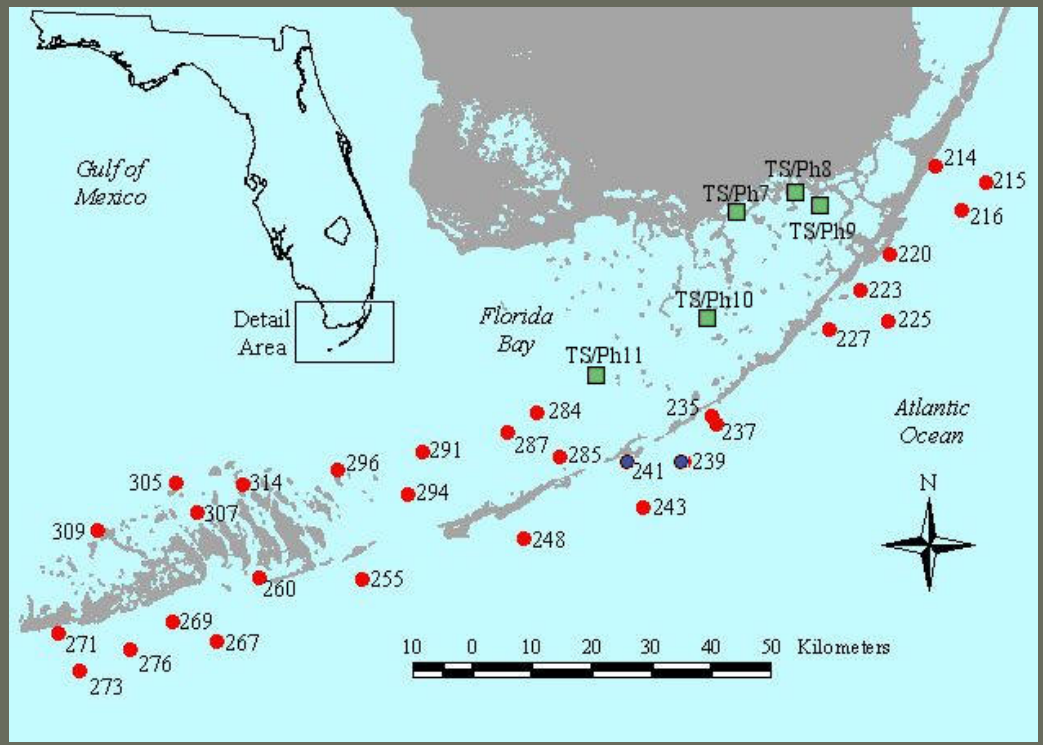
Recent seagrass-related research from the FCE-LTER

FCE-LTER ASM meeting, March 19-20, 2007, Fairchild Tropical Botanic Garden

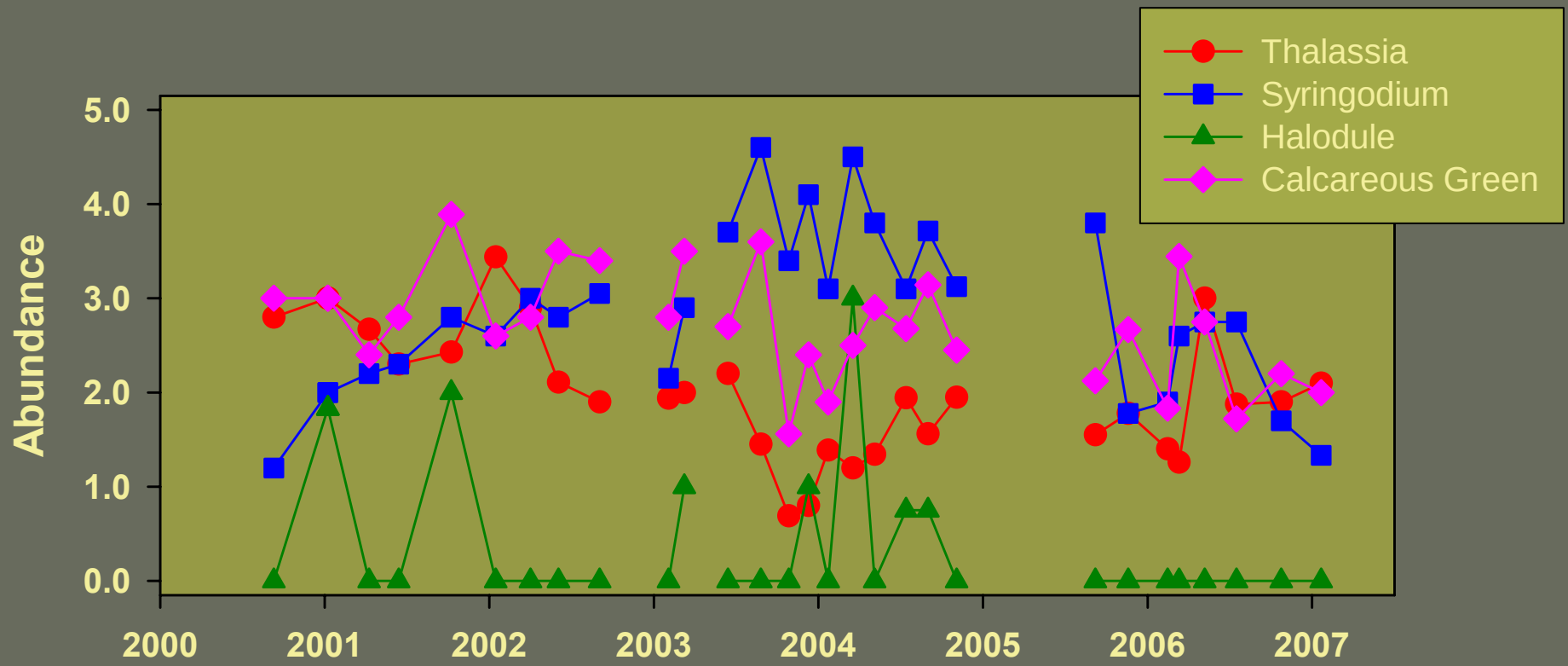
- Permanent monitoring
- Auxiliary projects
  - Bird stakes in Florida Bay revisited
  - NvsP funded by NPS
  - Response of seagrass communities to nutrient concentration by faunal aggregations
  - SAV in Shark River funded by USGS
  - Water quality-SAV relationship in upper estuaries funded by NPS
  - Response and acclimation of *Thalassia testudinum* to salinity stress
  - Effects of organic matter loading and iron availability on seagrasses

