PFAS in Wisconsin 2020 Precipitation & 2022 Air Studies

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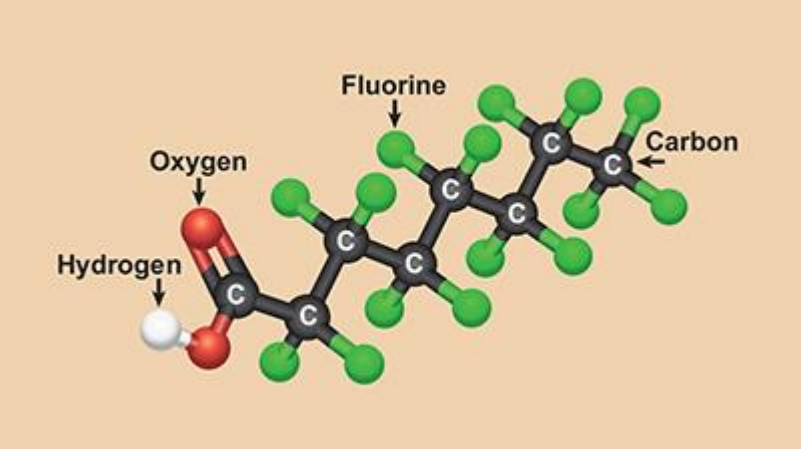
What are PFAS?

Per- and PolyFluoroAlkyl Substances –

- Carbon-Fluorine bonds make these compounds highly stable, water- and oil- resistant
- Used in countless commercial products, and in firefighting foam as a surfactant

Most classes of PFAS don't degrade naturally –

- Accumulate in environment
- Now exists in surface and ground water, drinking water, rainwater, sediment, ice caps… etc.
- Concentrations vary based on nearby sources
- Transport mechanisms aren't fully understood



Perfluorooctanoic acid (PFOA)

High concentrations and exposure over time are known to cause negative health effects –

- Loss of reproductive health
- Developmental delays in children
- Increased cancer risk
- Compromises immune system

Wisconsin 2020 PFAS in Precipitation Study NADP/NTN Monitoring Site Map

- Conducted PFAS precipitation monitoring at 8 National Atmospheric Deposition Program (NADP/National Trends Network (NTN)) sampling sites
- Two studies
  - **Spring/Summer 2020** - Background study at 7 sites (14 weeks)
  - **Fall** - Source study at 2 sites
    - **Marinette** - temporary installation
    - **Trout Lake** - comparison permanent site
- Data from both studies combined for the purposes of sharing the results

2020 Sampling– Quality Assurance

NTN Site ID	NTN Site Name	Precipitation Samples	Field Method Blanks	Field Matrix Spikes	Methanol Trip Blanks	Sample Splits (DUPS)
WI06	UW Arboretum	13	2	1	2	1 pair
WI08	Brule River	9	2	1	2	1 pair
WI10	Potawatomi	9	2	1	2	1 pair
WI31	Baraboo	9	2	1	2	1 pair
WI35	Perkinstown	11	2	1	2	1 pair
WI36	Trout Lake	18	2	1	2	2 pairs
WI37	Spooner	10	2	1	2	1 pair
WI19	Marinette	10	1	1	1	1 pair
	TOTAL	89	15	8	15	9 pairs

