

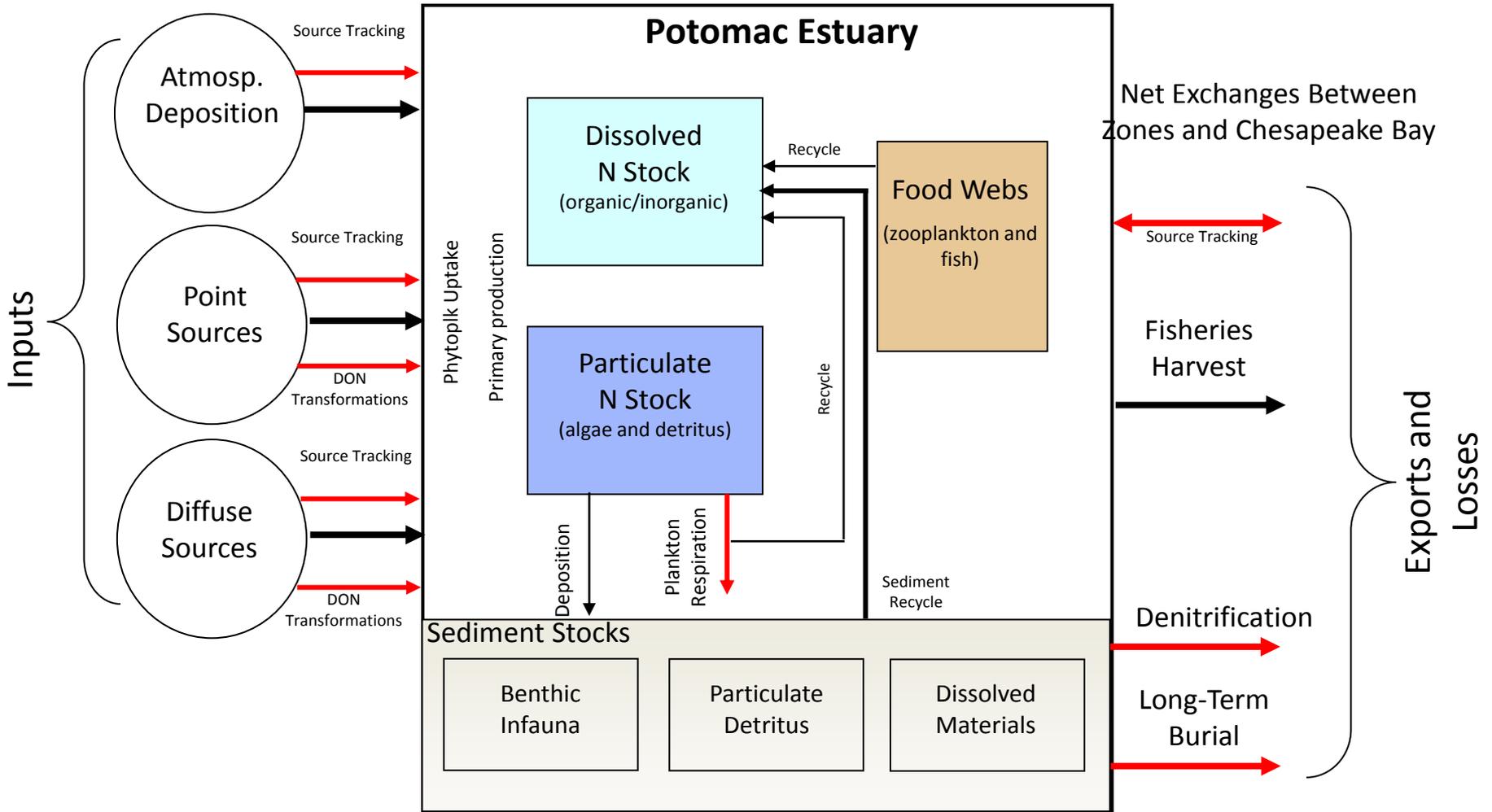
2011 Potomac Microcystis Bloom

Lora Harris, Katherine Ziombra, Meghann Niesen, & Hilary Staver



•Goal of our monitoring project is to assess fate of nitrogen in tidal Potomac.

