

Rates of and factors influencing Phosphorus Flux in the Stormwater Treatment Areas

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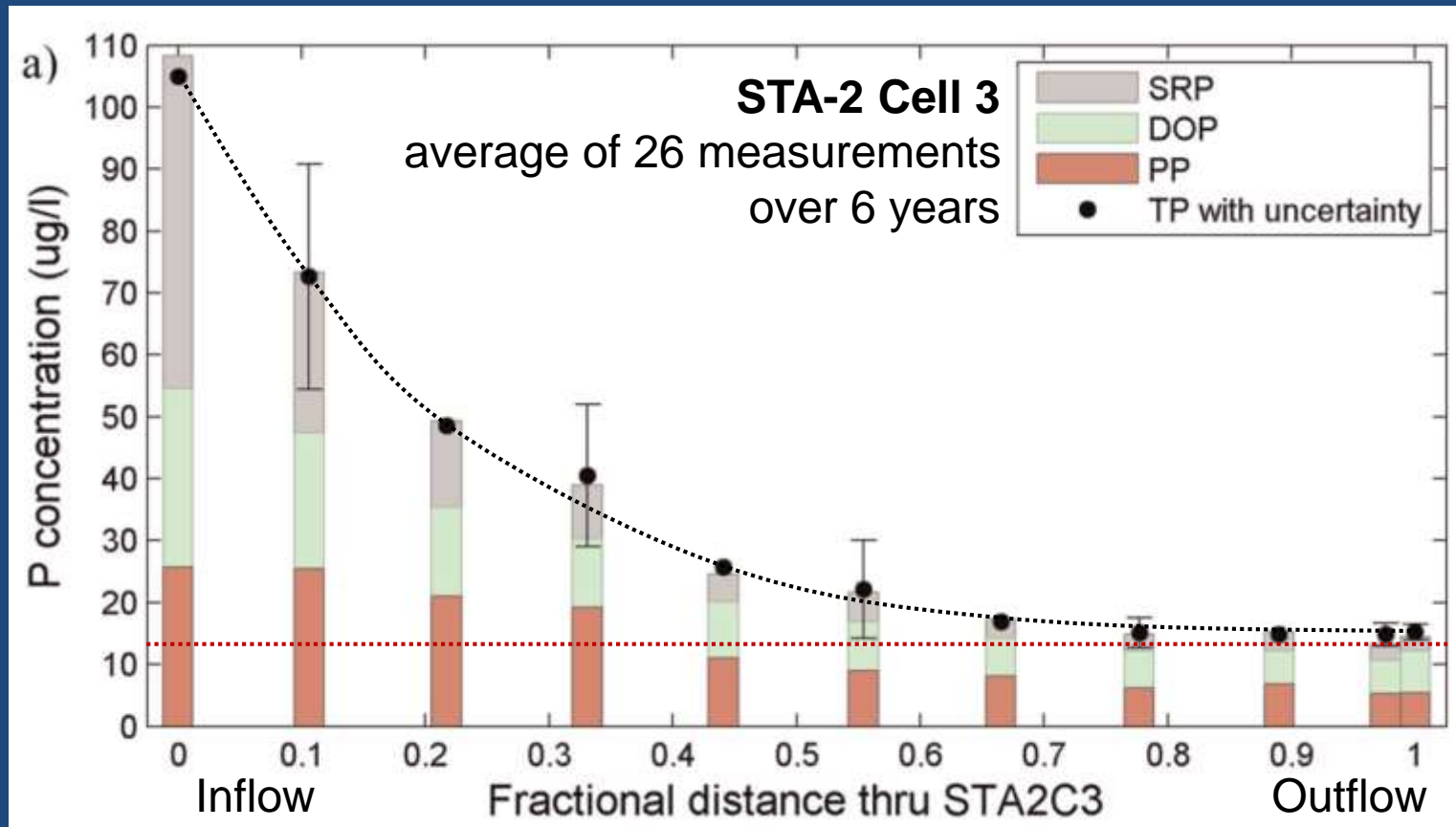
¹ DB Environmental, Inc.

