Carbon sequestration response to chronic saltwater intrusion in a coastal marsh in Louisiana

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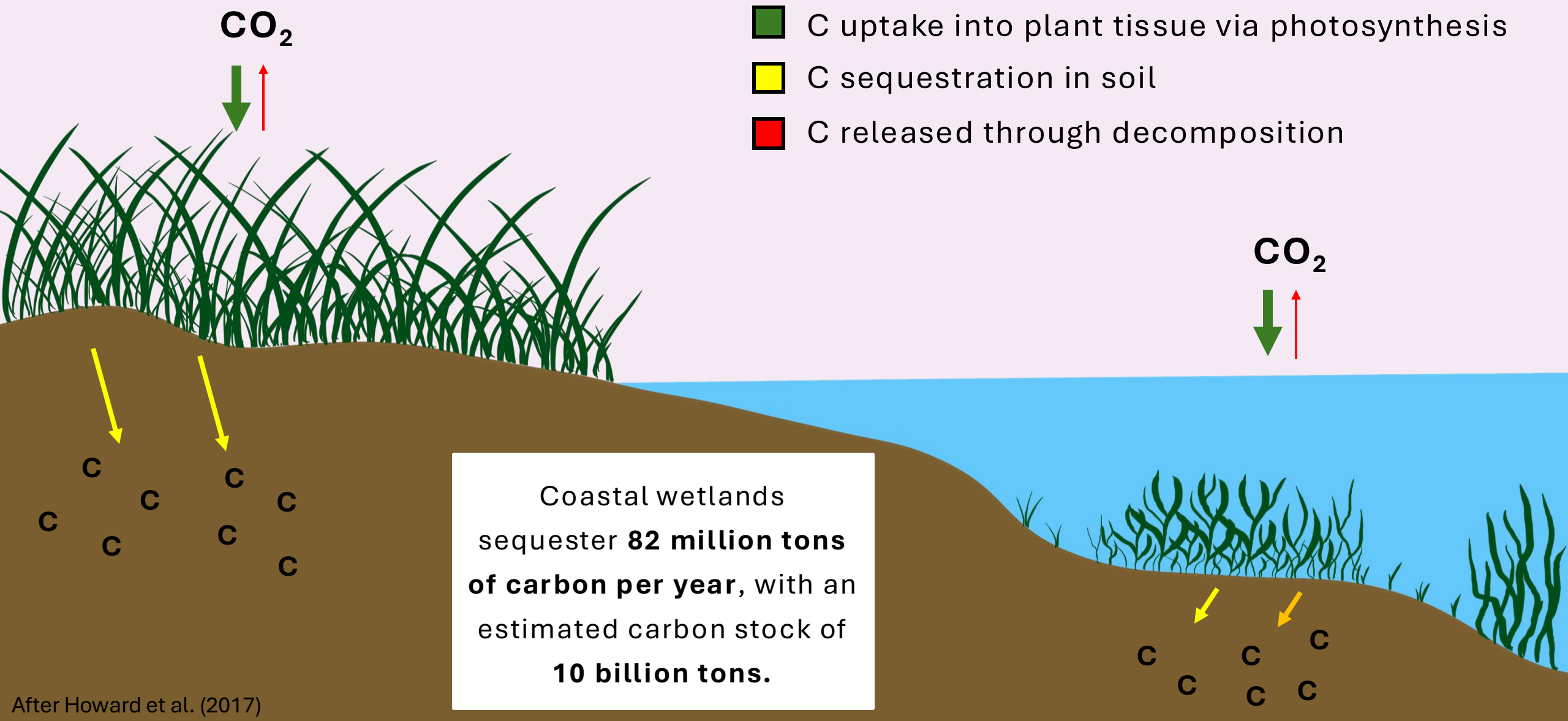
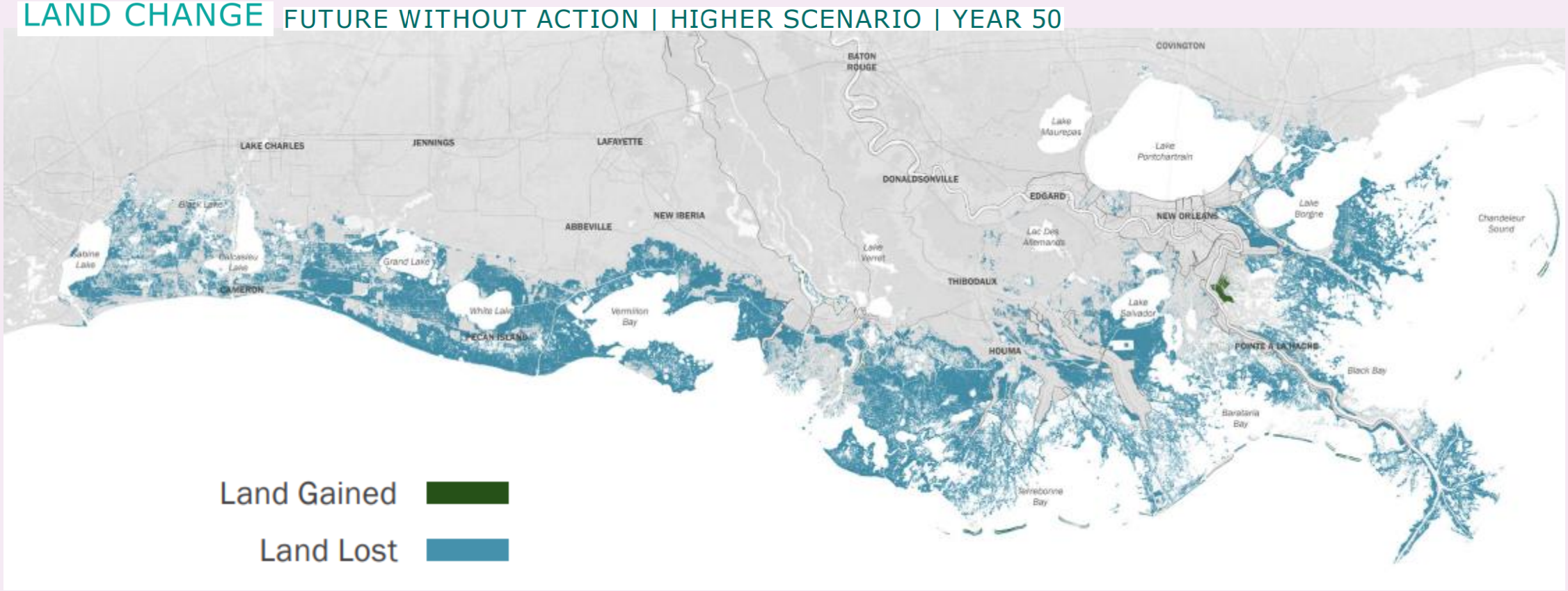
CARBON SEQUESTRATION