Permanent monitoring

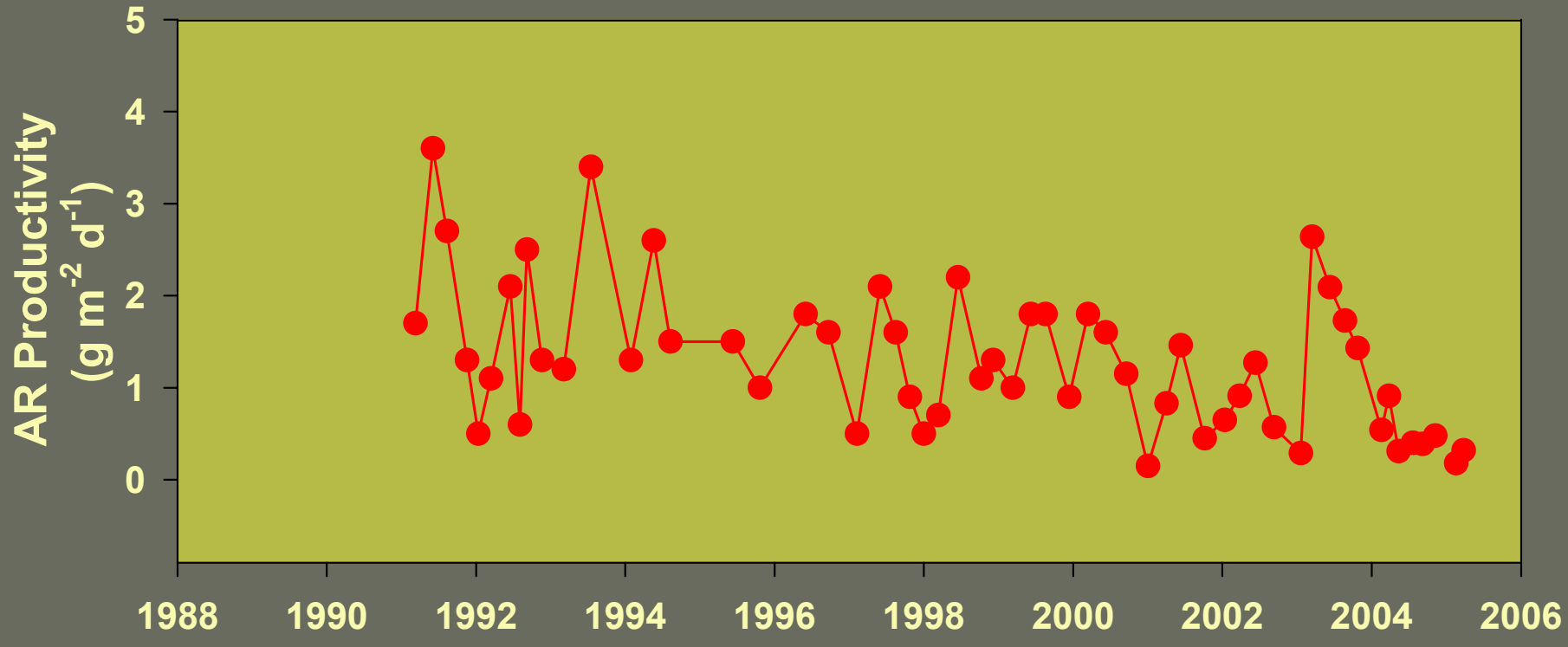


- Parameters measured on a bimonthly basis:
  - Macrophyte species composition
  - Macrophyte relative abundance
  - Morphology of seagrasses
  - Leaf growth rate of *Thalassia testudinum*
  - Seagrass elemental content (C:N:P)
  - Seagrass leaf stable isotopic content
  - Periphyton growth on mylar and periphytometers

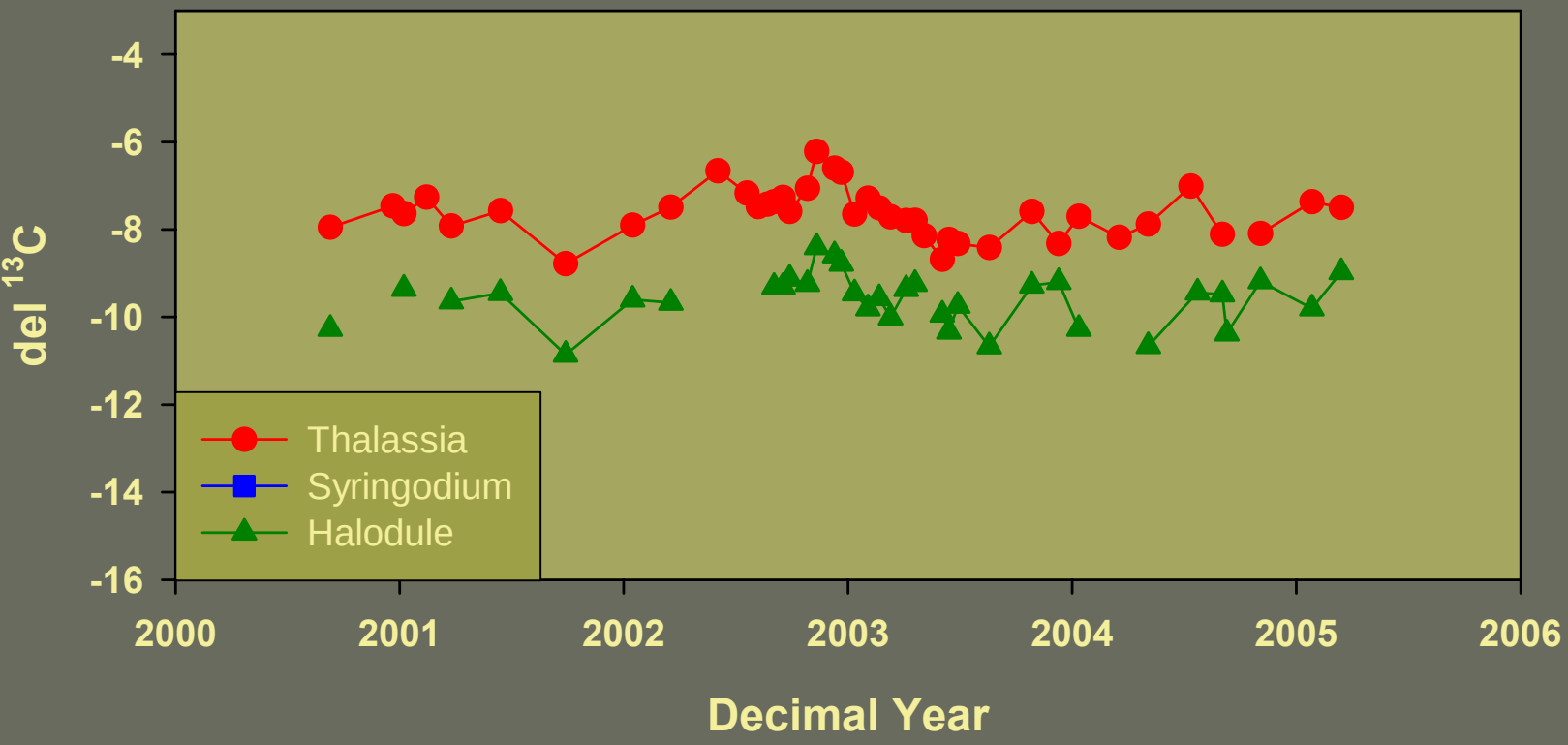
Trends in abundance of macrophytes at Sprigger Bank TS/PH 11



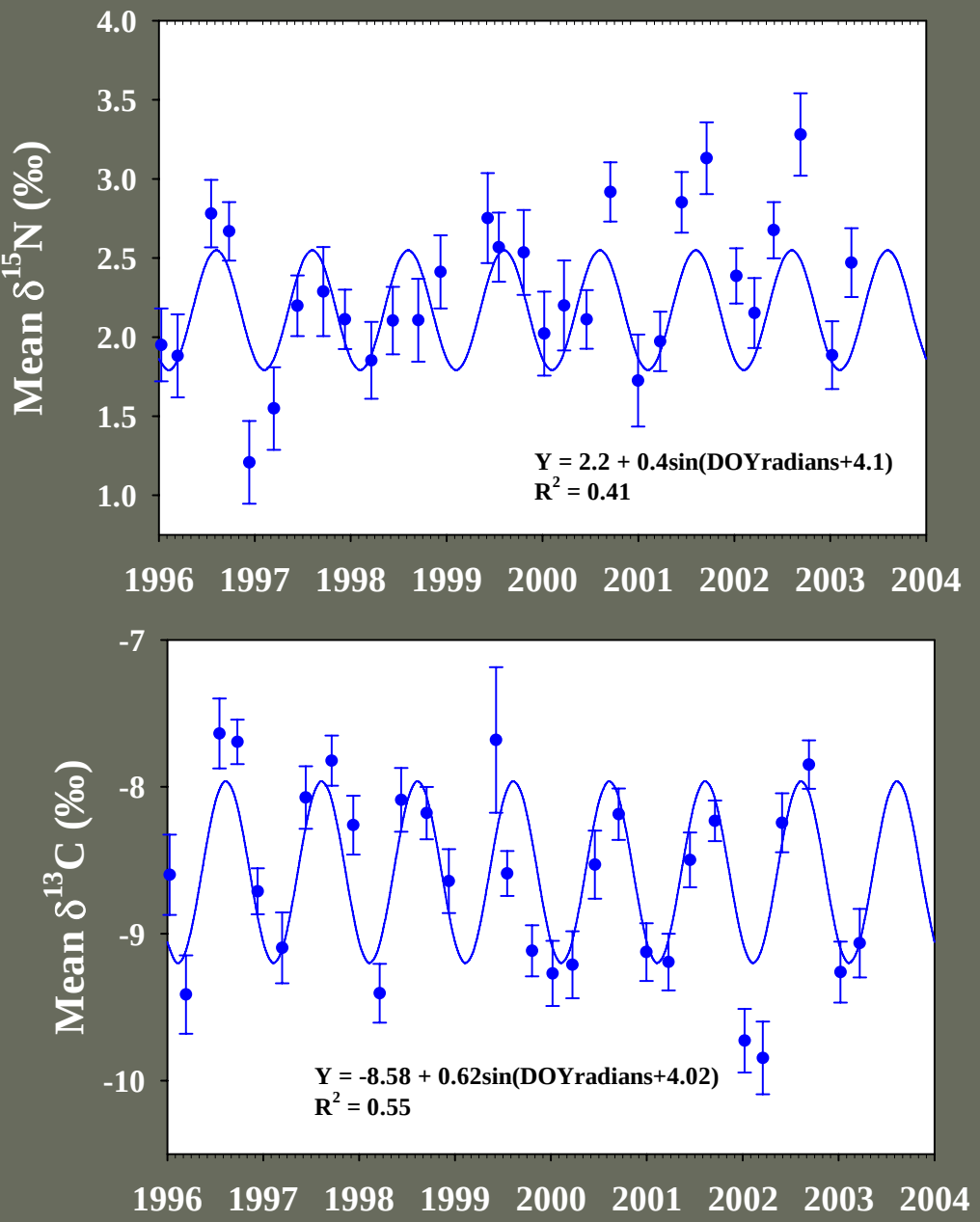
Aboveground productivity of *Thalassia testudinum* at TS/PH 11 (Spigger Bank)



