Lag Time in Phase 6 Watershed Model

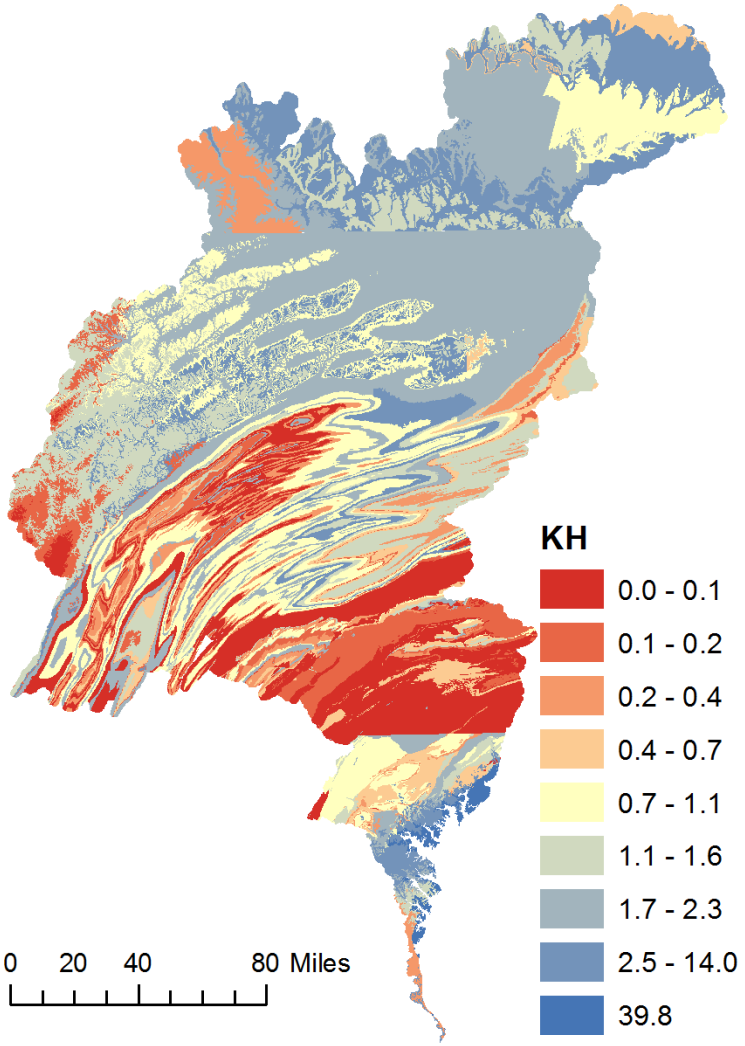
Gary Shenk and Gopal Bhatt

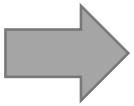
Presentation Outline

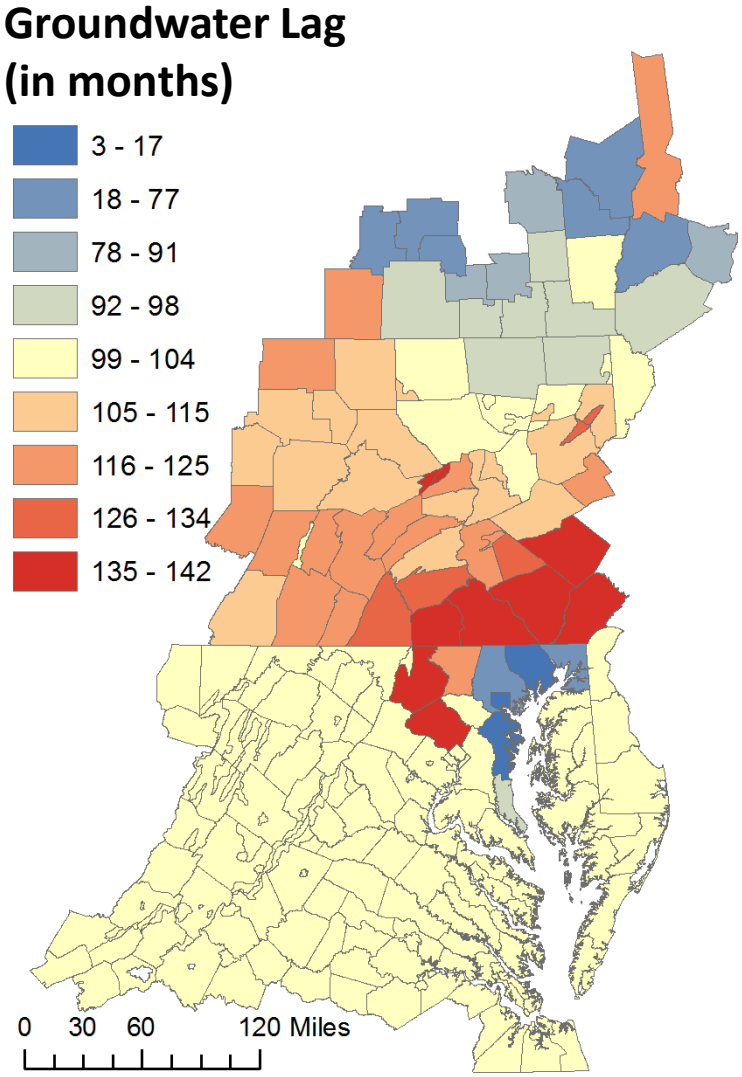
- Brief overview of lag-time used in Phase-6 prototypes (July/August-2015)
- Unit Nutrient Export Curve (UNEC)
- Revisions to lag-time estimates for Phase 6 Beta-1

