Sustainable Monocacy Commission

Thursday, March 25, 2021

7:00pm - virtual meeting through Webex

Agenda

- Member comments
- Review January 2021 meeting minutes (decision)
- Nominations and election of Chair and Vice-Chair (decision)
- Guest speaker #1: Andy Mekelburg, Potomac Valley Fly Fishers Club, will discuss a recognition or memorial for Lefty Kreh, a world-famous fly fisherman who was born and raised in Frederick County.
- Guest speaker #2: Dr. Kevin Sellner
  Dr. Sellner will present a summary of the Monocacy River Water Quality Assessment. The 2020 Assessment analyzed 33 years of data from 4 stations on the mainstem, plus 1 monitoring site on Big Pipe Creek.
- Sustainable Monocacy Commission Rules of Procedures – review of initial draft and discussion
- SMC logo design update (M. Moran)
- Next meeting: Thursday, May 27, 2021 (virtual meeting). Possible topics: Additional discussion of Monocacy River Water Quality Assessment, Review of 2019 Monocacy River Management, Other topics

Monocacy River Water Quality

1986-2018

Kevin Sellner & Drew Ferrier

Sustainable Monocacy Commission

March 25, 2021

Center for Coastal & Watershed Studies, Hood College

Key Findings for the Monocacy

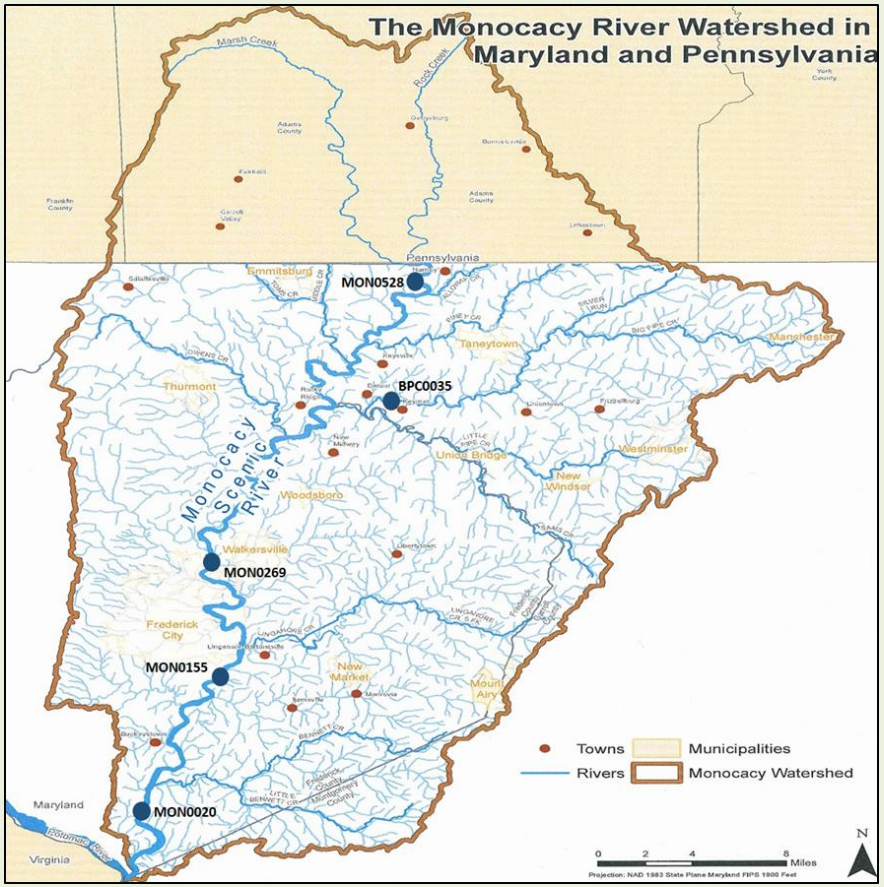
- Phosphorus concentrations highest at the PA-MD border with downriver dilution from Pipe Creeks of the two counties
- BNR implementation in Frederick City WWTP in November 2002 in the river reach that includes the City resulted in substantial phosphorus declines
- River nitrogen is driven by Pipe Creeks inputs from the two counties with additional smaller increases as the river passes through the Frederick County to the Potomac
- N&P have generally declined in each river segment from 1986 to 2018 but Frederick County & City still remain sources of N as the river traverses its borders
- Nutrient increases in the Monocacy primarily from agriculture
- Event-driven nutrient deviations suggest future concerns from future boom-bust precipitation and droughts. Those coupled to warmer temperatures indicate large public health problems (Climate Emergency Resolutions)

