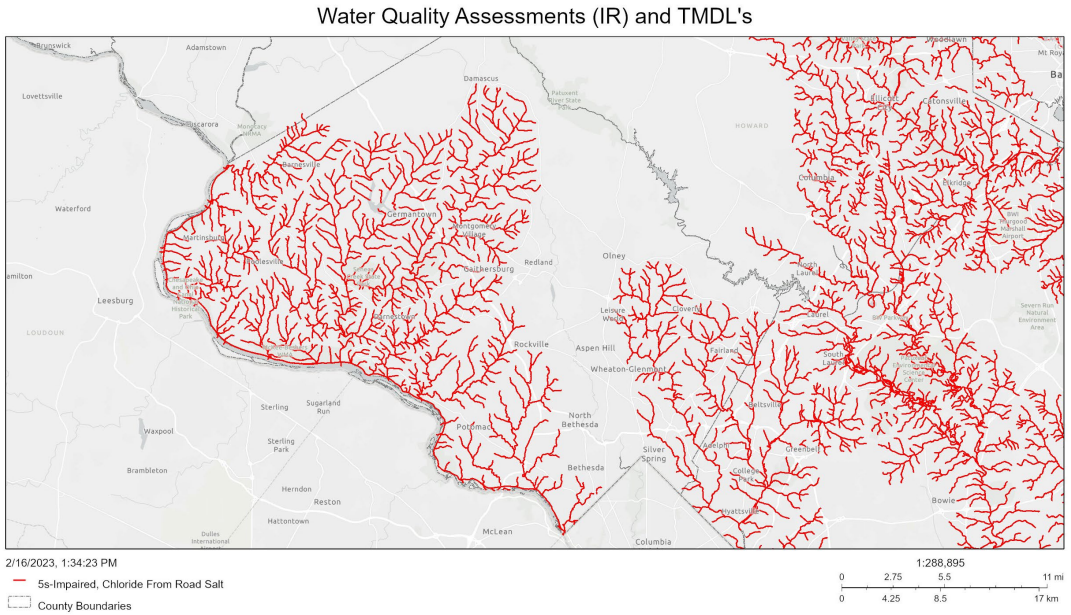
Montgomery County Department of Environmental Protection Conductivity Monitoring



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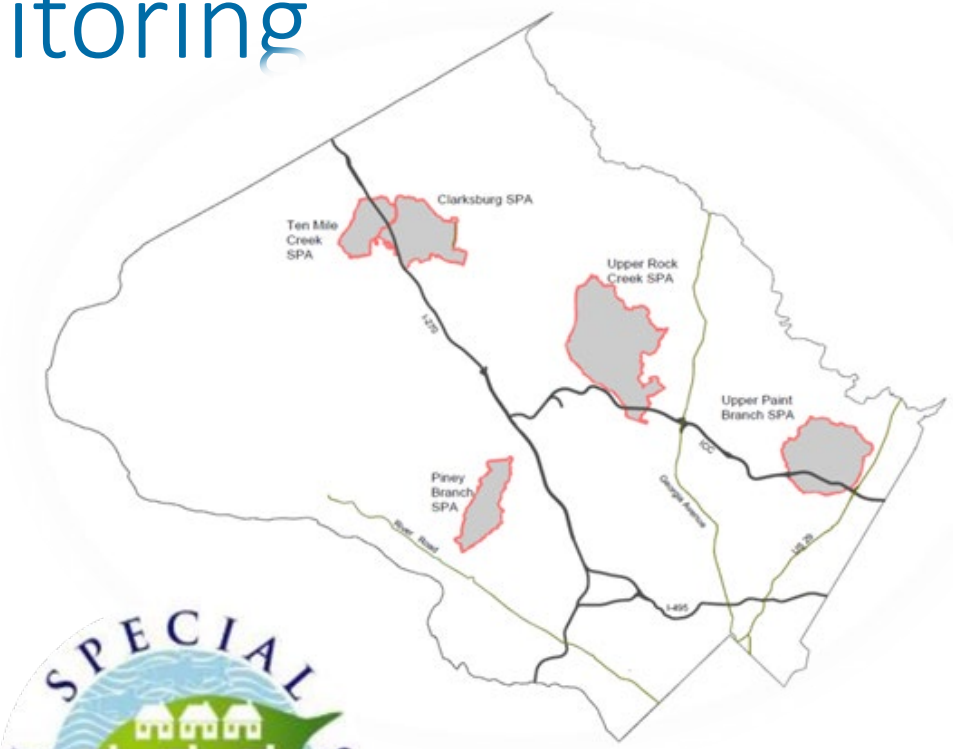
Why we monitor

- Special Protection Areas (SPAs)
  - Quantify impacts of development on surface and ground water
    - Ten Mile Creek SPA
    - Clarksburg Premium Outlets
- Patuxent Reservoirs Monitoring
  - Cooperative monitoring with WSSC
  - Assessing conductivity of reservoir tributaries
    - Mainstem Patuxent downstream of Rt. 97
    - Hawlings River at Rt. 650
- Watt's Branch Monitoring
  - Joint monitoring program with WSSC and UMD
  - Impacts on WSSC source water
  - Fulfilling phase I MS4 permit conductivity monitoring requirements

