Florida Keys National Marine Sanctuary

Steering Committee Meeting

Marathon, 2/12/2014

Water Quality Monitoring

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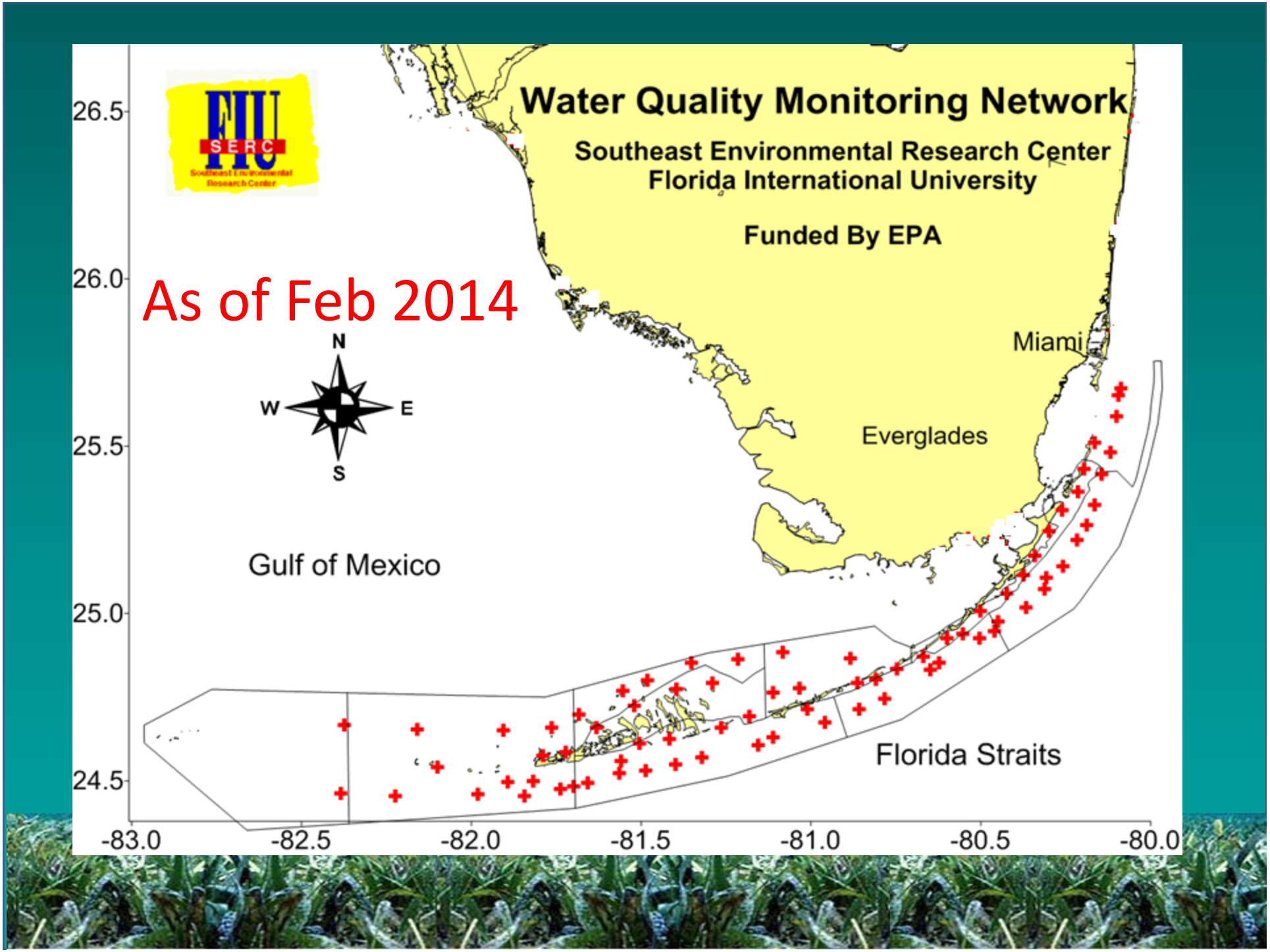
Florida International University, Miami, FL
2= Plymouth State University
Center for the Environment