From July Quarterly

Subsurface Lag in July/Aug 2015 Prototypes

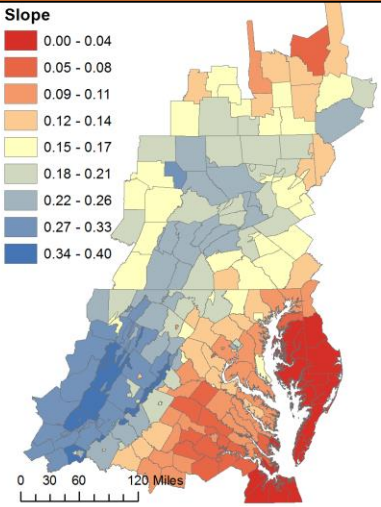




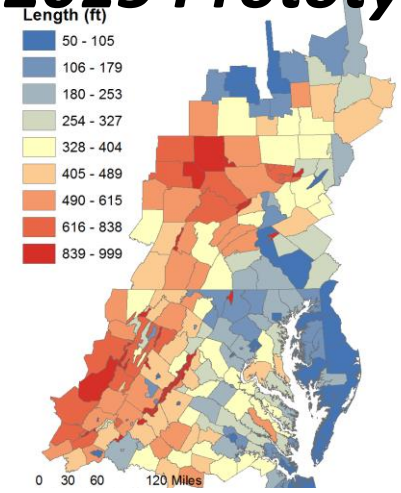


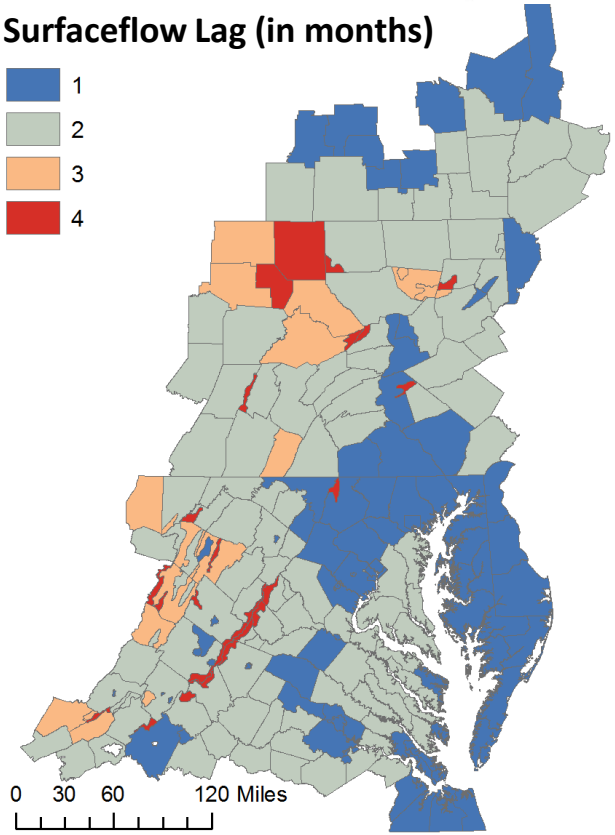
From July Quarterly

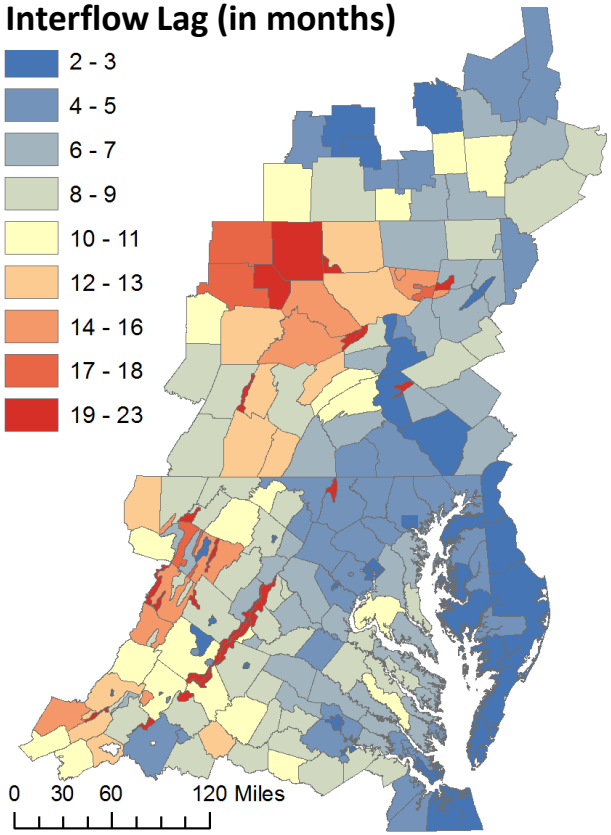
Surface Lag in July/Aug 2015 Prototypes

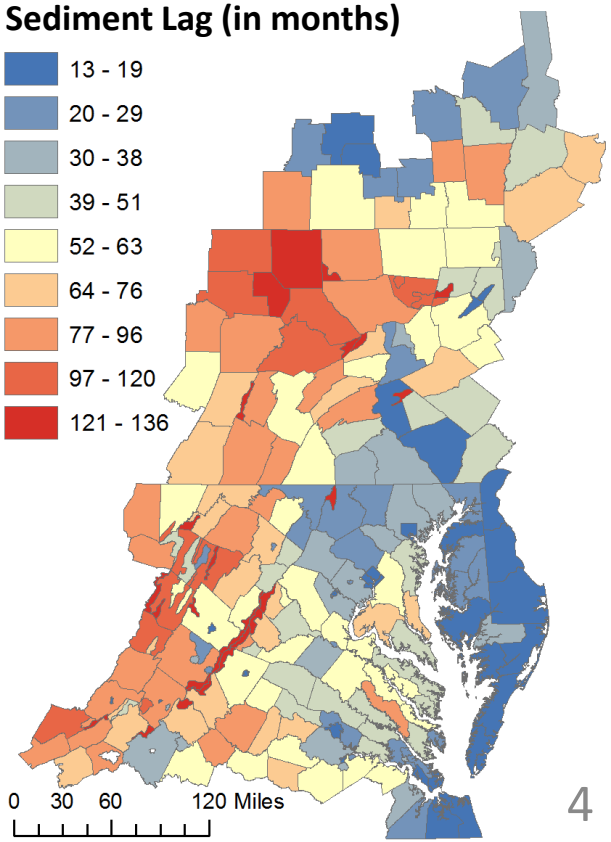


SLOPE LENGTH

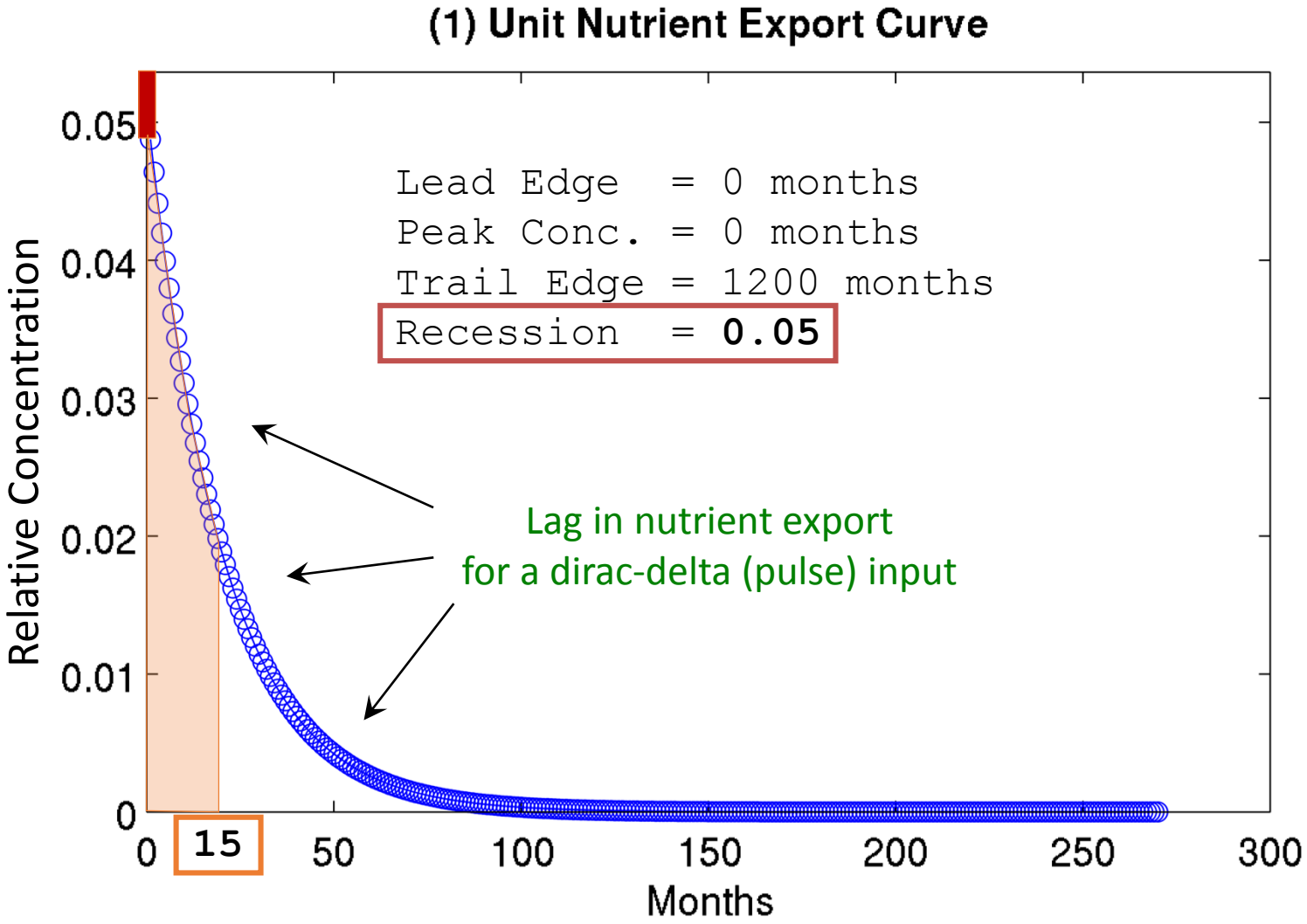




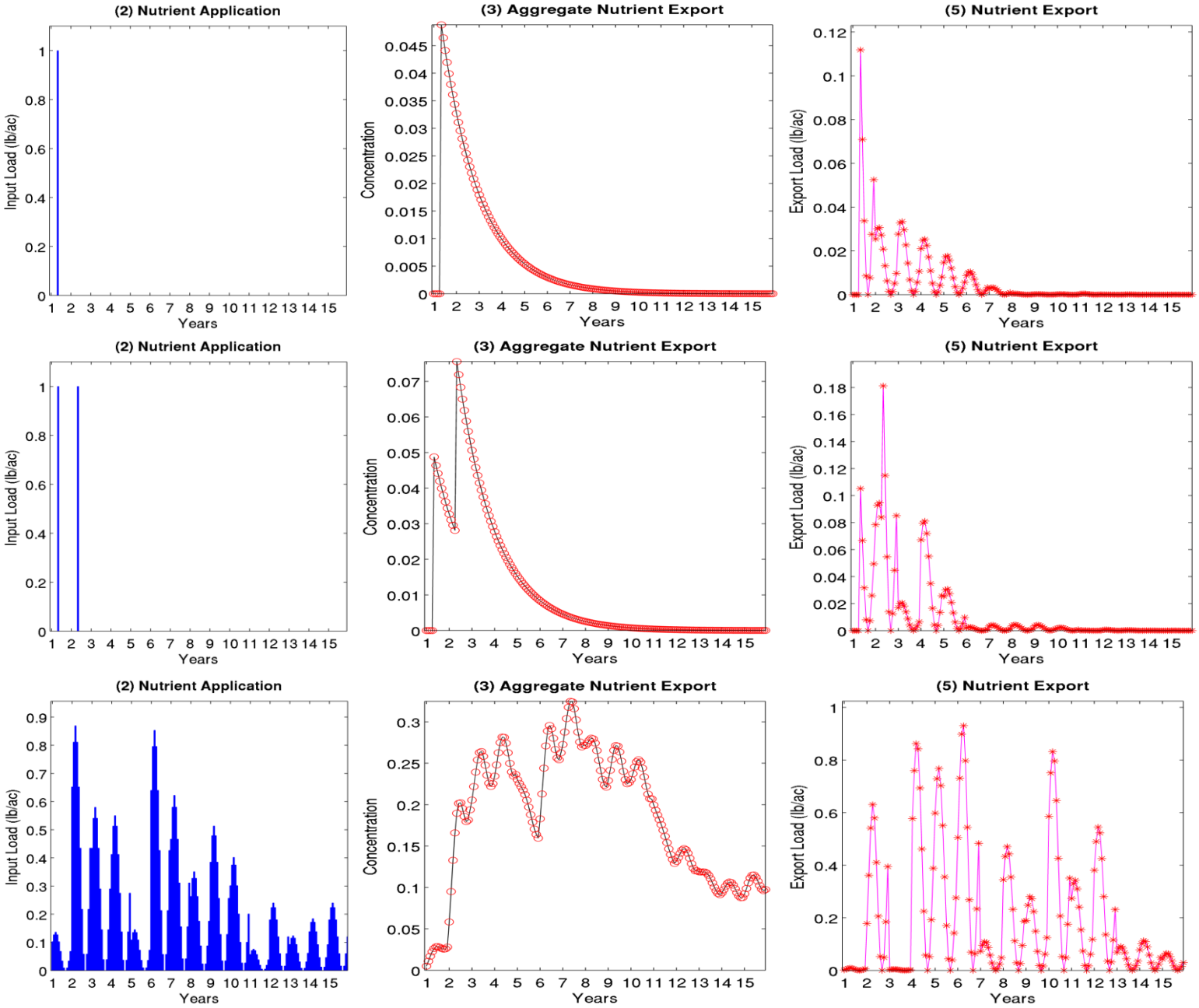




Unit Nutrient Export Curve



Unit Nutrient Export Curve



Parameterization

Nutrients:

