

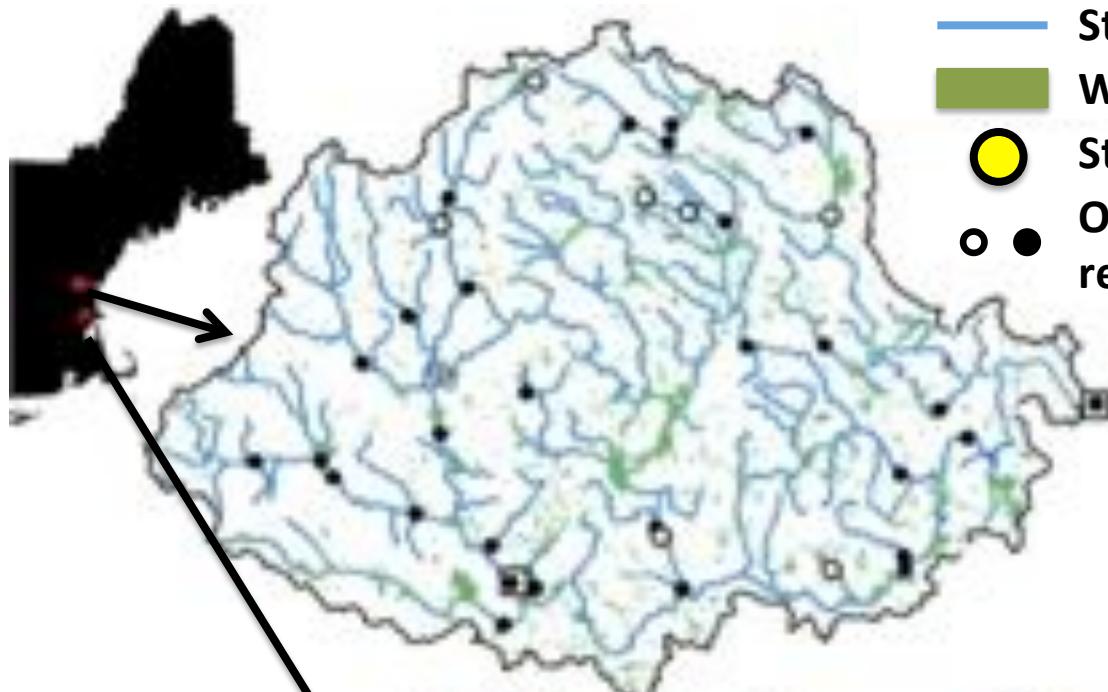
# Spatial and temporal variability of nitrogen cycling in riparian wetlands



