

DNR Drinking Water & Groundwater Study Group Meeting

February 8, 2024

Prevalence and Source Tracing of PFAS in Shallow Groundwater Used for Drinking Water in Wisconsin

Matt Silver¹, Bill Phelps¹, Kevin Masarik², Kyle Burke³, Chen Zhang³, Alex Schwartz³, Miaoyan Wang⁴, Amy L. Nitka², Jordan Schutz¹, Tom Trainor¹, John W. Washington⁵
and Bruce D. Rheineck¹

Wisconsin Department of Natural Resources¹

UWSP-Center for Watershed Science and Education²

Wisconsin State Laboratory of Hygiene³

University of Wisconsin – Madison⁴

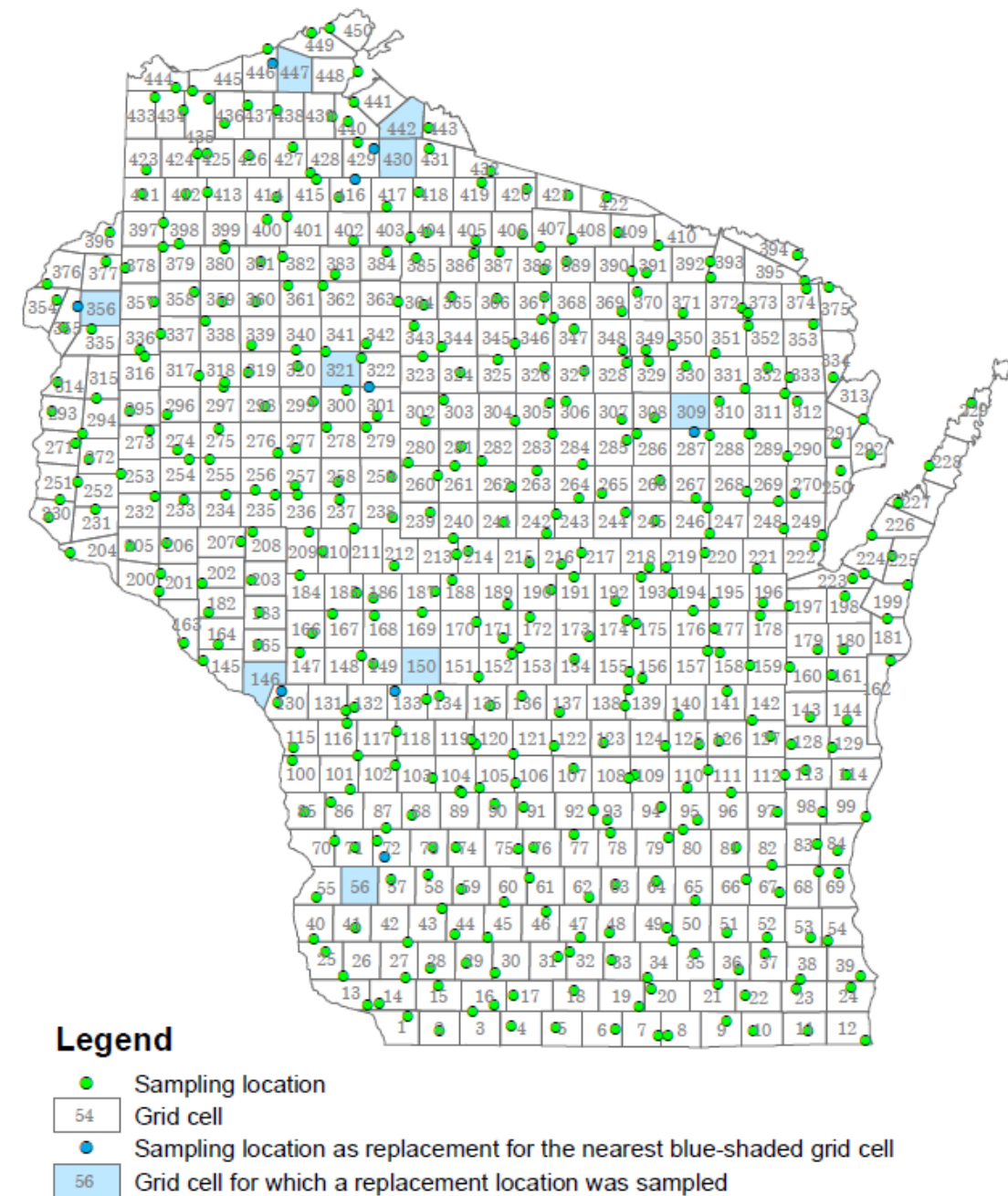
United States Environmental Protection Agency⁵

Introduction

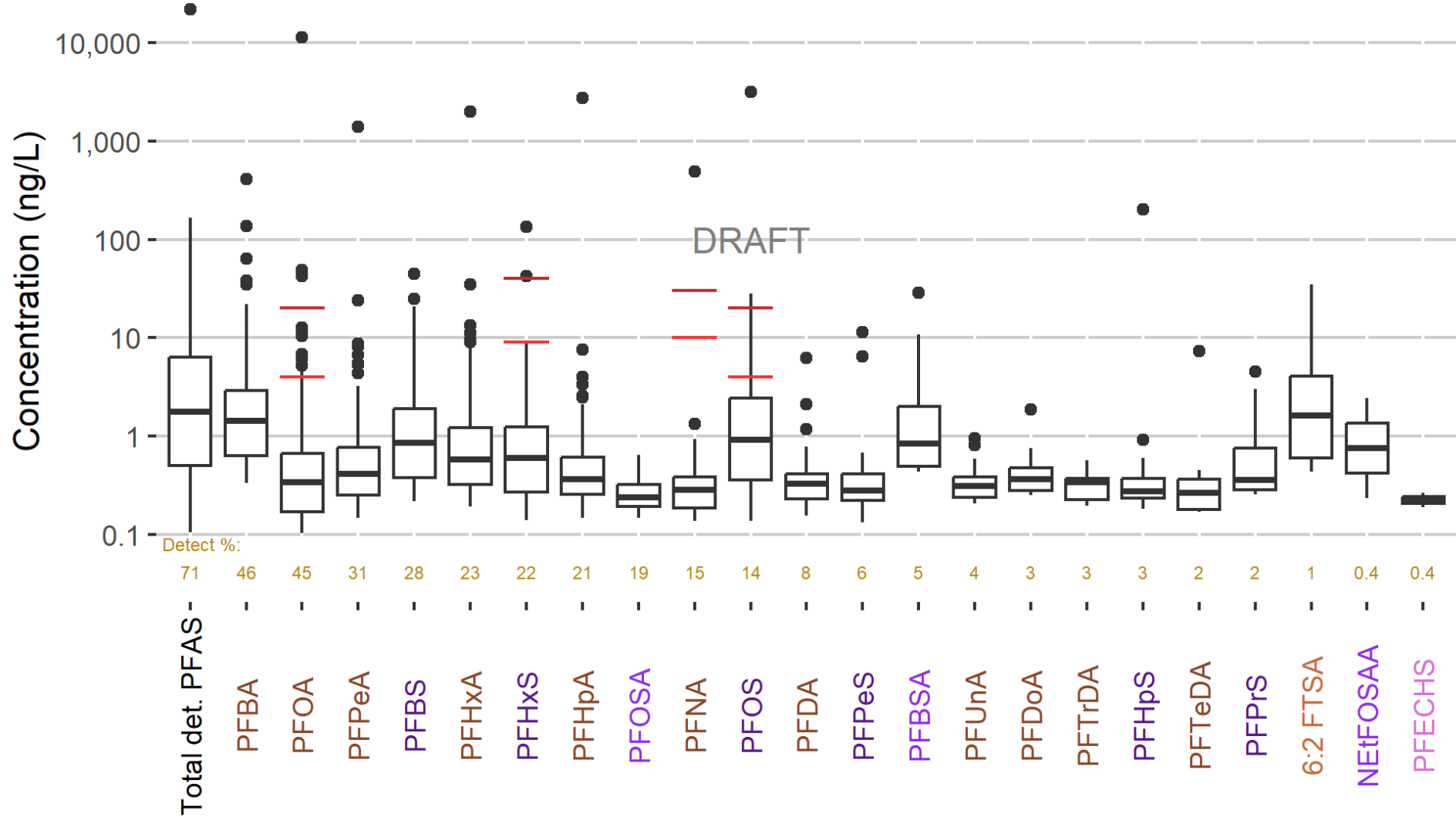
- Studies of wastewater, precipitation and soil suggest ubiquitous PFAS occurrence in those media
- Potential PFAS sources to groundwater are diverse
- Prior to this study, no systematic or widespread ambient shallow groundwater data in Wisconsin
- Study objectives:
 - Collect snapshot of the overall occurrence of PFAS in Wisconsin shallow groundwater
 - Evaluate potential types of PFAS sources to groundwater
 - Inform Source Water Protection needs