Trends in stable isotopic composition of seagrasses from Bob Allen TS/PH 10



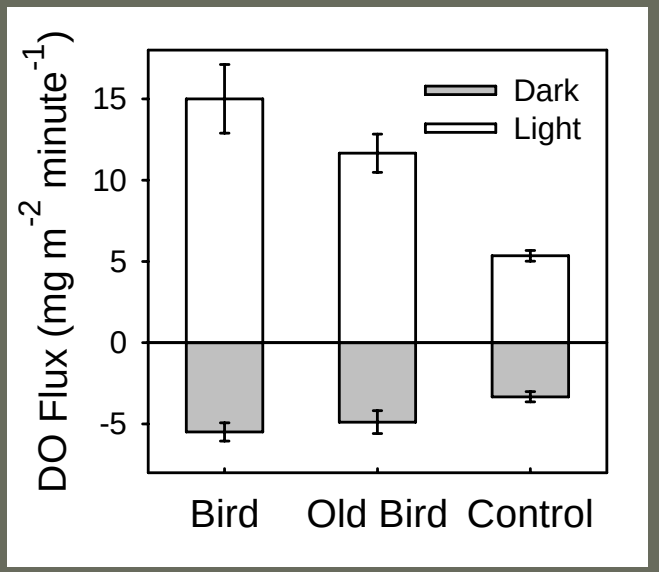
Across south Florida, there are repeatable seasonal patterns in the stable isotopic content of seagrasses – with up to 6 ‰ variation in the $\delta^{15}N$ of *Thalassia testudinum* at some sites



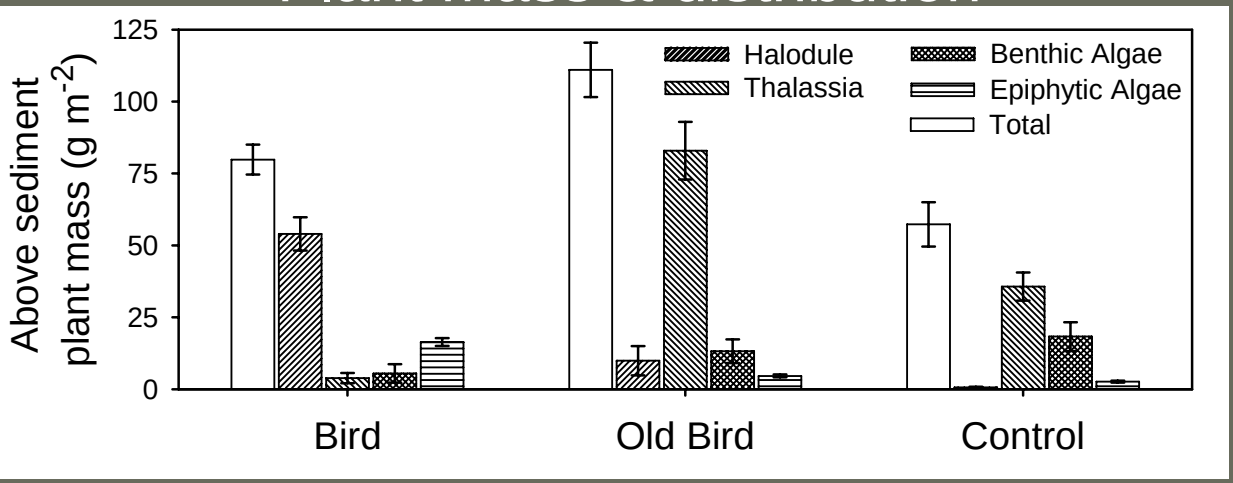
The permanent site monitoring will be continued into FCEII to allow for assessment of the impact of the “grand experiment” of water management on nutrient availability, nutrient processing, seagrass abundance, and benthic primary production

