

Mangrove vertical carbon fluxes following a historic snow event on a coastal Louisiana barrier island

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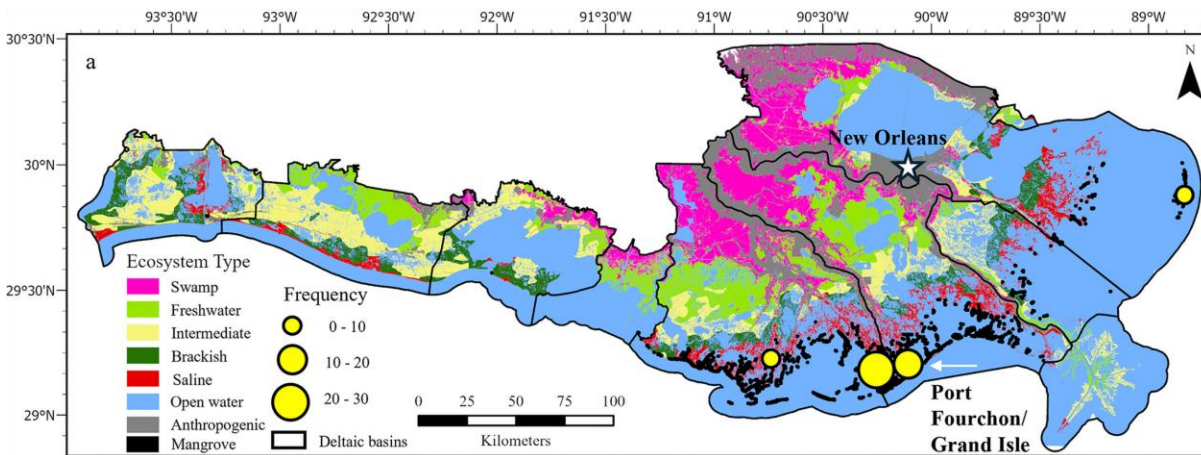
²Louisiana Universities Marine Consortium (LUMCON)

