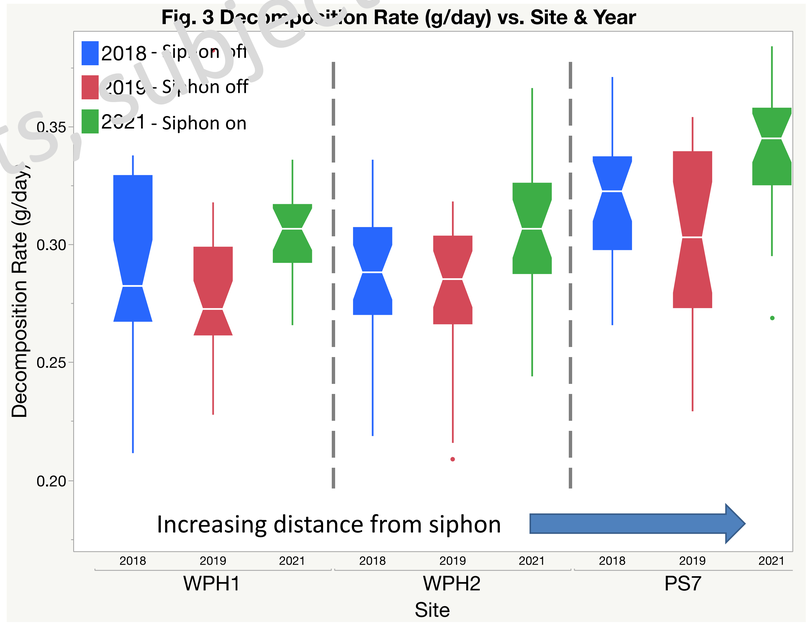
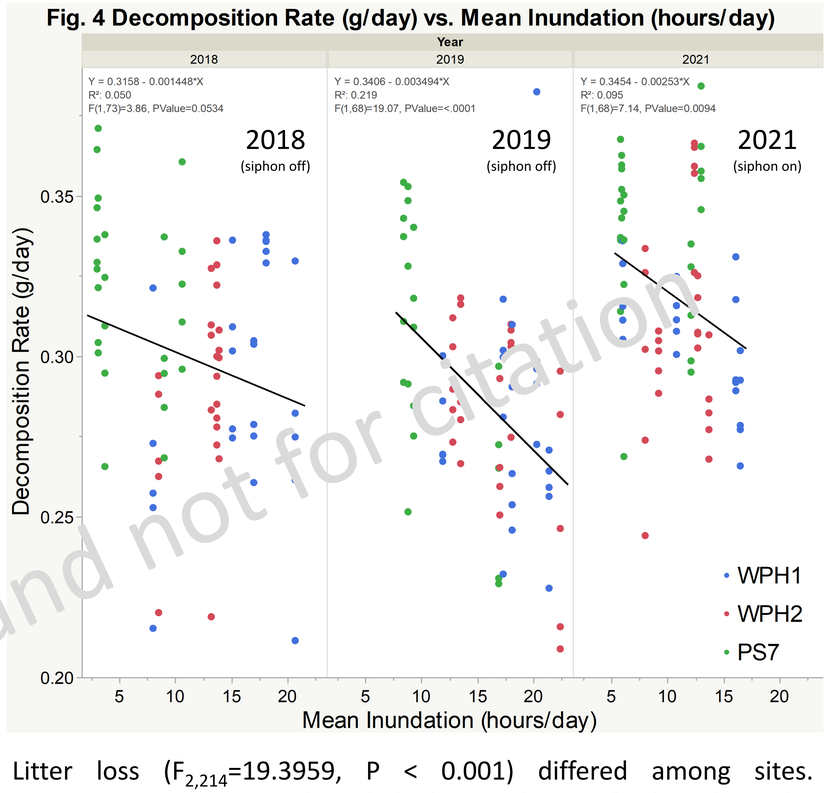


Fig. 2 - Study Site and Litter Bag Plots

Results





Litter loss ($F_{2,214}$=19.3959, P < 0.001) differed among sites. Decomposition was significantly higher at the site furthest from the siphon (PS7) relative to the two closer sites (WPH1 & WPH2; Fig. 3). Litter loss ($F_{4,214}$=17.1370, P < 0.001) differed across years. Decomposition was significantly higher during when the siphon was open in 2021 than other years (Fig. 3). Litter loss was negatively related to inundation in 2019 and 2022, but not 2018 (Fig. 3).

Conclusion

We found site and year-specific differences in organic matter decomposition within natural marshes along the Mississippi River in Plaquemines Parish, LA. In all three years, the site farthest from the siphon, which also tended to be less inundated, had the highest decomposition rate. In addition, all sites had higher decomposition rates in 2021 when the siphon was open. The next steps of this project is to explore if and how site and year-specific variation in salinity and temperature may be linked to the differences in decomposition we observed between years and sites.

Acknowledgments This research was funded by South Central Climate Adaptation Science Center and the NOAA Restore Science Program. We thank the project PI team and R. Kalvakaalva, N. Lois, U. Baza, M. Hernandez, K. Lamb, and R. Rossi for their assistance in the field and laboratory. Surveying support was provided by J.A. Cavell and R. Osborne from the LSU Center for GeoInformatics.

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