FIU | Southeast Environmental Research Center

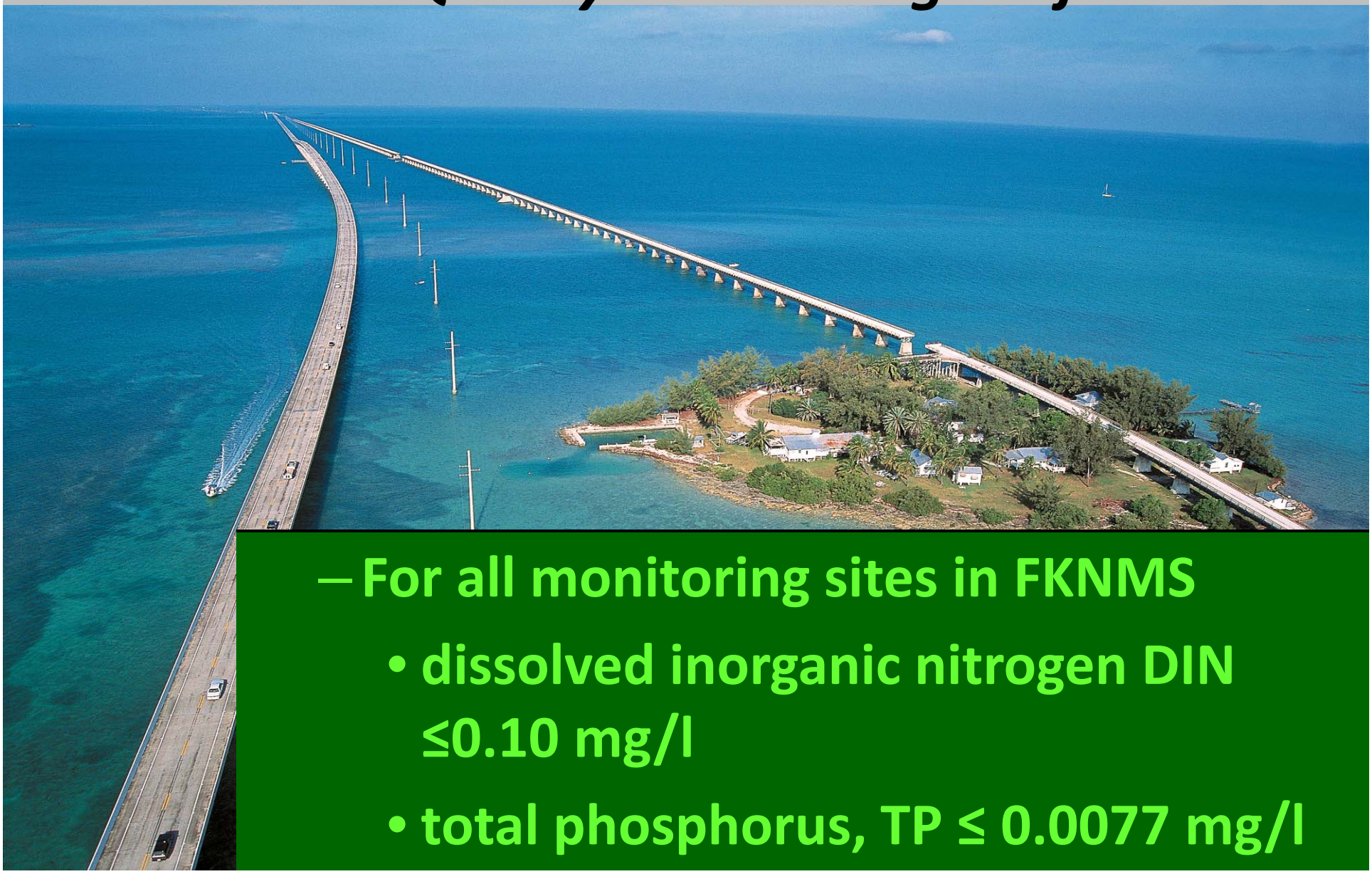
National Oceanic & Atmospheric Administration
NATIONAL MARINE SANCTUARIES

Monitoring Water Quality in FKNMS

- Establish baseline information about FKNMS waters
- Document events, both chronic and episodic
- Assess trends or changes in WQ over time
- Explain causes in WQ changes (internal & external driver)
- Provide relevant information for resource management decisions
- Document compliance practices (regulatory)
- Educate public & stakeholders about water quality *


Water Quality Monitoring Network
Southeast Environmental Research Center
Florida International University
Funded By EPA
As of Feb 2014
N
W
E
S
Miami
Everglades
Gulf of Mexico
Florida Straits
26.5
26.0
25.5
25.0
24.5
-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0

EPA developed Strategic Targets for the Water Quality Monitoring Project



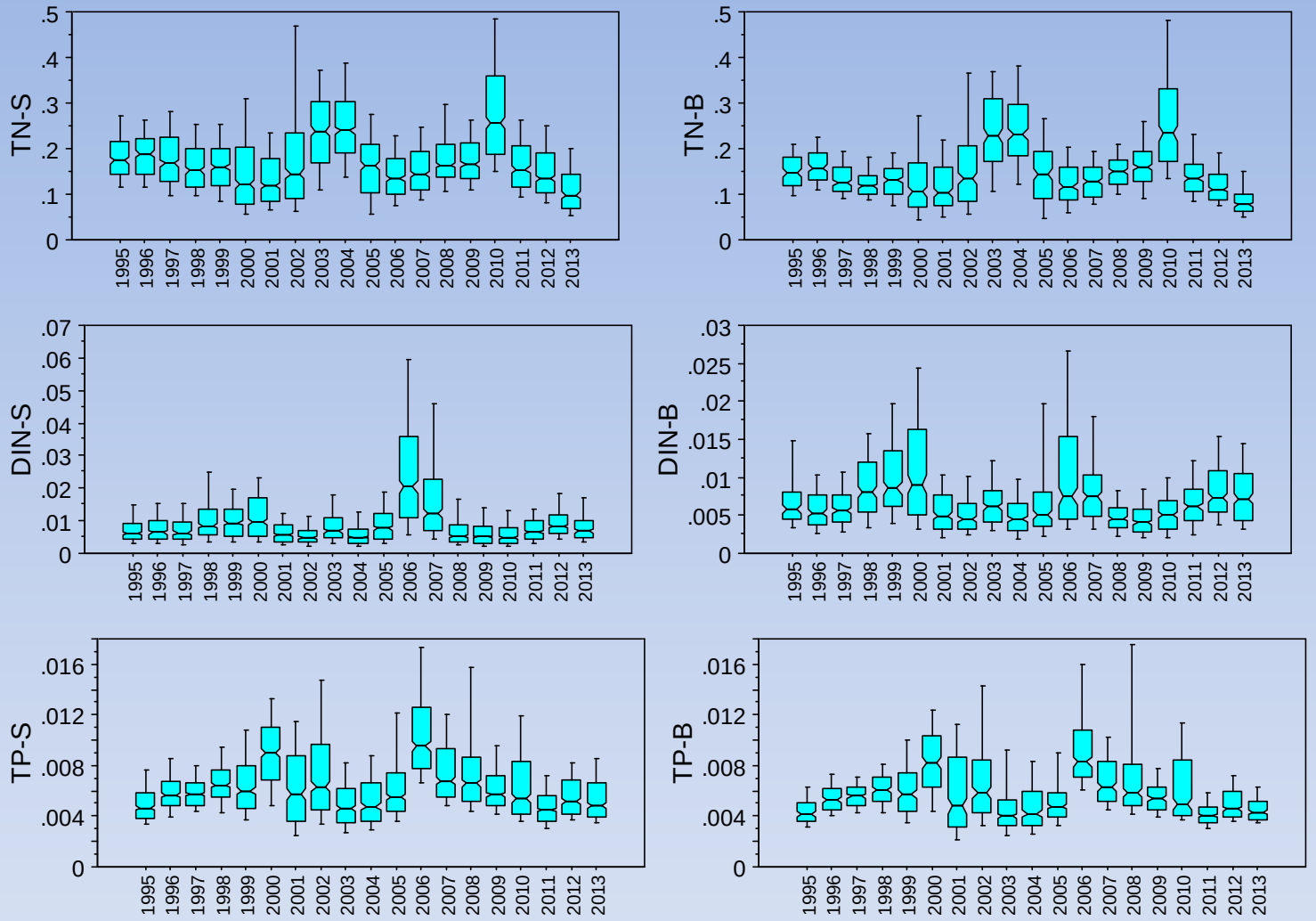
- **For all monitoring sites in FKNMS**
  - **dissolved inorganic nitrogen DIN ≤0.10 mg/l**
  - **total phosphorus, TP ≤ 0.0077 mg/l**

