National groundwater monitoring activities related to PFAS

Bruce Lindsey, U.S. Geological Survey

Coordinator, National Water Quality Network – Groundwater

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GROUNDWATER IS A THREE-DIMENSIONAL RESOURCE

The 82 Trend networks in the National Water Quality Network are Land Use studies or Major Aquifer Studies and each is sampled once per decade
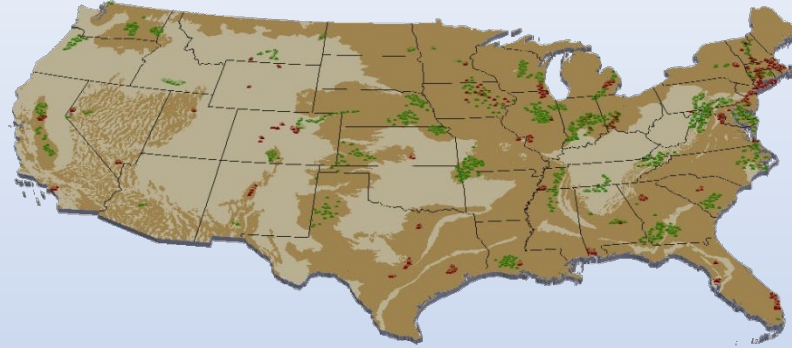
Land Use Studies
typically observation wells
~ 20 to 50 feet

Major Aquifer Studies
typically domestic wells
~ 50 to 150 feet

The 21 networks used as a source of public supply are not routinely scheduled for resampling, but are resampled as funds become available

Principal Aquifer Studies
typically Public Supply wells
~ 150 to 750 feet deep

National Water Quality Network – Public supply networks

- The base for sampling Per- and Polyfluoroalkyl Substances (PFAS) in public-supply wells is the Principal Aquifer Study (PAS) networks

- Each of the networks was sampled once during National Water-Quality Assessment (NAWQA) Cycle 3 (2013-2021)

- These networks are designed to monitor groundwater at the depth zone used for public supply and represent 84% of the groundwater used for public supply

- PAS networks are not routinely resampled. Starting in FY 22, additional funds were provided to resample public supply well networks for PFAS.

- PFAS sampling was conducted at 4 networks in the final years of the NAWQA project, and 2 additional networks have been sampled using the supplemental funding.

Locations of wells sampled for PFAS by the National Water Quality Network

(30 of the 82 trend networks have been sampled for PFAS as of 2023)

