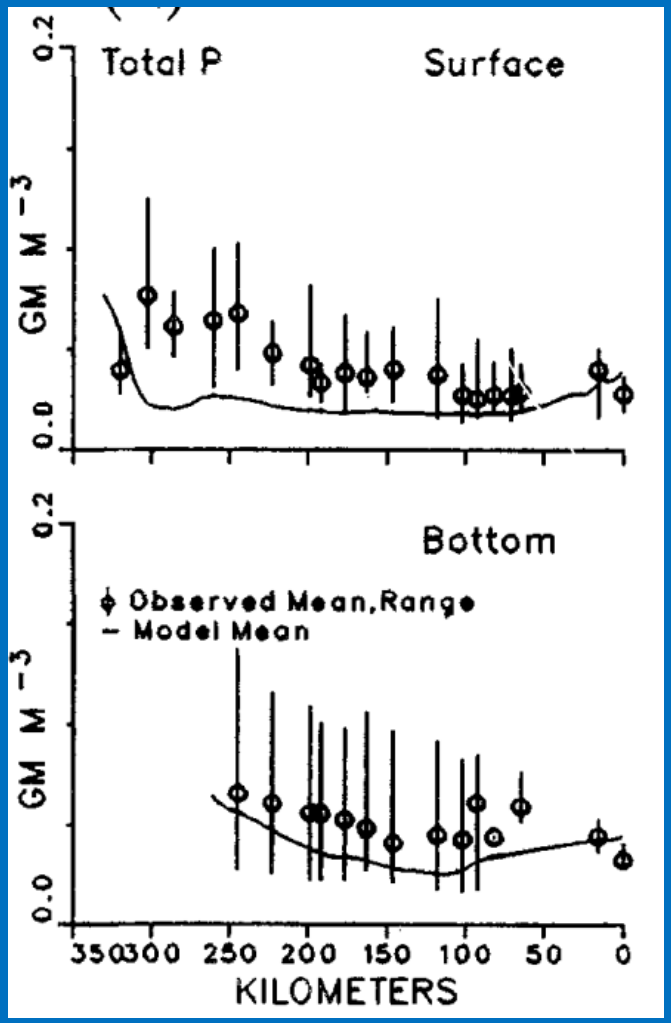
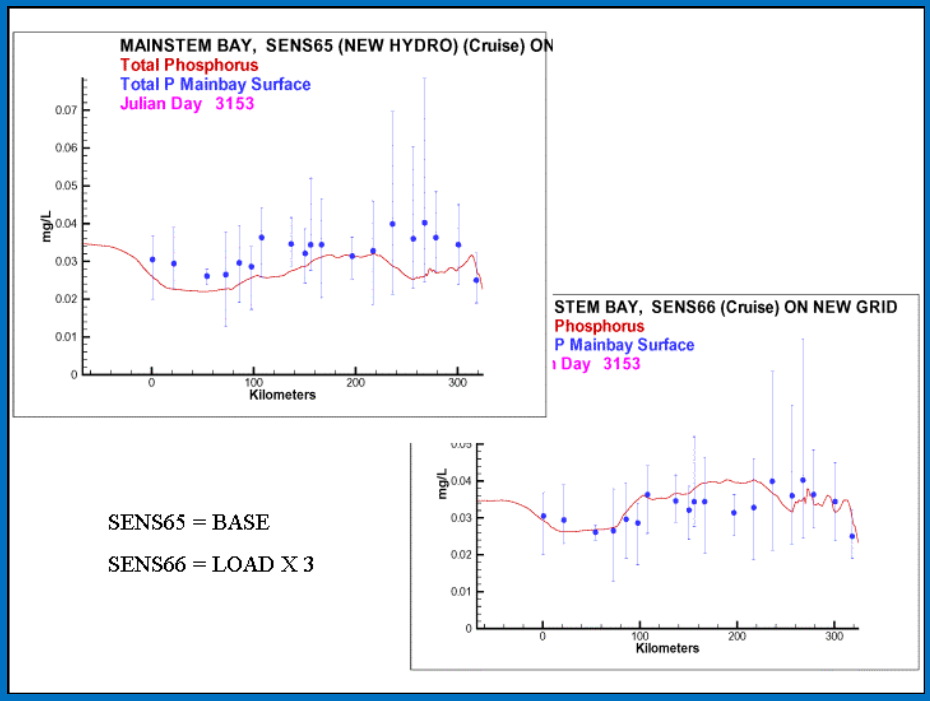
The Heritage

- 1999 – Computed total phosphorus is less than observed. Phosphorus from bankloads suggested as the missing load.
- Virginia Tributary Refinements – Bankloads of solids and phosphorus introduced.



