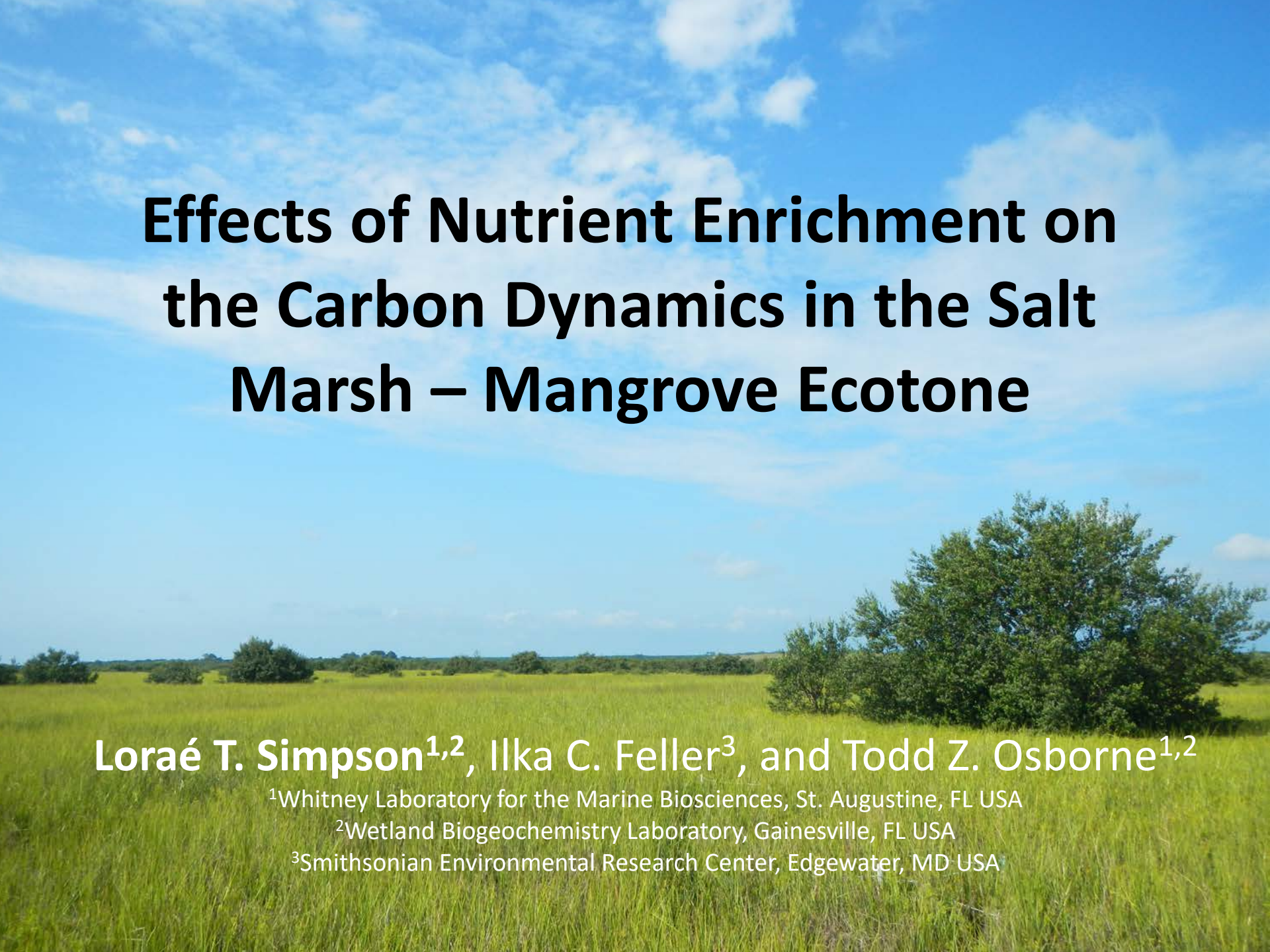
Effects of Nutrient Enrichment on the Carbon Dynamics in the Salt Marsh – Mangrove Ecotone



