Salt Marsh Metabolism and Carbon Accumulation

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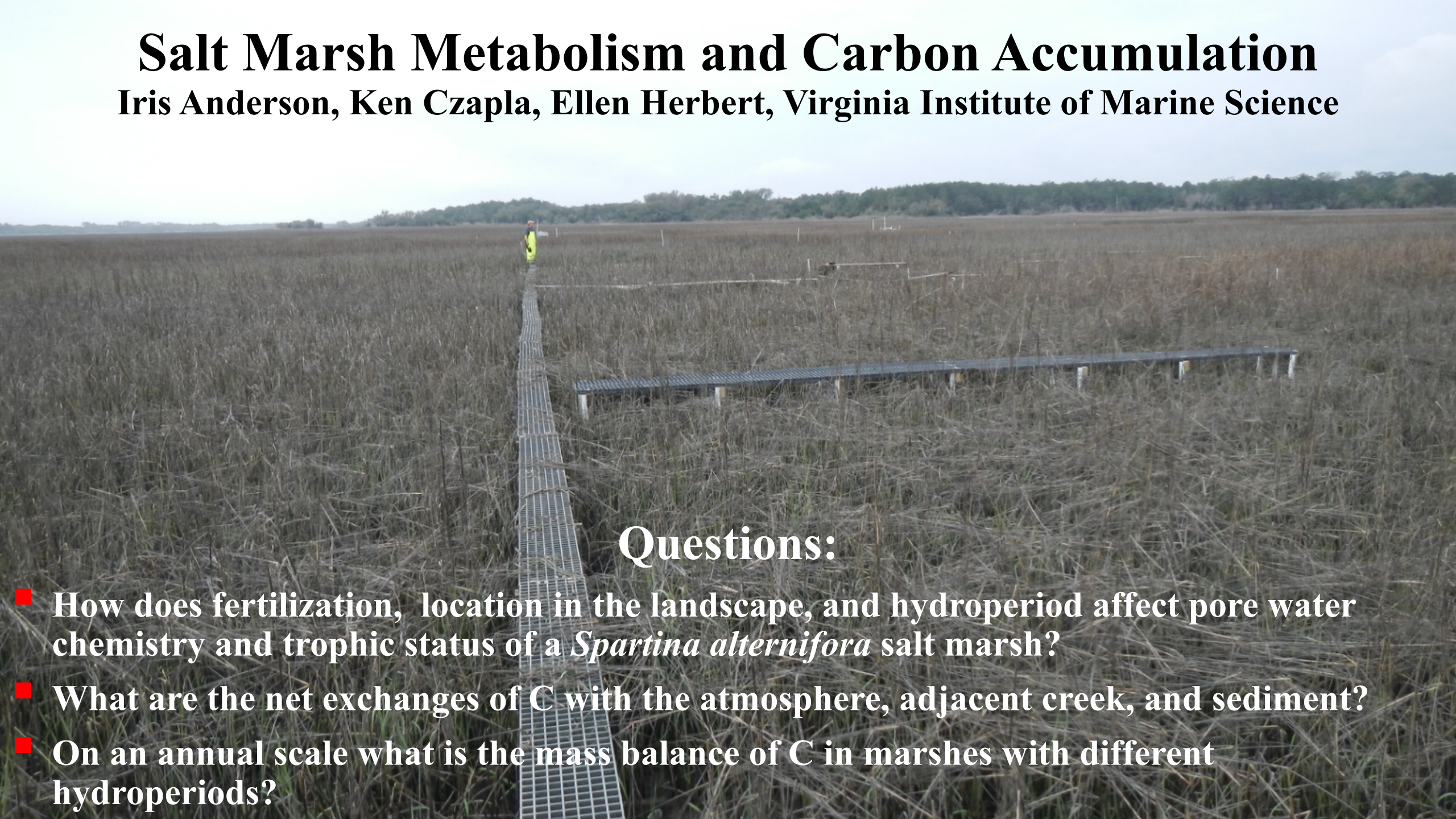


Questions:

- How does fertilization, location in the landscape, and hydroperiod affect pore water chemistry and trophic status of a *Spartina alternifora* salt marsh?
- What are the net exchanges of C with the atmosphere, adjacent creek, and sediment?
- On an annual scale what is the mass balance of C in marshes with different hydroperiods?