Compliance

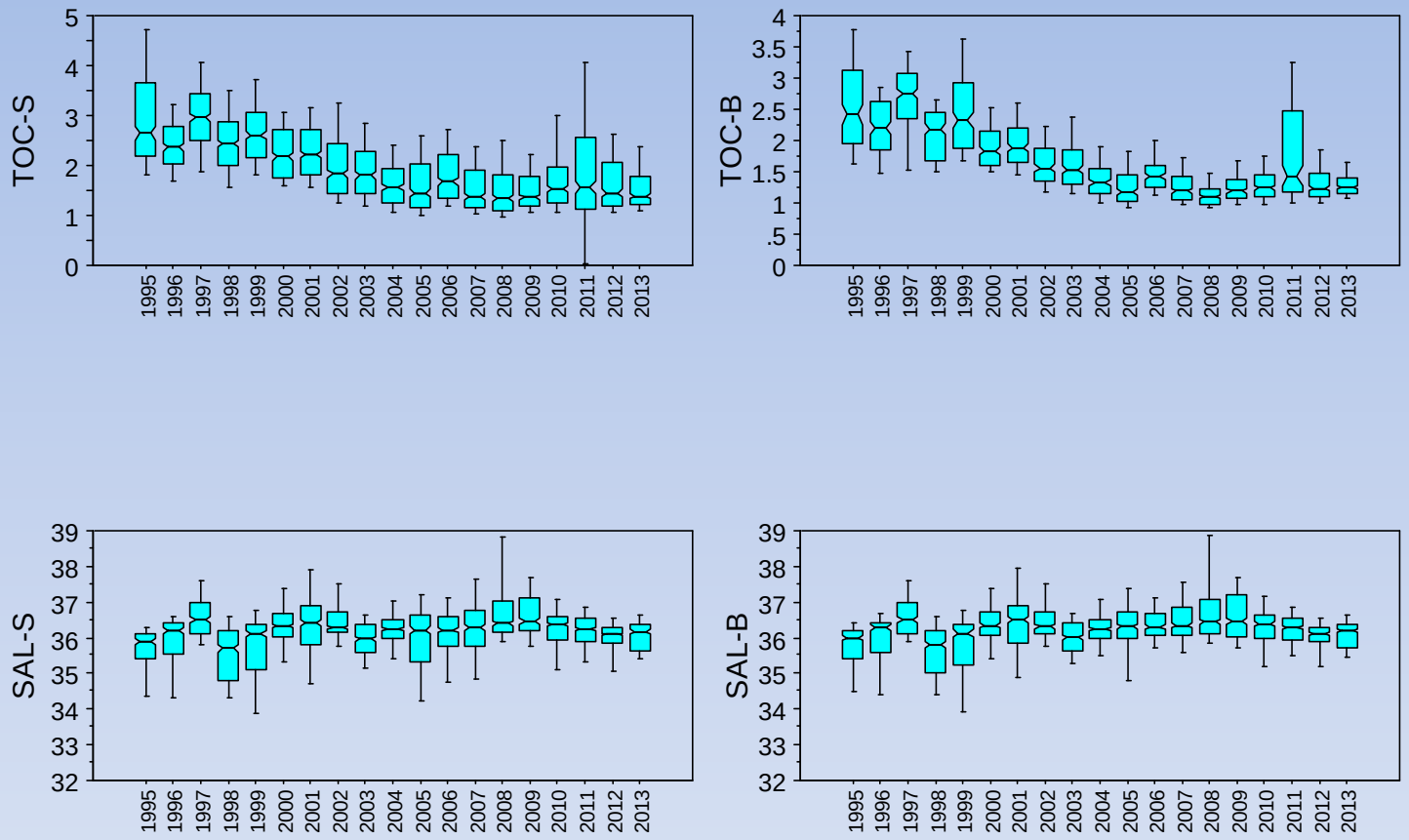
EPA WQPP Water Quality Targets

Year	Reef Stations		All Stations	
	CHLA ≤ 0.35 µg l^{-1}	K_d ≤ 0.20 m^{-1}	DIN ≤ 0.75 µM (0.010 ppm)	TP ≤ 0.25 µM (0.0077 ppm)
1995-05	1778 of 2367 (75.1%)	1042 of 1597 (65.2%)	7826 of 10254 (76.3%)	7810 of 10267 (76.1%)
2006	196 of 225 (87.1%)	199 of 225 (88.4%)	432 of 990 (43.6%)	316 of 995 (31.8%)
2007	198 of 226 (87.6%)	202 of 222 (91.0%)	549 of 993 (55.3%)	635 of 972 (65.3%)
2008	177 of 228 (77.6%)	181 of 218 (83.0%)	836 of 1,000 (83.6%)	697 of 1,004 (69.4%)
2009	208 of 228 (91.2%)	189 of 219 (86.3%)	858 of 1,003 (85.5%)	869 of 1,004 (86.6%)
2010	170 of 227 (74.9%)	176 of 206 (85.4%)	843 of 1,000 (84.3%)	738 of 1,003 (73.6%)
2011	146 of 215 (67.9%)	156 of 213 (73.2%)	432of 569 (75.9%)	507 of 569 (89.1%)
2012	142 of 168 (84.5%)	135 of 168 (80.4%)	268 of 447 (60.0%)	368 of 447 (82.3%)
2013	148 of 172 (86.0%)	115 of 172 (66.9%)	290 of 448 (64.7%)	353 of 448 (78.8%)

