Increasing sediment in Great Bay: Can we finger a culprit?

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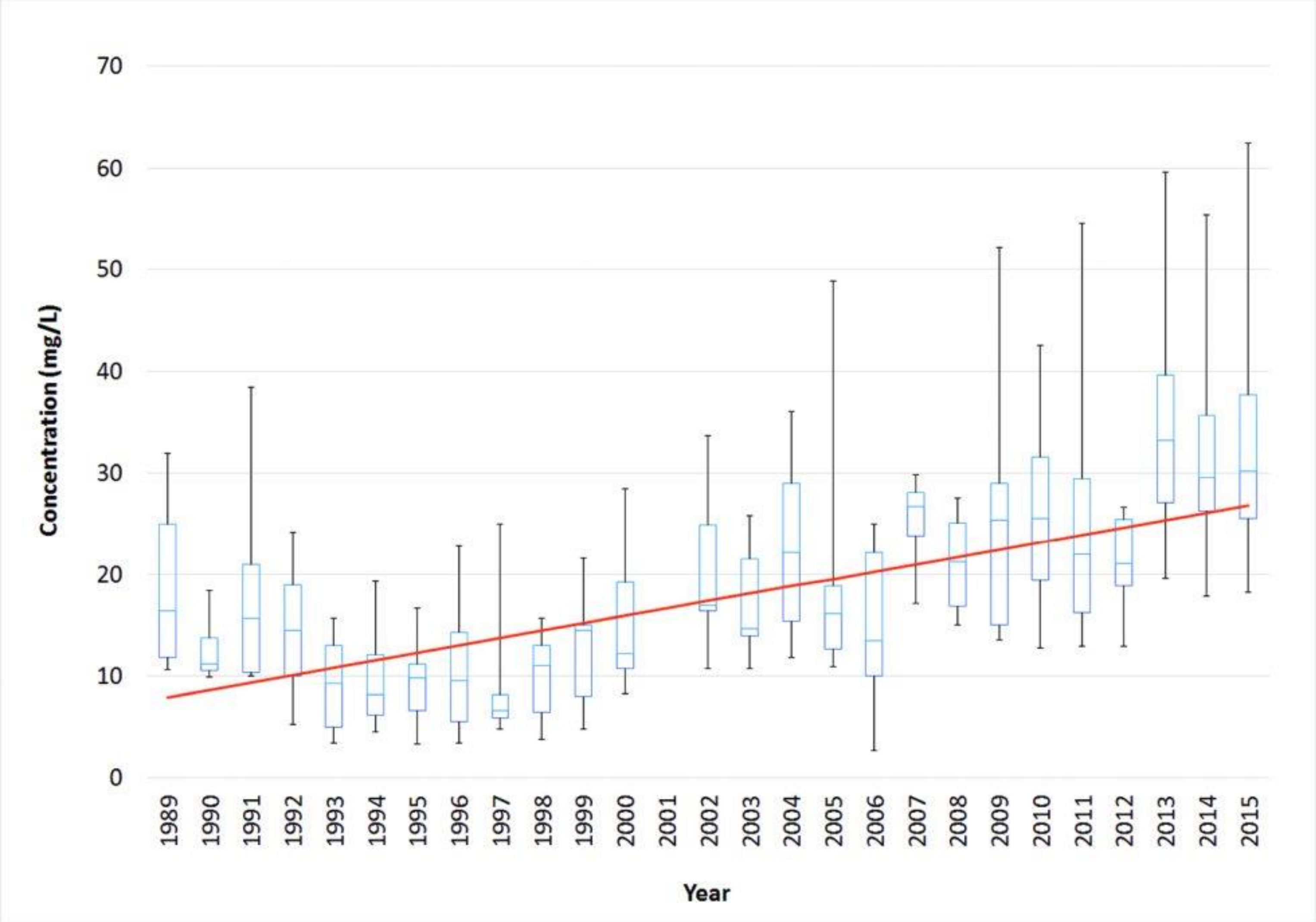
Clear increase in TSS at Adams Point, low tide