Water Quality Parameters

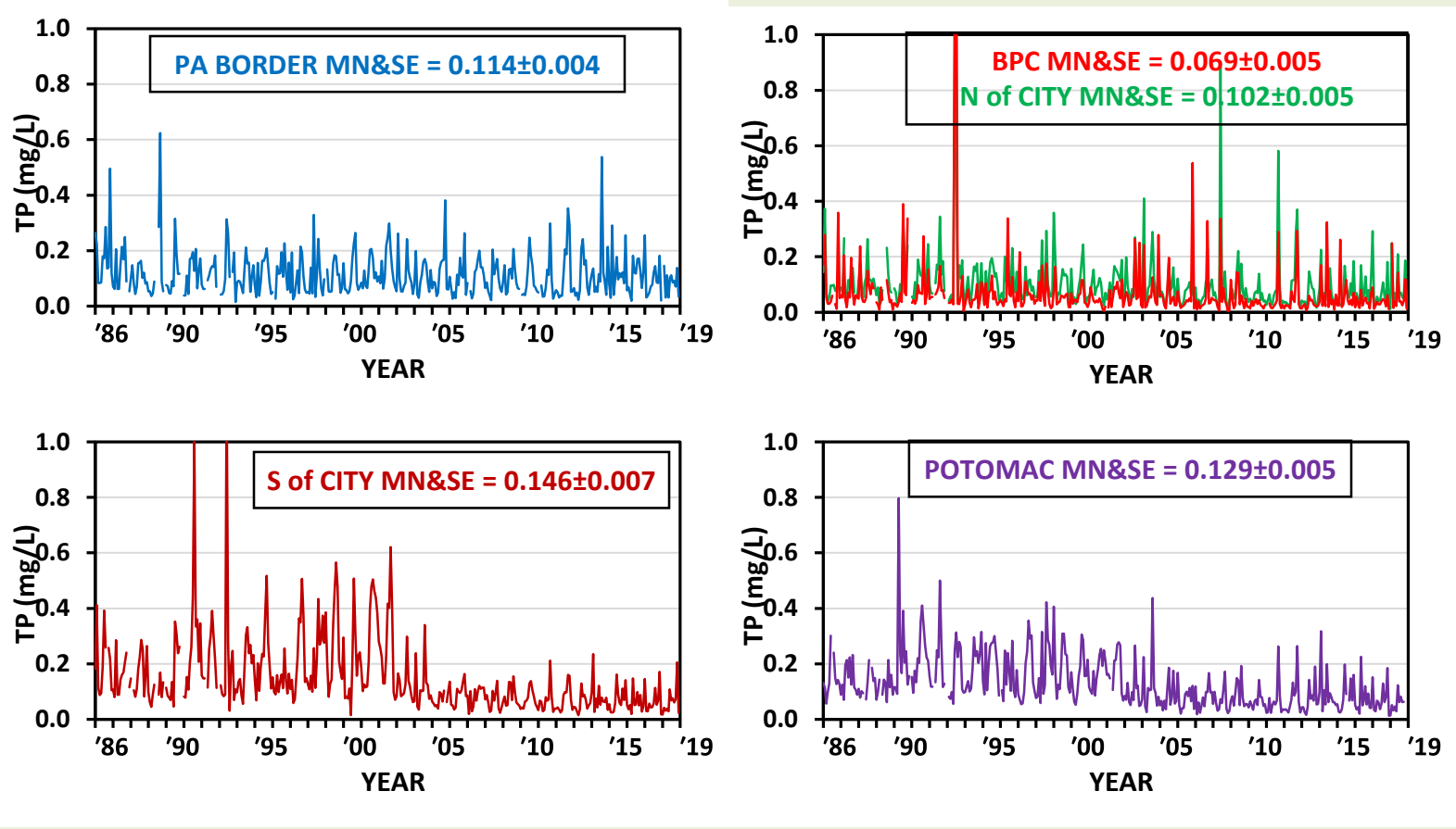
- All rivers transport land-derived nitrogen, phosphorus, sediment, and other materials
- N found in TN, DIN, NO23, & NH4; P found in TP & ortho-phosphate
- N & P are critical macronutrients that govern production of planktonic and benthic algae, cyanobacteria, and submersed grasses whose subsequent decay controls hypoxia/anoxia locally and in the bay. Bay's poor condition led to the 2010 bay-wide TMDL
- Multiple statements were made that the 1) bay is better so the Monocacy must be as well and 2) any 'pollution' is from our PA neighbor to the north

River Details

- State monthly monitoring at 5 stations in the river watershed 1986-2018
- Station details:
  - MON0528 at PA Border
  - BPC0035 Carroll + Frederick County
  - MON0269 North of City
  - MON0155 below City
  - MOB0020 at Potomac