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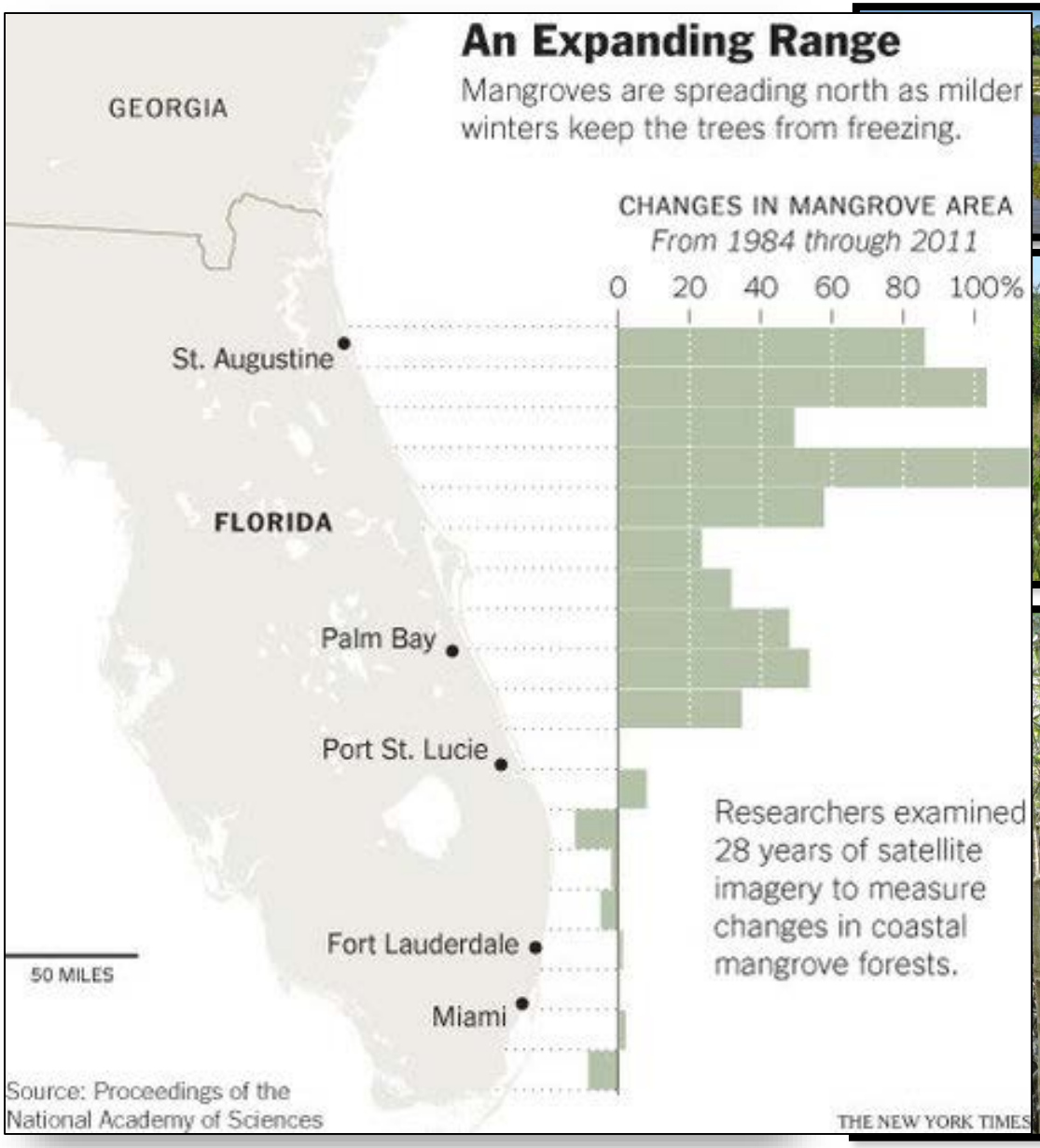
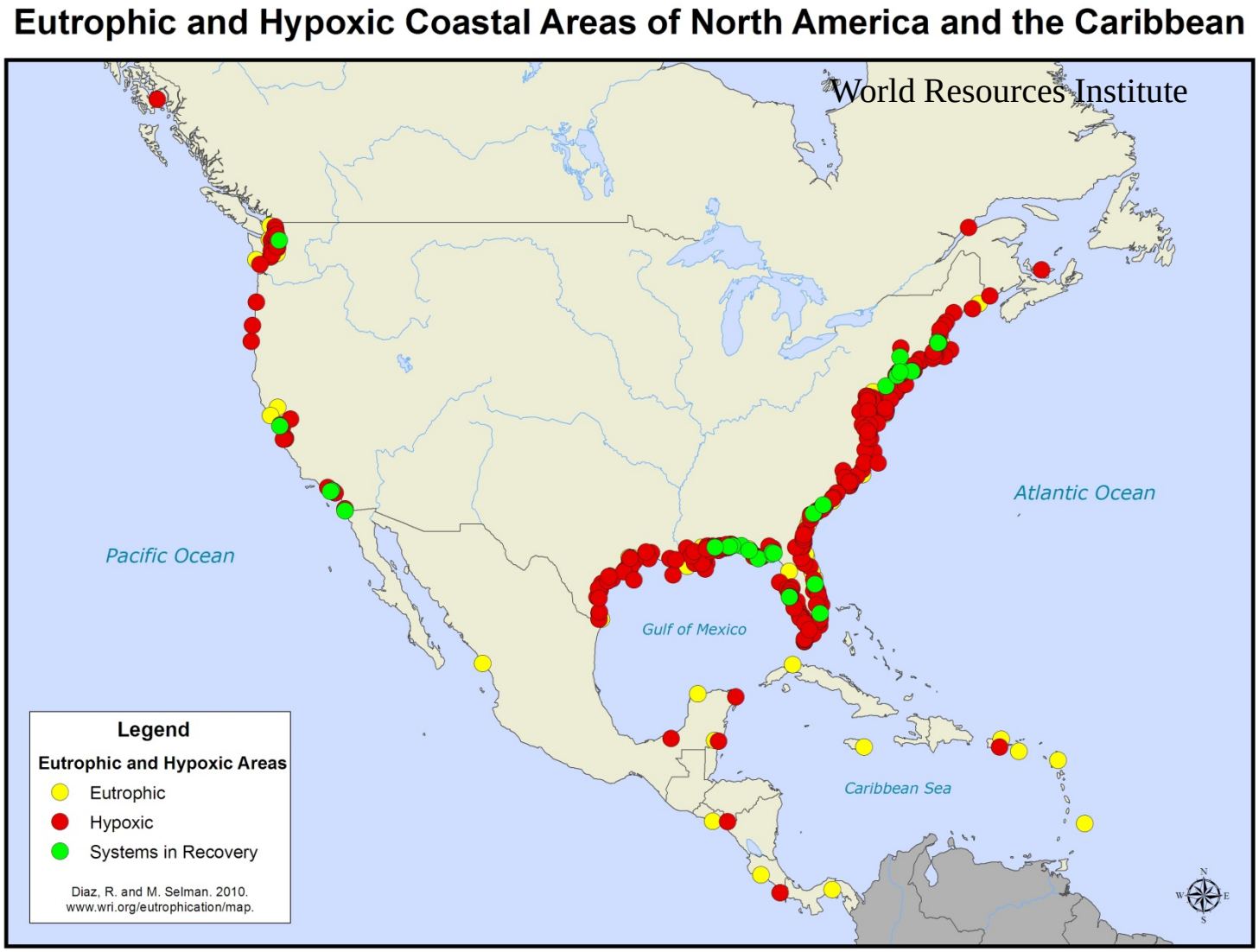
Florida Mangroves