Special Protection Area Monitoring

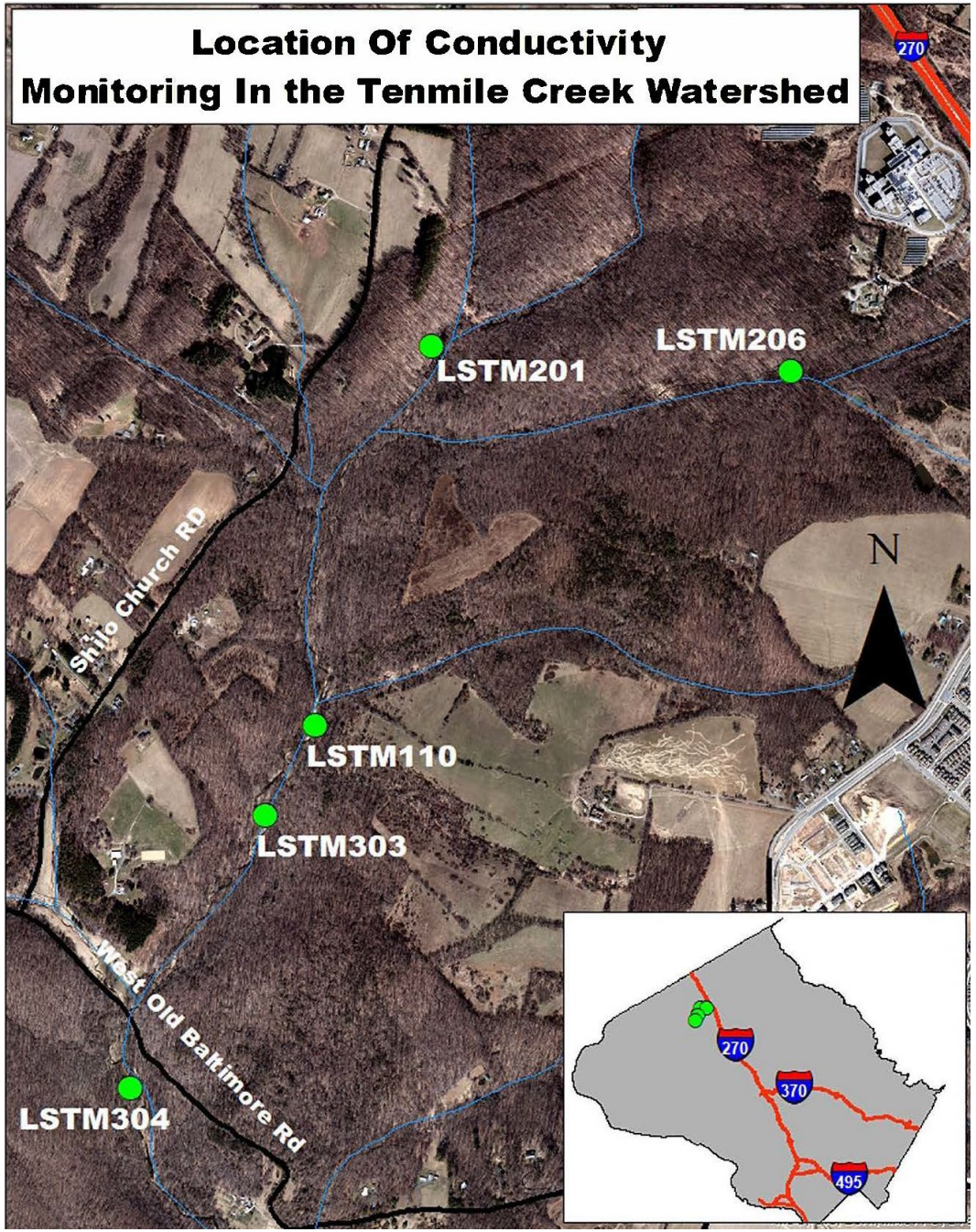
- What is an SPA- Five areas designated by County Council requiring protections beyond standard environmental laws, regulations, and guidelines for land development and certain uses.

- Ten Mile Creek Study
  - 3 large developable parcels shifting from Ag to residential/commercial
- Clarksburg Premium Outlets
  - Large retail development adjacent to I-270 focused on ESD



Ten Mile Creek Conductivity Monitoring

- 5 test sites
- One reference site in the Patuxent watershed
- Ten Mile Creek Study
  - 3 large developable parcels shifting from Ag/forest to residential/commercial

