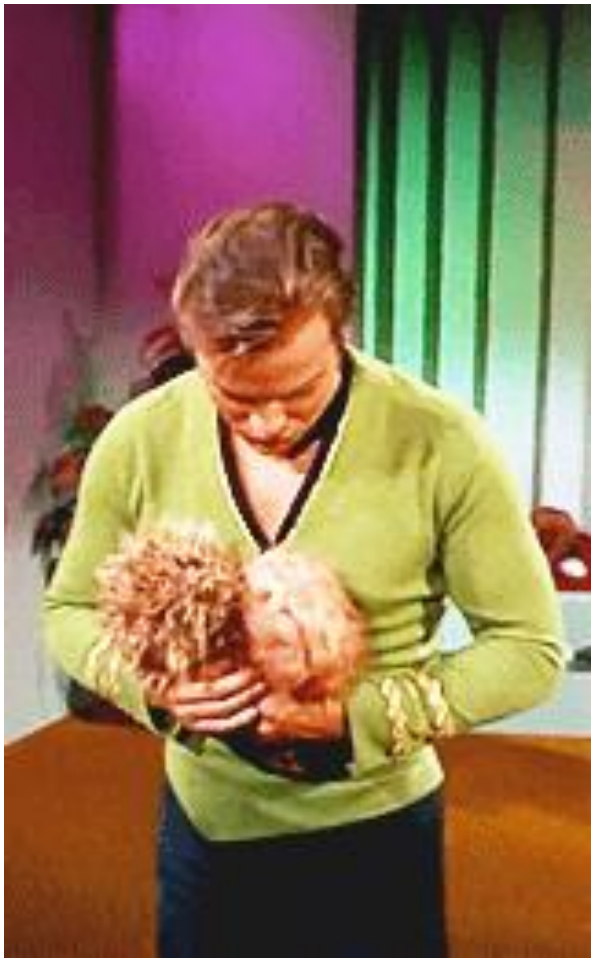
University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

THE TROUBLE WITH TRIBLETS

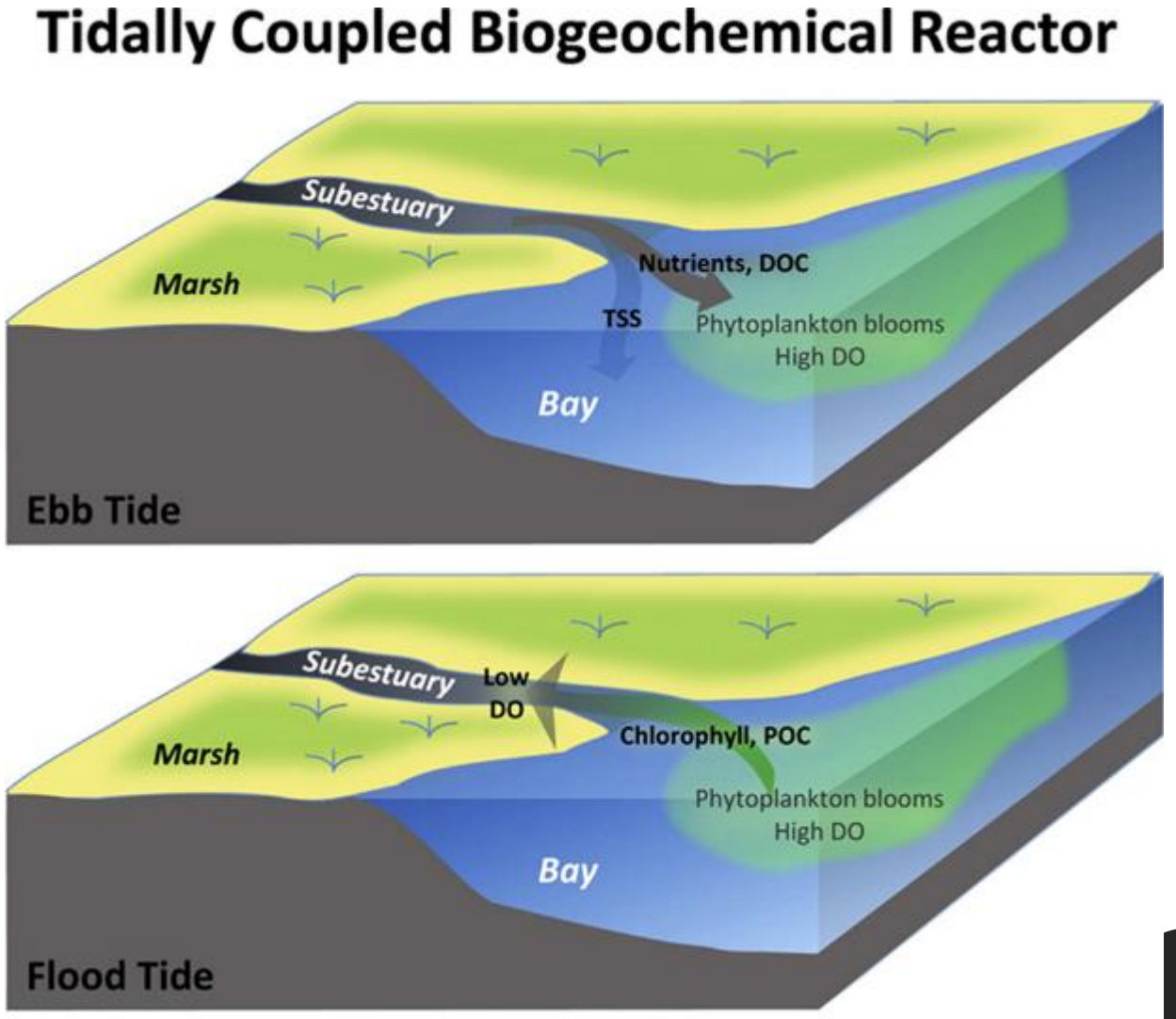
Lora Harris – UMCES CBL

w/ M Forsyth, J Testa, A Rodriguez, L Lapham

Tribbles
vs.
Triblets



Tribbles vs. Triblets



Voynova et al. 2015 ECSS

Triblets are:

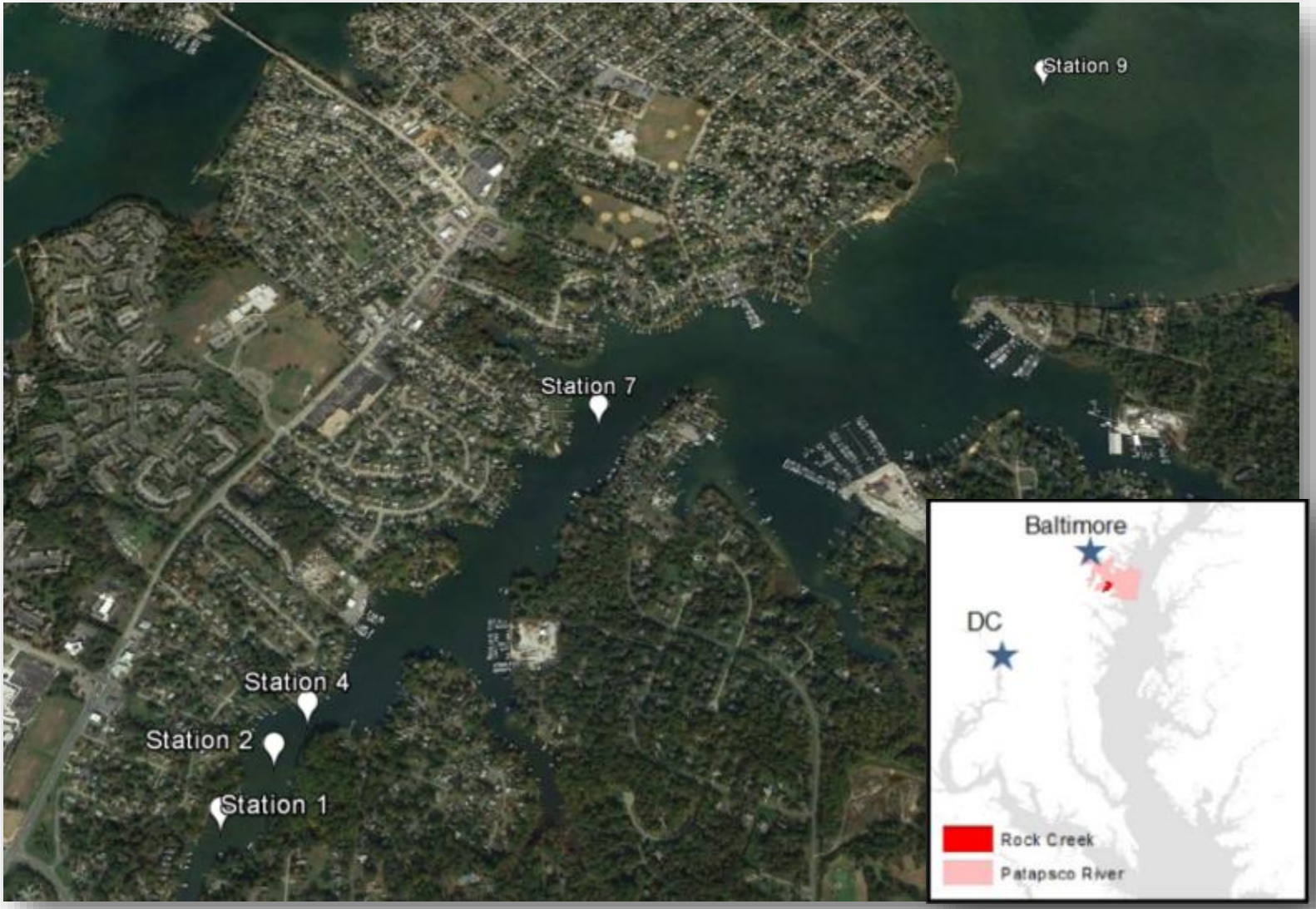
- *Adored*
- *Numerous*
- *Troublesome!*

