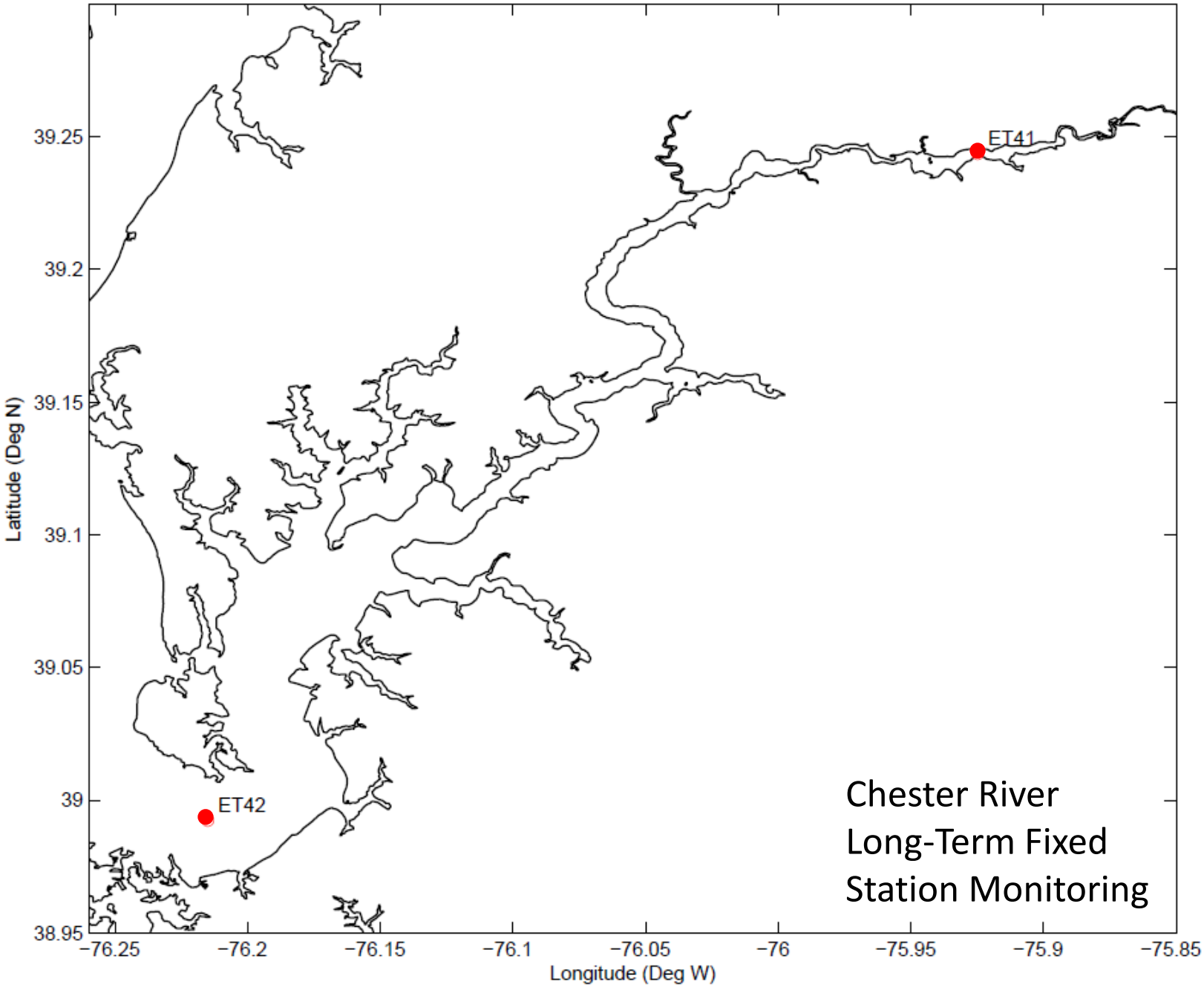
Update on Chester River Modeling

UMCES-UMaine Team

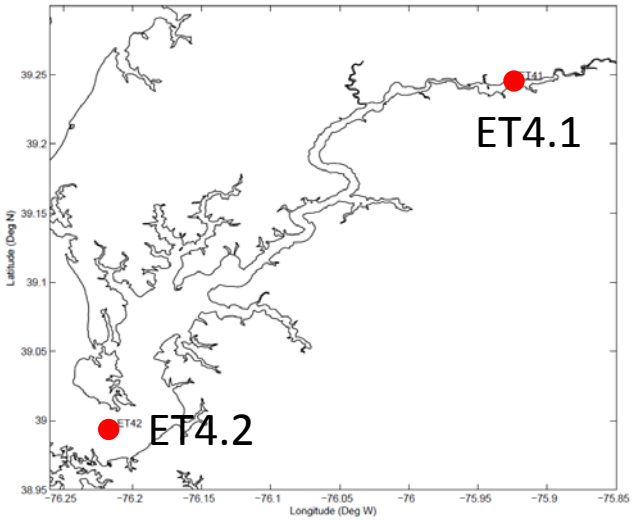
Jeremy Testa
Damian Brady
Kelly Cole
Ming Li

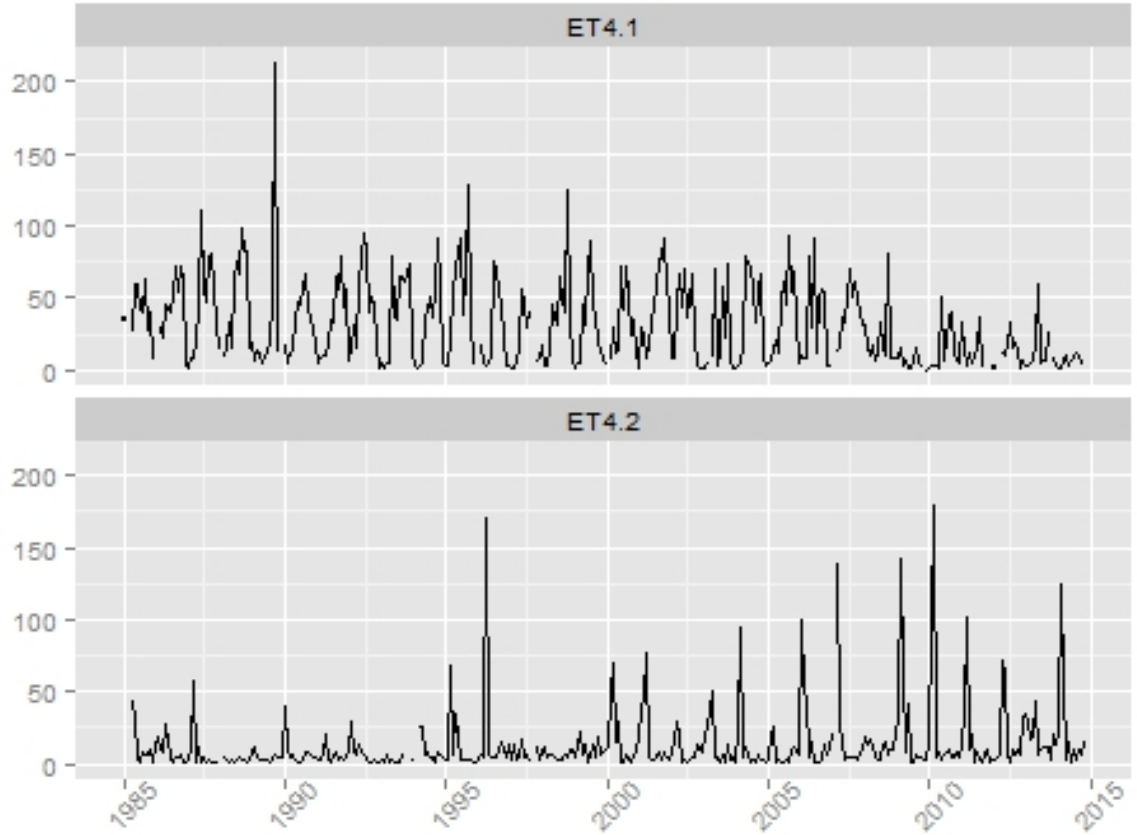
With help from: Jennifer Humphrey, Casey Hodgkins