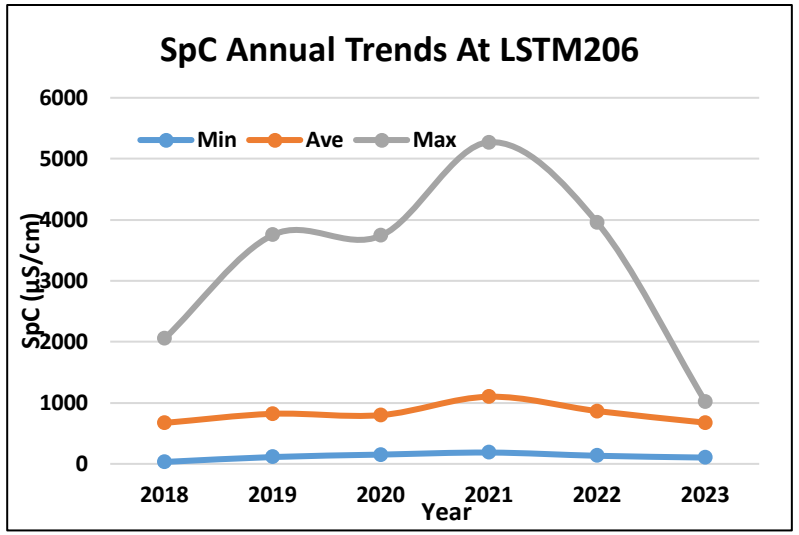


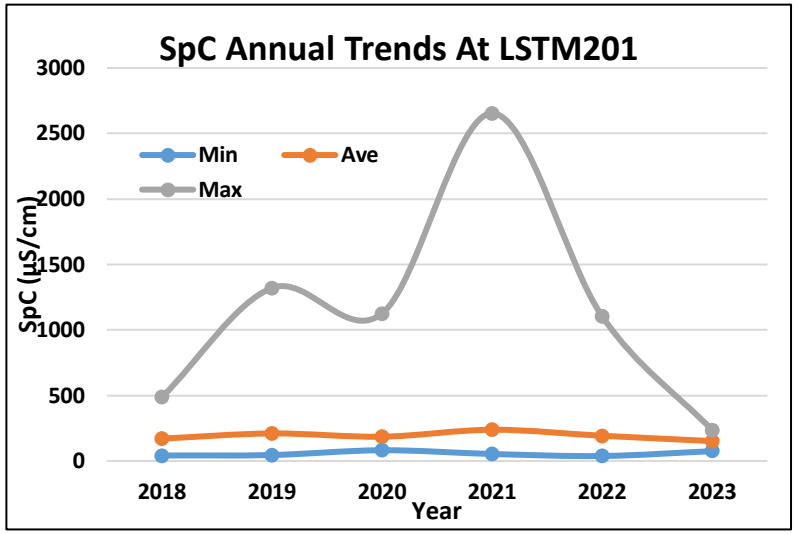
Ten Mile Creek Conductivity

Note the different scale

Test Sites

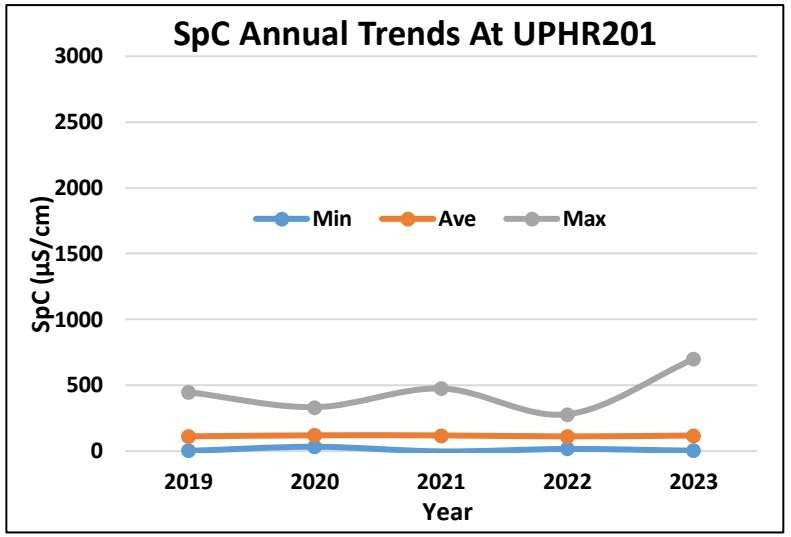
- LSTM206
  - ~15% impervious
  - ~38% forest
  - Consistently high conductivity
- LSTM201
  - 6% impervious
  - ~43% forest
  - Volatile given high forest and low impervious



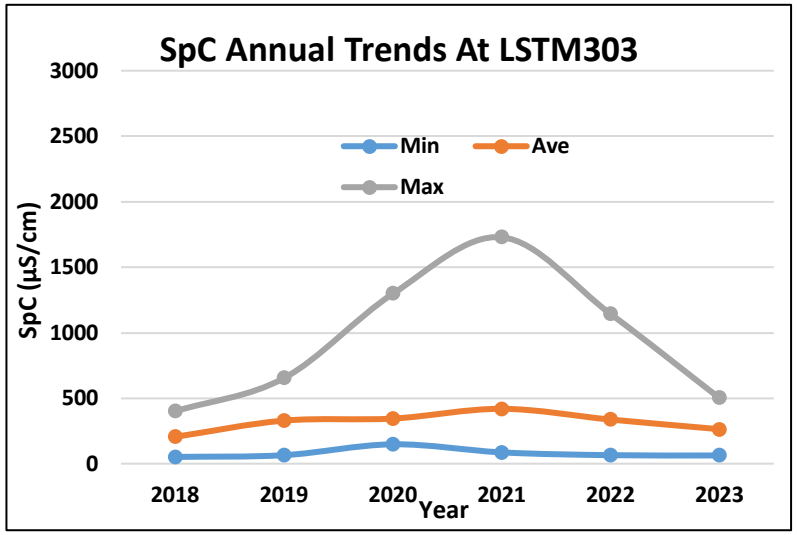


Control Site

- UPHR201
  - Upper Patuxent Trib
  - <2% impervious
  - ~30% forest
  - Strong agricultural influence