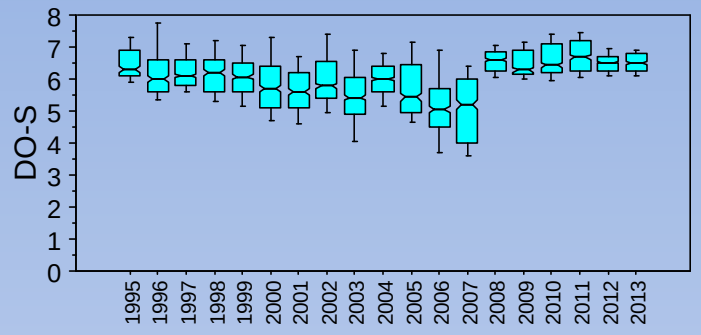
Temporal tendencies and trends

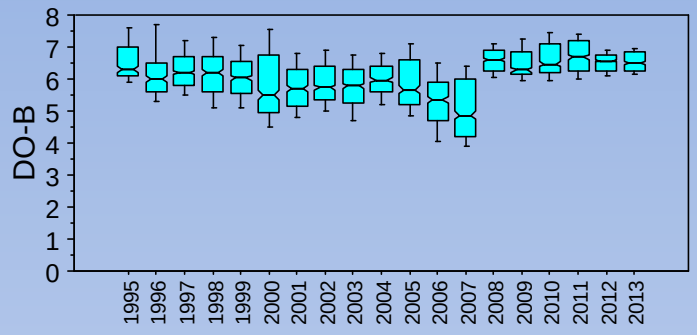


Nutrient cycles are more important than secular trend

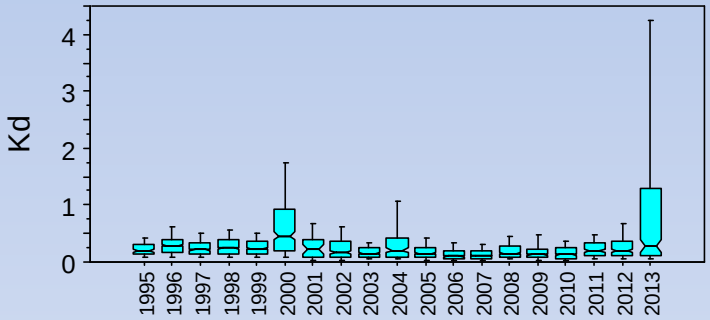


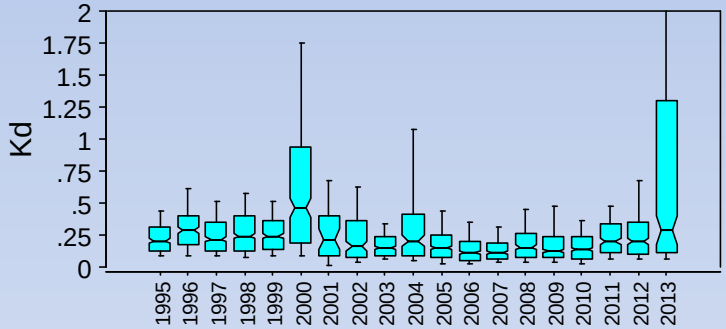
…except for TOC and Salinity

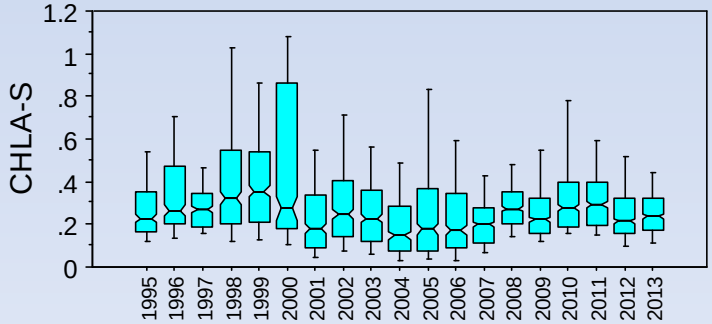




DO and %DO Sat display strong system shift in 2008-2008







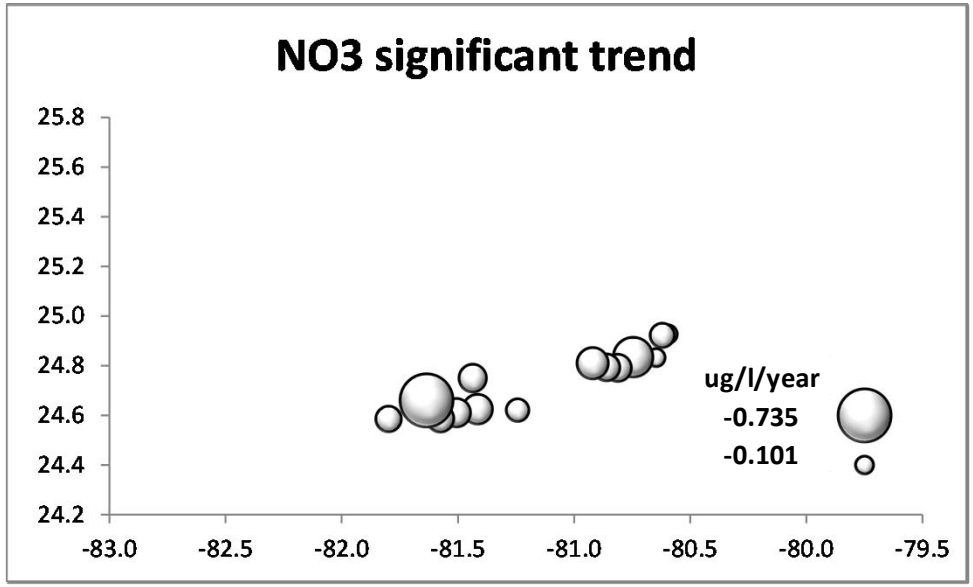
CHLa shift to lower levels linked to dryer regional climate (?)