² South Florida Water Management District

Flux chambers at STA-2 Cell 3 mid region

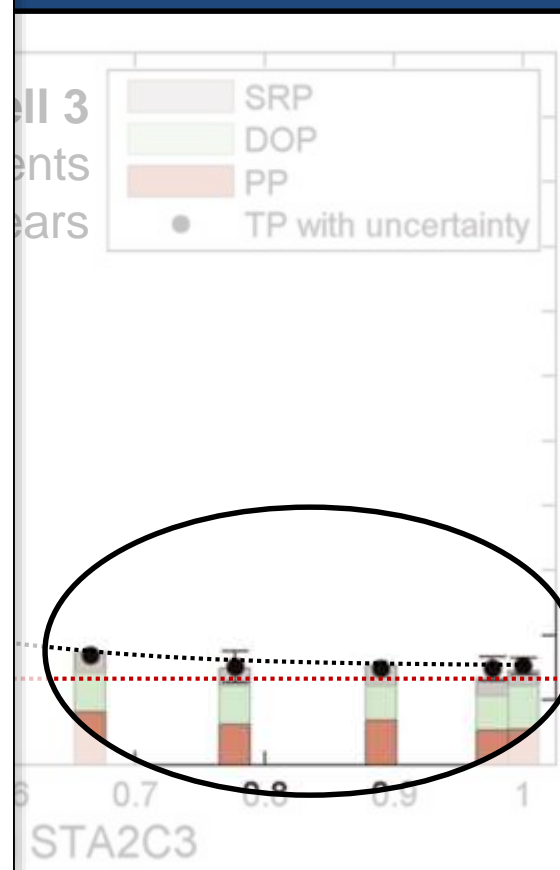
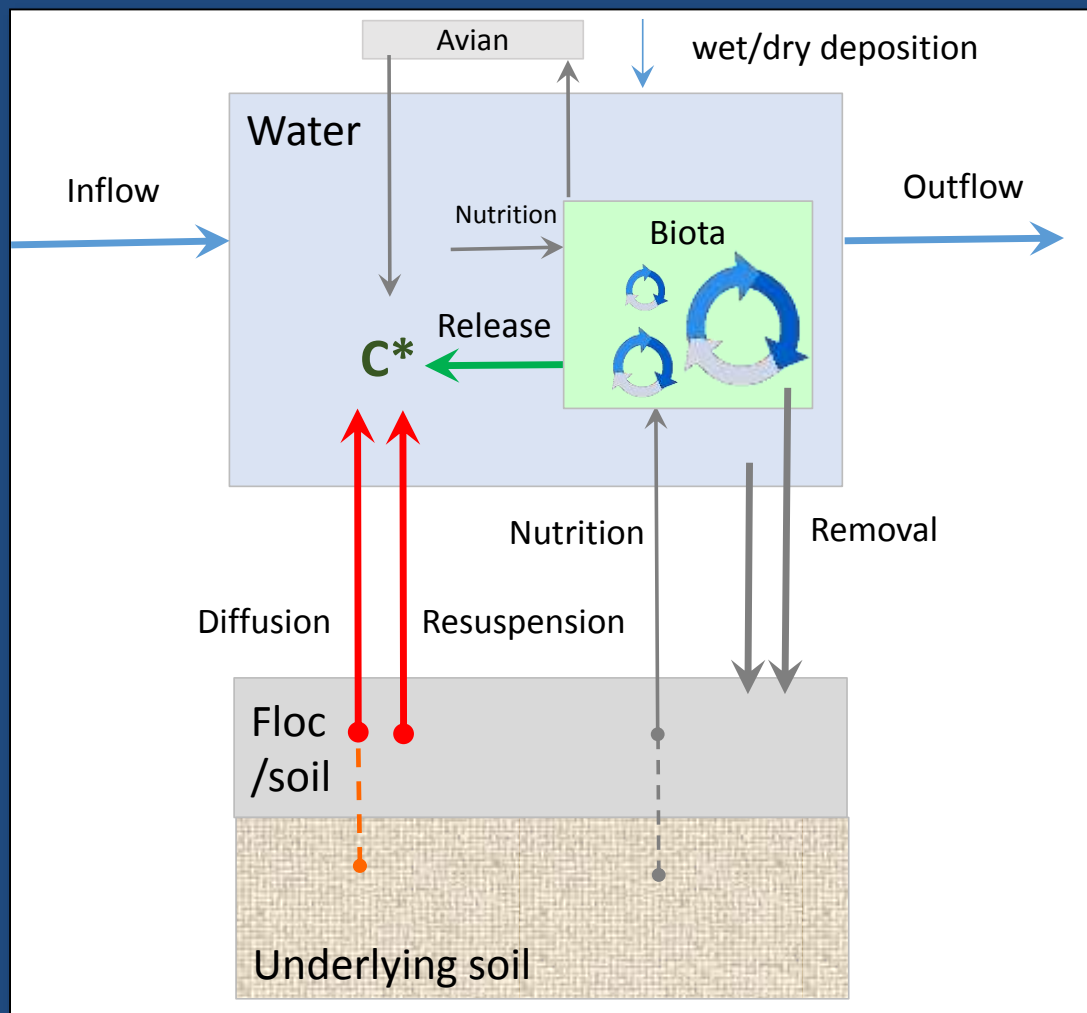


Relevance to STA outflow concentrations



Juston and DeBusk, 2011. WRR 47:W01511

Relevance to STA outflow concentrations



DeBusk, 2011. WRR 47:W01511

Study area and experimental design



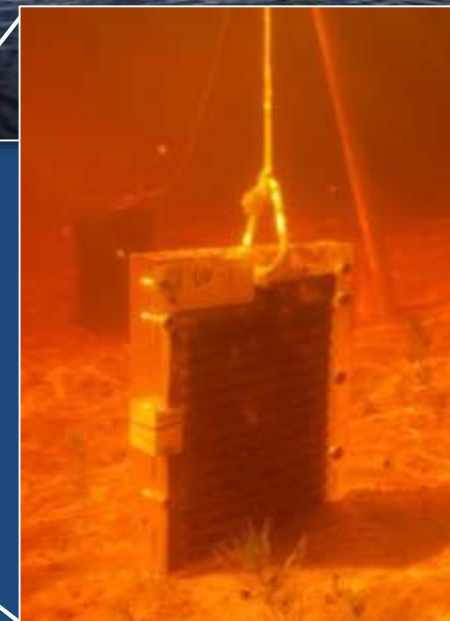
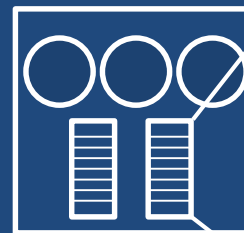
STA-2 Cell 3