David Rosengarten

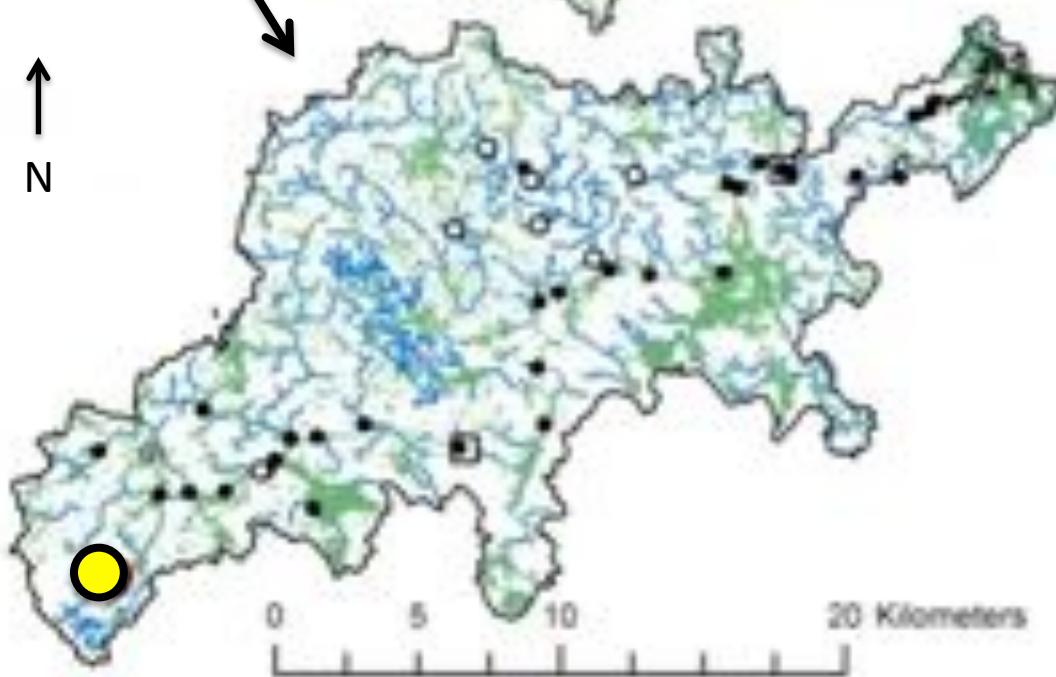
M.S. Hydrology candidate

Committee members:  
Anne Lightbody, Linda Kalnejais,  
Wil Wolheim, Matt Davis



Streams  
Wetlands  
Study site  
Other nutrient  
research locations

Lamprey River



Ipswich River

*Image adapted from  
Shan Zuidema*

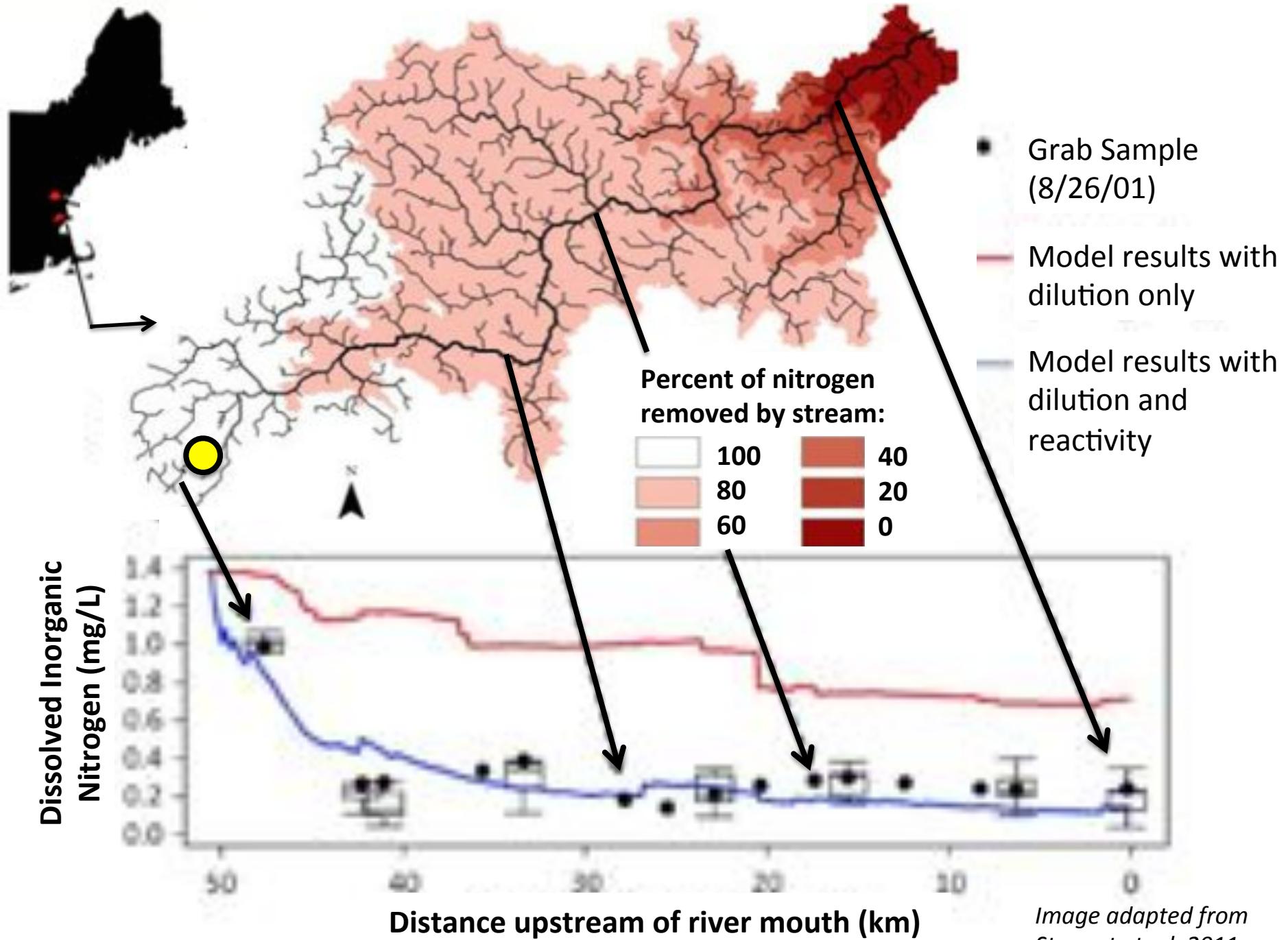
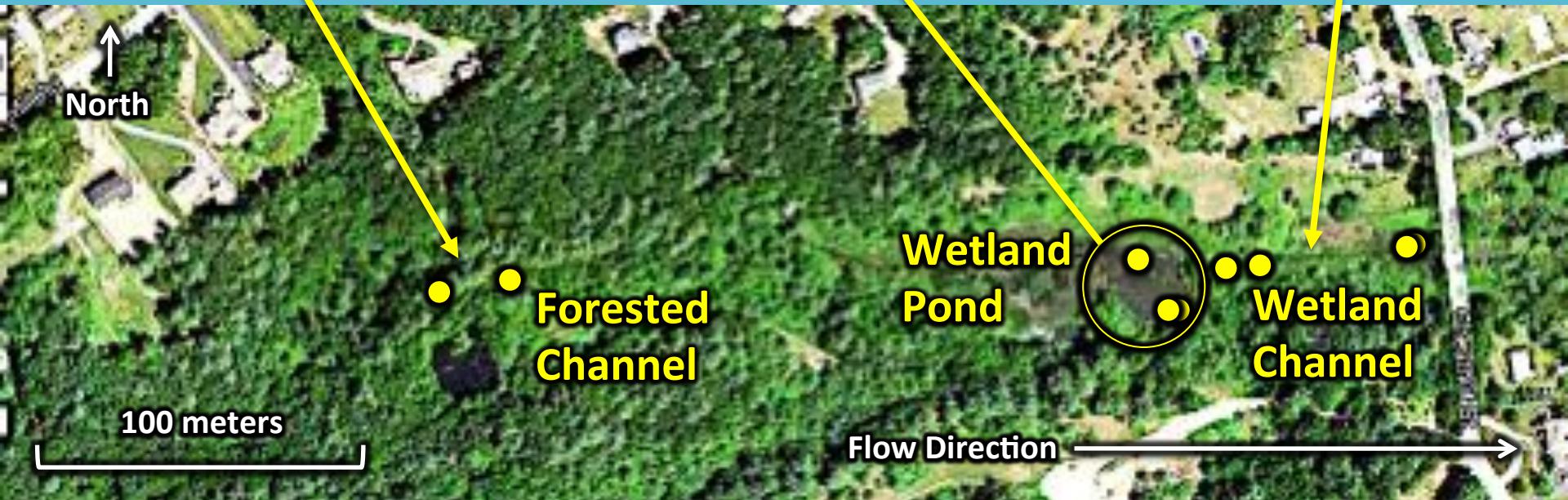