Anne Arundel County
WATERSHED
Protection & Restoration
PROGRAM

restore
ROCK CREEK

CALVERT COUNTY
ESTABLISHED 1654

http://www.ceem.cbl.umces.edu/


Station 9
Station 7
Station 4
Station 2
Station 1
Baltimore
DC
Rock Creek
Patapsco River

Contents lists available at ScienceDirect

Ecological Engineering

journal homepage: www.elsevier.com/locate/ecoleng

Optimizing recovery of eutrophic estuaries: Impact of destratification and re-aeration on nutrient and dissolved oxygen dynamics

L.A. Harris [a,*], C.L.S. Hodgkins [a], M.C. Day [a], D. Austin [b], J.M. Testa [a], W. Boynton [a], L. Van Der Tak [b], N.W. Chen [c]

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Optimizing recovery of eutrophic estuaries: Impact of destratification and re-aeration on nutrient and dissolved oxygen dynamics

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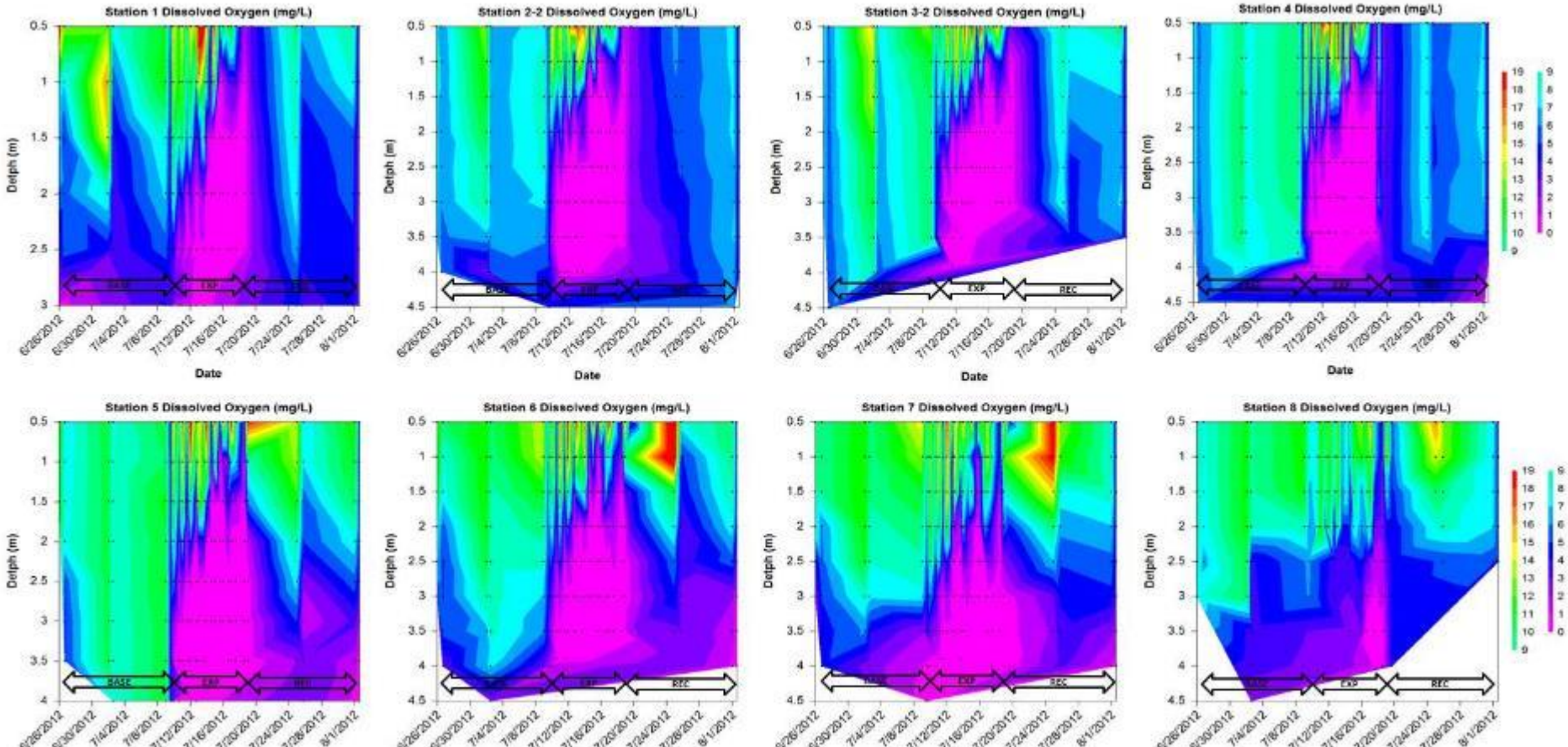
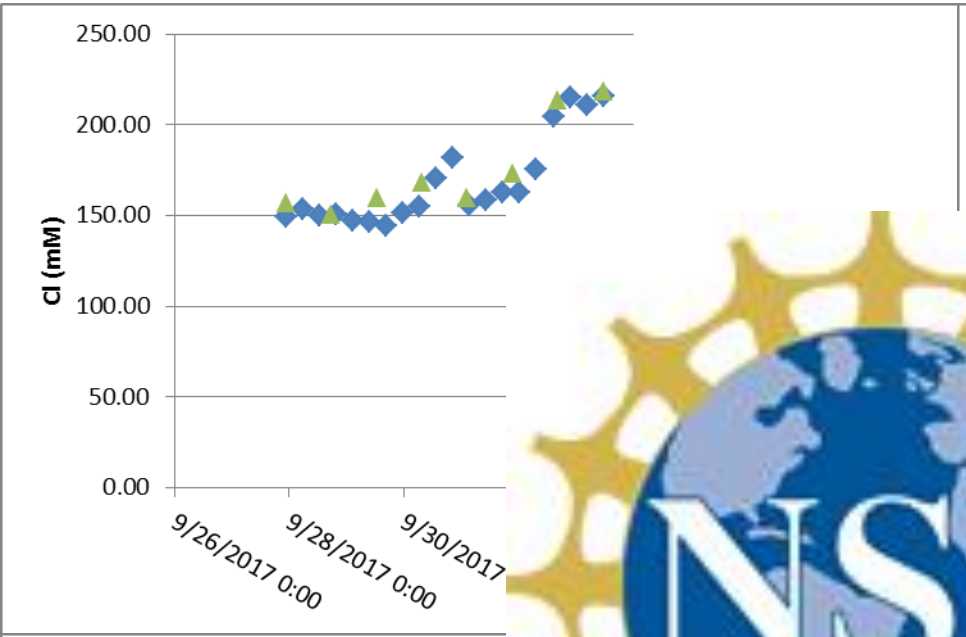
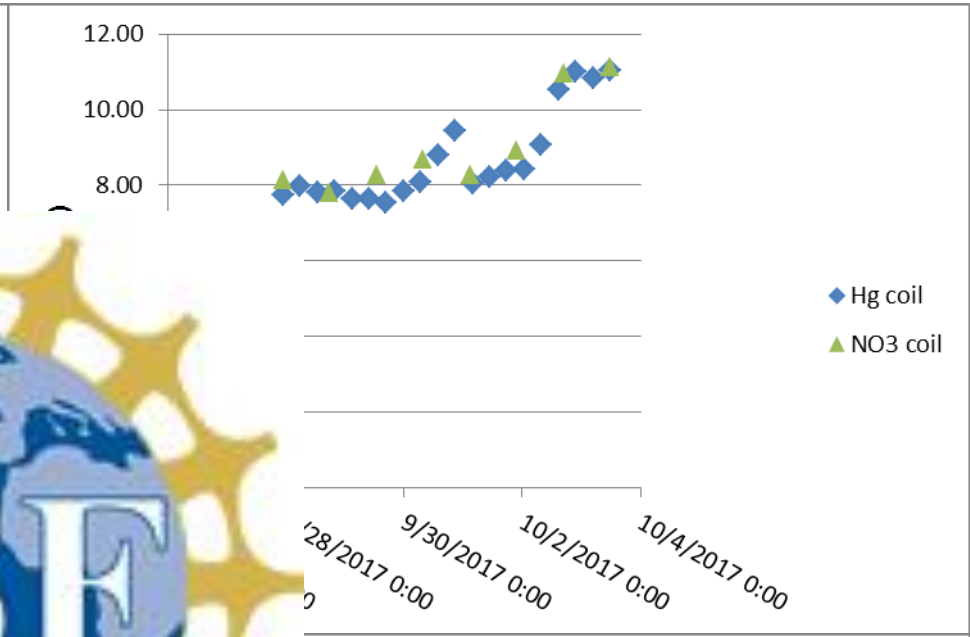
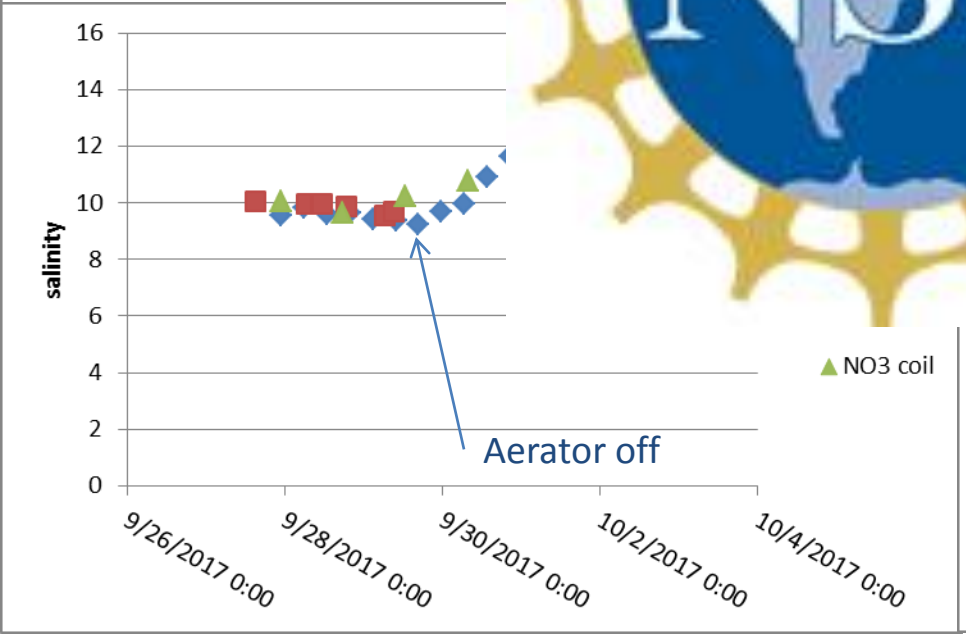
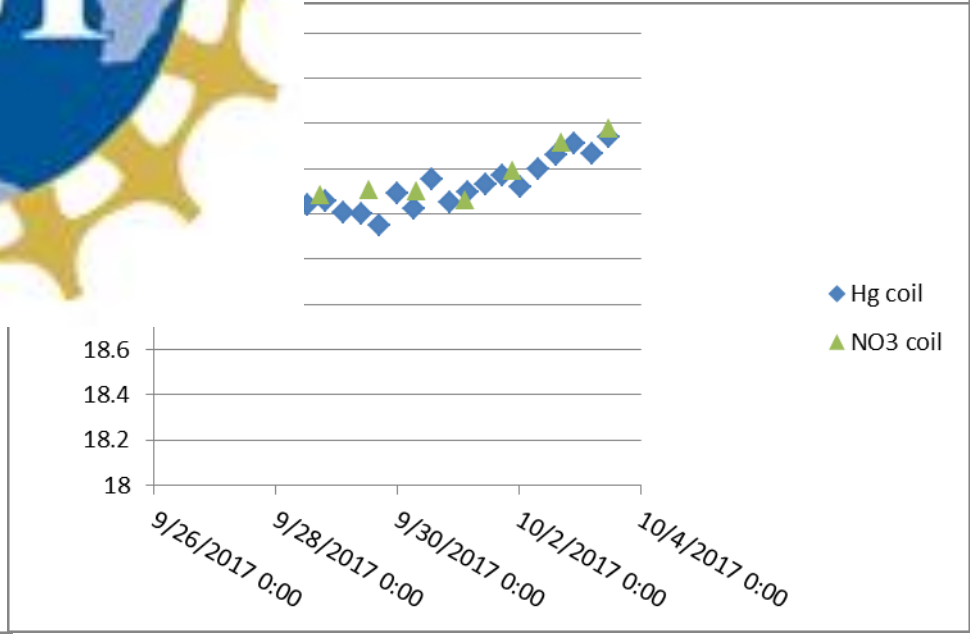