GROUNDWATER WELL SAMPLING LOCATIONS

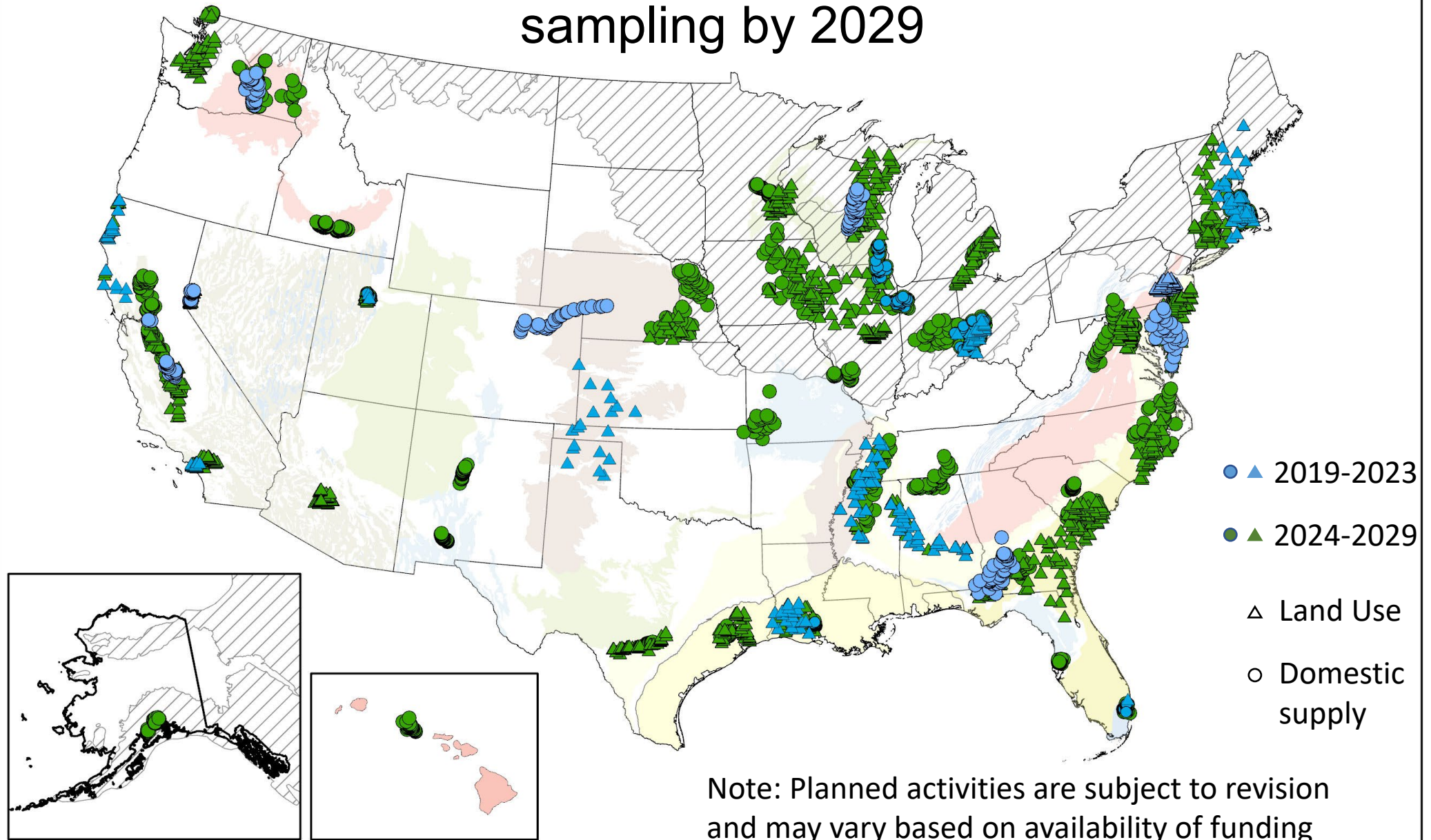- Sampled in 2019-2022
- Sampled in 2023