Sampling

- Equal area grid approach (right)
- Homes with private wells with casing no deeper than 40 feet below the water table
- Participation invitation letters and on-line form
 - “random” selection of participants
- Specific PFAS sampling protocol for study developed
- Two teams of two samplers (“clean hands/dirty hands” technique)
- Samples for both PFAS and non-PFAS analysis
- PFAS field blank for every sample
- Lab analysis for PFAS at WSLH and for other analytes at UWSP-Water and Environmental Analysis Lab (WEAL)

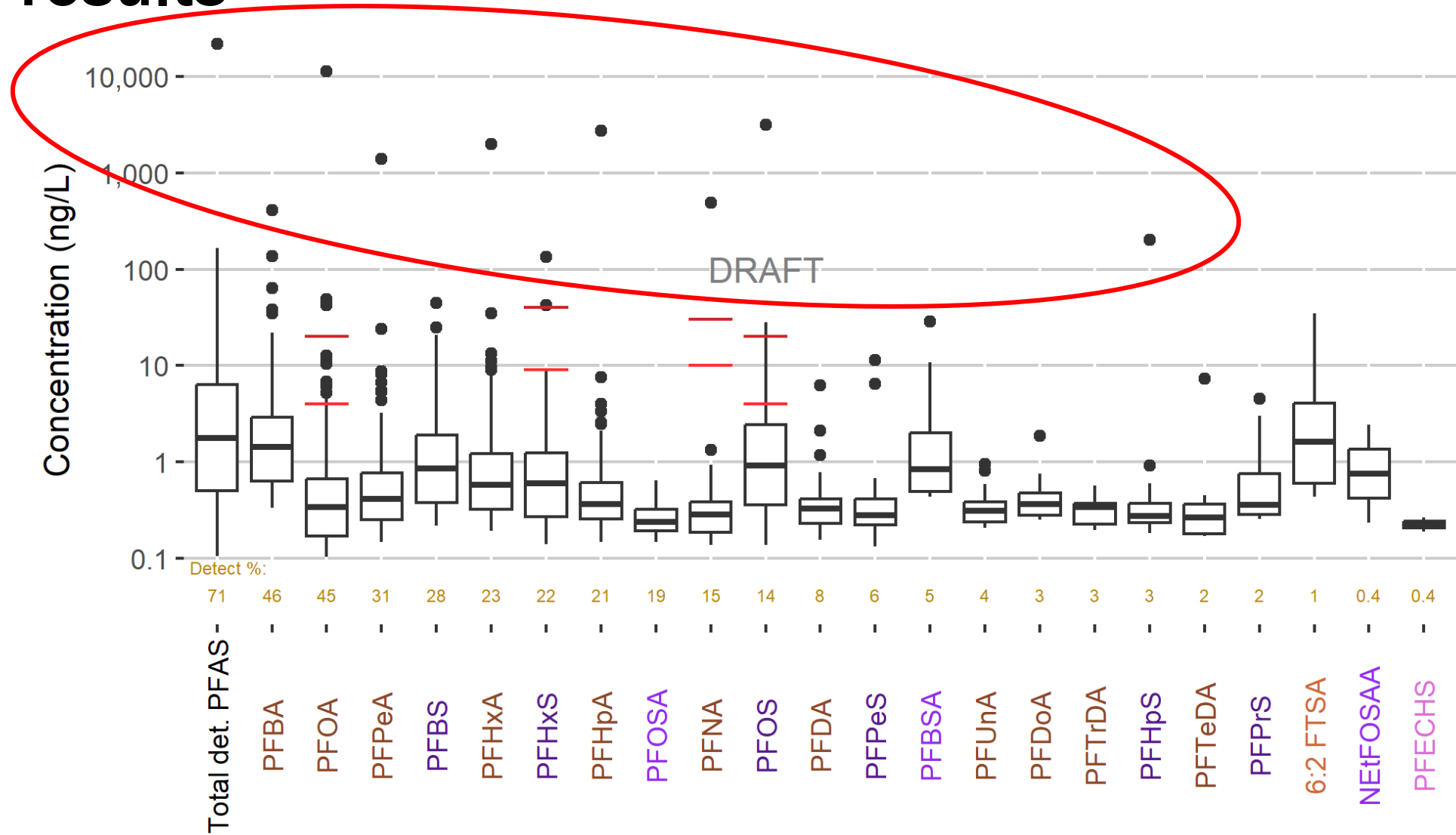


PFAS results



Color: PFCA PFSA pre-PFCA pre-PFSA cyclic analog of PFOS — WI public health guideline value — Federal proposed MCL

PFAS results

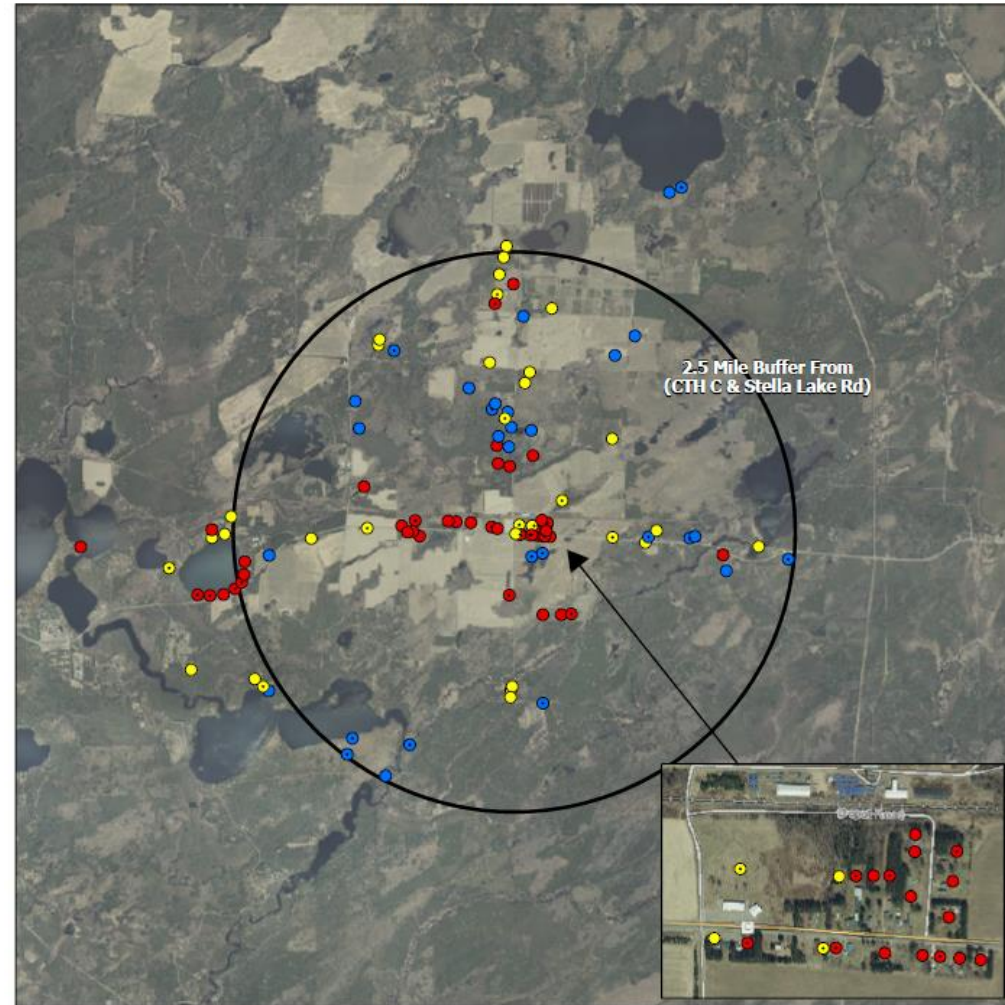


Color: PFCA PFSA pre-PFCA pre-PFSA cyclic analog of PFOS — WI public health guideline value — Federal proposed MCL