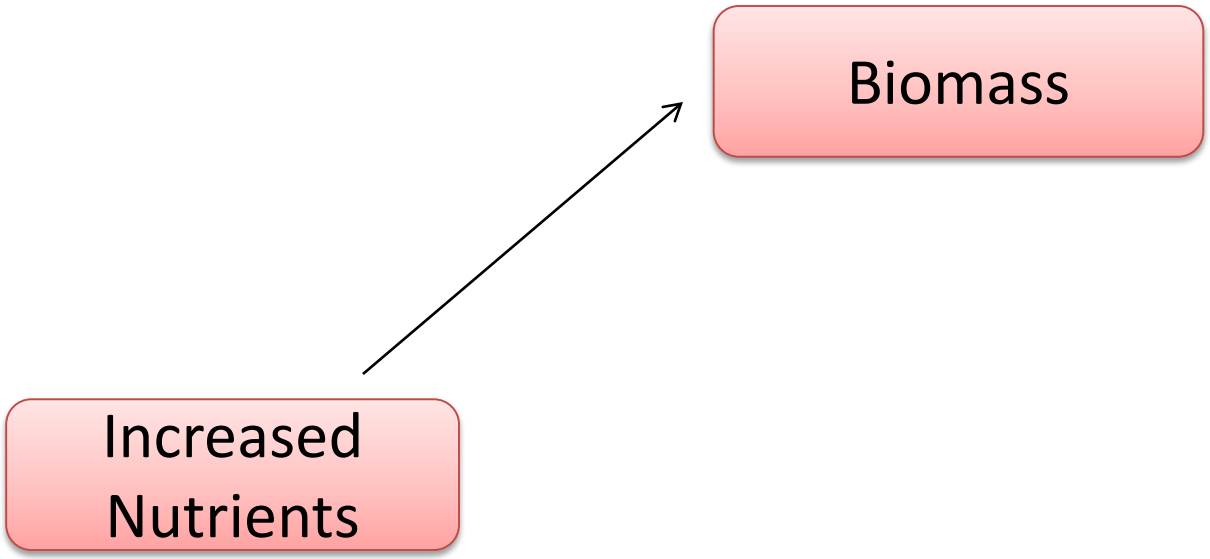


Coastal Nutrient Enrichment



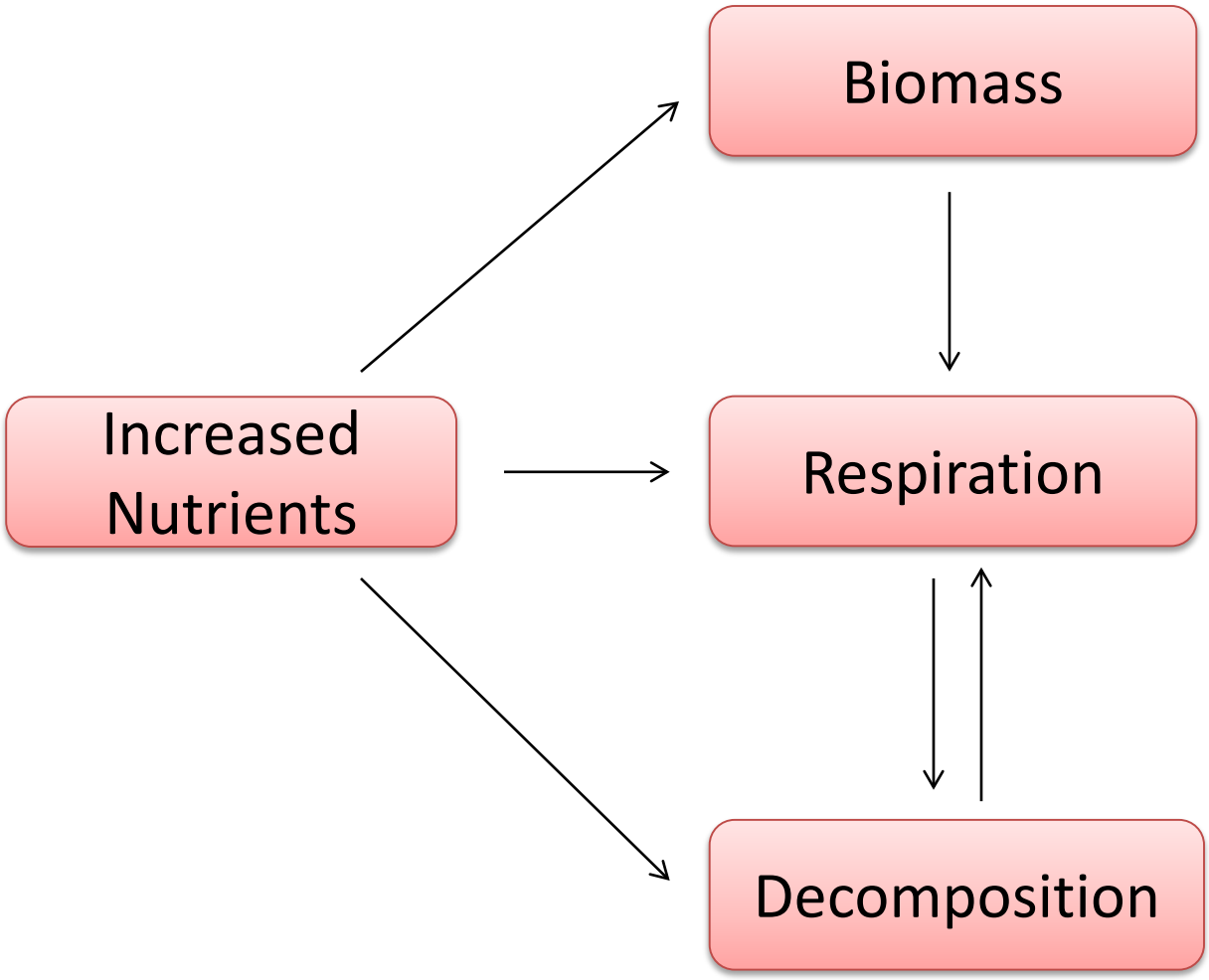
65% of U.S. estuaries and coastal water bodies are moderately to severely degraded by excessive nutrient inputs (NOAA, 2017)

Does nutrient enrichment increase mangrove carbon sequestration via increased mangrove growth and cover?



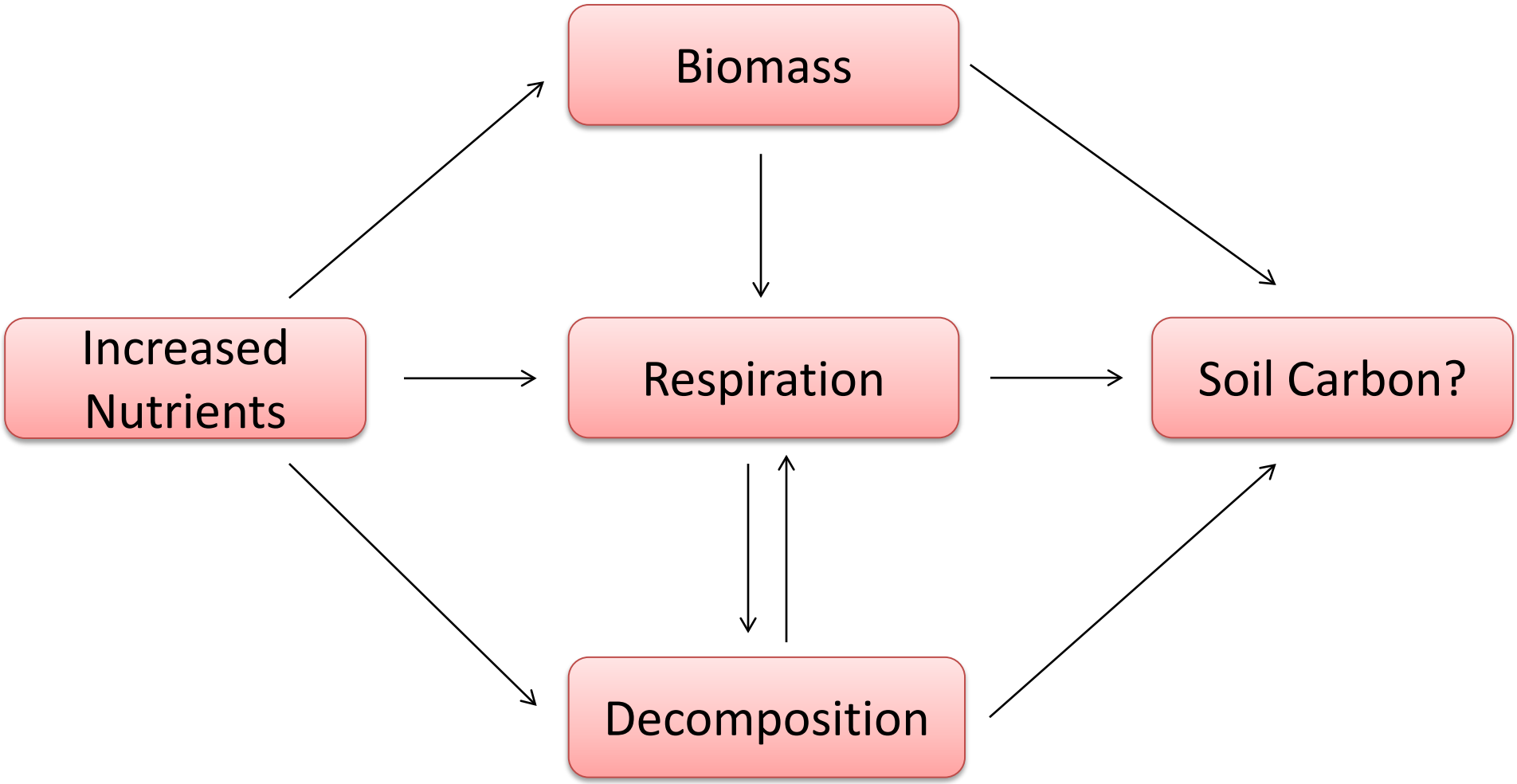
- Increases in limiting nutrients lead to increases in above and belowground biomass of *A. germinans* (McKee et al. 1995; Feller et al. 2003; Simpson et al. 2013)

Does nutrient enrichment lead to increased soil respiration and belowground decomposition?