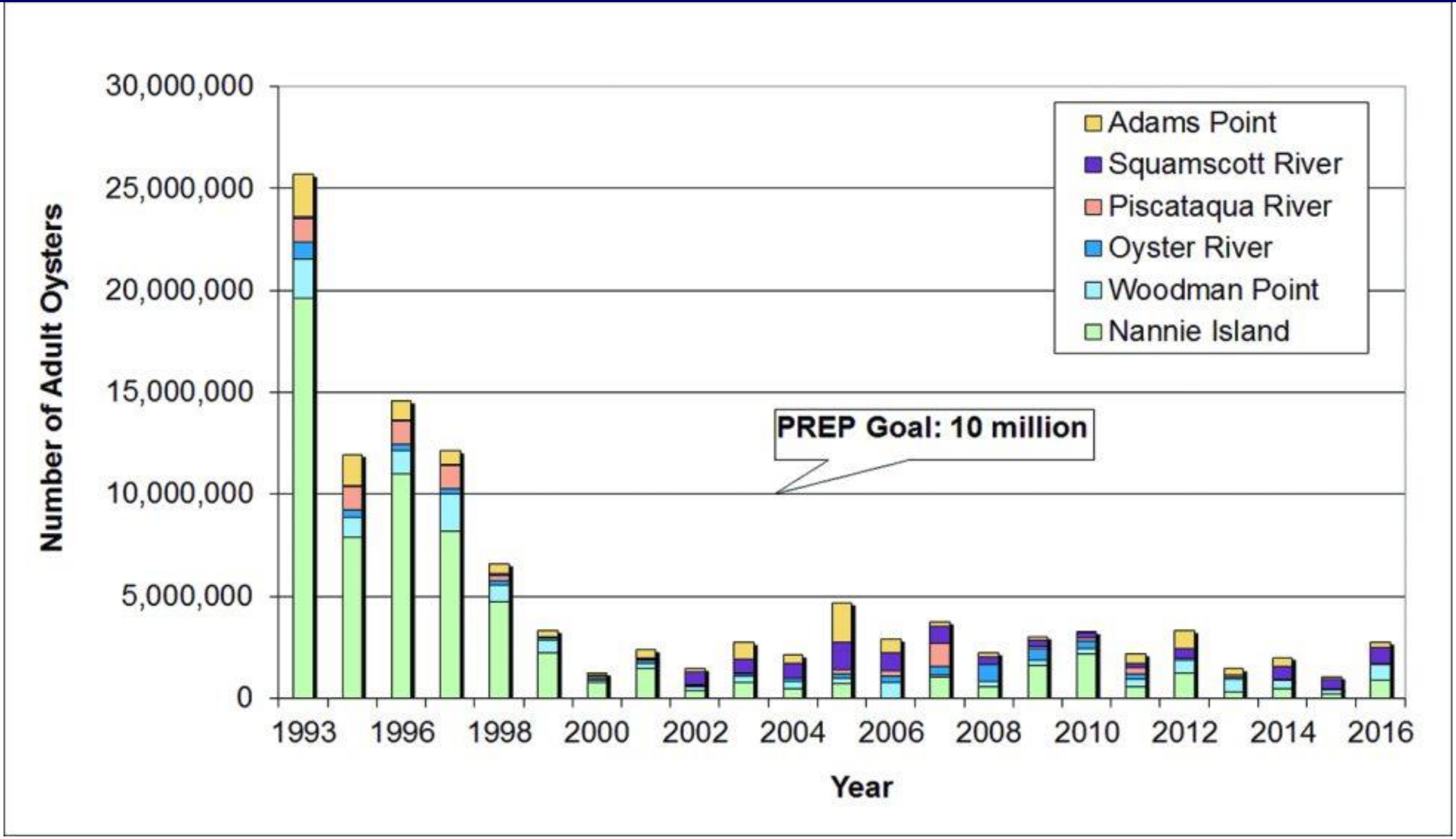


PREP
SOE
(2018)