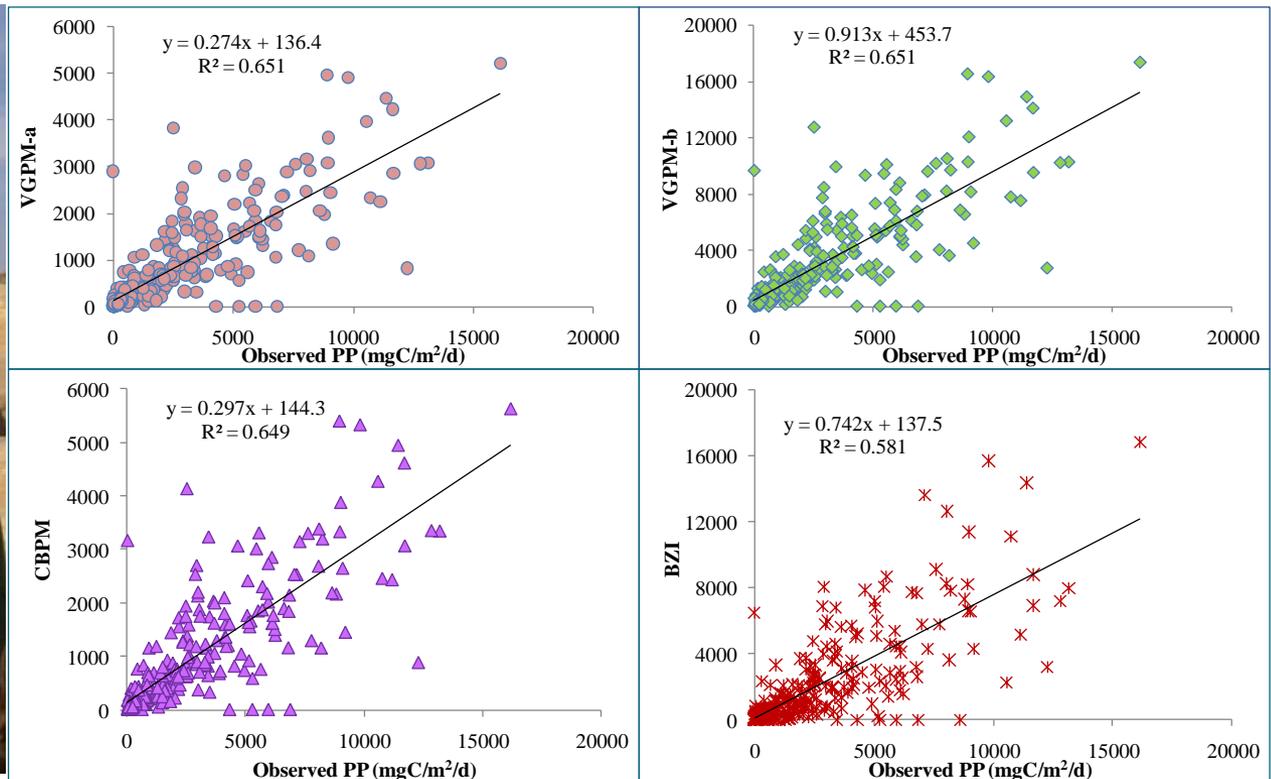
•This includes understanding carbon production & dynamics of phytoplankton community