- Nitrate
- Ammonia
- Organic Nitrogen
- Phosphate
- Organic Phosphorus

Flowpaths

- Surface flow
- Interflow
- Sediment bound
- Groundwater

5 x 4 = 20 lag parameters sets

Export Targets:

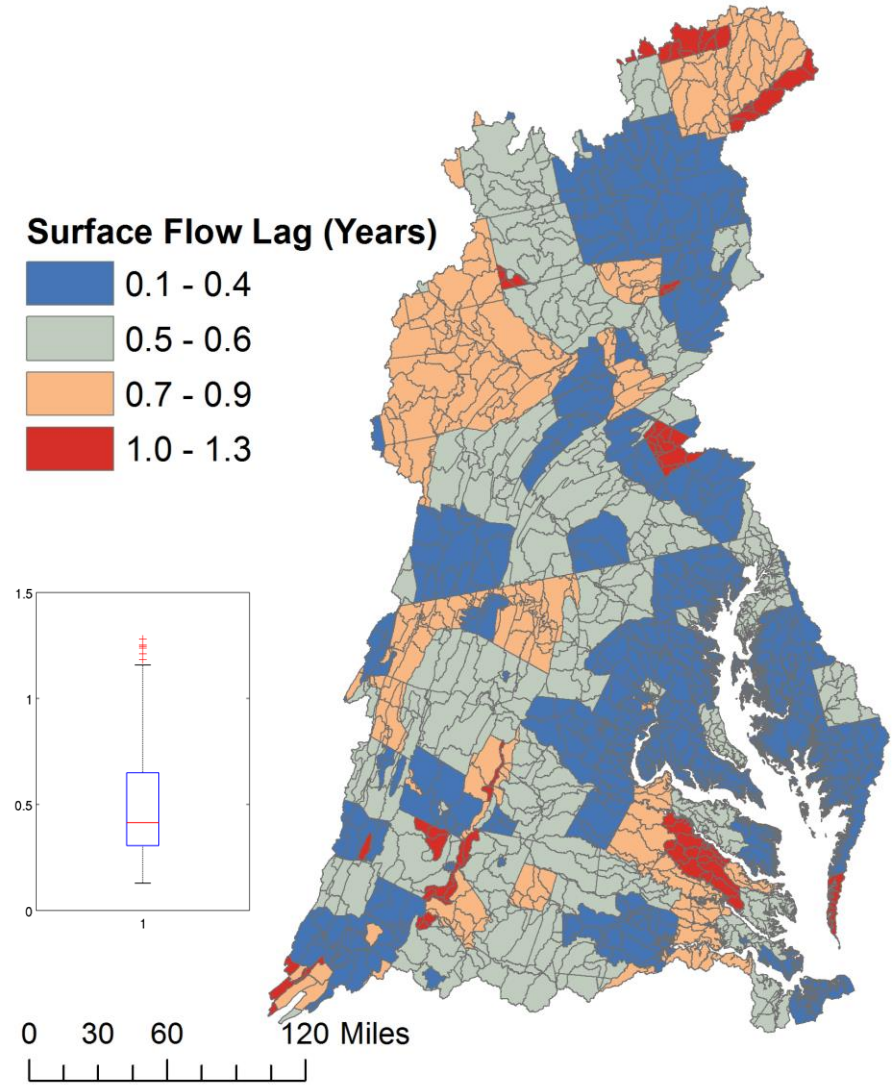
- Surface
- Groundwater

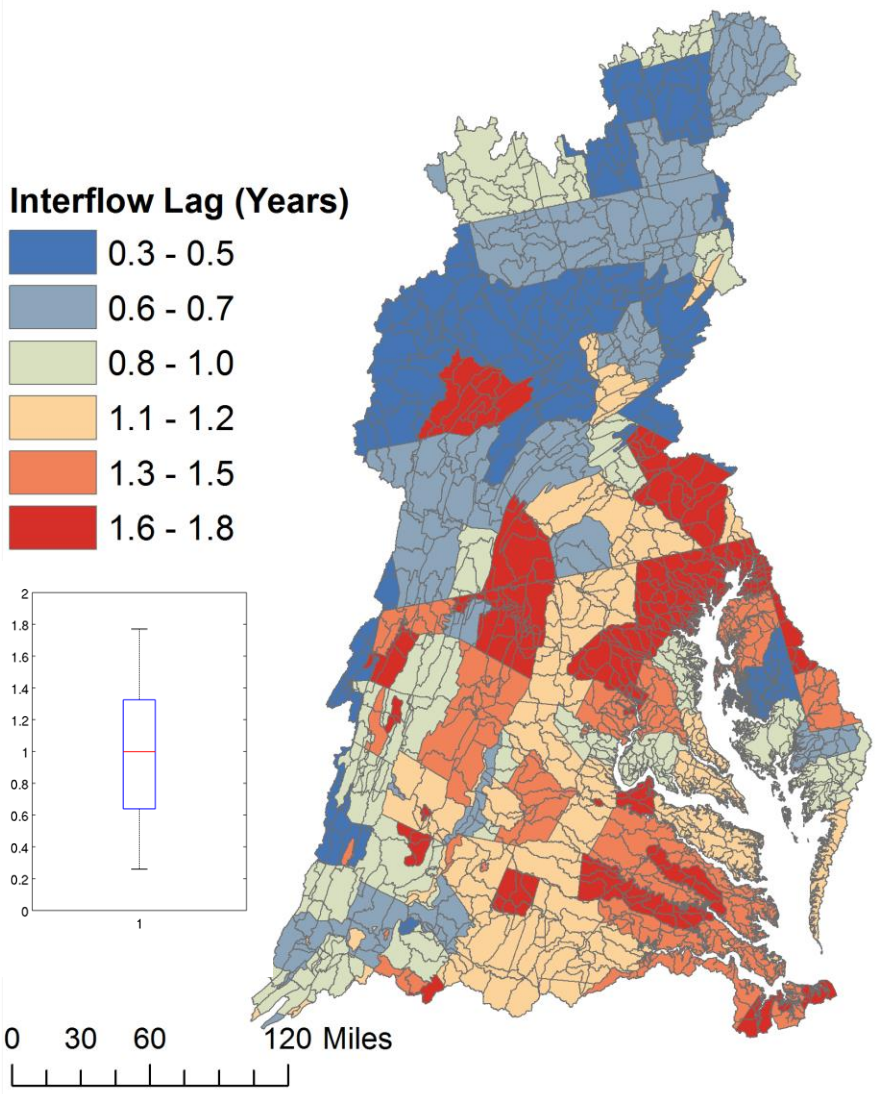
- Surface
- Interflow
- Sediment