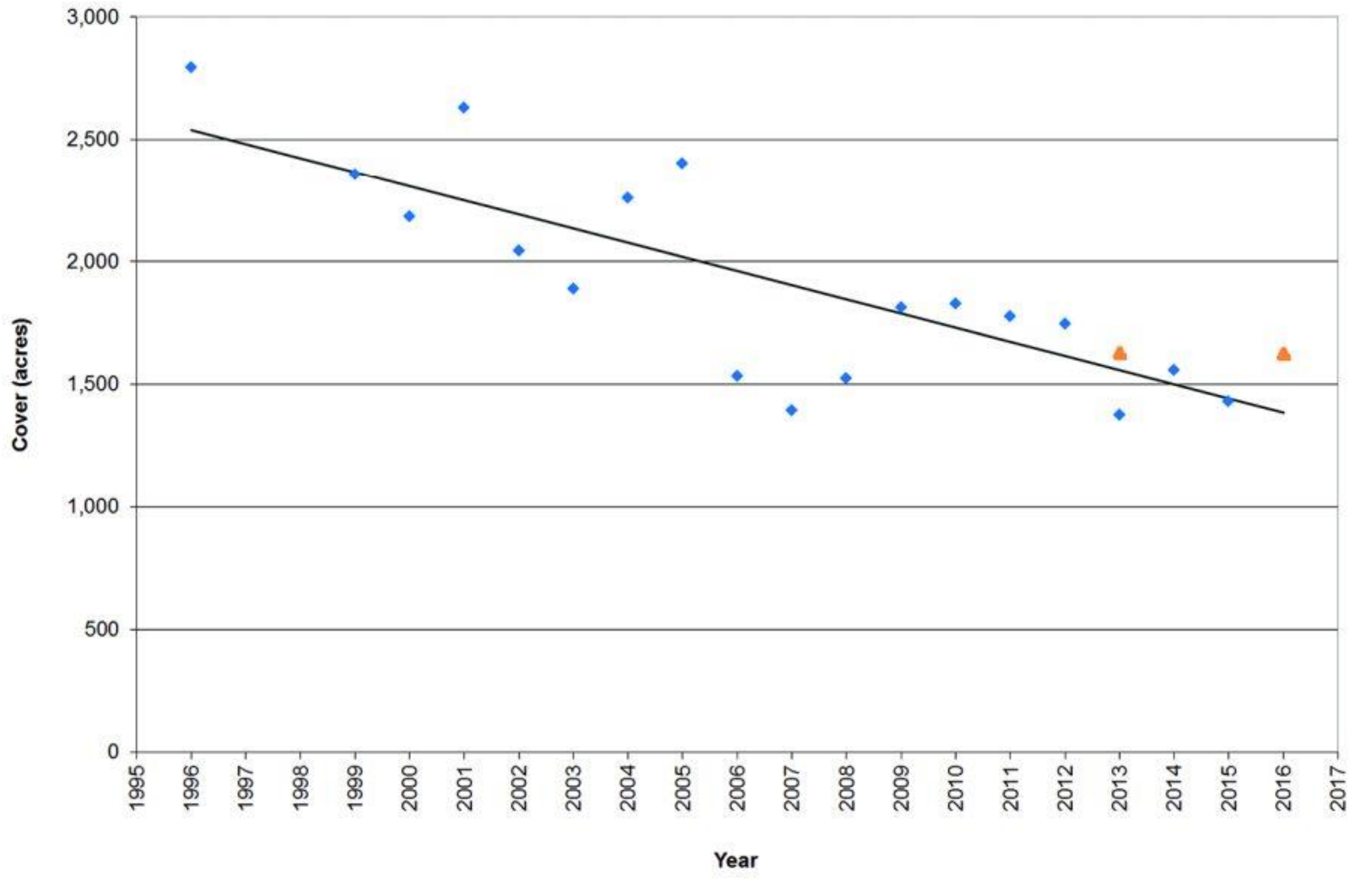
Possible mechanisms

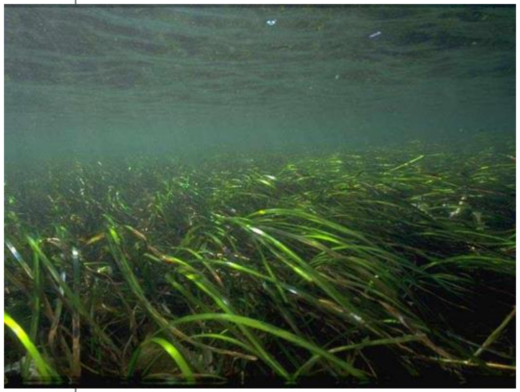
- Reduced filtering by oysters (need to know previous biomass and filtering rate to estimate impacts of oyster decline)
- Reduced benthic protection from erosion due to eelgrass decline
- Degradation of marsh due to increased N loading into Bay
- Increased production from watershed due to increased urbanization, impervious surface, or more extreme events

Oyster decline (PREP SOE 2018)