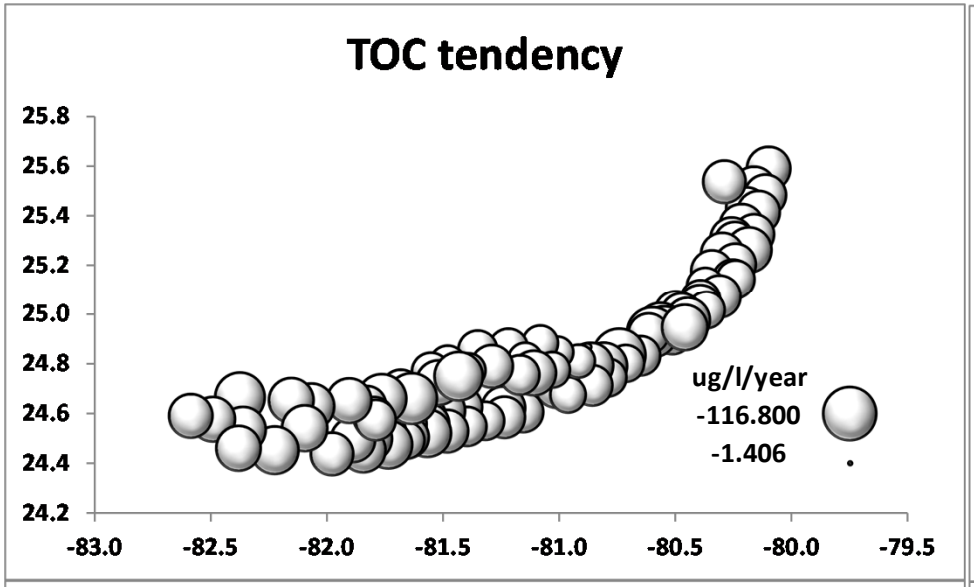
Spatial tendencies and trends

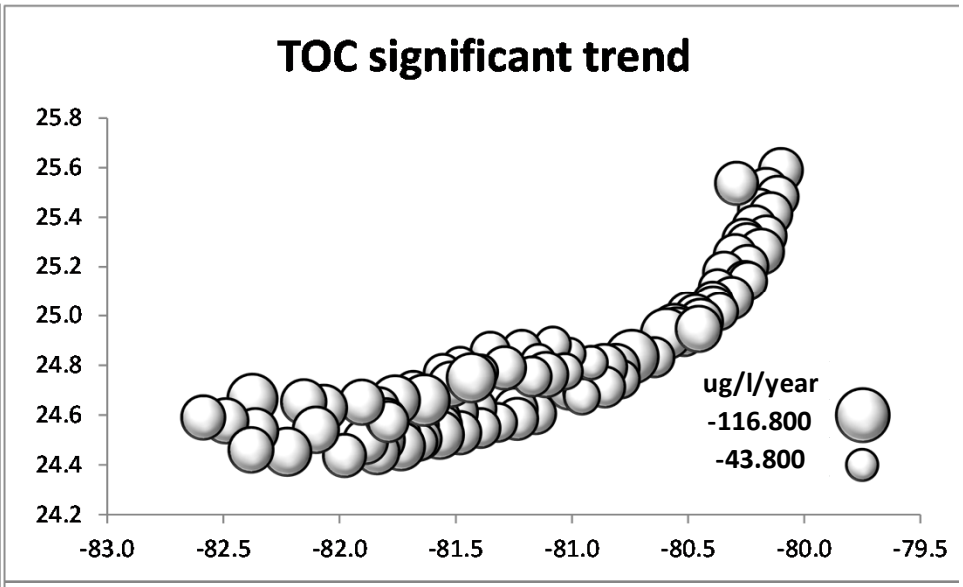
Trend Analysis

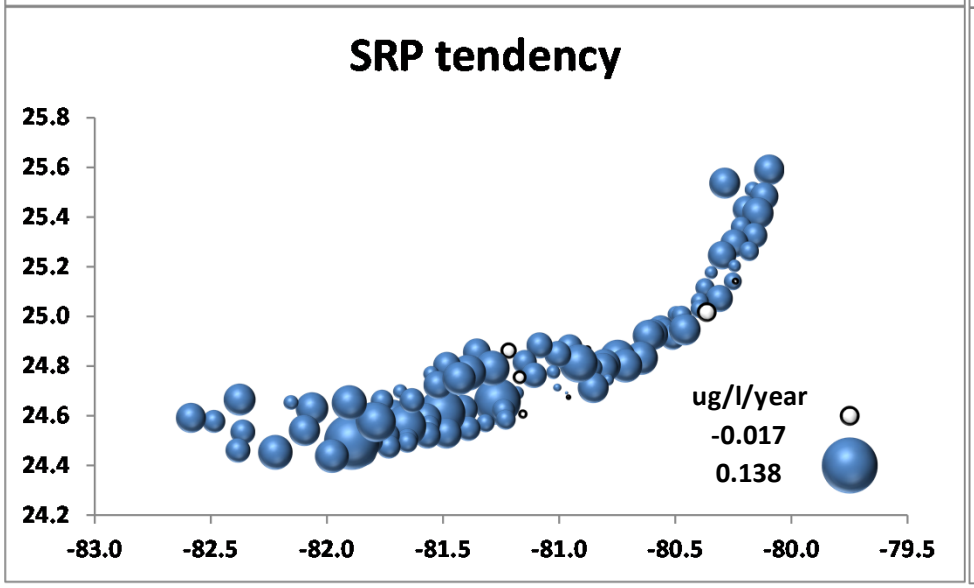
- Simplest approach
  - Slope of linear regression ***for each variable at each station***
  - POR 1995-2014
  - Significance level set at p<0.10