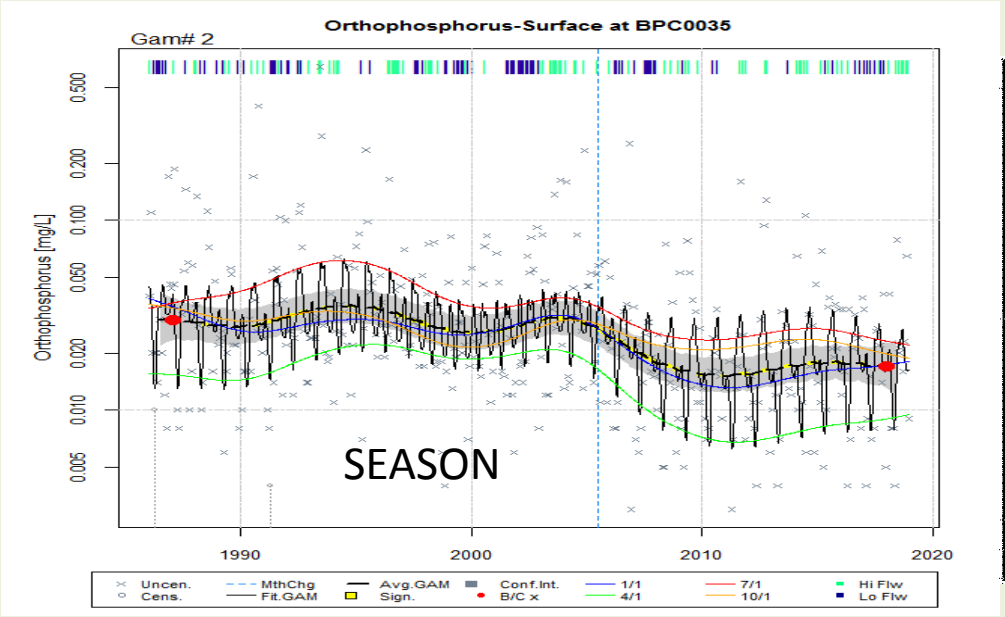


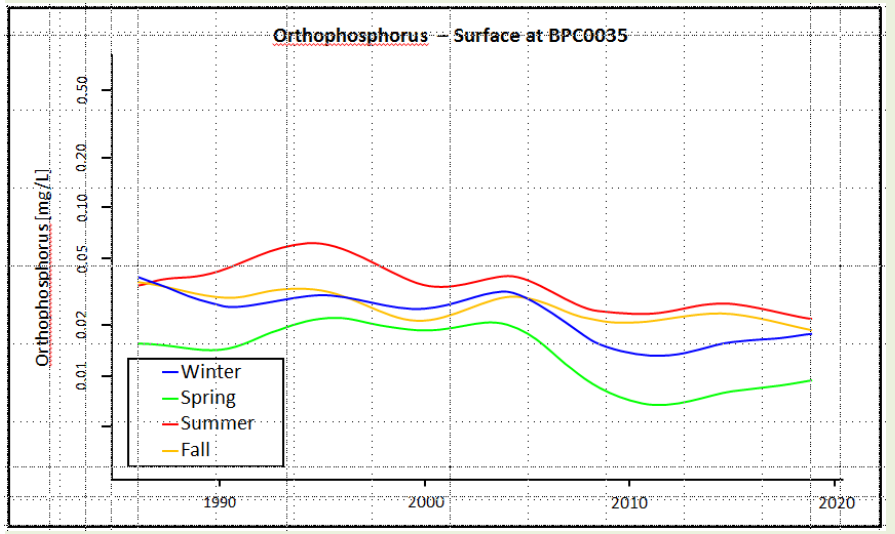
Phosphorus



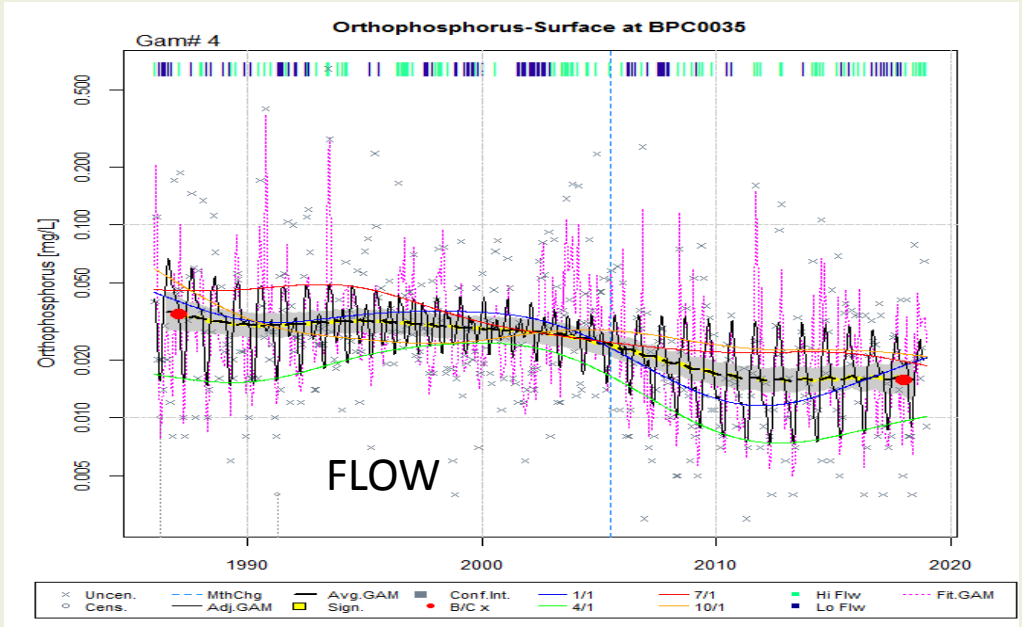
Monthly TP concentrations (mg/L) in the Monocacy River for the 1986-2018 period. Note the high variability.