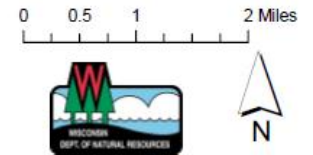
Town of Stella PFAS Sampling Effort



Map of Starks area/Town of Stella
PFAS sampling results (as of 8/7/2023)

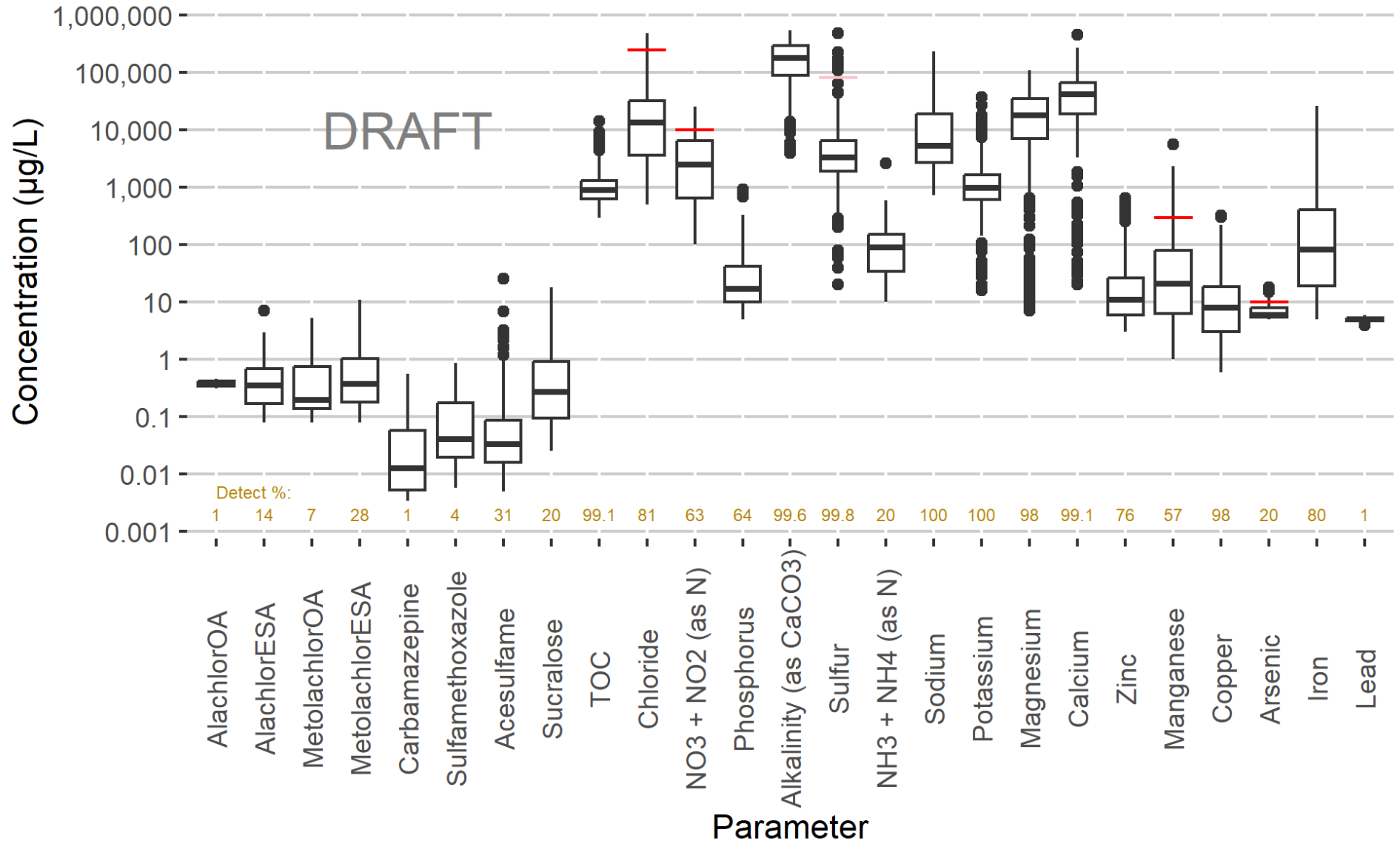


- No detection of any PFAS
- No detection of any PFAS (Granite Well)
- PFAS detected but < WI Health Guidelines
- PFAS detected but < WI Health Guidelines (Granite Well)
- PFAS detected but > WI Health Guidelines
- PFAS detected but > WI Health Guidelines (Granite Well)