State of the Coast 2025

Coastal Carbon Session 1: Advances in Blue Carbon Science



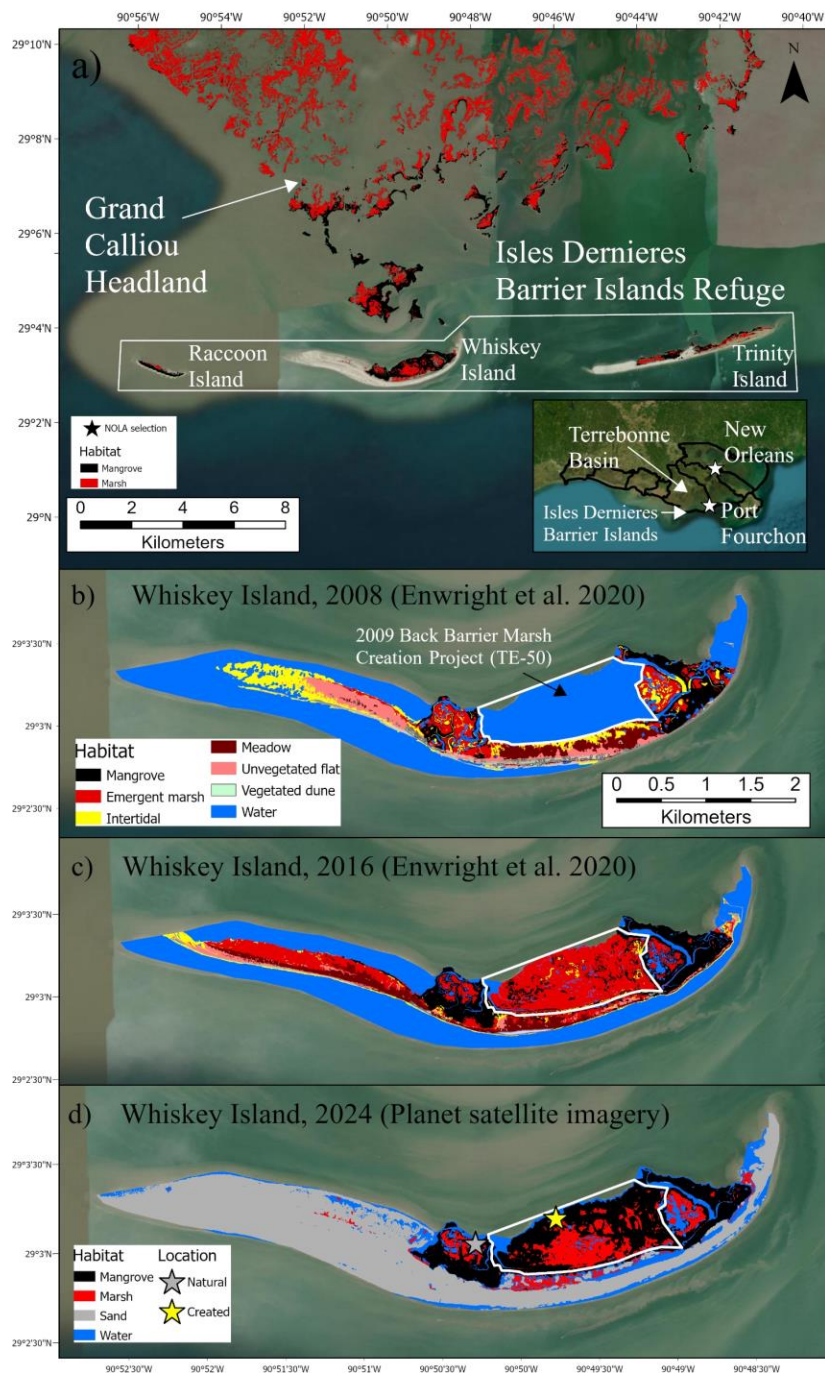
Mangrove research in coastal Louisiana



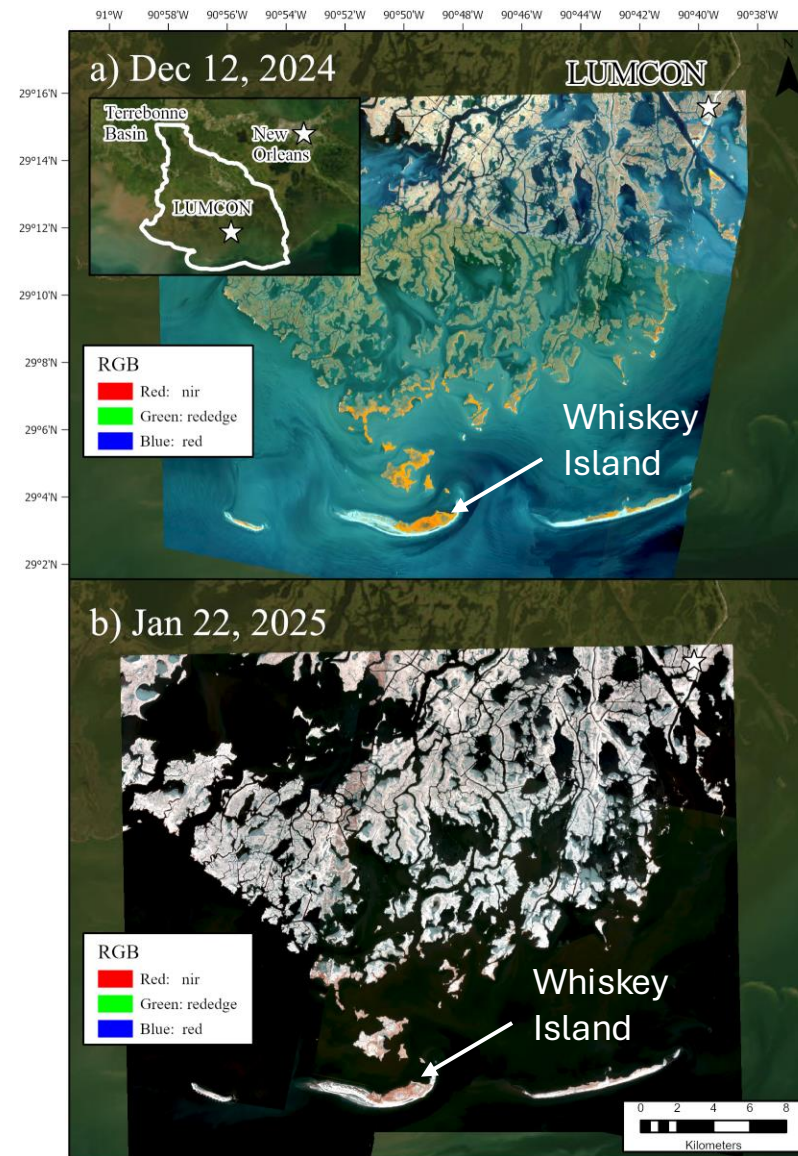
*Published mangrove research primarily comes from Port Fourchon, yet mangroves are found across eastern deltaic basins.
(Lamb-Wotton et al in review)*