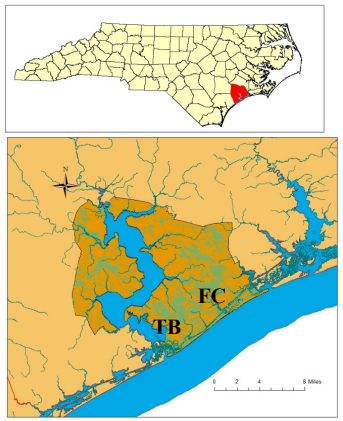
Effects of fertilization, location, and hydroperiod on pore water chemistry in two *S. alterniflora* salt marshes in North Carolina

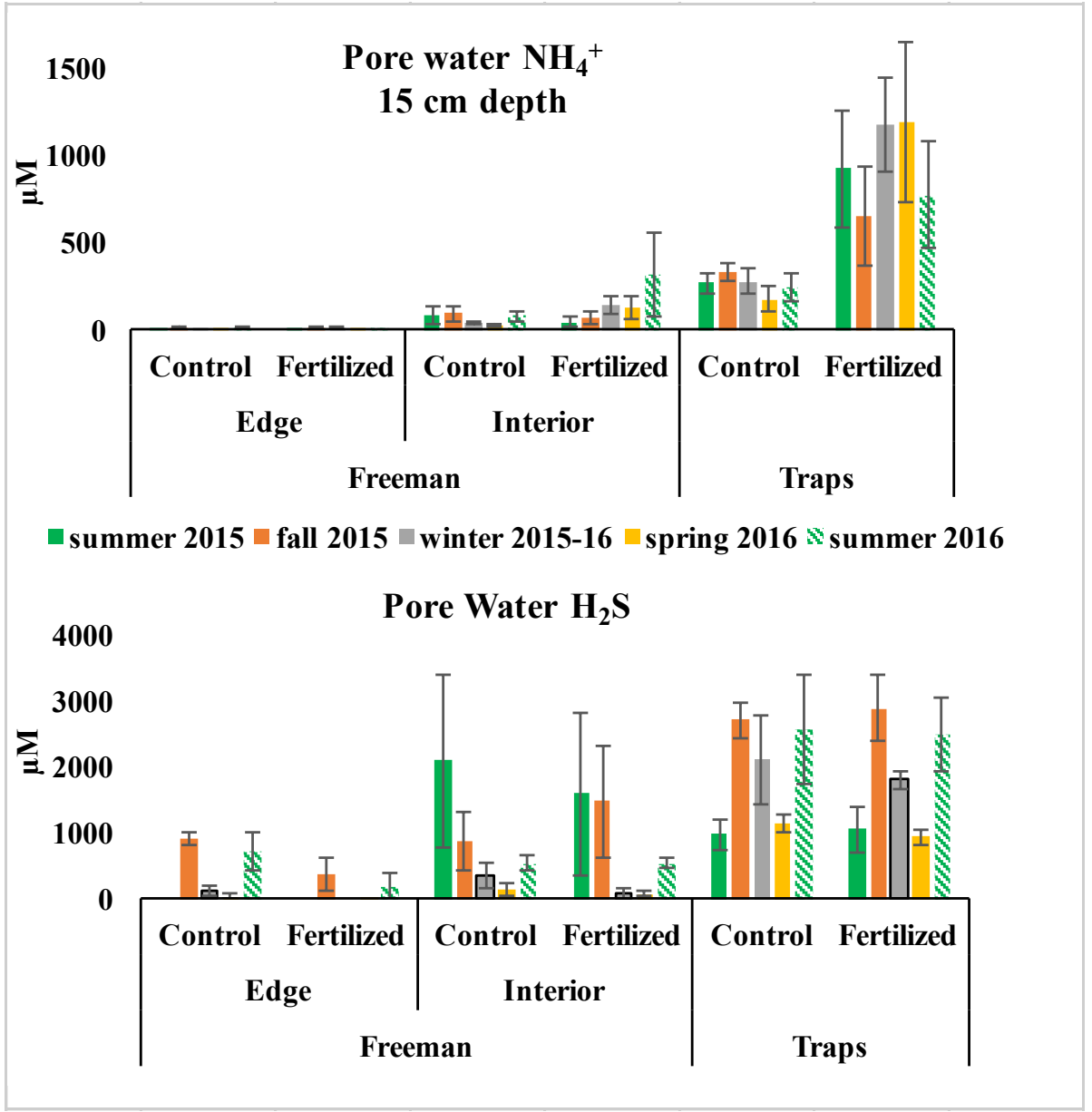
Freeman Creek marsh

- Adjacent to intra coastal waterway
- Higher tidal range; shorter hydroperiod
- Locations: 6 plots each, edge and interior