Revisiting Cross Bank after 24 years

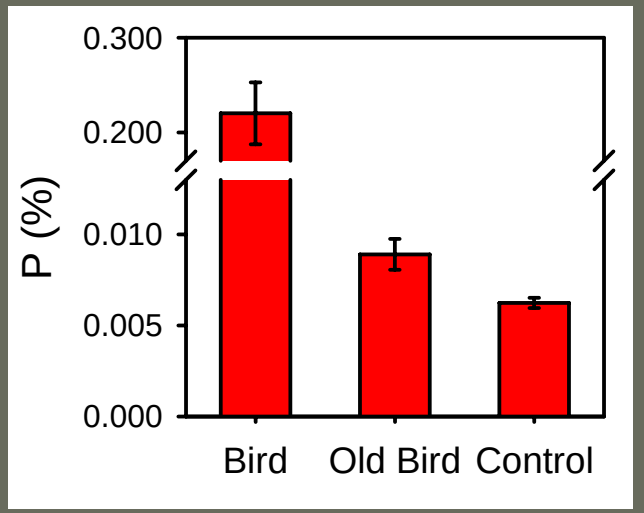
Productivity



Plant mass & distribution



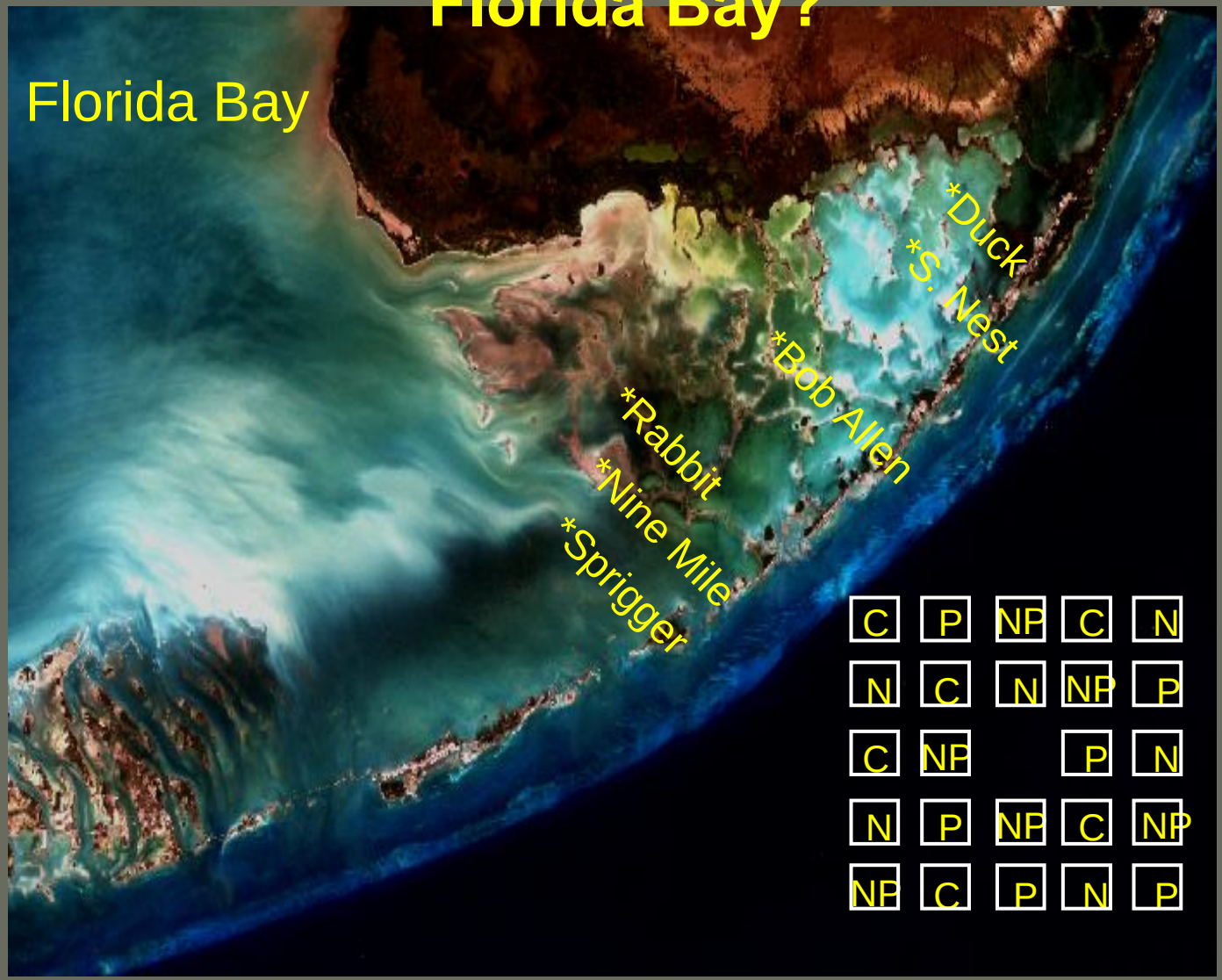
Sediment P



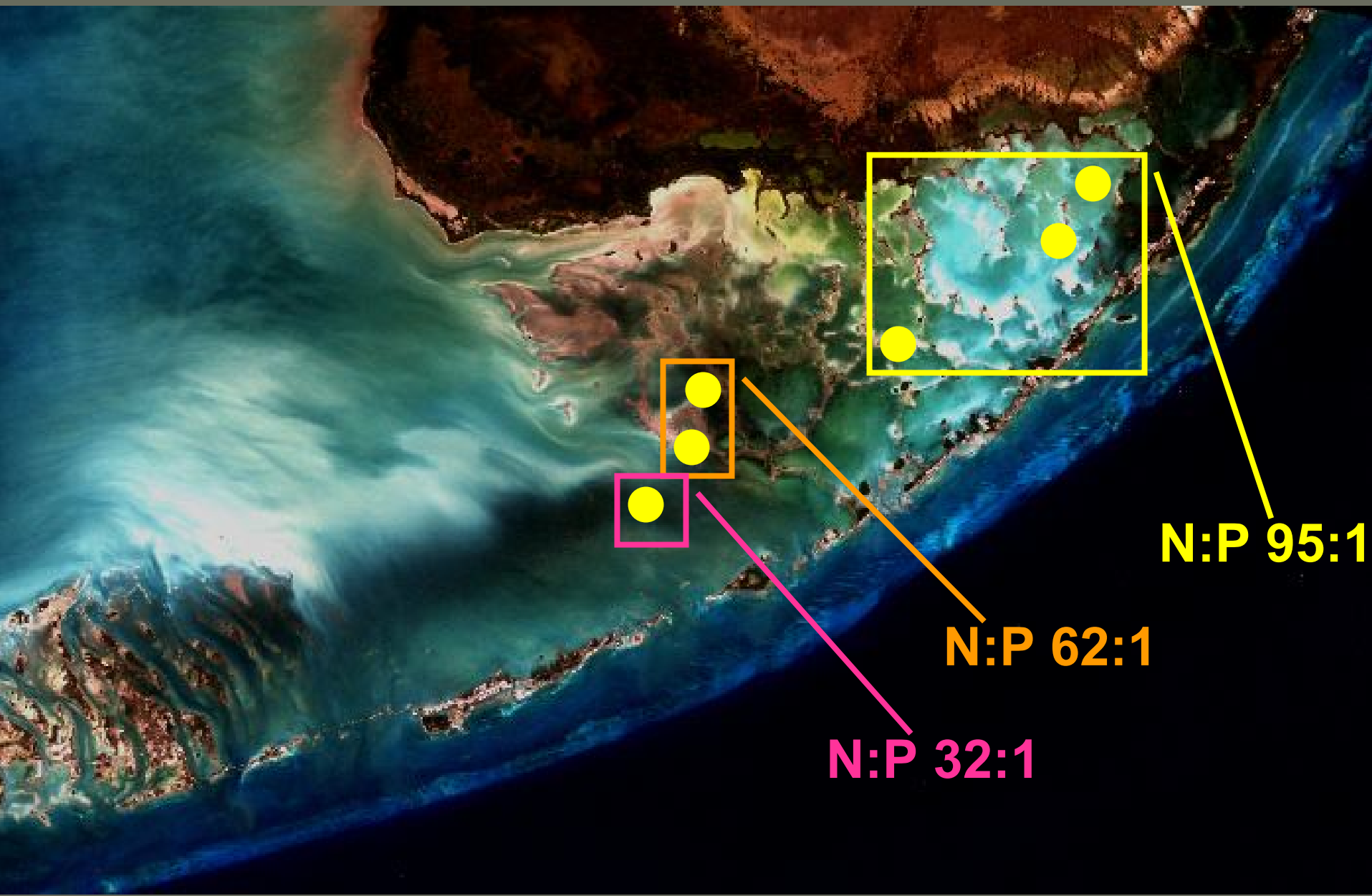
Future direction for FCEII

Examine ecosystem P retention and shifts in P pools as nutrient loading change in Florida Bay

Do predictions of P limitation that follow from stoichiometry hold for Florida Bay?



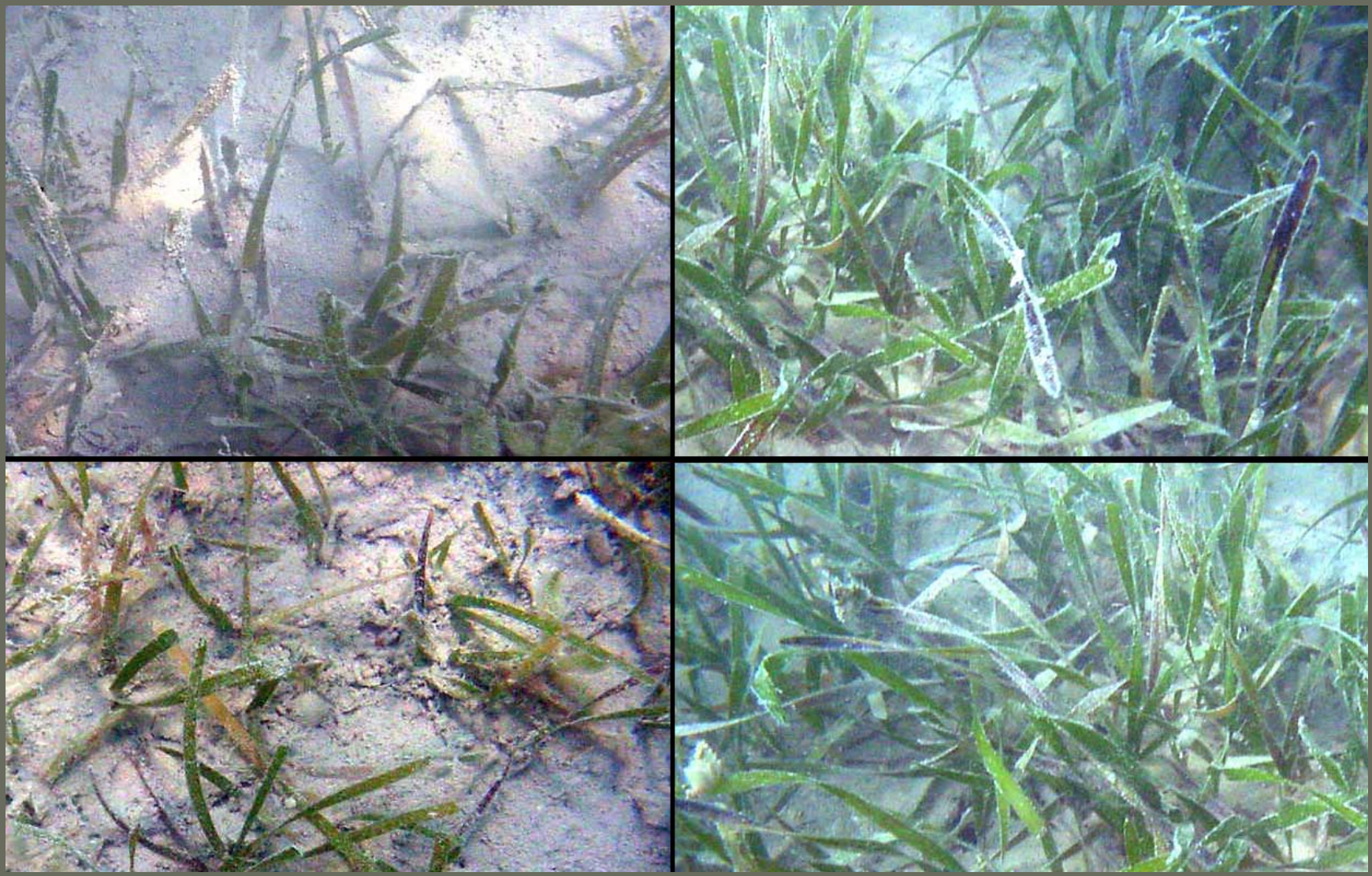
I. N and P limitation in benthic primary producers



(Armitage et al., *Estuaries* 2005)