Vegetated

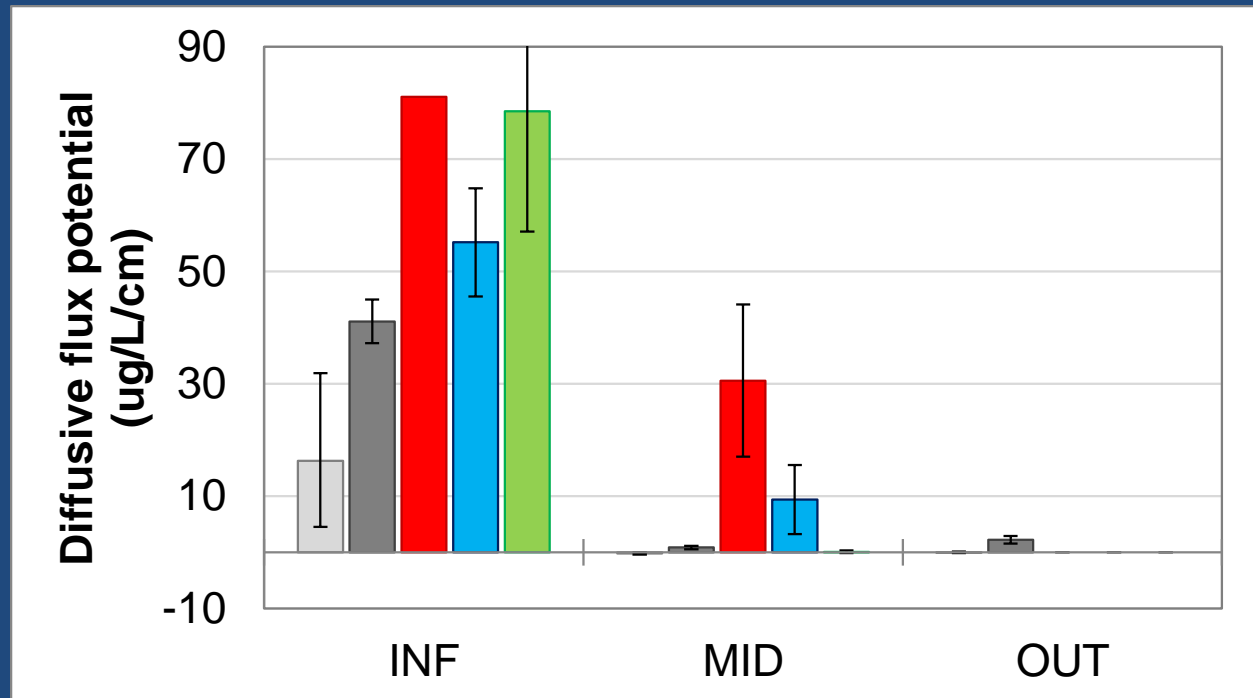
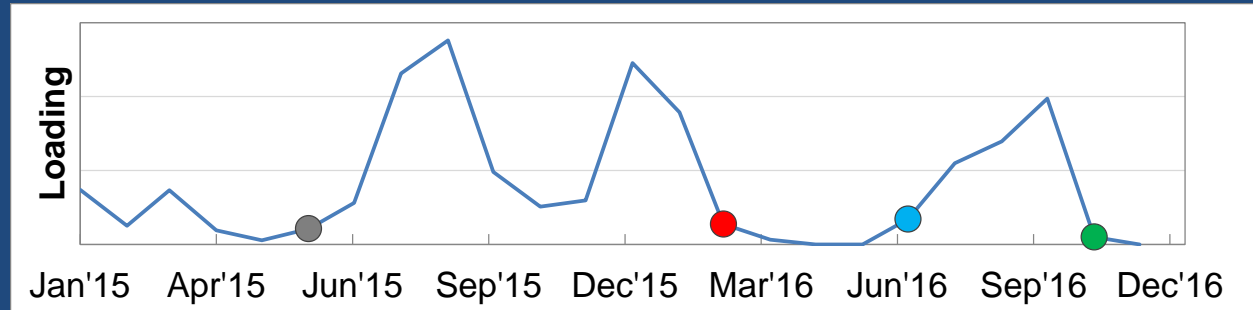