- Fertilization: 3 controls, 3 plots fertilized; 30 mol N yr^{-1} as NH_4NO_3; 15 mol P yr^{-1} as P_2O_5

Traps Creek marsh

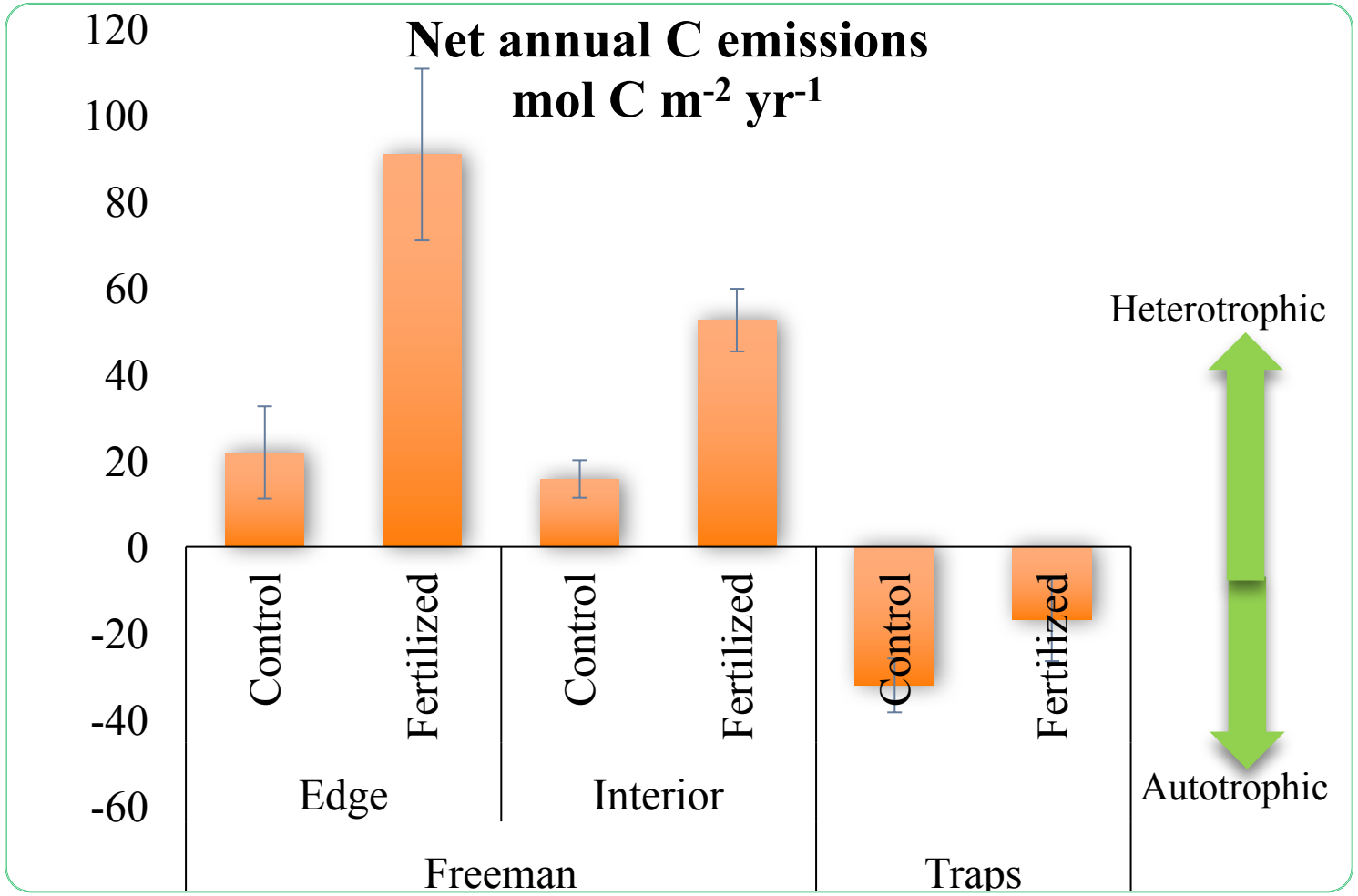
- Adjacent to the New River Estuary
- Lower tidal range; longer hydroperiod (shallow water effect)
- Sediment starved
- Locations: 6 plots, interior only
- Fertilization as above