Coastal wetlands sequester **82 million tons of carbon per year**, with an estimated carbon stock of **10 billion tons.**

After Howard et al. (2017)

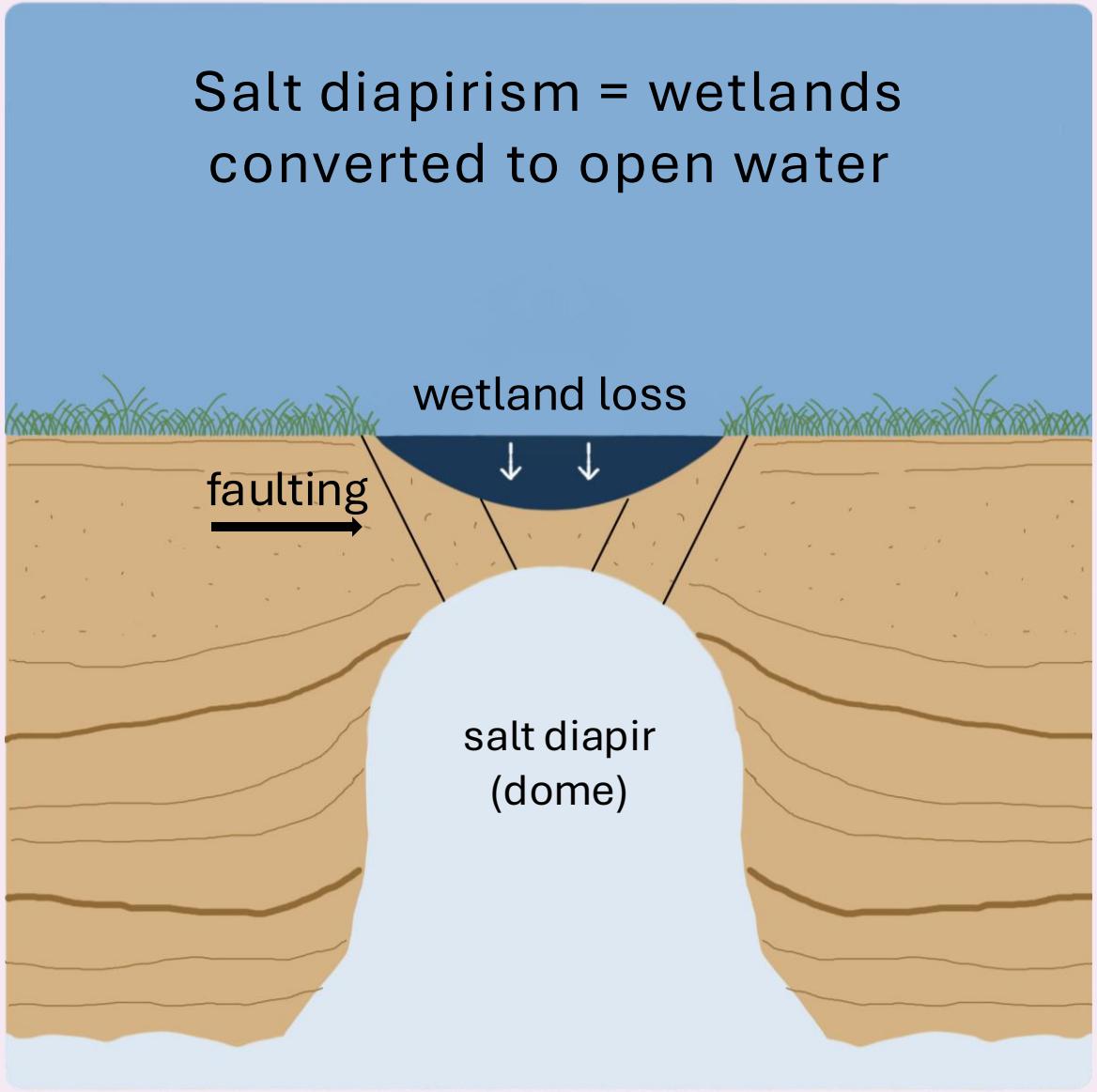
CARBON SINK → CARBON SOURCE

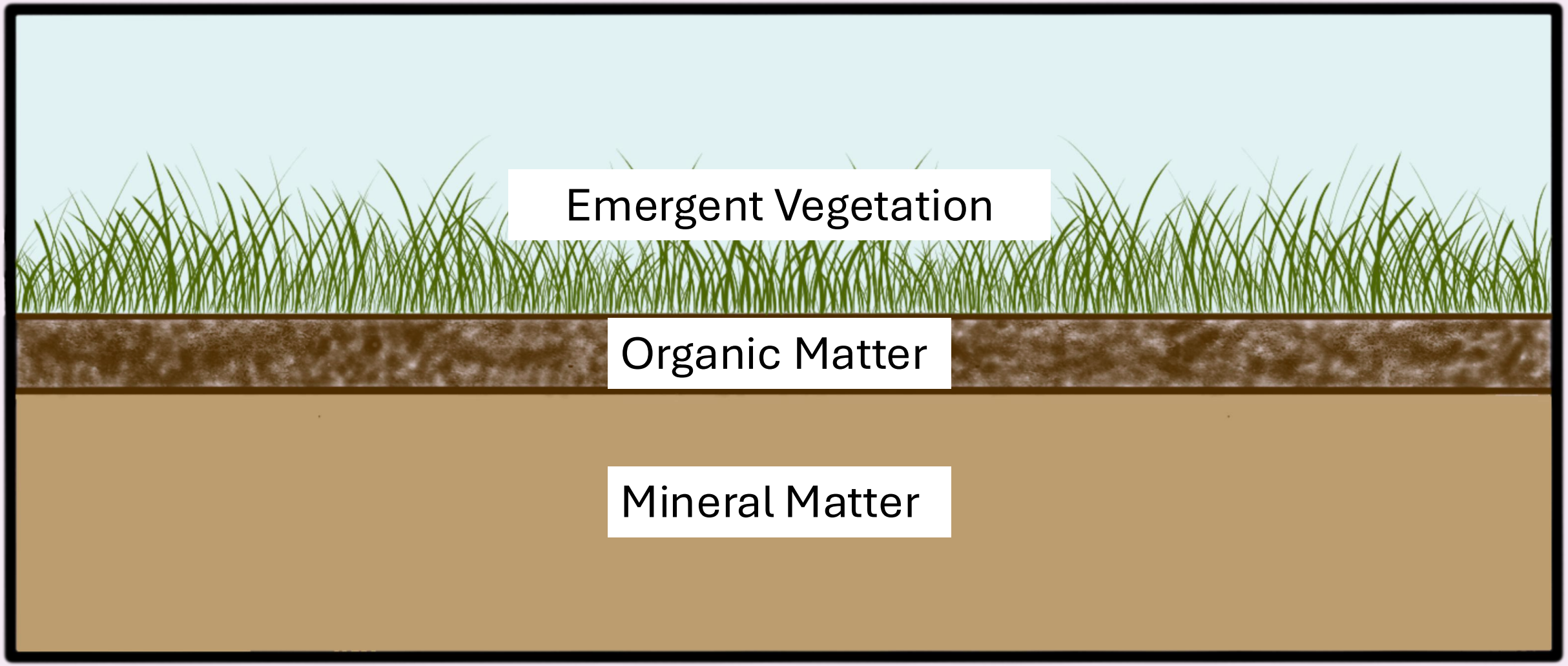


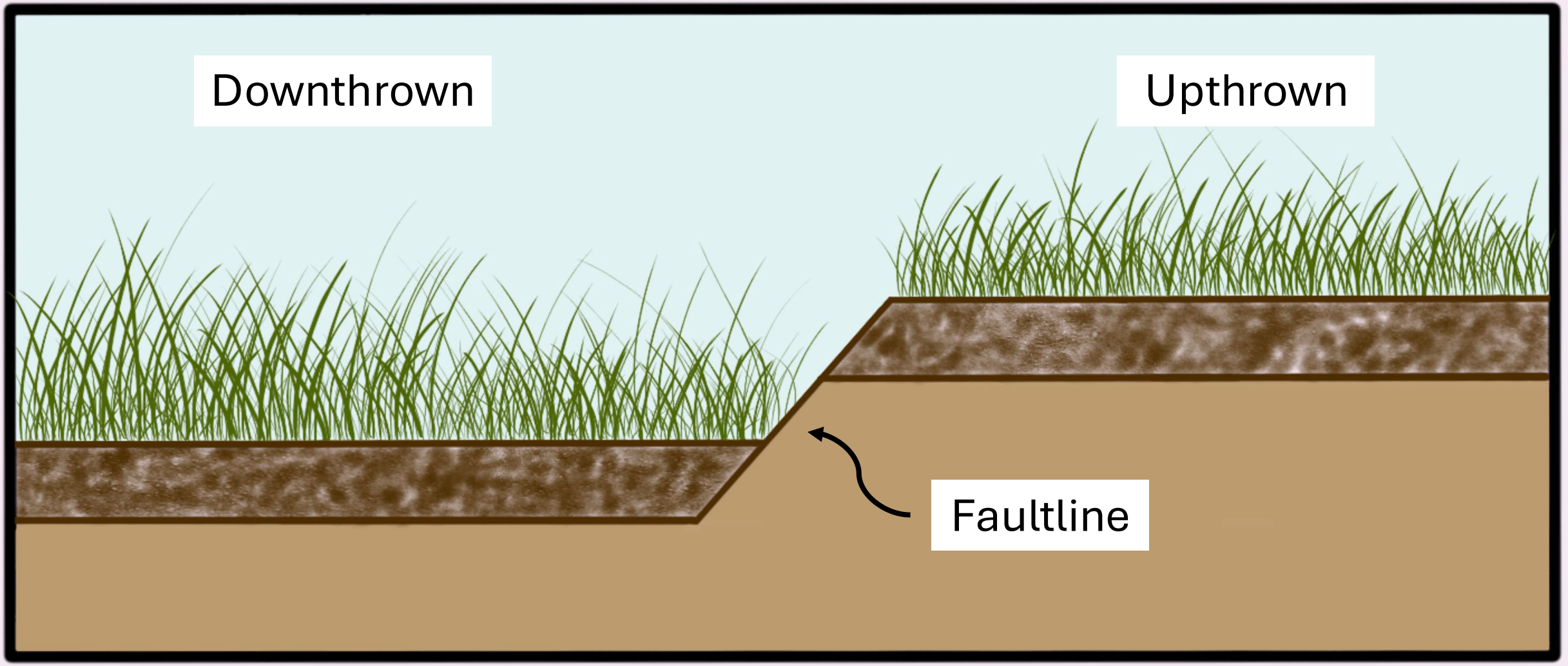
(CPRA, 2023)