Unvegetated



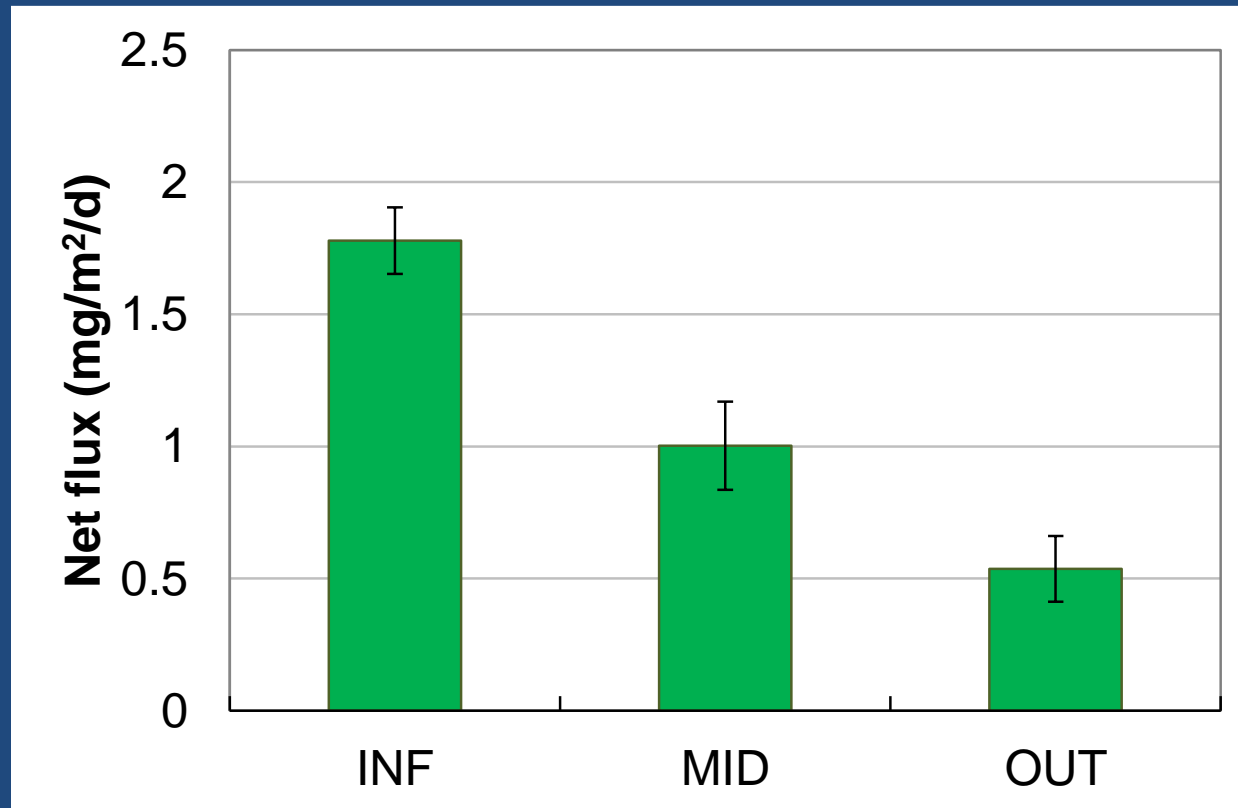
Diffusive flux potential

Diffusive flux measured over a range of loading conditions



Net flux rates

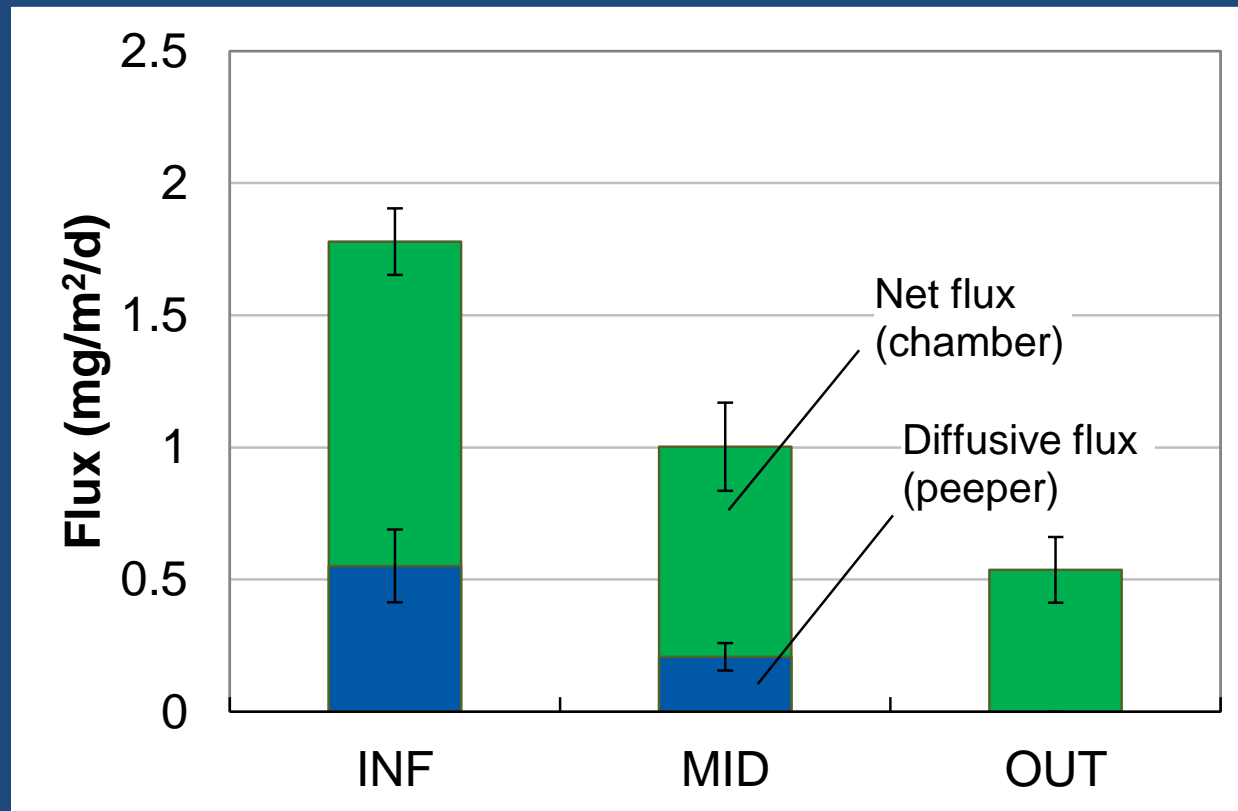