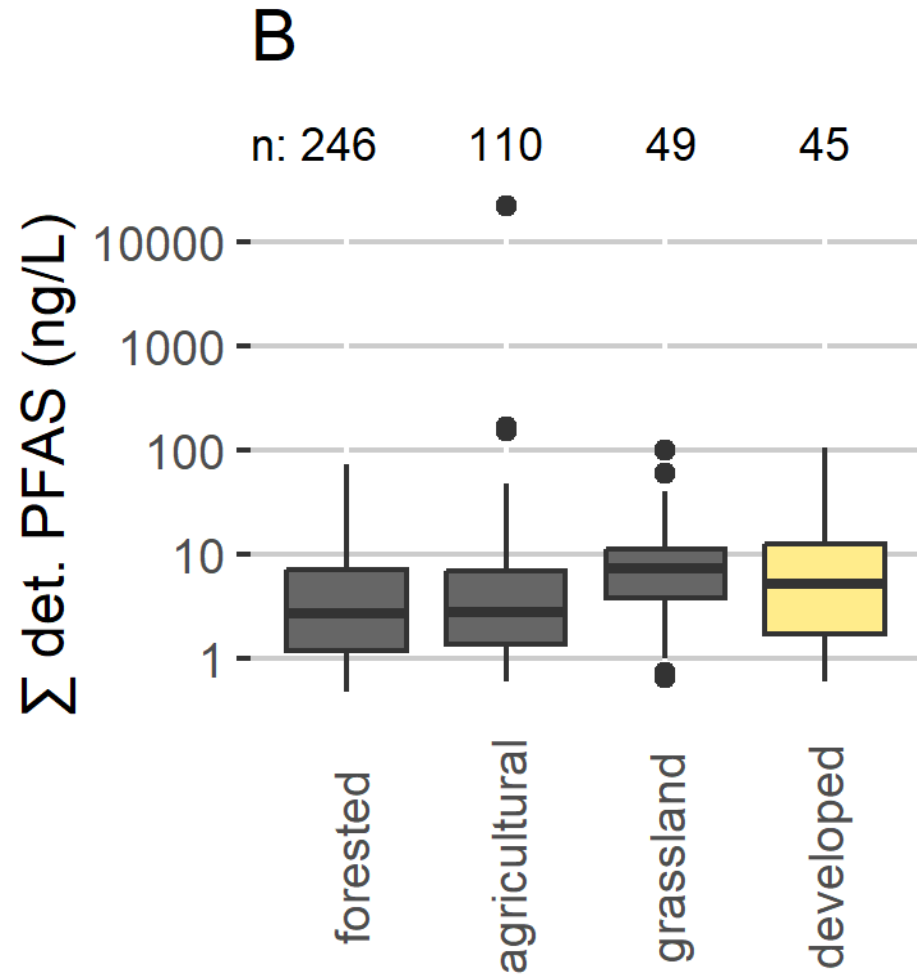
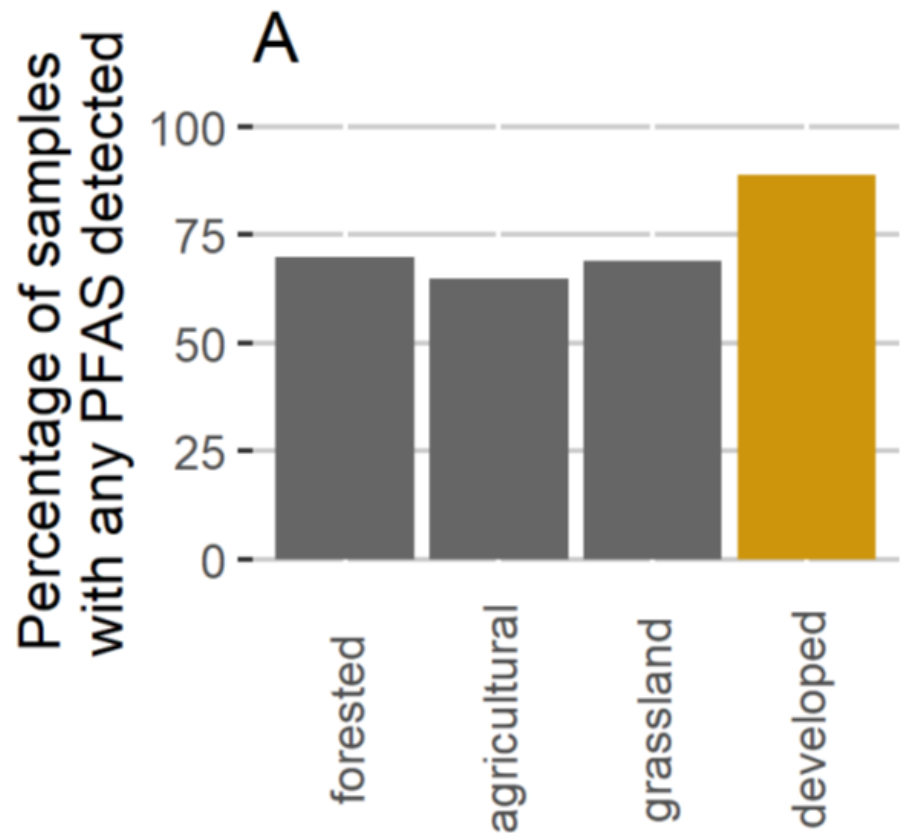
Non-PFAS results

- NR140 standard for which there are project sample results above that value
- NR140 public welfare standard for sulfate is 250 mg/L; value shown by line is the corresponding concentration of S, if all S is sulfate

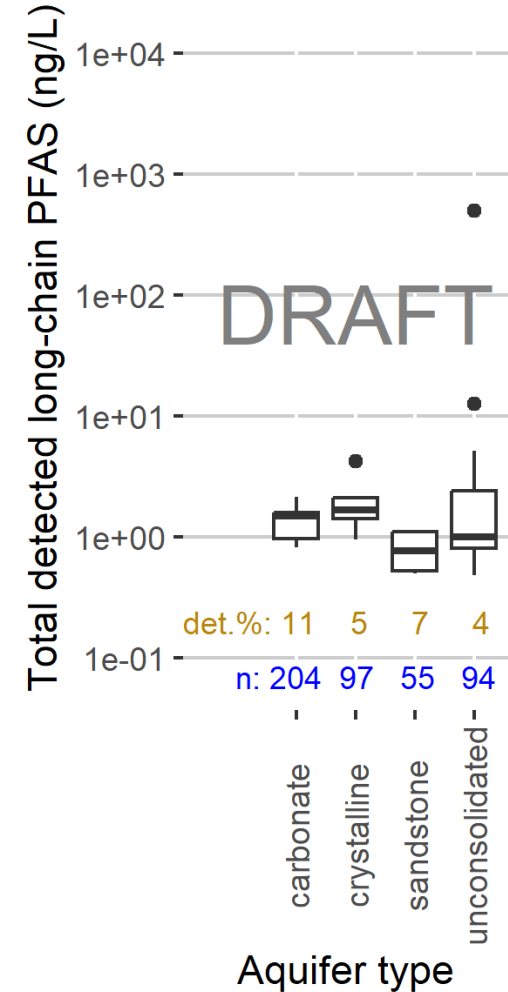
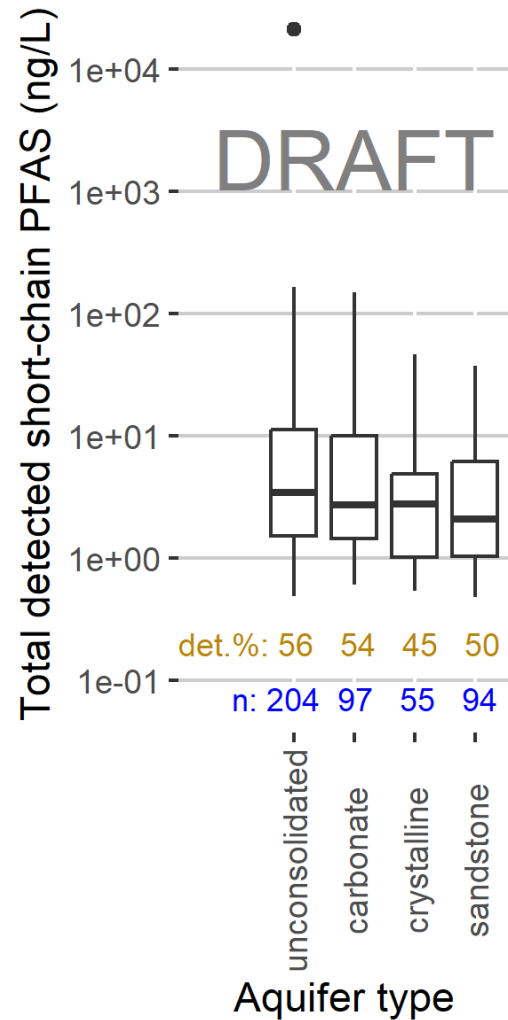
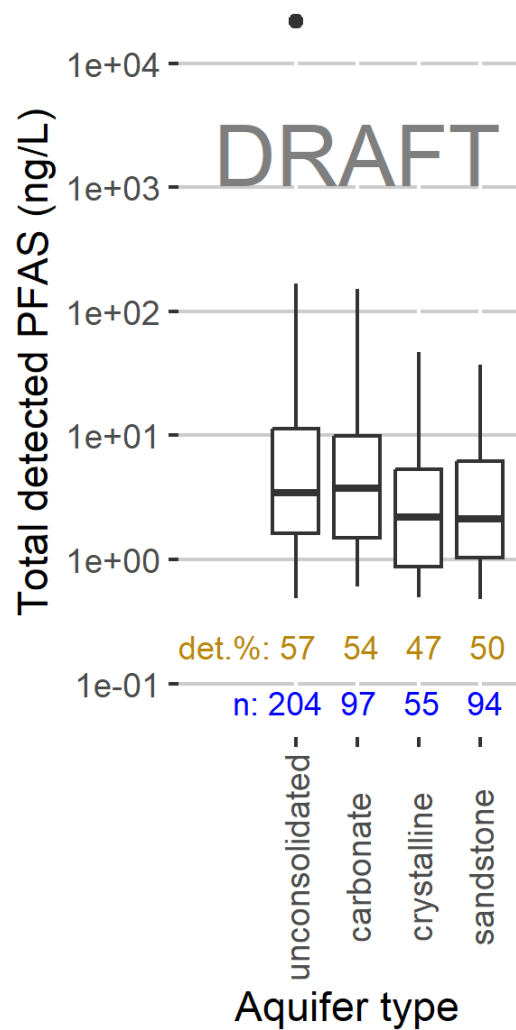