The Heritage

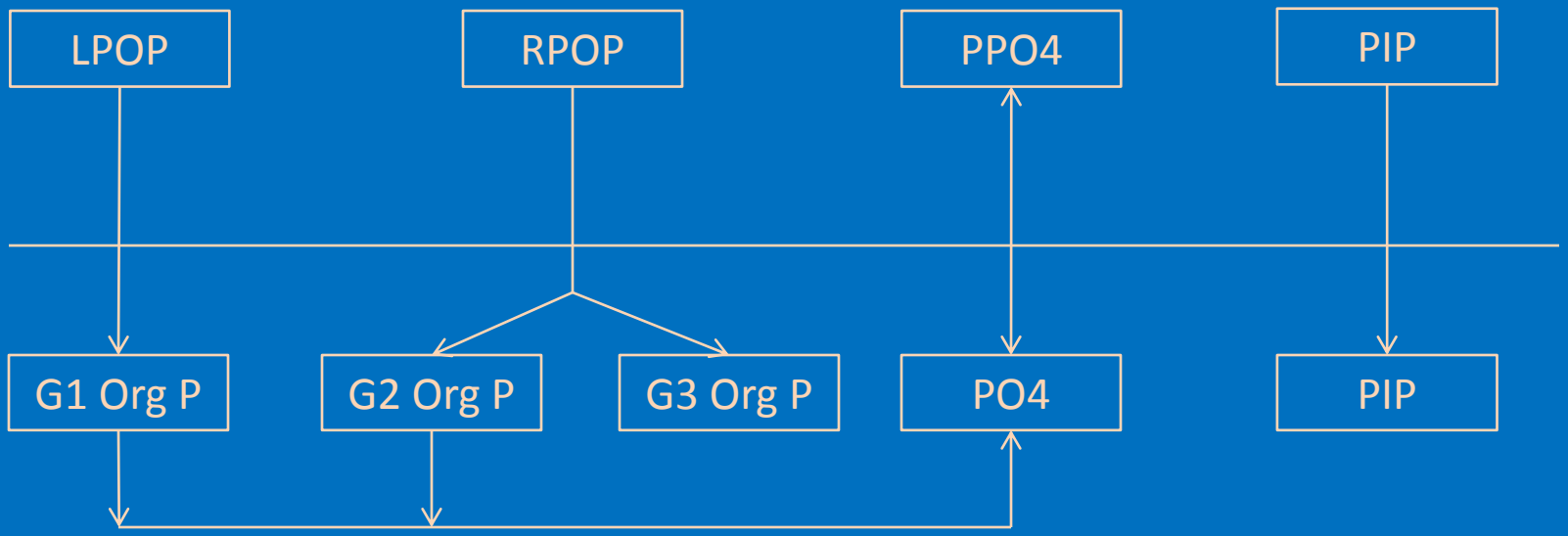
- 2002 – Refined estimates of bankloads of solids, nitrogen, and phosphorus.
- 2010 – No nutrients from bankloads in the model used for TMDL's.



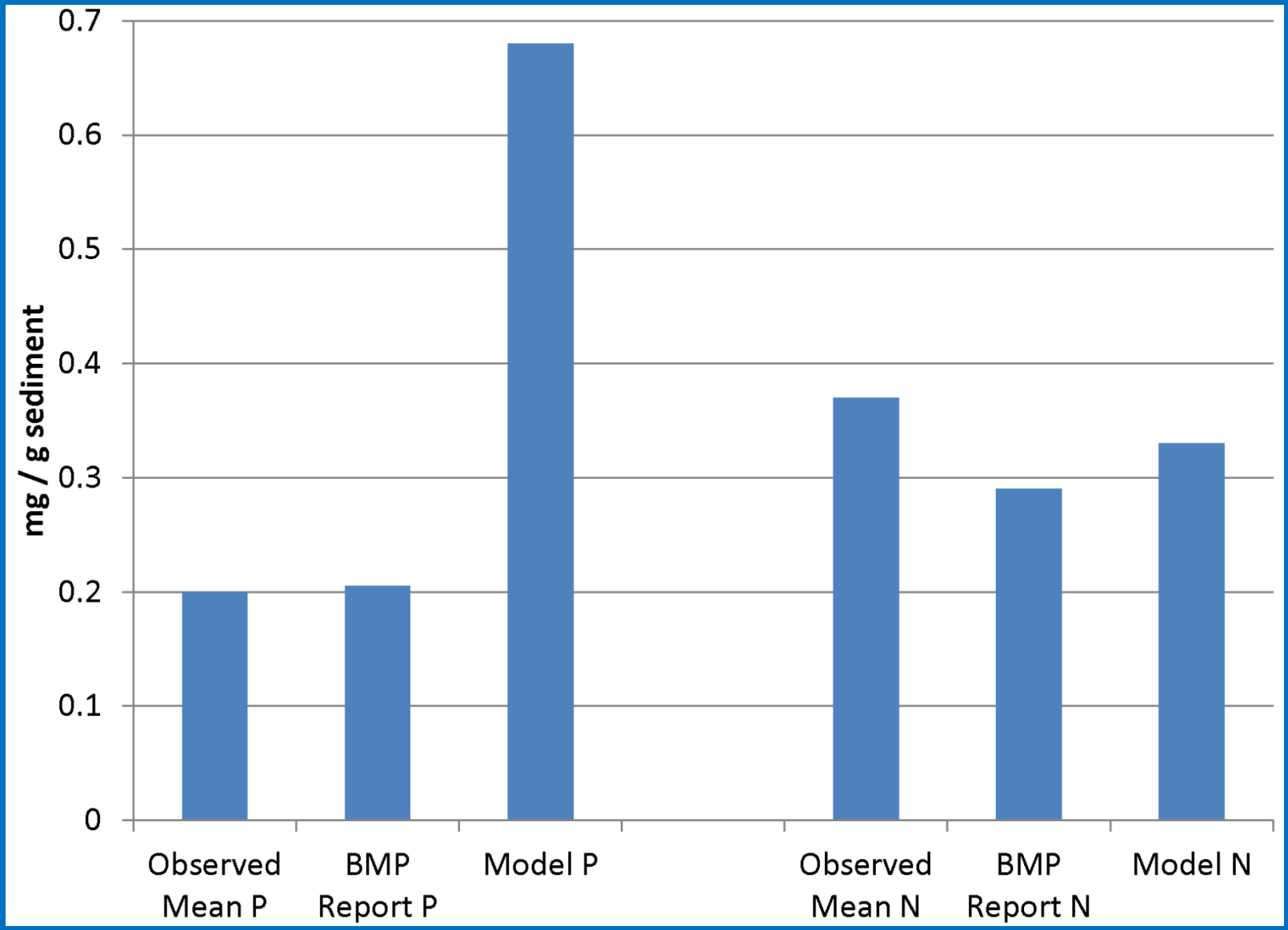
Model Particulate P Variables in Water Column