Graduate Student Research

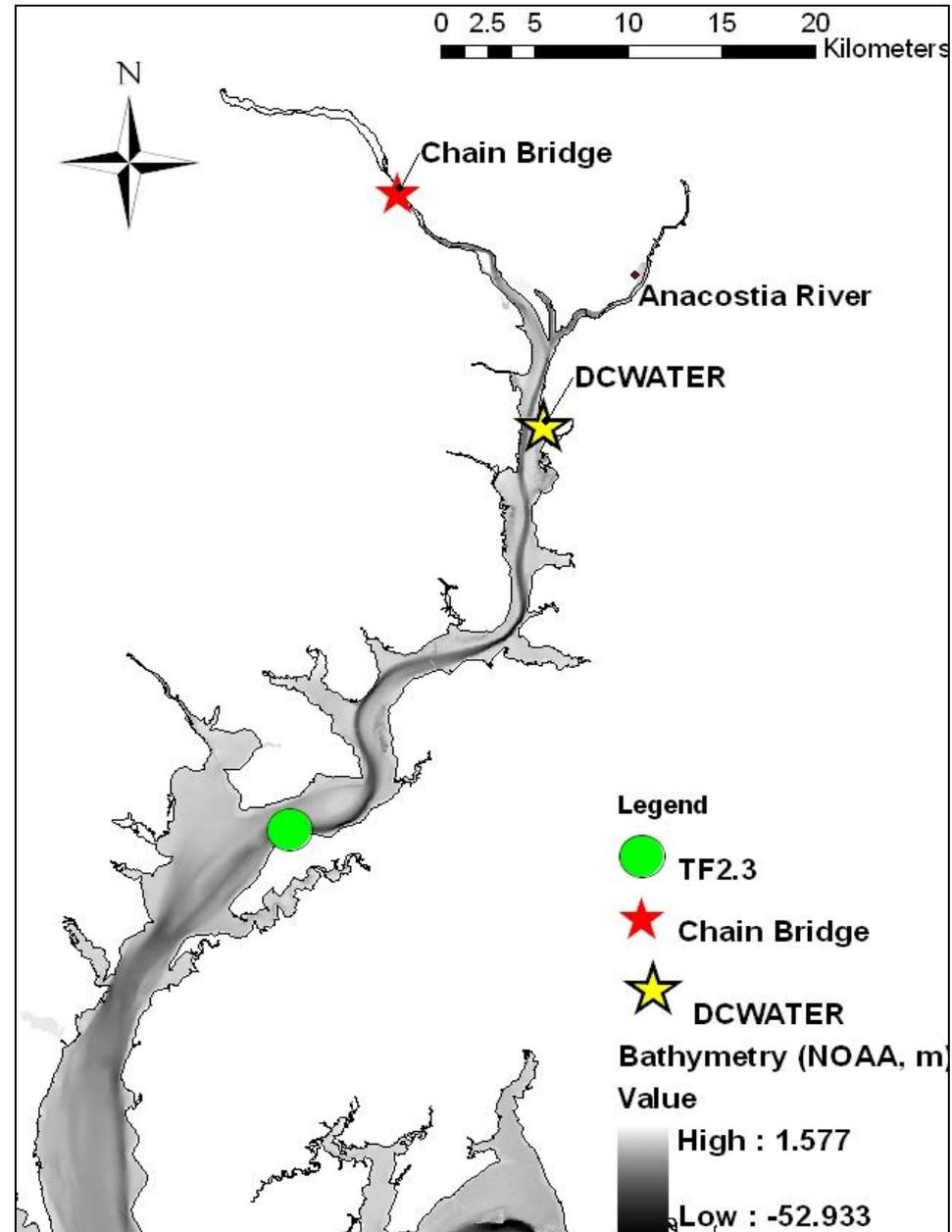
Katherine Ziombra, M.S. candidate UMCES-CBL

- 1. What models of primary production are effective in the tidal fresh Potomac?*
- 2. How have patterns of water column nitrogen concentrations changed in the context of management actions at the Blue Plains Wastewater Treatment Plant?*