Differences between land uses

(largest land use category in 500 m circle around well/property)



Differences between aquifer types



Geographic results for PFBA

Aquifer Type

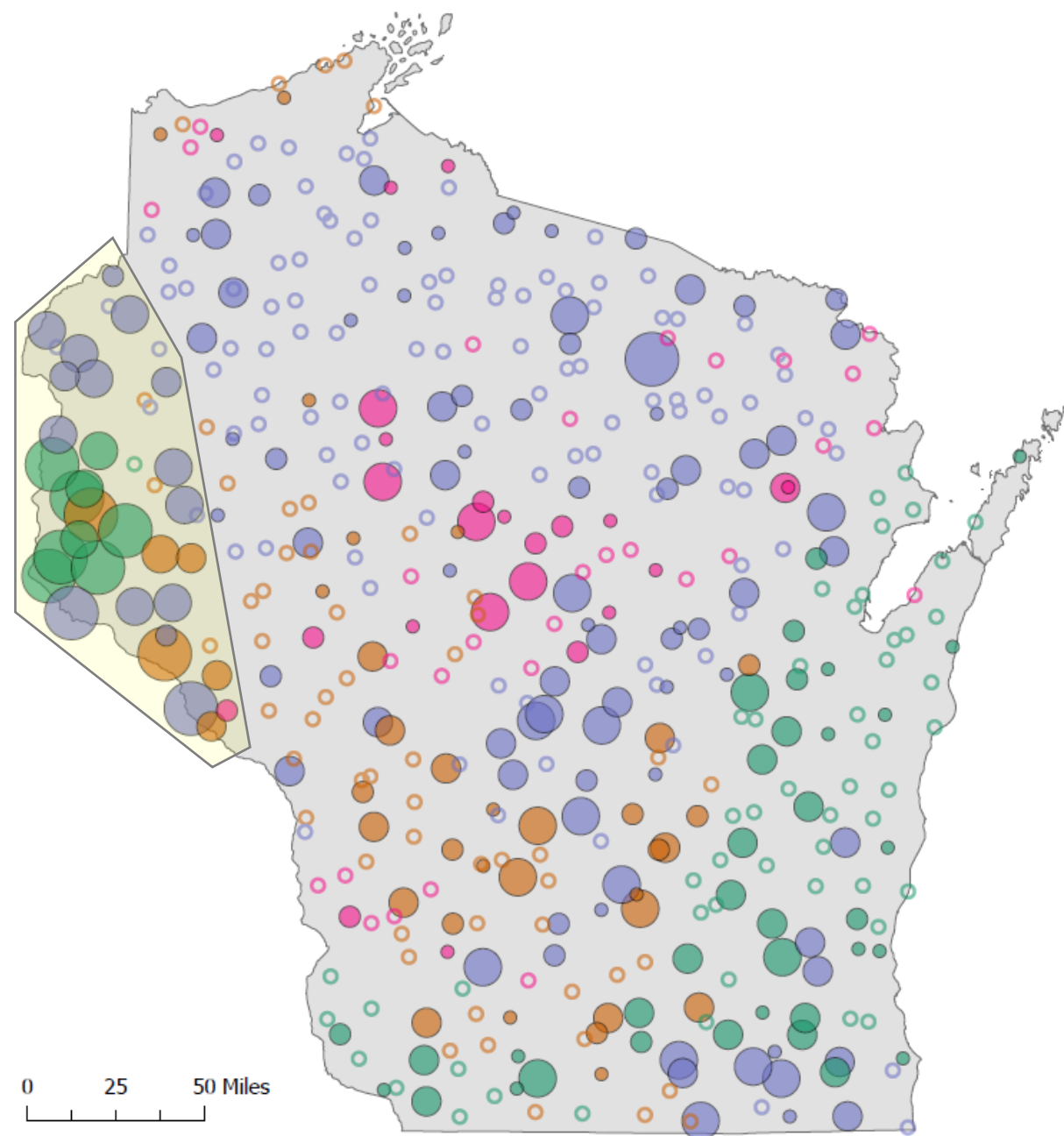
- Carbonate
- Crystalline Rock
- Sandstone
- Unconsolidated

PFBA Log Concentrations

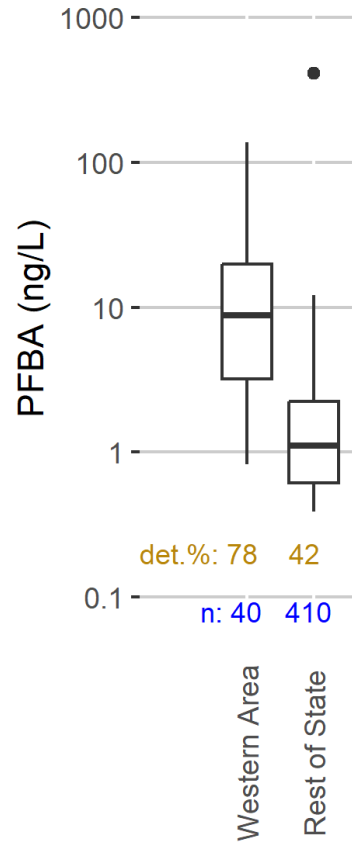
- 1.210 - 2.620
- 0.531 - 1.200
- 0.126 - 0.530
- -0.169 - 0.125
- -0.500 - -0.170

● Non-detects

A non-detect is reported for samples in which the result was below the Level of Detection (LOD) for the given compound.