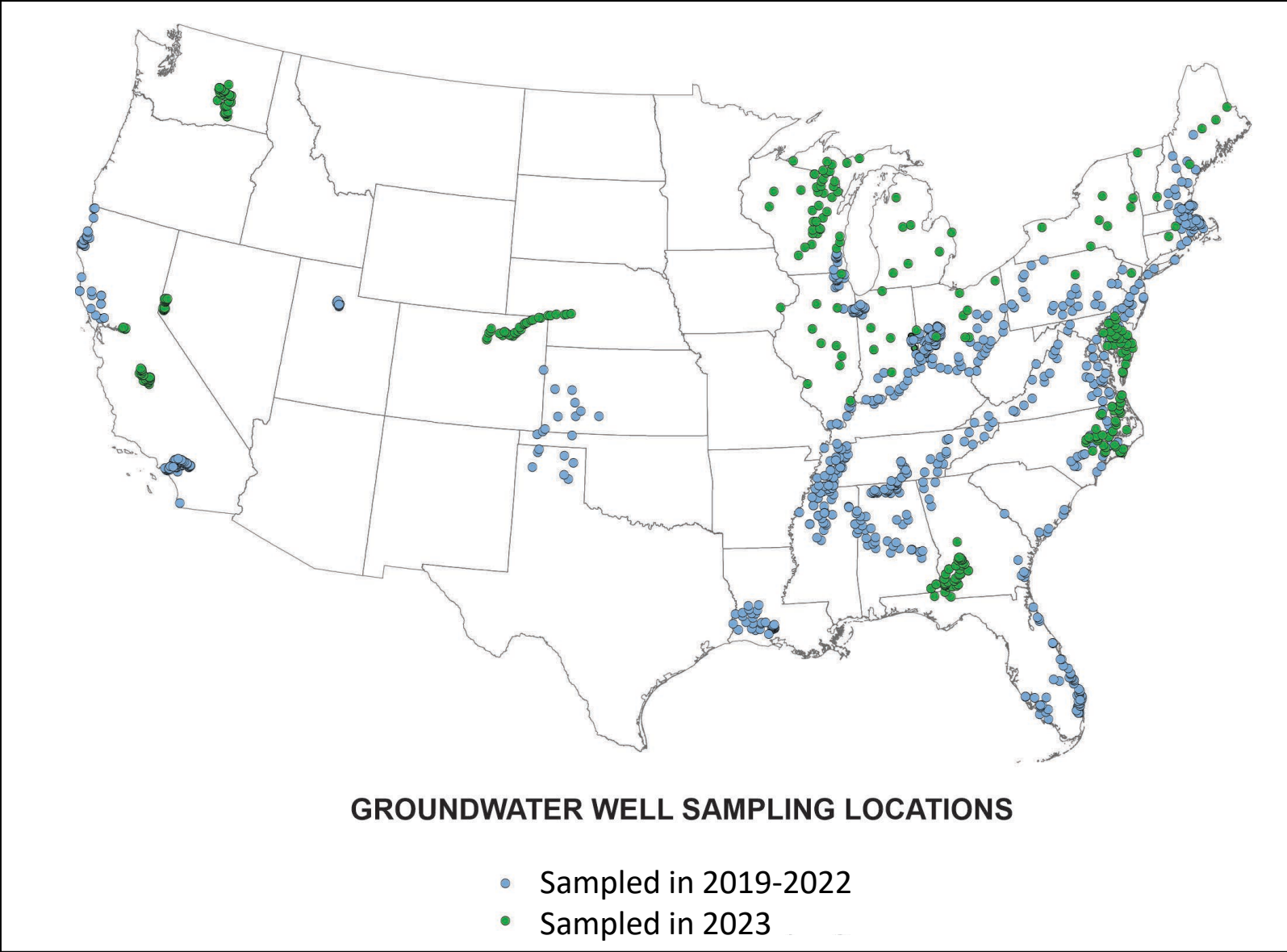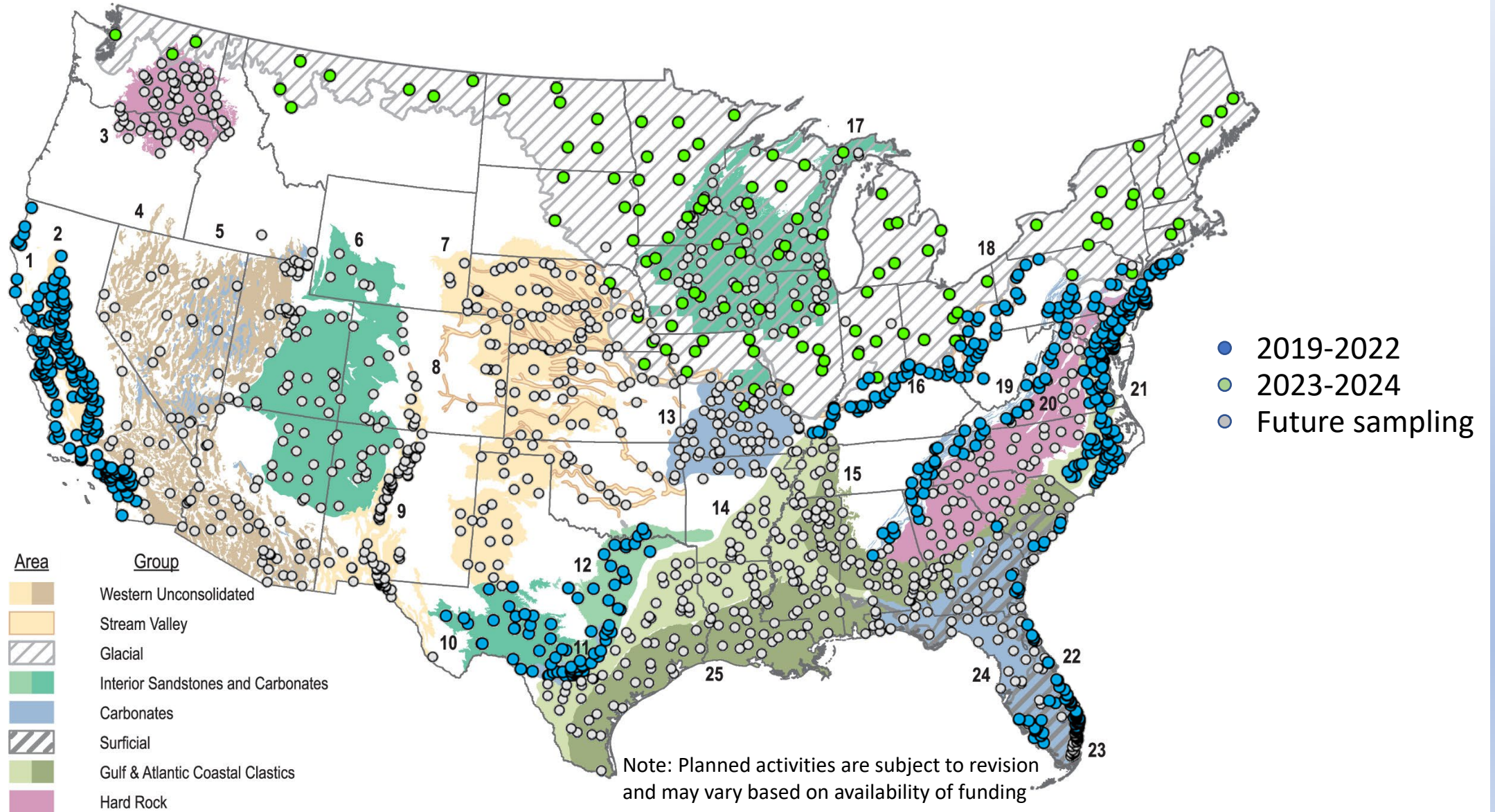
Progress on national coverage