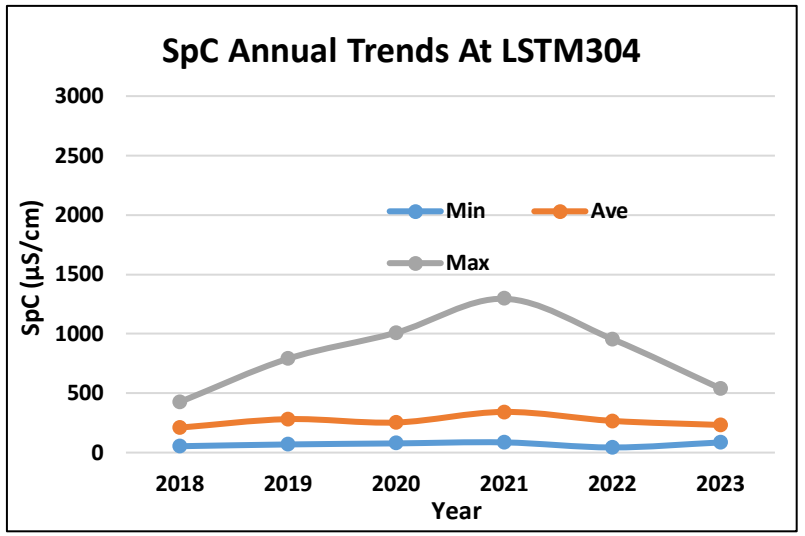


Ten Mile Creek Mainstem Conductivity



Upper Mainstem

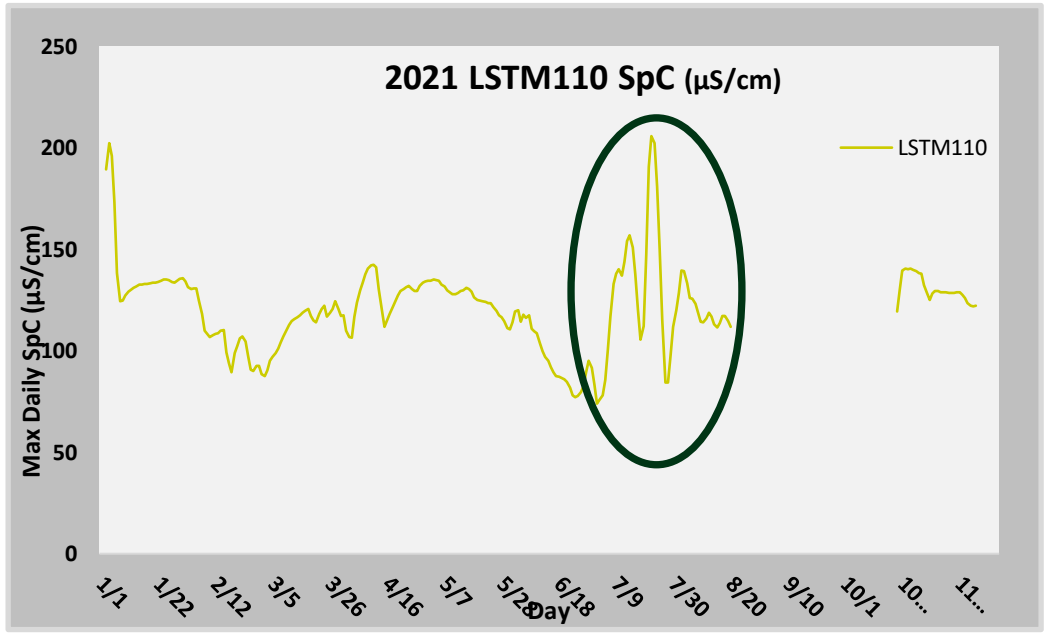
- Moderate max/average
- More volatile
- Watershed storage?

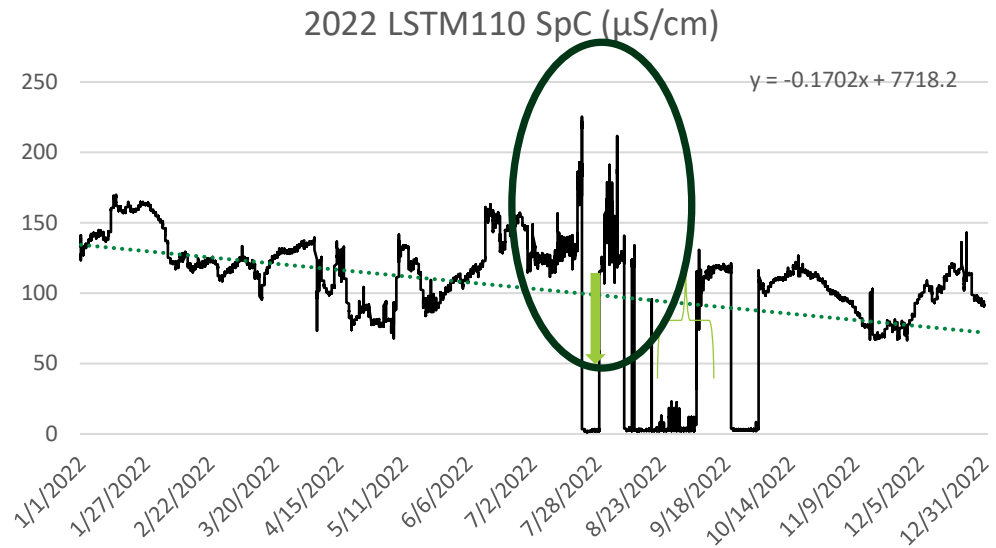


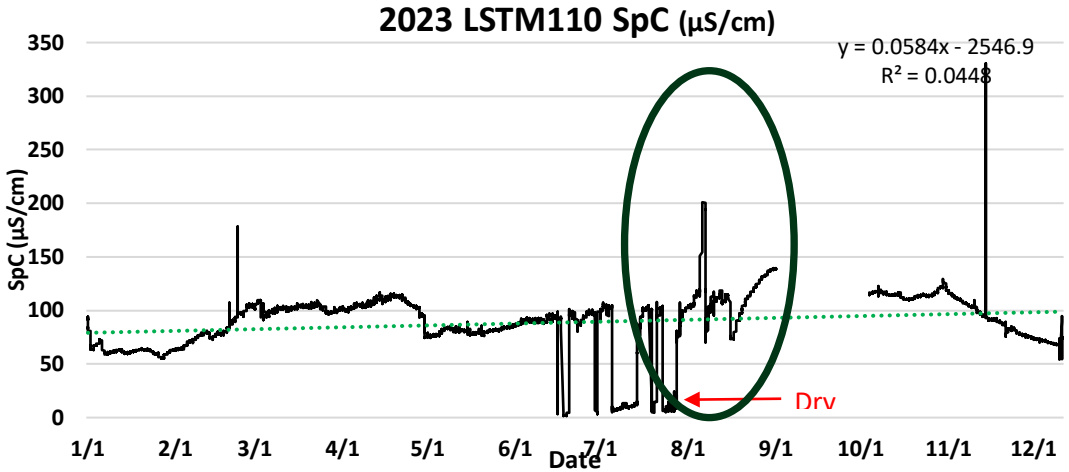
Lower Mainstem

- Reduced max average
- More consistent
- Watershed storage?