Geographic results for PFBA



Aquifer Type

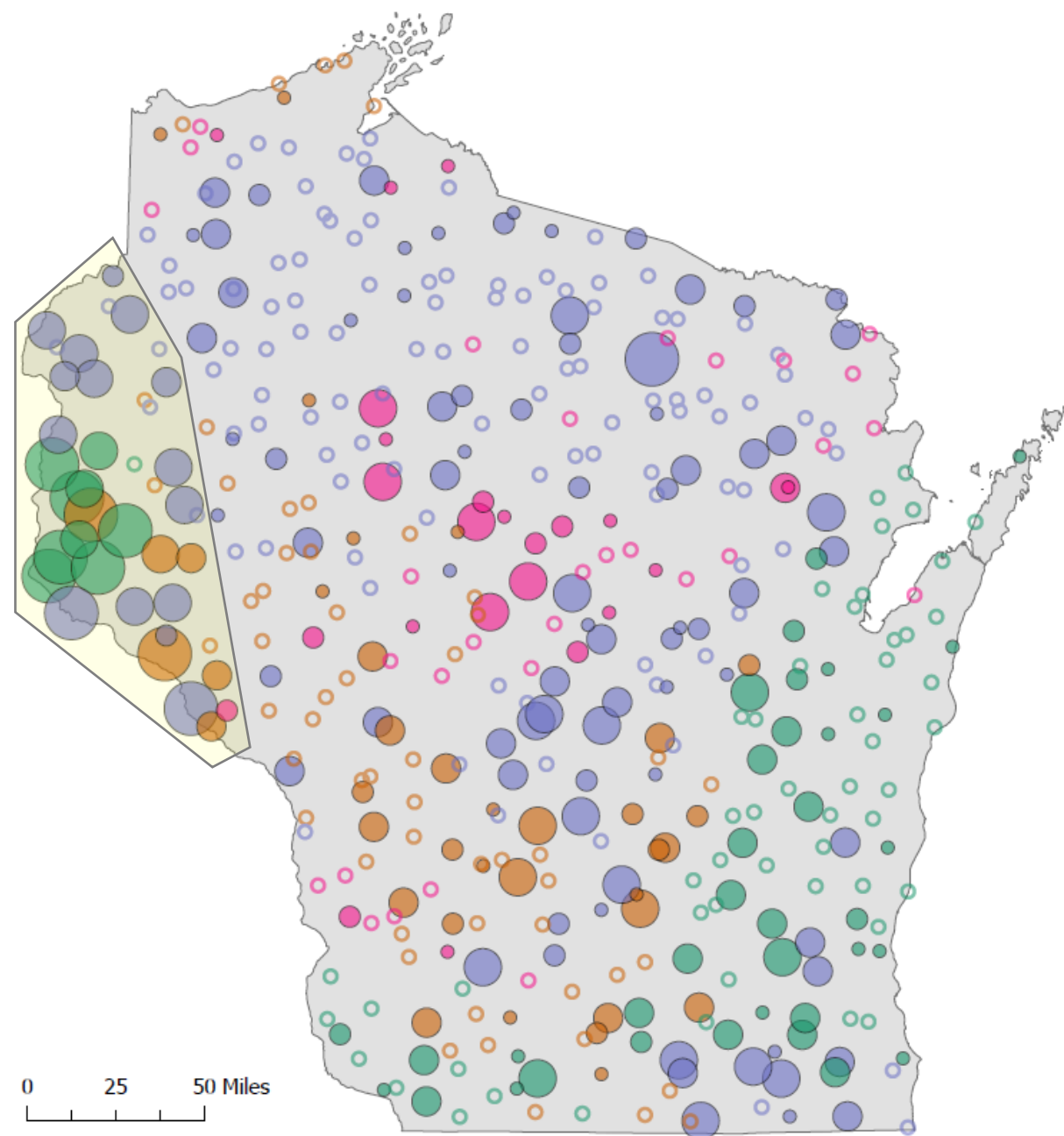
- Carbonate
- Crystalline Rock
- Sandstone
- Unconsolidated

PFBA Log Concentrations

- 1.210 - 2.620
- 0.531 - 1.200
- 0.126 - 0.530
- -0.169 - 0.125
- -0.500 - -0.170

● Non-detects

A non-detect is reported for samples in which the result was below the Level of Detection (LOD) for the given compound.



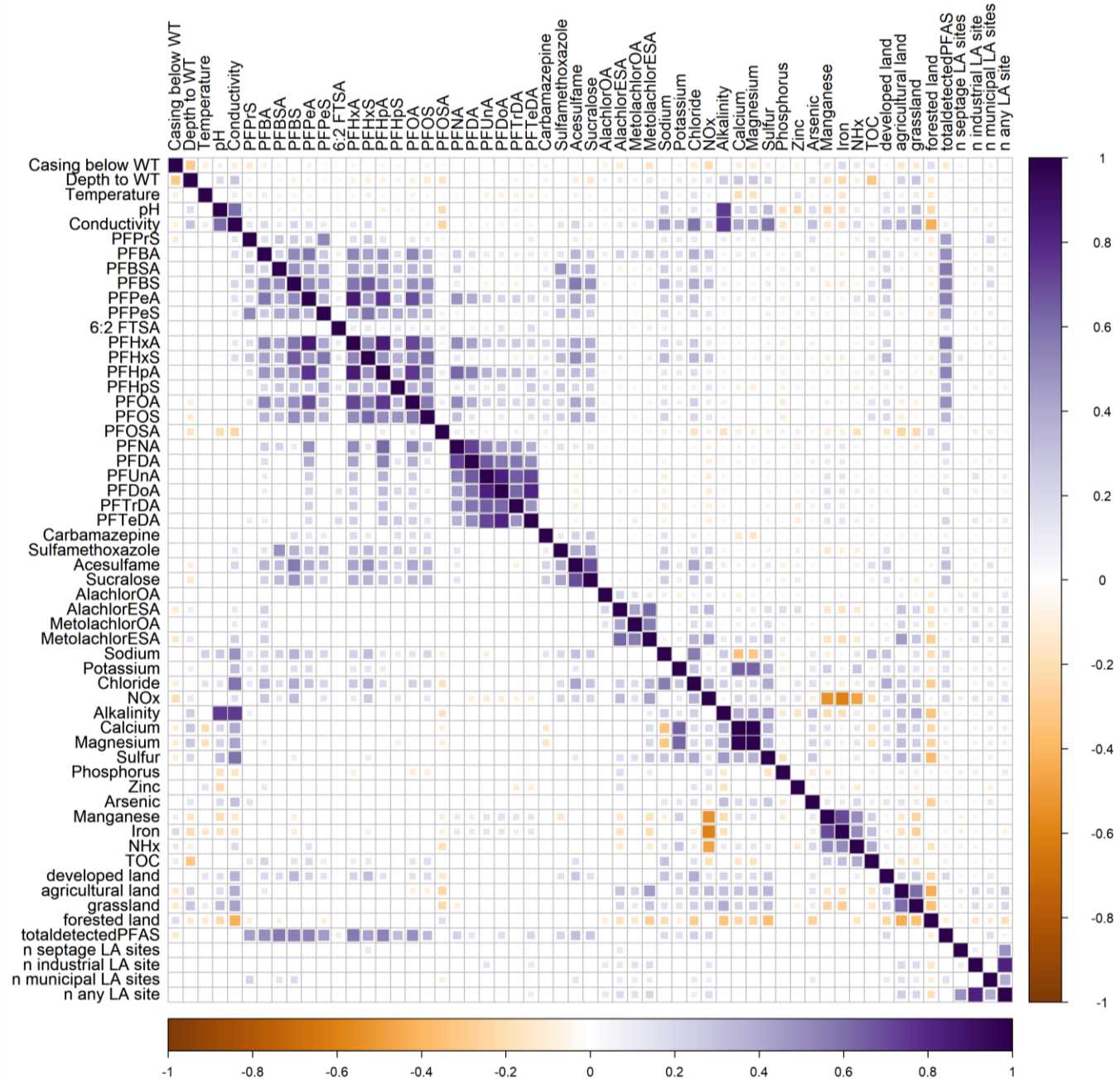
Multi-variate analysis: correlations

Noteworthy correlations:

- Short-chain PFAS with other short-chain PFAS
- Long-chain PFAS with other long-chain PFAS
- HWIs & PFAS (especially short chain)
- Developed land and PFAS

Noteworthy lack of consistent and/or strong correlations:

- Herbicide metabolites and PFAS
- Agricultural land and PFAS
- Land application of waste