Example data set: March 2016



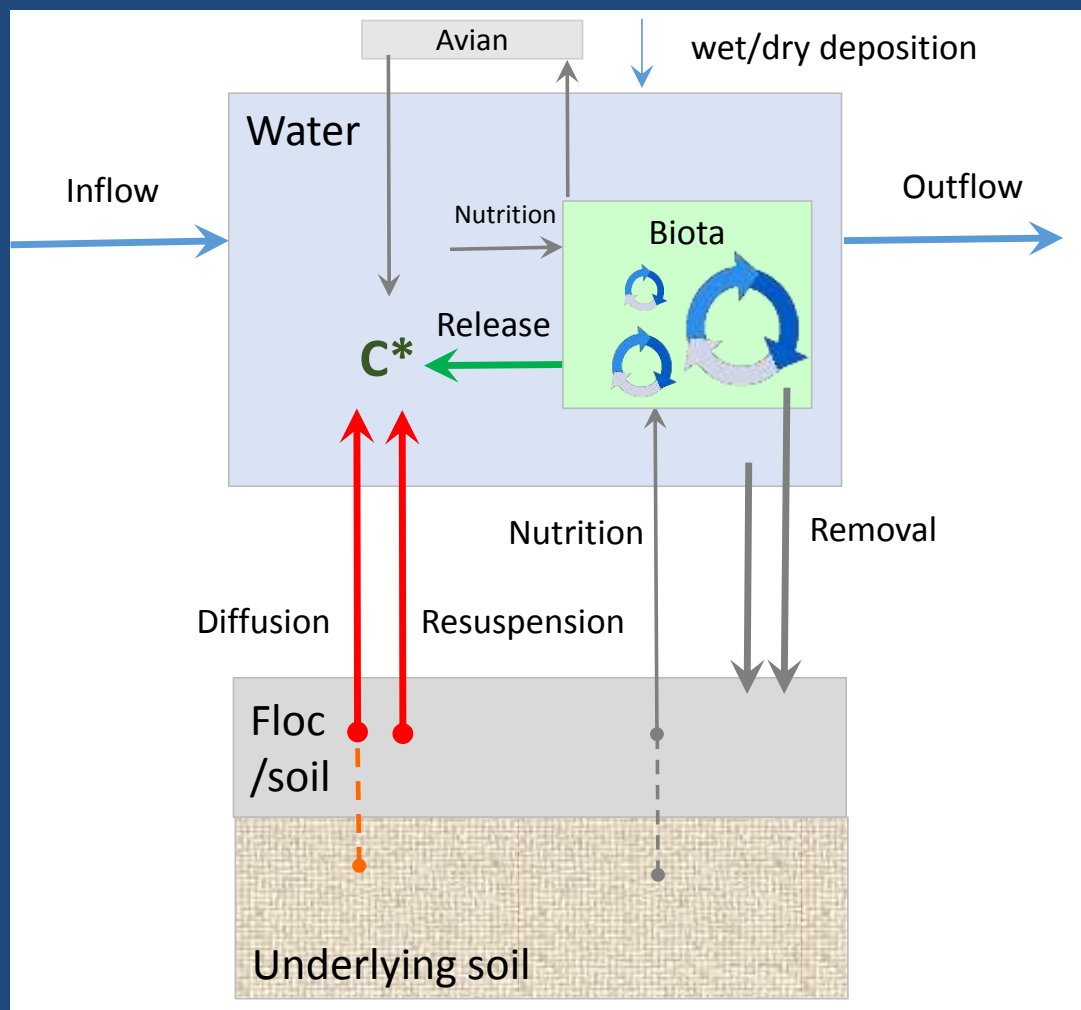
Calculated from $\delta C/\delta t$ between time of chamber closure and achievement of equilibrium