Topic	Definition	<i>n</i> articles (% of total)
Mangrove expansion	Changes in ecosystem properties with lateral encroachment into salt marsh	17 (32.7%)
Freeze tolerance	Effects of freeze events on mangrove distribution	12 (23.1%)
Coastal restoration	Effects of restoration activities on ecosystem properties, survivorship	11 (21.1%)
Disturbance	Events that impact mangroves: hurricanes, climate change, nutrient enrichment, oiling	10 (19.2%)
Other	Does not fit into one of the above categories	2 (3.8%)

*Count and definition of coastal Louisiana mangrove papers within 4 overarching research topics.
(Lamb-Wotton et al. in review).*

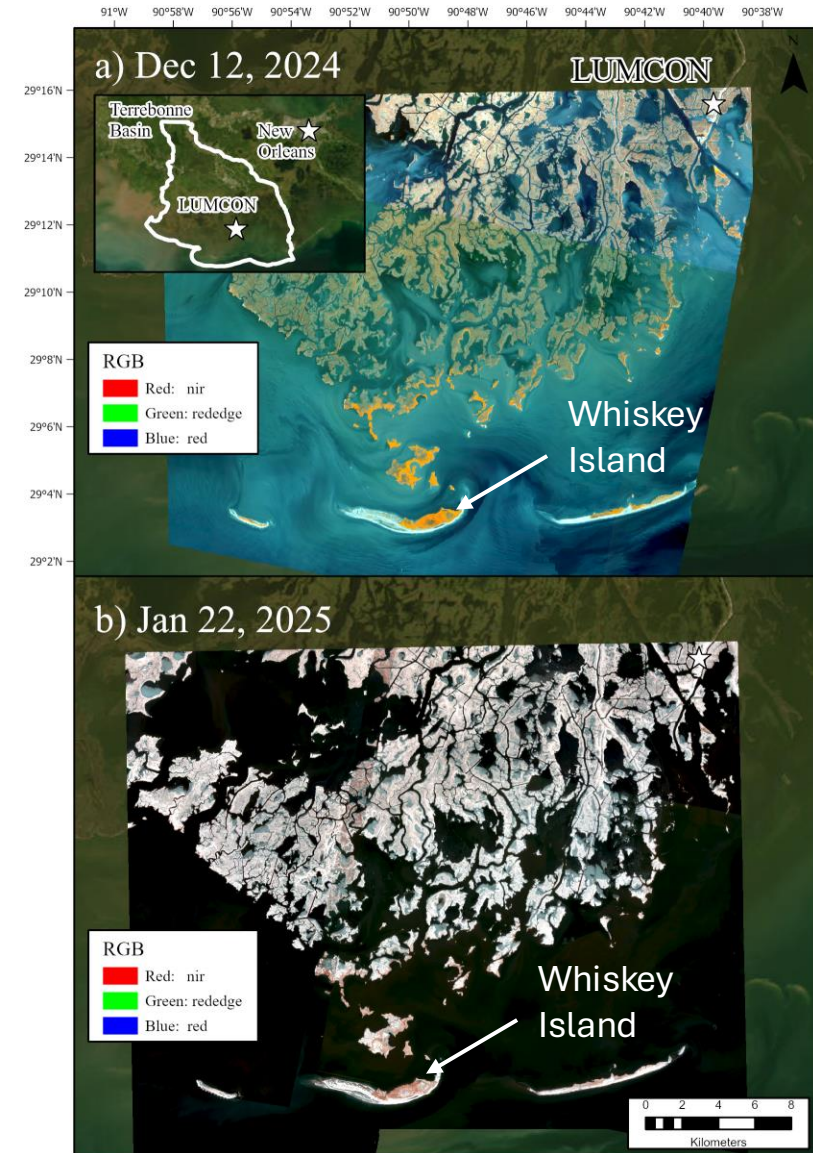
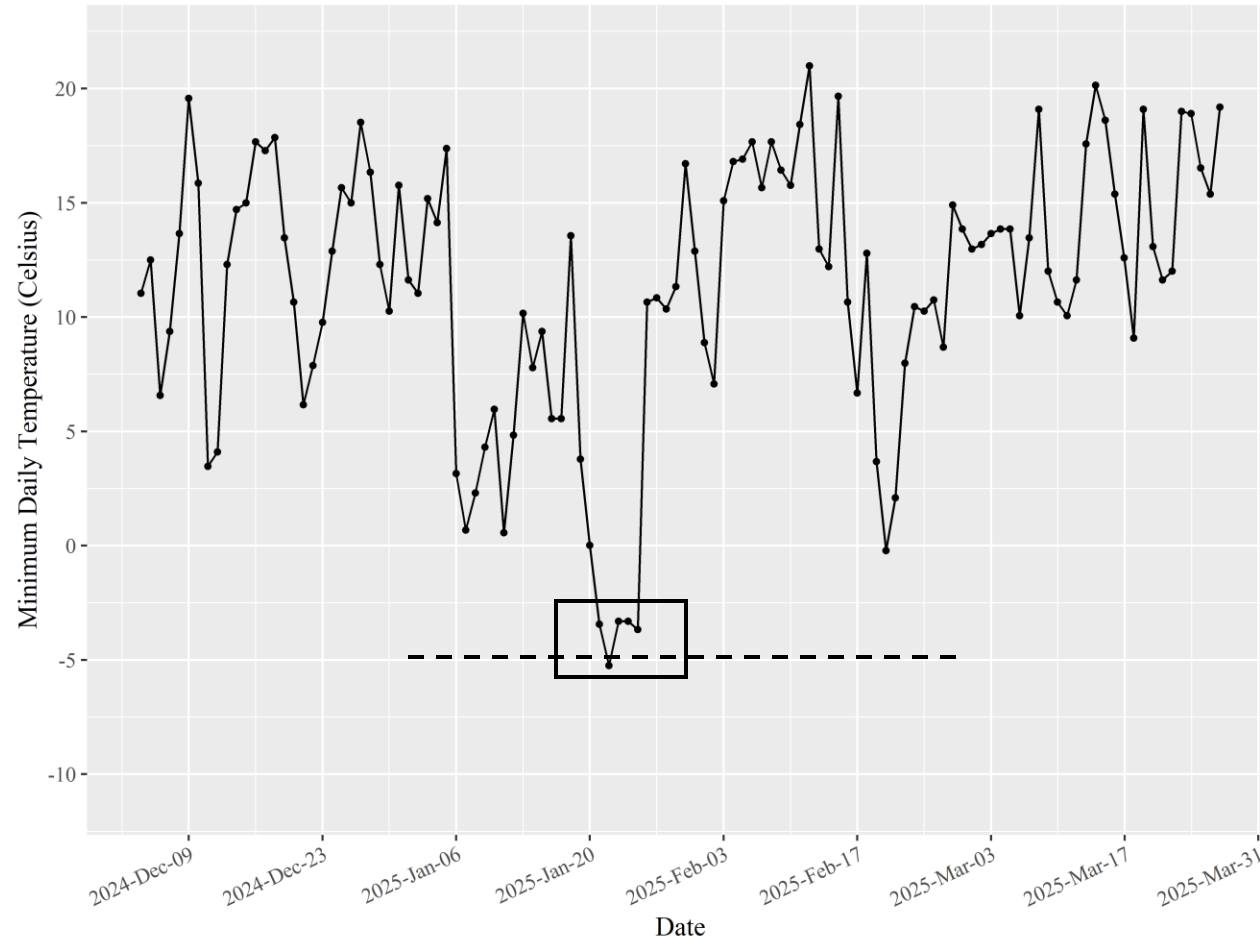