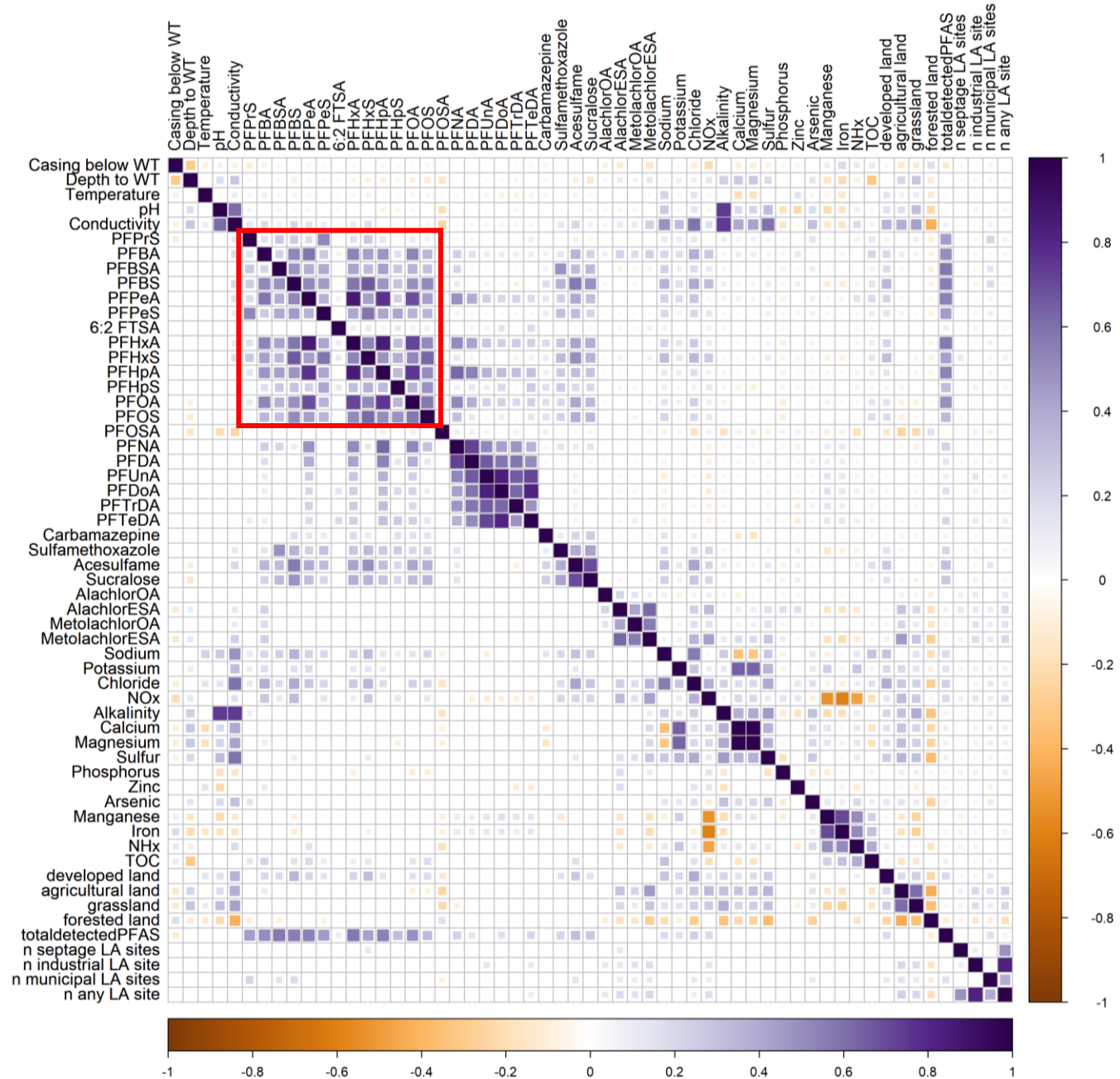
Multi-variate analysis: correlations

Noteworthy correlations:

- **Short-chain PFAS with other short-chain PFAS**
- Long-chain PFAS with other long-chain PFAS
- HWIs & PFAS (especially short chain)
- Developed land and PFAS

Noteworthy lack of consistent and/or strong correlations:

- Herbicide metabolites and PFAS
- Agricultural land and PFAS
- Land application of waste



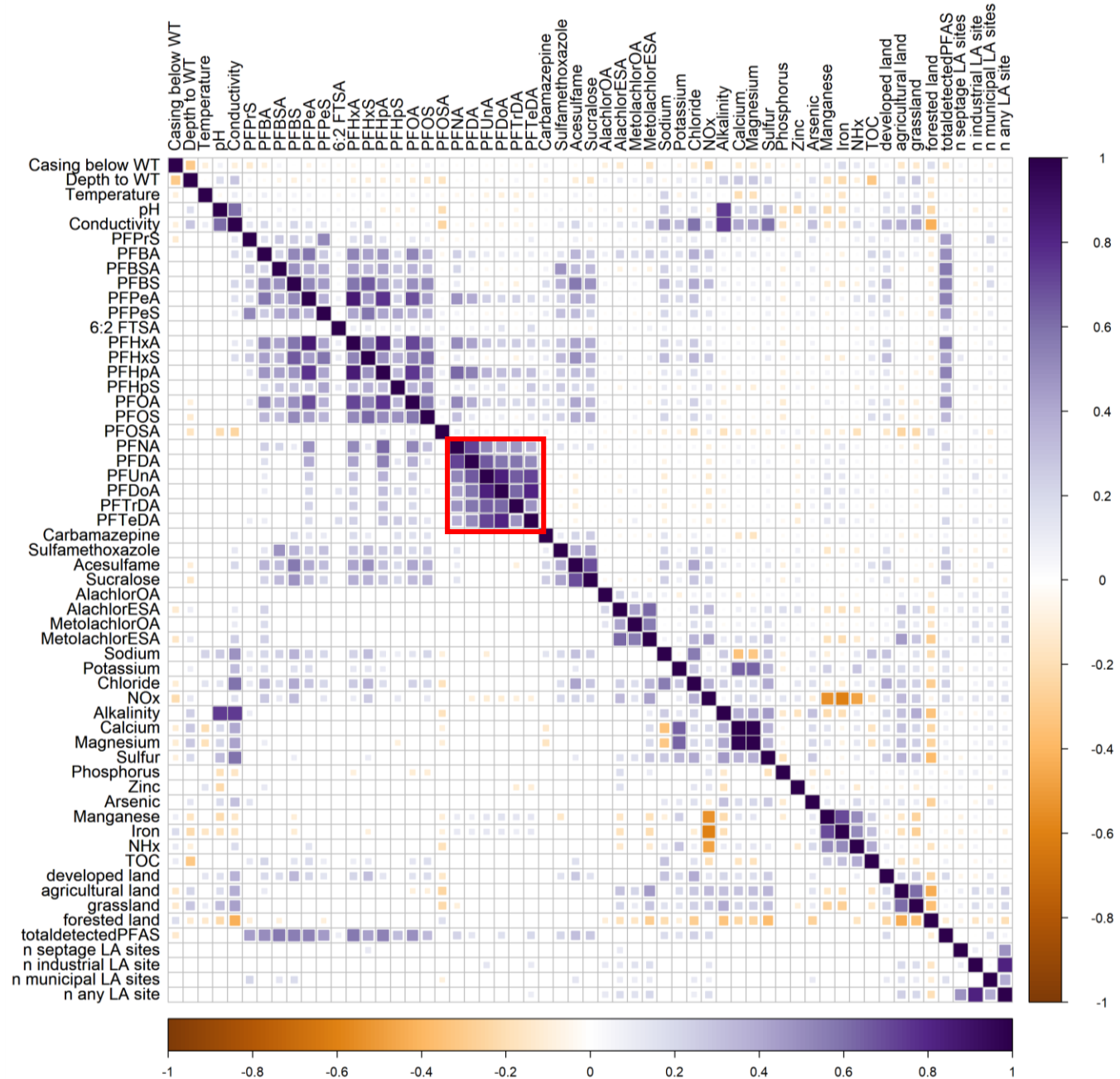
Multi-variate analysis: correlations

Noteworthy correlations:

- Short-chain PFAS with other short-chain PFAS
- **Long-chain PFAS with other long-chain PFAS**
- HWIs & PFAS (especially short chain)
- Developed land and PFAS

Noteworthy lack of consistent and/or strong correlations:

- Herbicide metabolites and PFAS
- Agricultural land and PFAS
- Land application of waste