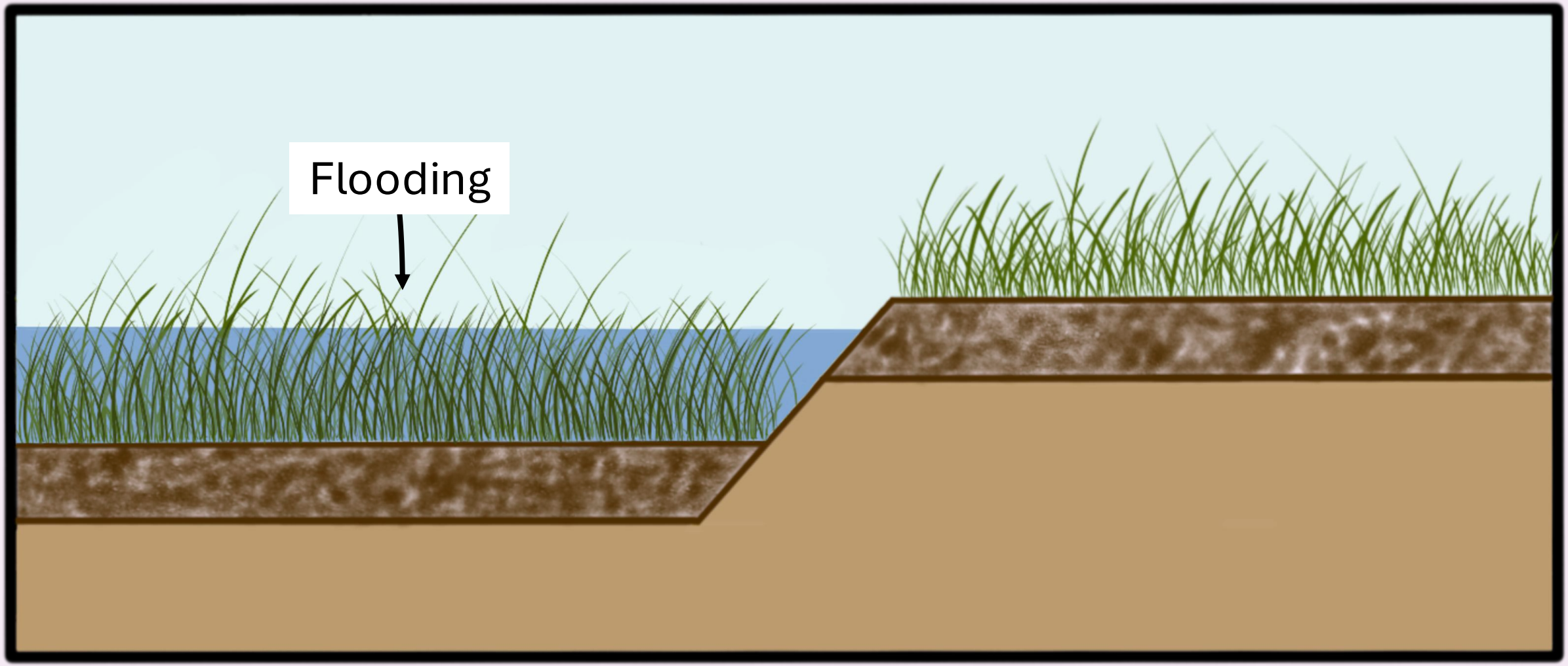
Faulting in Louisiana can result in up to 20 mm/yr of subsidence.
(Yuill et al., 2009)