Jan 2025 snow-storm and hard freeze

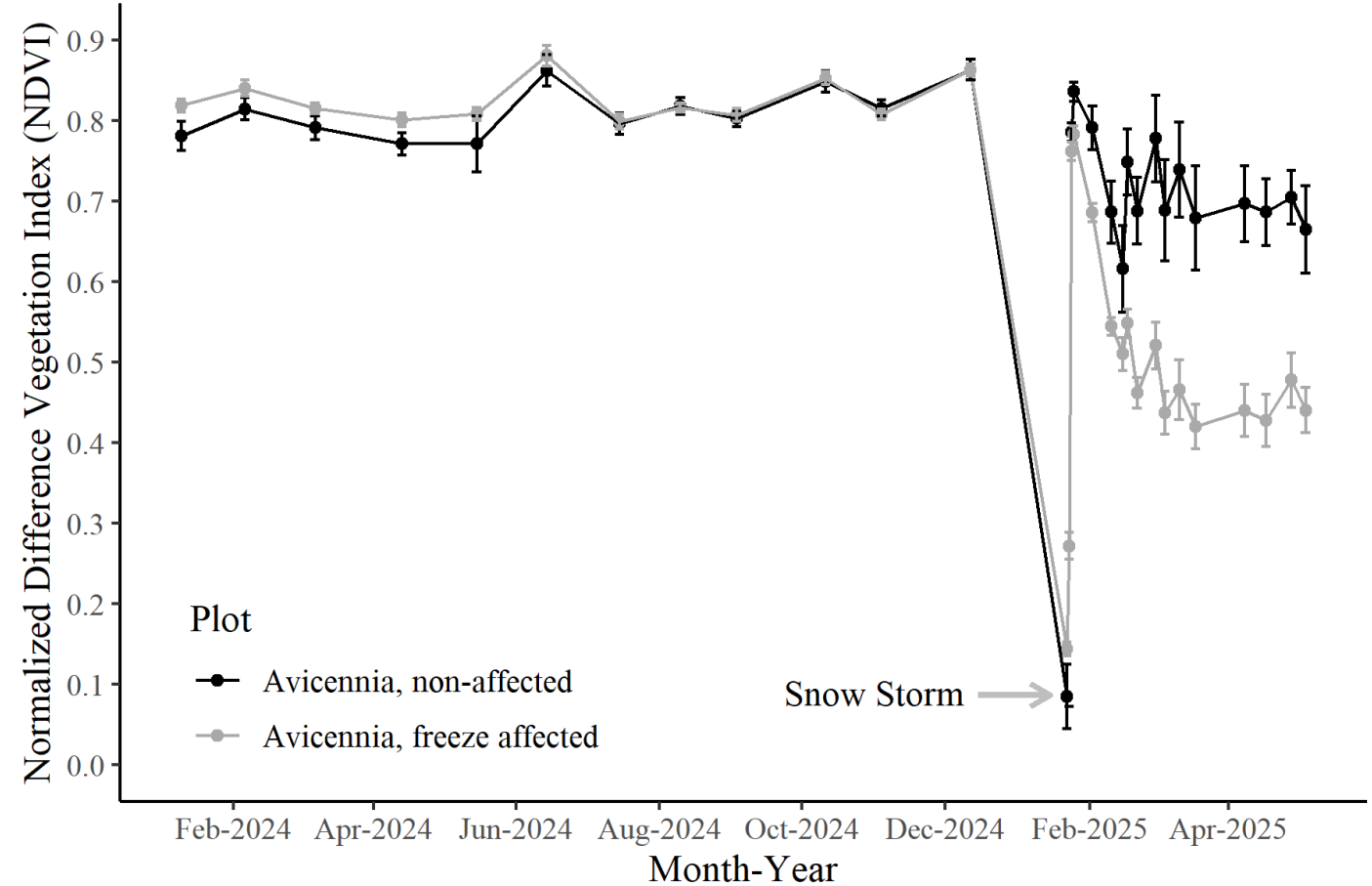
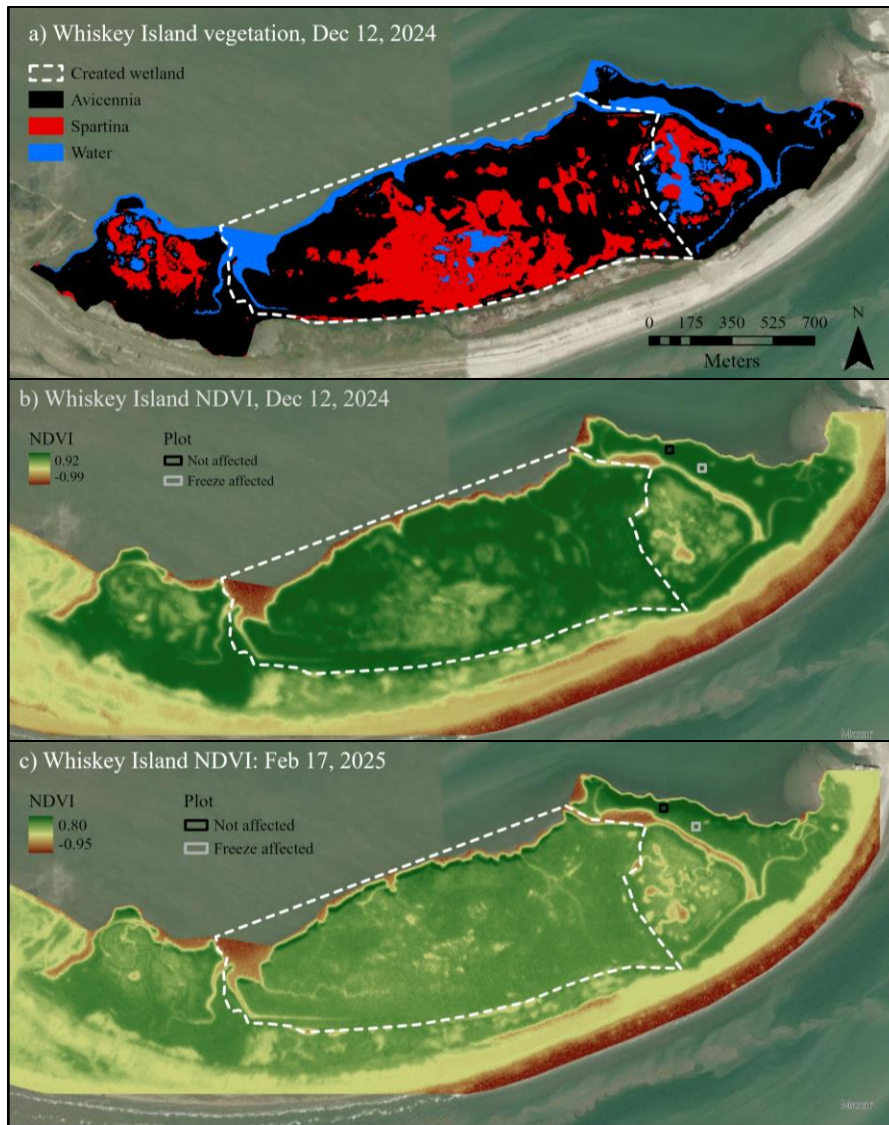