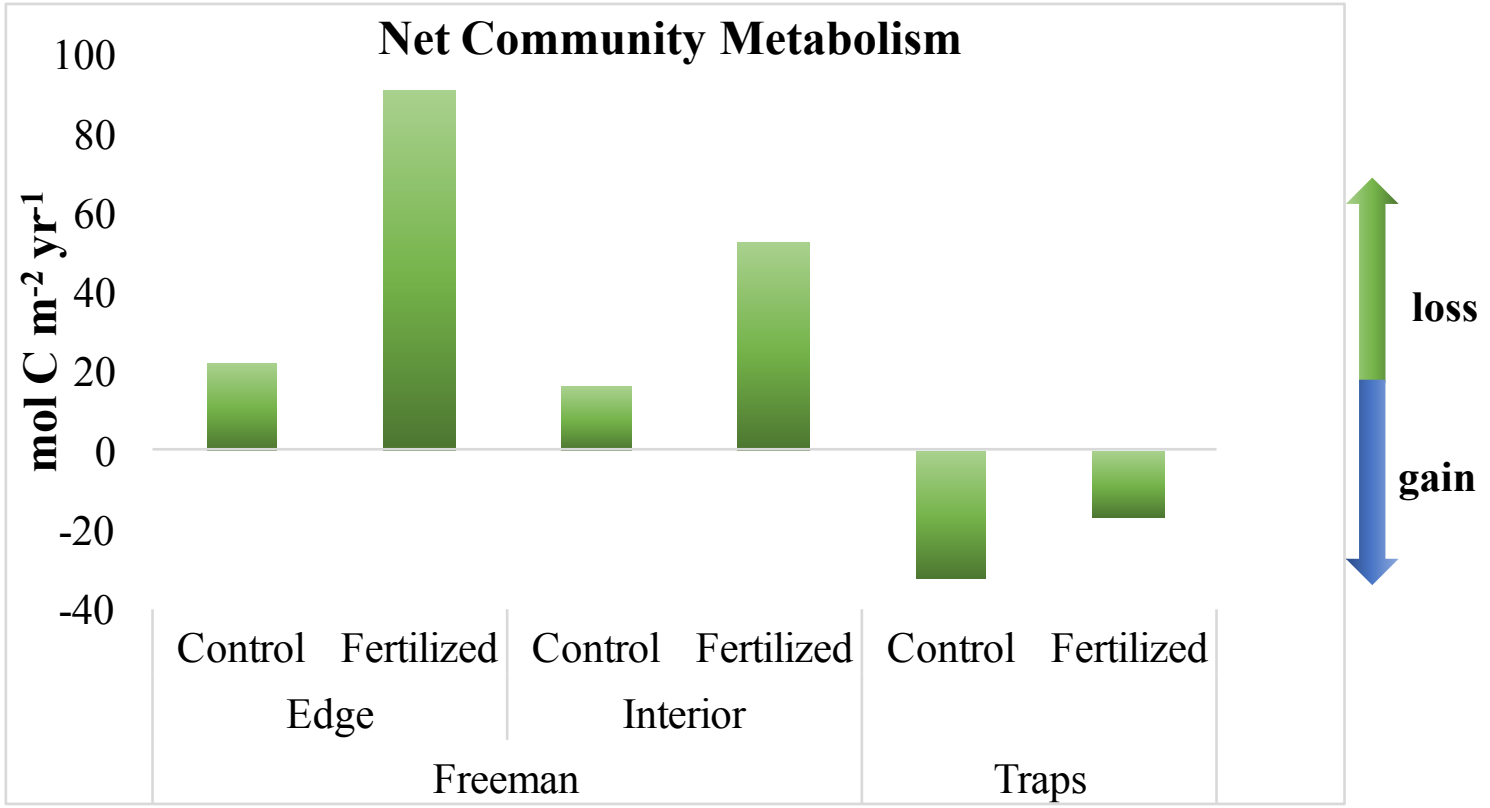
Regulation of net community production by location and fertilization

- Fertilization increased CO_2 effluxes (net heterotrophy) from both edge and interior plots at Freeman marsh.
- Effluxes from fertilized edge plots at Freeman were significantly higher than from interior marsh.
- Fertilization decreased influxes (net autotrophy) at Traps marsh.