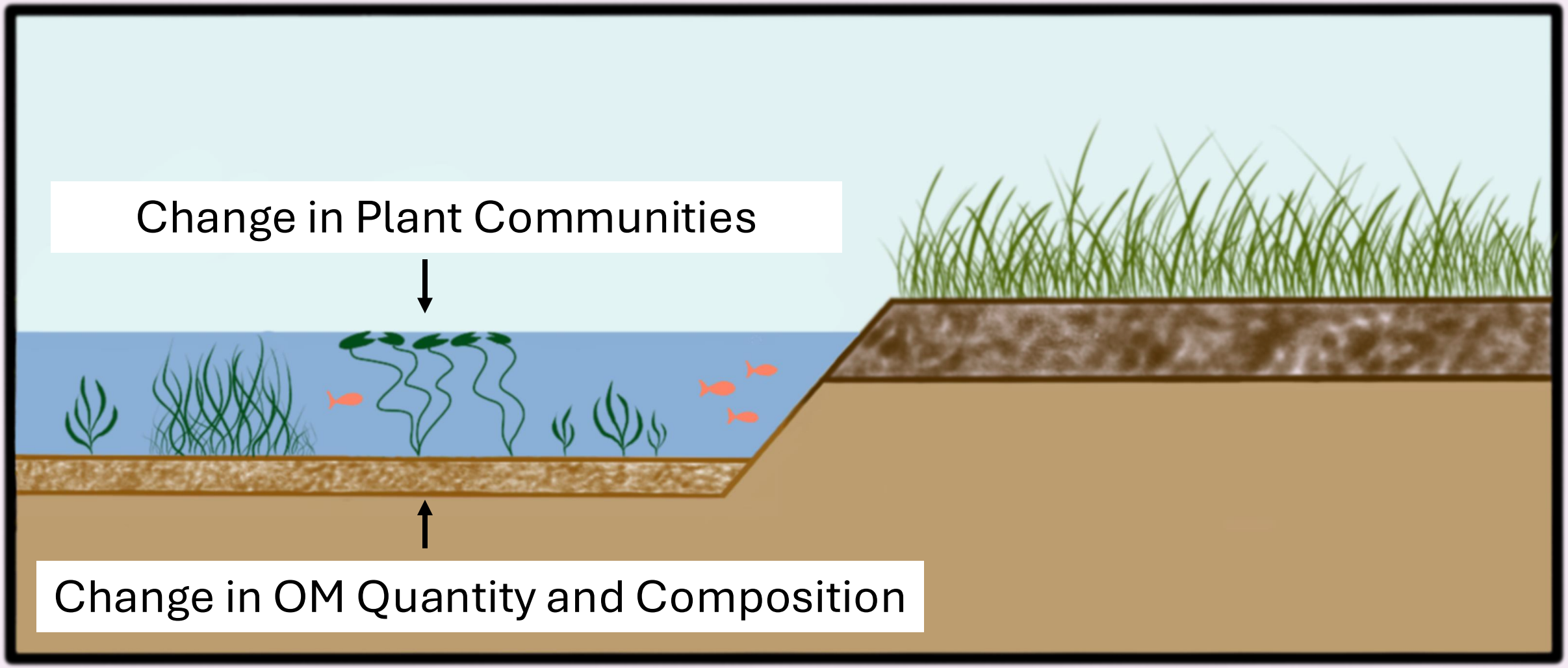
TECTONICS: FAULTING




Emergent Vegetation
Organic Matter
Mineral Matter

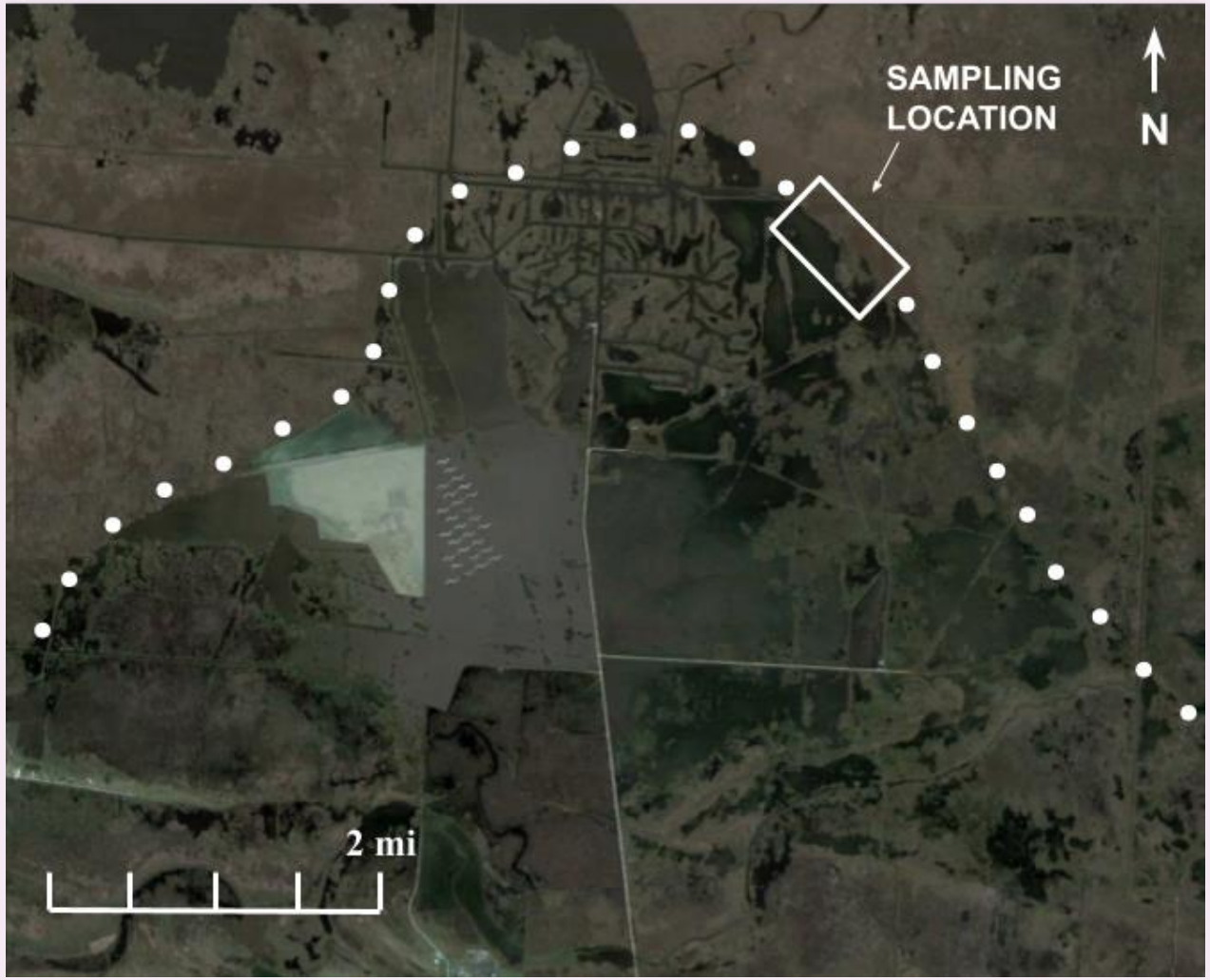

Downthrown
Upthrown
Faultline


Flooding