Comparison of flux rates

Example data set: March 2016

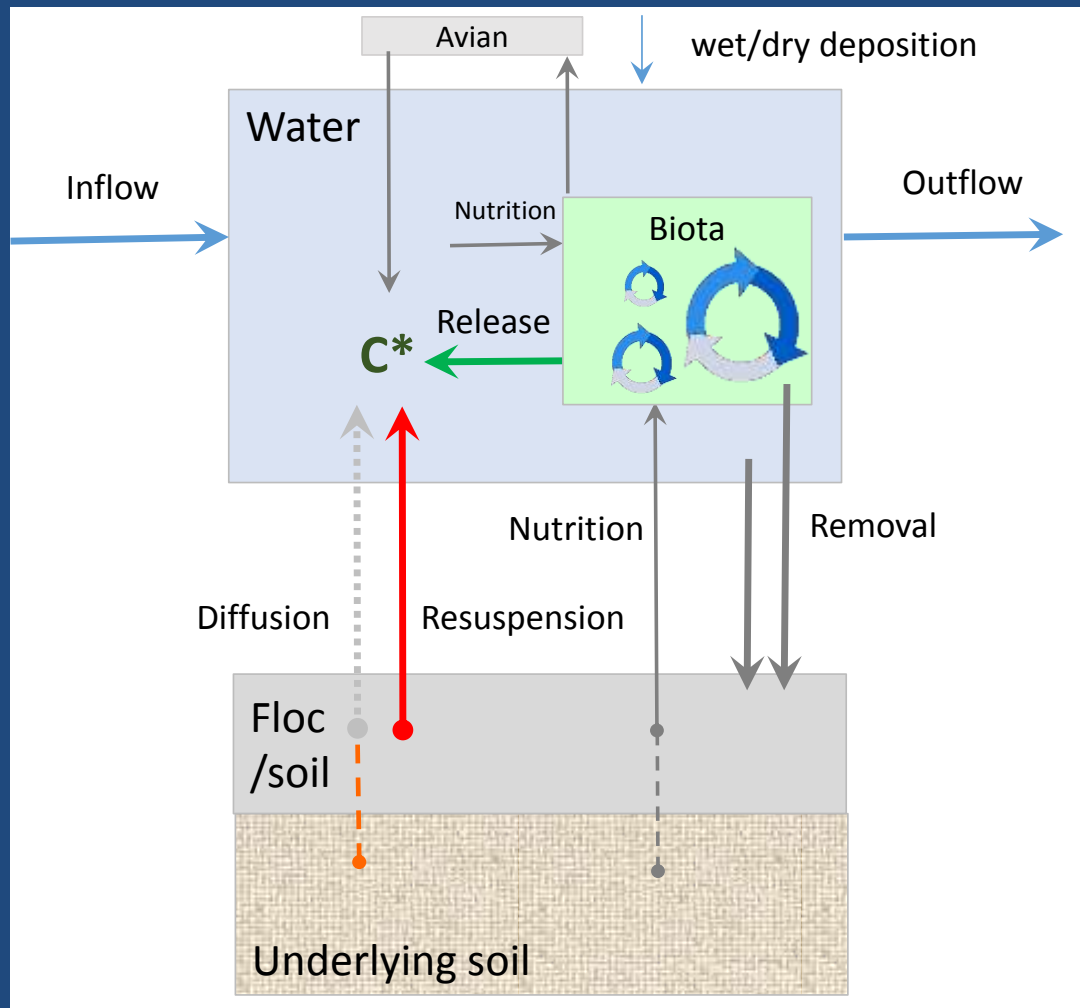


Flux: sources and vectors



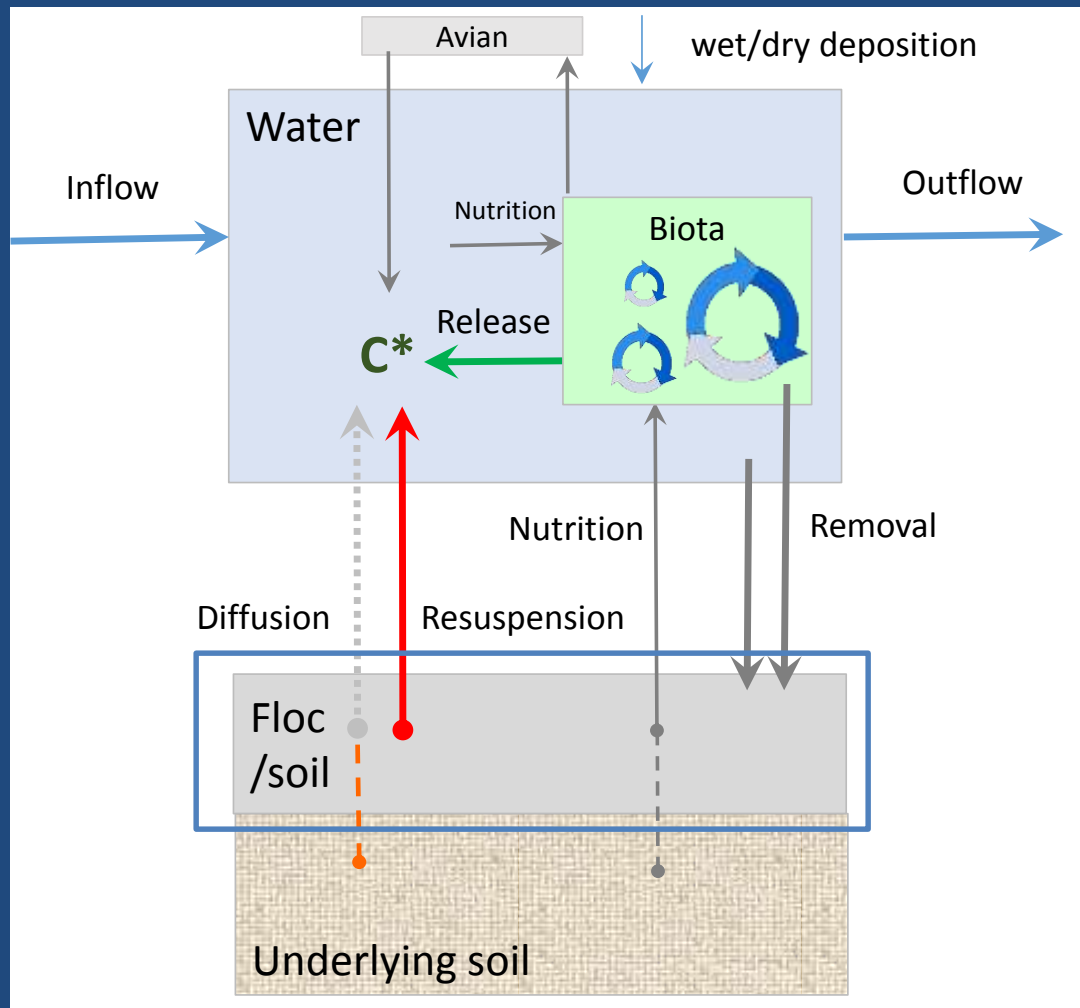
What are the sources and vectors (mechanisms) contributing to net flux in STA outflow regions?

What contributes to net flux in STA outflow regions?