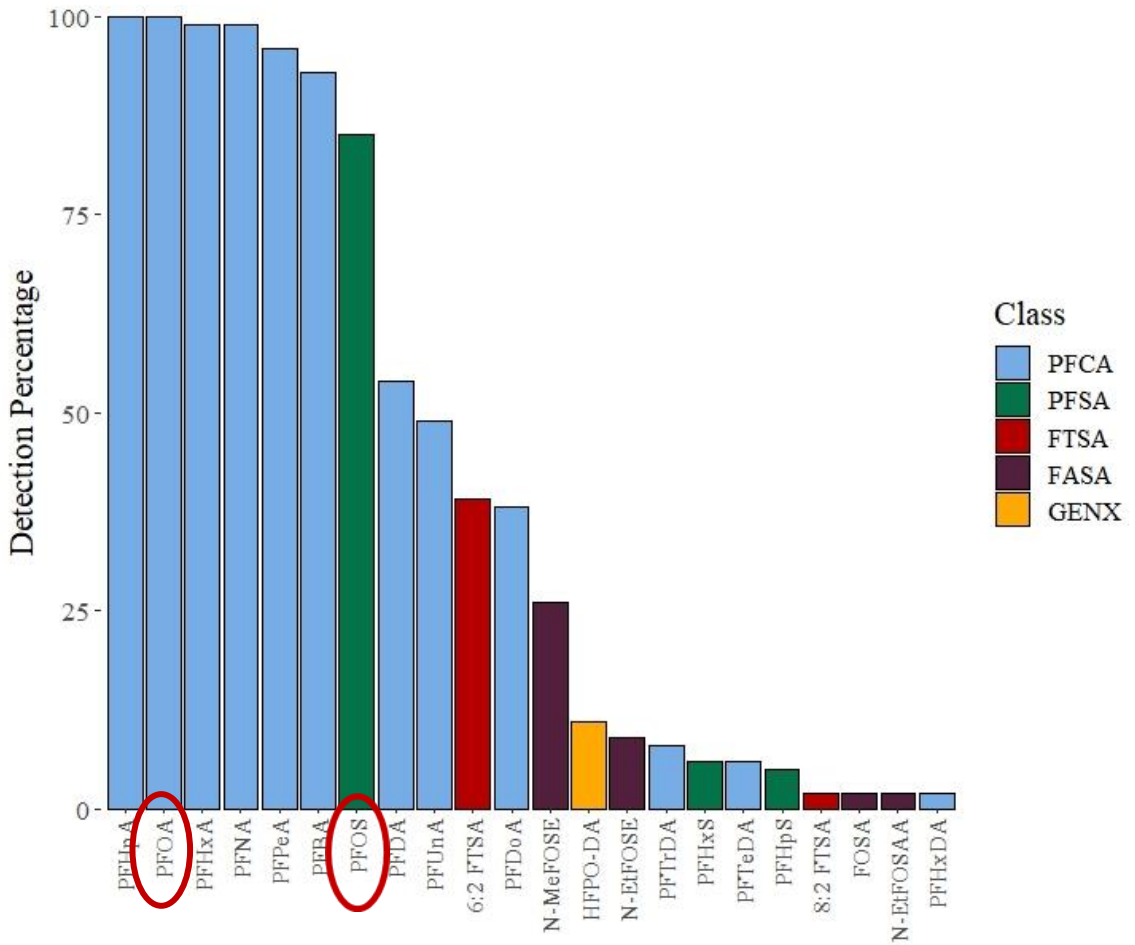
NTN Wet-Only Collector

89 Precipitation Samples + 47 QA Samples = 136 Total Samples

WI 2020 Study Results – Frequency of PFAS Detection

22 PFAS compounds were detected in at least 2 samples

- The carboxylates (PFCAs) were the most frequently detected PFAS compound class
- With the exception of PFOS, the sulfonates (PFSAs) are less abundant in the precipitation
- PFOA detected in nearly 100% of samples and PFOS detected in over 80% of samples
- FTSAs (fluorotelomersulfonates) , GenX and FASAs (perfluorosulfonamides) are less frequently detected, but important at certain sites