Season & Flow Impacts on Phosphorus

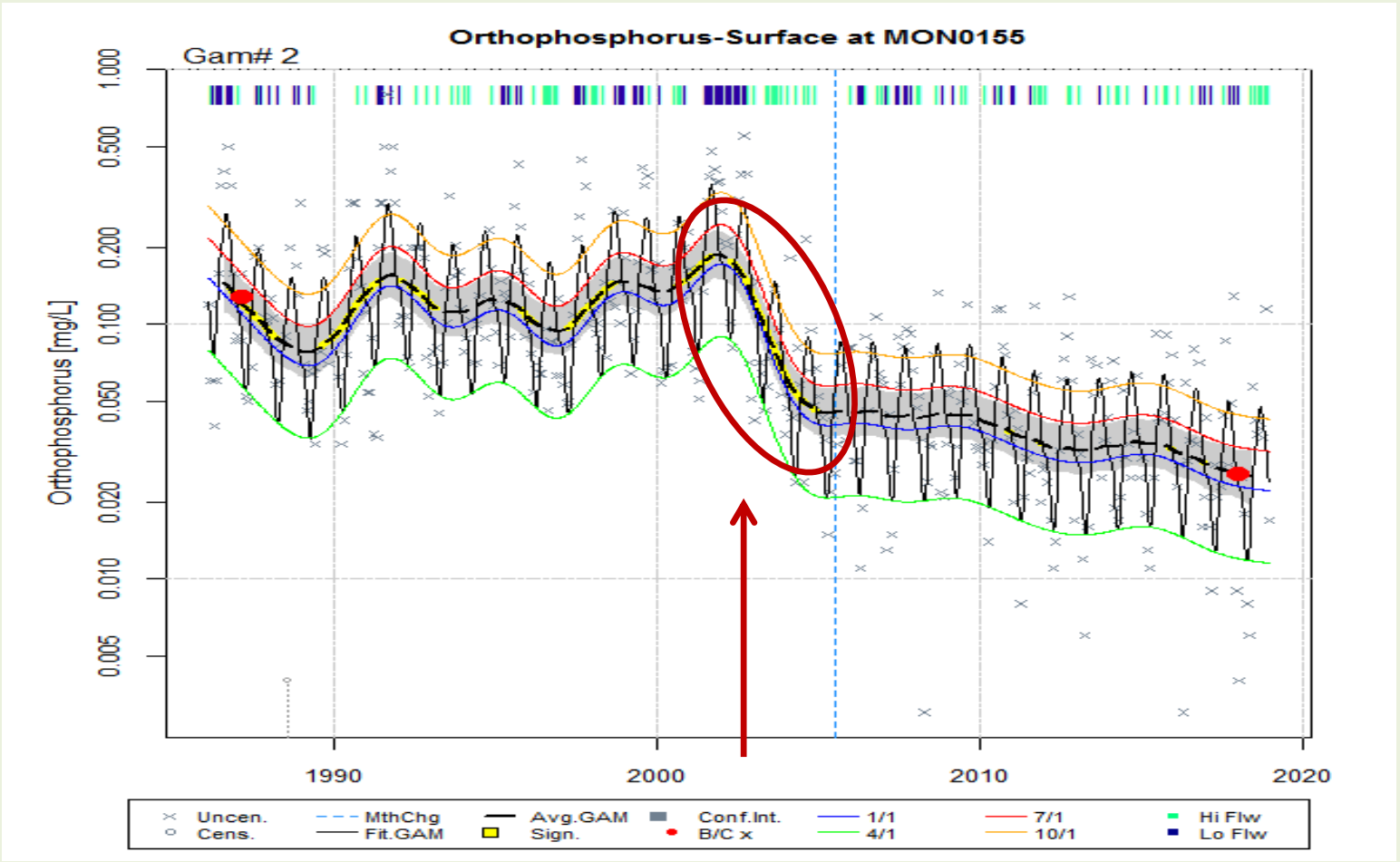




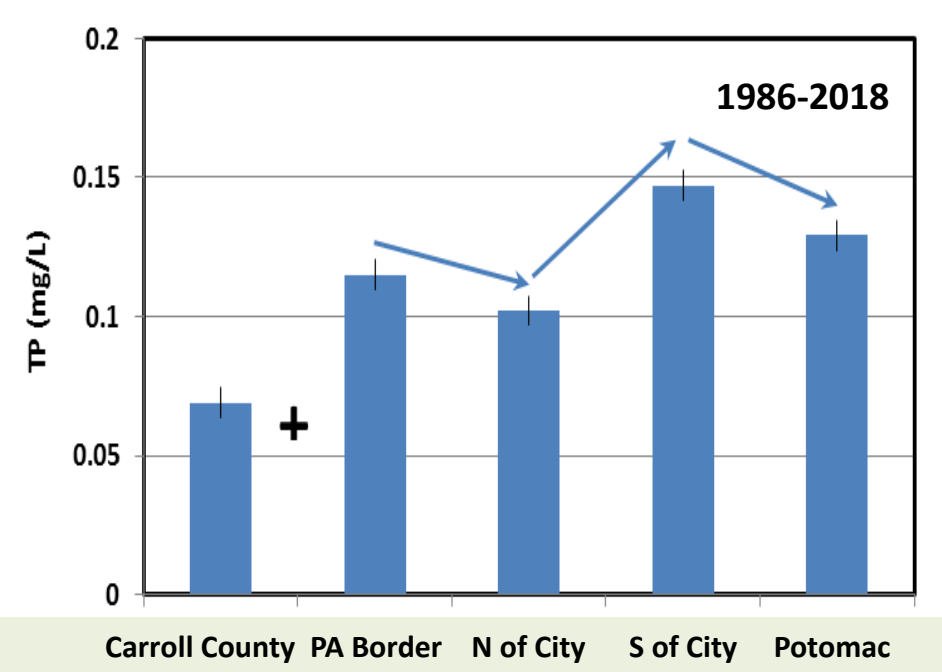
High & low flow events matter – Climate Change implications



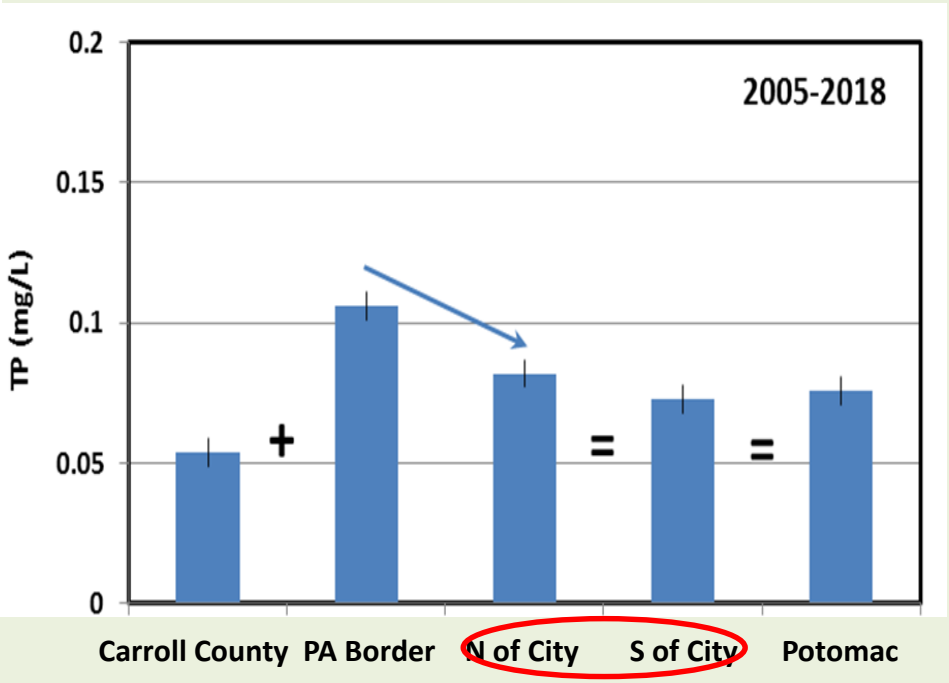
What land use change?