Short term deployment results thus far





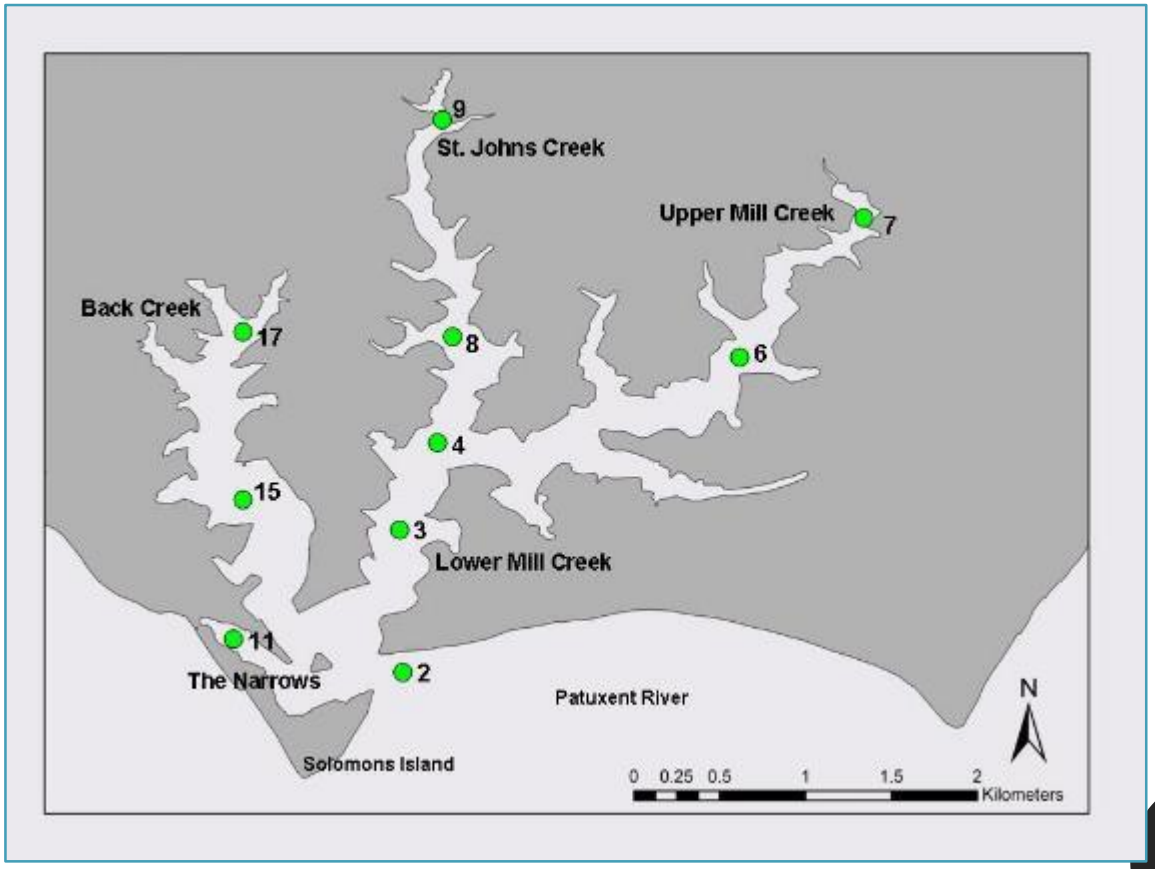




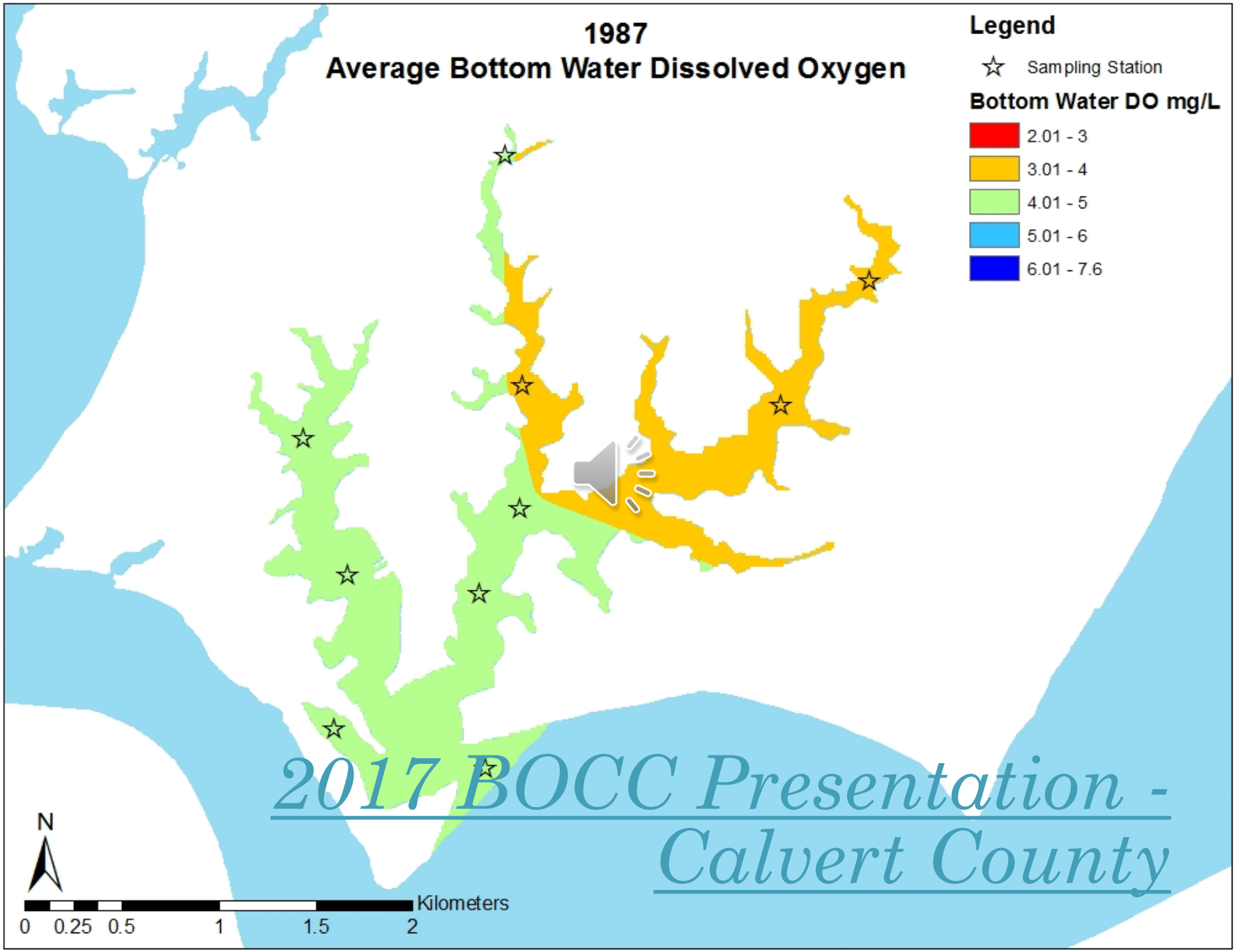
Lessons Learned…

Adored & Community Invested
$$$$$$$$$$$$$
Fascinating Biogeochemistry!

Solomons Harbor Sampling Locations 1987-2015



- Dissolved Oxygen
- Temperature
- Salinity
- Chlorophyll
- Secchi Disk



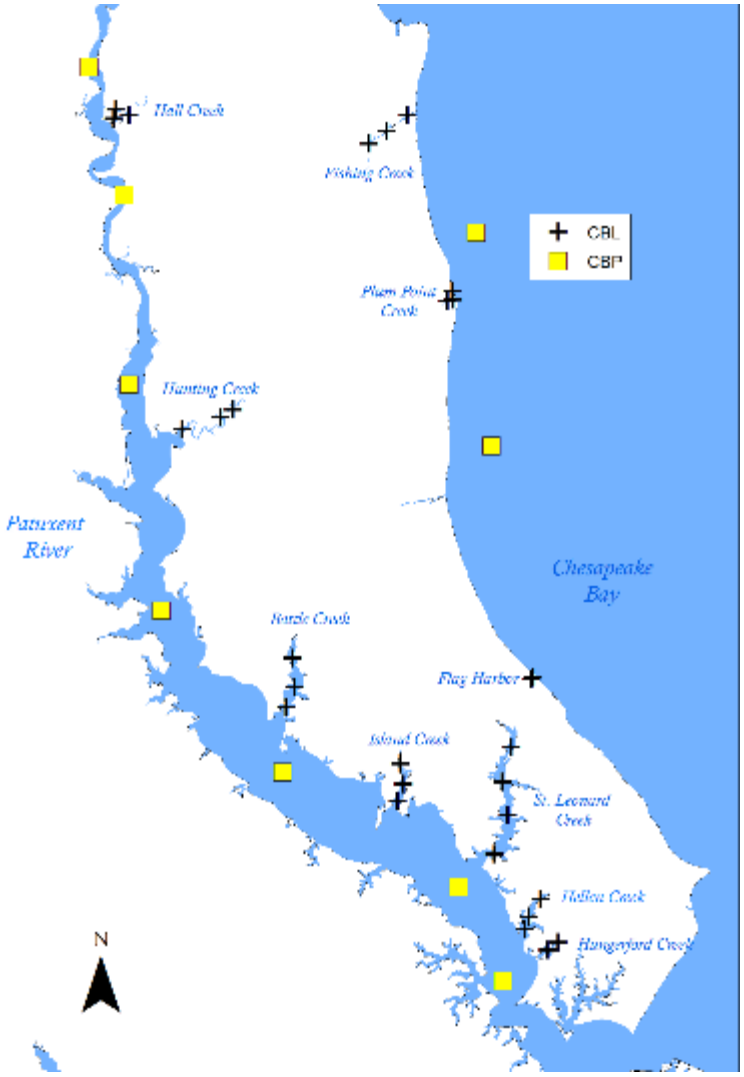
2017 BOCC Presentation - Calvert County

Chesapeake Bay -> Calvert County, MD

Monitoring Calvert County

Patuxent River & western Bay monitored through Chesapeake Bay Program (CBP)