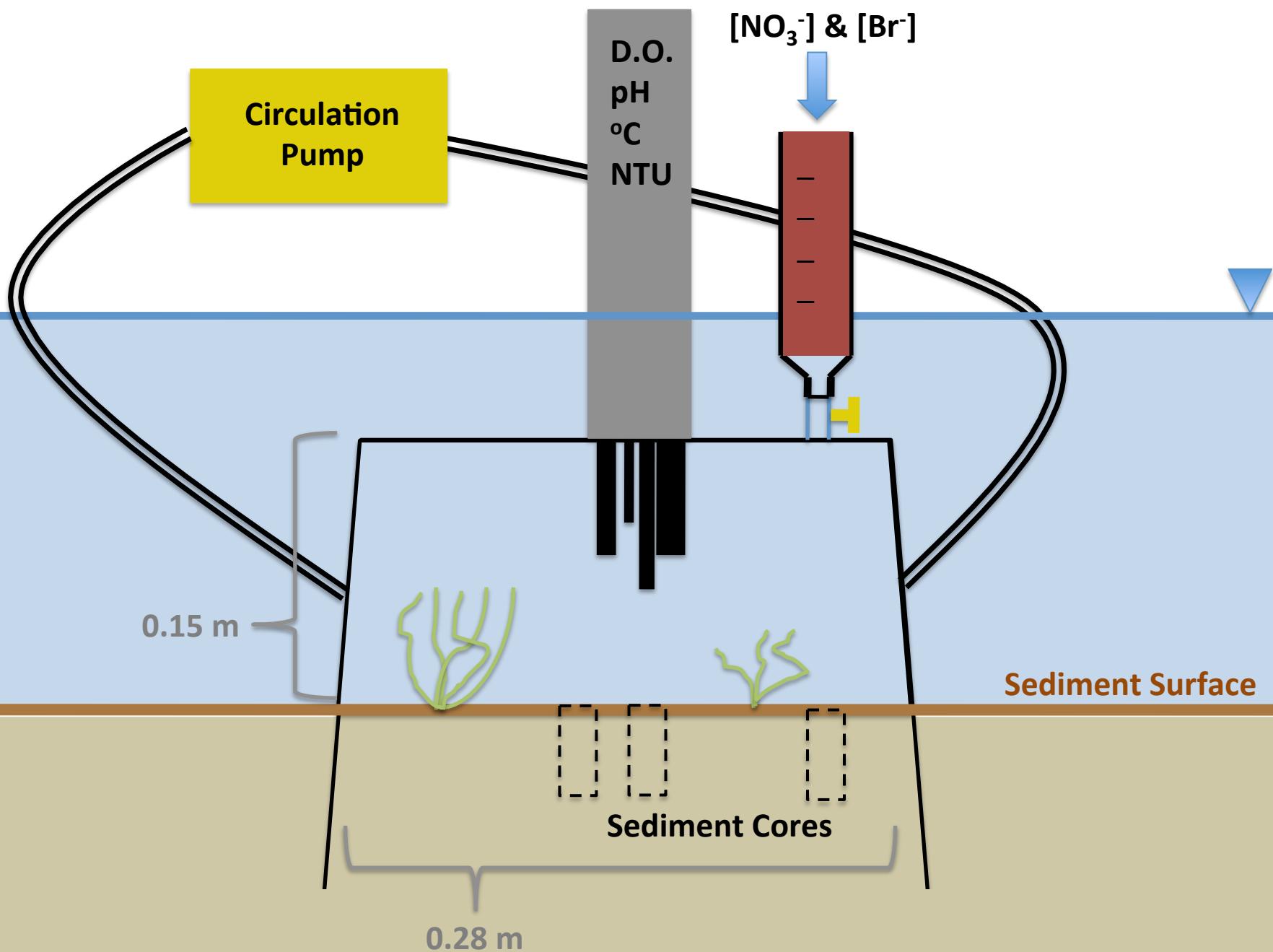
Image adapted from Stewart et. al. 2011

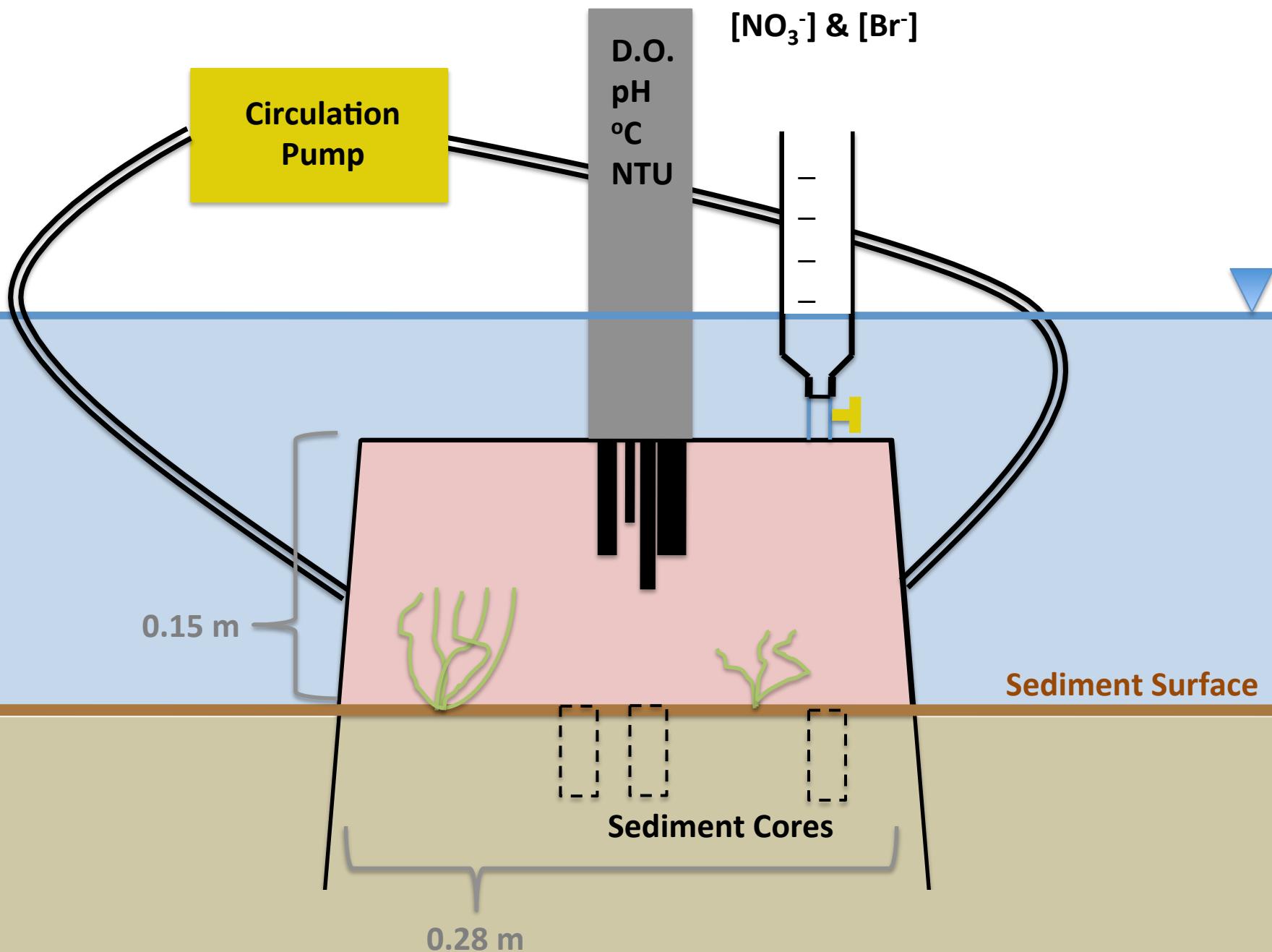
## Research Question:

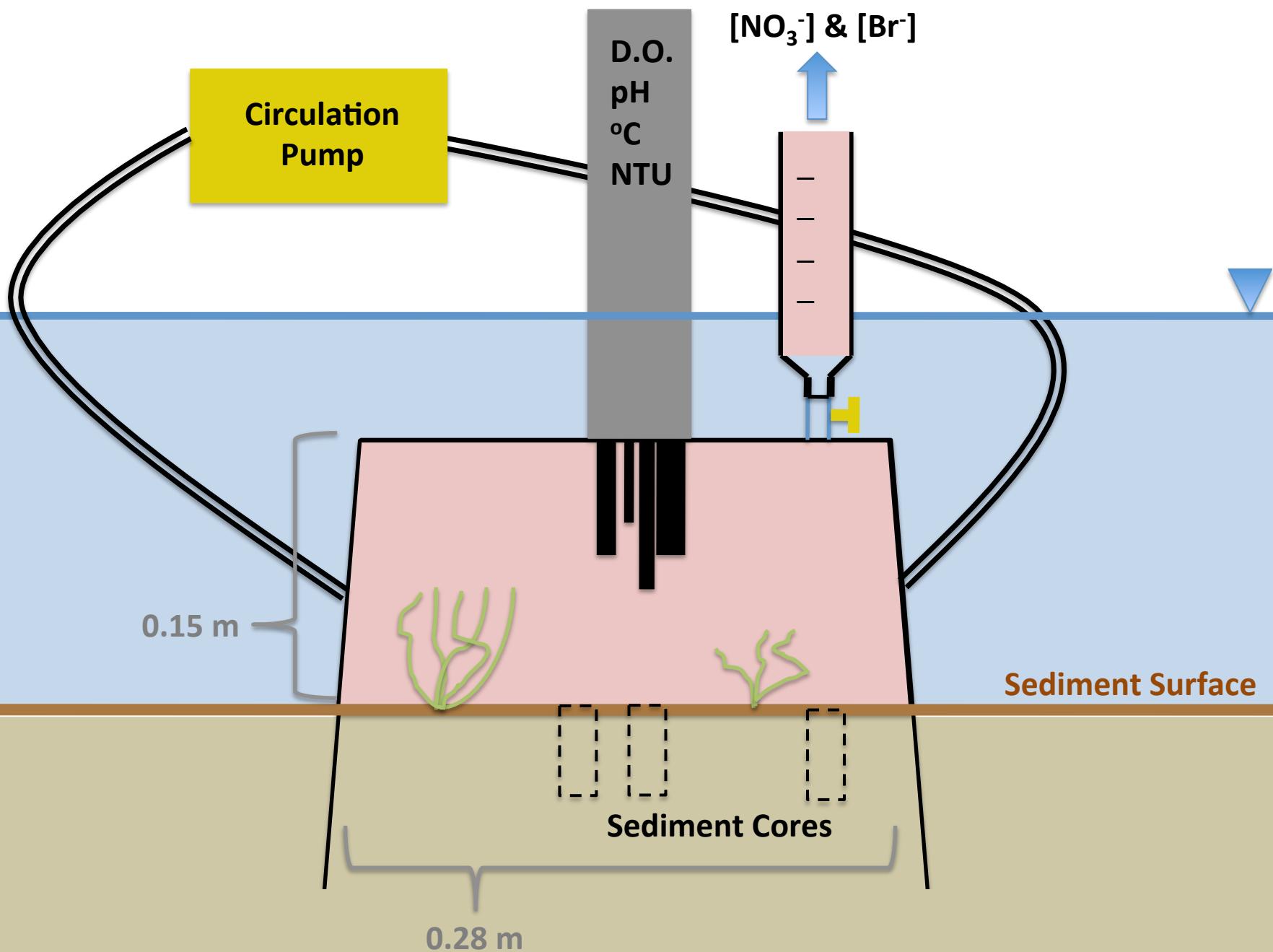
- Is nitrate uptake higher in wetlands compared to forested channels?



# Sawmill Brook







Concentration of nitrate in chamber

[NO<sub>3</sub><sup>-</sup>/Br<sup>-</sup>]