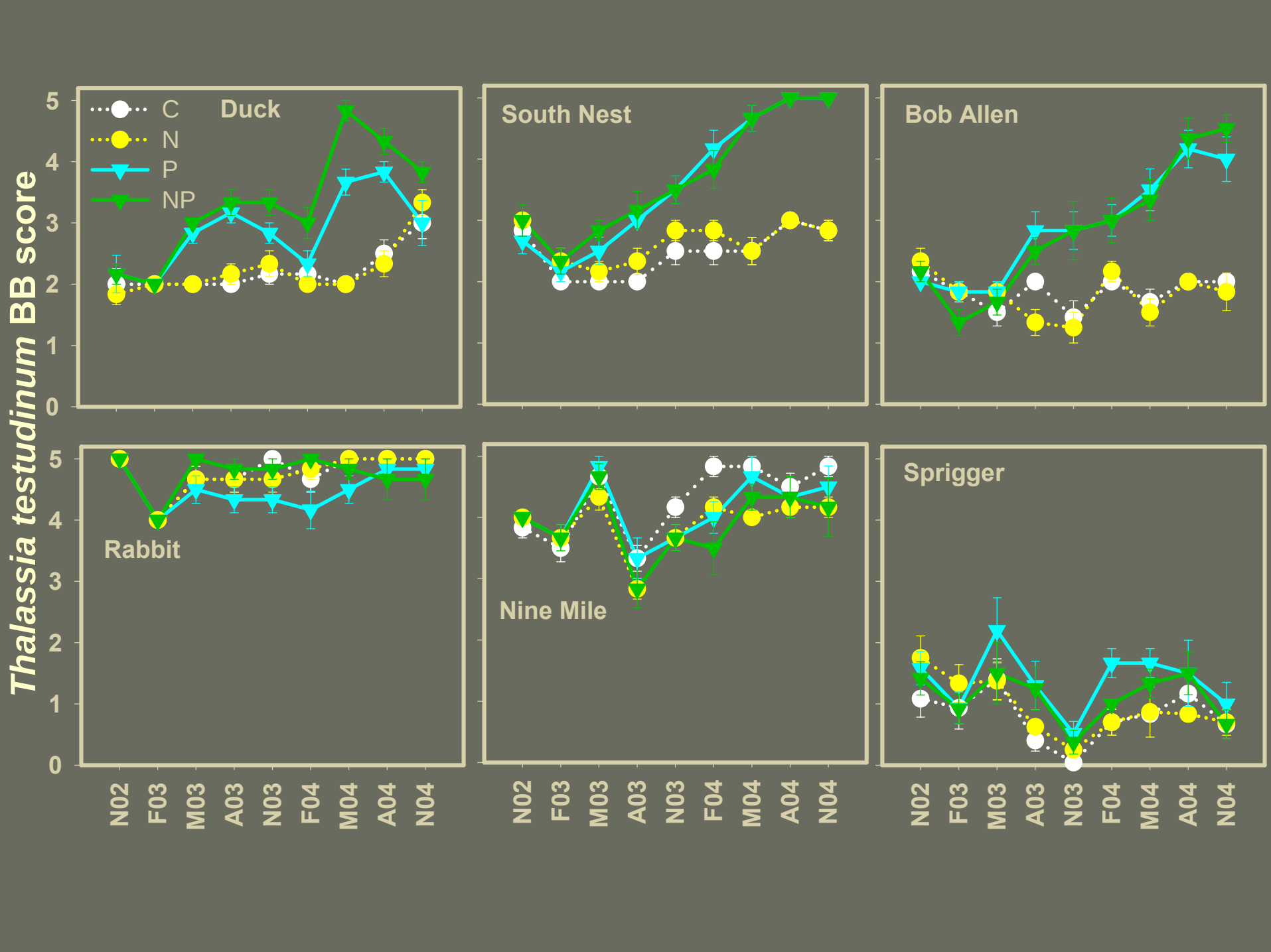
C

P

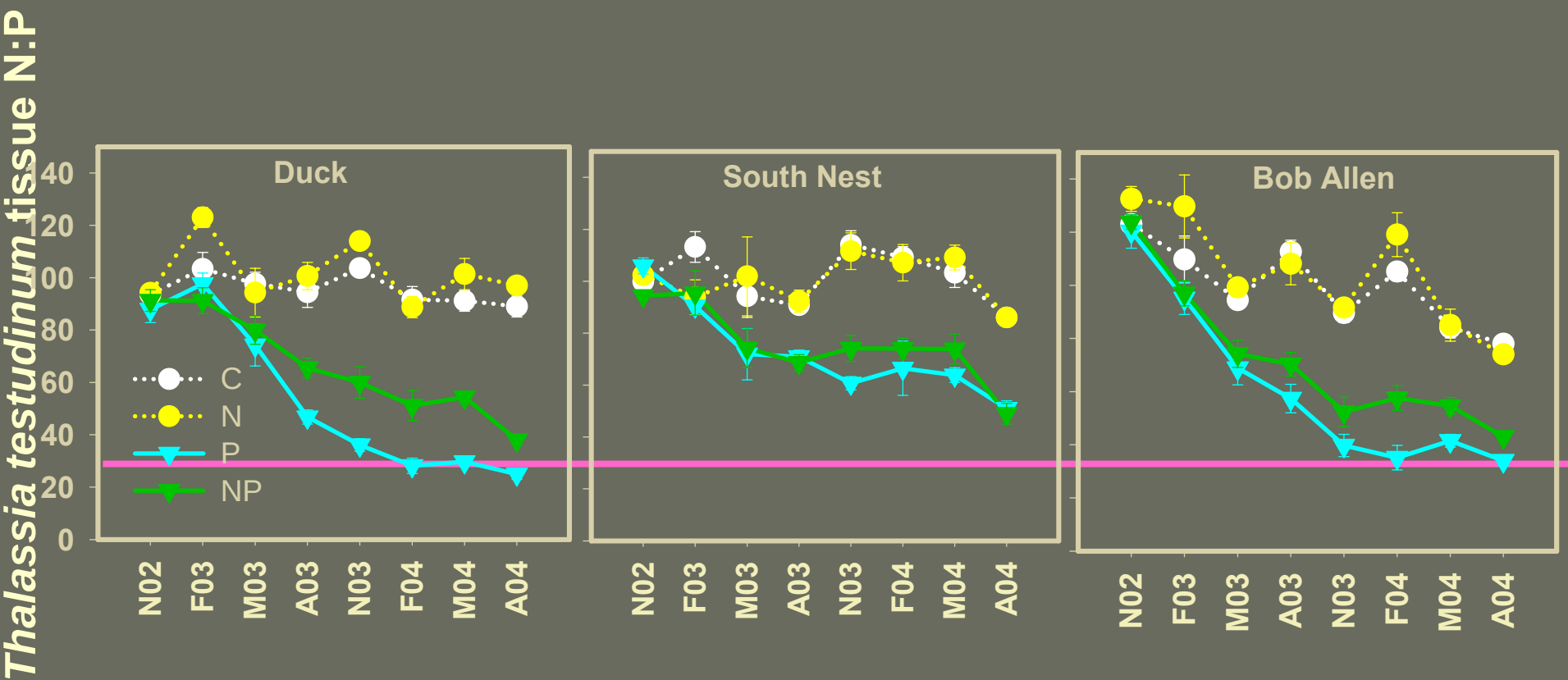


N

NP

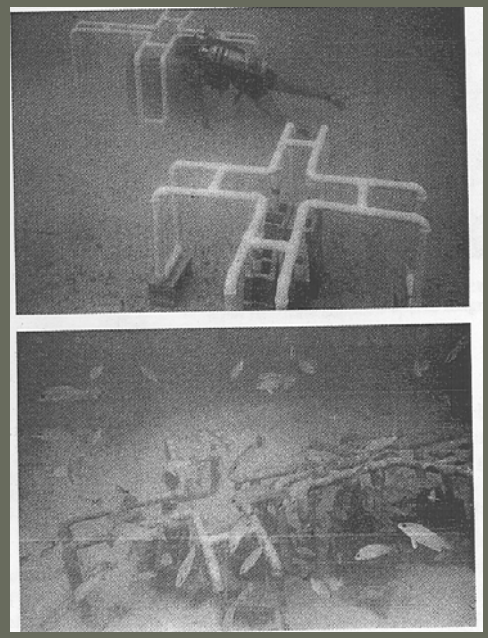

Thalassia testudinum BB score
C
N
P
NP
Duck
South Nest
Bob Allen
Rabbit
Nine Mile
Sprigger
0
1
2
3
4
5
N02
F03
M03
A03
N03
F04
M04
A04
N04

95:1 sites
Thalassia P-limited



More Future direction for FCEII

Continue the long-term nutrient enrichment experiments across the nutrient limitation gradient in Florida Bay, concentrating more on faunal responses to the nutrient-induced changes in the seagrass community (new CESI funding)