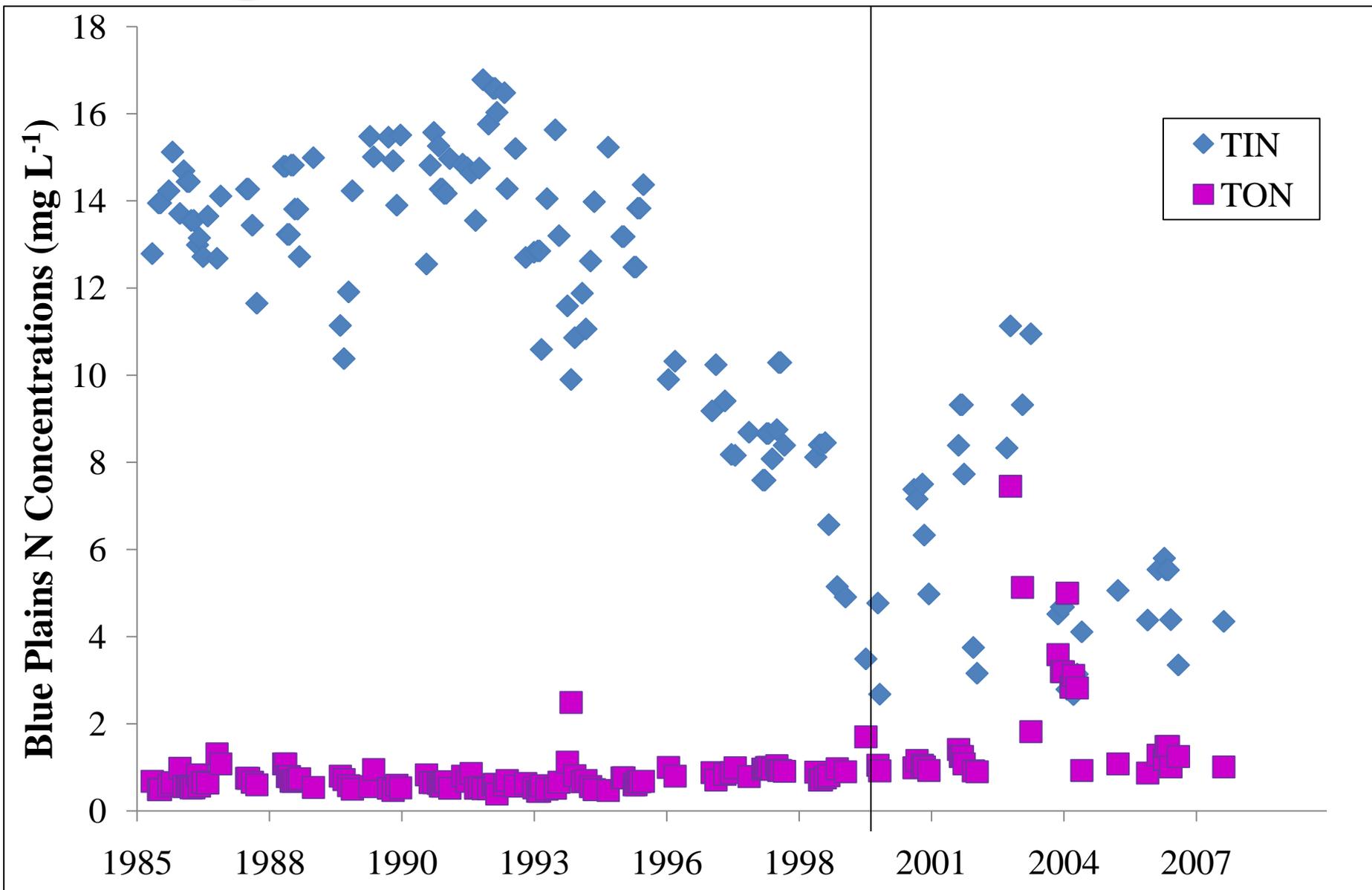


Analysis of Tidal Fresh Over Past 20 Years

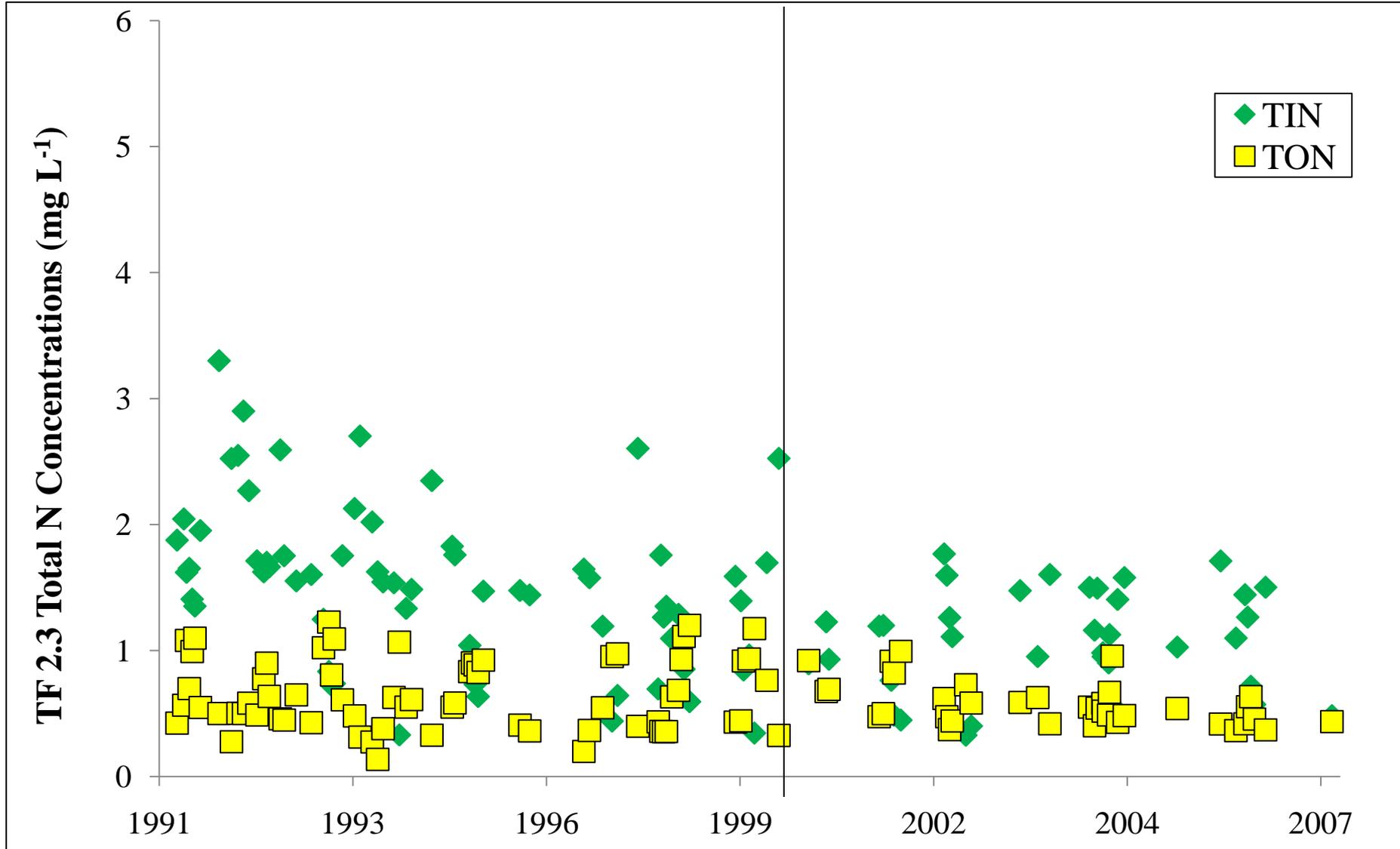
- Empirical relationship between N and production
- Assess impact of BP WWTP on nutrient reduction
- Address organic N
- Station in close proximity to BP with adequate data set
- Evaluate N source contributing to primary production