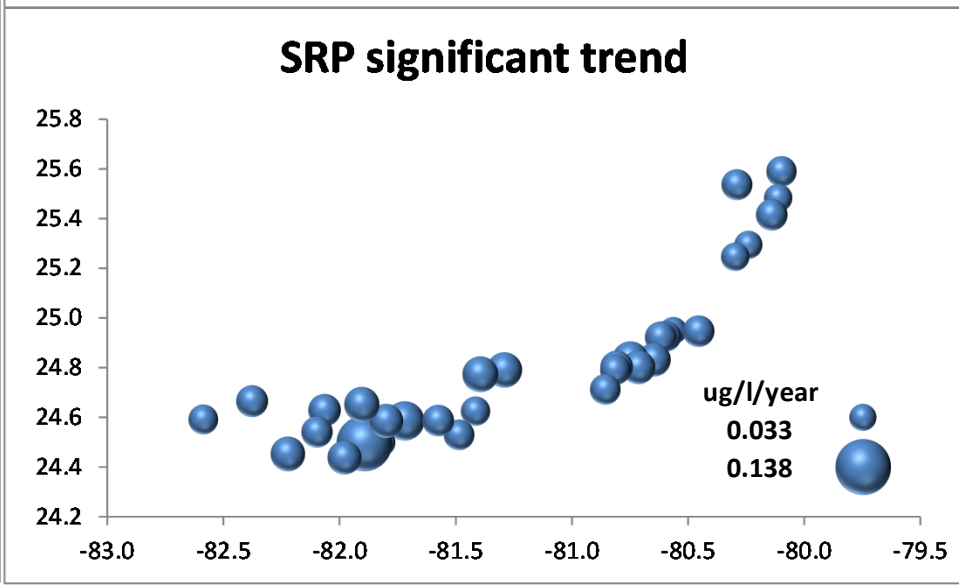
Increases in Blue
Declines in White

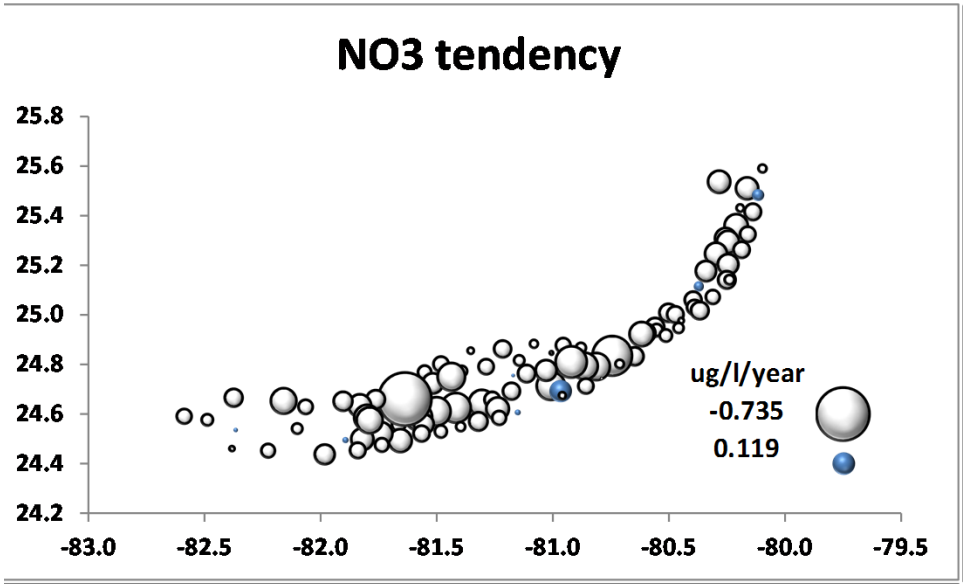


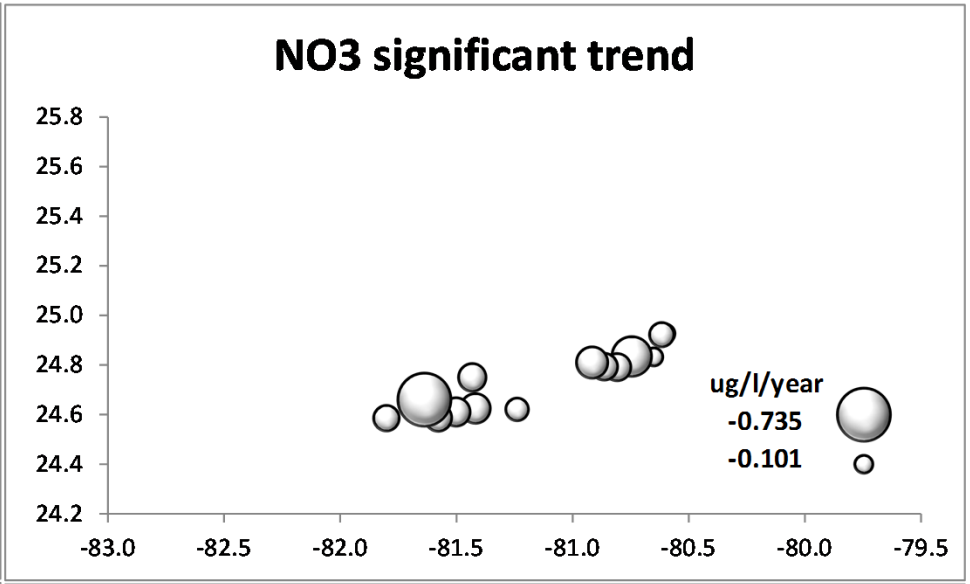

TOC tendency
25.8
25.6
25.4
25.2
25.0
24.8
24.6
24.4
24.2
-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0
-79.5
ug/l/year
-116.800
-1.406

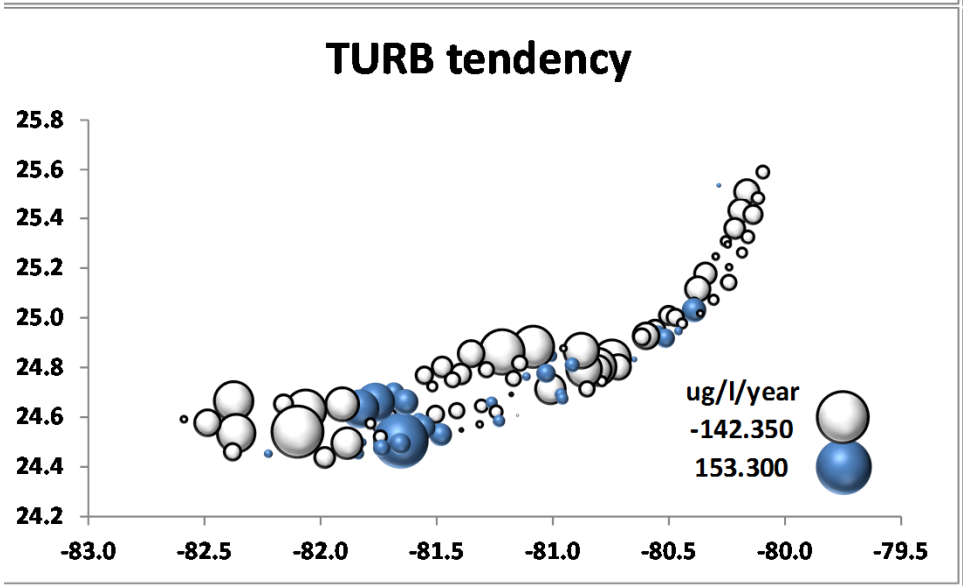