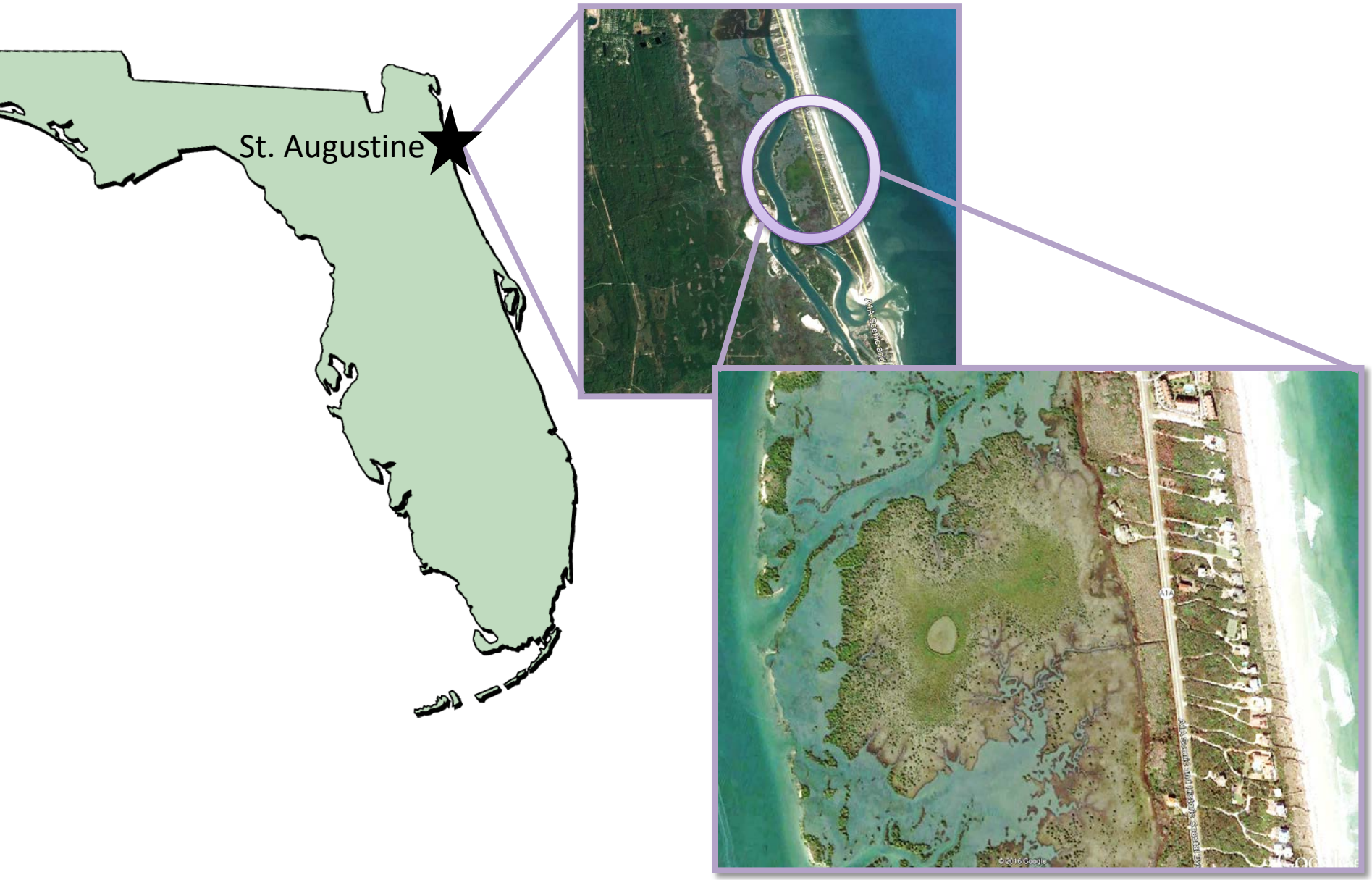


- Increases in limiting nutrients lead to increases in above and belowground biomass of *A. germinans* (McKee et al. 1995; Feller et al. 2003; Simpson et al. 2013)
- Soil respiration is higher in nutrient enriched plots than in controls (Lovelock et al. 2014; Keuskamp et al. 2015)
- Belowground decomposition is higher in nutrient enriched plots (*i.e.* Reef et al. 2010)

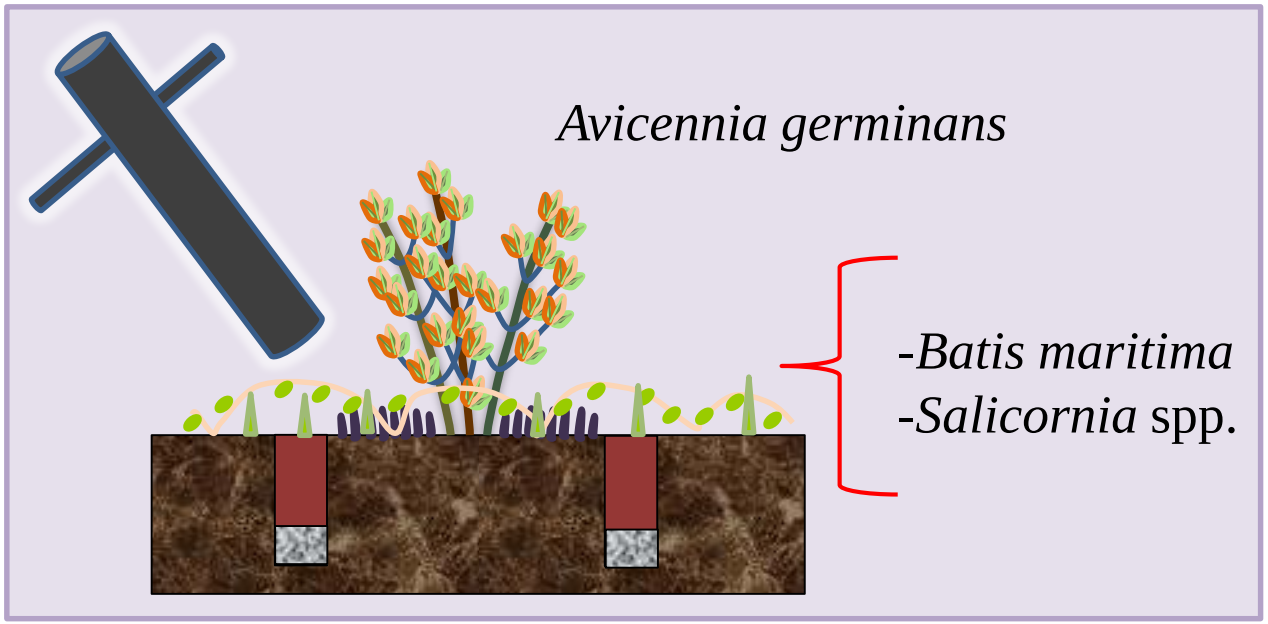
Does nutrient enrichment lead to increases in ecotonal carbon storage?