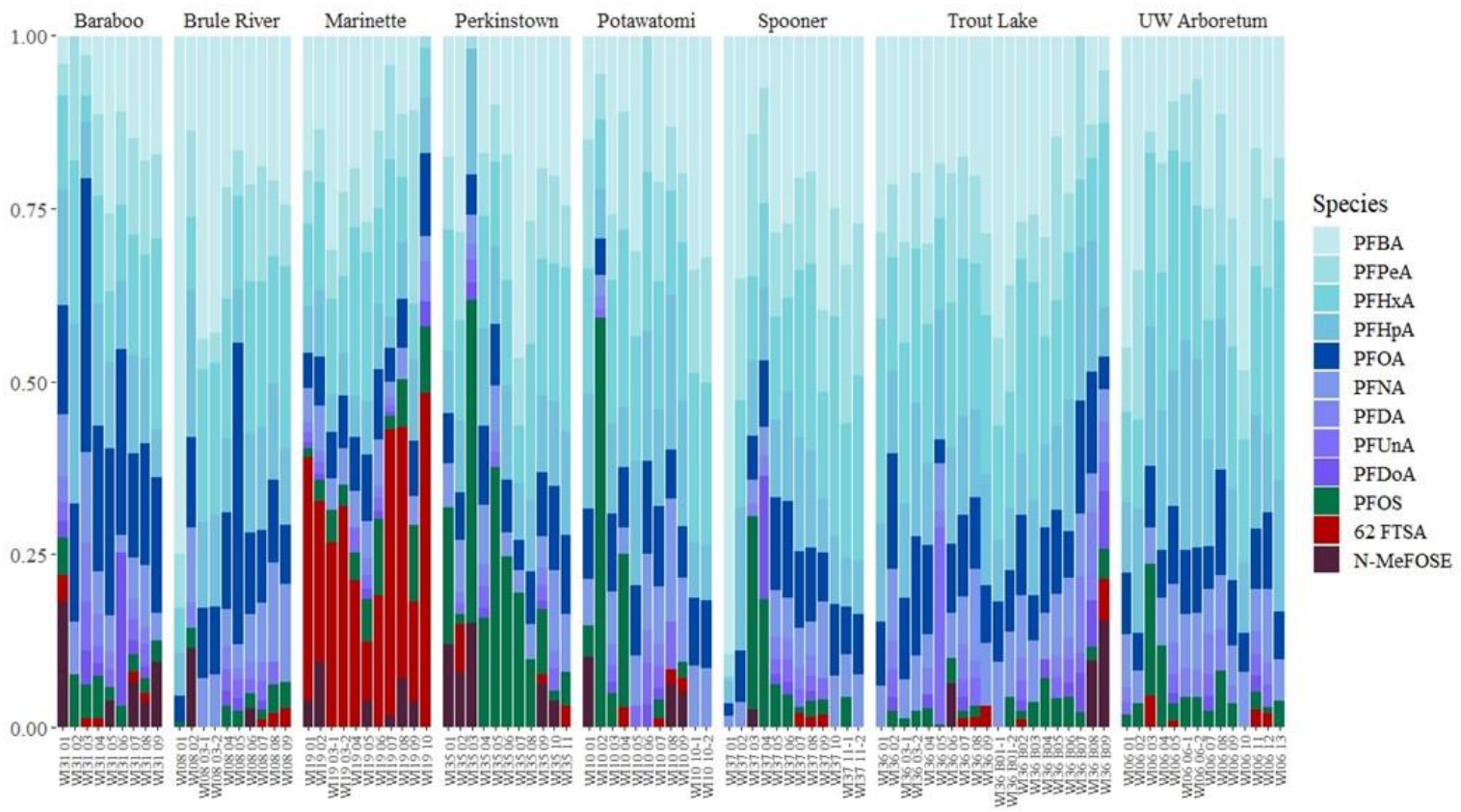
PFAS Signatures by Site - Regional Trends

Generally similar signatures at five of the sites:

Higher PFOS and PFOA contributions at Perkinstown and Baraboo

Site 19 (Marinette) is very different

- FTSAs are major contributors
- Point source impacted (6:2 FTSA an AFFF tracer)
- Site was designed to measure a point source (< 1 mile from the source)