Change in Plant Communities
Change in OM Quantity and Composition

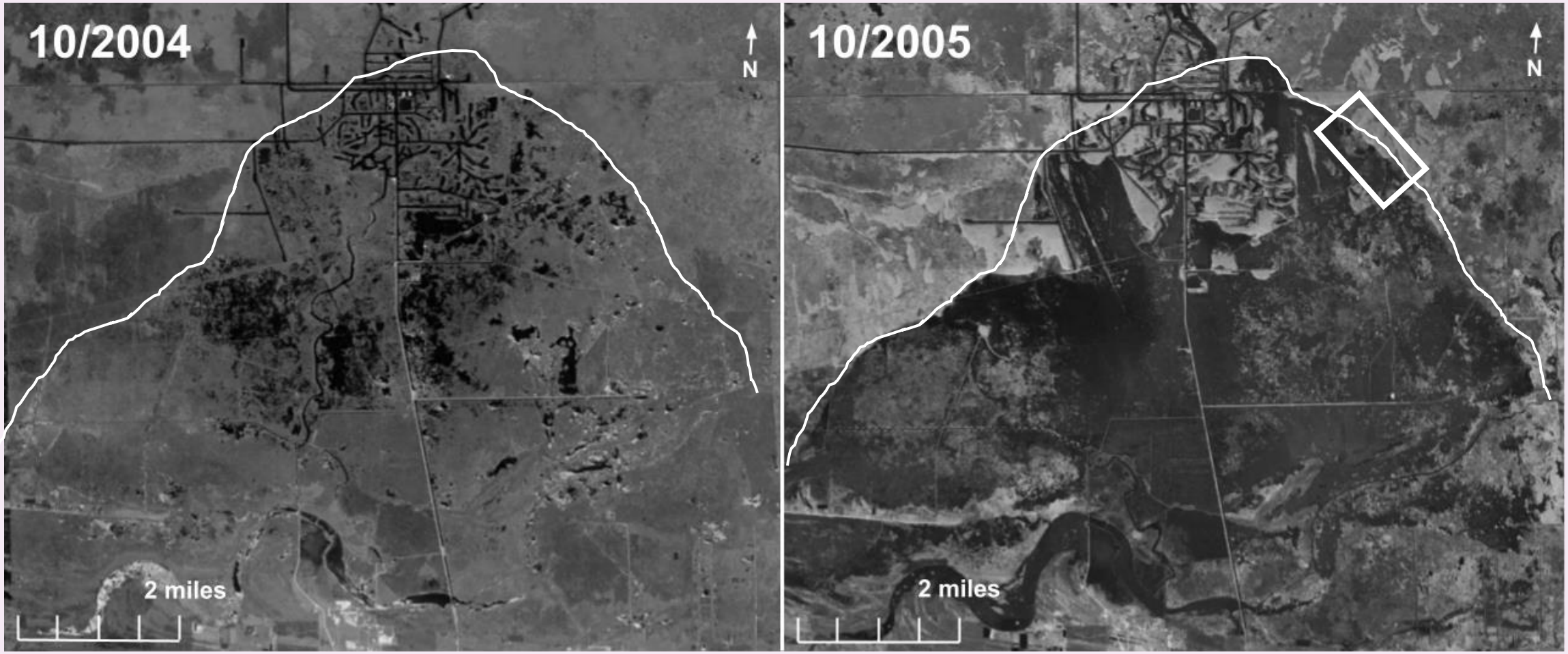
How does organic matter and carbon sequestration respond to flooding in faulted coastal landscapes?