Net exchanges of C between marsh and atmosphere, creek, and sediment

- Freeman marsh lost C and Traps marsh gained C via net metabolism
- Lateral export of DIC + DOC was a minor loss term in the C budget.
- Sediment OC input was the major source of accumulated C in Freeman and Traps interior.
- All marsh sites except Freeman edge accumulated C.



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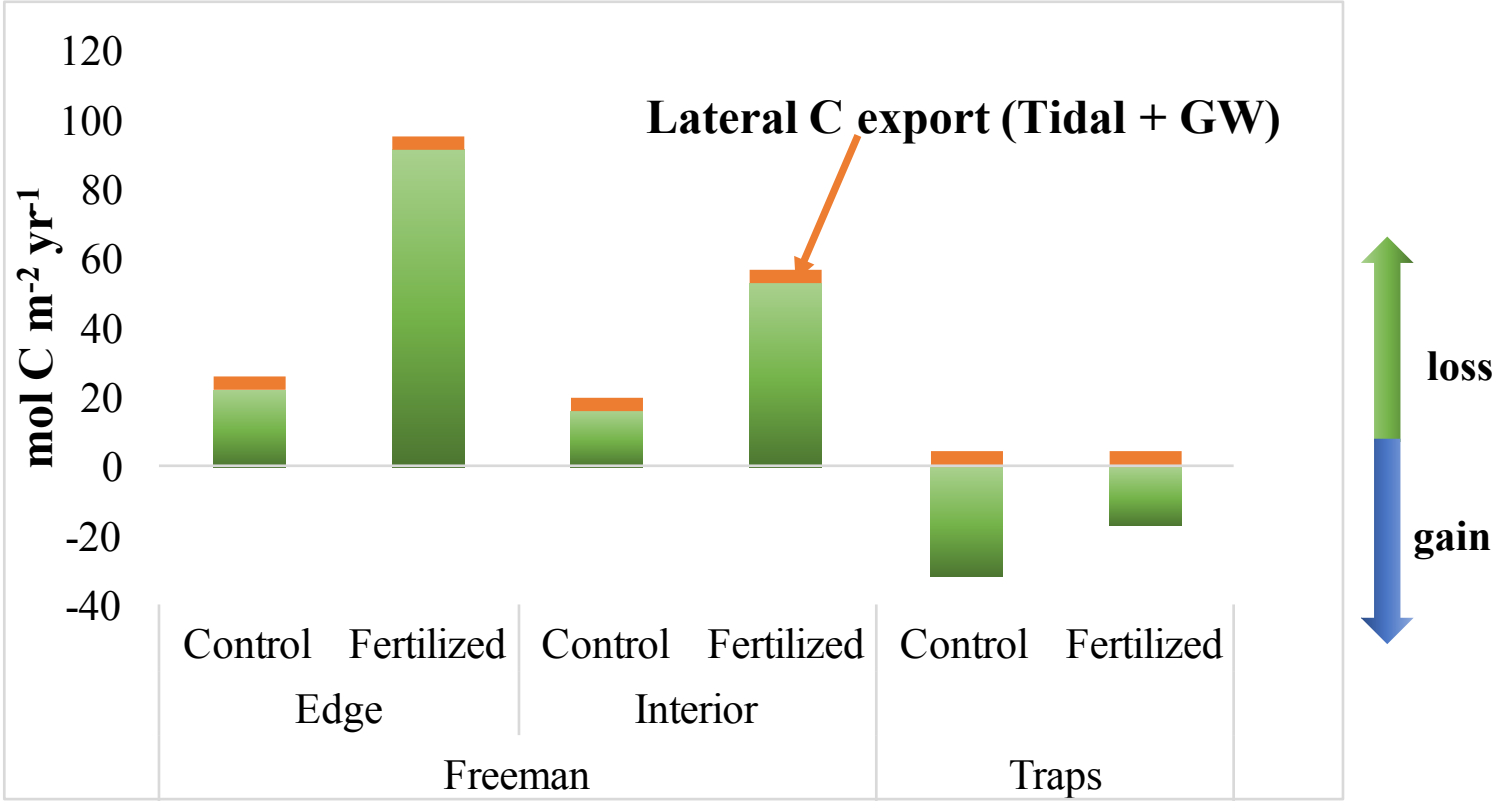