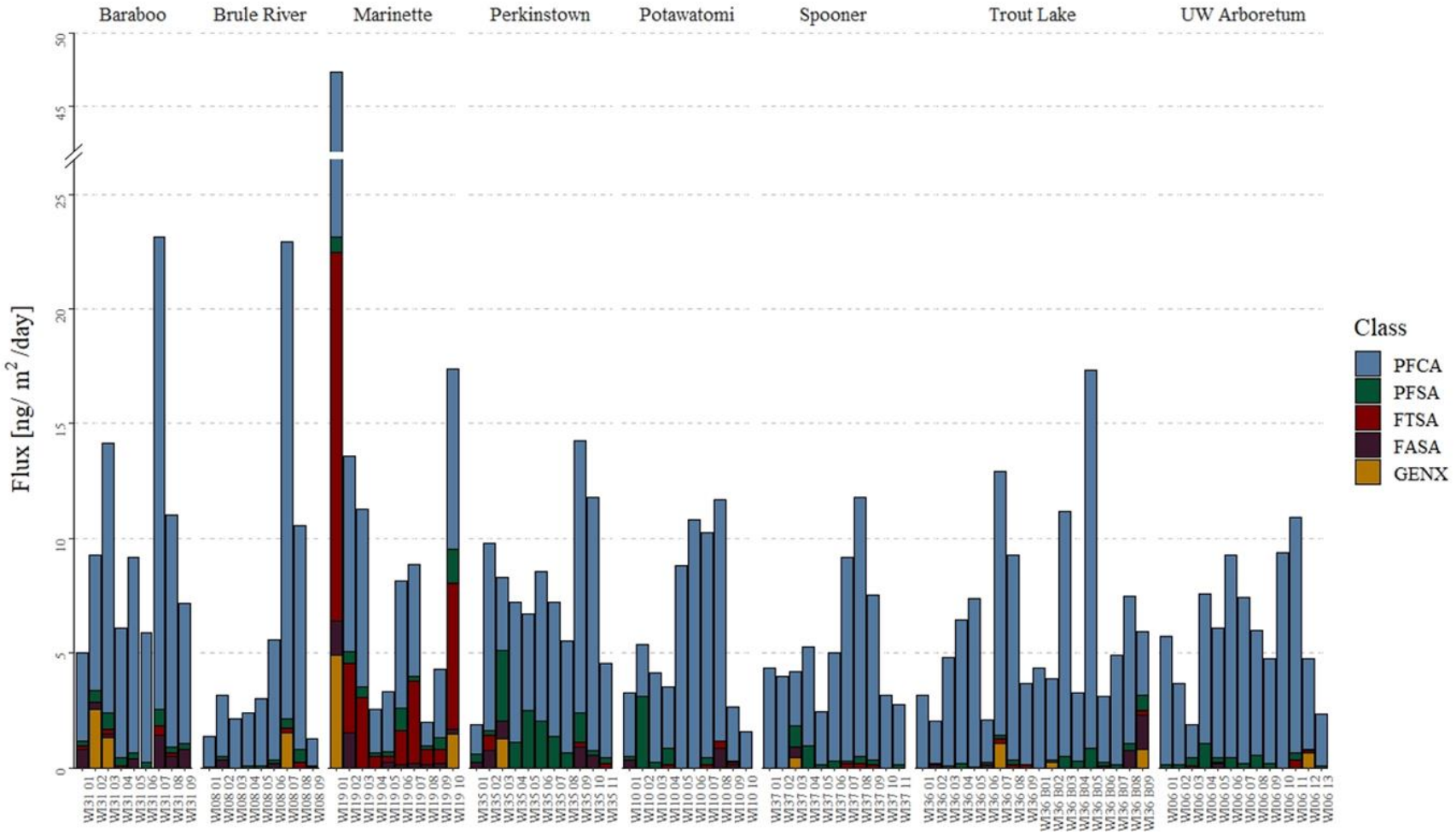
Summed Concentrations by PFAS Class

Total summed PFAS (of 36 quantified) never above 6.5 ng/L

Highest PFOA + PFOS observed at Baraboo: (Max sum: 1.9ng/L median sum: 0.4ng/L)

Still lower than the WI groundwater action level

Same magnitude as other studies collecting precipitation in rural/non-industrial regions (Dreyer et al 2010, Kwok et al 2010, Gewurtz et al 2019)



Key Points / Lessons Learned

1. Concentrations of individual PFAS compounds in precipitation are typically <1 ng/L, though levels can be significantly higher at specific sites/dates.
2. The carboxylates (PFCAs) dominate the PFAS composition of precipitation – primarily as a result of atmospheric processing.
3. Legacy PFAS compounds (PFOS, PFOA) are STILL major contributors to PFAS atmospheric pools
4. With the appropriate datasets and modeling tools, one should be able to resolve point/local sources from regional/background levels and sources.
5. A comprehensive field and laboratory quality assurance (QA) program is essential to the production & documentation of high quality, defensible atmospheric PFAS data.
6. PFAS deposition rates were relatively uniform across the study sites: Average **7.3 ng/m^2/day** for the study period.