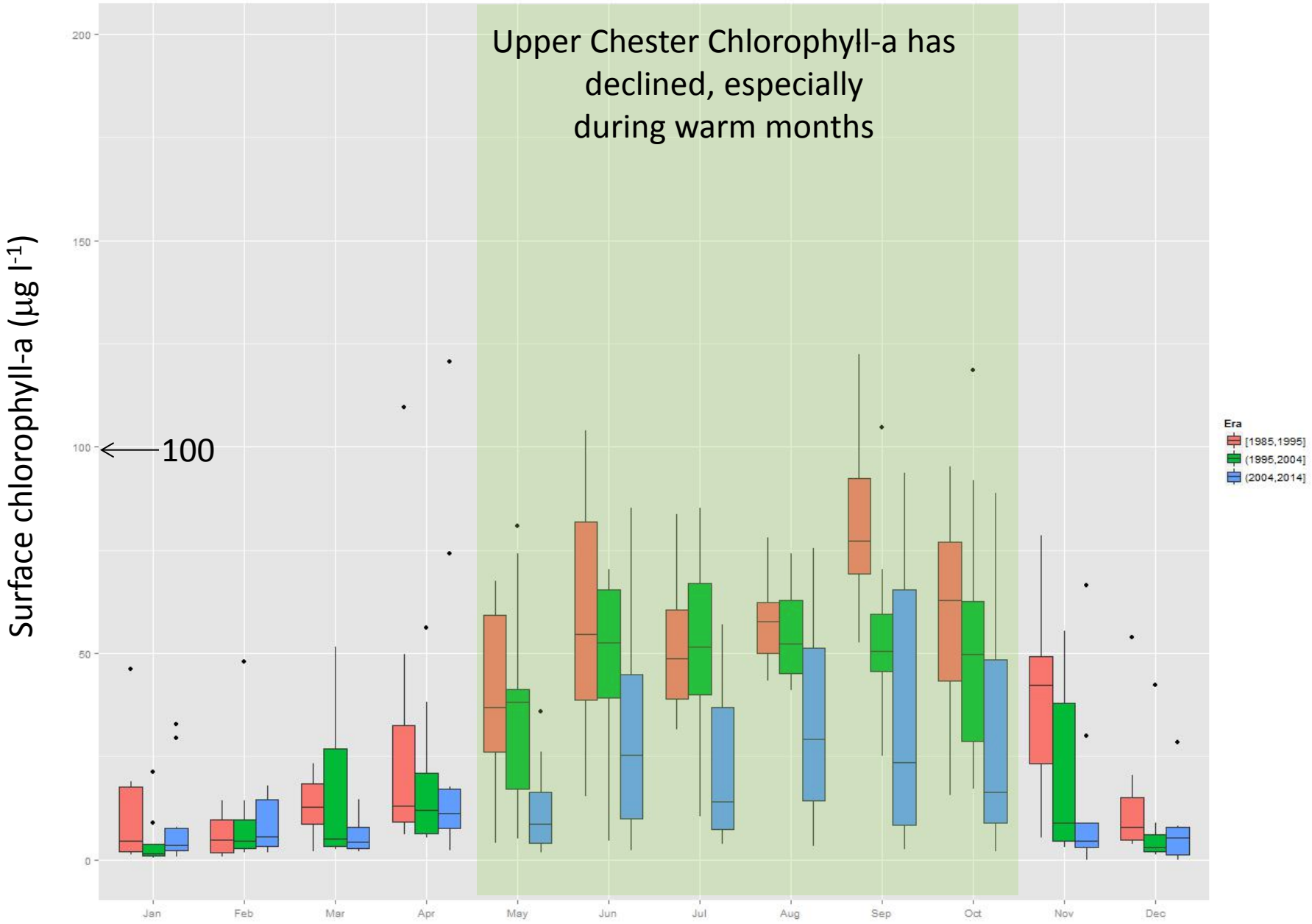
(1) Long-term patterns in Chester water quality and loading
(2) Corsica River Loading
(3) Chester Modeling Update