Jan 2025 snow-storm and hard freeze

Minimum daily temperatures on Whiskey Island from in situ measurements.



Widespread mangrove freeze affects on Whiskey Island



Research question

1. How did the Jan 2025 historic snow-storm and subsequent freezing temperatures impact mangrove vertical carbon fluxes?

HYP: Leaf mortality will reduce overall net ecosystem production through reductions in respiration and primary production.



*Bordering area where
freeze affects were
minimal*

$$\text{NEP (light)} = \text{Gross Ecosystem Production (GEP)} - \text{ER (dark)}$$

CO₂/CH₄ vertical fluxes in freeze affected and non-affected trees



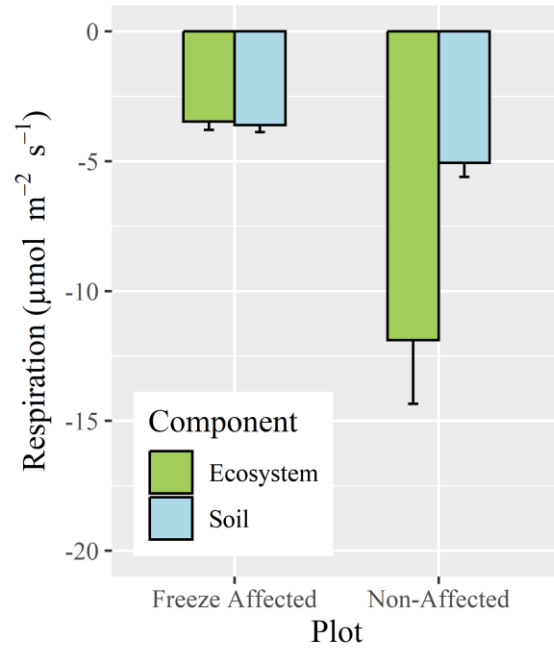
Net Ecosystem Production (NEP)