- By 2029 all trend networks will be sampled for PFAS
- Resampling at PAS networks is at half of the wells (per network) sampled in NAWQA Cycle 3
- At the current rate of sampling, it will take15 years to complete sampling at all PAS networks
- Resampling of PAS networks is prioritized by vulnerability; several networks have predominantly premodern groundwater and are less likely to have PFAS detected.

Note: Planned activities are subject to revision and may vary based on availability of funding

Locations of trend networks sampled or scheduled for sampling by 2029

Legend:
- 2019-2023
- 2024-2029
- △ Land Use
- ○ Domestic supply

Note: Planned activities are subject to revision and may vary based on availability of funding

Locations of public-supply networks sampled or scheduled for sampling

Note: Planned activities are subject to revision and may vary based on availability of funding

Legend — Area / Group:
- Western Unconsolidated
- Stream Valley
- Glacial
- Interior Sandstones and Carbonates
- Carbonates
- Surficial
- Gulf & Atlantic Coastal Clastics
- Hard Rock

Sampling:
- 2019–2022
- 2023–2024
- Future sampling

Initial findings

Top variables for predicting PFAS detection based on initial report (using data from 2019):

- Tritium
- Fire training areas
- DOC
- Urban Land use
- Sum of VOCs

From McMahon and others, 2022
https://doi.org/10.1021/acs.est.1c04795
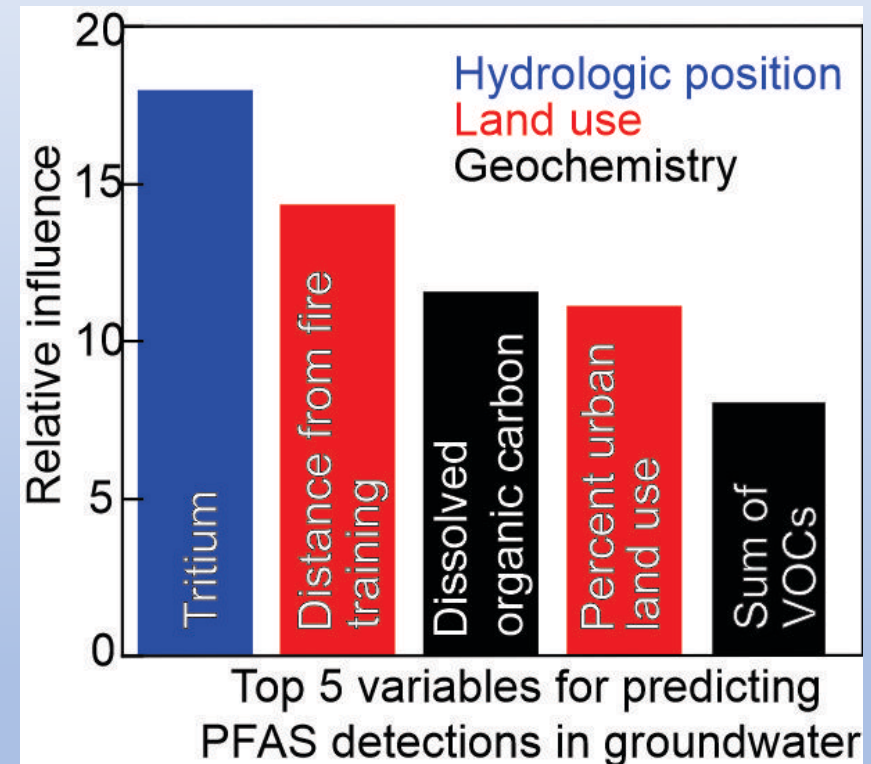
PFAS by 2023 Proposed EPA Maximum Contaminant Levels(MCLs) and Hazard Index (HI)
(Samples from 2019 only)

Constituent and benchmark	Network type and Rate of exceedance of benchmark		
	Public-Supply (n=115)	Domestic-Supply (n=107)	Urban (n=28)
PFOA (4 ng/L)	32%	8%	50%
PFOS (4 ng/L)	34%	12%	54%
PFBS/GENX/ PFHxS/PFNA Hazard Index*	9%	3%	10%