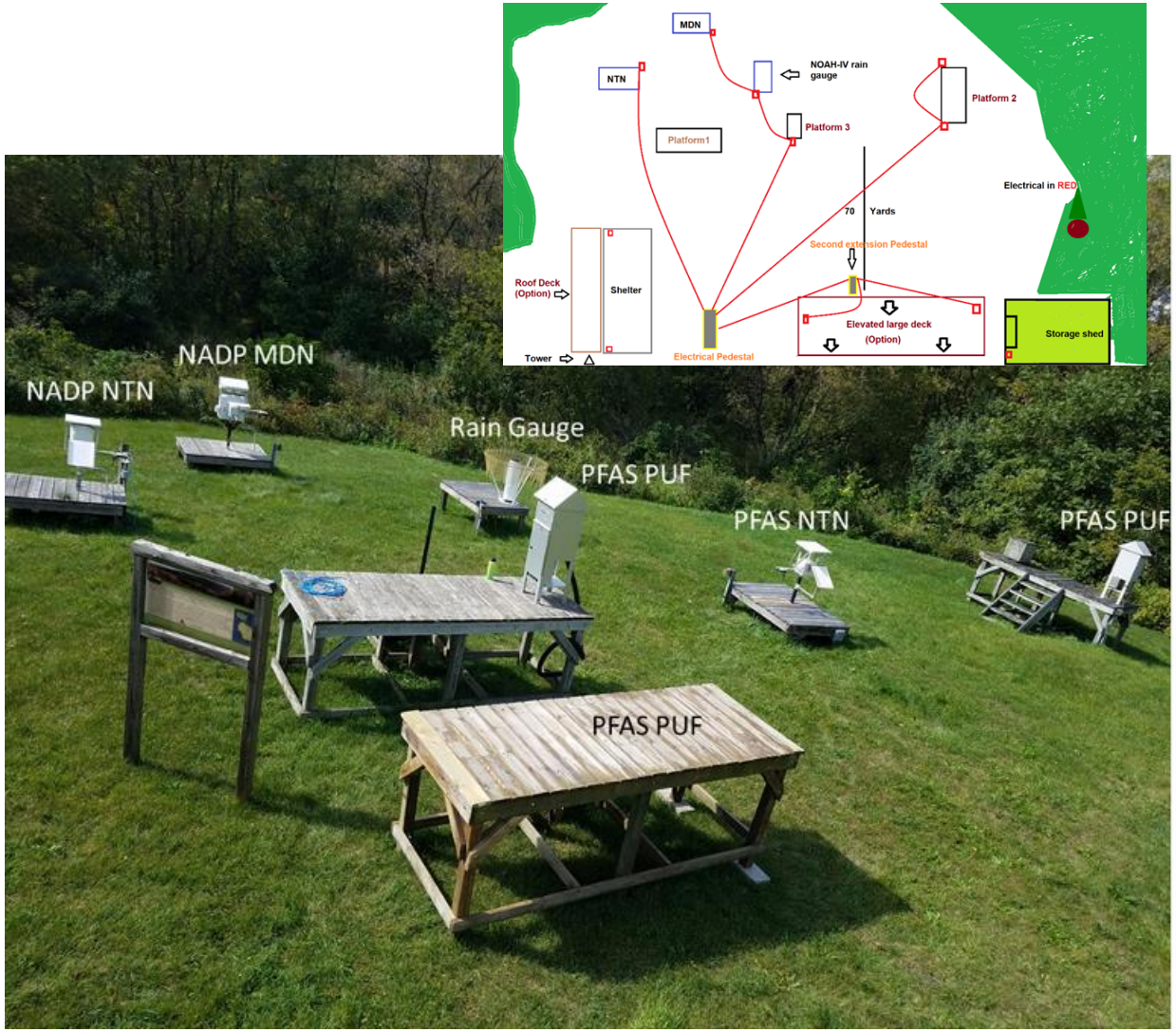
PFAS 2022 Air Method Development

Long-Term PFAS in Precipitation Monitoring and PFAS in Air Method Development

- Wisconsin will host 2 of 9 long term PFAS precipitation monitoring sites

- Wisconsin will have **2 air method development PFAS supersites**
  - DNR Baraboo
  - WSLH Madison Eagle Heights