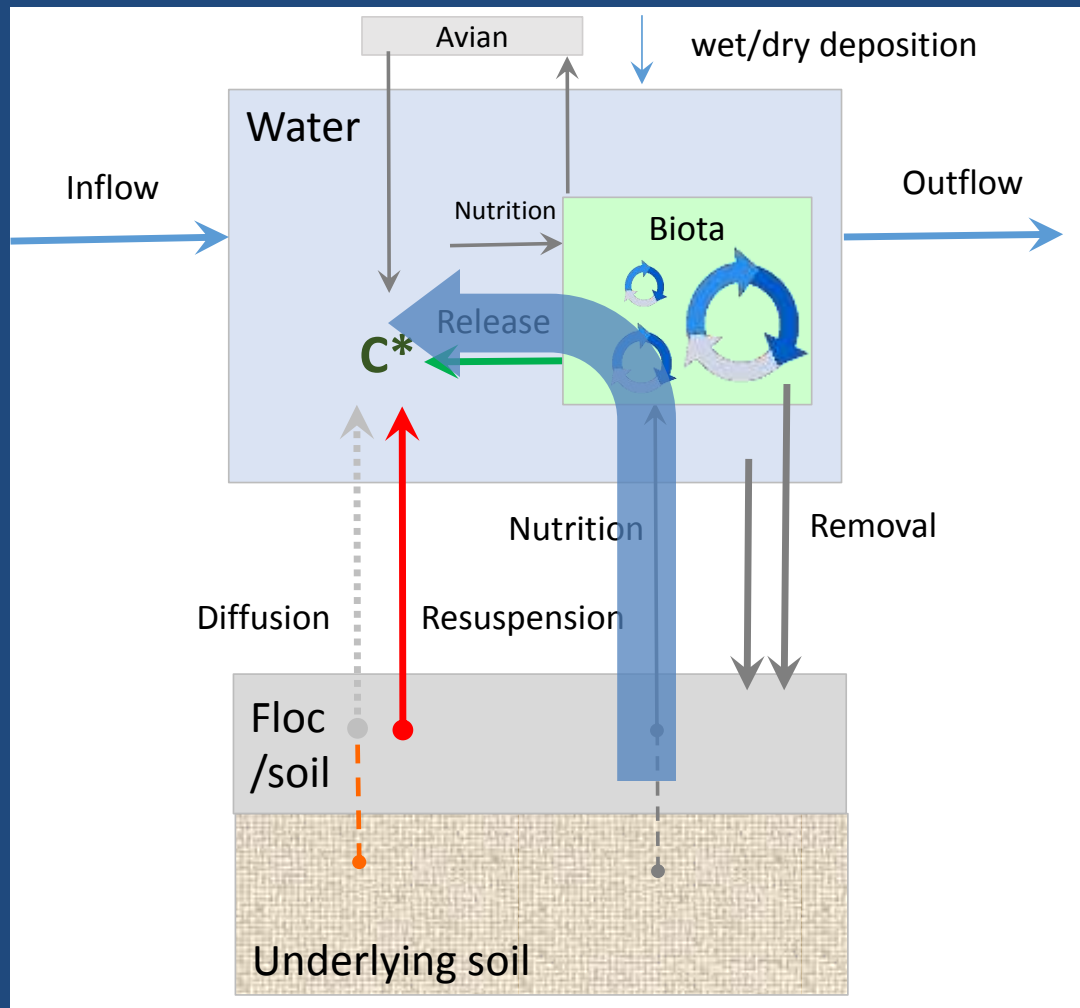
- **Vector: Diffusion?**

What contributes to net flux in STA outflow regions?



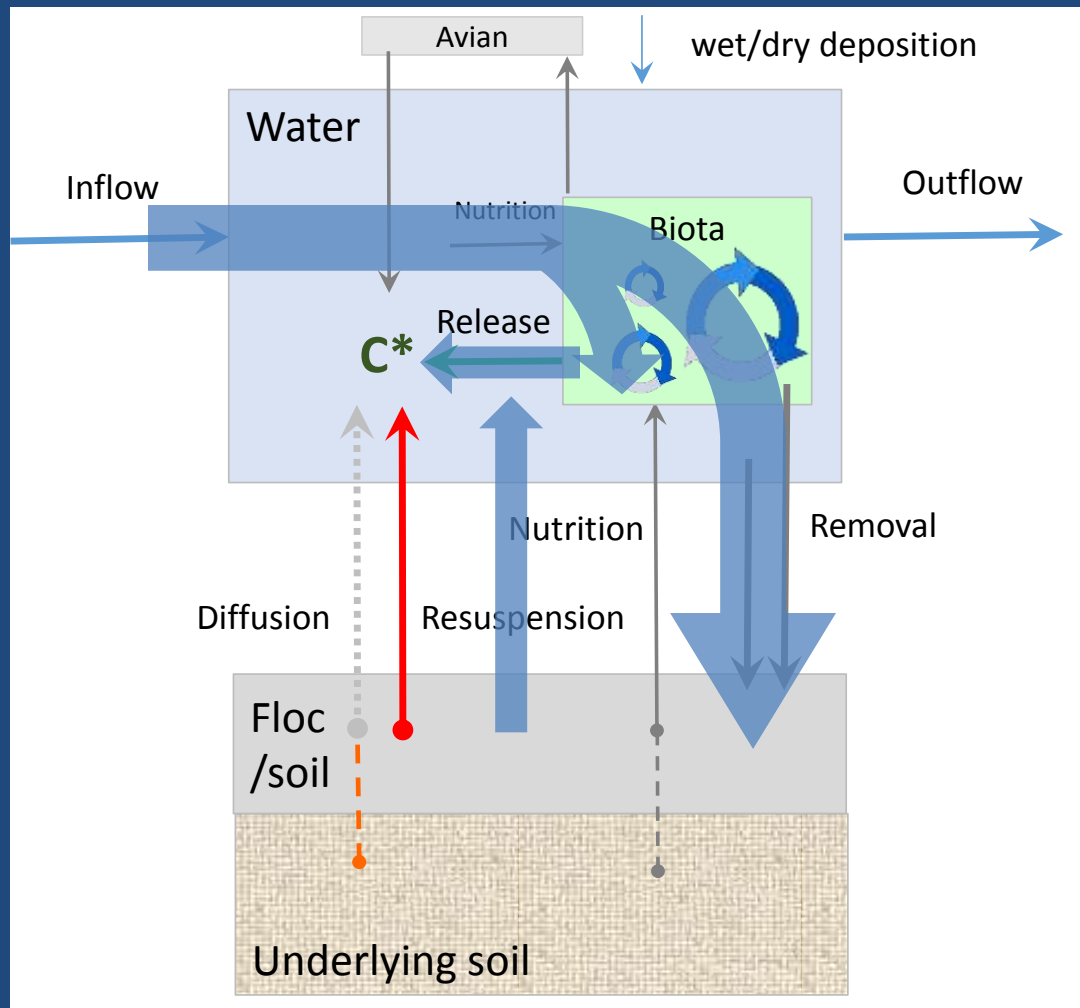
- Vector: Diffusion?
- Source: Soil?

What contributes to net flux in STA outflow regions?