- ~1985-present
- 9 stations

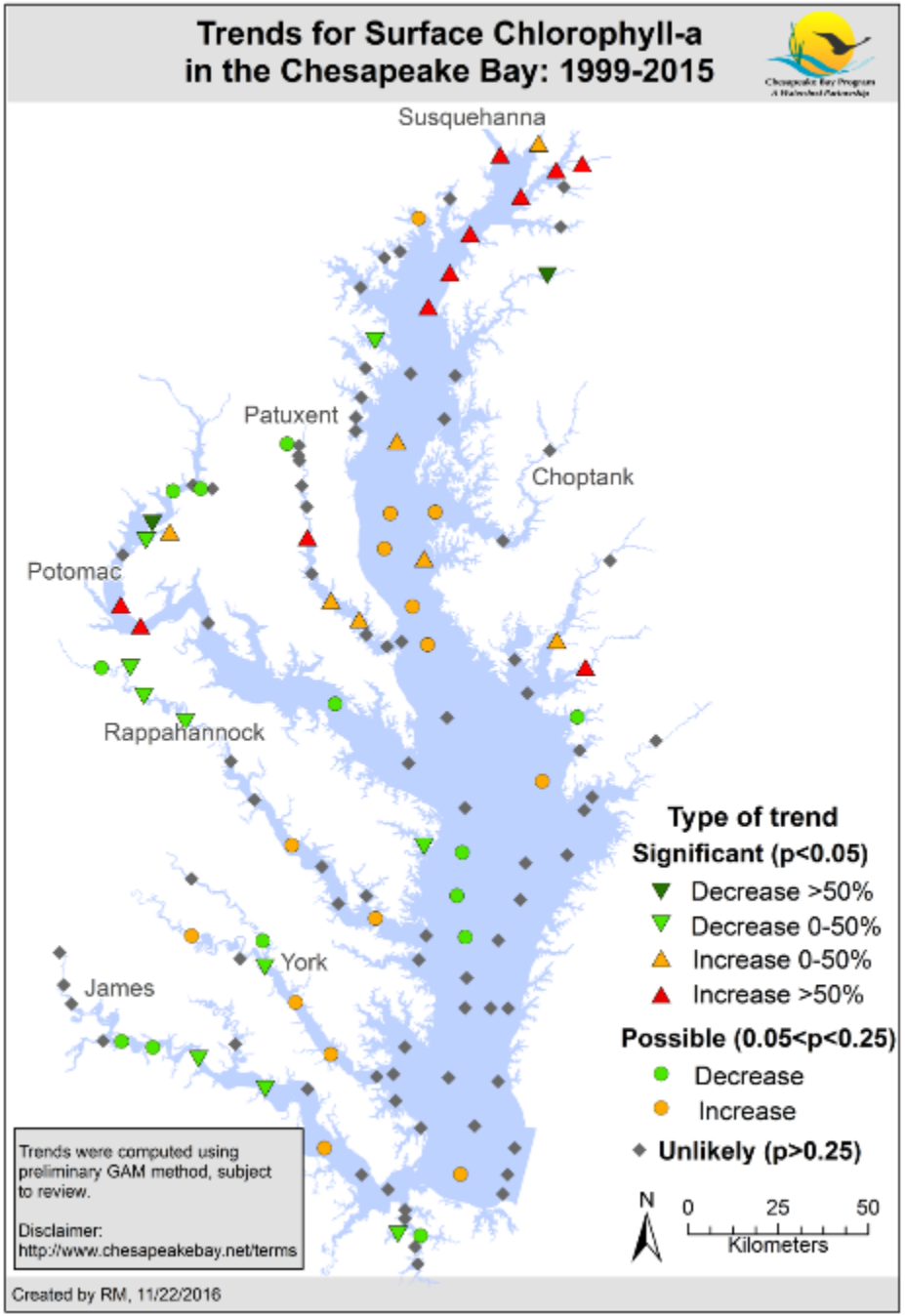


Triblets monitored by Chesapeake Biological Lab (CBL)

- ~2010-2017
- 29 stations

Assessing Trends with Generalized Additive Models (GAMs)