Ten Mile Creek Conductivity: Preconstruction





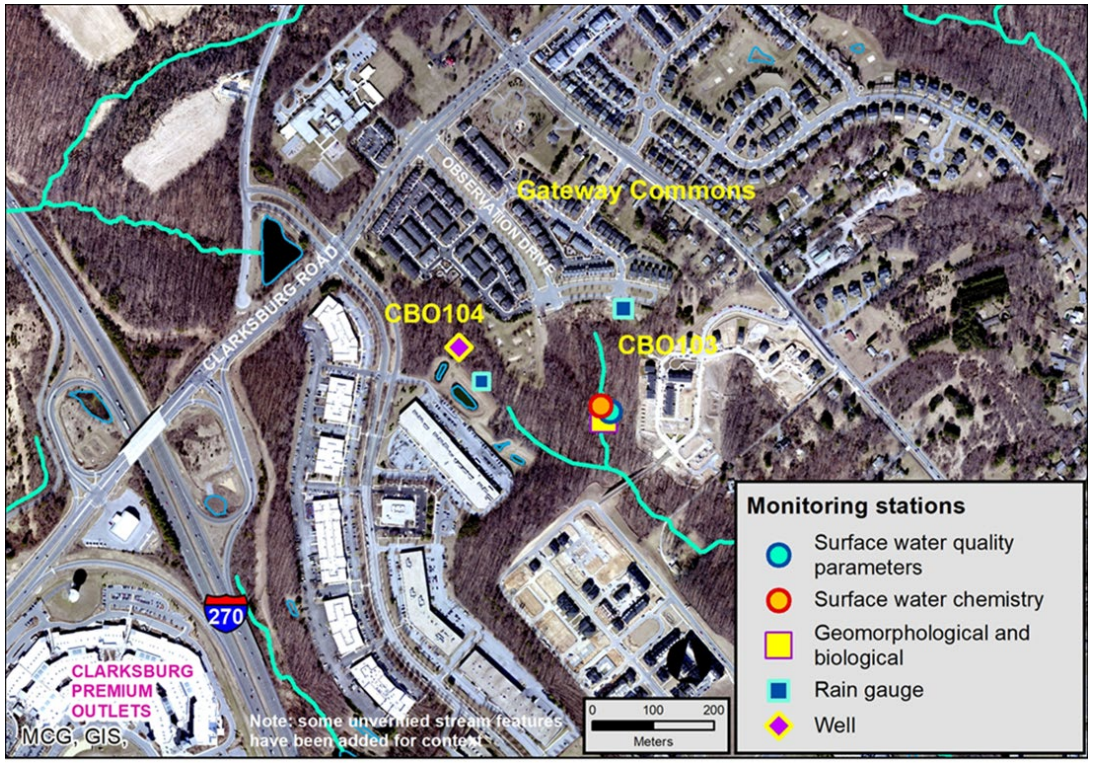


- Summer spikes in undeveloped sites are often the max annual conductivity
- What's the cause?

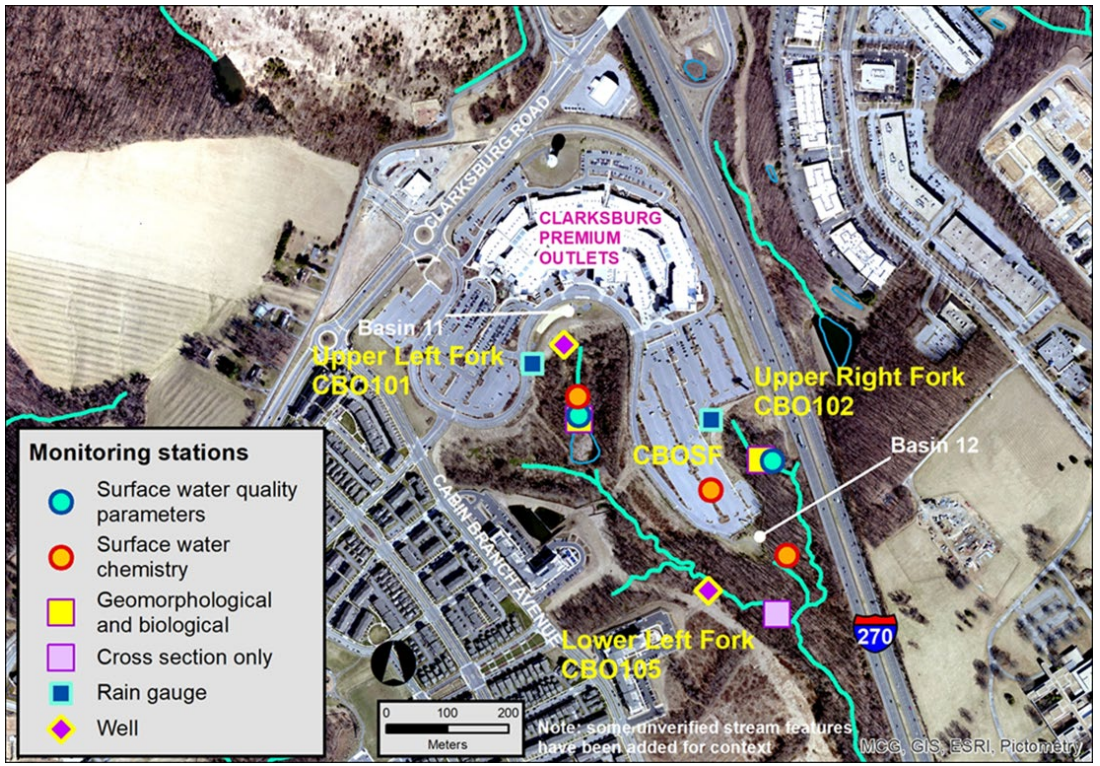
Clarksburg Premium Outlets

- Large retail development
  - First Large “ESD” development in Montgomery County
  - High impervious (>50%)
  - Several hundred small ESD bmps
  - SHA salt dome up slope (should not drain to CPO)