Phosphorus

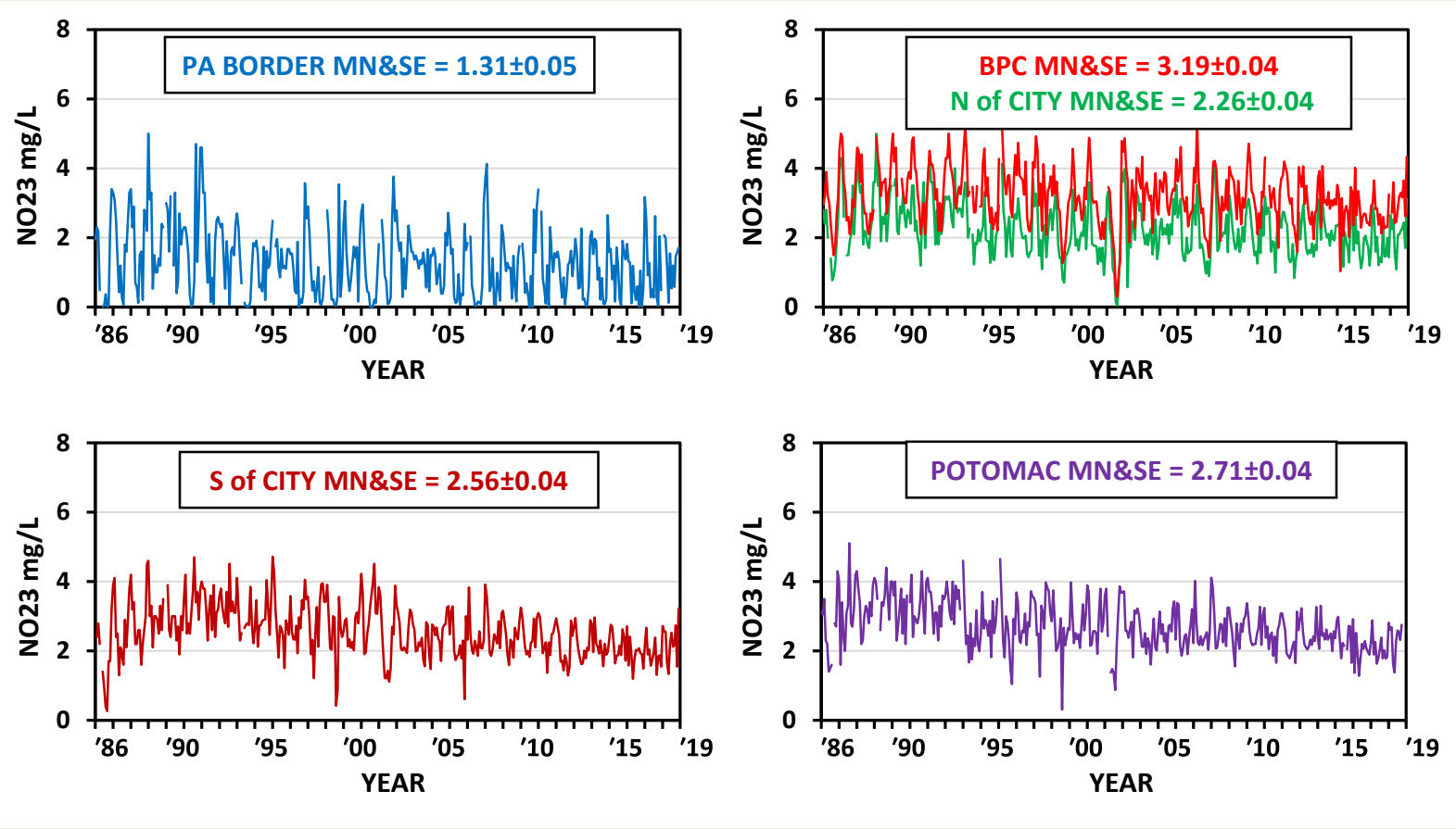


High P at PA Border is diluted by input from Carroll County's Big Pipe Creek to yield a low TP concentration N of the City. Levels increase through the City river segment and decline in the southern County.



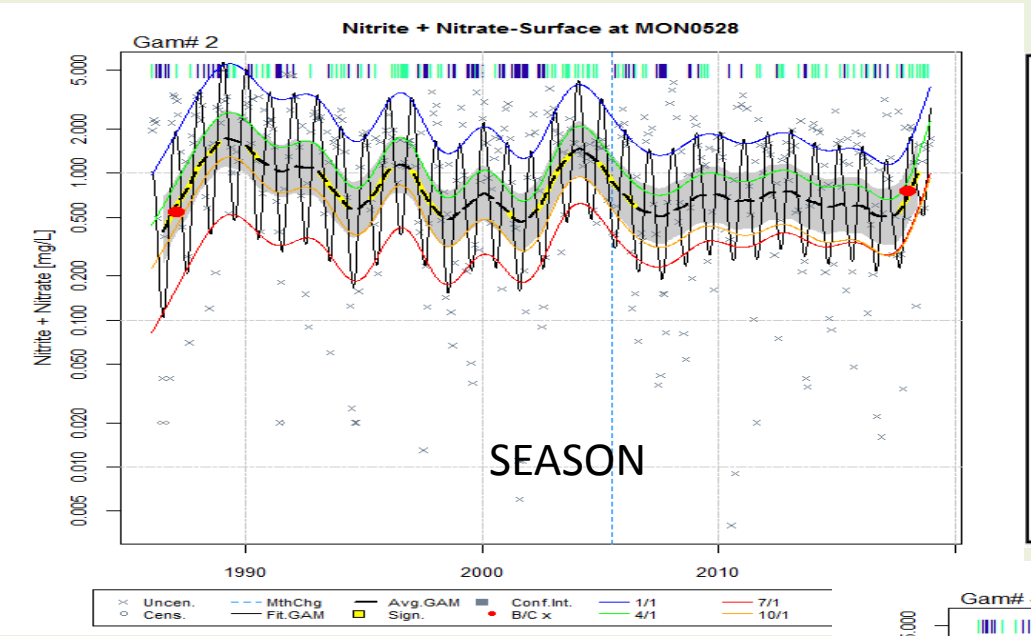
High P at PA Border is diluted by input from Carroll County's Big Pipe Creek to yield a lower TP concentration N of the City. But high levels seen for the entire period have been reduced in the City river segment and remain low in the southern County.