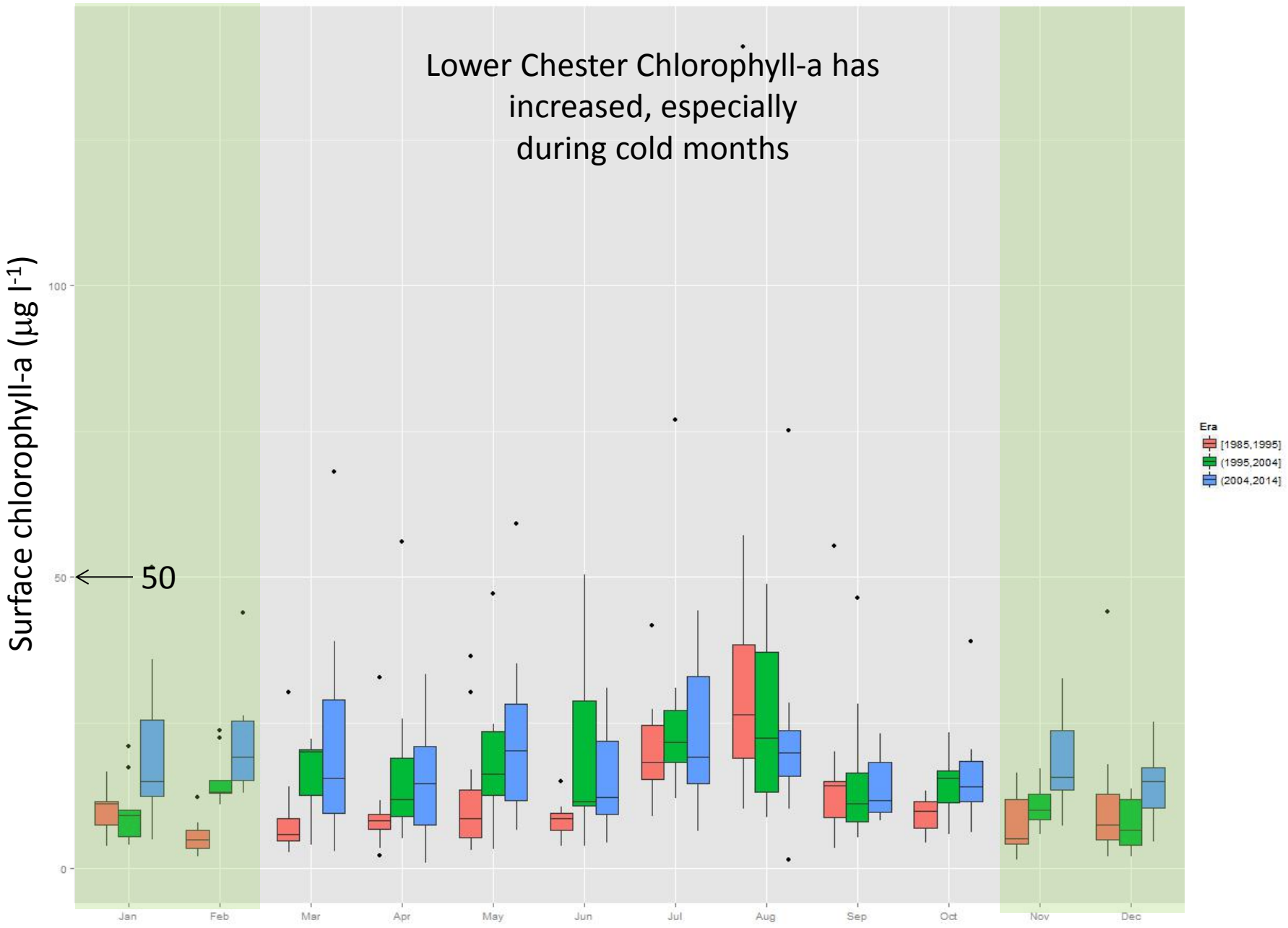

ET41
ET42
Chester River
Long-Term Fixed
Station Monitoring
Latitude (Deg N)
39.25
39.2
39.15
39.1
39.05
39
38.95
−76.25
−76.2
−76.15
−76.1
−76.05
−76
−75.95
−75.9
−75.85
Longitude (Deg W)

Chester River Long-Term Fixed Station Monitoring:
Axial Differences in temporal patterns of chlorophyll-a

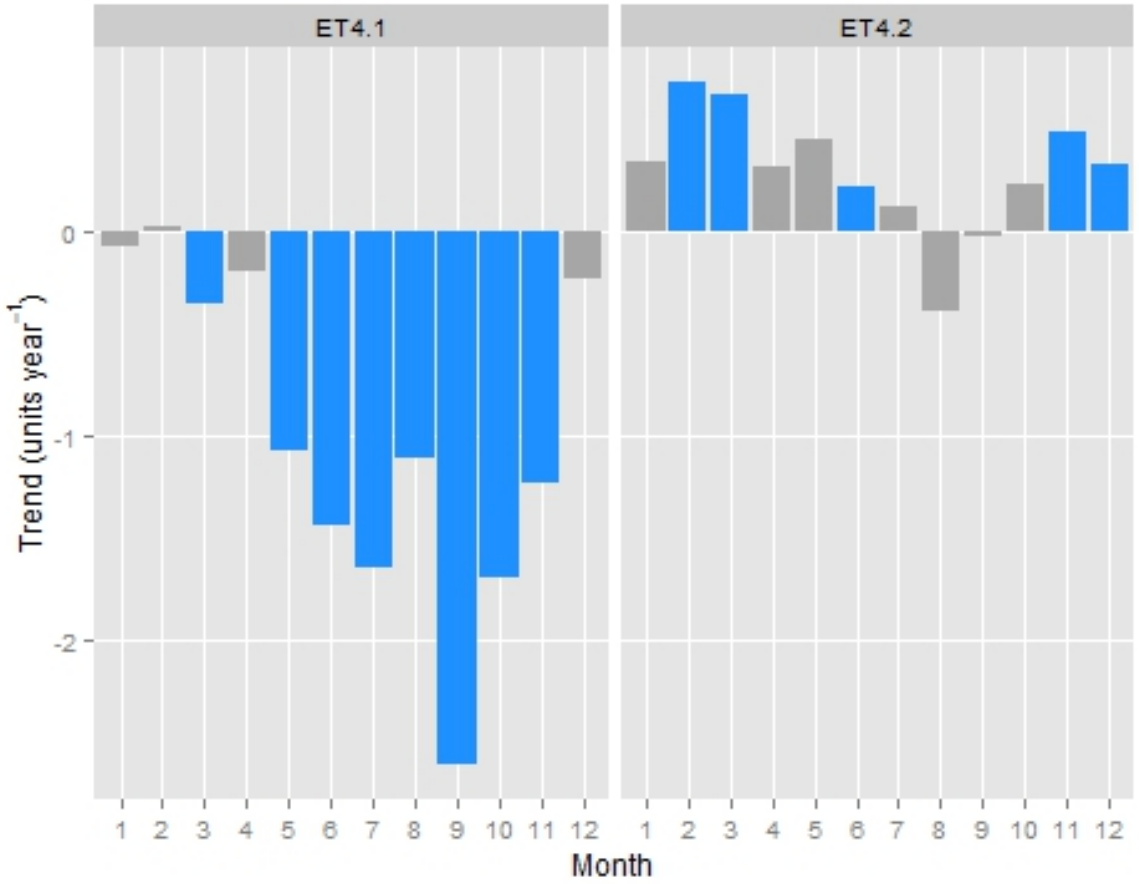




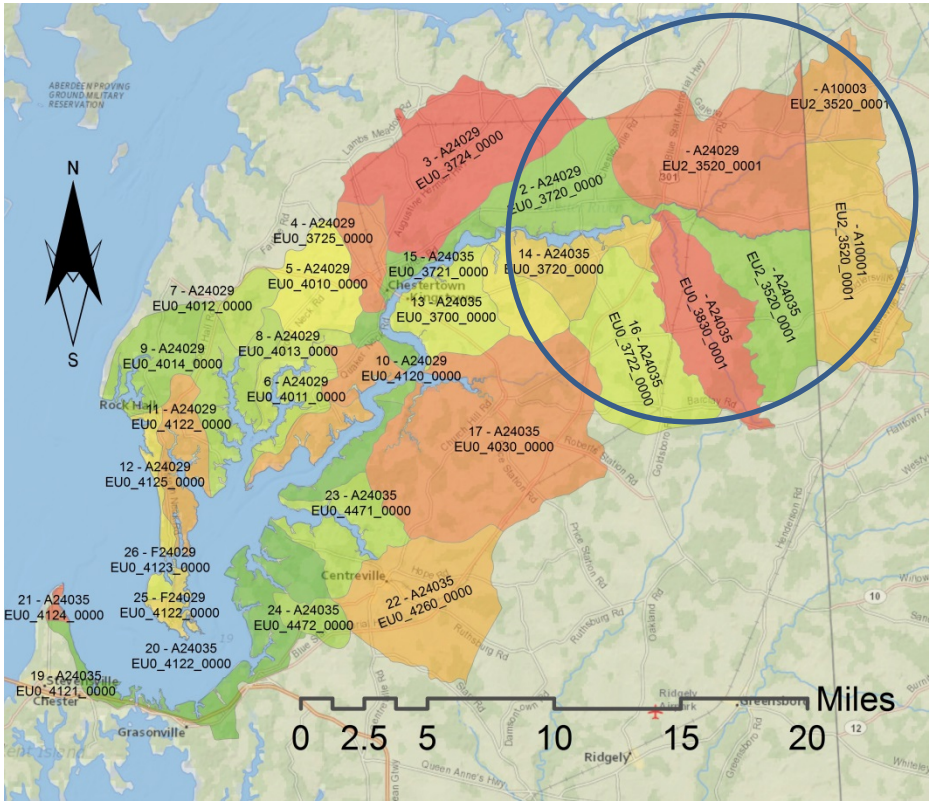

Upper Chester Chlorophyll-a has declined, especially during warm months
Surface chlorophyll-a (µg l-1)
200
150
100
50
0
100
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Era
[1985,1995]
(1995,2004]
(2004,2014]