CBP looks at trends using this statistical approach in mainstem of tributaries

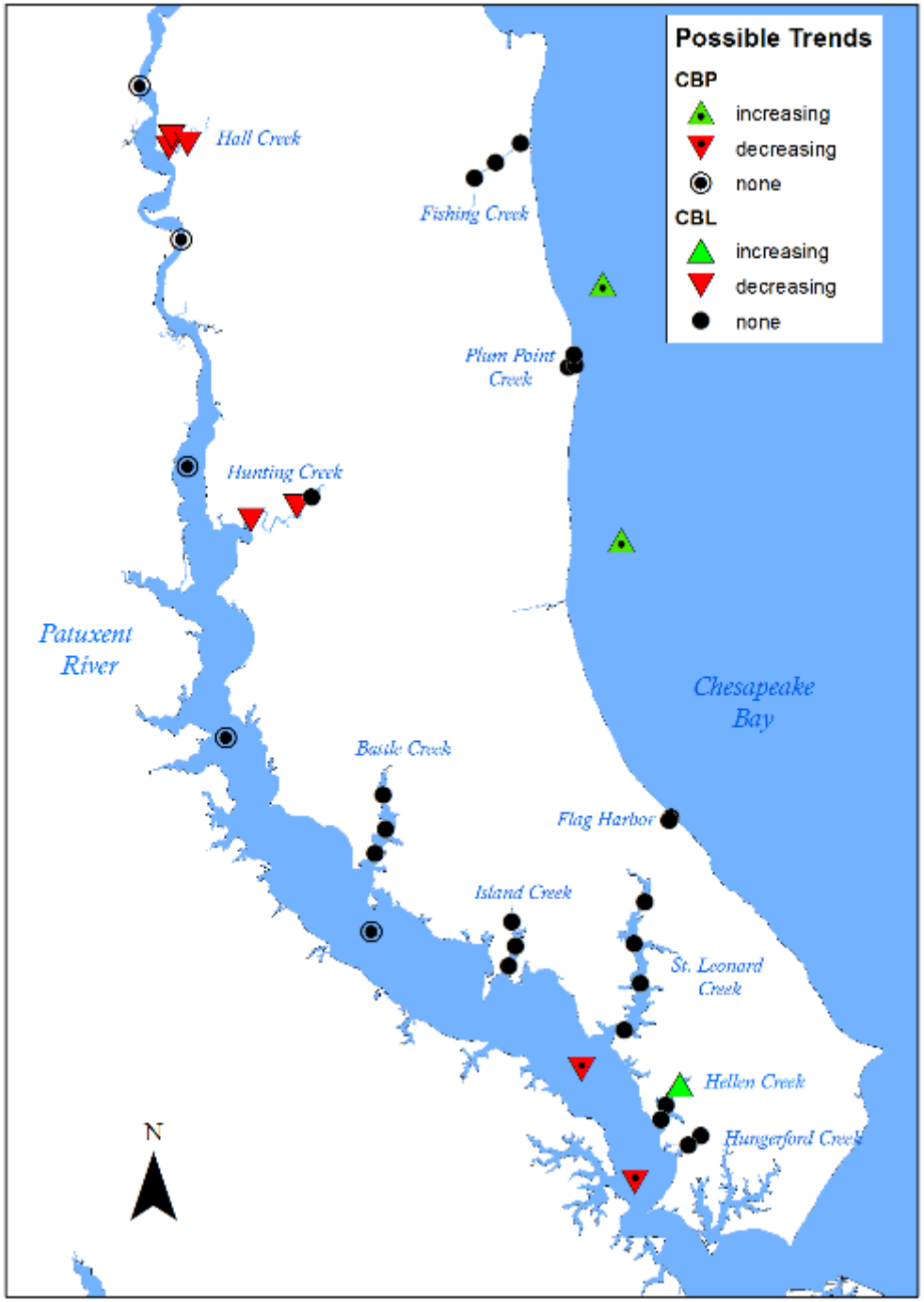


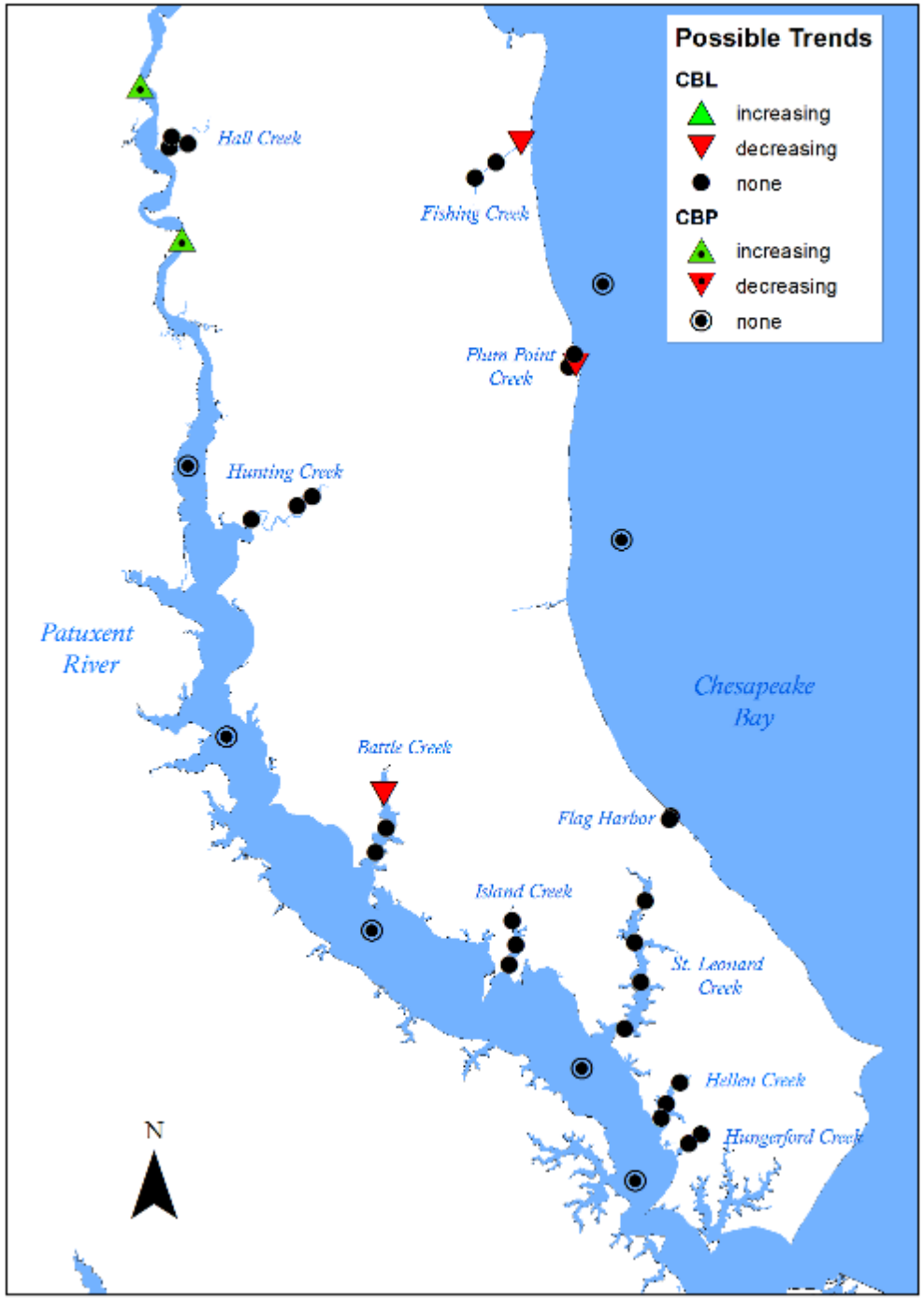
Time-series Observations

- GAMs for same years & months used to identify trends
- Response Variables:
  - Water Clarity (Secchi)
  - Bottom Dissolved Oxygen
  - Surface Chlorophyll
- Water quality ~ s(year) + s(day of year)

Water Clarity (Secchi)