PCs + 4 lag parameters sets

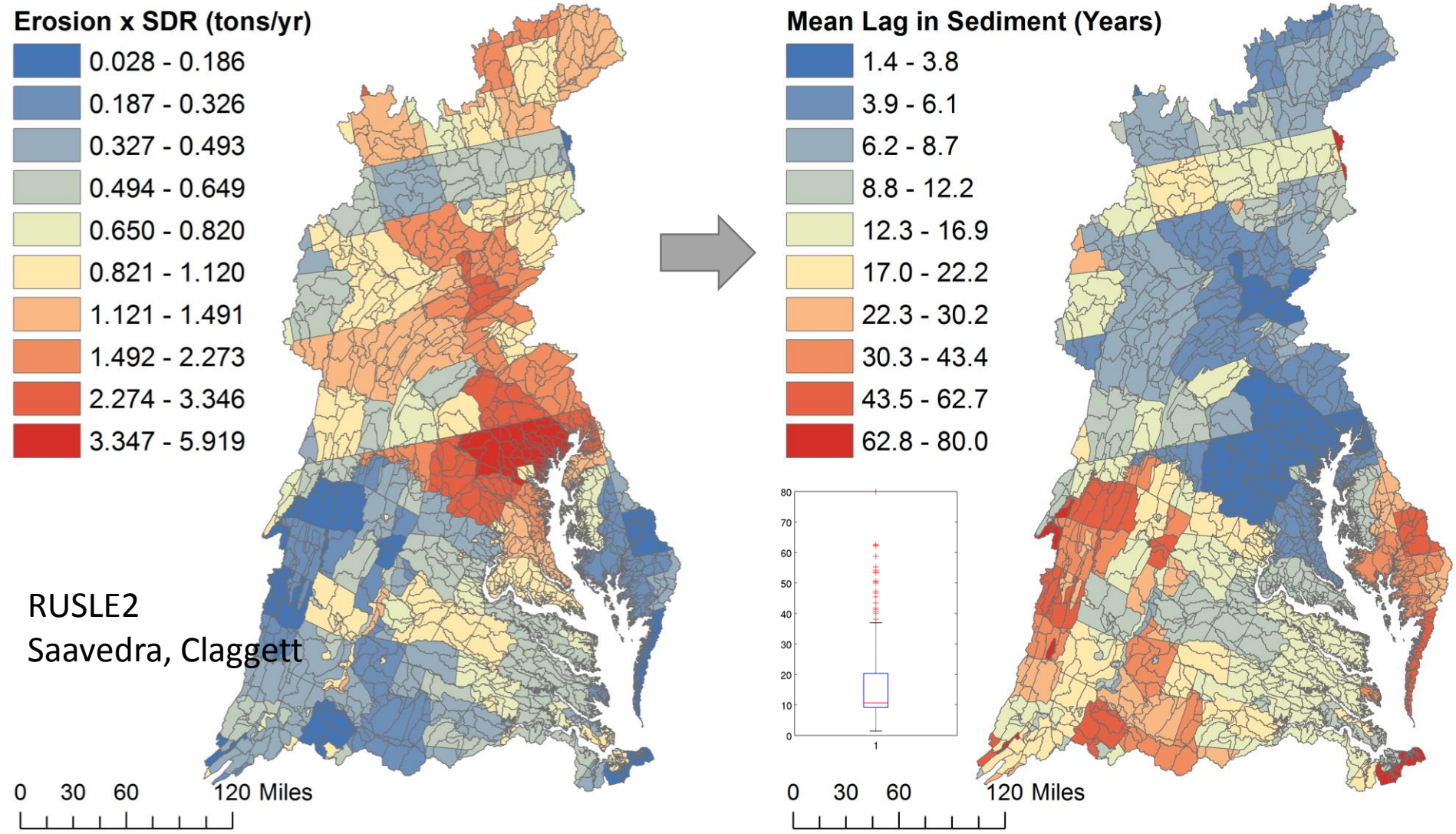
* either global or segment specific

lag in surface flow bound nutrient export

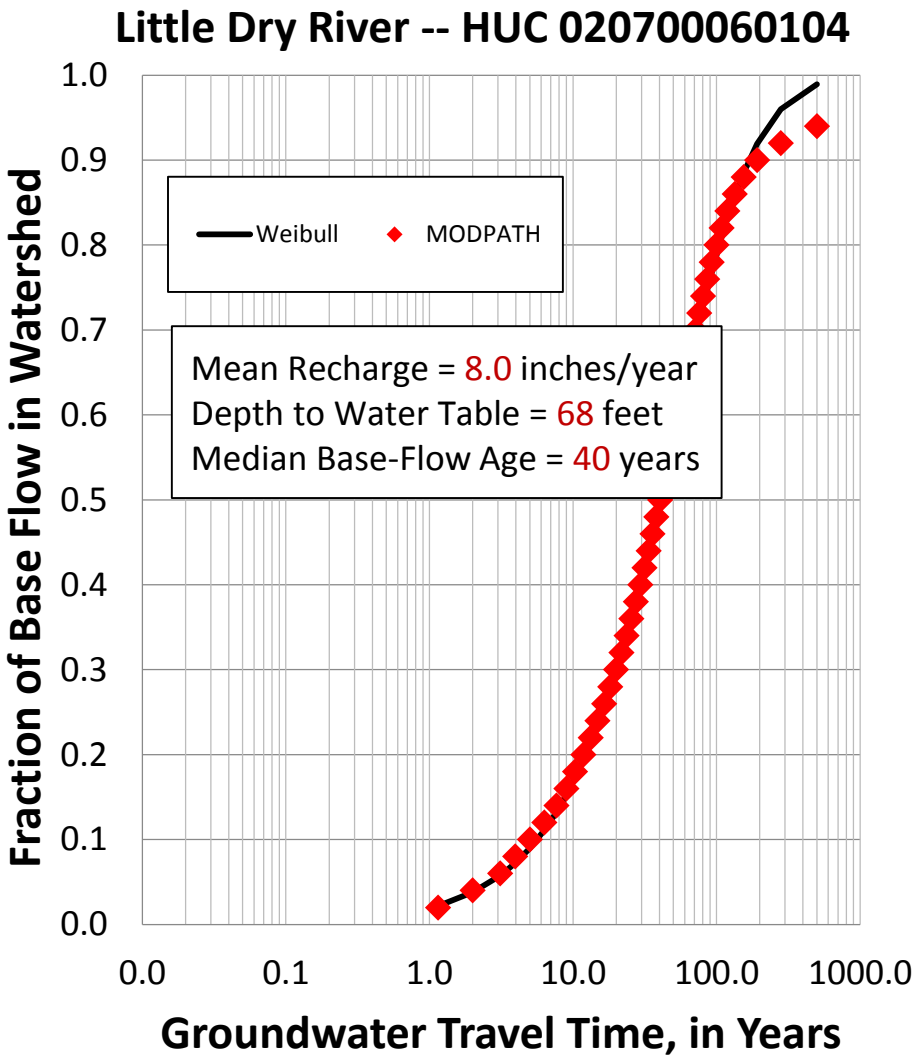


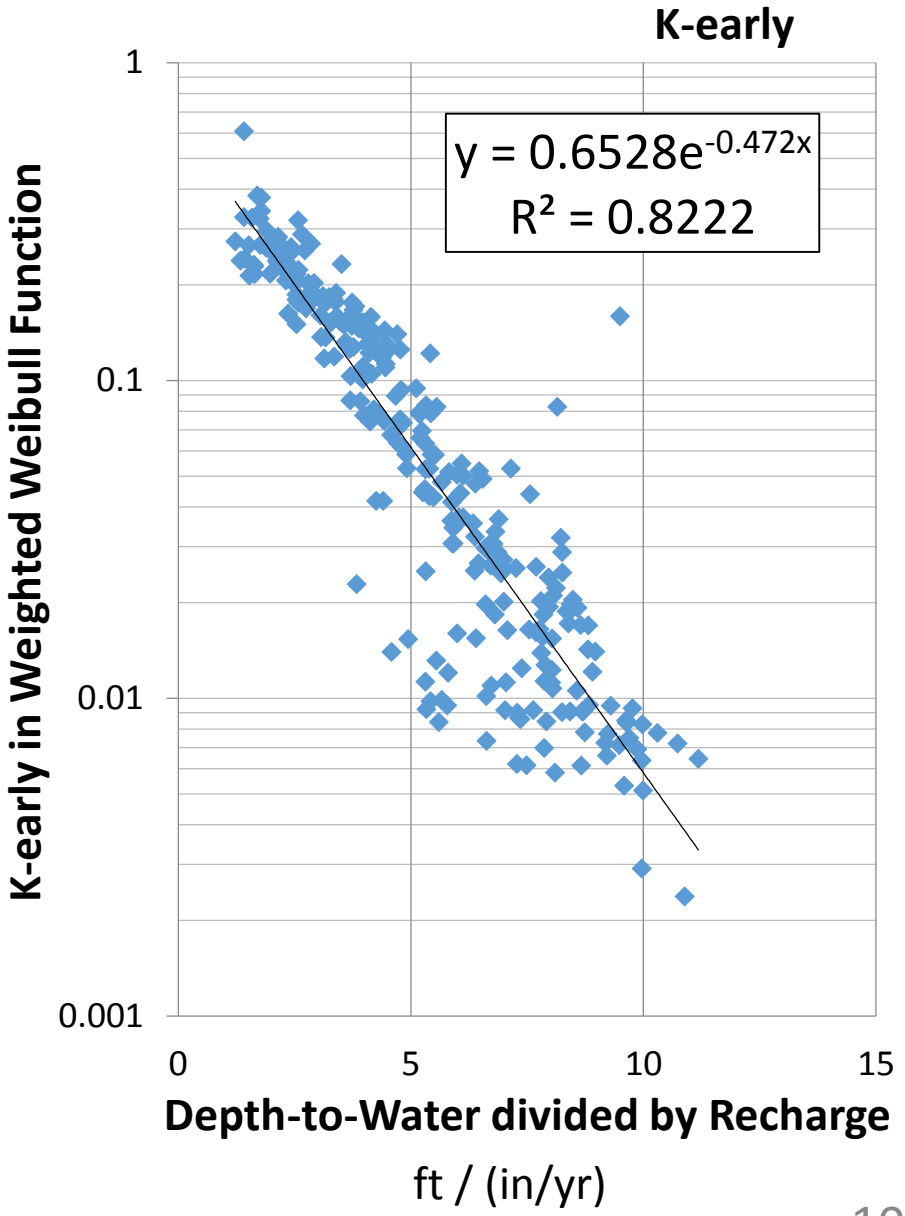


lag in sediment bound nutrient export



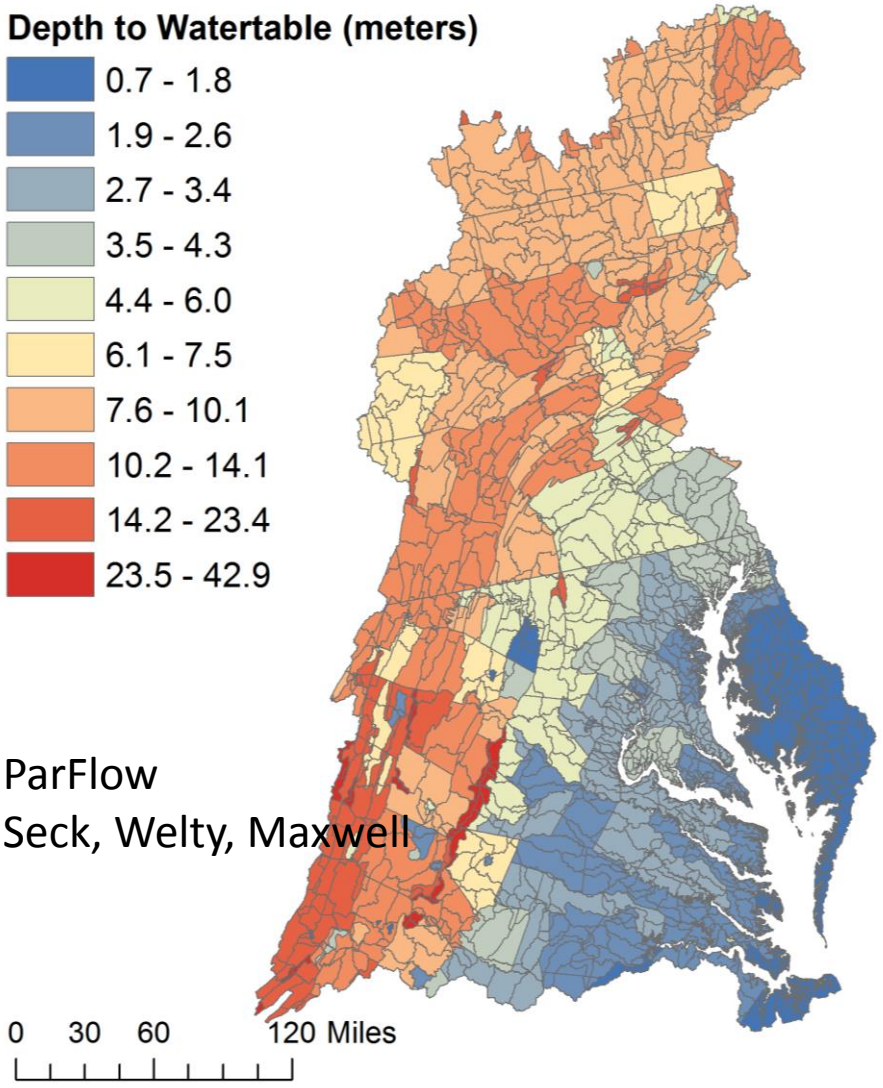
lag in groundwater bound nutrient export