Clarksburg Premium Outlets ESD monitoring

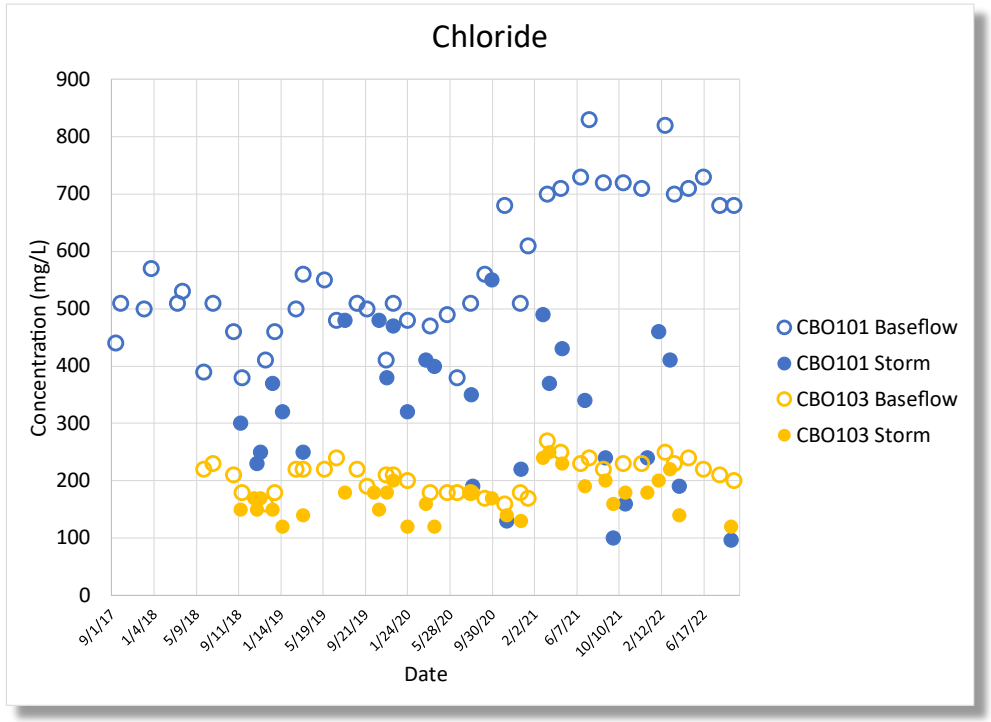


CBO103 and CBO104 Locations

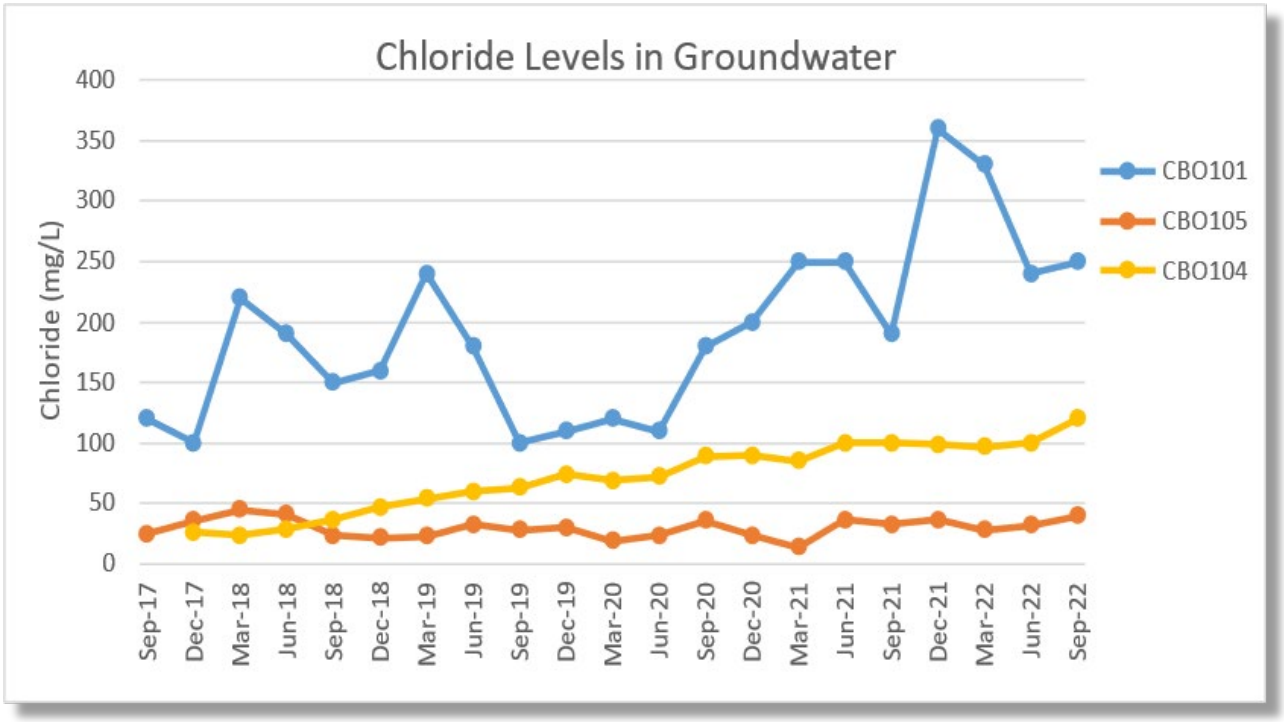


CBO101, CBO102, and CBO105 Location

Clarksburg Premium Outlets



Surface Water



Groundwater

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Clarksburg Premium Outlets Conclusions

- BMPs didn’t attenuate chloride, sodium, or conductivity
- Groundwater chloride increased across monitoring period
  - Is ESD infiltrating chloride into groundwater?
- Surface water shows trend of increasing chloride

Patuxent Reservoirs Conductivity Monitoring

- Pilot study
- Two monitoring stations
  - Upper Patuxent River at Rt. 97
  - Lower Hawlings River at Rt. 650
- Assessing two major water sources for Tridelphia and Rocky Gorge Reservoirs