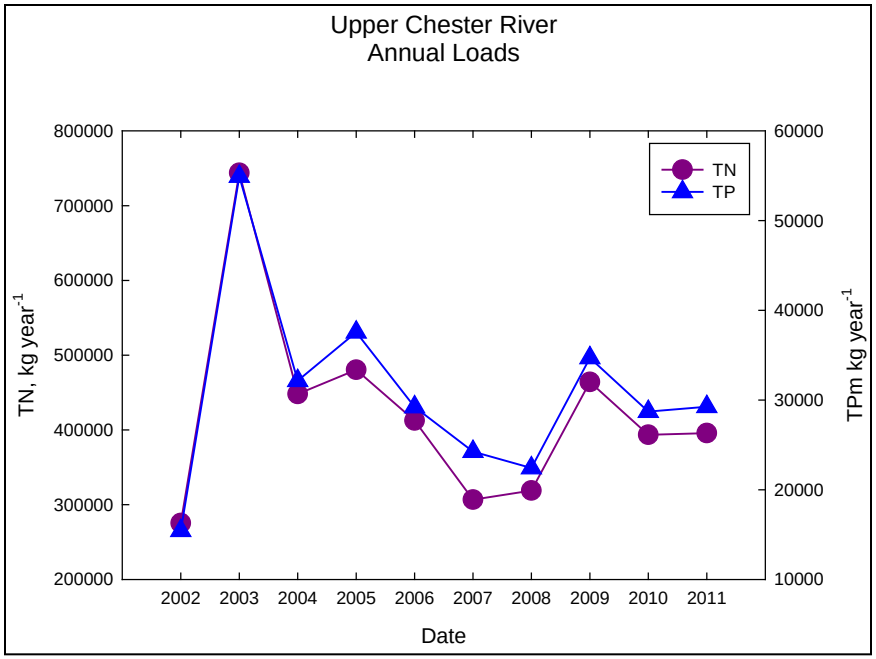

Lower Chester Chlorophyll-a has increased, especially during cold months
Surface chlorophyll-a (µg l-1)
100
50
0
50
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Era
[1985,1995]
(1995,2004]
(2004,2014]

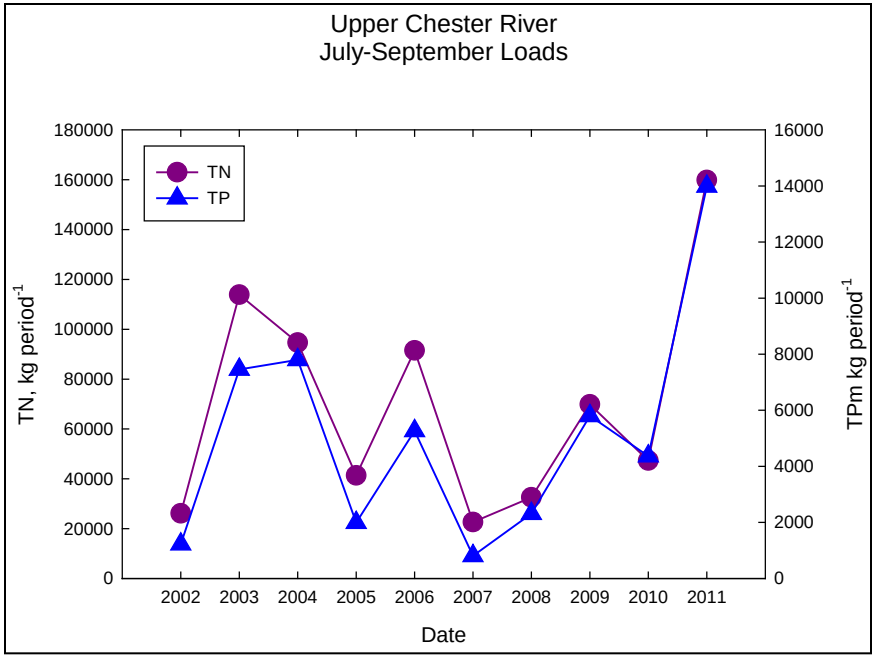
Chester River Long-Term Fixed Station Monitoring:
Axial Differences in temporal patterns of chlorophyll-a