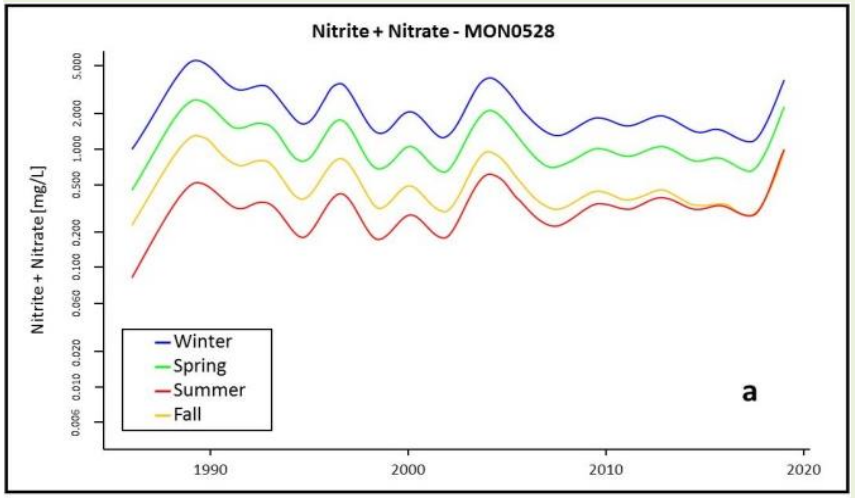
Nitrogen



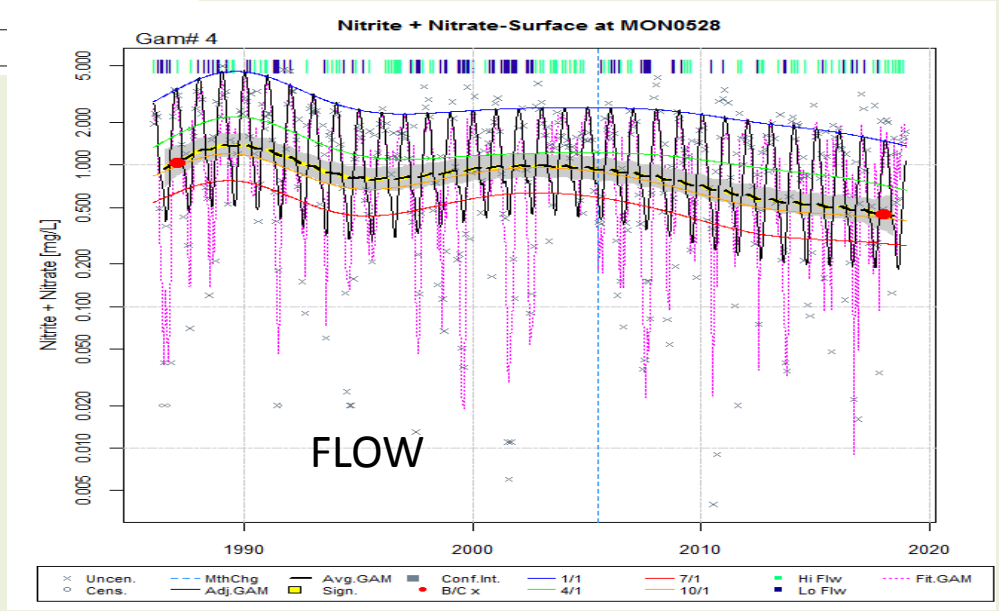
Monthly NO23 concentrations (mg/L) in the Monocacy River over 33 years. Again note the high variability.

Season & Flow Impacts on Nitrogen

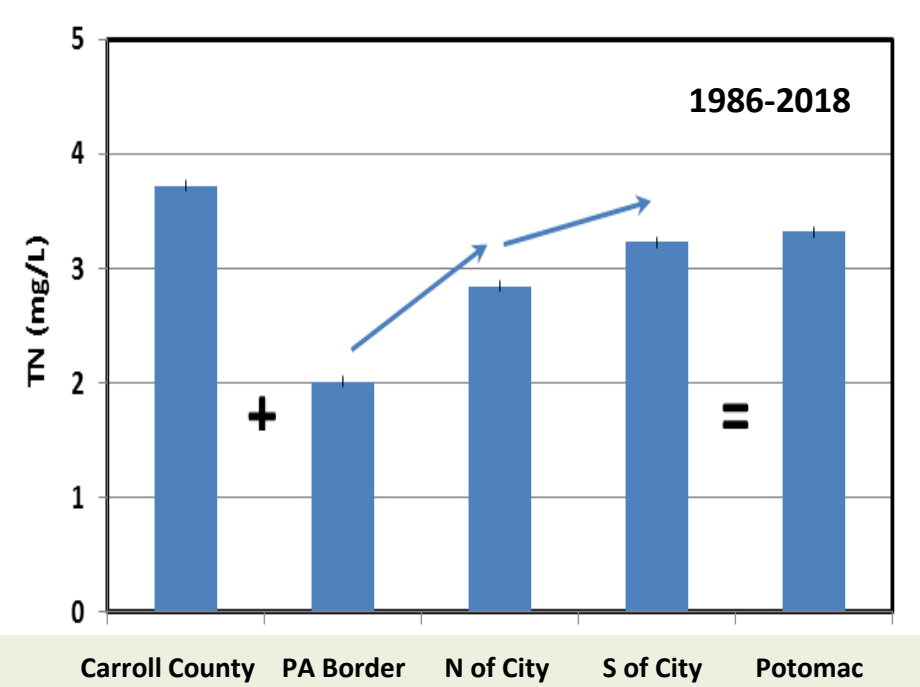


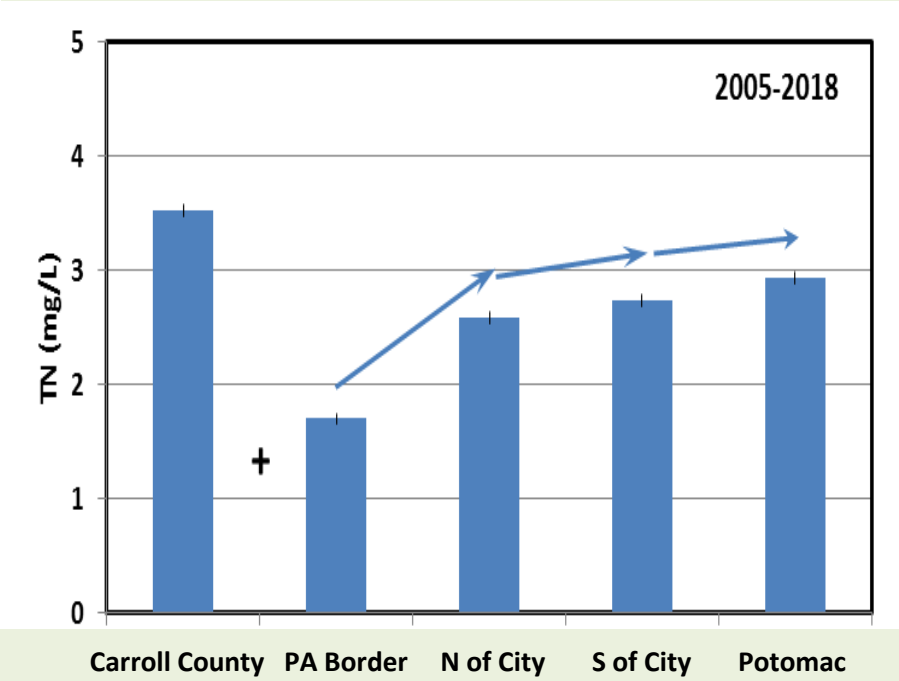


Just as for P, high & low flow events matter – Climate Change implications



Nitrogen Enrichment





Low N at PA Border is enriched by input from Big Pipe Creek of Carroll County to yield a high TN concentration N of the City; levels increase further through the City river segment

Low N at PA Border is enriched by input from Big Pipe Creek of Carroll County to yield a high TN concentration N of the City; levels increase further through the City river to the Potomac