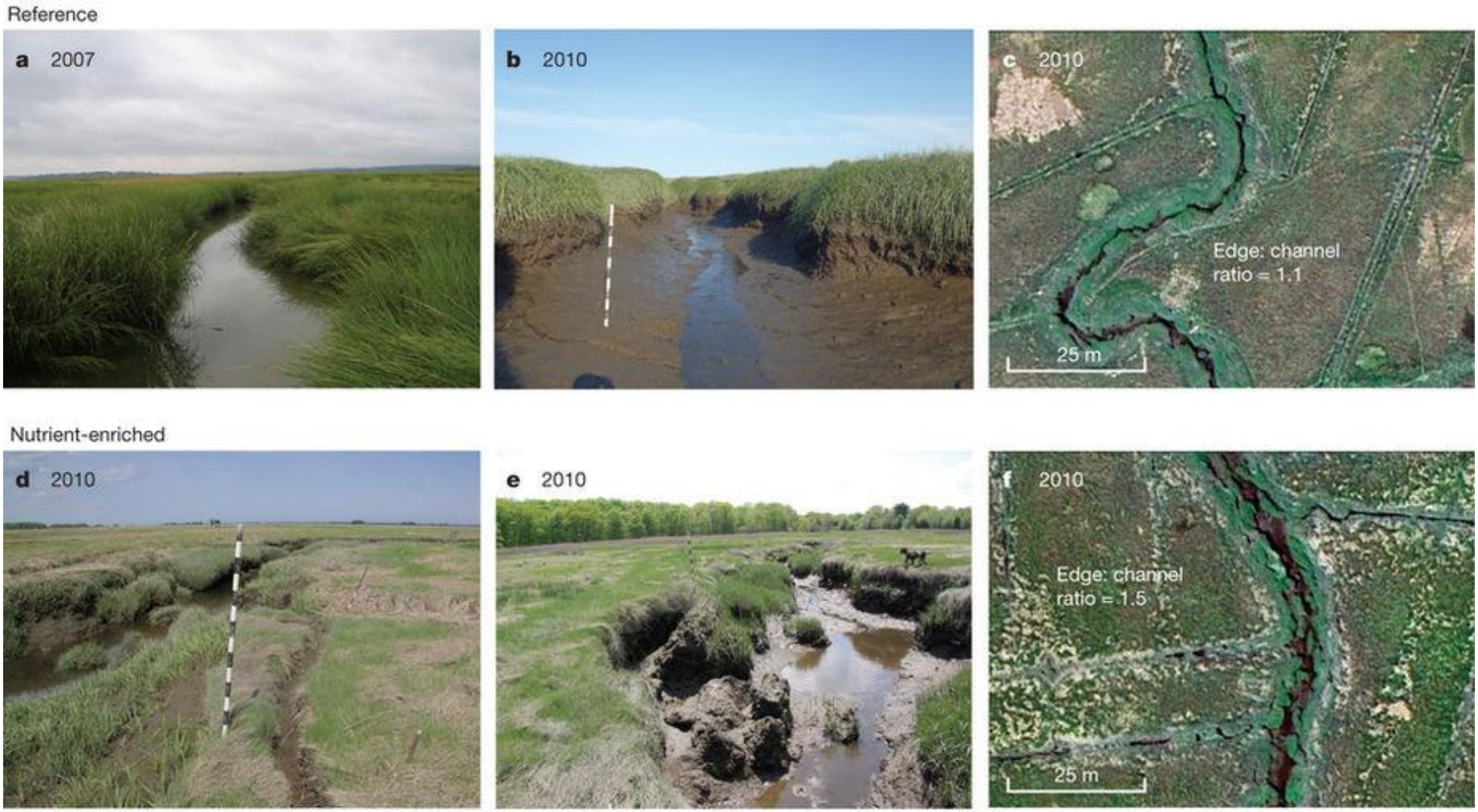


Eelgrass decline (PREP SOE 2018)