STUDY AREA



Intermediate salinity wetlands: 0.5 - 5 ppt

HURRICANE RITA



Intermediate salinity wetlands: 0.5 - 5 ppt

March of 2006: up to 17.9 ppt
(Steyer et al., 2005)

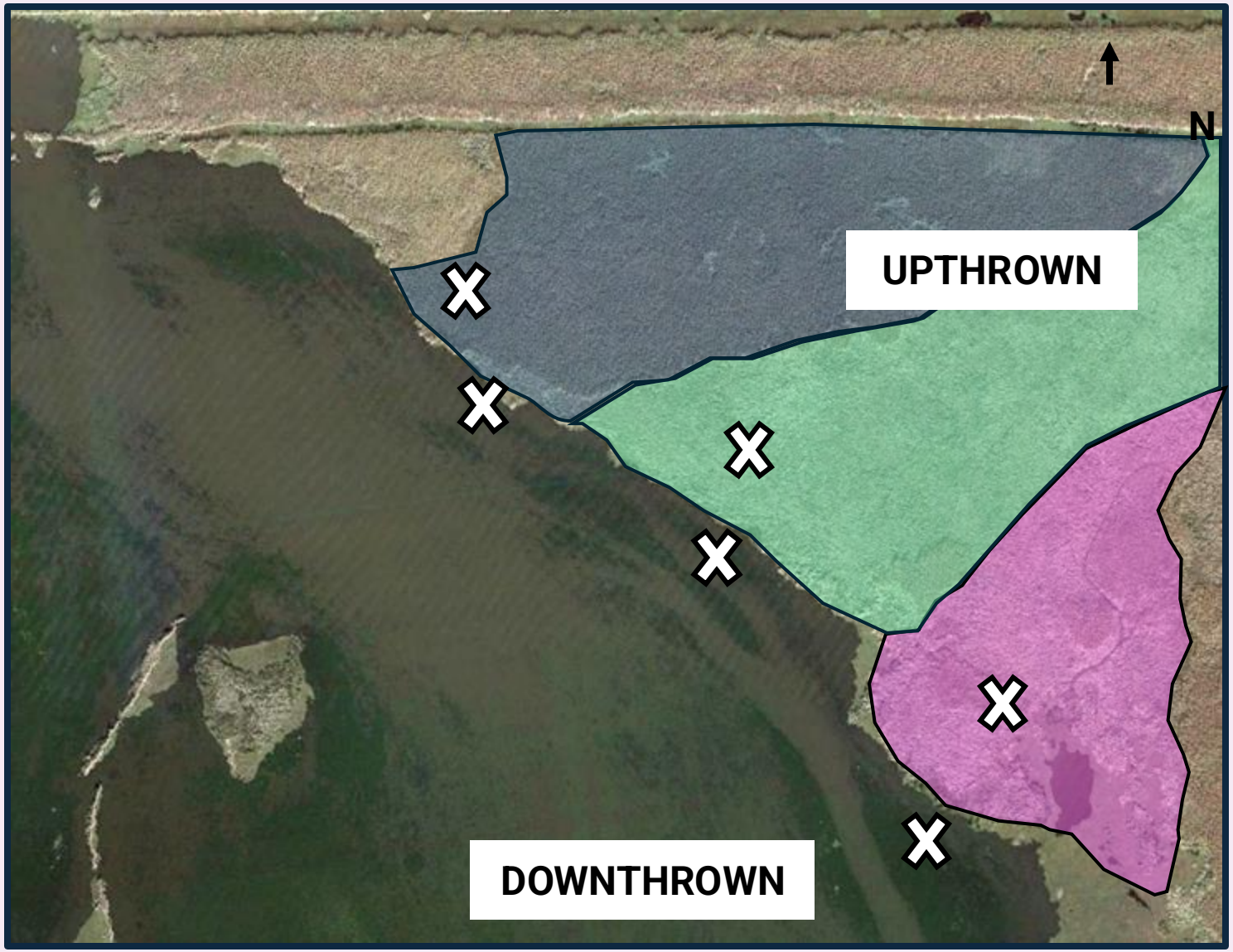
SAMPLING LOCATION

1.) *Phragmites australis*

2.) *Spartina patens*

3.) *Schoenoplectus californicus*

SAMPLING LOCATION



Phragmites australis

Spartina patens

Schoenoplectus californicus

CORING LOCATION

Downthrown plant species:

- *Alternanthera philoxeroides*
- *Myriophyllum spicatum*
- *Salvina molesta*
- *Brasenia schreberi*

PLANTS COLLECTED

($\delta^{13}C‰$, photosynthetic pathway)