Upper Patuxent Logger Location

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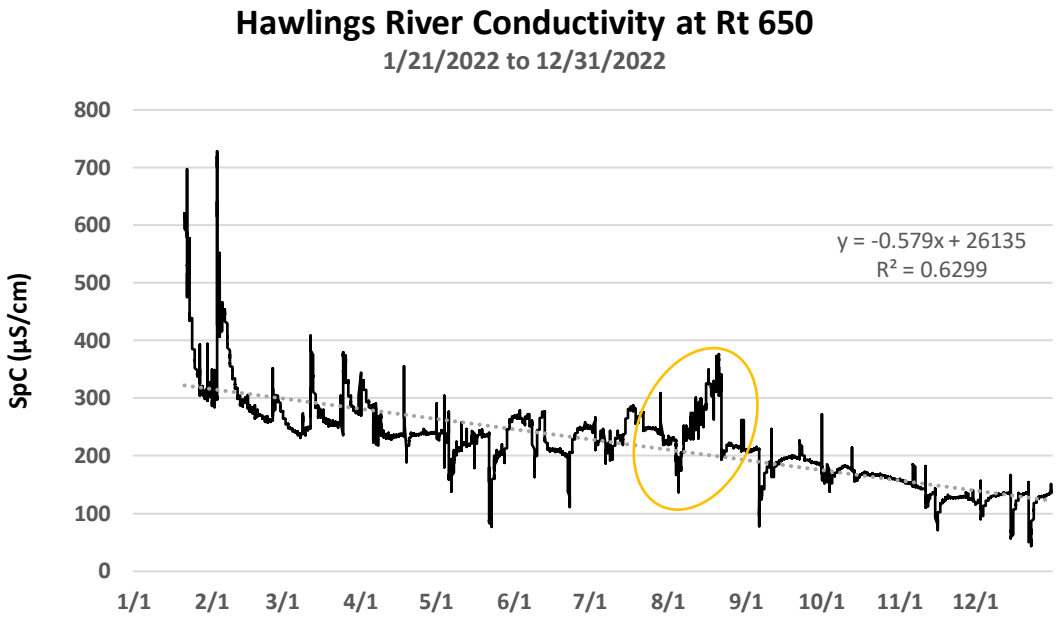
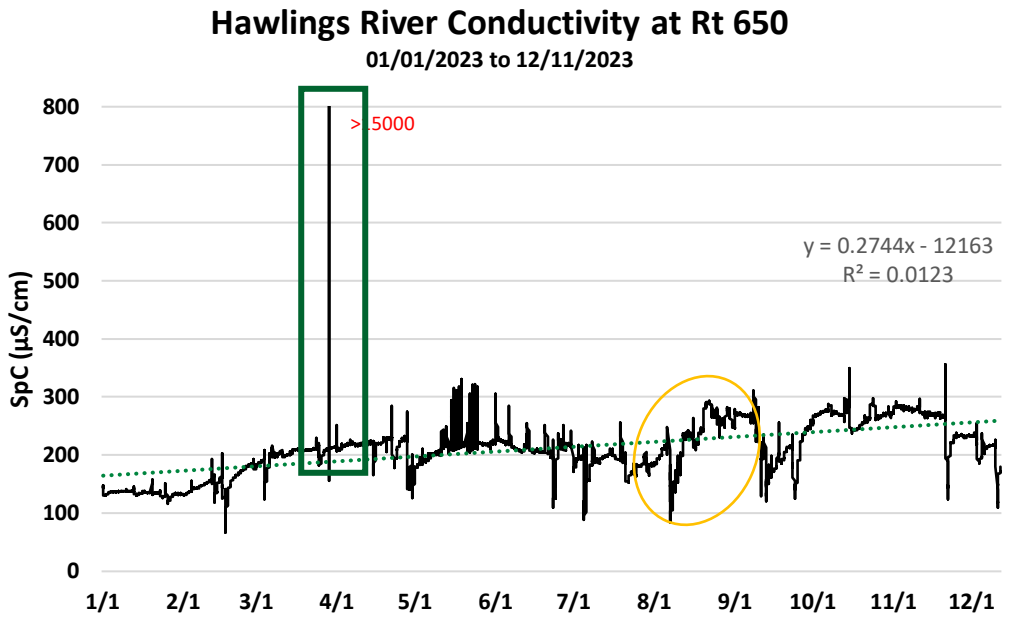
Patuxent Reservoirs Conductivity Monitoring





Notes

- Upward spikes are road salting events in winter of 2022.
- Other upward spikes are unknown causes between April 2022 and December 2023
- Orange ovals denote late summer baseflow rise in conductivity
- Green rectangle was a 2-hour spike to >5,000 µS/cm unrelated to any rain or snow events

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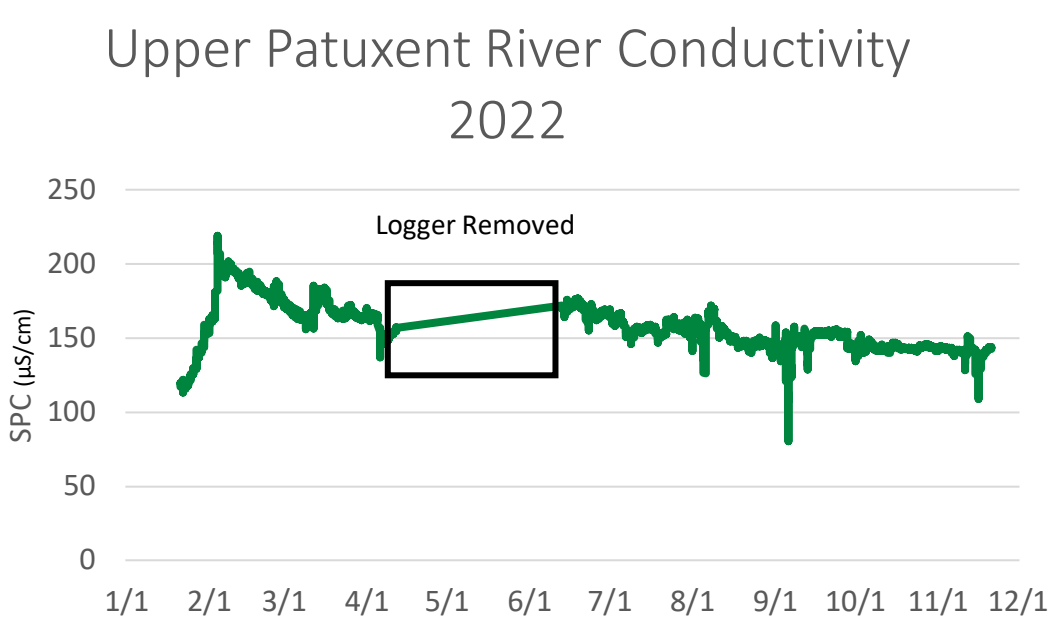
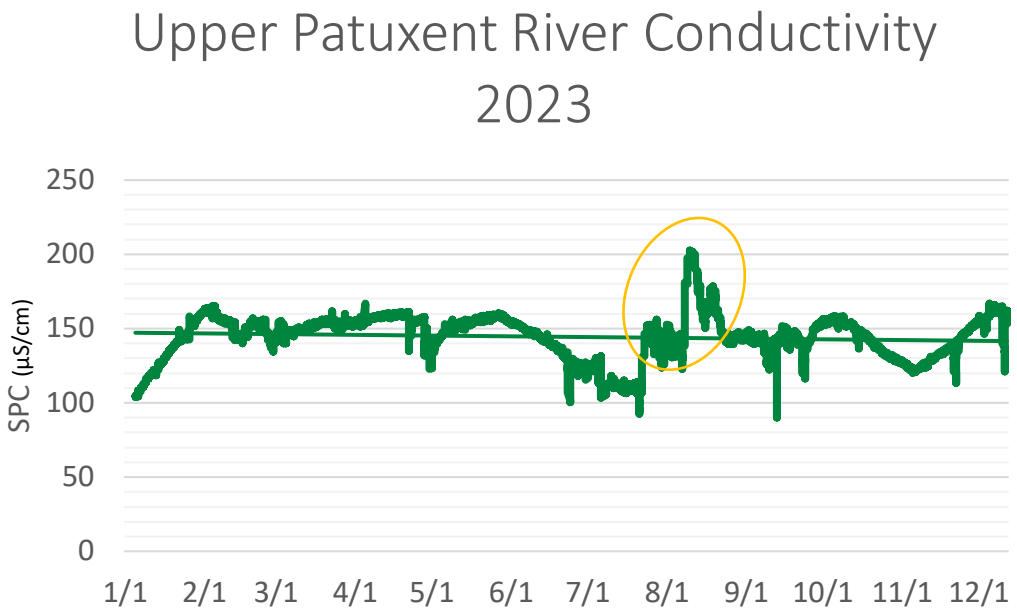
Patuxent Reservoirs Conductivity Monitoring