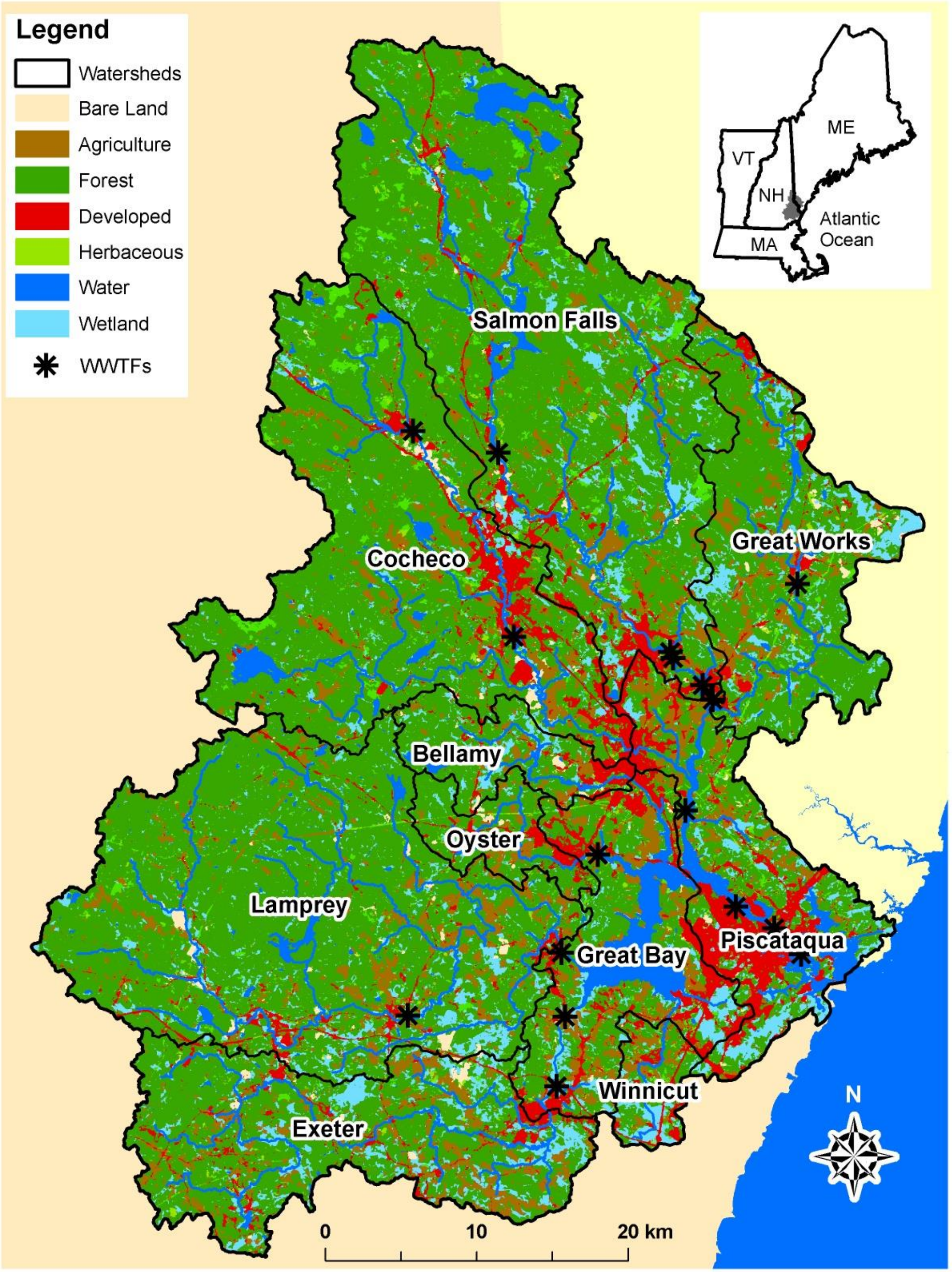
Marsh decline due to N fertilization (Deegan et al. 2012 Nature)