Nitrogen Concentration at Blue Plains



Nitrogen Concentration at TF 2.3



Evaluation of Nitrogen Sources

- Which nitrogen source influenced primary production downstream of Blue Plains?
 - Blue Plains or Potomac River at Chain Bridge
- All possible subset regression

PP/chl ~ Blue Plains TN load + Chain Bridge TN load + Chain Bridge TSS load + Photic zone depth + Year + TF2.3 DIN + Chain Bridge discharge

- AICc, w_i , and adjusted r^2 criterion
- Pre and Post BNR implementation

Model Ranking

Pre-BNR				
	PP/cbl=	adj r ²	AICc	w _i
Model 1	TF DIN	0.139	62.808	.085
Model 2	Zp	0.131	62.972	.078
Model 3	BP TN Load	0.130	62.981	.078
Model 5	Zp + TF DIN	0.174	63.938	.048
Post-BNR				
Model 1	TF DIN	0.199	55.760	.132
Model 2	T	0.078	57.408	.058
Model 5	Year	0.070	57.504	.055
Model 4	Zp + TF DIN	0.204	57.521	.055

Conclusions

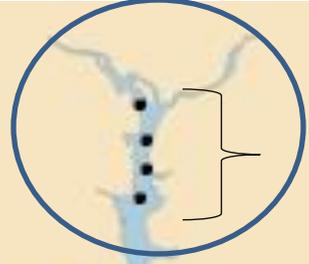
- Pre-BNR
 - Blue Plains nitrogen contributed to primary production
 - Local DIN nitrogen primary source
 - Photic depth influenced primary production
- Post BNR
 - Blue Plains nitrogen was not a variable in the top ranked models
 - Light and local DIN principal variables affecting primary production

Microcystis Primary Production



- Bloom of the blue-green algae *Microcystis aeruginosa* in the Potomac that began was present during our August cruise
- Changed species composition of plankton community