- Labile Particulate Organic Phosphorus – Decay rate 0.12 / day.
- Refractory Particulate Organic Phosphorus – Decay rate 0.005 / day.
- Particulate Phosphate – Partitioned between dissolved and particulate phases. Loosely bound.
- Particulate Inorganic Phosphorus – Originates in the watershed. Tightly bound. Inert in water column.

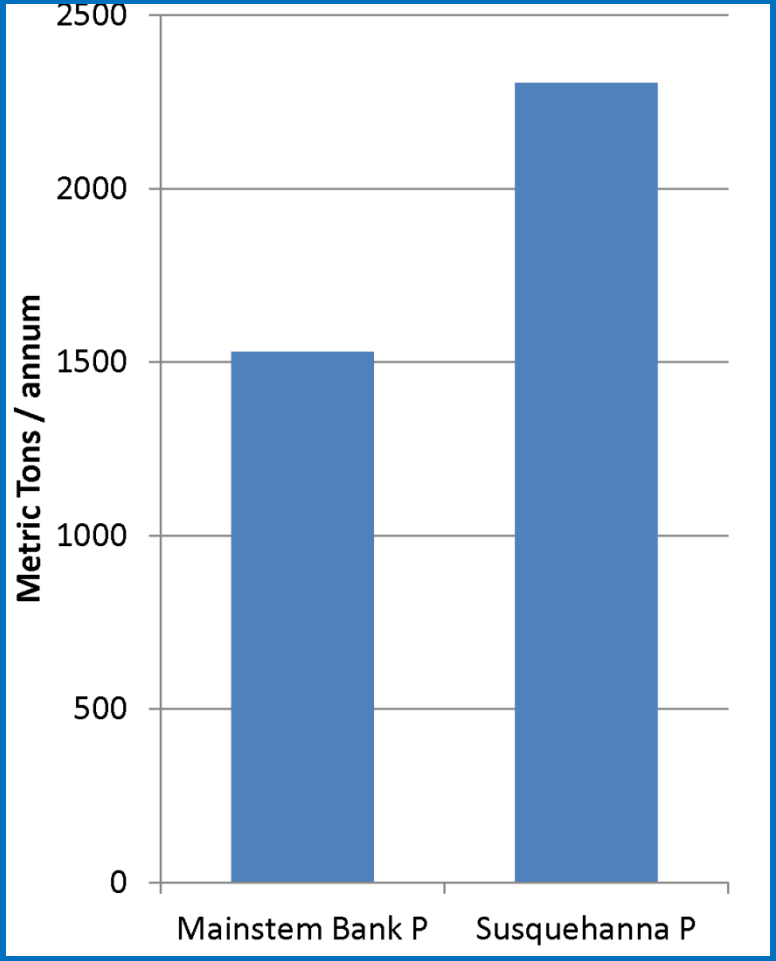
Routing Water Column P to Sediments

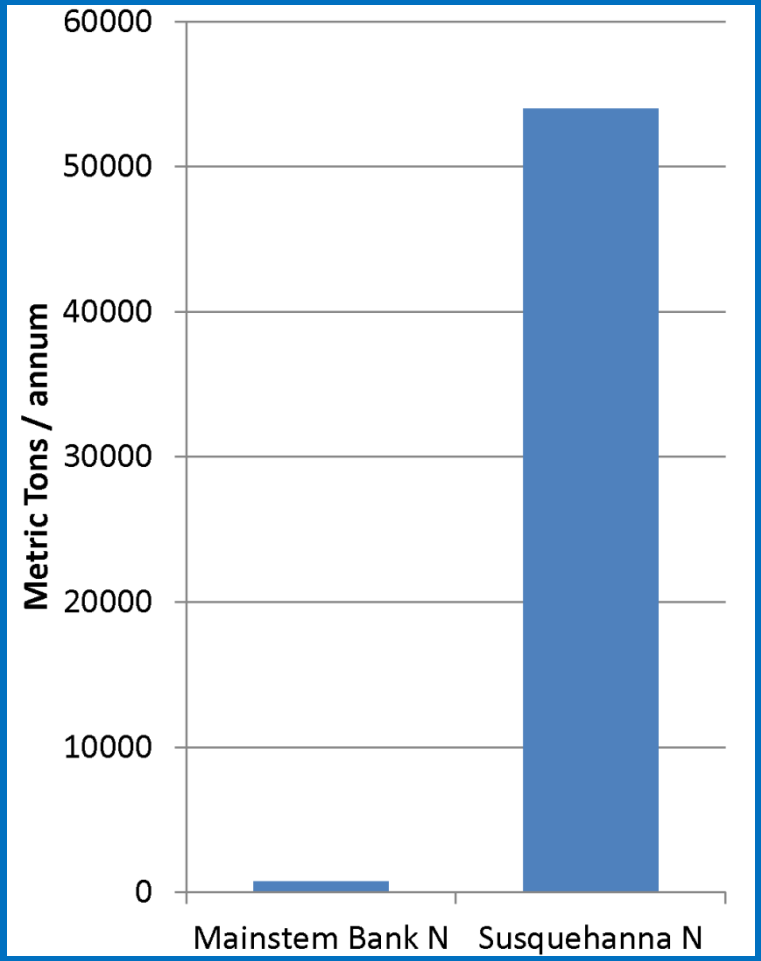


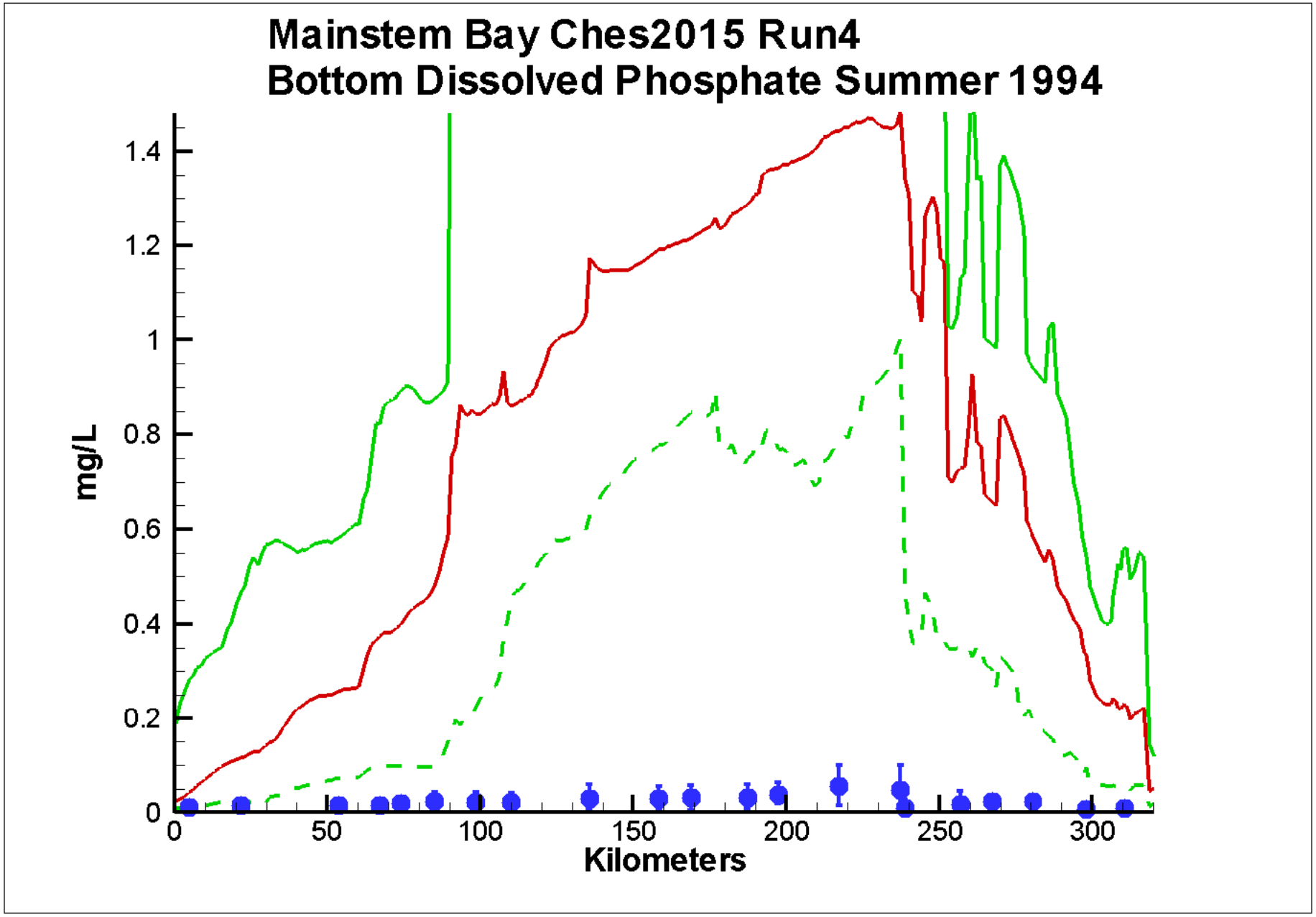
Nutrient Content of Eroded Sediments

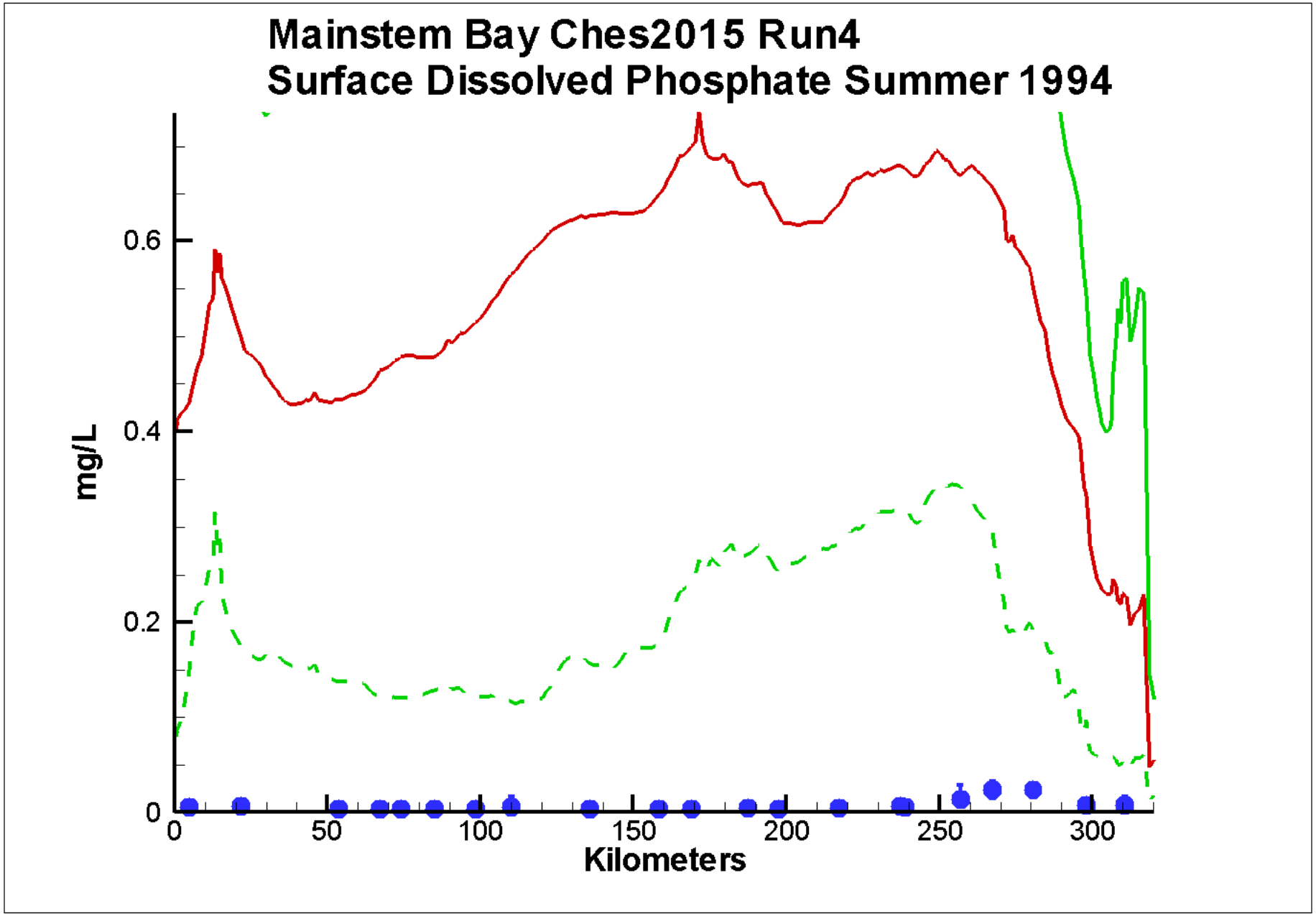


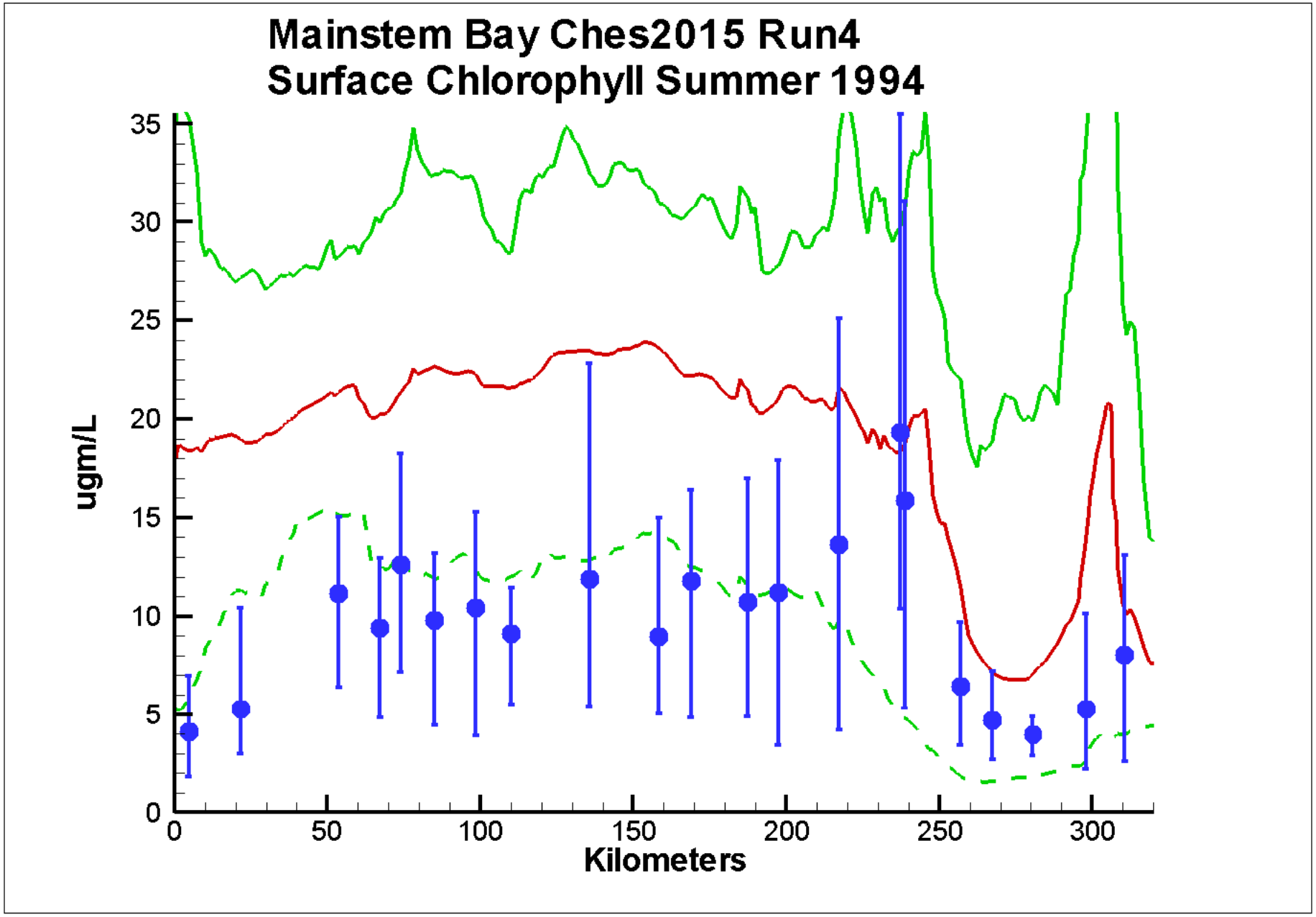
Bank Nutrient Loads