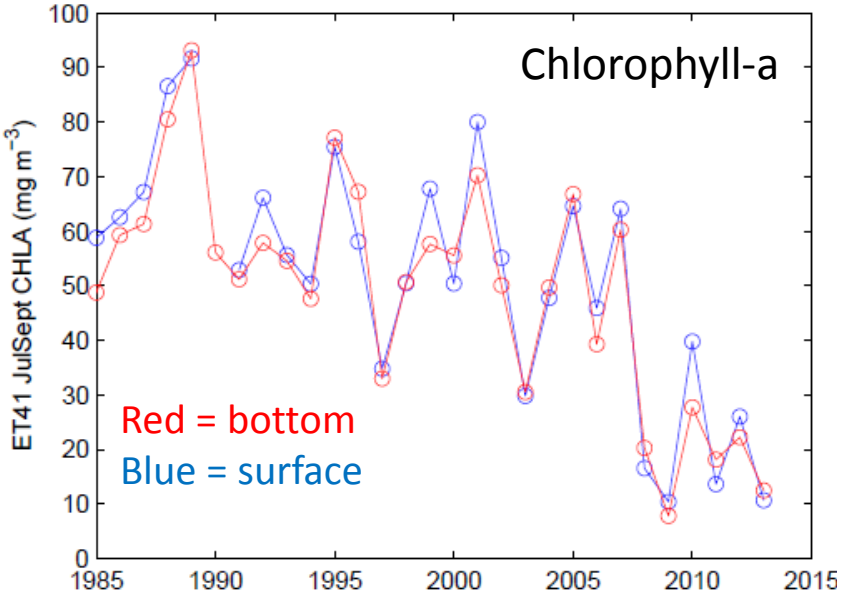
Upper Chester River
TN and TP Loading

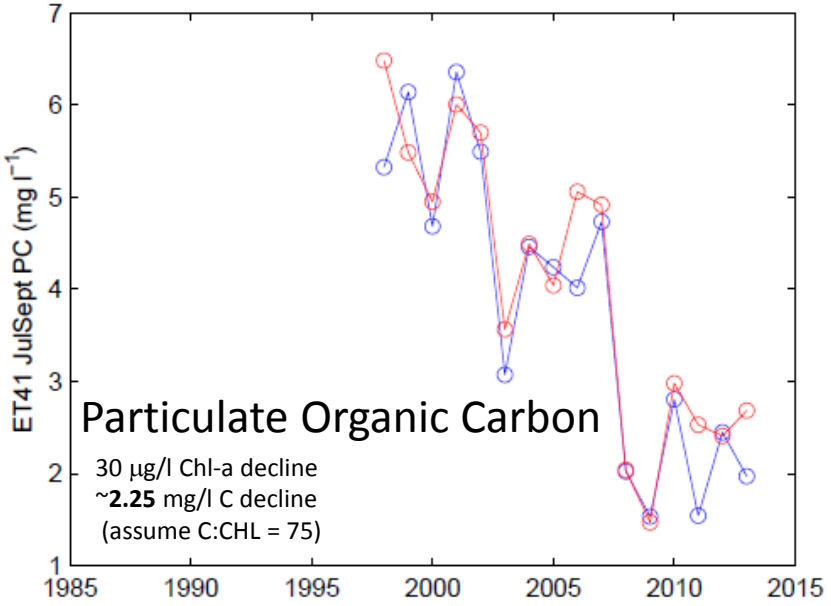


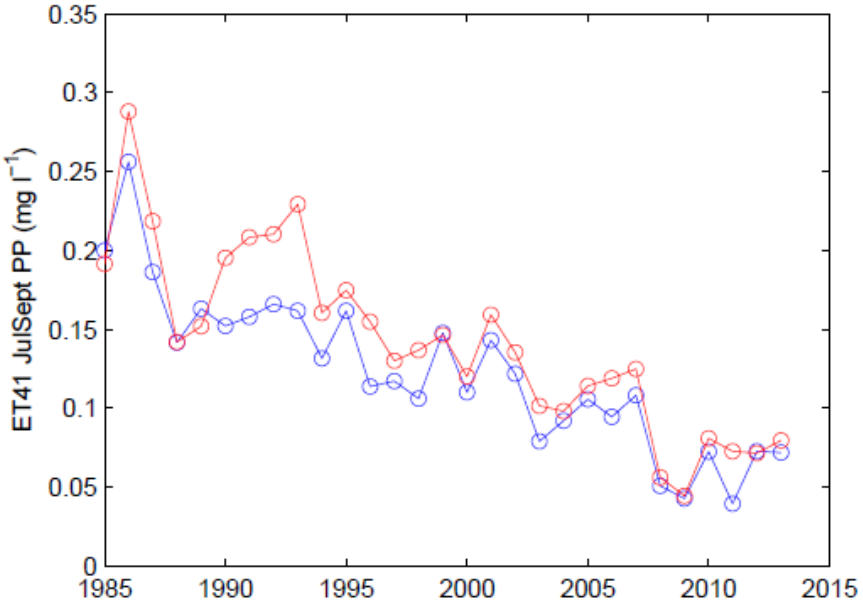


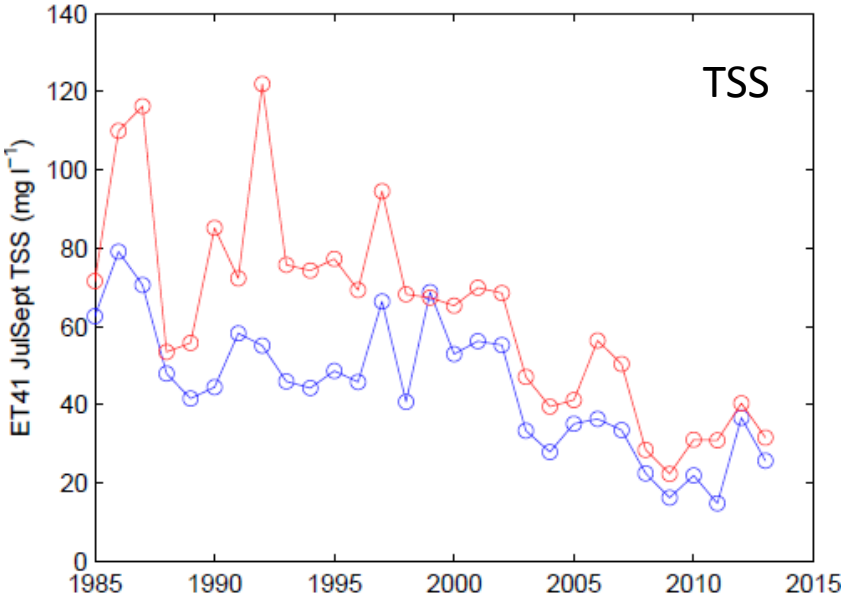


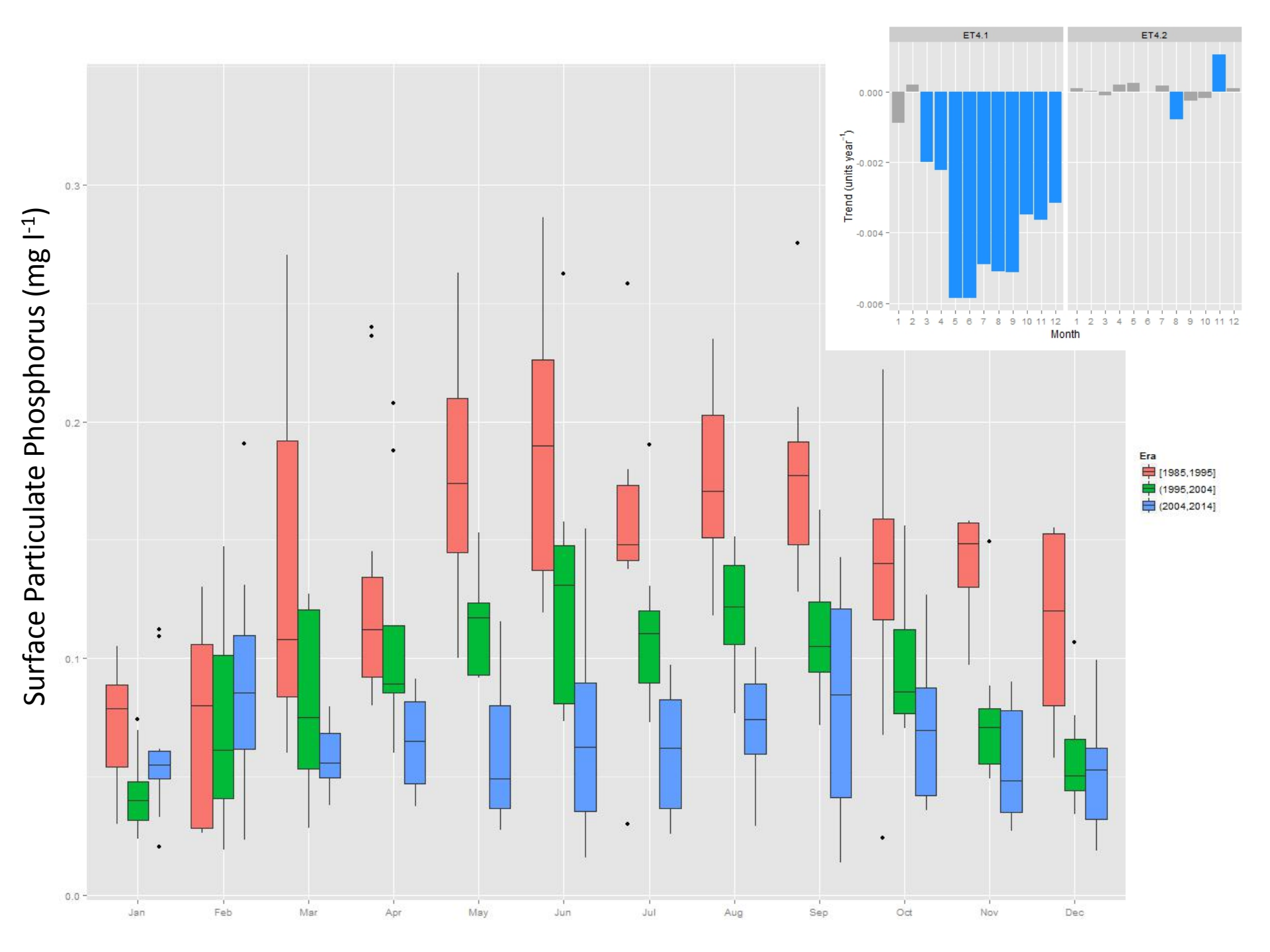
Upper Chester (ET4.1) Particulate Time-Series