0.030

0.025

0.020

0.015

0.010

0

2

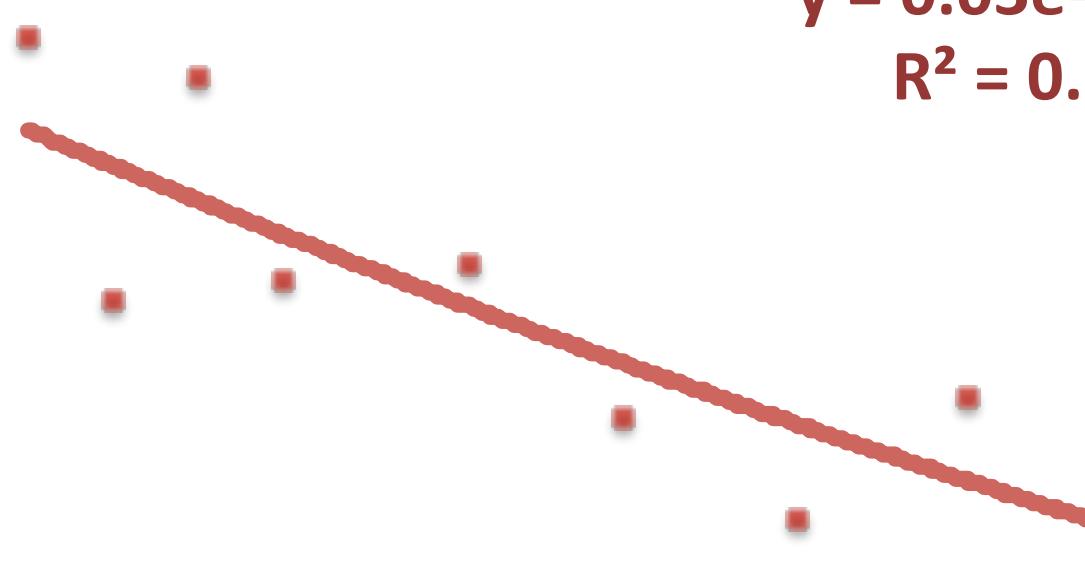
4

6

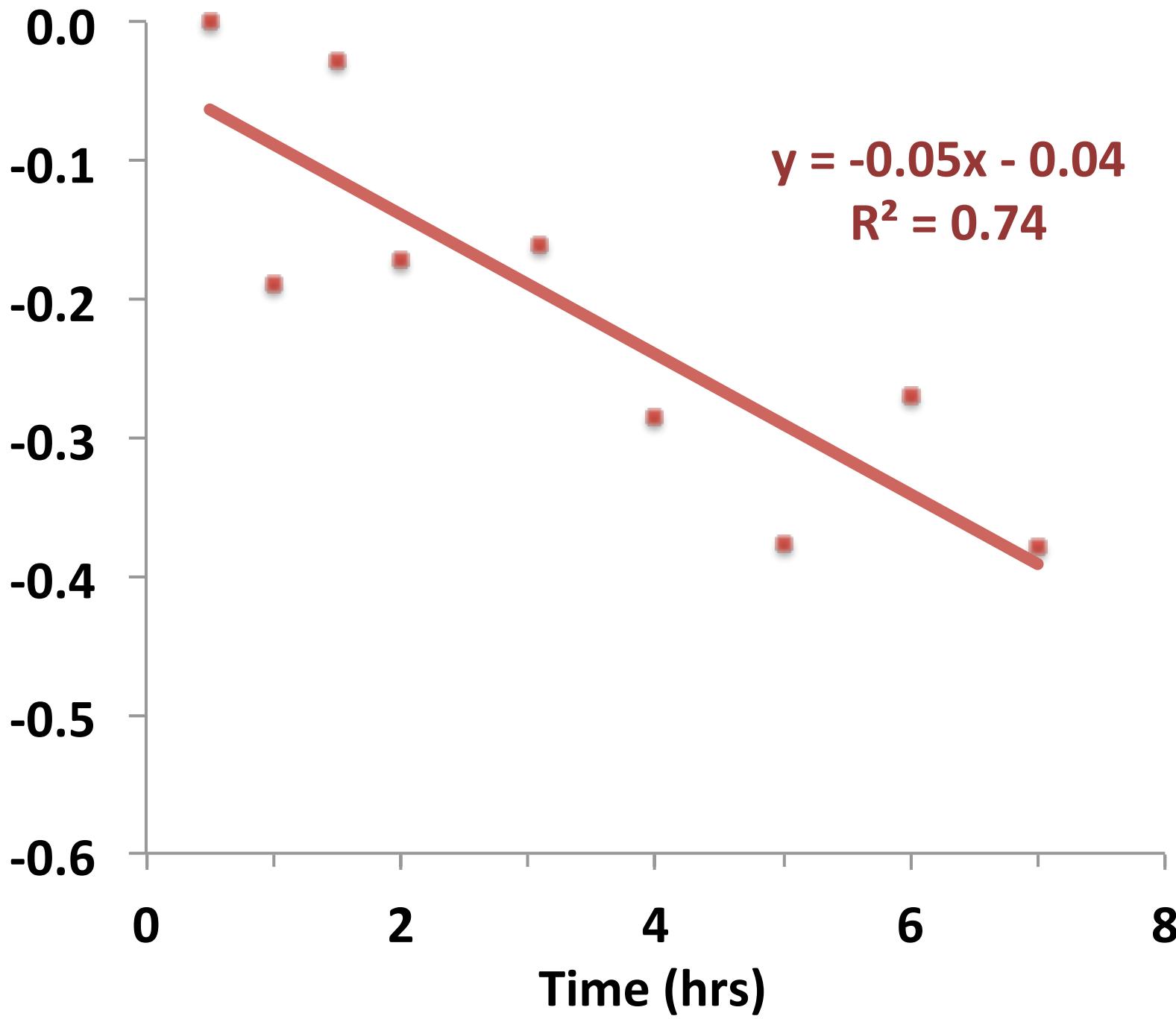
8

Time (hrs)

$$y = 0.03e - 0.05x$$
$$R^2 = 0.74$$



Concentration of nitrate in chamber  
 $\ln ([\text{NO}_3^-]/[\text{Br}^-] / [\text{NO}_3^-/\text{Br}^-]_{\text{initial}})$



Concentration of nitrate in chamber

$\ln ([\text{NO}_3^-/\text{Br}^-] / [\text{NO}_3^-/\text{Br}^-]_{\text{initial}})$