Study Site

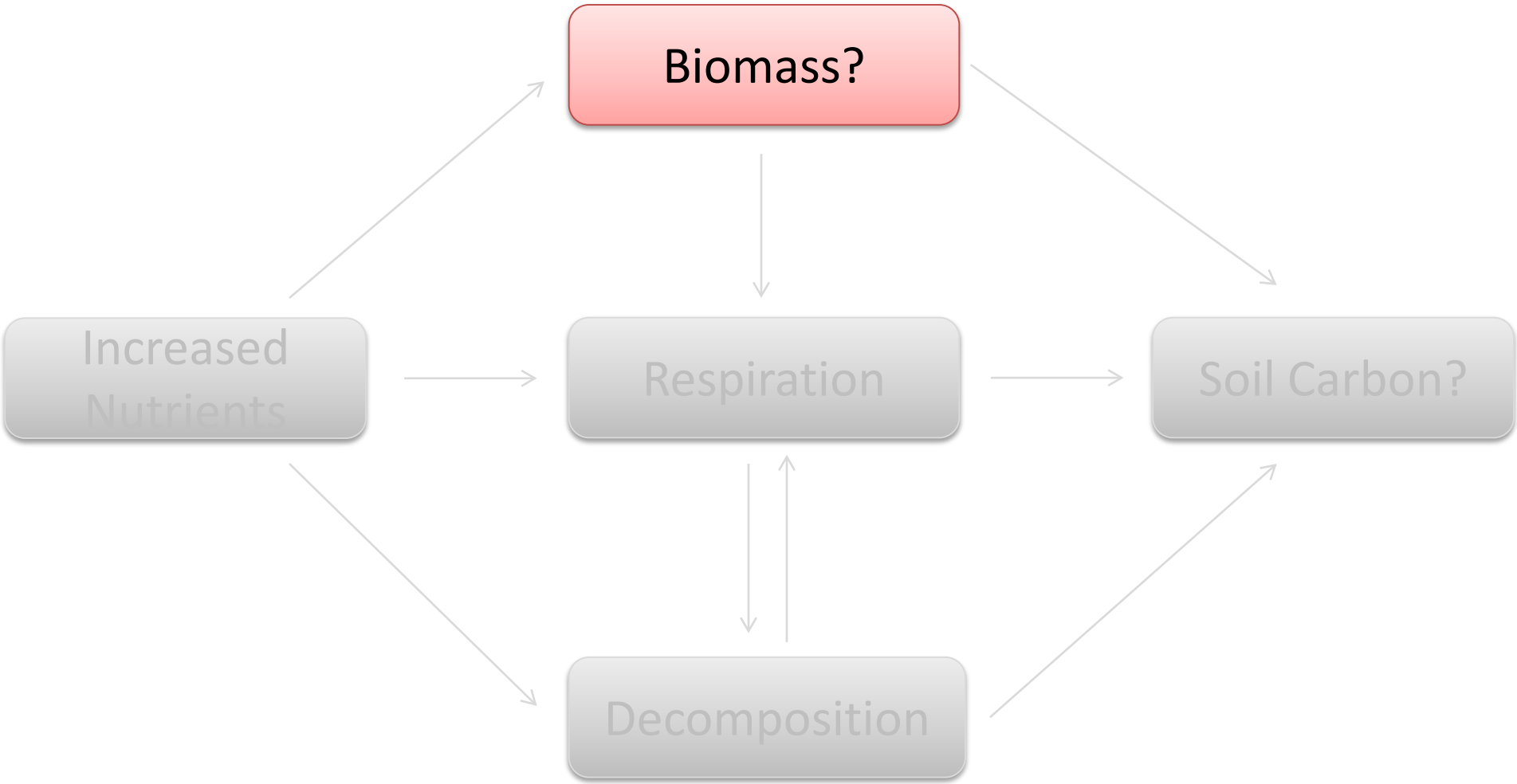


Experimental Nutrient Enrichment



Nitrogen enriched, Phosphorous enriched, Control

Fertilized yearly since 2013


Biomass?
Increased Nutrients
Respiration
Soil Carbon?
Decomposition

Biomass

Biomass

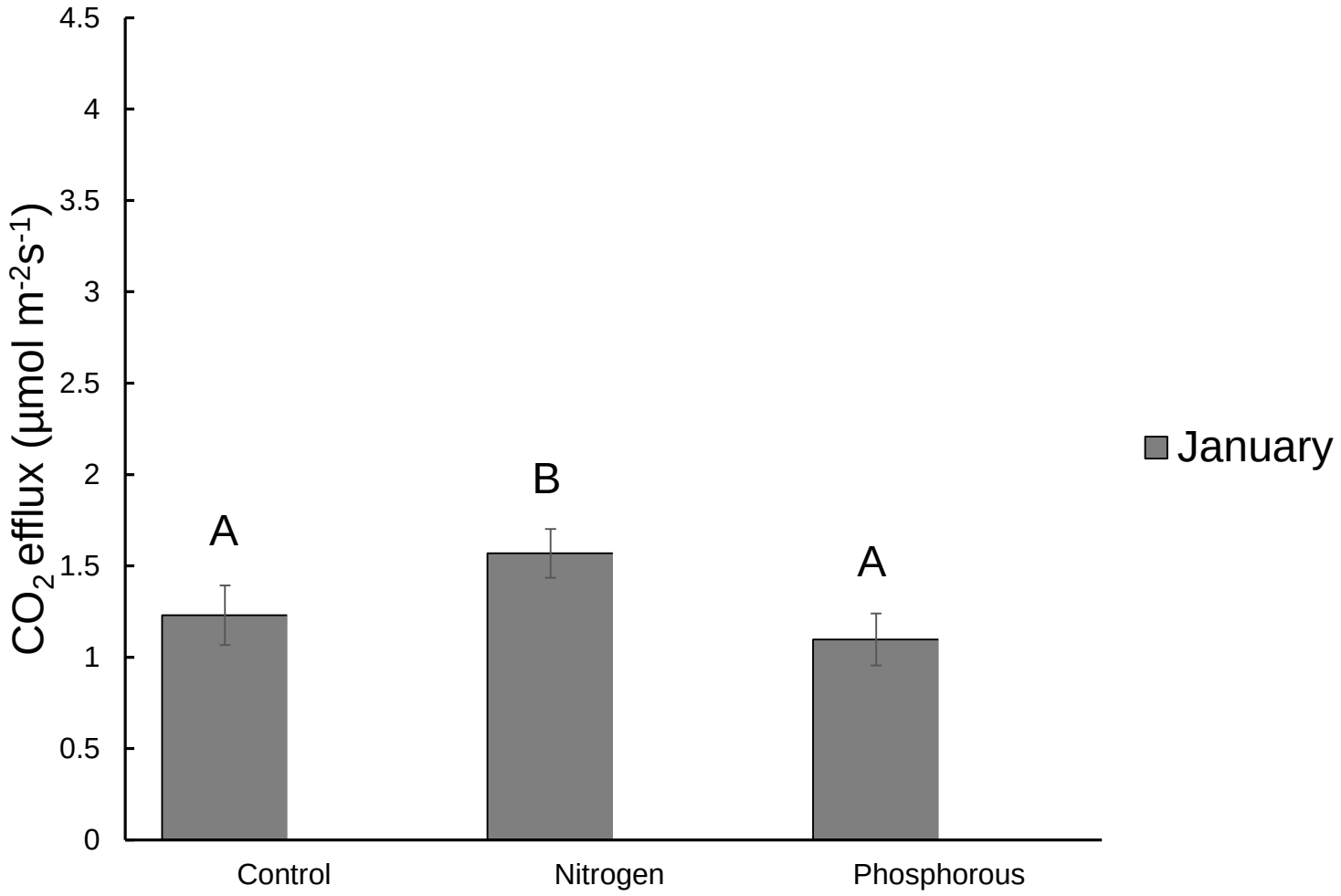
Increased Nutrients

Respiration?