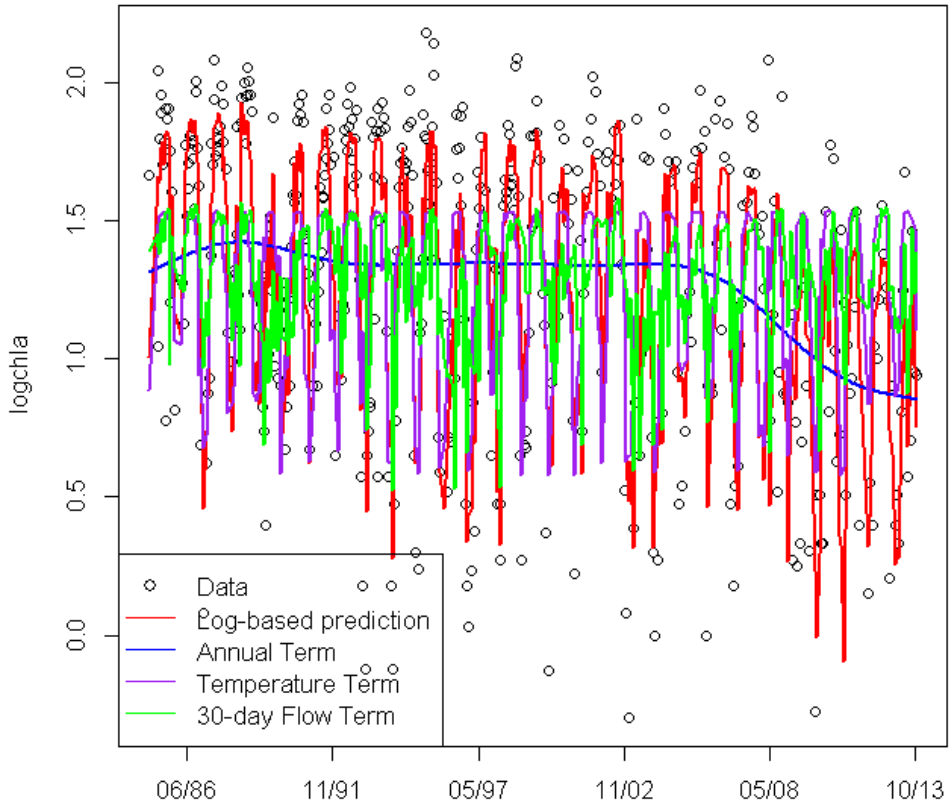


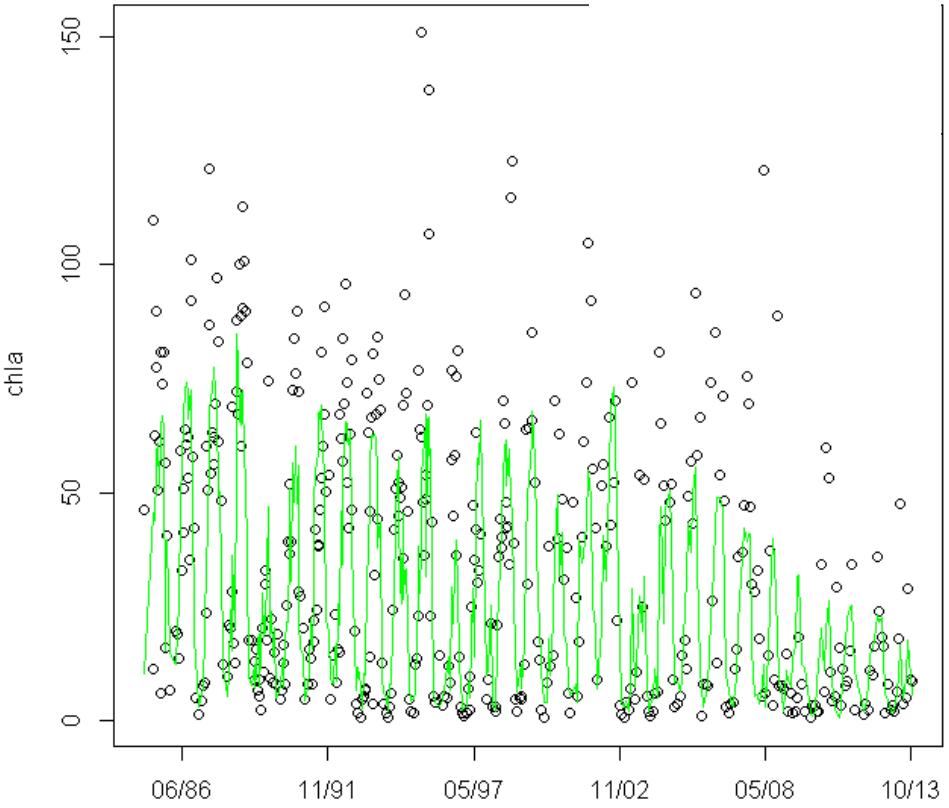





Surface Particulate Phosphorus (mg l-1)
0.0
0.1
0.2
0.3
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Era
[1985,1995]
(1995,2004]
(2004,2014]
ET4.1
ET4.2
Trend (units year-1)
0.000
-0.002
-0.004
-0.006
1 2 3 4 5 6 7 8 9 10 11 12
Month