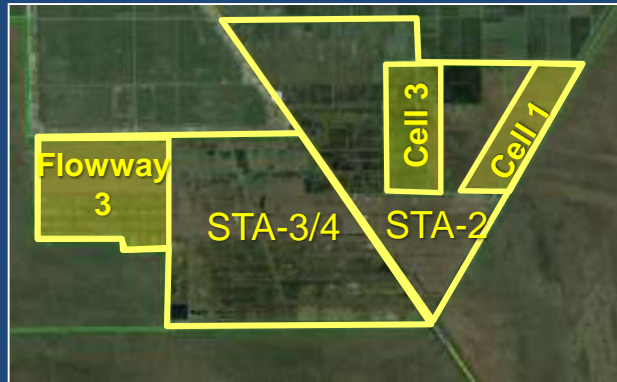
- Vector: Diffusion?
- Source: Soil?
- **Source/vector: Vegetation?**

What contributes to net flux in STA outflow regions?



- Vector: Diffusion?
- Source: Soil?
- Source/vector: Vegetation?
- **Antecedent loading**

Next steps: identify flux sources and vectors



Measurements in additional flow ways and hydraulic conditions

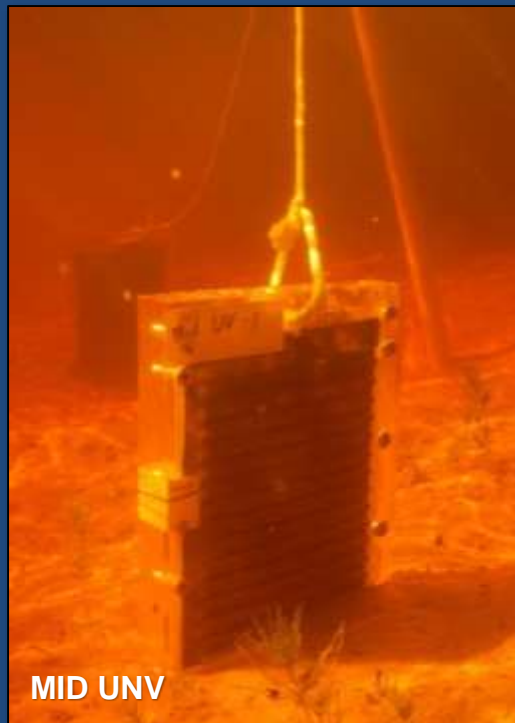
Refine experimental platform to better resolve effects of vegetation and soil character



Novel methods to identify fate and transformation of fluxed P

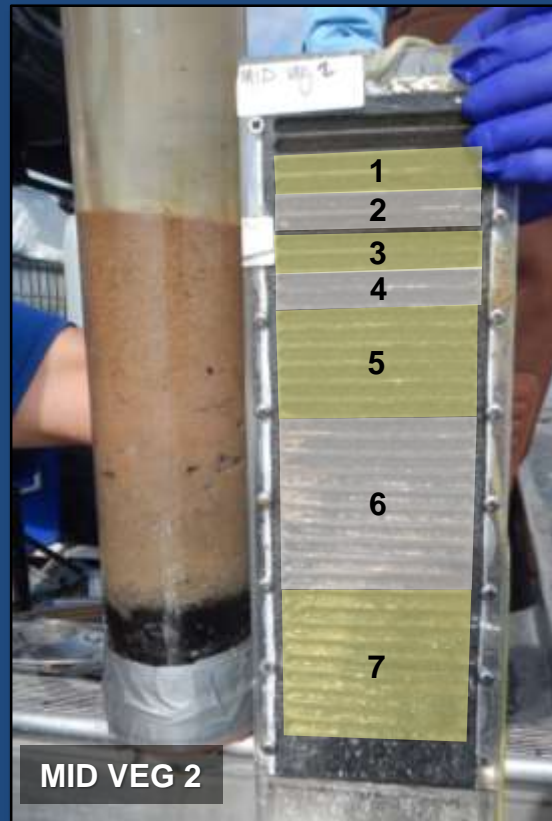
Supplemental Information

Diffusive flux: porewater equilibrators



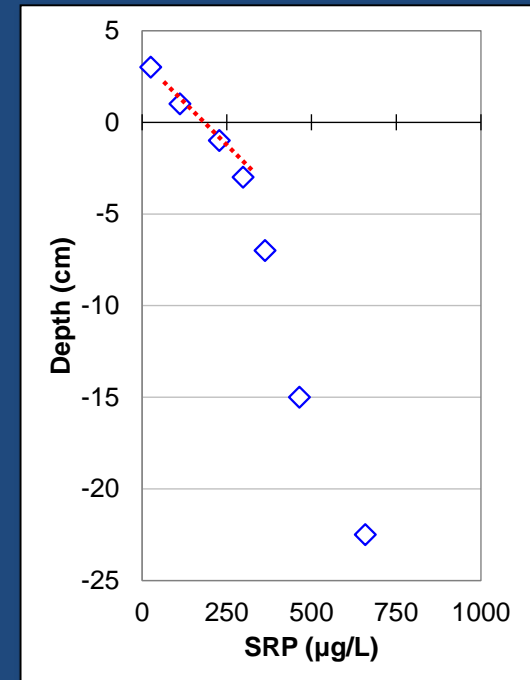
MID UNV

Installed to depth of
30 cm below floc
surface



MID VEG 2

7 composite samples
from each peeper



Diff. flux calculated
from gradient across
interface

Net flux: in situ flux chambers

STA-2 Cell 3 OUT
Google Earth – Feb 2016

- 1.5 m diameter
- Open top, open bottom
- Installed in marsh “in situ”
- Large openings allow exchange with marsh
- Vegetated & unvegetated



25 m

Net flux: in situ flux chambers

- Openings sealed during 2-wk monitoring events
- Surface water sampled at $t = 0, 1, 3, 7$ & 14 days
- Analytes: TP, TDP, SRP, TN, TDN, NH_4 , NO_x , DOC
- Net flux calculated from rate of change between $t=0$ and achievement of equilibrium