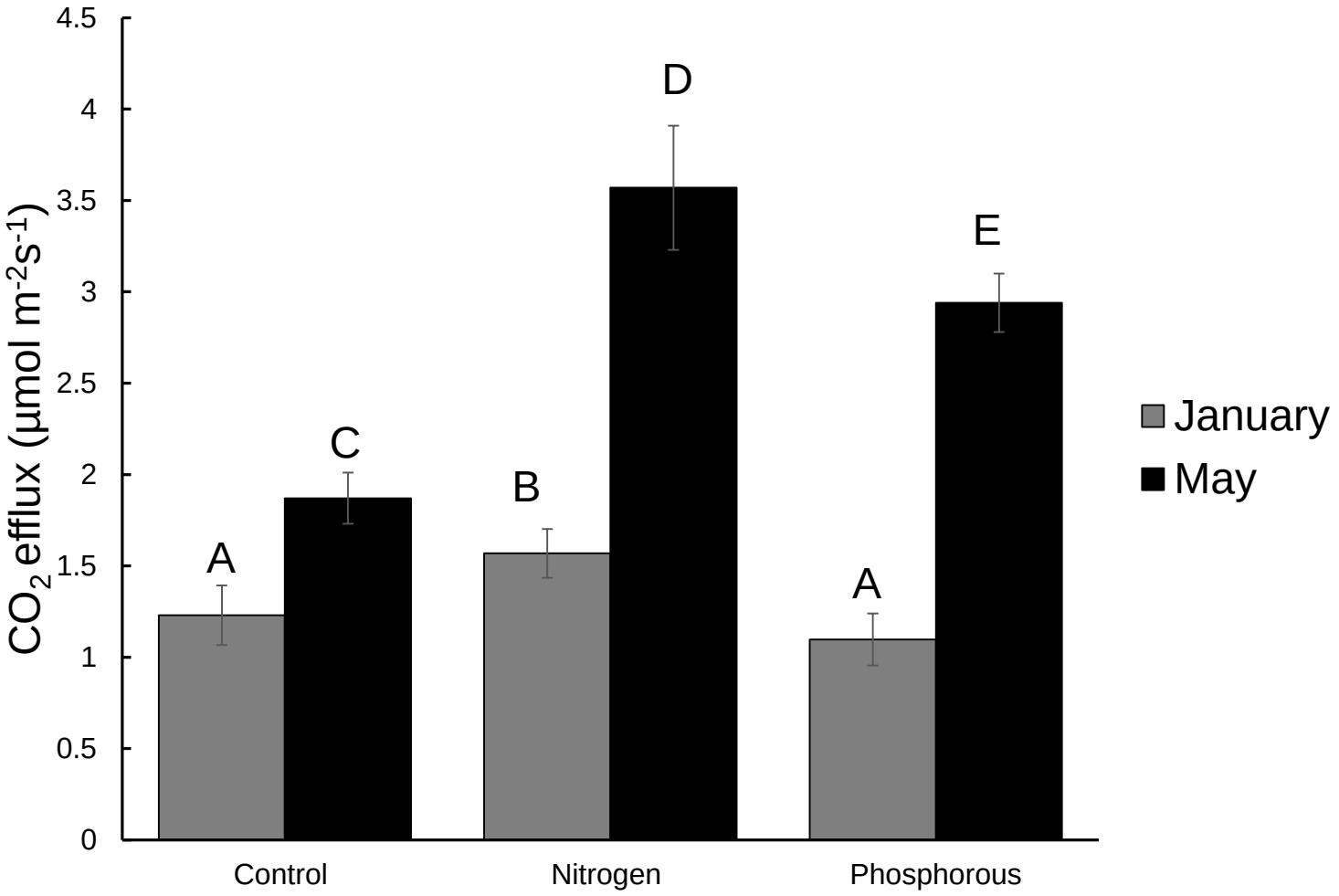
Soil Carbon?

Measured at low tide with a LICOR 6400

Soil Respiration

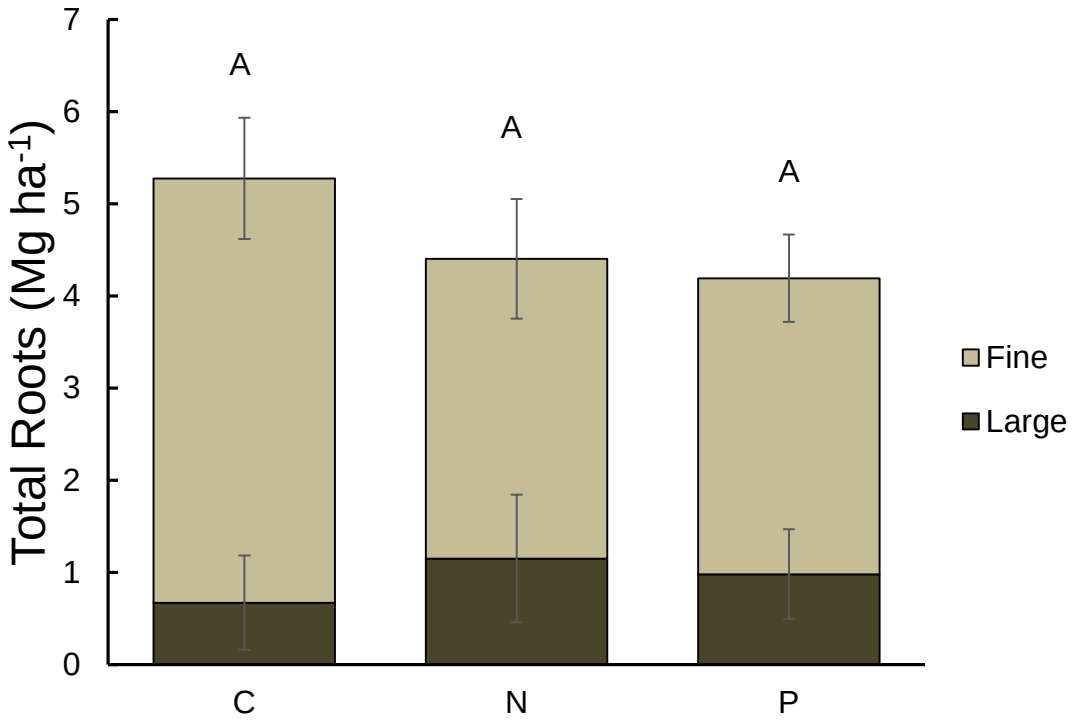


Soil Respiration



($F_{5,429}$= 20.48, p = <0.0001)