Increased watershed production of TSS

Land use change, extreme events

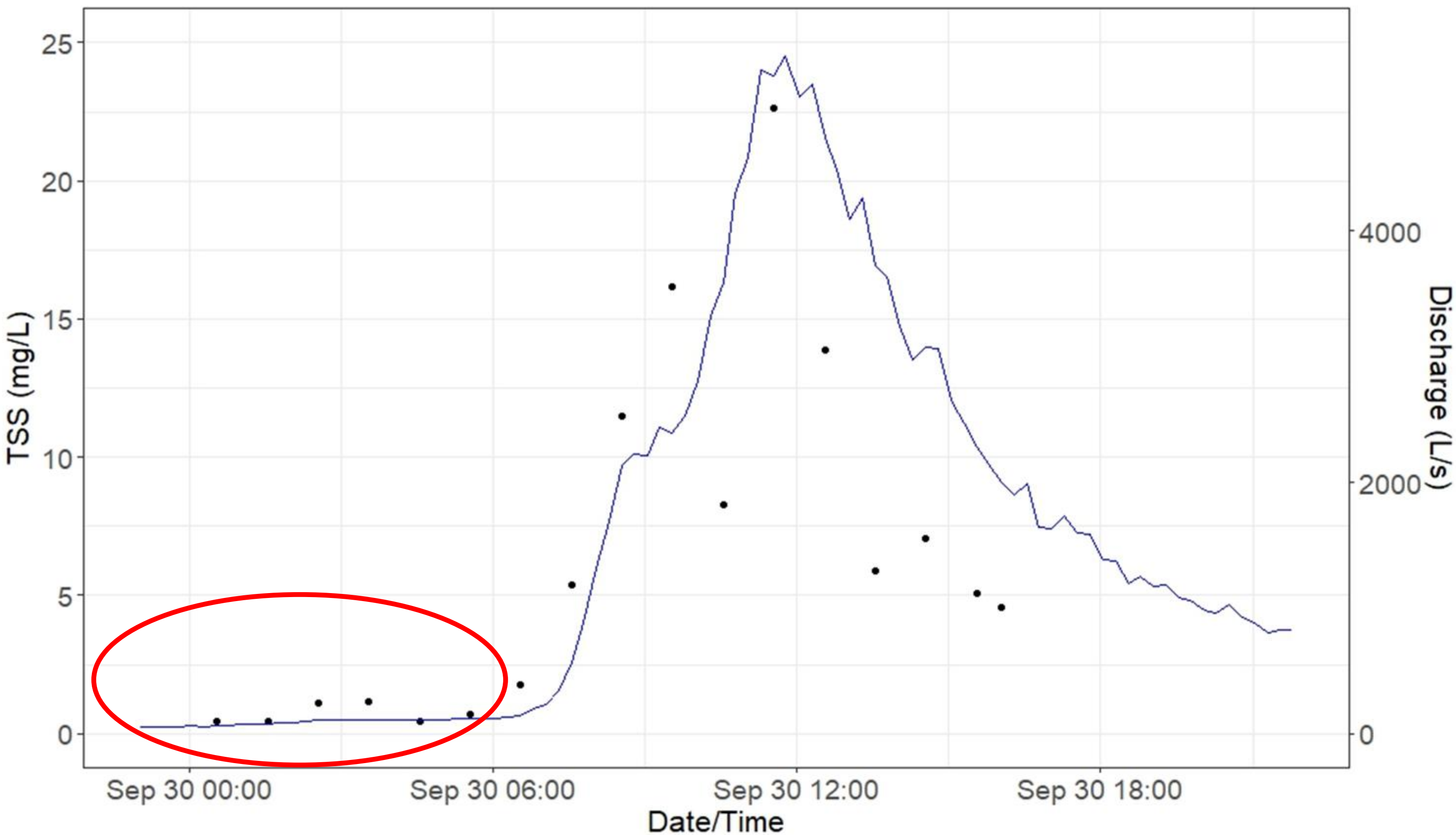
Watersheds in the Great Bay Estuary System



How do we finger a culprit?

- Assess TSS load from watersheds and relate that to concentrations in Bay