TSS & Chlorophyll

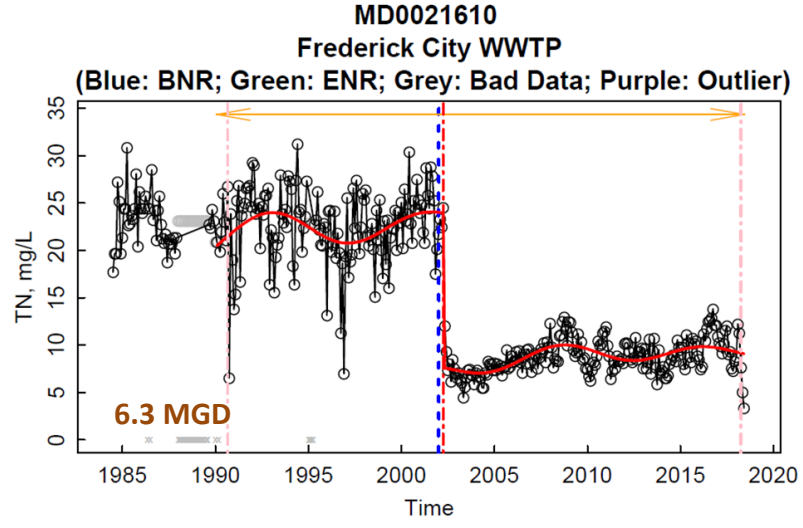
STATION	TSS (mg/L)
PA BORDER	12.3±0.8[a]
CARROLL CTY	17.7±2.2[b]
N of CITY	17.0±2.2[b]
S of CITY	16.9±1.4[b]
POTOMAC	18.1±2.2[b]

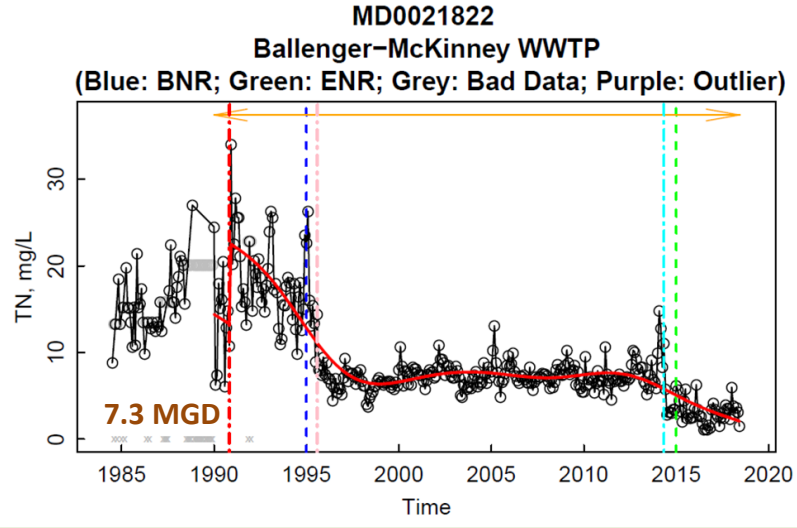
Both TSS & Chlorophyll are low with few differences along the river

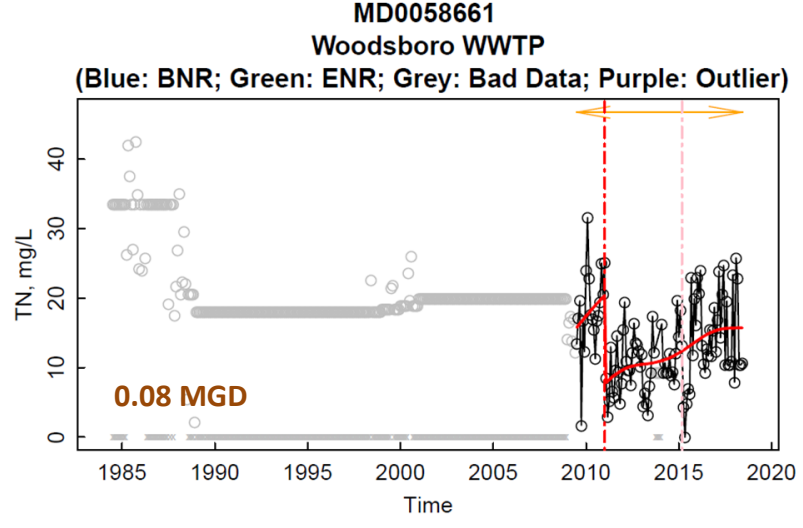
STATION	CHL (µg/L)
PA BORDER	5.22±0.50[a]
CARROLL CTY	2.69±0.19[b]
N of CITY	4.24±0.57[c]
S of CITY	5.24±0.62[c]
POTOMAC	5.30±0.82[c]

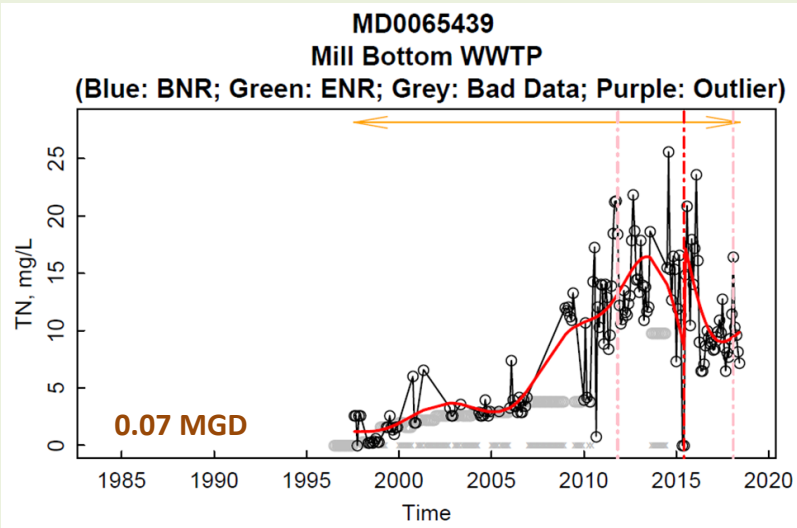
a-c indicate significantly concentrations