Data from McMahon and others, 2022

https://doi.org/10.1021/acs.est.1c04795

Benchmarks from: Proposed PFAS National Primary Drinking Water Regulation

Per- and Polyfluoroalkyl Substances (PFAS) | US EPA

PFAS sampling for the National Water Quality Network – surface water started in 2023
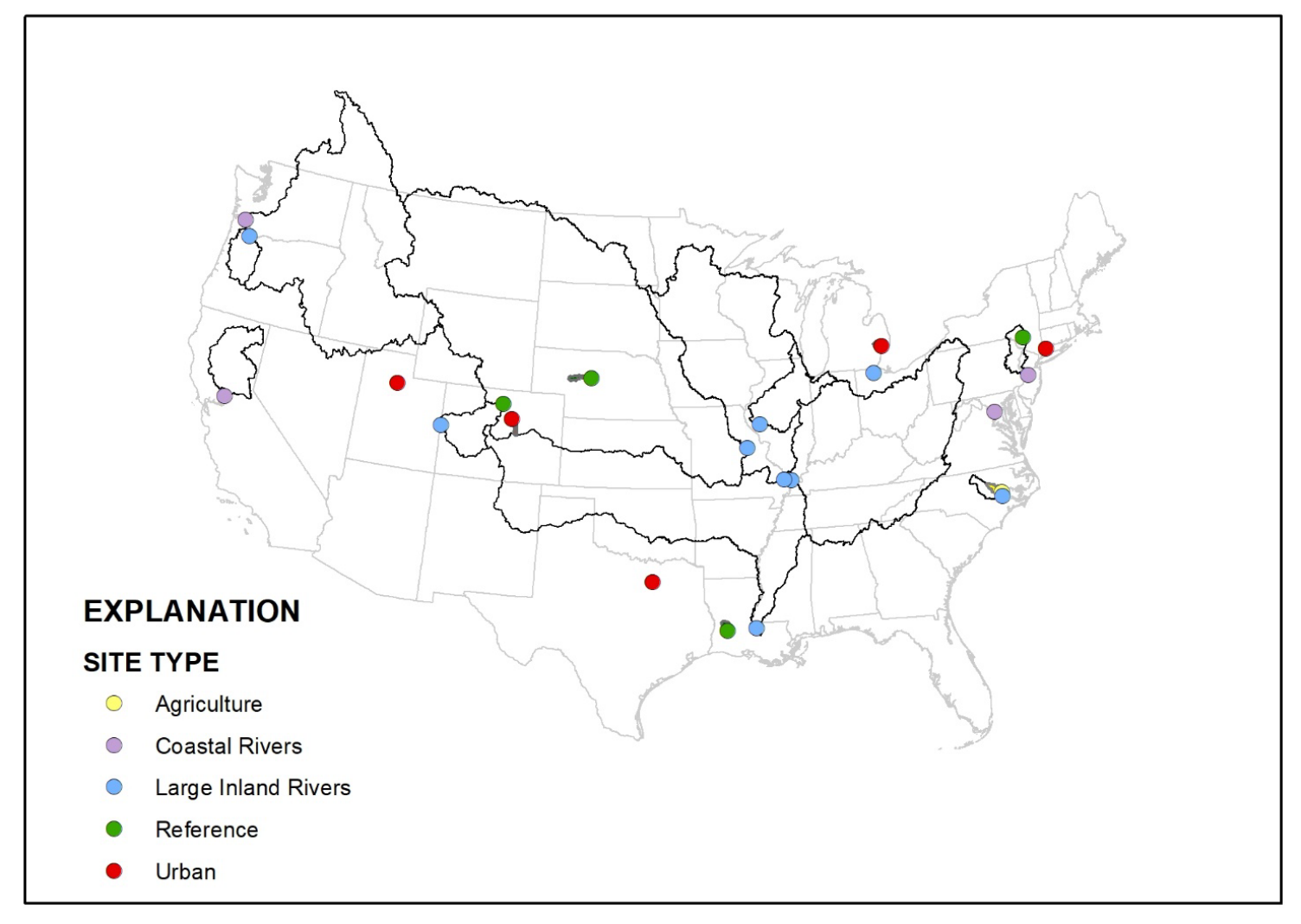
Ongoing work

- Analysis of results of sampling from 2019 to 2022 is ongoing.

- More than 1,200 samples are available nationally

- Product will include a national map predicting PFAS occurrence

- Benchmark exceedance for PFAS using 2022 proposed MCLs and HI is greater than has been observed for other contaminants.*

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QUESTIONS?