2 Supersites: Air and Precipitation Instrumentation

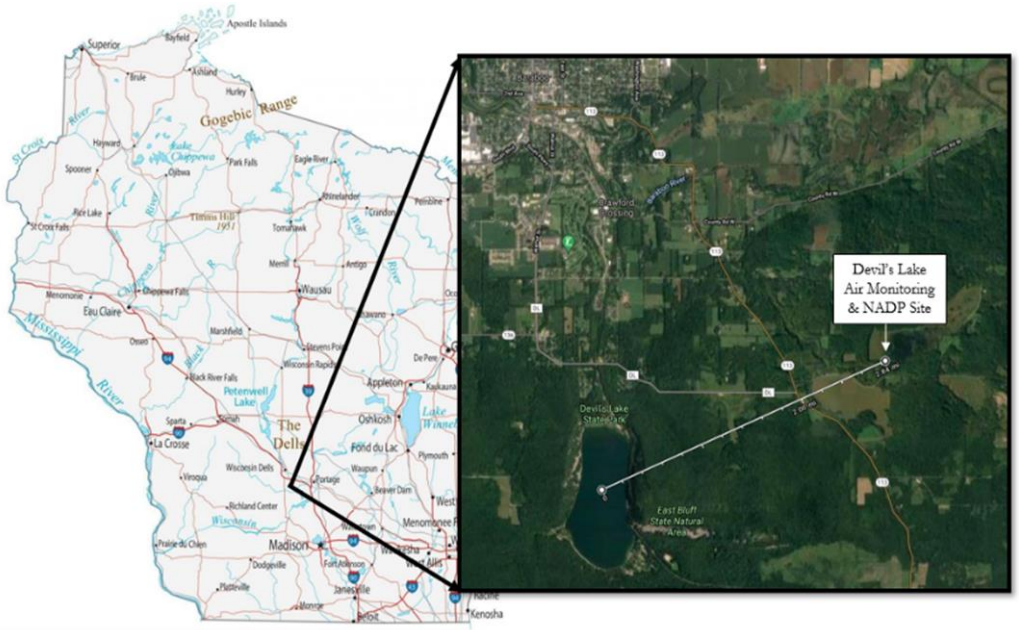


PUF + High Vol Sampler	NADP NTN Bucket Collector
3 samplers on site	2 samplers on site
Weekly Sample Collection by DNR and WSLH/NADP for 1 year	
Event based samples	Event based samples

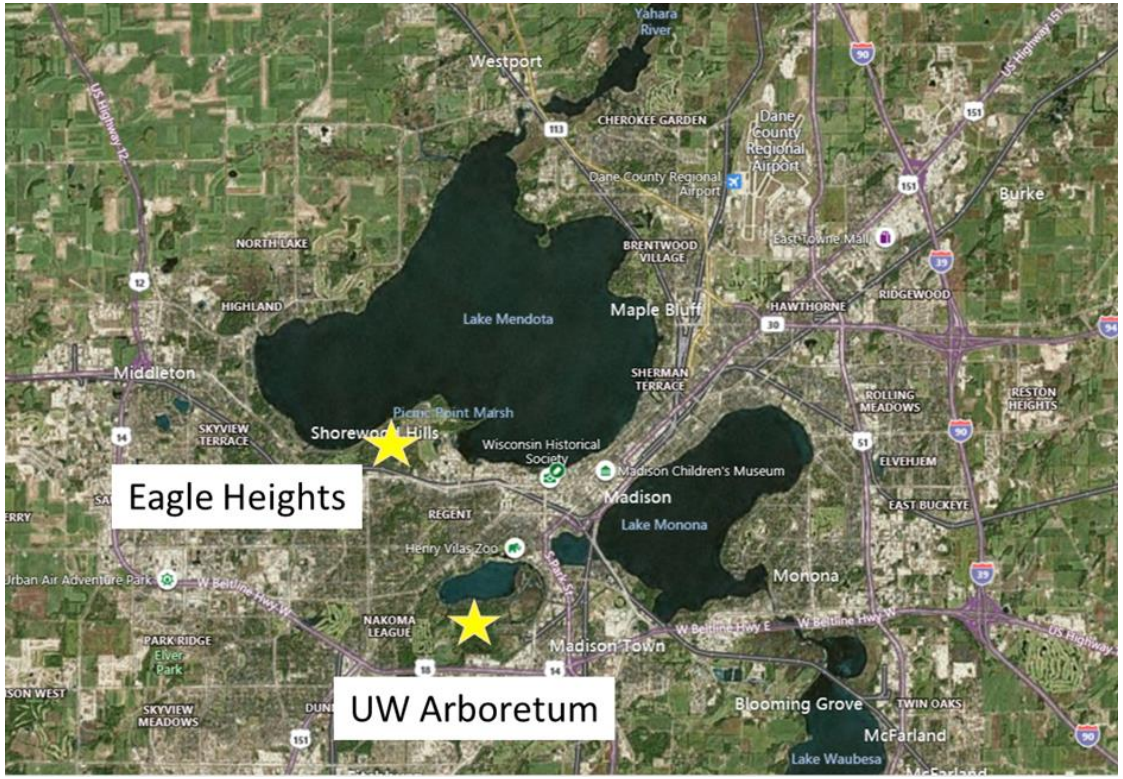
2 Supersites: Wisconsin Sampling Plan

Baraboo Air monitoring site
- Three Hi-Volume PUF samplers
- Two NADP Precipitation samplers
- One soil sample