Soil Respiration



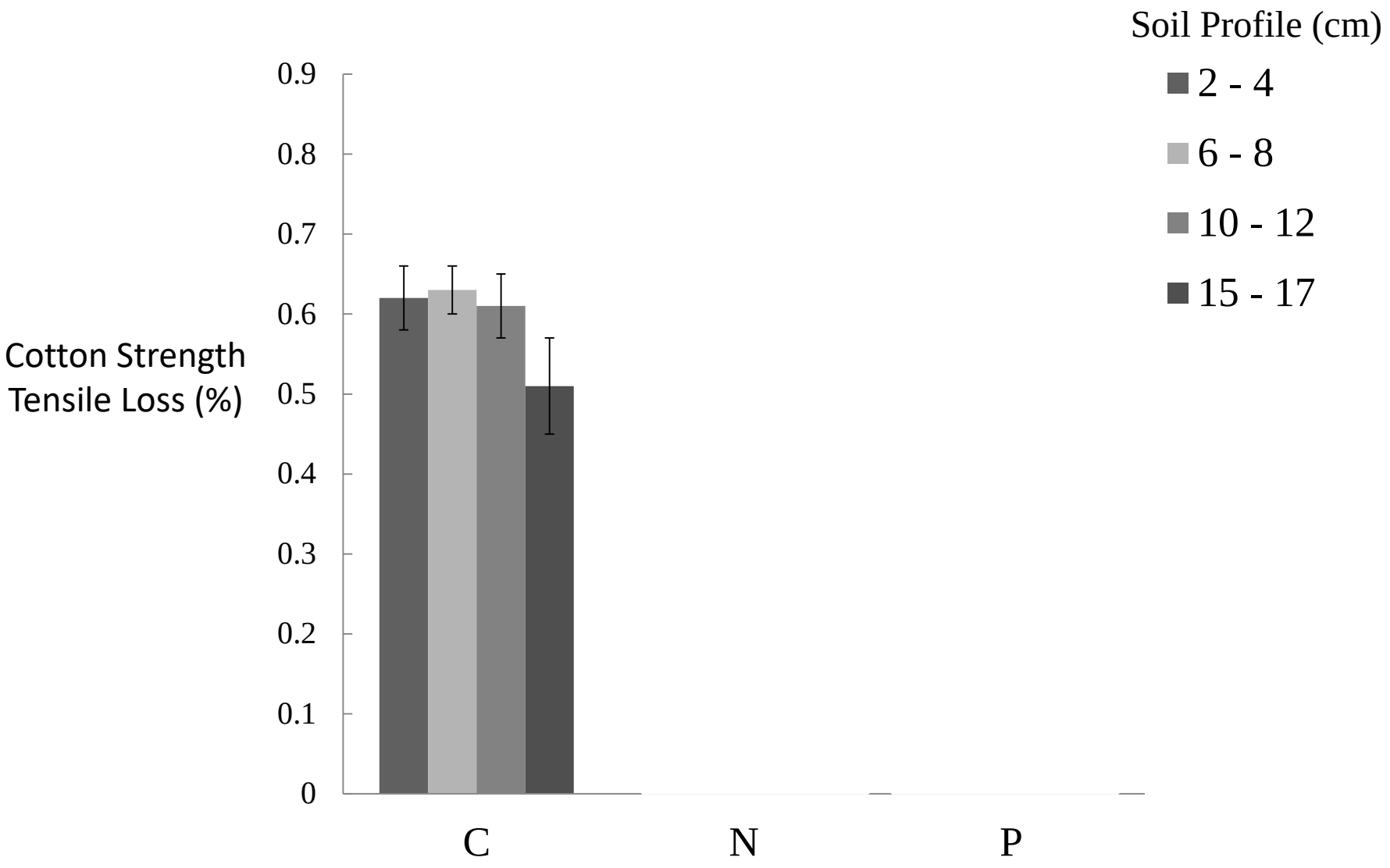
	May 2016	January 2017
Salinity (ppt)	56.0 ± 0.72[a]	62.7 ± 0.72[b]
Soil Temp (ºC)	25.8° ± 0.15[a]	18.8° ± 0.15[b]
pH	5.96 ± 0.07[a]	4.72 ± 0.06[b]
Air Temperature (ºC)	30°/21°	26°/12°

Biomass

Decomposition?

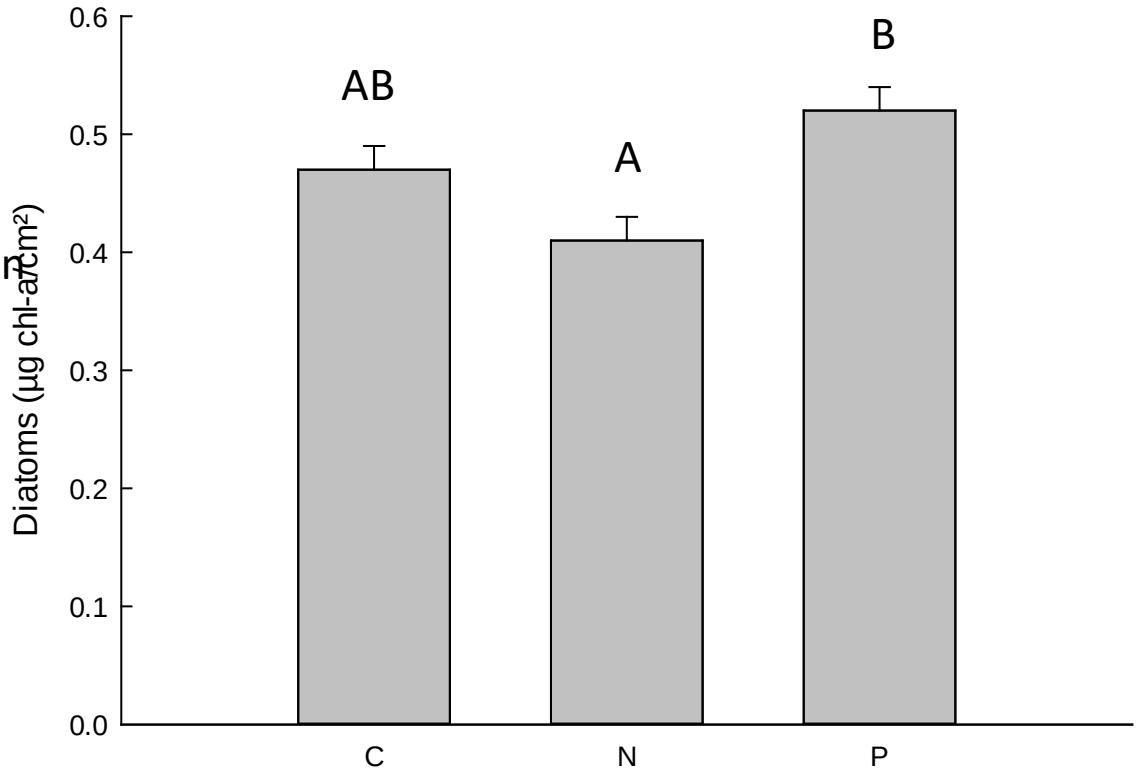
Protocol from Maltby (1988)

Belowground Decomposition



Diatom Community

Diatom Concentration
(µg chl-a/cm²)