Emergent Vegetation

-26.77 ‰, C_3

California Bulrush
Schenoplectus californicus

-27.60 ‰, C_3

Phragmites
Phragmites australis

-13.80 ‰, C_4

Spartina
Spartina patens

Submerged / Floating Vegetation

-29.61 ‰, C_3

Alligator Weed
Alternanthera philoxeroides

-27.85 ‰, C_3

Watershield
Brasenia schreberi

-28.85 ‰, C_3

Giant Salvinia
Salvinia molesta

-16.43 ‰, INT

Eurasian Water-Milfoil
Myriophyllum spicatum

SAMPLE COLLECTION & PREPARATION

core collection

core

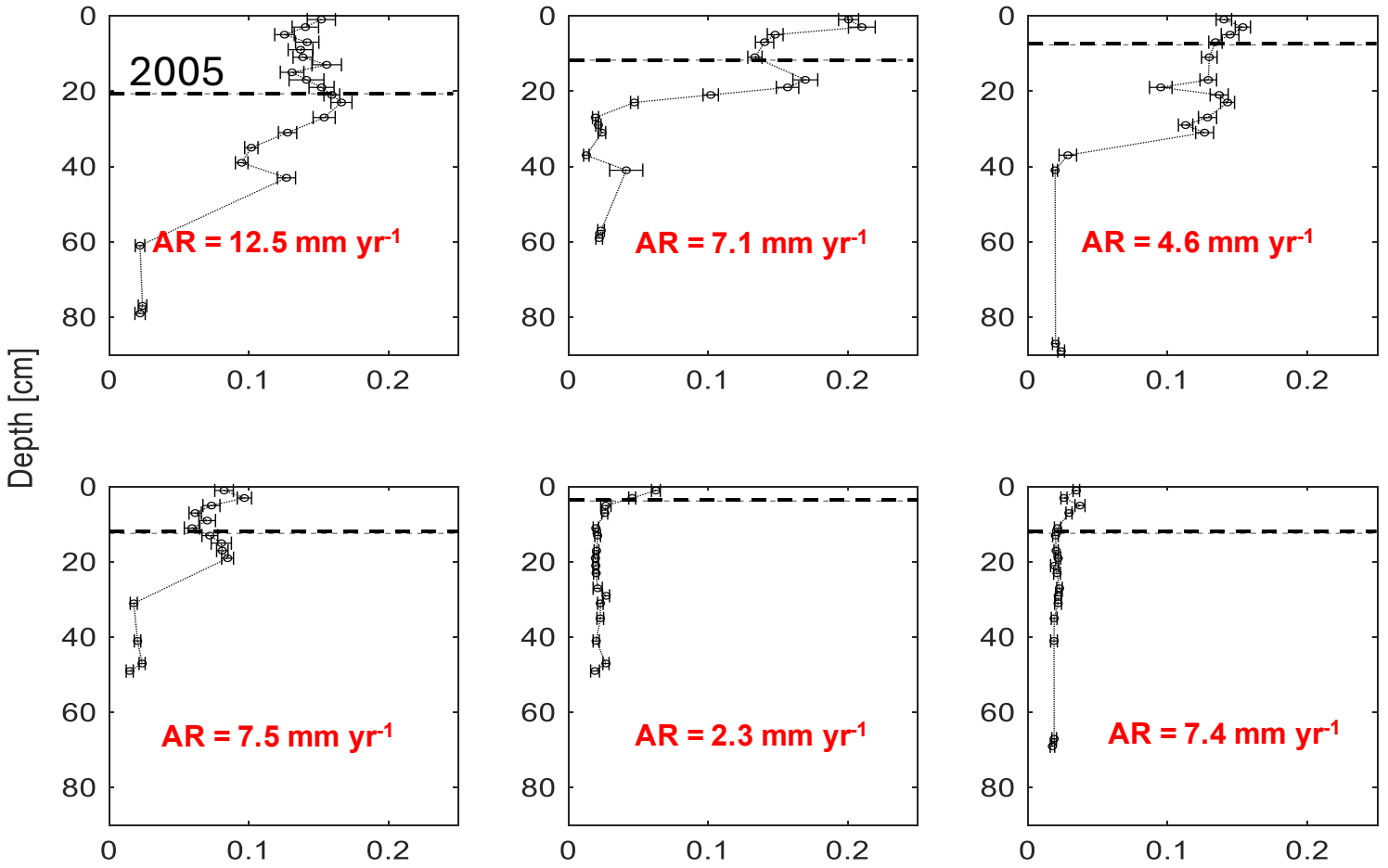
core & plant drying

core & plant milling

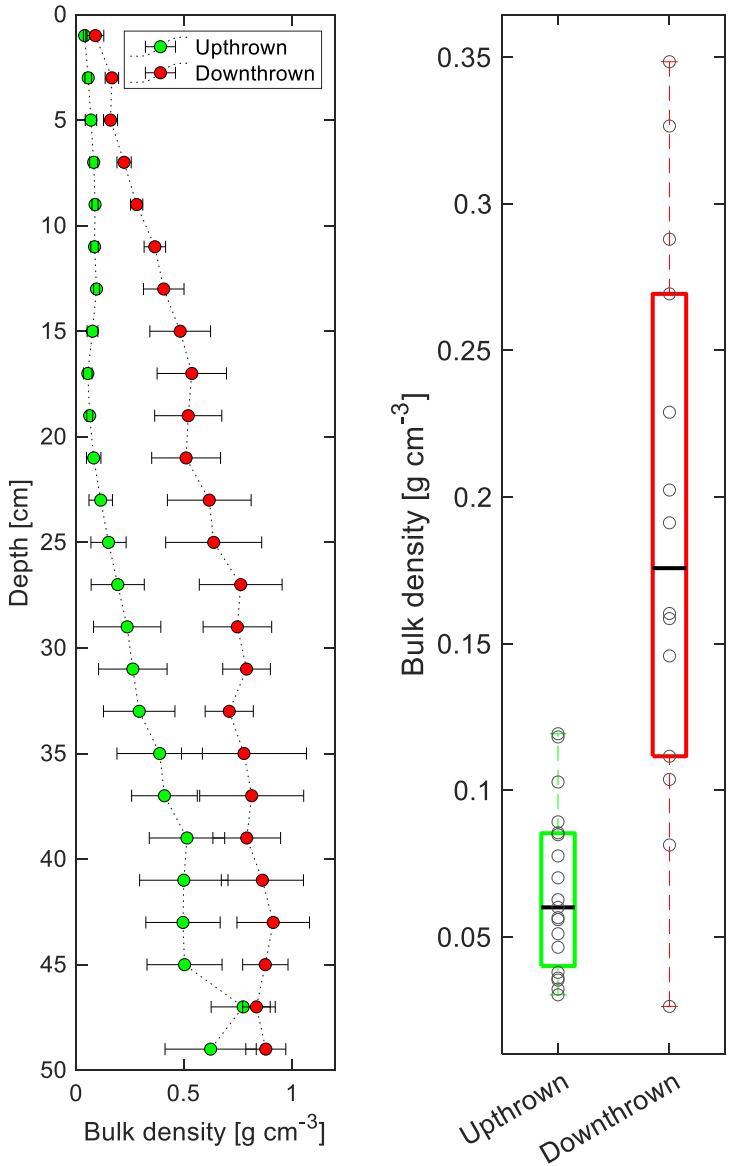
- ✓ Bulk Density
- ✓ C & N concentration
- ✓ $\delta^{13}C$
- ✓ ^{210}Pb activity (dating & accretion rates)