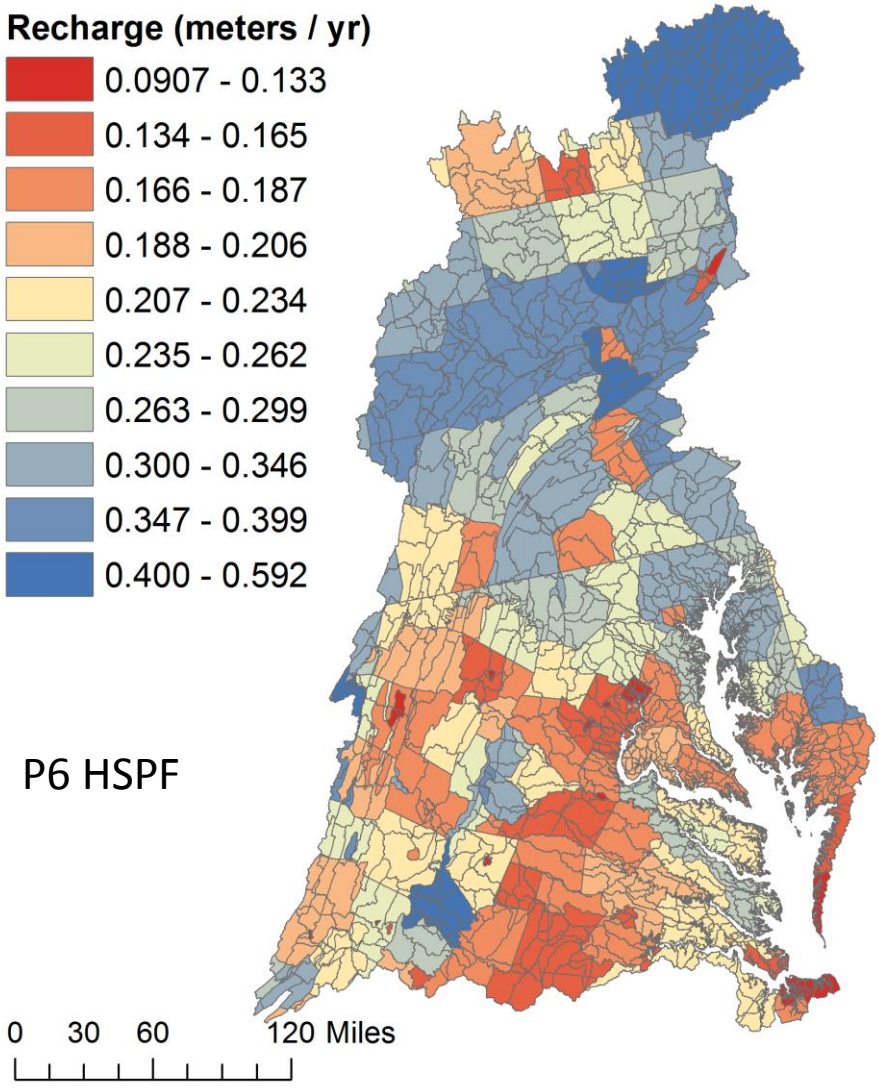


Sanford, 2015

lag in groundwater bound nutrient export

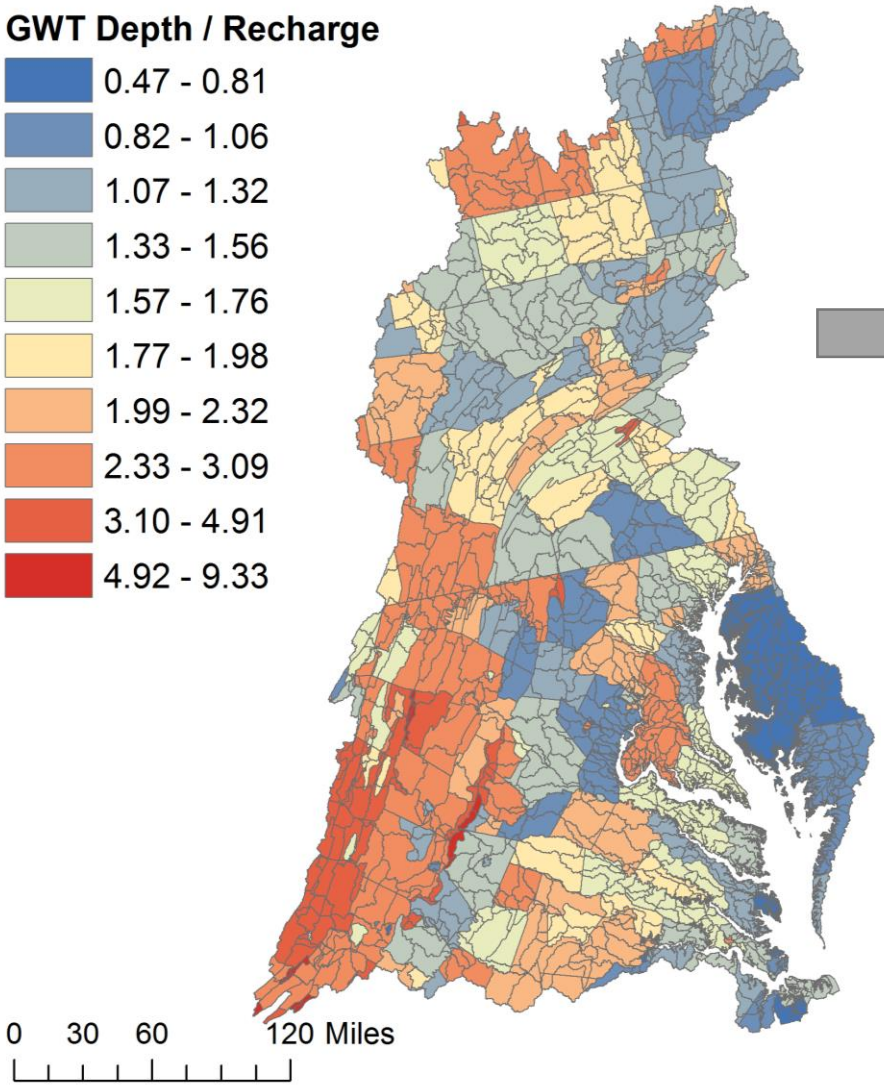


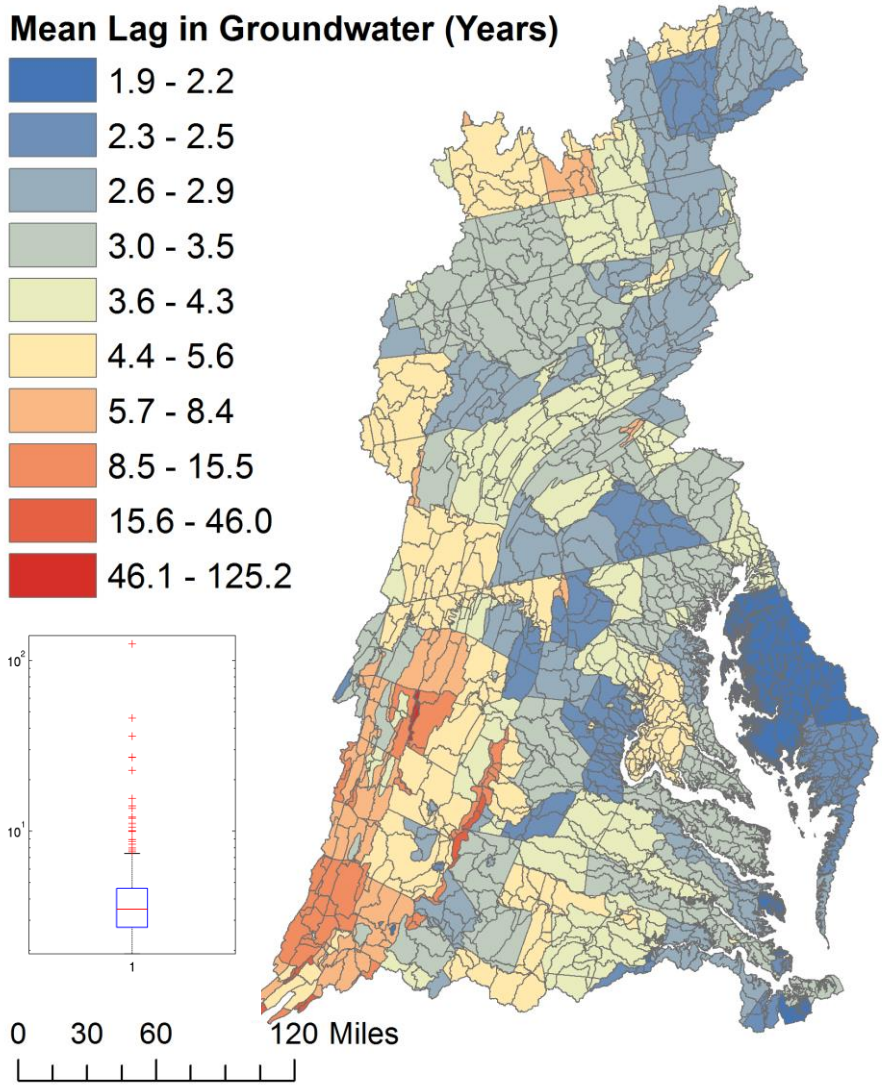
ParFlow
Seck, Welty, Maxwell



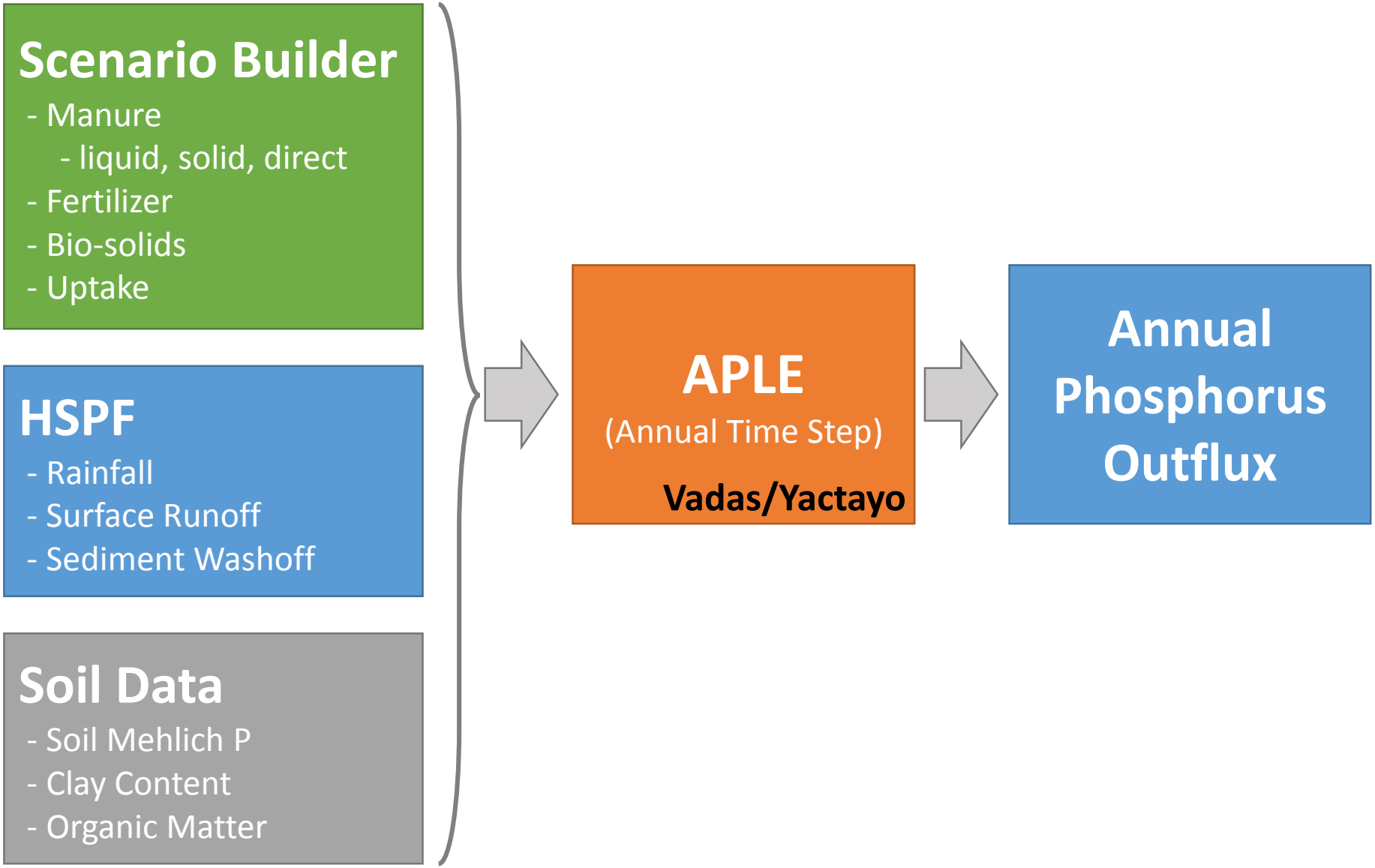
P6 HSPF