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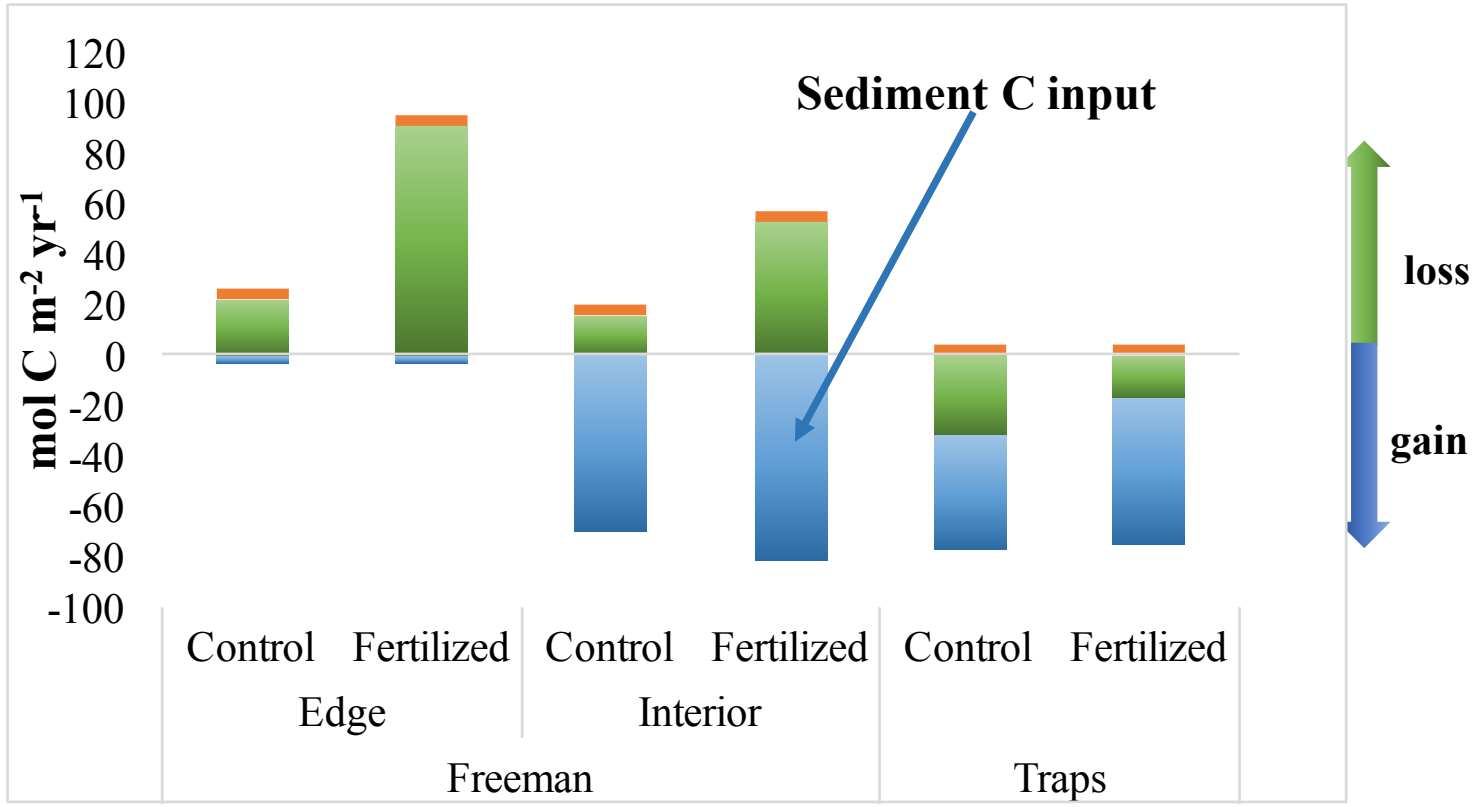