GAM ET4.1 Chlorophyll-a



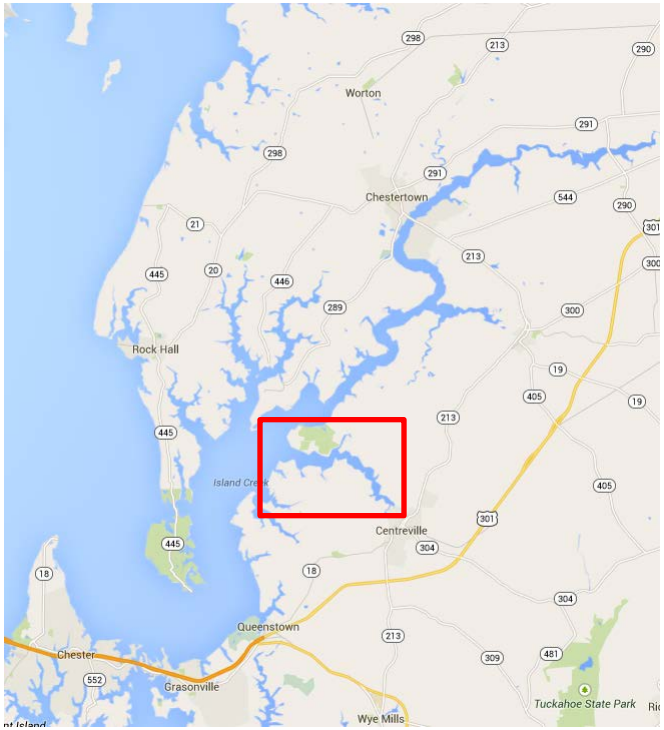


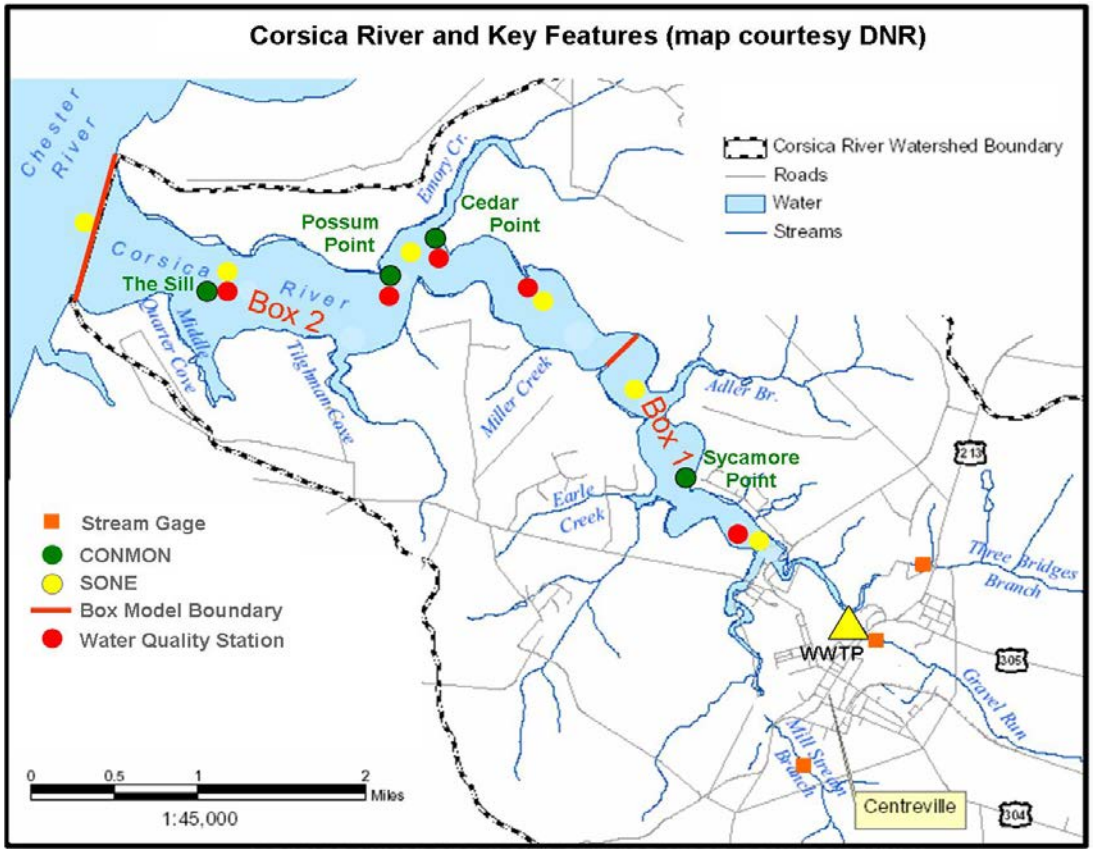
logChla = f(time, temperature, previous 30-days flow)

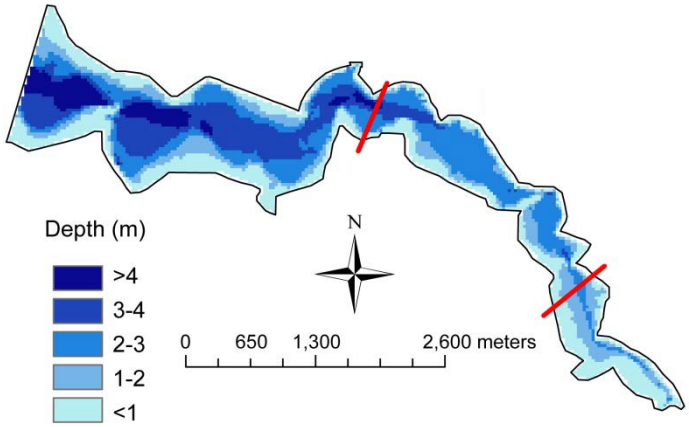
Preliminary Conclusions

- There has been an apparent decline in chlorophyll-a in the upper Chester River, while winter chlorophyll has increased in the lower Chester
- In upper Chester, this decline is associated with declines in particulate phosphorus, carbon, and TSS
- There is no obvious associated decline in TP or TN loading
- A clear explanation for this decline is lacking