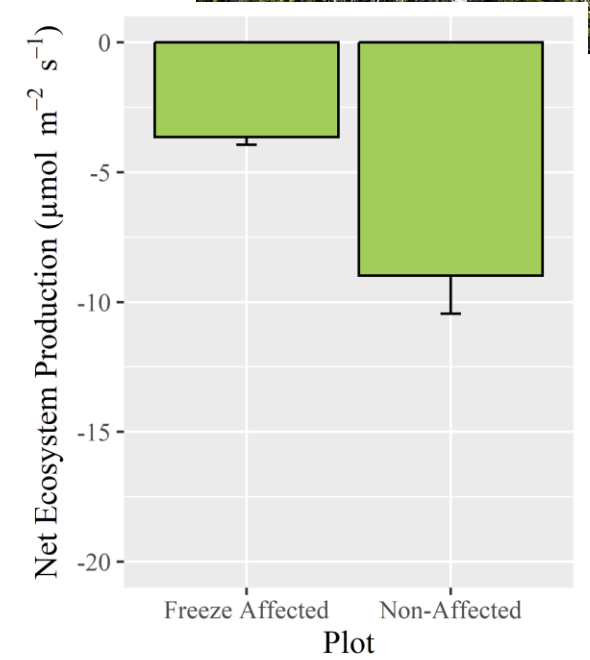
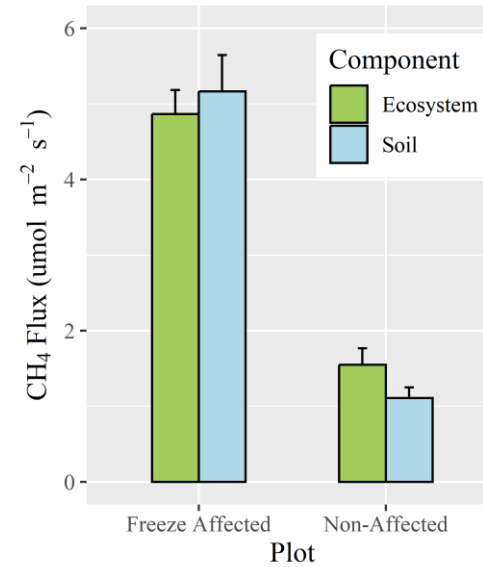
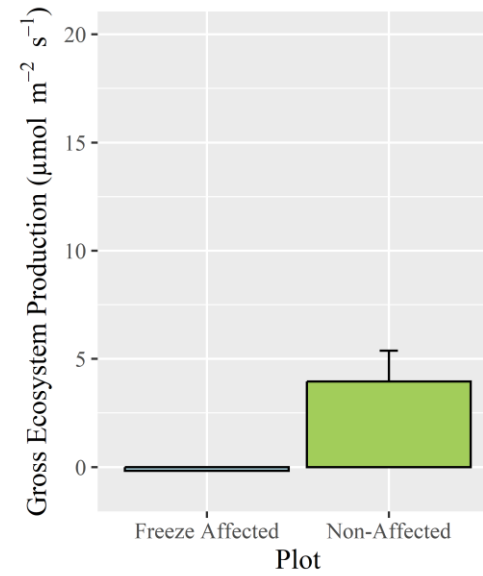
Ecosystem Respiration (ER; mangrove + soil)



$$\text{NEP} = \text{GEP} - \text{ER}$$



Bars are mean \pm SE of March and April measurements (“pre growing season”).



Next Steps

1. Continue vertical C flux measurements through summer & fall; process/analyze porewater data.
2. Is there a “carbon debt” associated with this disturbance and how long does it take to recover this across Whiskey Island?

Thanks!