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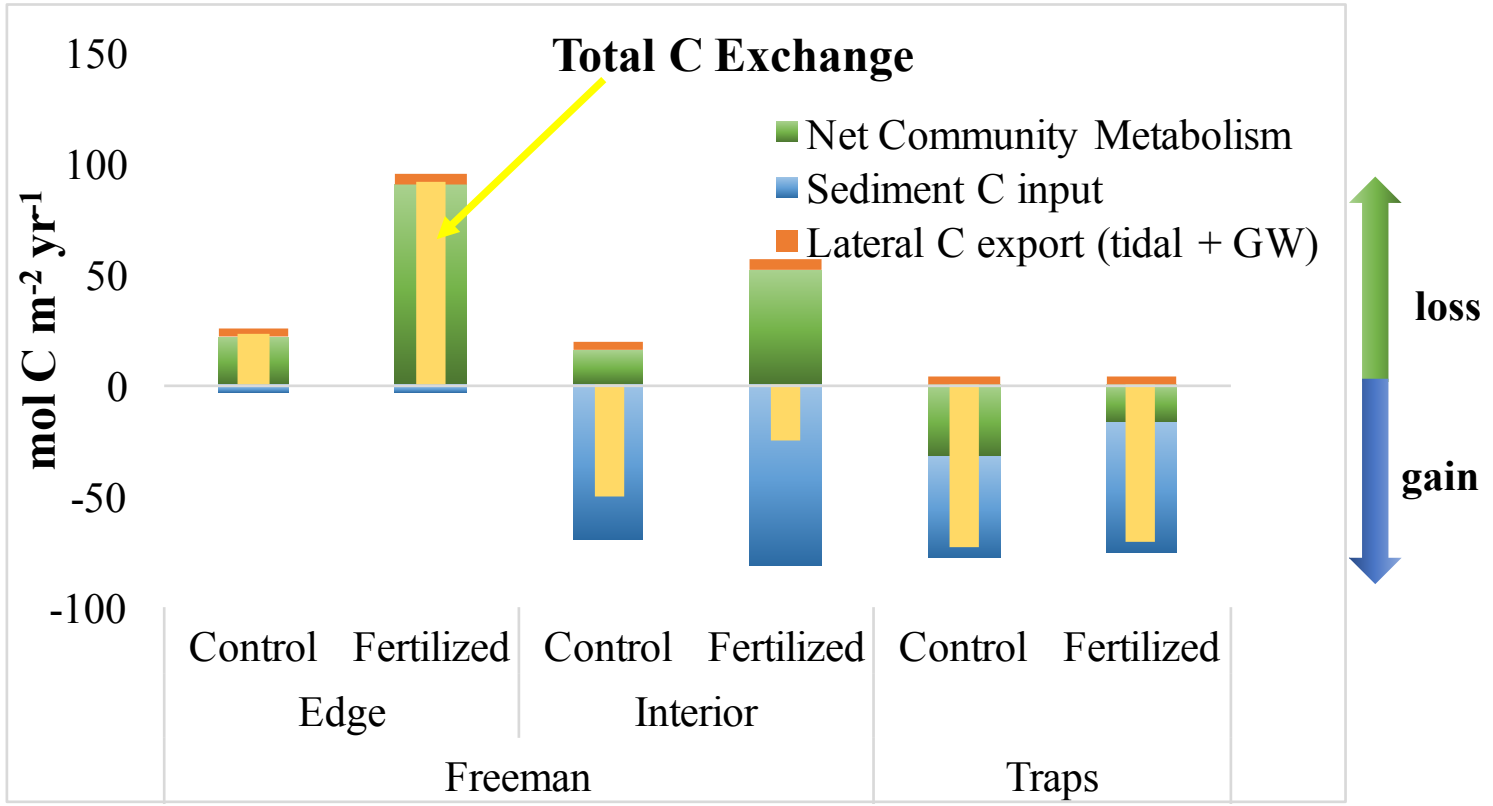