0.0

-0.1

-0.2

-0.3

-0.4

-0.5

-0.6

0

2

4

6

8

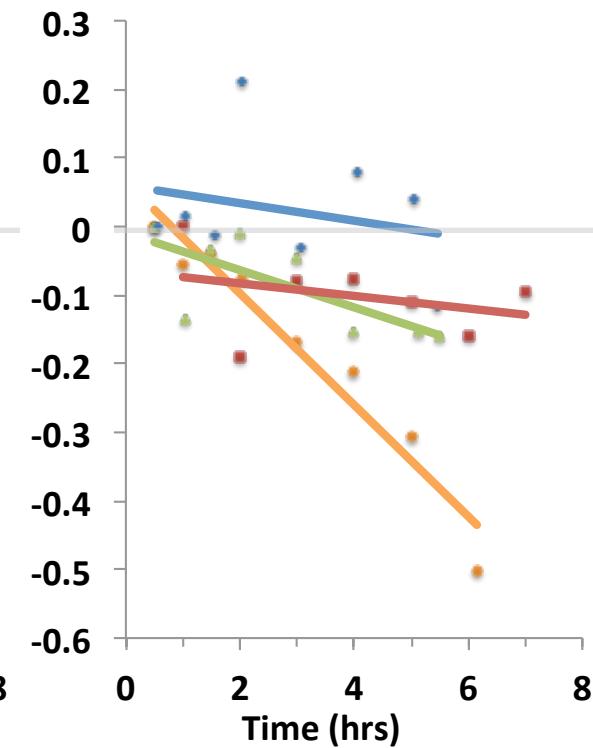
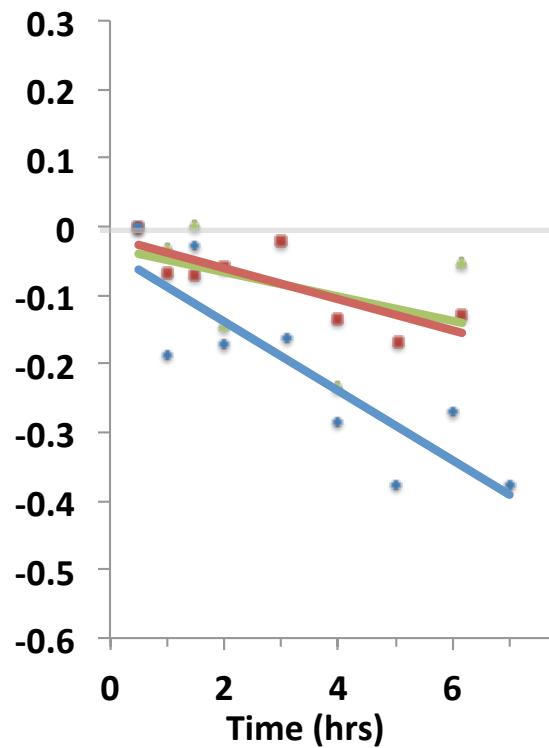
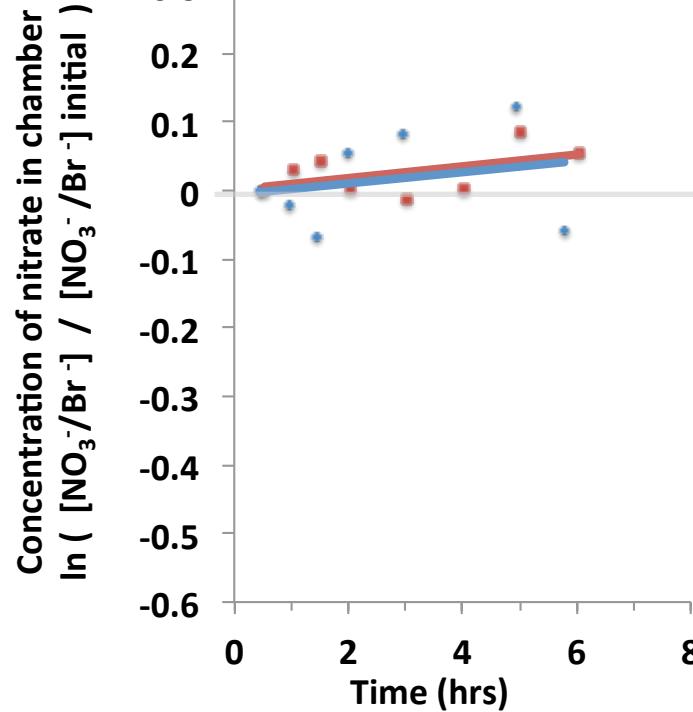
Time (hrs)