Baraboo Water Samples
- One Sediment core
- Two Multi-depth water samples

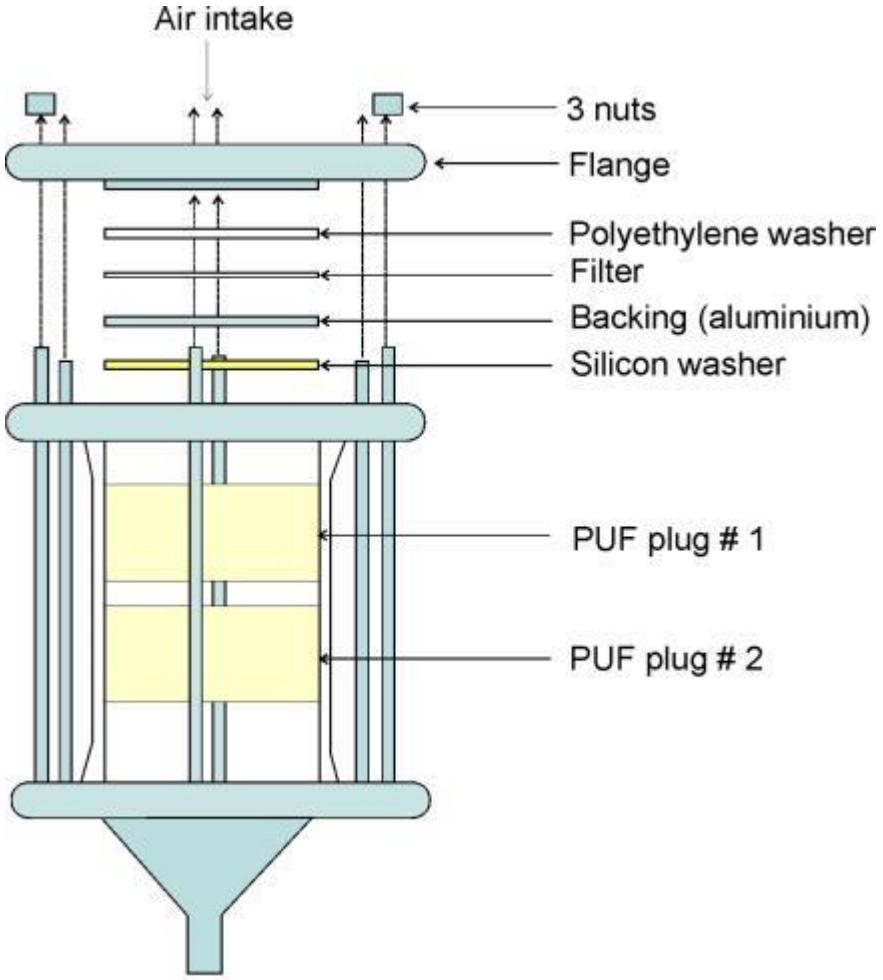


Madison (Eagle Heights and Arboretum)
- Three Hi-Volume PUF samplers
- Two NADP Precipitation samplers
- Multiple soil sample



Federal Method Development Goal

- Ambient Air sampling method and standardized **sampling media**
  - May be used to support further refinement of Stack test method
    - Other Test Method (OTM) – 45
  - Bring together stack testing and ambient methods for comparability among them



Wisconsin's Goals

- Maximize supersite method development
- Investigate pressing scientific questions related to PFAS partitioning and transport between different environmental media (soil, rain, surface water, sediment and air)
  - This work directly supports the WISPAC research goals.
    1. Standard Setting
    2. Sampling
    3. Pollution Prevention
    4. Engagement, Education, and Communication
    5. Research and Knowledge
    6. Phase Out
    7. Future Investments
    8. Identifying and Addressing Historic Discharges

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OFF THE RECORD"