Corsica River

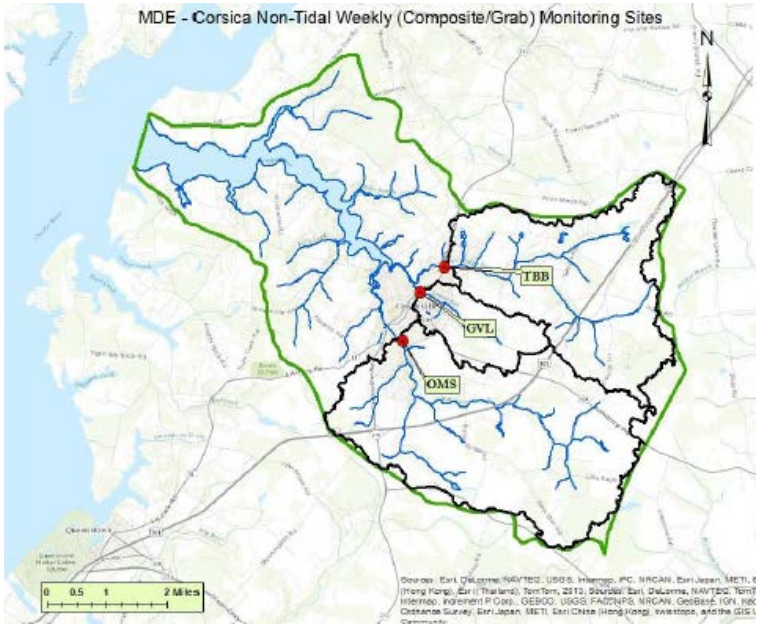


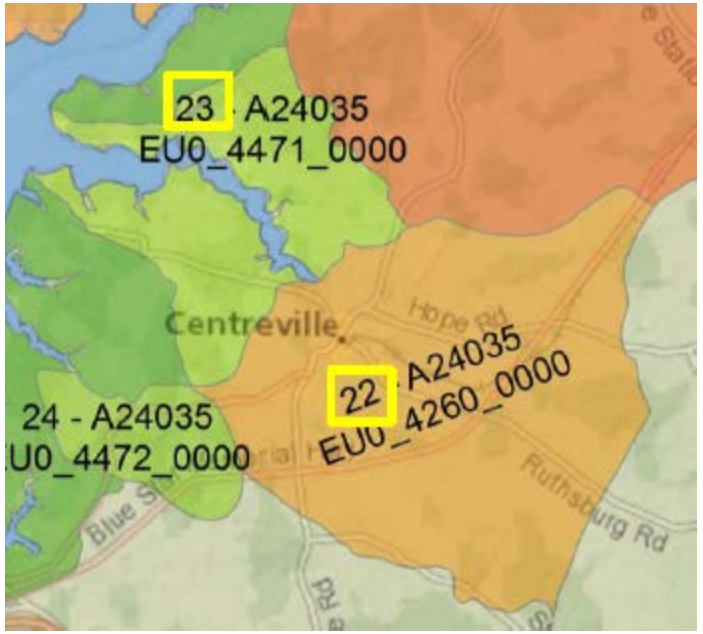


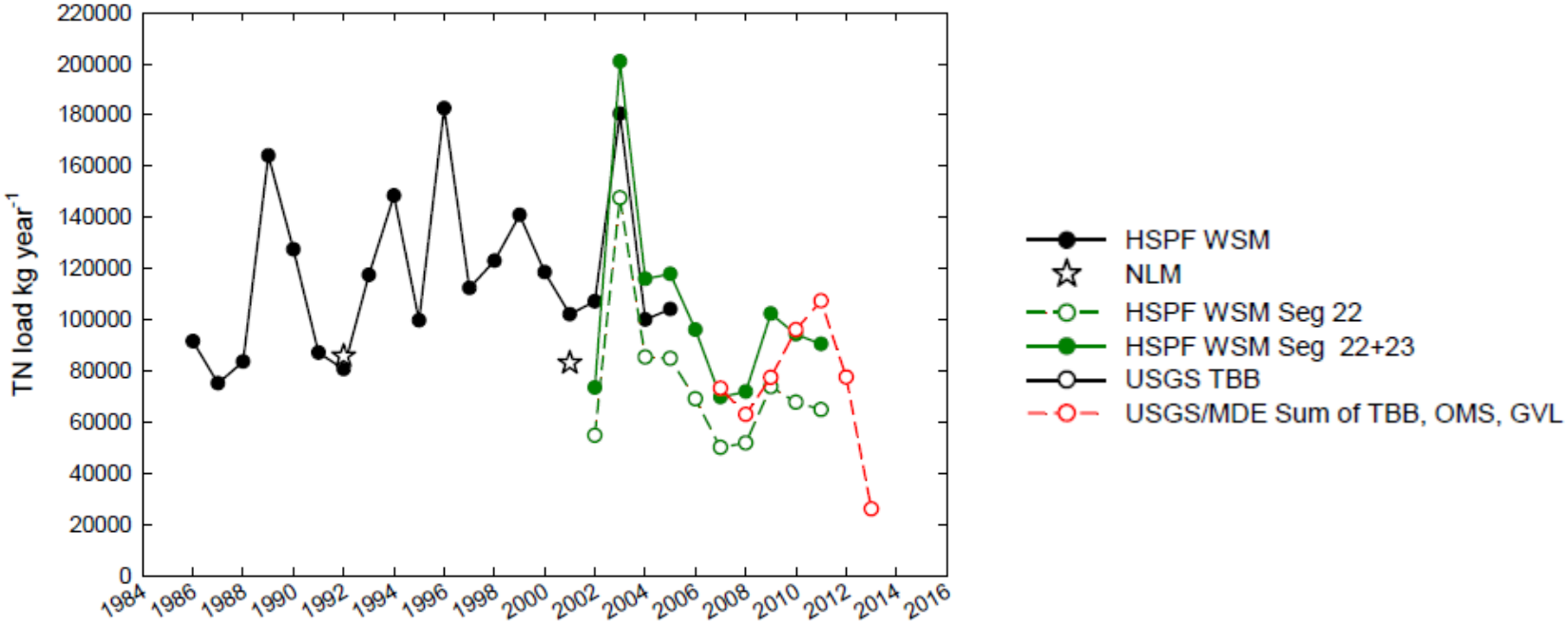


- 3 ConMon Sensors
- Sampling for chl-a, nutrients, DO, etc.
- 3 streams gauged (> 50% of watershed)

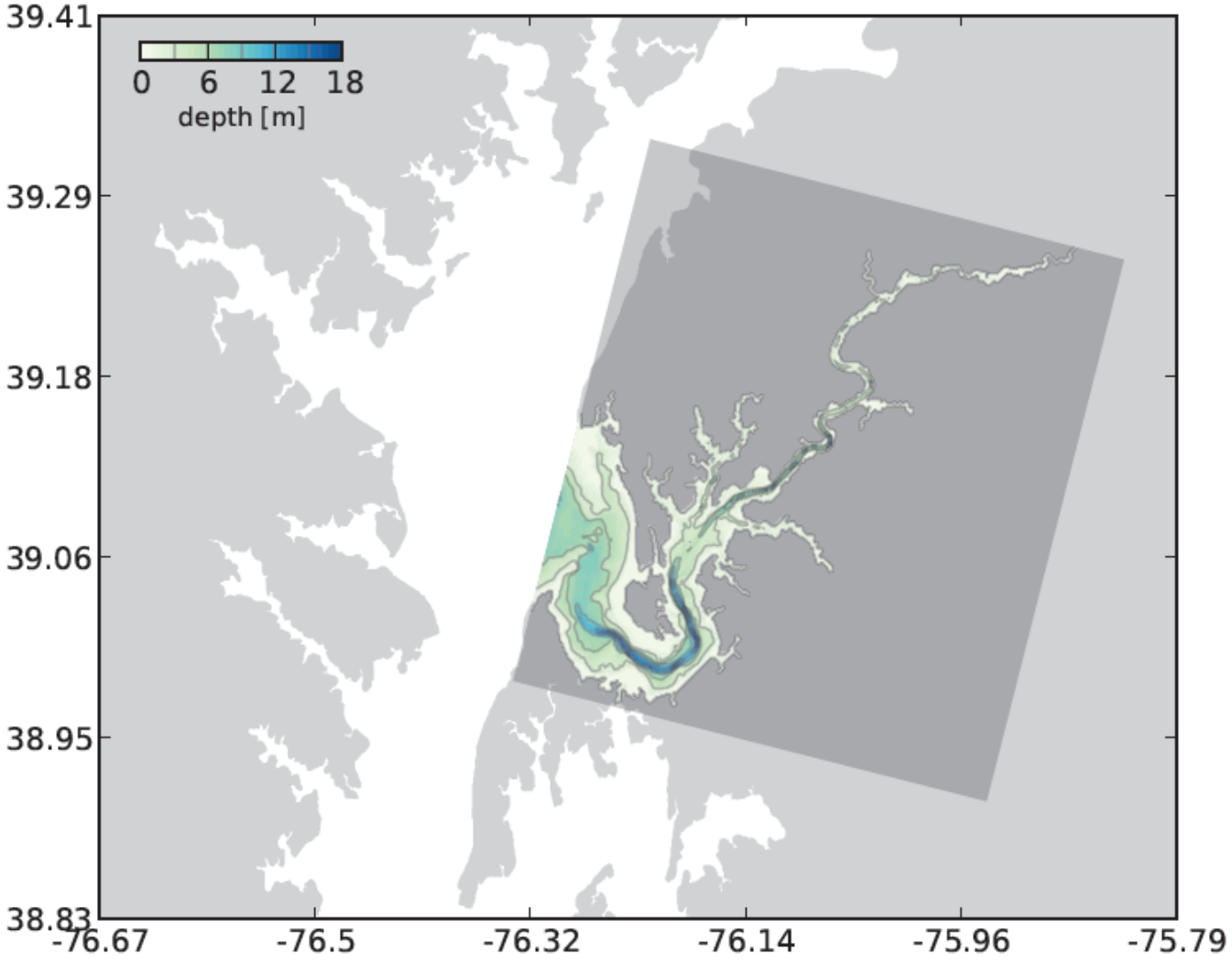
Corsica River Loads







Current ROMS-RCA Grid in Chester



(1) 70 meter grid resolution (512x512 cells)
(2) Seaward boundary at mouth of Chester
(3) 10 vertical layers
(4) COAWST Modeling system