- Elemental characteristics of TSS (C/N of TSS compared to possible sources)
- Biogeochemcial tracers (^{13}C, ^{15}N, rare earth elements)

TSS notoriously variable, and responsive to flow



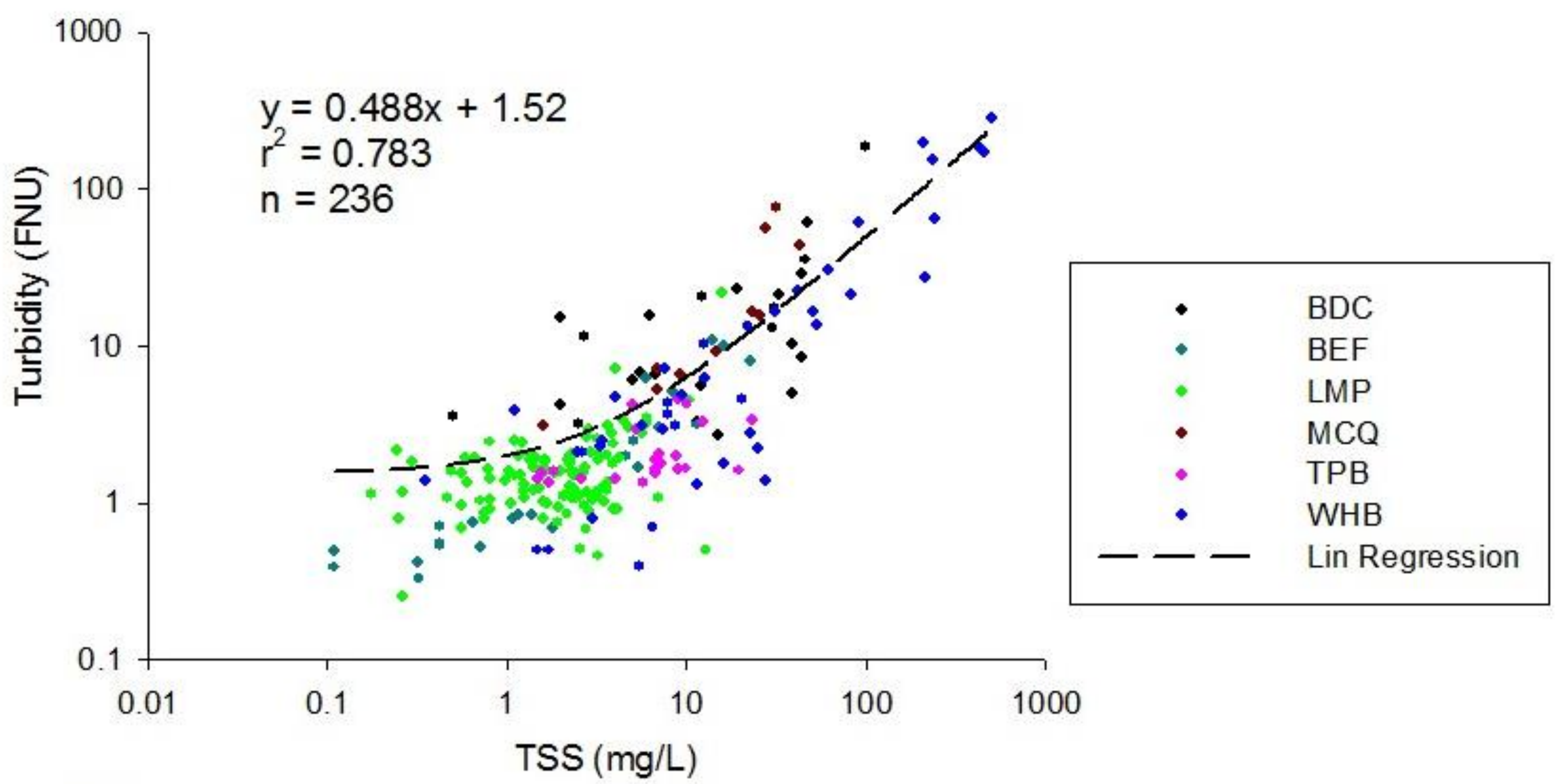
Aquatic Sensors to capture that variability