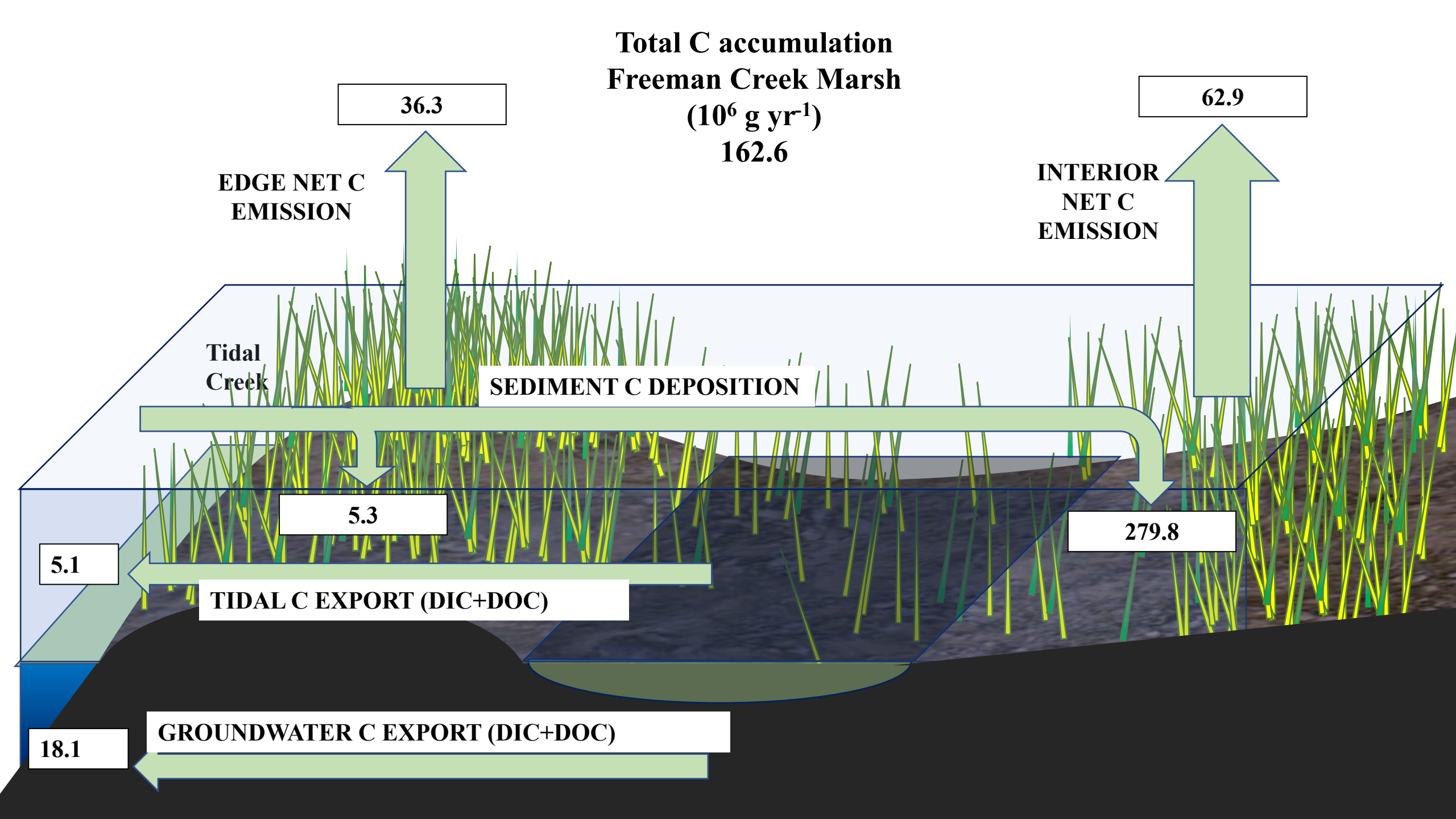
Total C accumulation
Freeman Creek Marsh
(10^6 g yr^{-1})
162.6
36.3
EDGE NET C EMISSION
62.9
INTERIOR NET C EMISSION
Tidal Creek
SEDIMENT C DEPOSITION
5.3
279.8
5.1
TIDAL C EXPORT (DIC+DOC)
18.1
GROUNDWATER C EXPORT (DIC+DOC)