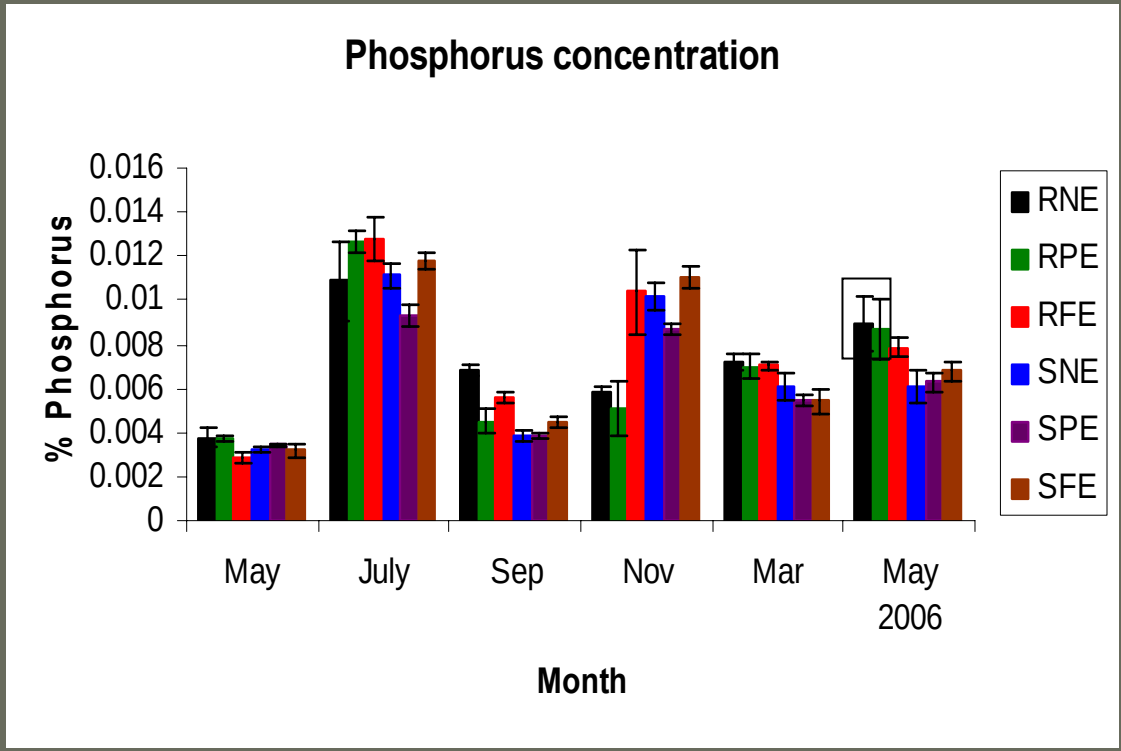


Can artificial reefs induce high fish concentrations and how do these high abundances affect the benthic community that surround the fish aggregation?

Sediment % Phosphorus

There would be an increase in sediment phosphorus concentrations

There was a significant increase of phosphorus at plots with high fish abundances



Effect	*F-value*	*P-value*
Reef	4.89	**0.029**
Exclosure	7.18	**0.020**
Reef x Exclosure	0.11	0.898
Time	99.34	**<0.0001**
Reef x Time	10.27	**<0.0001**
Exclosure x Time	3.08	**0.003**
Reef x Exclosure X Time	1.92	**0.050**