Satlantic SUNA

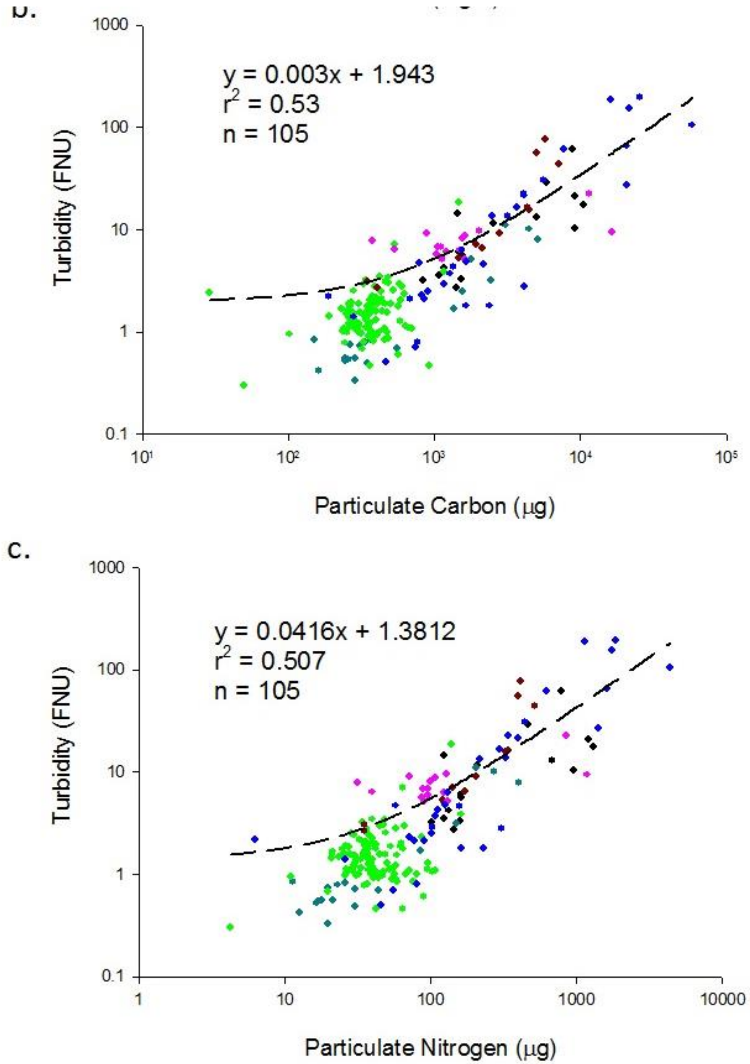
YSI Exo 2 Sonde 6 optical ports

Sensors predict TSS well

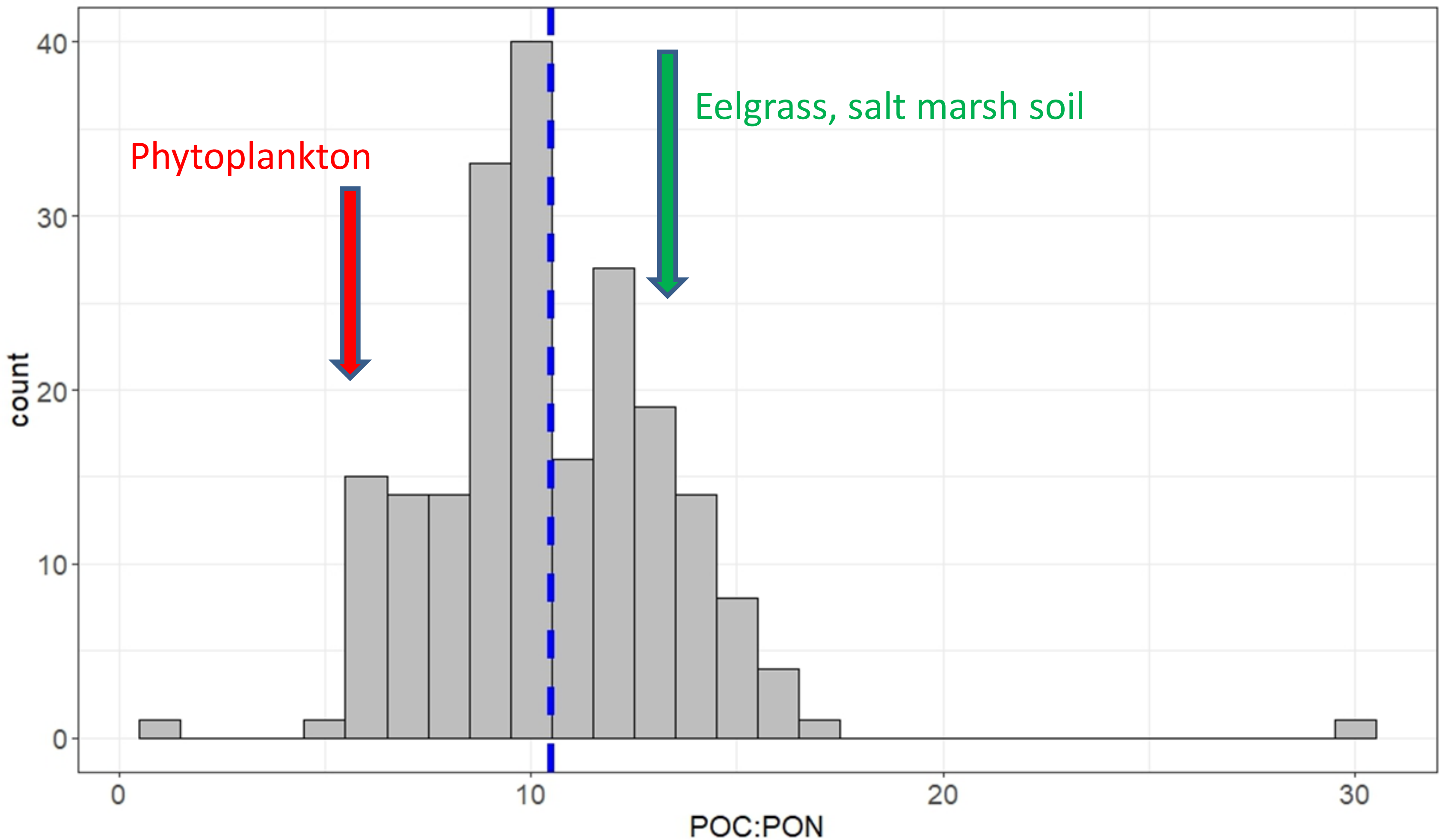
(Snyder et al. in revision WRR)



Sensors also predict PC and PN, improving estimates of total N loading



C/N (mass) of TSS in NH rivers, compared to salt marsh soils, algae, eelgrass



Proposed research plan to address TSS

- Establish sensors and autosamplers for TSS at several important river mouths
- Develop library of TSS samples for C/N and multiple tracer analysis
- Use mass inputs from rivers, mass in Bay, and tracers to constrain likely sources of TSS in Bay

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University of New Hampshire

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Current N Conditions Map

(Median Total Dissolved Nitrogen)

Sampled 5 times:
Oct. 2010, May 2011 and
3 times summer 2012

TN Thresholds for
<u>Assessing Impairment</u>
DO - 0.45 mg/L
Eelgrass - 0.30 mg/L