TOC significant trend
25.8
25.6
25.4
25.2
25.0
24.8
24.6
24.4
24.2
-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0
-79.5
ug/l/year
-116.800
-43.800

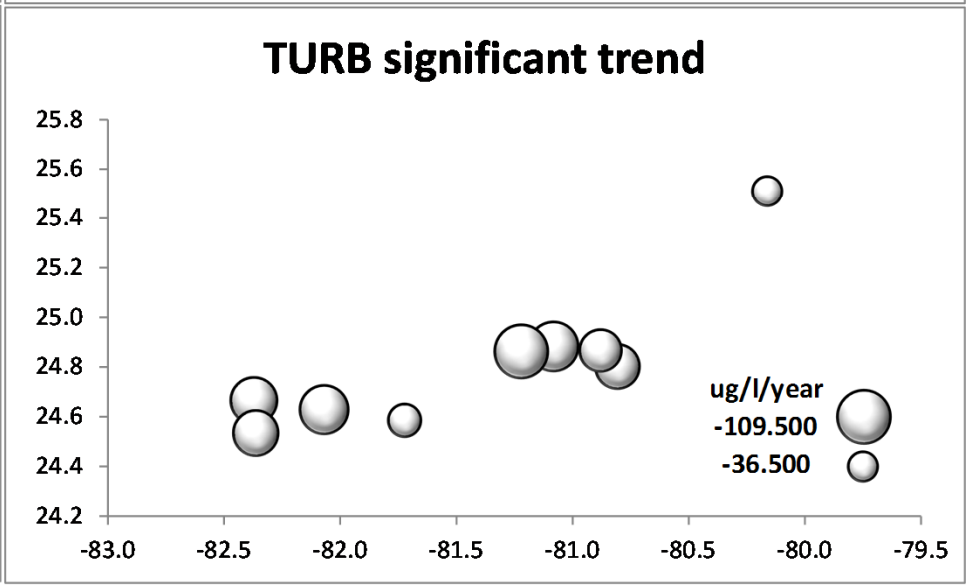

SRP tendency
25.8
25.6
25.4
25.2
25.0
24.8
24.6
24.4
24.2
-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0
-79.5
ug/l/year
-0.017
0.138