Benthic plant communities of Shark River

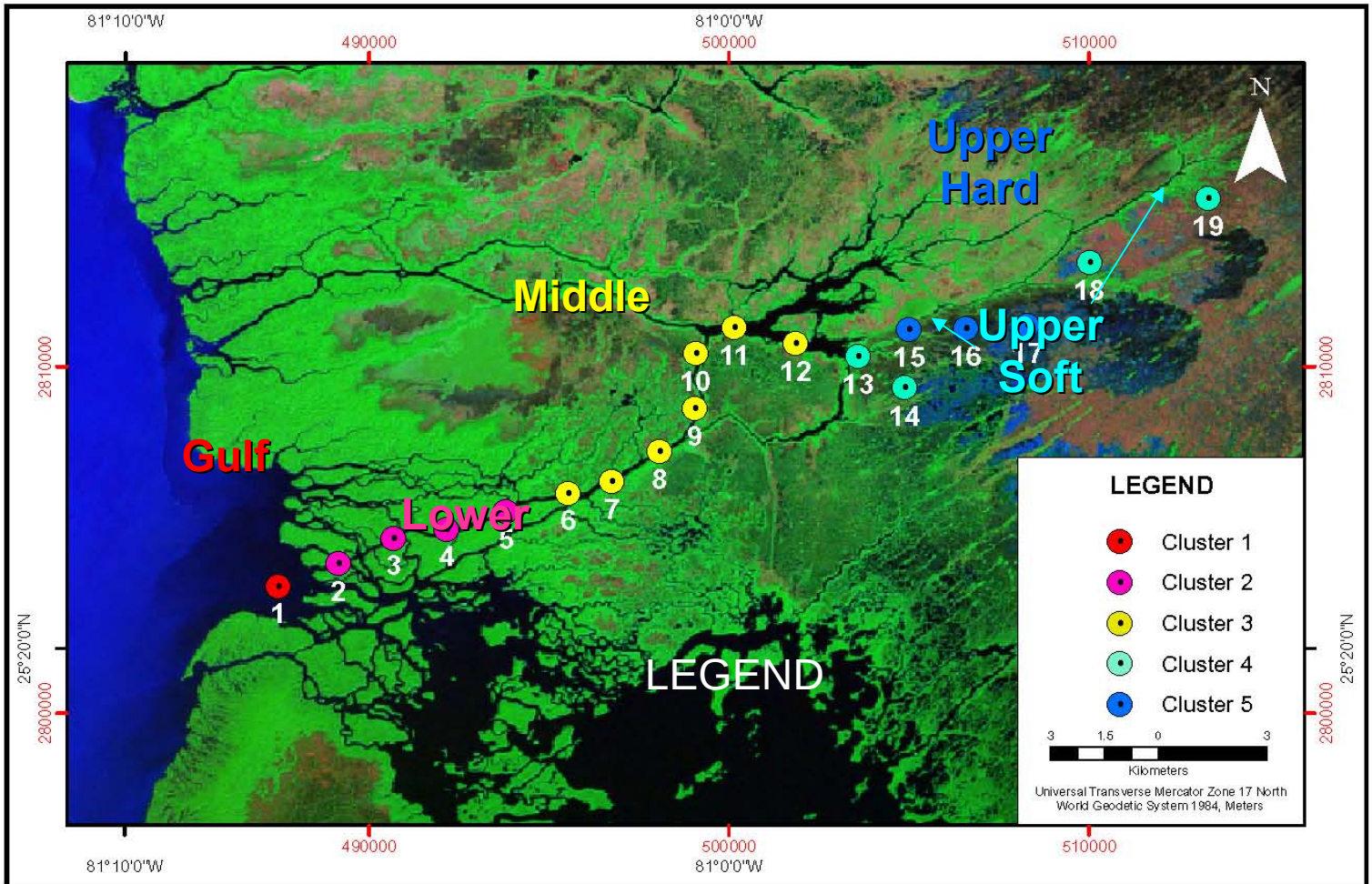
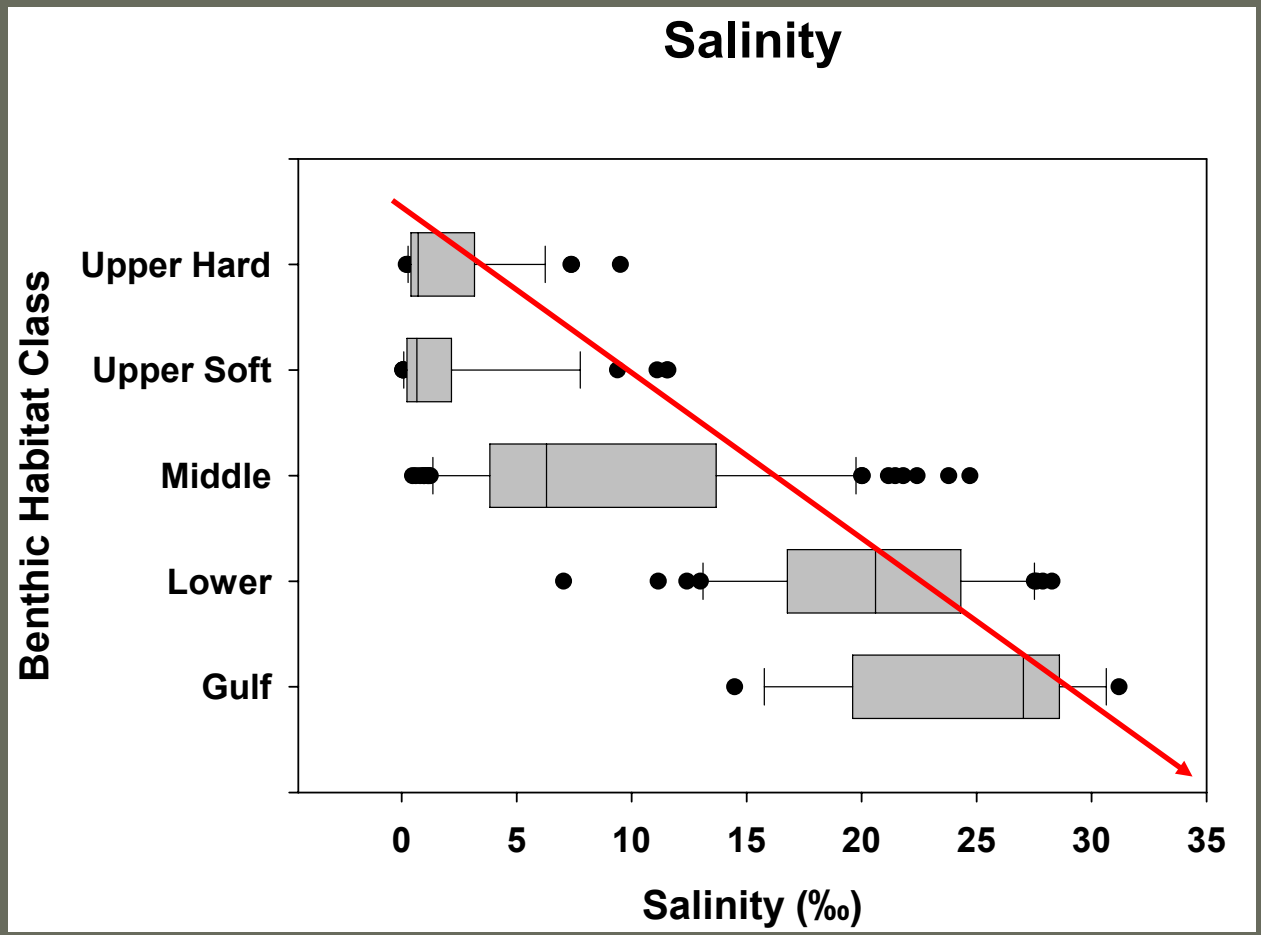
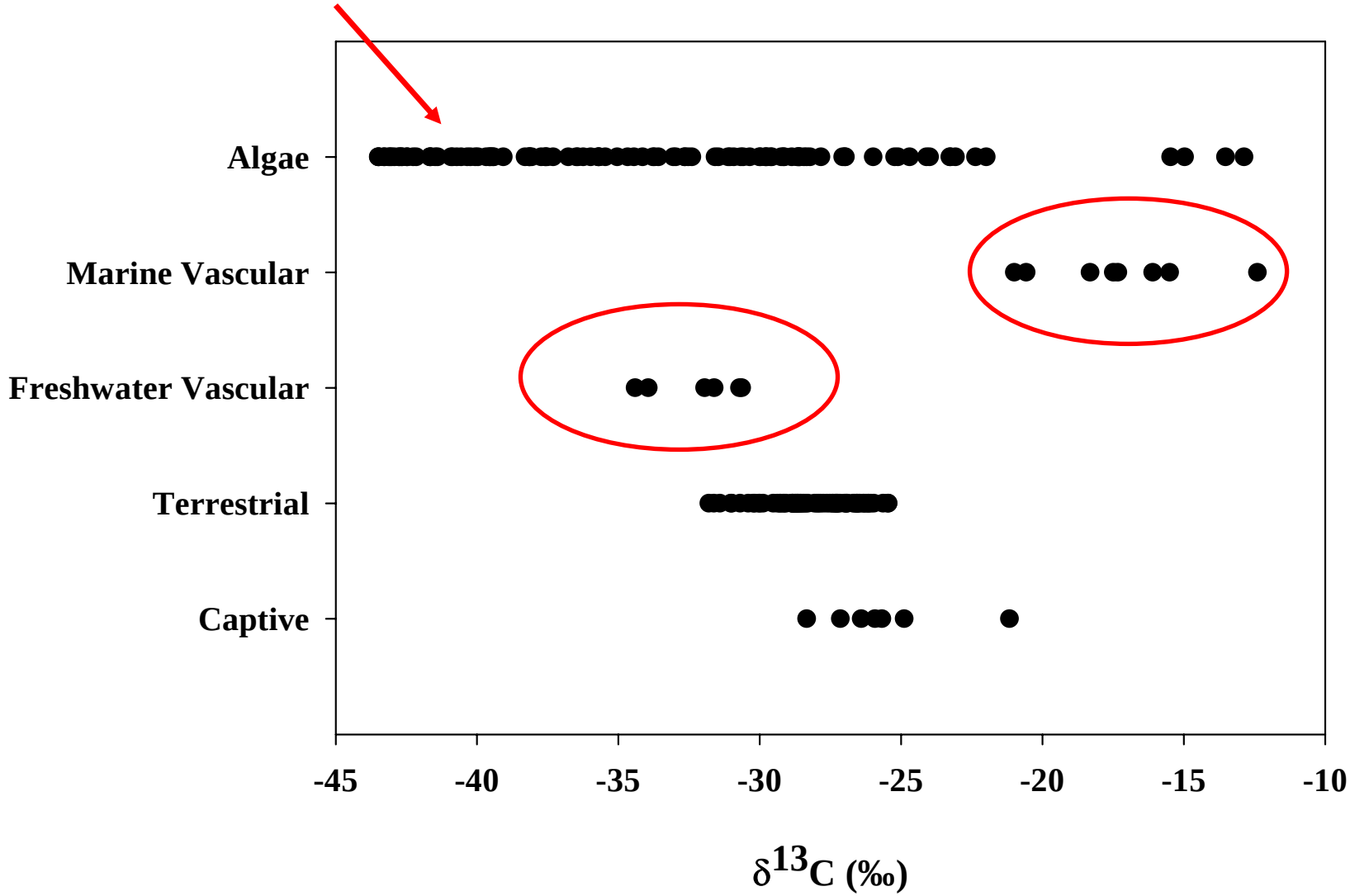


Figure 1. Results of cluster analysis of Shark River Study stations reflecting an "estuarine gradient."



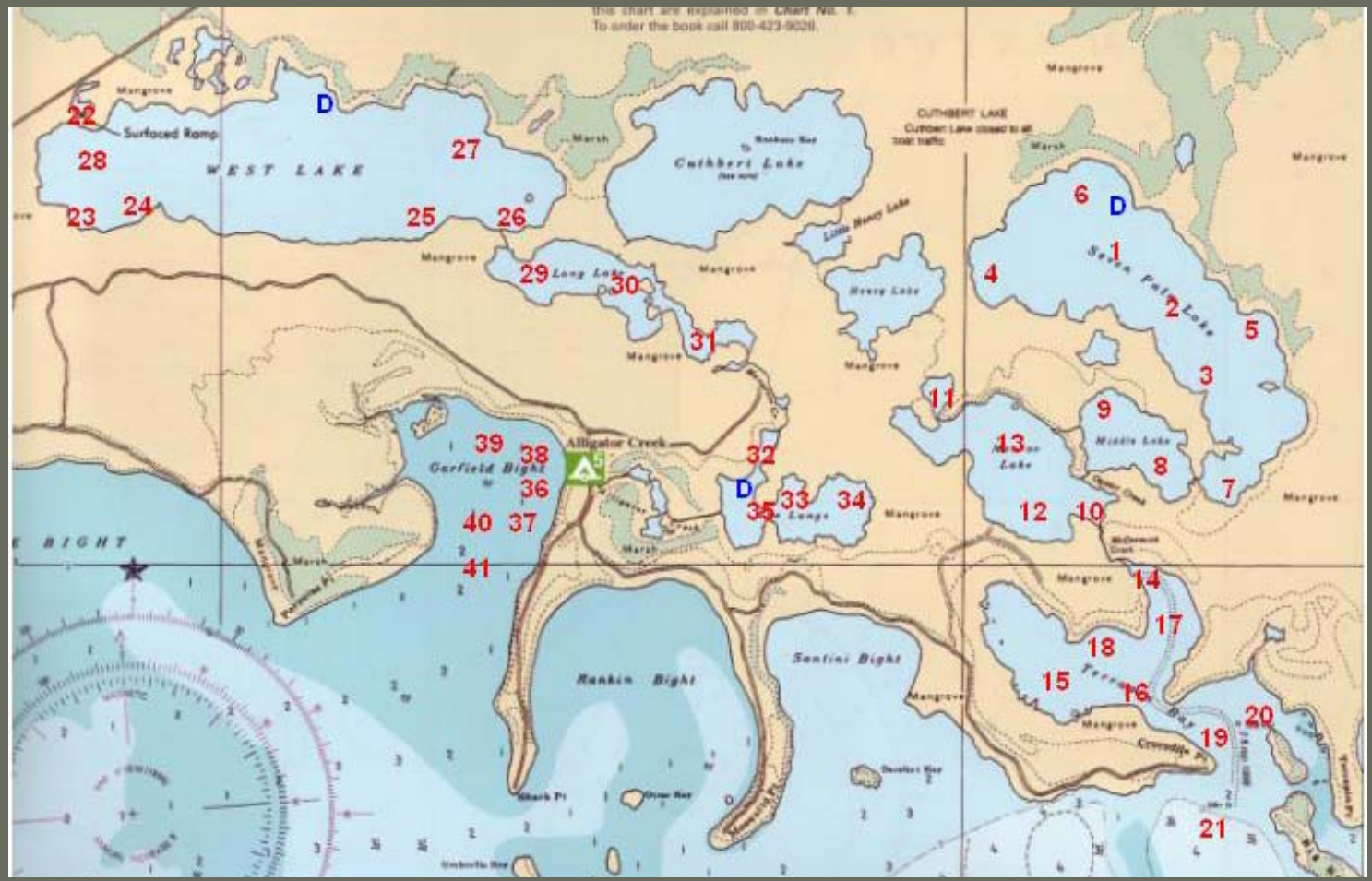
Salinity showed predictable patterns along the river with most variability along the middle portion of the river. Other water quality parameters co-varied with salinity