~~It's the WWTPs!~~









MON0269-MON0155

MON0155-MON0020

Courtesy of Q. Zhang & J. Keisman

Model Results indicate Agriculture and not WWTPs

TN and TP EOS loads (lbs/year) by sector in the 2018 Progress Run

Agriculture ●

Regulated Development ●

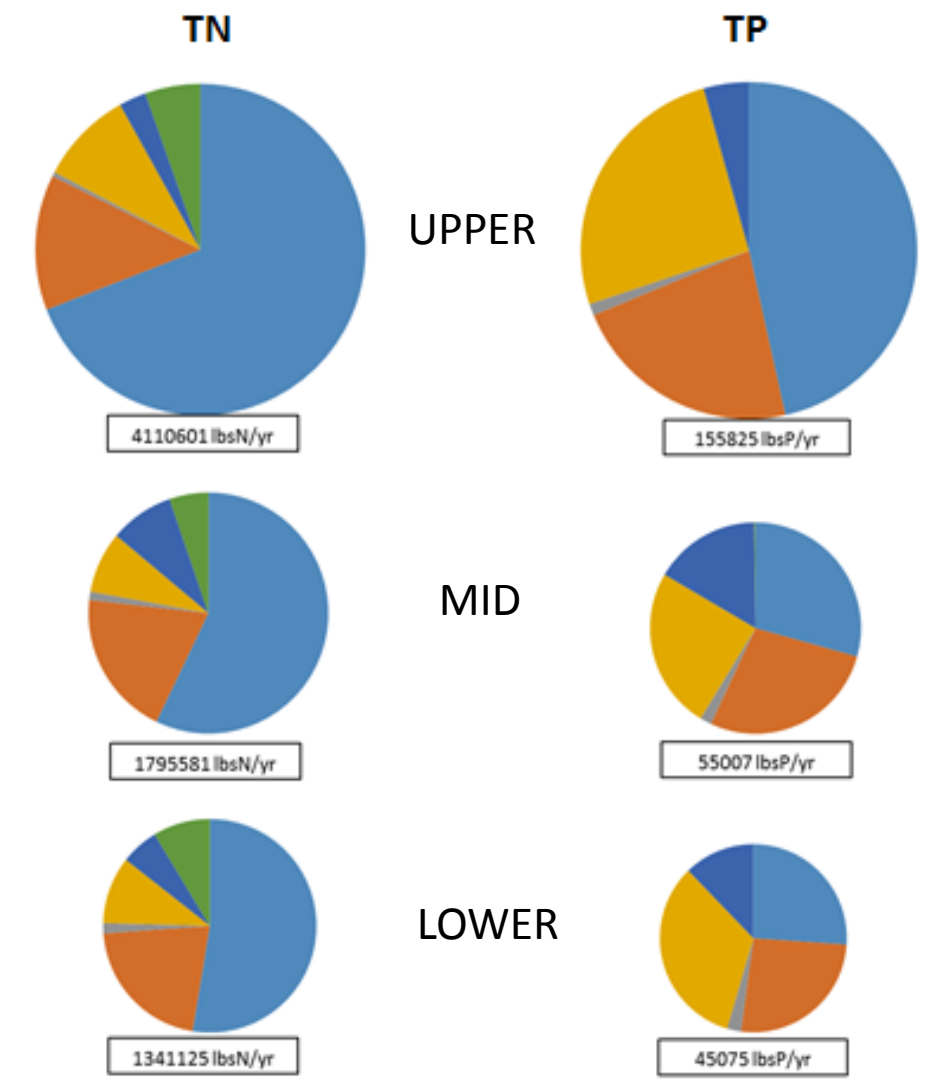
Non-regulated Development ●

Natural ●

Wastewater ●

Septic ●

(CAST results, courtesy of G. Shenk, USGS CBP).



Many Other River Contaminants

- Ag & lawn herbicides & pesticides
  - Intersex in small mouth bass
  - Immuno-compromised populations
- Fair to poor bottom macroinvertabrates in tributaries of the Monocacy
- Ft. Detrick: 3 decades+ of compounds (TCEs, PCEs)
- Halogenated compounds from drinking water facilities
- Warmer climate, drought-driven cyanobacteria toxins

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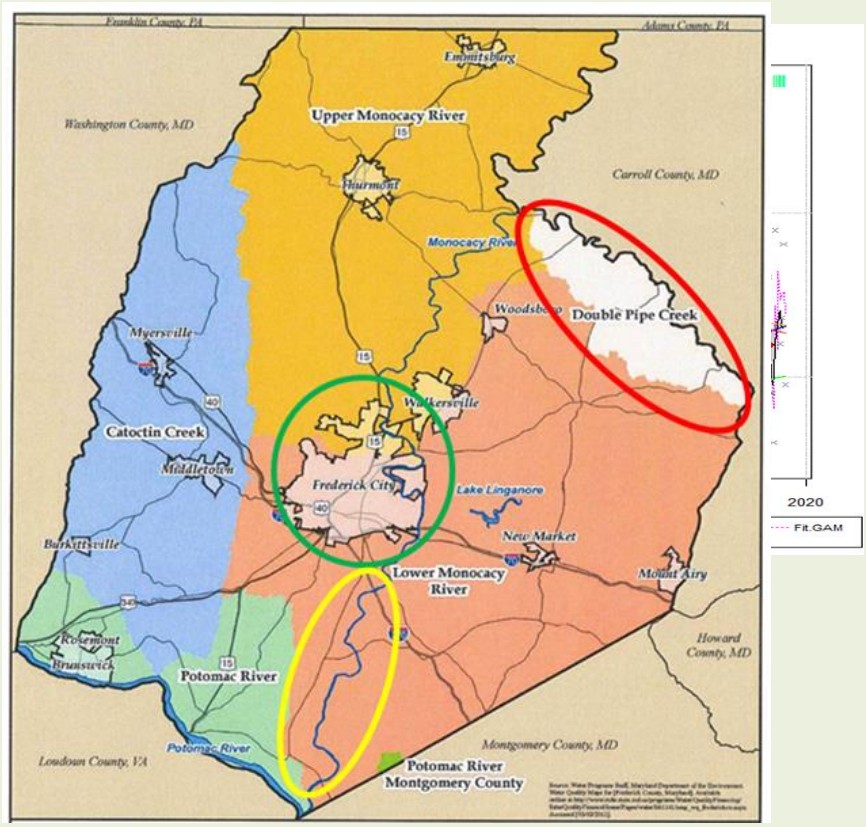
Future Needs

- Questions:
  - Nutrient load from Little Pipe Creek?
  - Which nutrients are associated with high and low (drought) flow events?
  - Can models generate EOS loads for individual creeks & streams >100 cfs?
  - Can the watershed model be used to 'predict' concentrations of river nutrients to contrast with observed levels?
- Phase II: Baseflow sampling in small creeks
- Phase III: Outreach and public-private funding partnerships for BMP identification & implementation
- Recommendations on land use options from 1) existing City & County documents & reports; 2) Climate Emergency Mobilization WG for County & City policies; and 3) ICPRB-NRCS Little Pipe Creek project.



Thank you!

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Acknowledgements
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