SRP significant trend
25.8
25.6
25.4
25.2
25.0
24.8
24.6
24.4
24.2
-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0
-79.5
ug/l/year
0.033
0.138

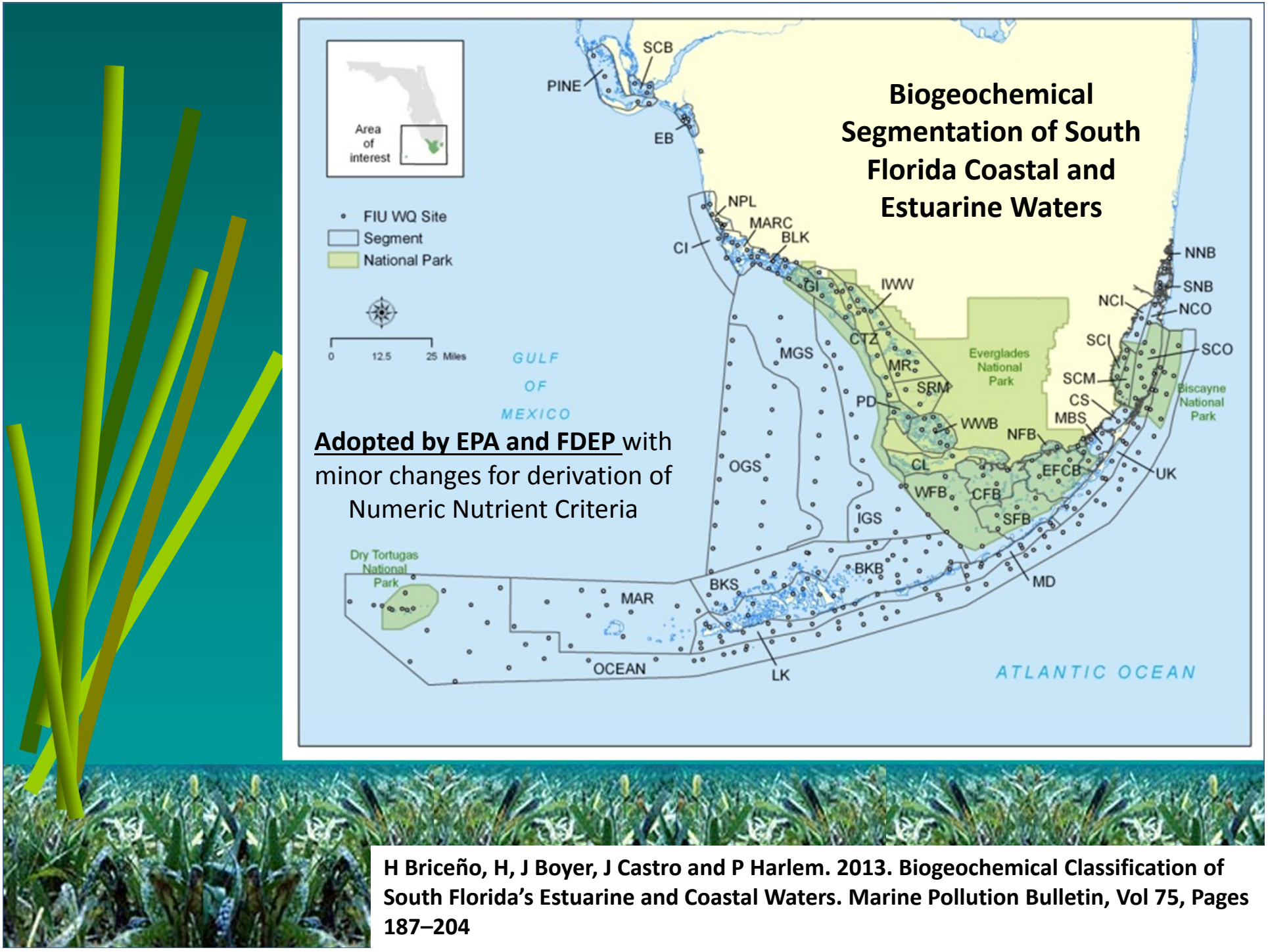

NO3 tendency
25.8
25.6
25.4
25.2
25.0
24.8
24.6
24.4
24.2
-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0
-79.5
ug/l/year
-0.735
0.119


NO3 significant trend
25.8
25.6
25.4
25.2
25.0
24.8
24.6
24.4
24.2
-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0
-79.5
ug/l/year
-0.735
-0.101


TURB tendency
25.8
25.6
25.4
25.2
25.0
24.8
24.6
24.4
24.2
-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0
-79.5
ug/l/year
-142.350
153.300


TURB significant trend
25.8
25.6
25.4
25.2
25.0
24.8
24.6
24.4
24.2
-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0
-79.5
ug/l/year
-109.500
-36.500

Recent achievements….



Adopted by EPA and FDEP with minor changes for derivation of Numeric Nutrient Criteria

H Briceño, H, J Boyer, J Castro and P Harlem. 2013. Biogeochemical Classification of South Florida's Estuarine and Coastal Waters. Marine Pollution Bulletin, Vol 75, Pages 187–204

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