~2010-2017



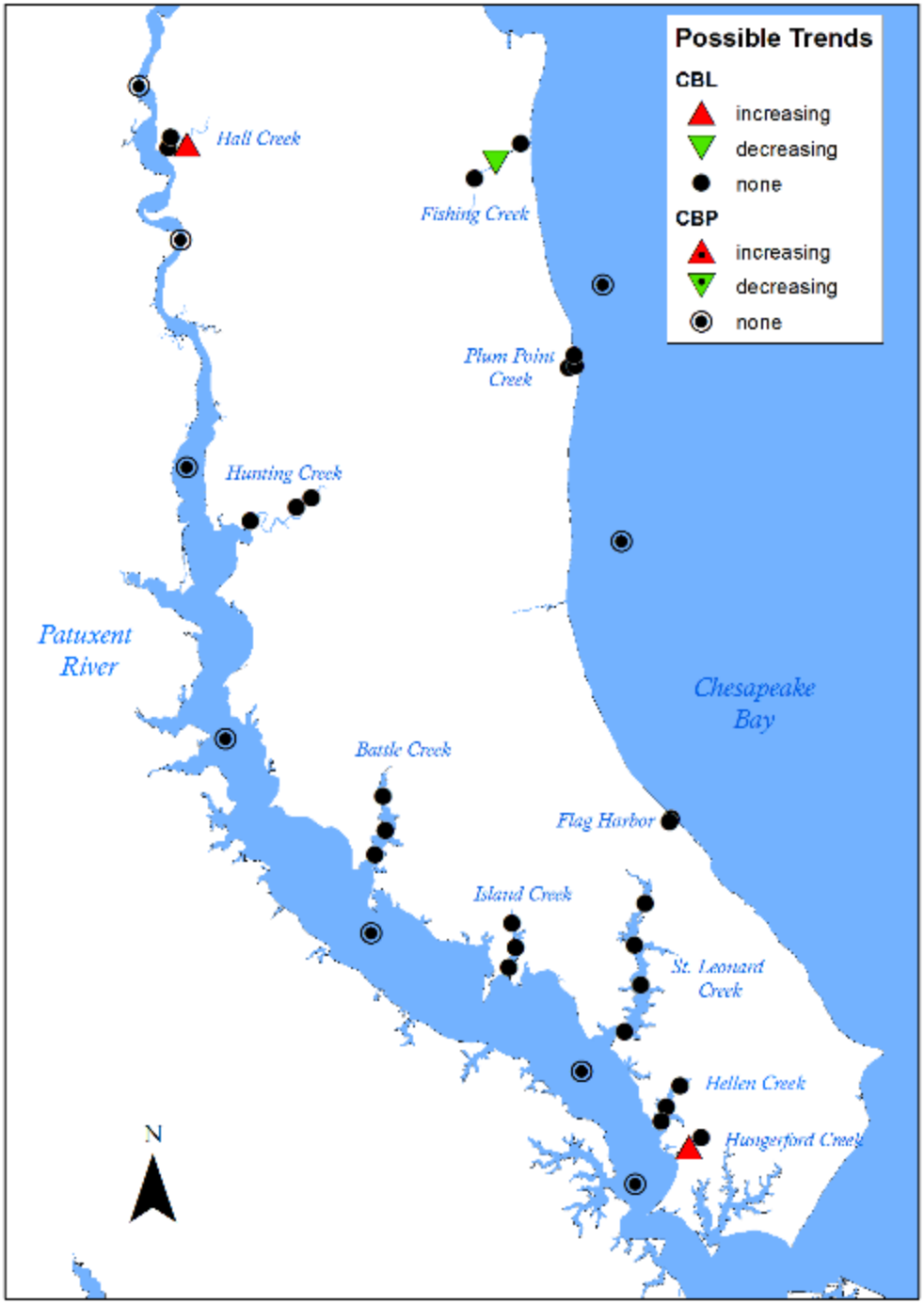


Bottom Dissolved Oxygen

~2010-2017

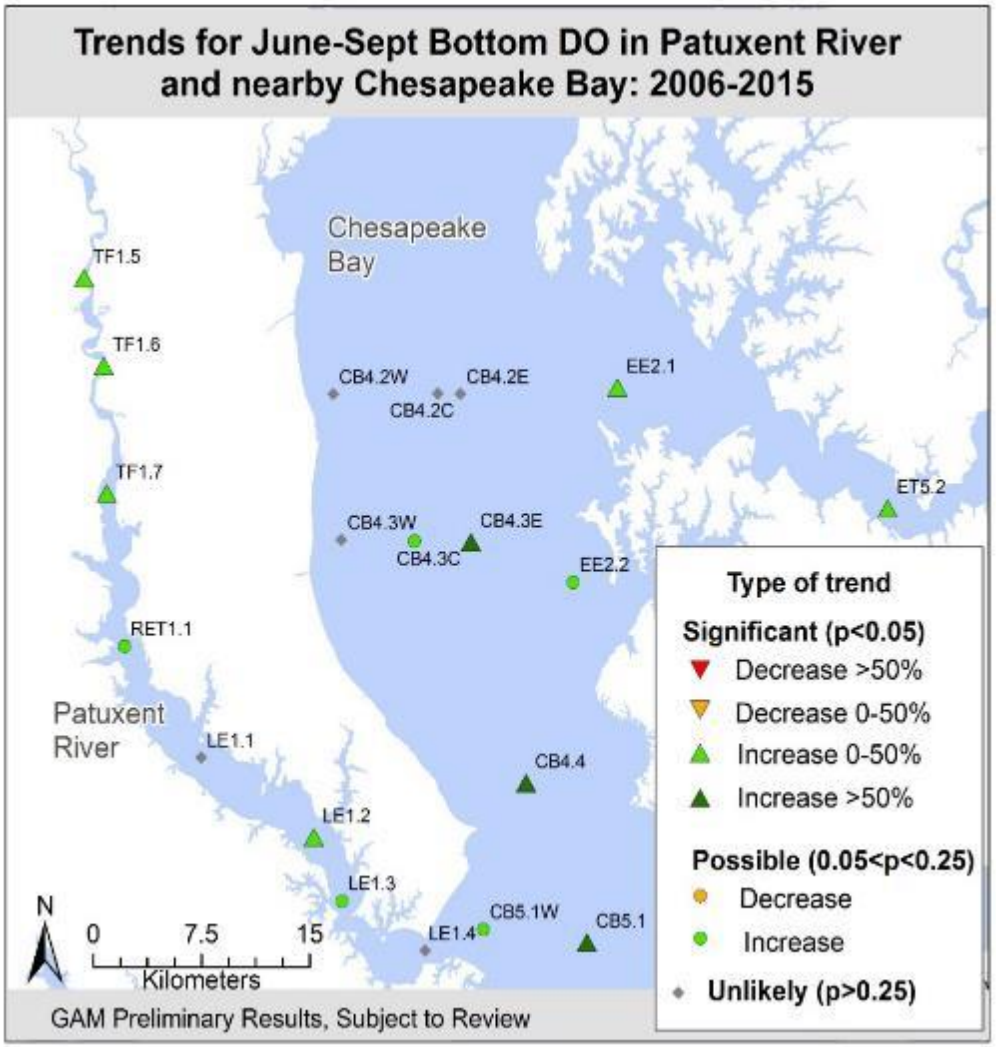
Surface Chlorophyll

~2010-2017



Considerations

- Many non-significant trends
- Initial analysis does not reveal universal patterns between triblets and larger estuary
- Will additional years show similar pattern?
- Have the big changes already occurred?



Lesson Learned…

Community Memory
Wade-in, creek culture, high use

Troublesome!
Connections with estuary unclear

A Little Physics…

The "Upside-Down" Estuary

A Little Physics…

The "Upside-Down" Estuary

Marine Pollution Bulletin 62 (2011) 672–680

Contents lists available at ScienceDirect

Marine Pollution Bulletin

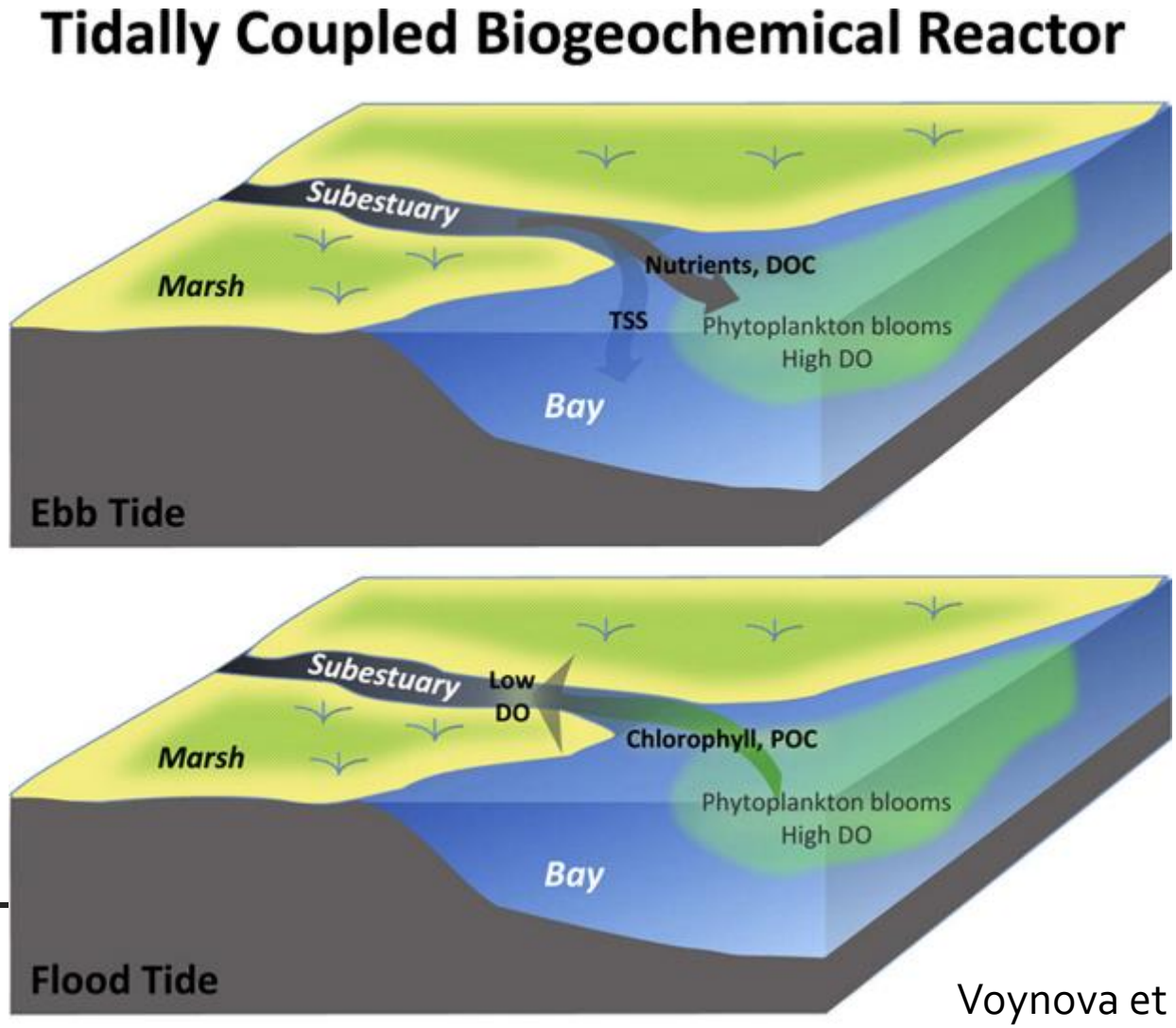
journal homepage: www.elsevier.com/locate/marpolbul

Some challenges of an "upside down" nitrogen budget – Science and management in Greenwich Bay, RI (USA)

Peter A. DiMilla [a], Scott W. Nixon [a], Autumn J. Oczkowski [b,*], Mark A. Altabet [c], Richard A. McKinney [b]