lag in groundwater bound nutrient export



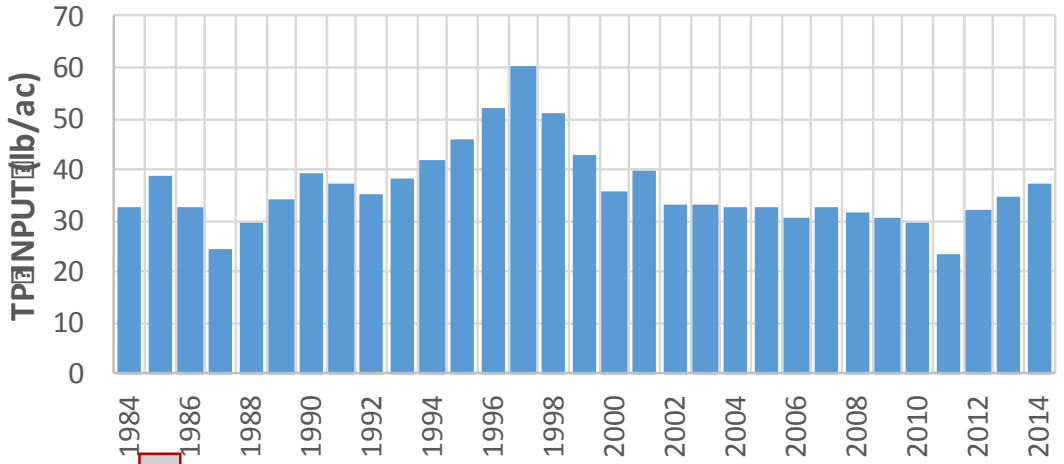


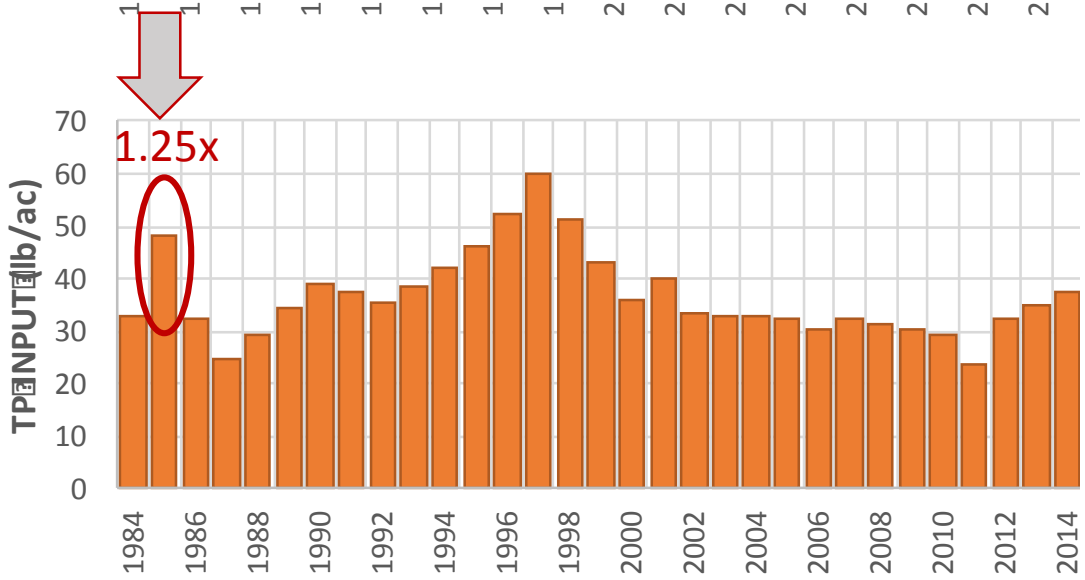
APLE as a source to estimate lag in phosphorus export



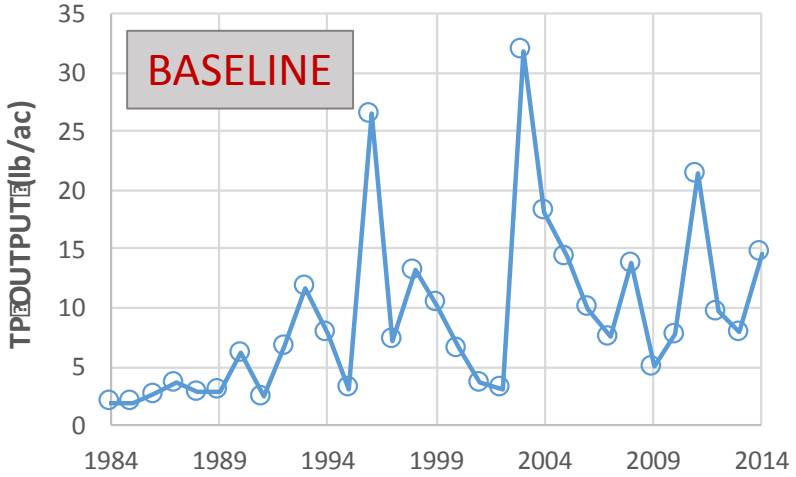
Method used for estimating lag in phosphorus export