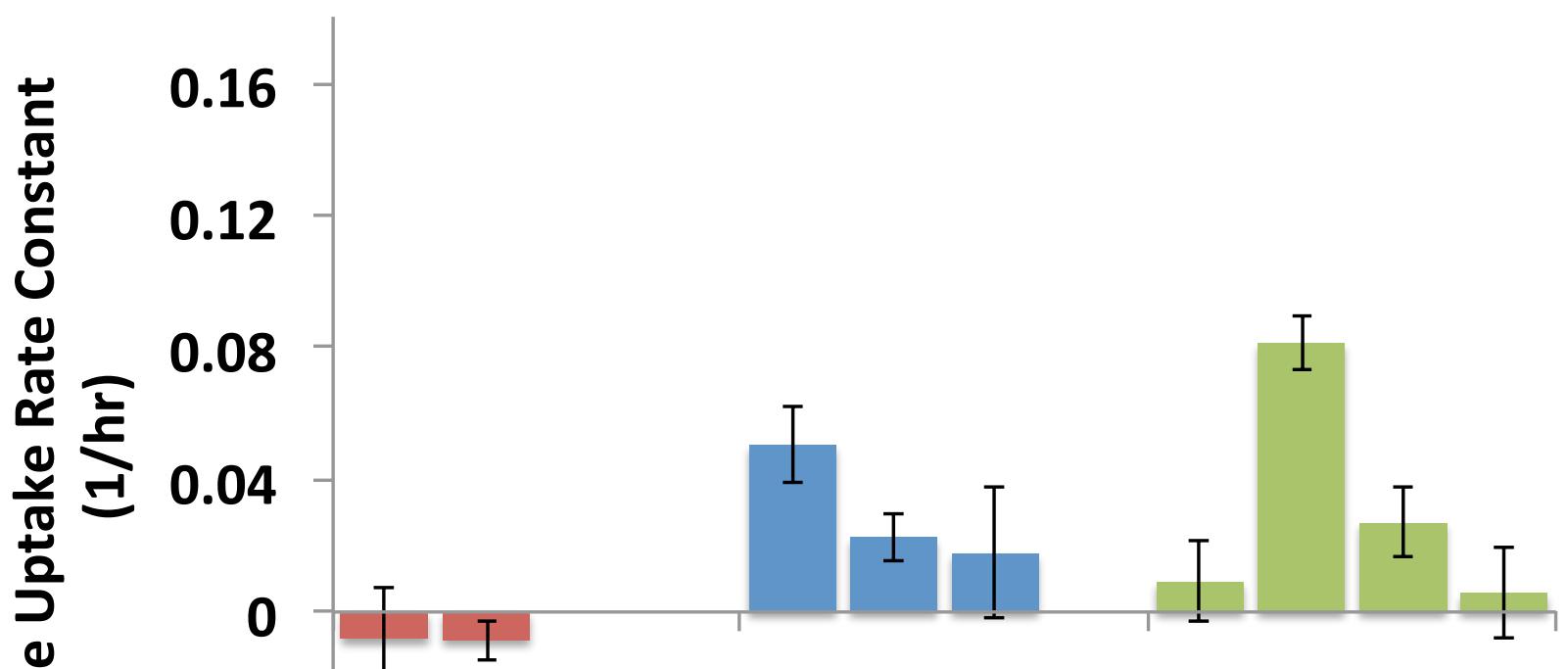
$\text{NO}_3^-$  Uptake Rate Constant

$$y = -0.05x - 0.04$$

$$R^2 = 0.74$$





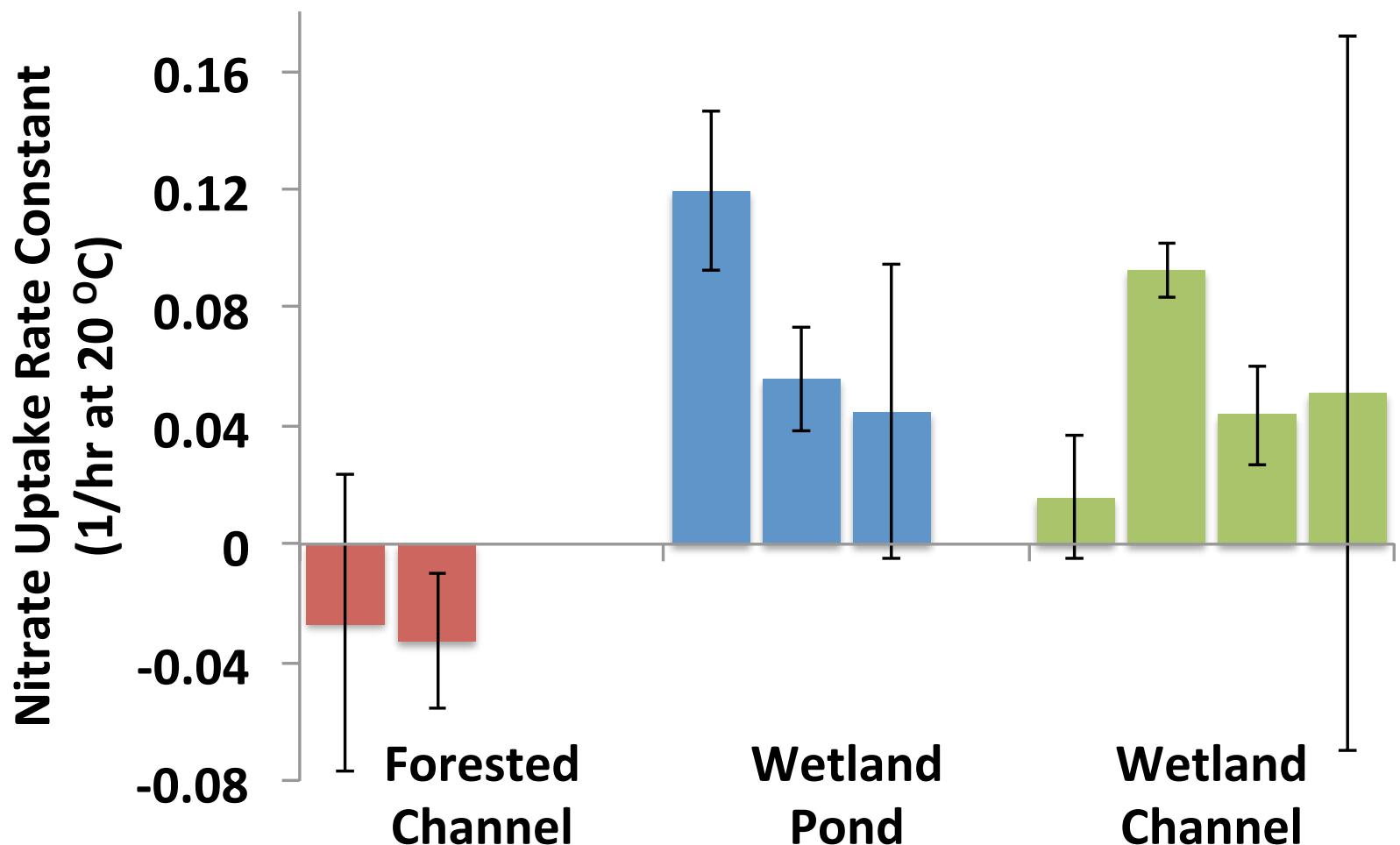


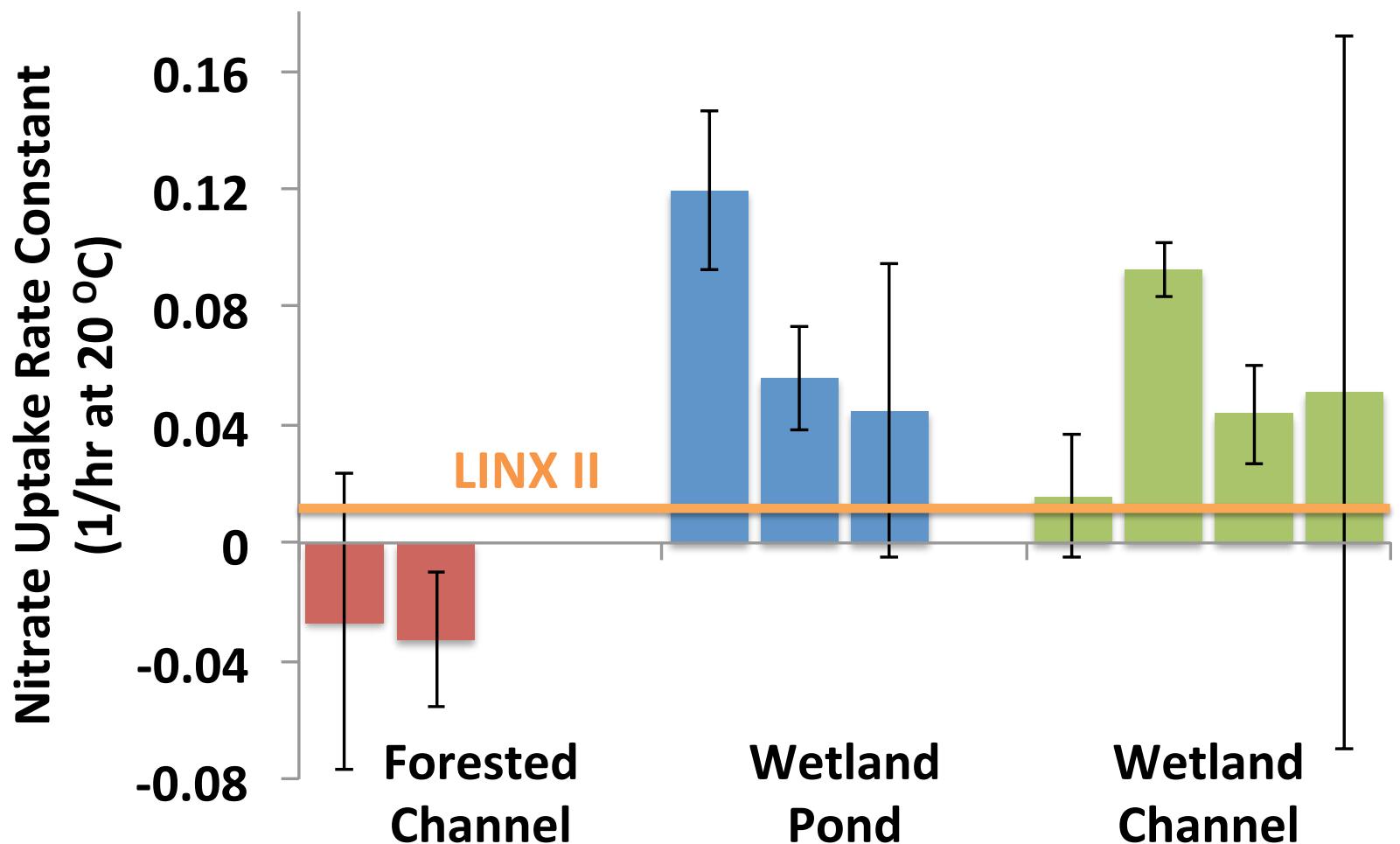
Forested  
Channel

Wetland  
Pond

Wetland  
Channel







## Research Question:

- Is nitrate uptake higher in wetlands compared to forested channels?

## Implications for coastal New England rivers:

- Need watershed management efforts to protect wetlands
- Watershed nutrient models should incorporate wetlands

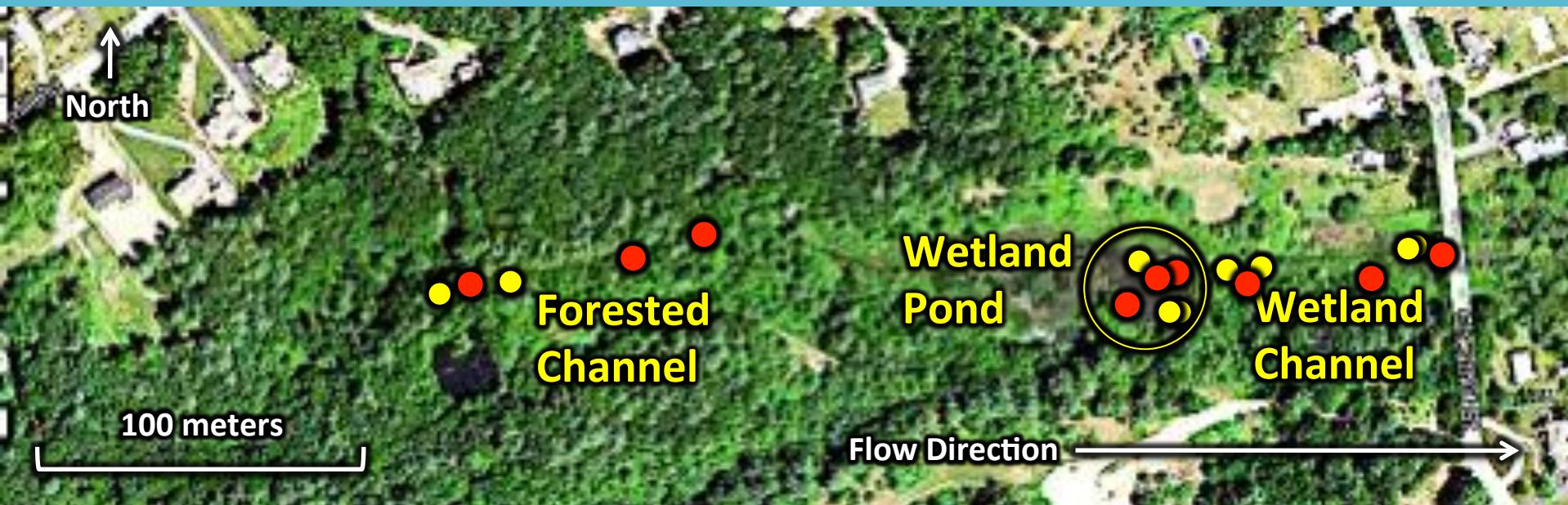
# Future Work:

Measure temporal variability

Additional measurements in Spring

Estimate whole wetland uptake rates

- Combine with whole wetland tracer studies to estimate influence of different areas on wetland scale uptake
- Compare with previously observed and modeled ambient nitrate uptake rates





# Thanks!

Committee Members:

Anne Lightbody, Linda Kalnejais

Wilfred Wolheim, Matt Davis

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Sophie Wilderotter, Shan Zuidema

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# Questions?

Please contact David Rosengarten with any questions at:  
[iam@davidwarrenrosengarten.com](mailto:iam@davidwarrenrosengarten.com)

Much more information on this research can be found in David's thesis:  
Rosengarten, D. (2014). Spatial and temporal variability of  
nitrate cycling in a New England headwater wetland  
and stream (MS). University of New Hampshire. Retrieved from  
<http://librarycatalog.unh.edu/record=b3822855~S5>