More intensive Source Tracking Stations



CBL 1 - 4

★ Long-term Biodiversity Monitoring



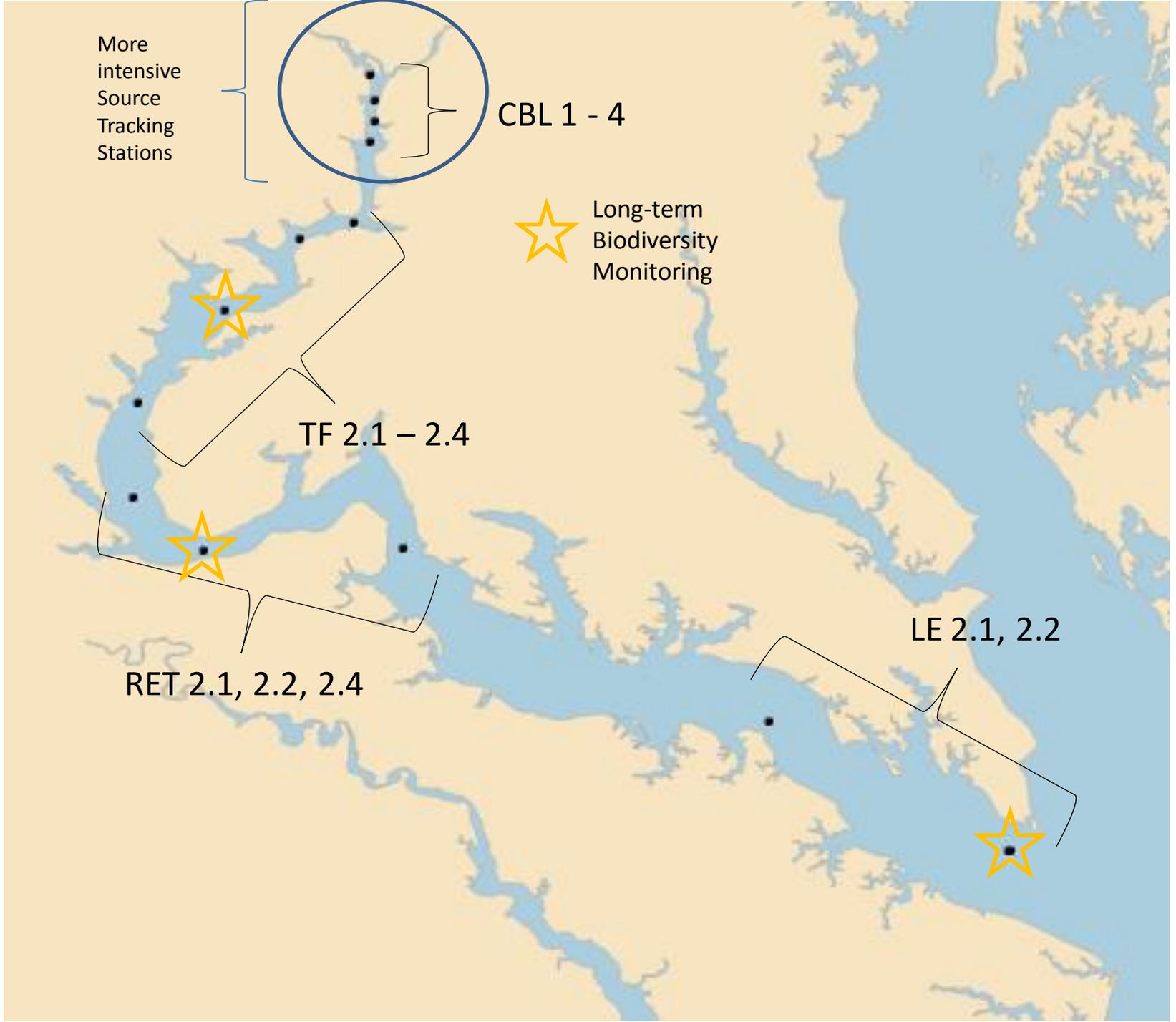
TF 2.1 - 2.4



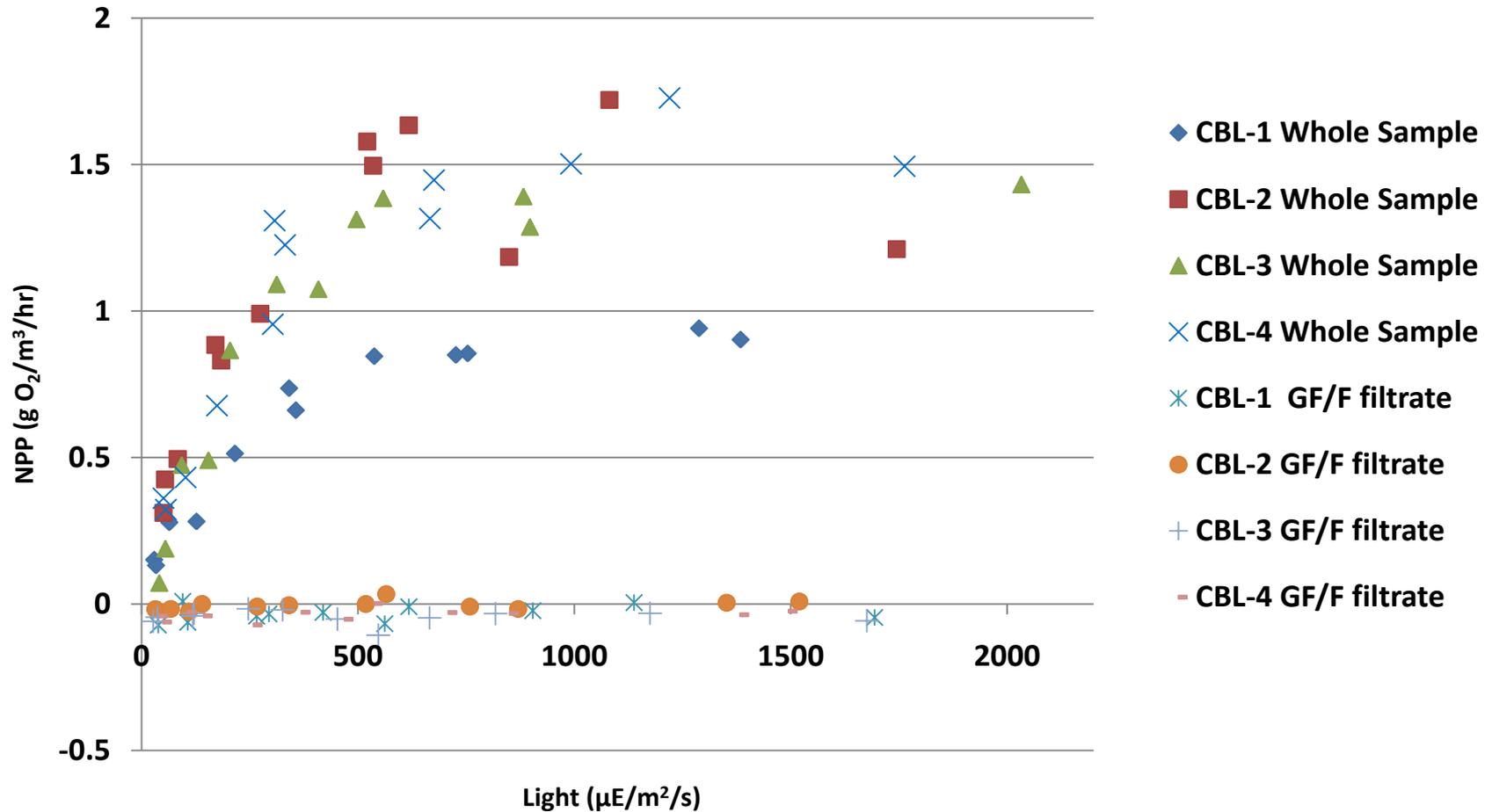
RET 2.1, 2.2, 2.4



LE 2.1, 2.2



August Net Primary Productivity



Effects on Primary Productivity Models

$$P_d = 0.81 B Z_p I_0 e^{-E/kT}$$

		Predicted Daily Net Primary Productivity (mg C/m ² /day)		Picoplankton Productivity as % of Total Productivity
Station ID	Larger Size Classes	Picoplankton a. actual prediction <i>b. for 2 ug/L chlorophyll</i>	Total	
CBL-1	1162.6	1.1 <i>77.9</i>	1163.7 <i>1240.5</i>	0.09% <i>6.28%</i>
CBL-2	1041.4	1.3 <i>68.3</i>	1042.6 <i>1109.7</i>	0.12% <i>6.16%</i>
CBL-3	1554.6	2.3 <i>80.4</i>	1556.8 <i>1634.9</i>	0.15% <i>4.92%</i>
CBL-4	1406.7	1.3 <i>79.6</i>	1408.1 <i>1486.3</i>	0.10% <i>5.35%</i>

Graduate Student Research

Meghann Niesen, M.S. candidate UMCES-CBL

- 1. Are primary production rates influenced by biodiversity in the Potomac?*
- 2. How do molecular approaches compare with microscopic identification when measuring metrics of biodiversity?*