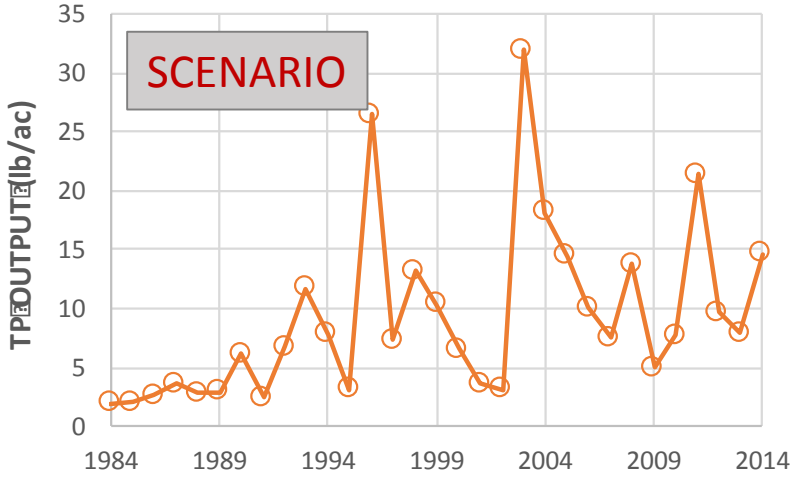
Input: H24021,MD,Fredrick



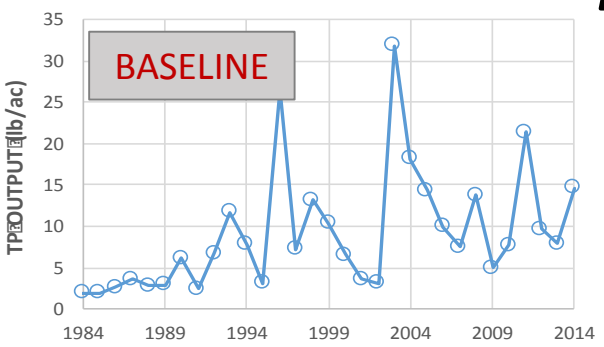


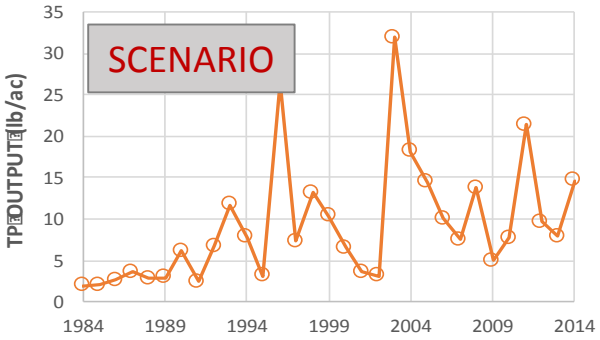
Outflux: APLE Model

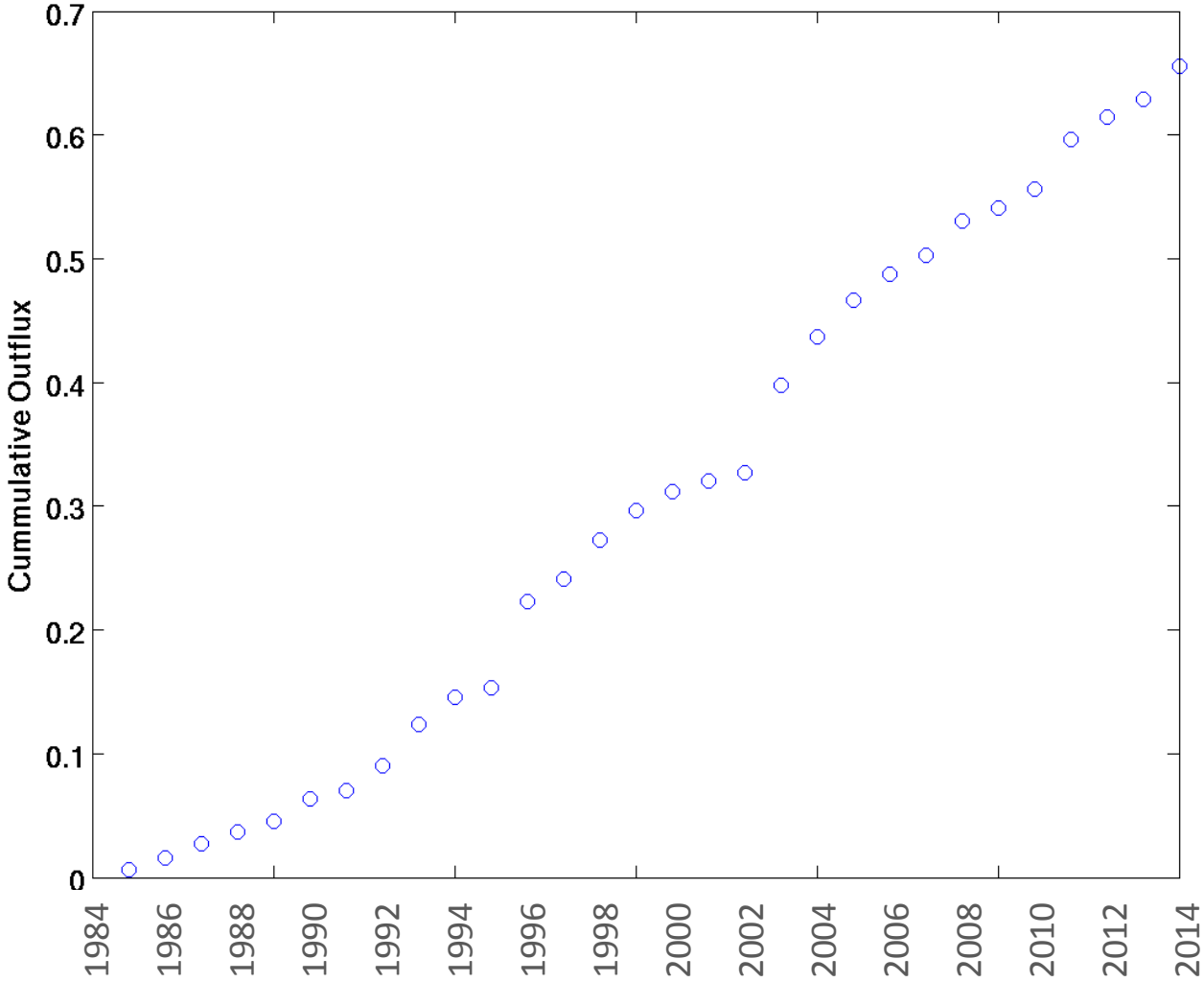


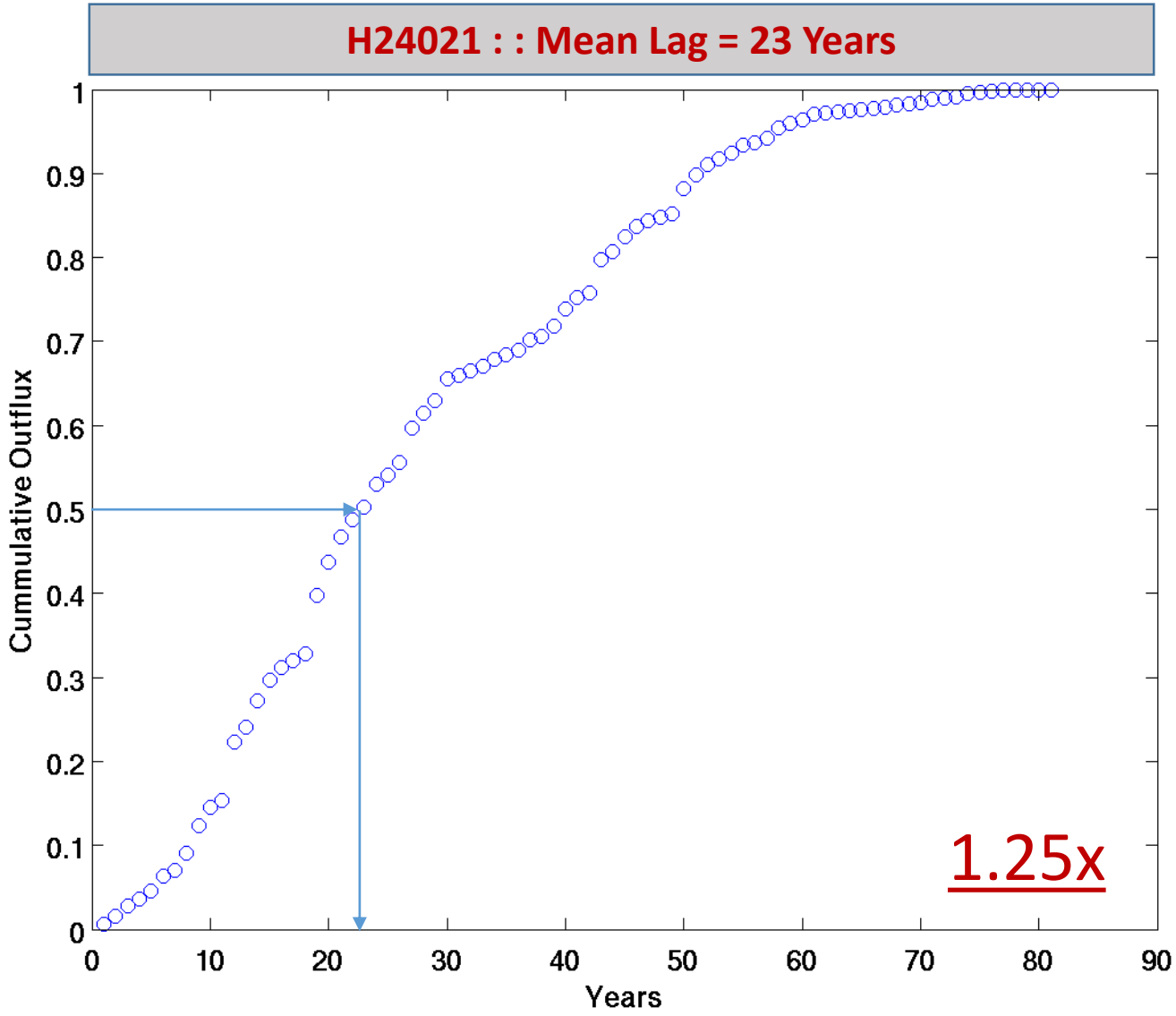


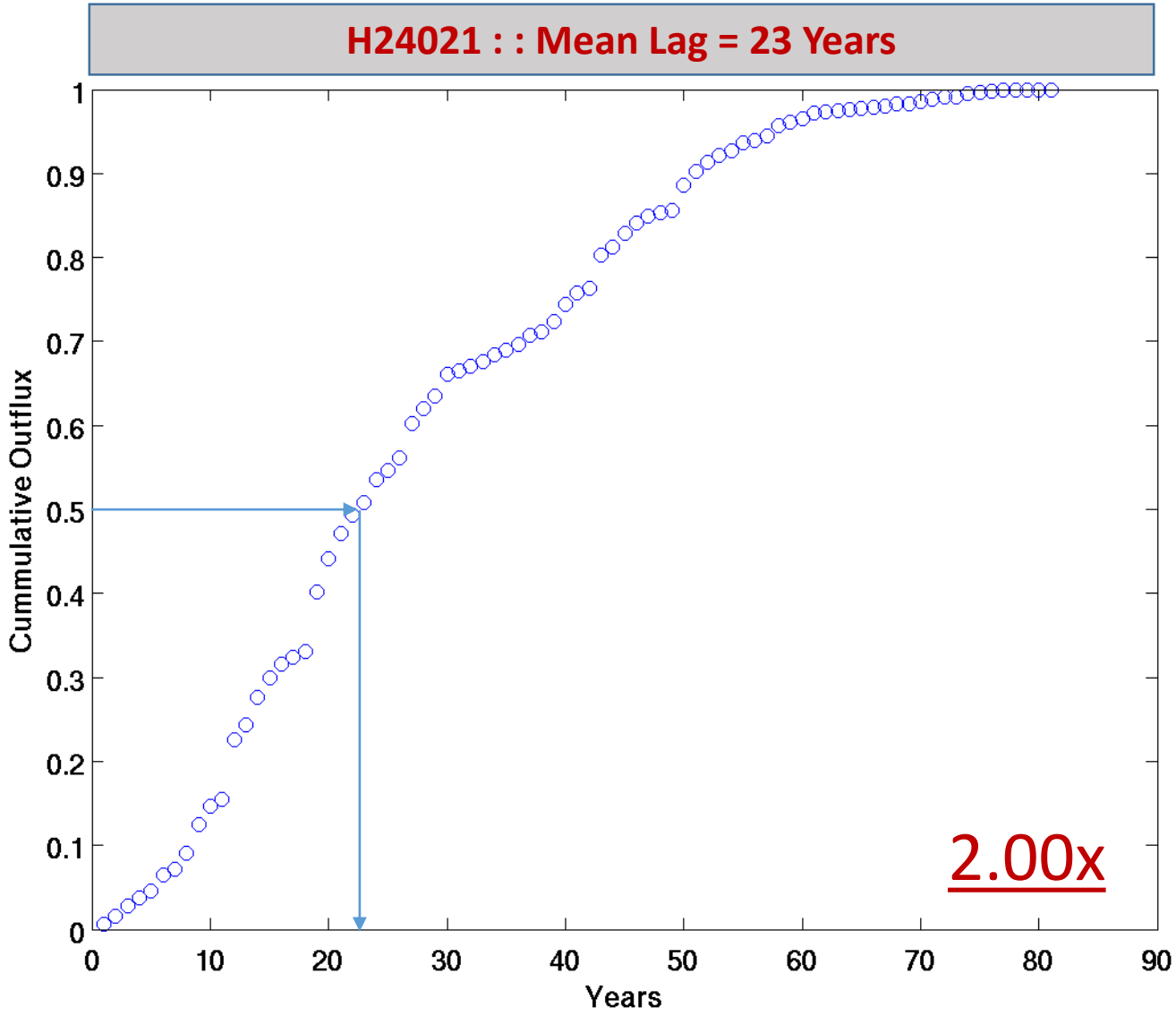
Difference between Scenario and Baseline

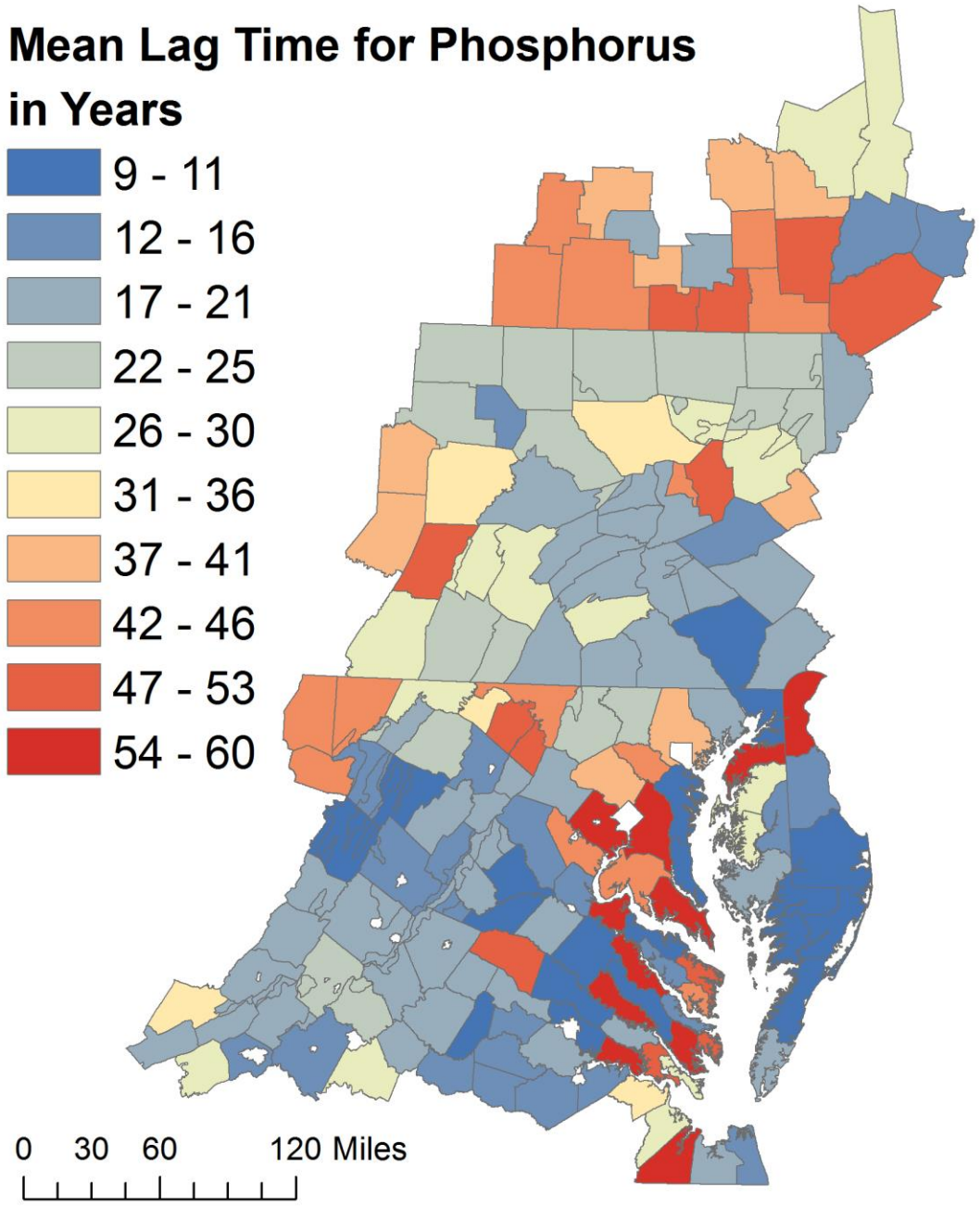


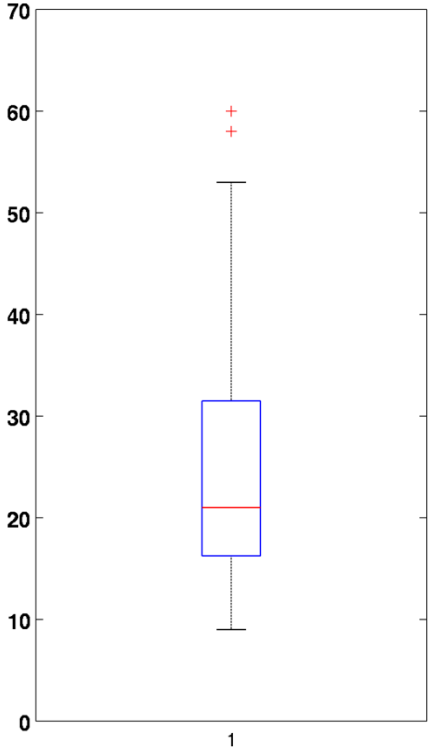





H24021 : : Mean Lag = 23 Years
Cummulative Outflux
Years
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
10
20
30
40
50
60
70
80
90
1.25x


H24021 : : Mean Lag = 23 Years
Cummulative Outflux
Years
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
10
20
30
40
50
60
70
80
90
2.00x


Mean Lag Time for Phosphorus in Years
9 - 11
12 - 16
17 - 21
22 - 25
26 - 30
31 - 36
37 - 41
42 - 46
47 - 53
54 - 60
0 30 60 120 Miles


70
60
50
40
30
20
10
0
1

Next Steps …

- Incorporate these estimates of lag times in the watershed model calibration.

- Examine the effect on model performance.