A Little Physics…

The "Upside-Down" Estuary

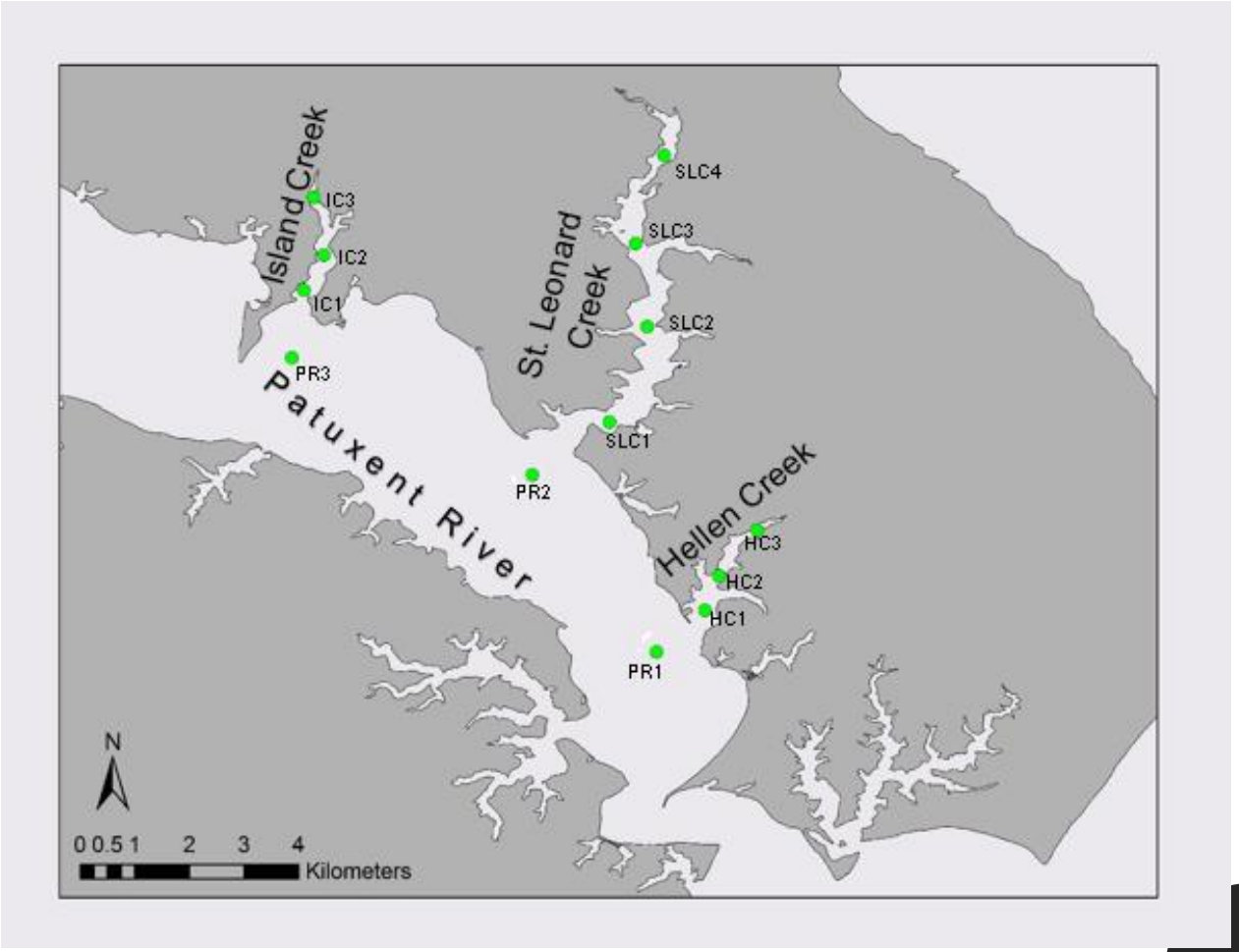


Voynova et al. 2015 ECSS

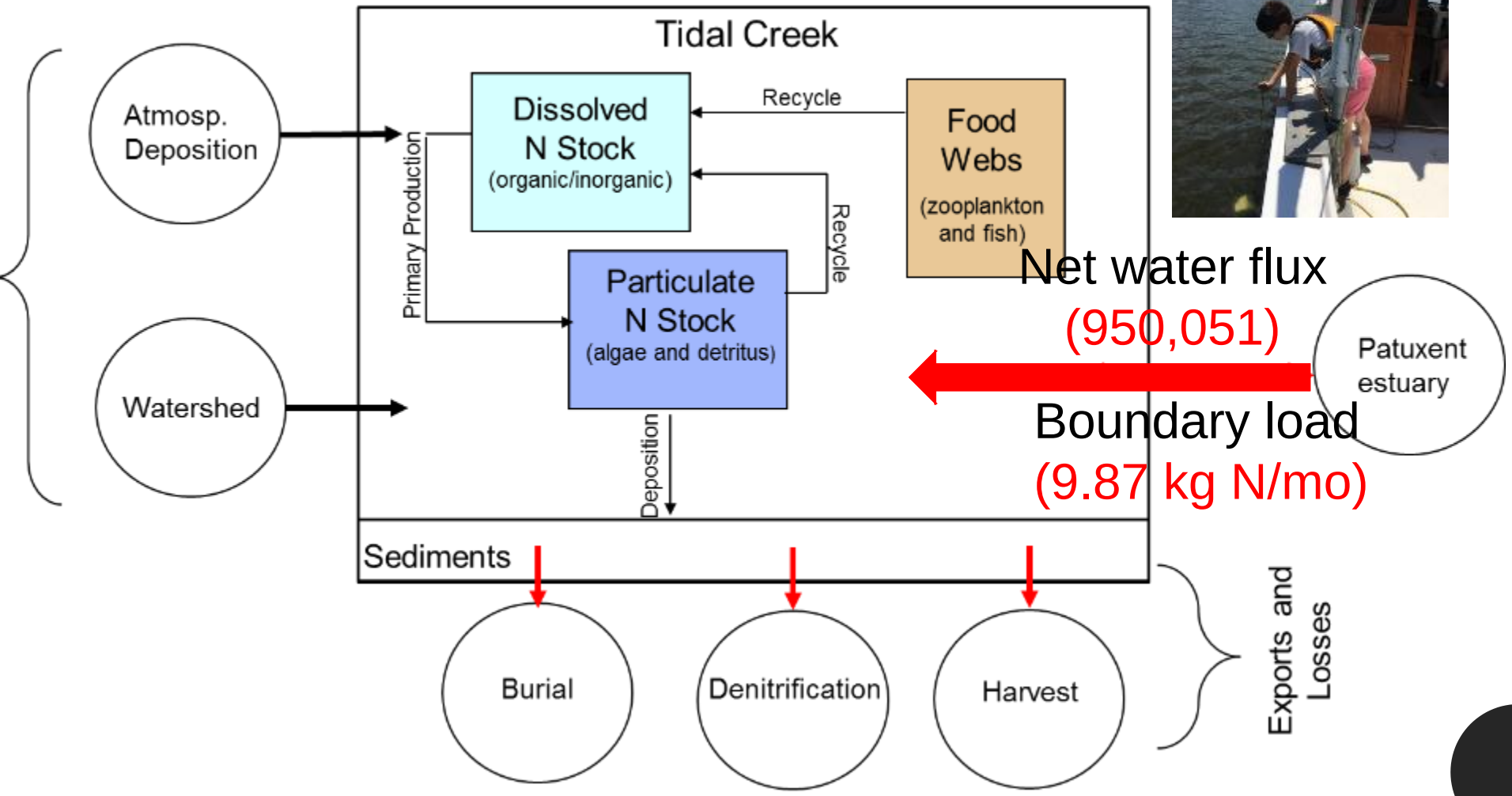
Study Site

Lower Patuxent

- Island Creek
- St. Leonard Creek
- Hellen Creek



Summer REU Project



Lesson Learned…

Triblets are active places, influenced by both land and larger estuary

Do we capture this in our current models (conceptual/numerical) & associated management?
Do we need to?

With Gratitude

Anne Arundel County WATERSHED Protection & Restoration PROGRAM

CALVERT COUNTY ESTABLISHED 1654

Chesapeake Bay Program
A Watershed Partnership

restore ROCK CREEK

NSF

Sea Grant Maryland