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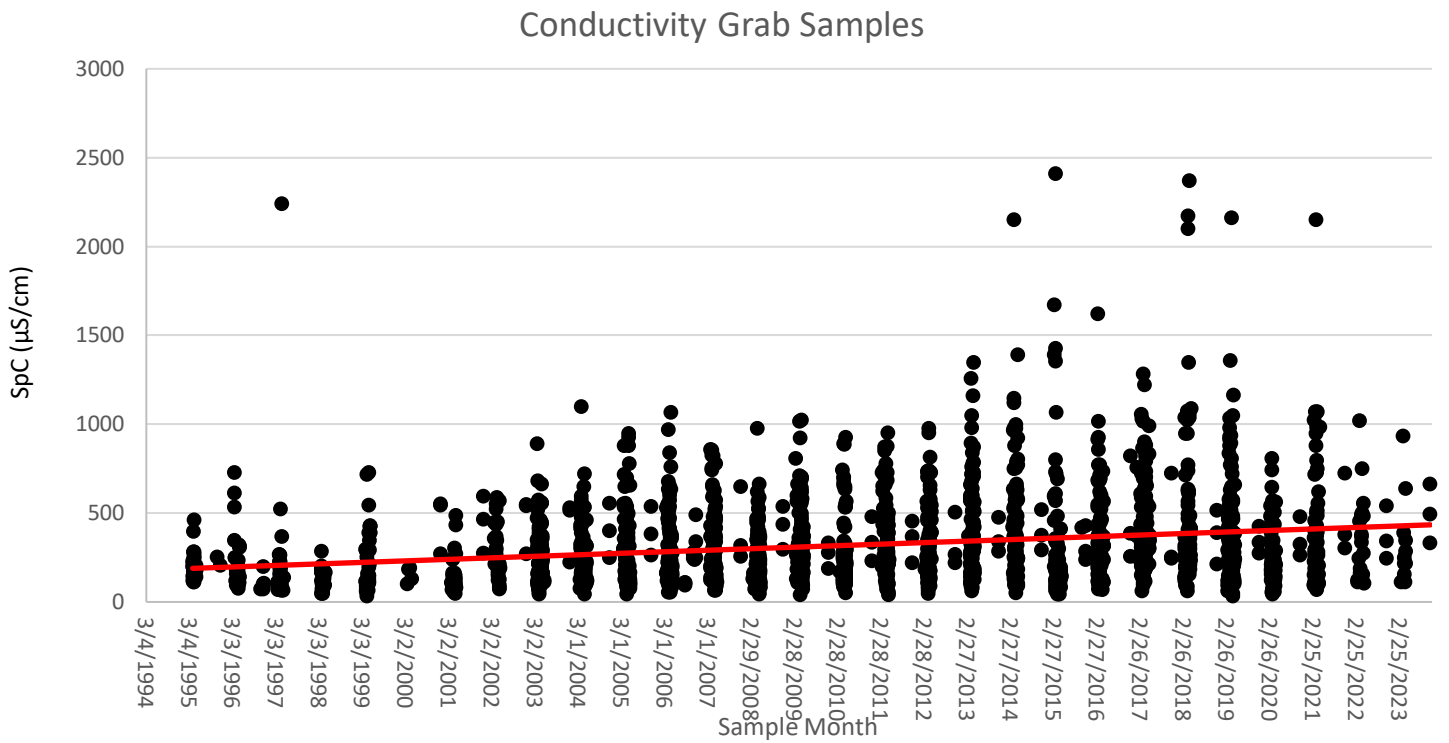
28 years of in situ monitoring (1995-2023)



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Looking Forward:
Watt's Branch Cooperative Monitoring

- A partnership between University of Maryland, WSSC, and MCDEP

- Measure the contribution of Watt's Branch ions to the Potomac Filtration Plant

- Two continuous conductivity loggers
  - Piney Branch tributary to Watt's Branch
  - Mainstem of Watt's Branch 1.2 miles above confluence with Potomac

- Collection of grab samples every 4-6 weeks to generate watershed specific ion curves. (Thanks Sujay!)

What we are seeing:

- Small streams have higher conductivity than larger ones
  - Is this dilution or watershed storage?
- Small streams are more volatile than larger ones
- Low salt use in 2021 and 2022 resulted in reduced conductivity
  - If a low salt application year is detectable in most watersheds management actions could have an immediate impact
- Road salt isn't the only source of conductivity
  - spring/summer spikes in undeveloped watersheds
  - These sources are generally small compared to road salt influence
- Stormwater BMPs don't reduce chloride, and may increase groundwater chloride concentrations