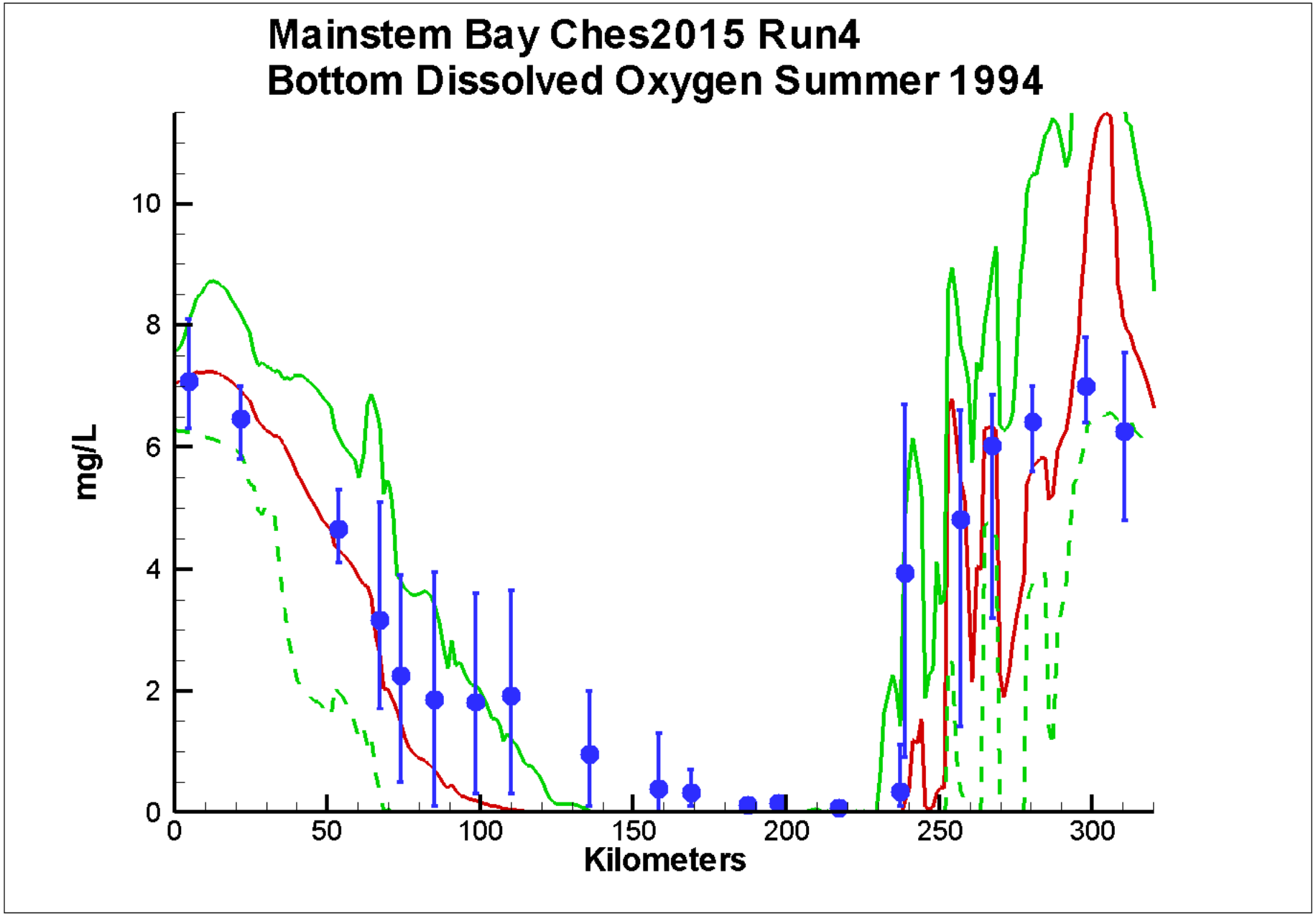


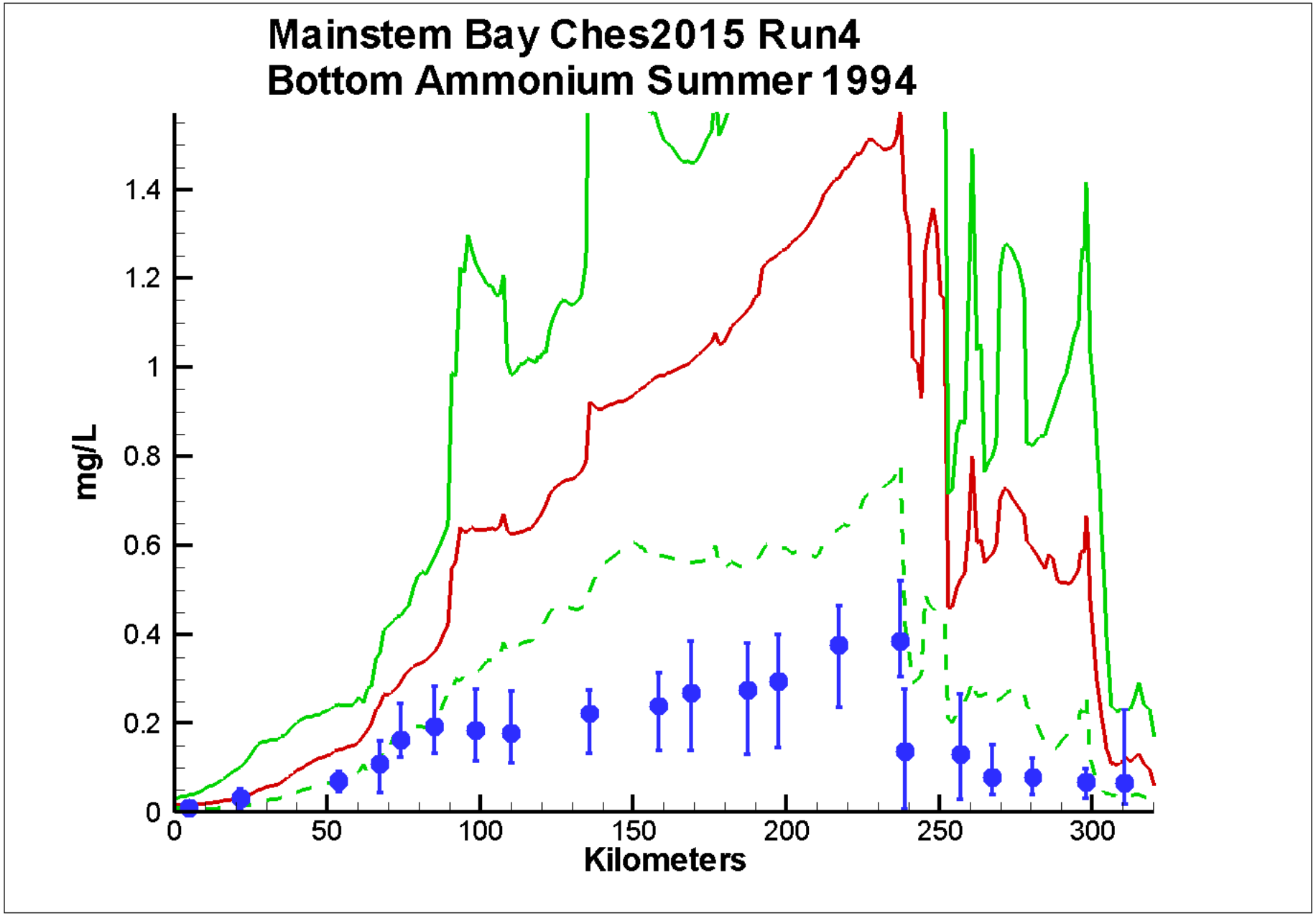


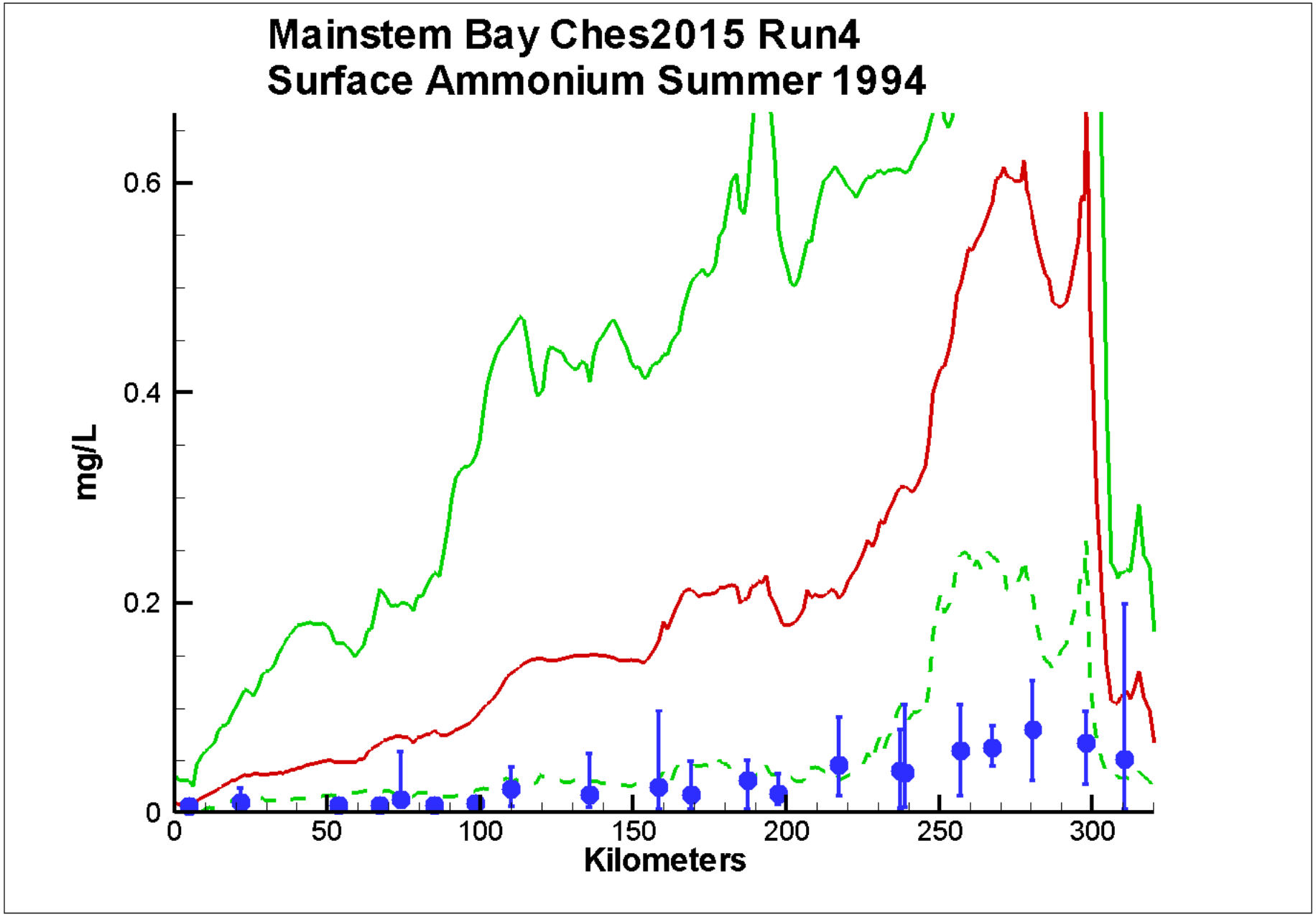

Mainstem Bay Ches2015 Run4
Bottom Dissolved Phosphate Summer 1994
mg/L
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
50
100
150
200
250
300
Kilometers


Mainstem Bay Ches2015 Run4
Surface Dissolved Phosphate Summer 1994
mg/L
0
0.2
0.4
0.6
0
50
100
150
200
250
300
Kilometers


Mainstem Bay Ches2015 Run4
Surface Chlorophyll Summer 1994
ugm/L
0
5
10
15
20
25
30
35
0
50
100
150
200
250
300
Kilometers


Mainstem Bay Ches2015 Run4
Bottom Dissolved Oxygen Summer 1994
mg/L
0
2
4
6
8
10
0
50
100
150
200
250
300
Kilometers


Mainstem Bay Ches2015 Run4
Bottom Ammonium Summer 1994
mg/L
0
0.2
0.4
0.6
0.8
1
1.2
1.4
0
50
100
150
200
250
300
Kilometers


Mainstem Bay Ches2015 Run4
Surface Ammonium Summer 1994
mg/L
0
0.2
0.4
0.6
0
50
100
150
200
250
300
Kilometers

Discussion

- This run needs a thorough examination. Why are we seeing this large reaction to bankloads?
- This issue should not be addressed casually:
  - We need a careful evaluation of loads and reactivity.
  - We likely need model recalibration. Potentially, new formulations.
  - The magnitude of bank P loads is significant relative to TMDL loads. They also occur distant from conventional loads in tributaries and point sources.