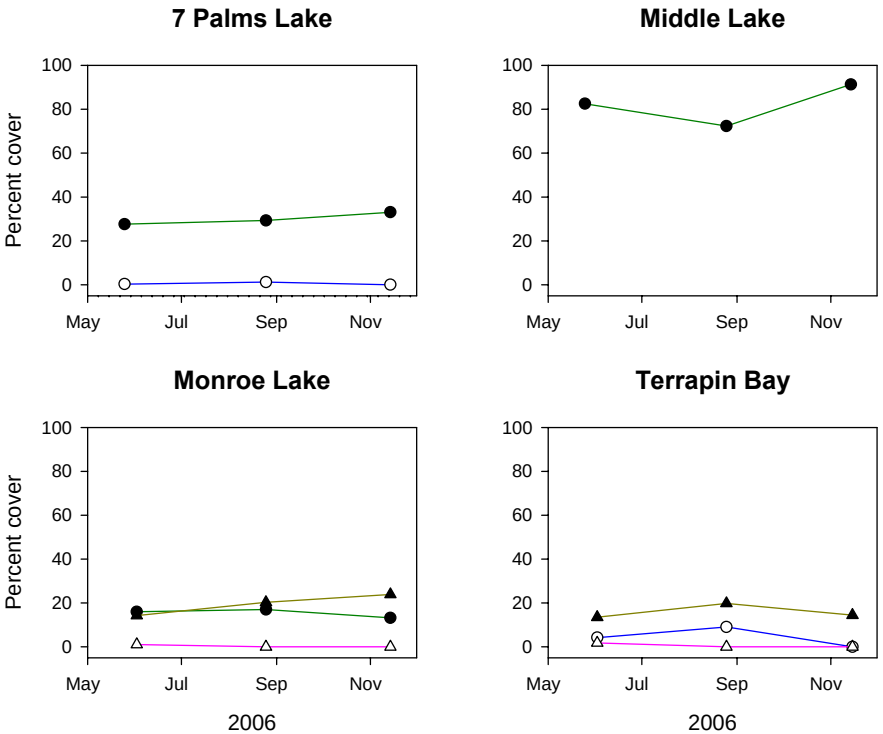
There was a huge range in $\delta^{13}C$ from benthic macrophytes in the Shark River



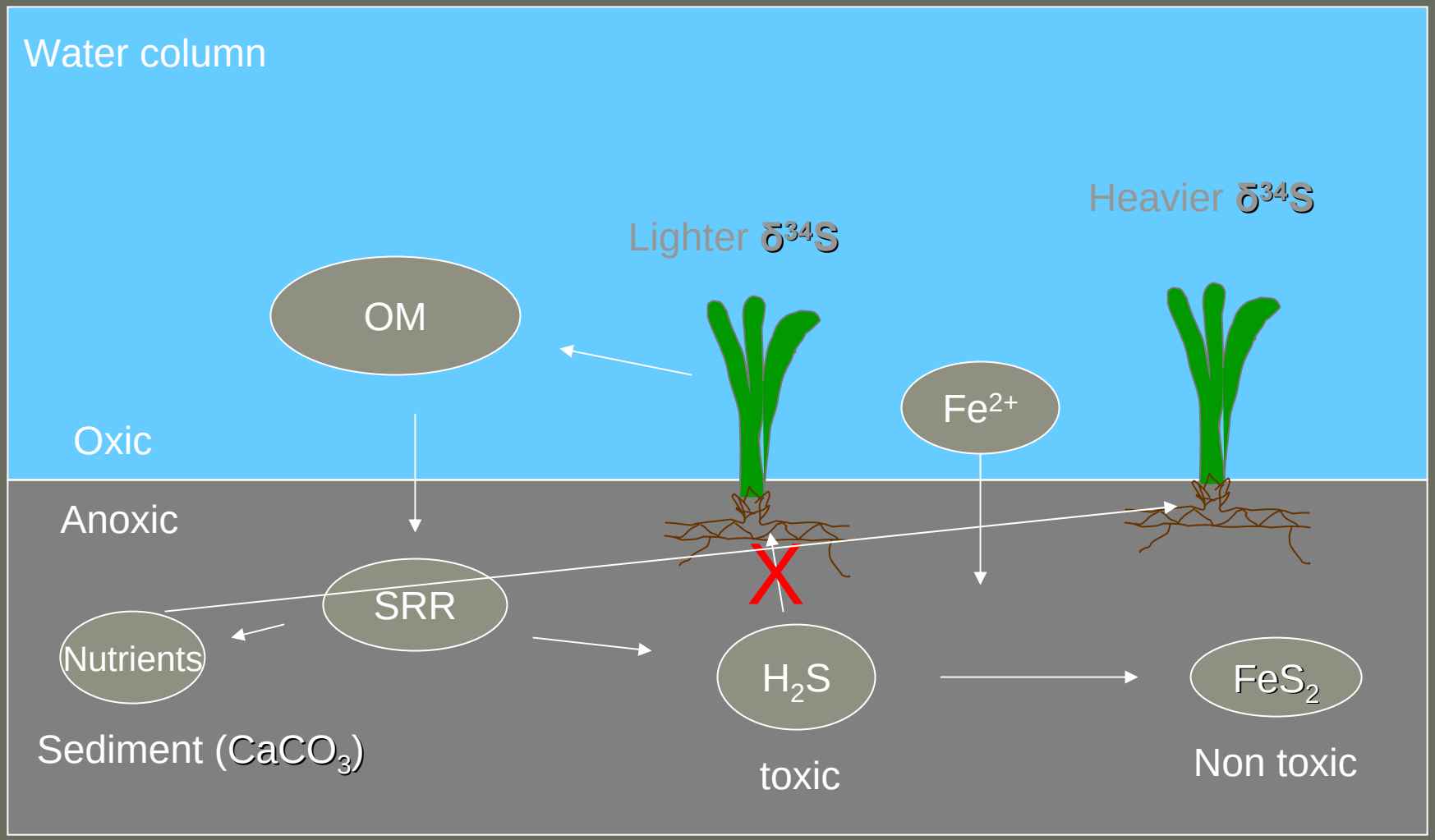
Submerged aquatic vegetation and physicochemical monitoring in the Florida Bay mangrove zone for CERP assessments and targets refinement

Thomas A. Frankovich , James W. Fourqurean, Douglas Morrison




7 Palms Lake
Middle Lake
Monroe Lake
Terrapin Bay
Percent cover
100
80
60
40
20
0
May
Jul
Sep
Nov
2006
Halodule
Batophora
Acetabularia
Chara

Effects of organic matter loading and Fe availability on seagrasses



Set up

- 2x2 factorial design arranged in a Latin square.
- Area= 0.5m^2

And some more Future directions for FCEII

Continue experimental investigations into the interactions between biogeochemistry and seagrass productivity. Nitrogen cycling is ripe for study in this P- and Fe-limited system.