Spartina sp *Schoenoplectus sp* *Phragmites sp*

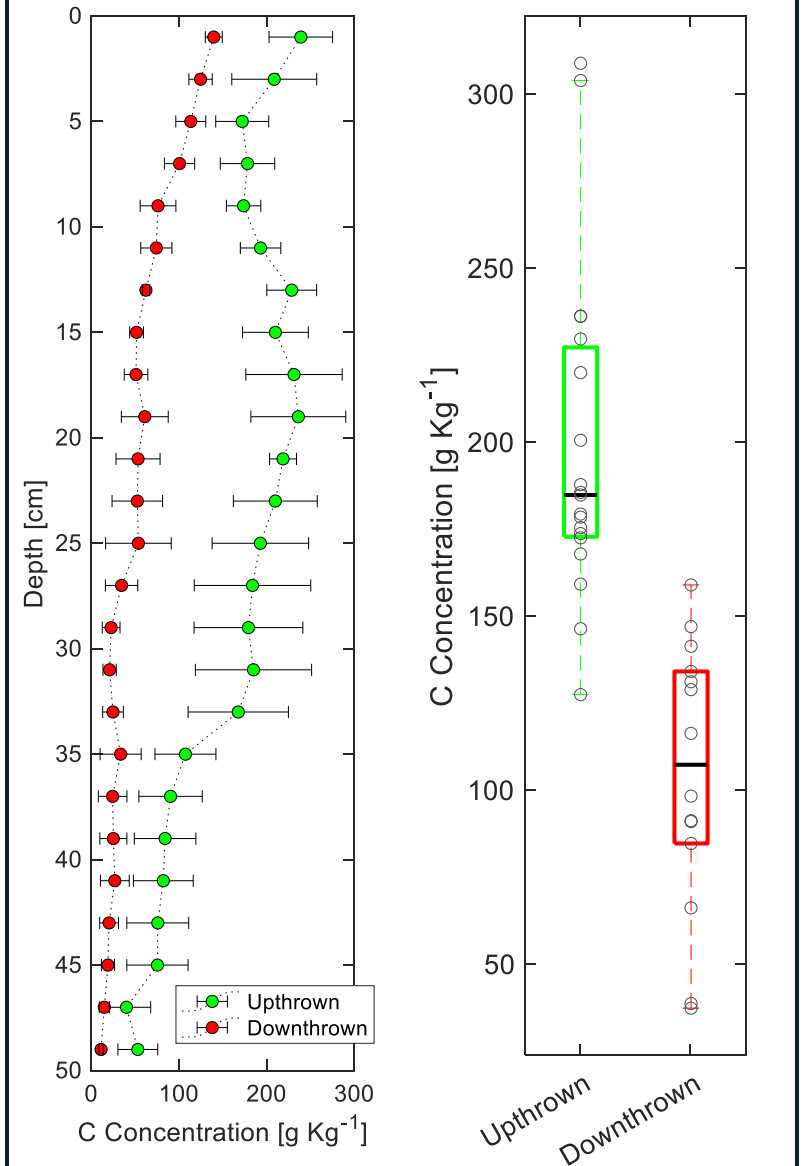




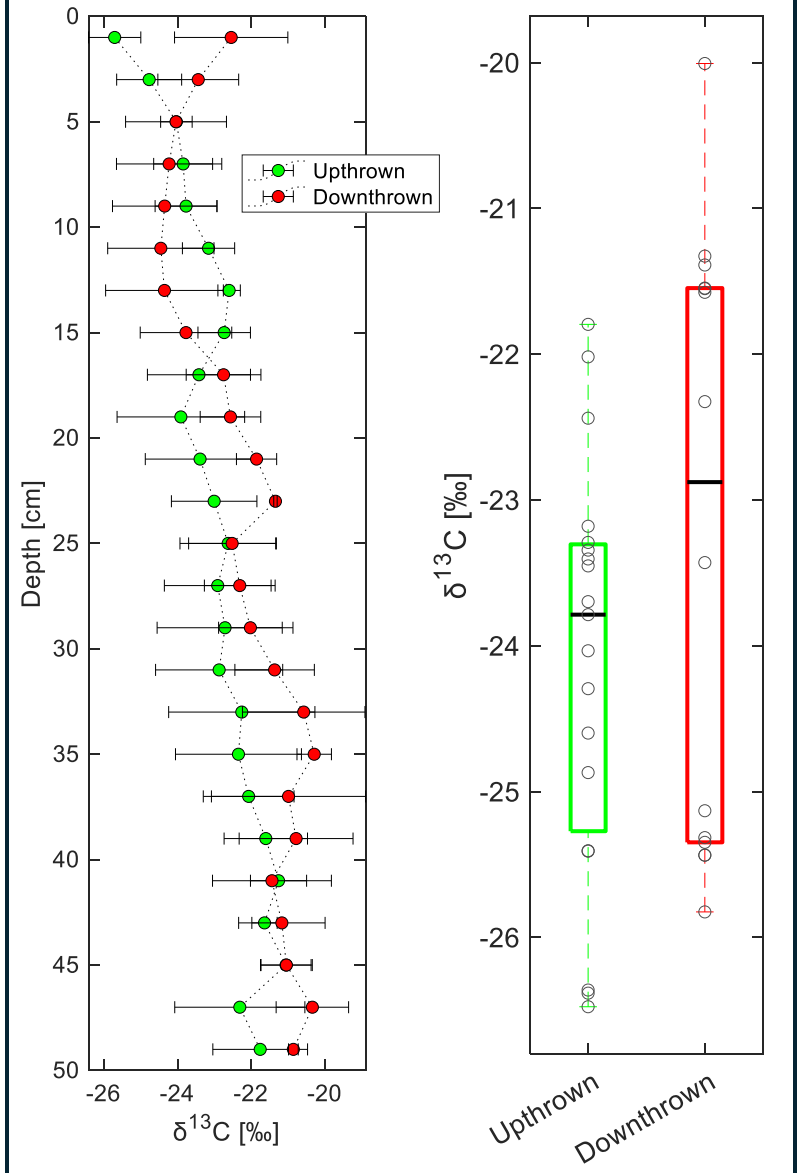
Bulk density



C concentration



$\delta^{13}C$



Carbon Sequestration = AR × Bulk density × C concentration

- ✓ BD was higher on the downthrown side of the fault and lower on the upthrown side.
- ✓ %C was lower on the downthrown side of the fault and higher on the upthrown.
- ✓ $\delta^{13}C$ did not change on the downthrown side of the fault.
- ✓ C sequestration becomes more variable and has a relatively lower median value in the downthrown than in the upthrown.

REFRENCES

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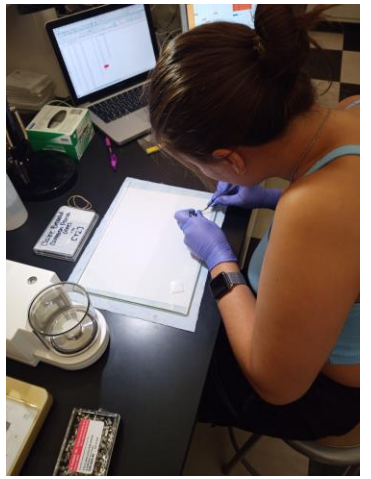
Thank you!



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