P = 0.008

Increased Nutrients

Bion

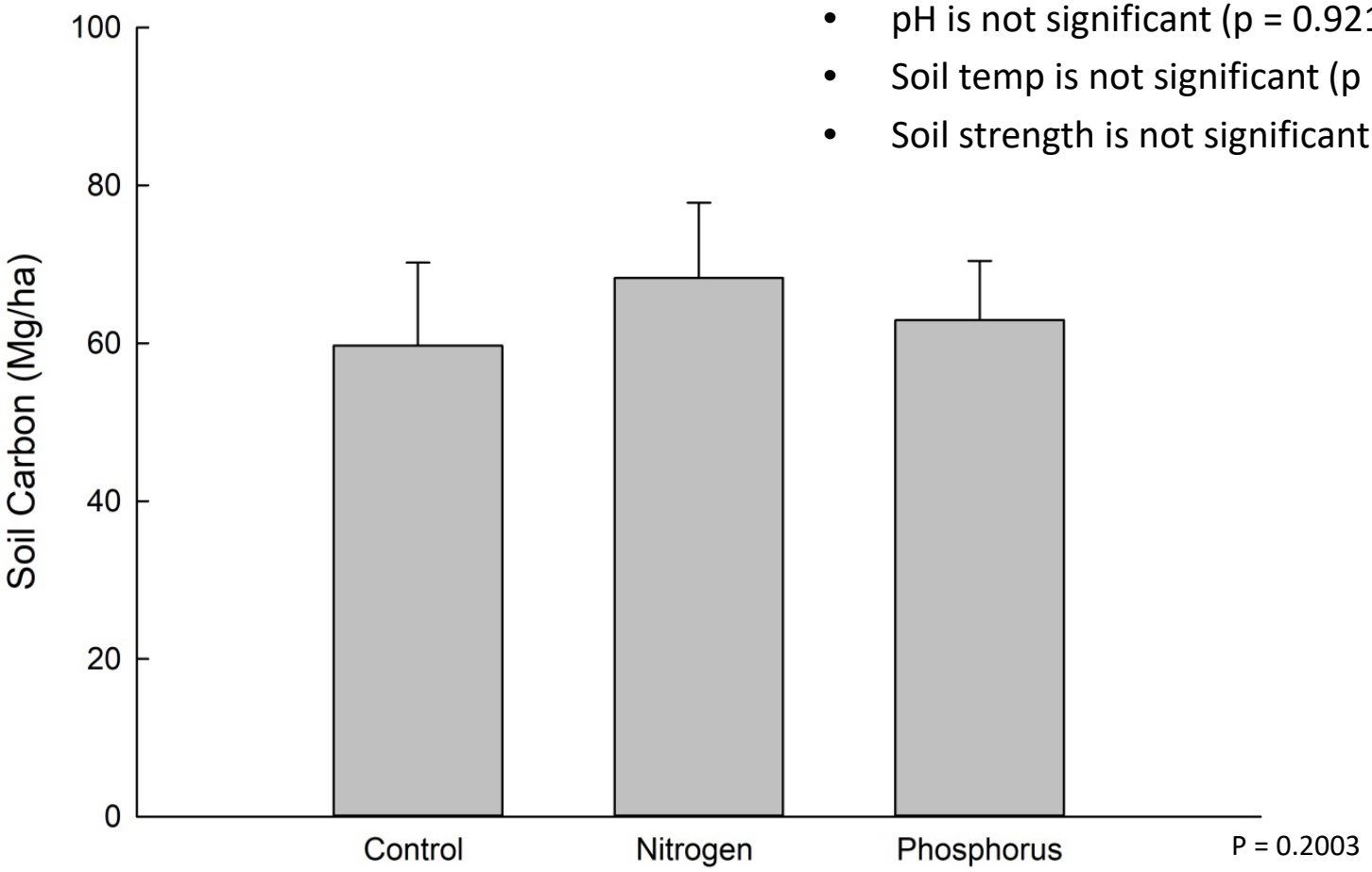
Respir

Decompos

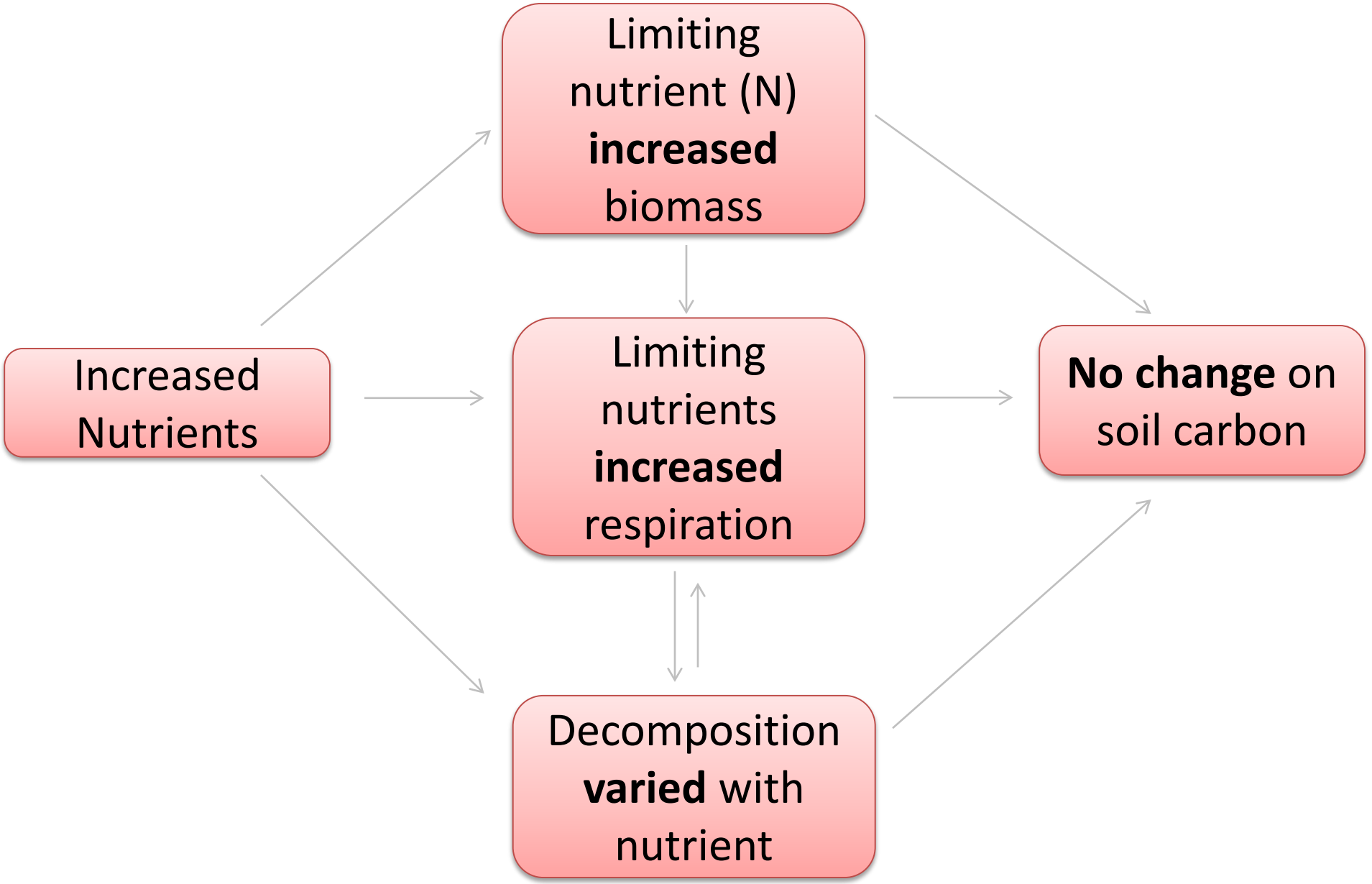
Soil Carbon?

Soil Carbon

- Salinity is not significant (p = 0.2240)
- pH is not significant (p = 0.9218)
- Soil temp is not significant (p = 0.6283)
- Soil strength is not significant (p = 0.1618)



Soil C has not changed over the last 6 years


Limiting nutrient (N) **increased** biomass
Increased Nutrients
Limiting nutrients **increased** respiration
No change on soil carbon
Decomposition **varied** with nutrient

Acknowledgements

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