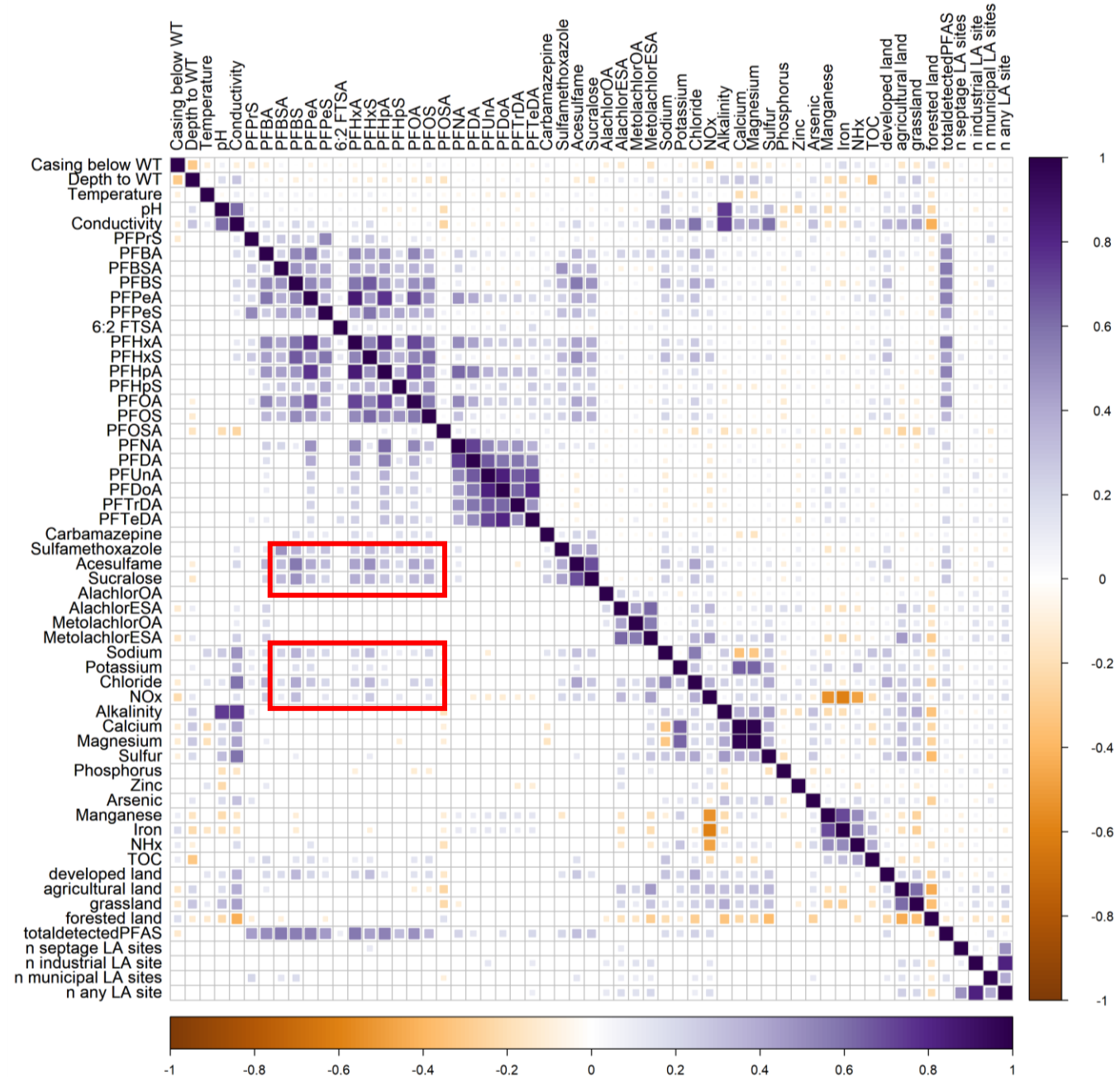
Multi-variate analysis: correlations

Noteworthy correlations:

- Short-chain PFAS with other short-chain PFAS
- Long-chain PFAS with other long-chain PFAS
- **HWIs & PFAS (especially short chain)**
- Developed land and PFAS

Noteworthy lack of consistent and/or strong correlations:

- Herbicide metabolites and PFAS
- Agricultural land and PFAS
- Land application of waste



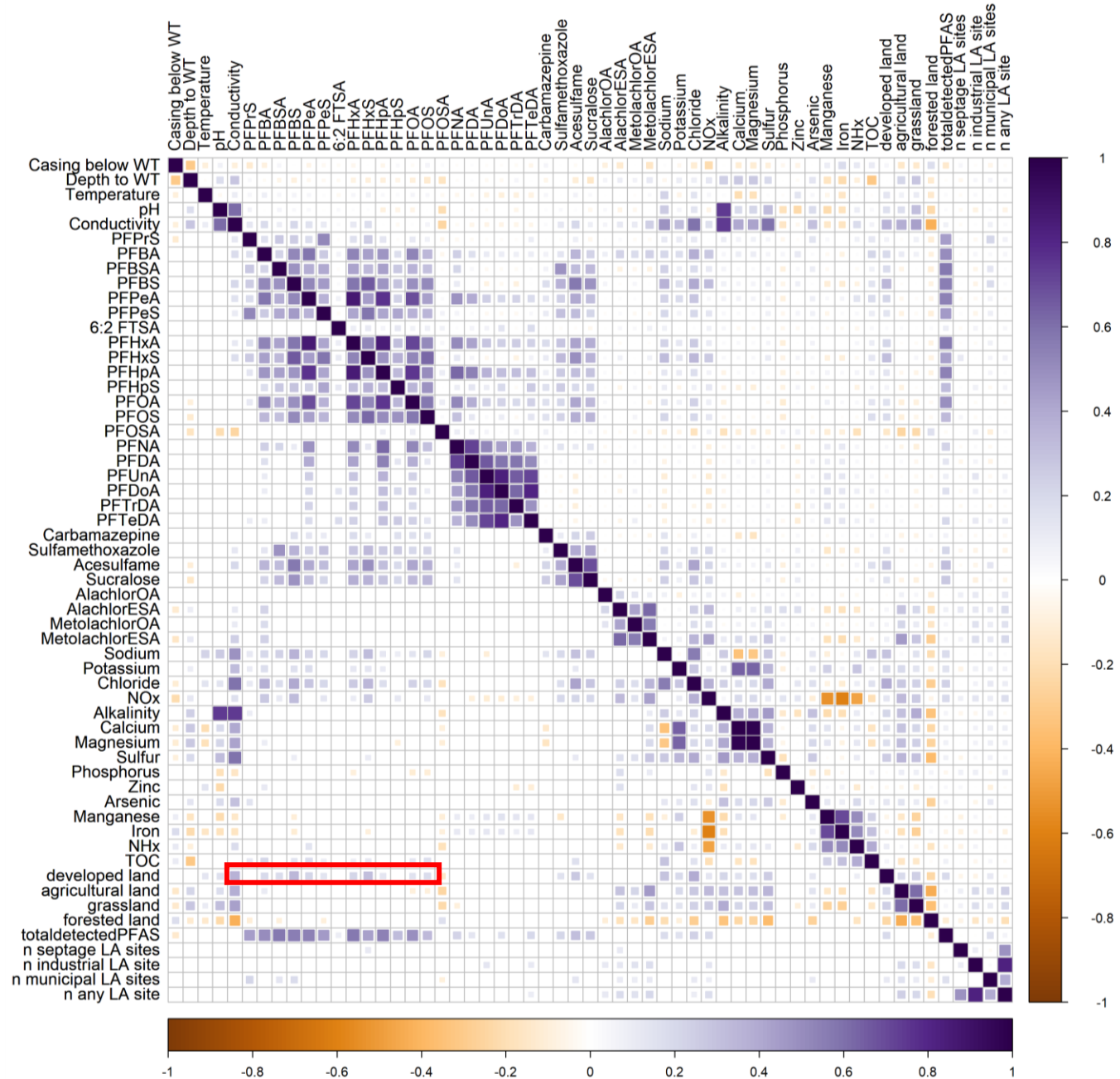
Multi-variate analysis: correlations

Noteworthy correlations:

- Short-chain PFAS with other short-chain PFAS
- Long-chain PFAS with other long-chain PFAS
- HWIs & PFAS (especially short chain)
- **Developed land and PFAS**

Noteworthy lack of consistent and/or strong correlations:

- Herbicide metabolites and PFAS
- Agricultural land and PFAS
- Land application of waste



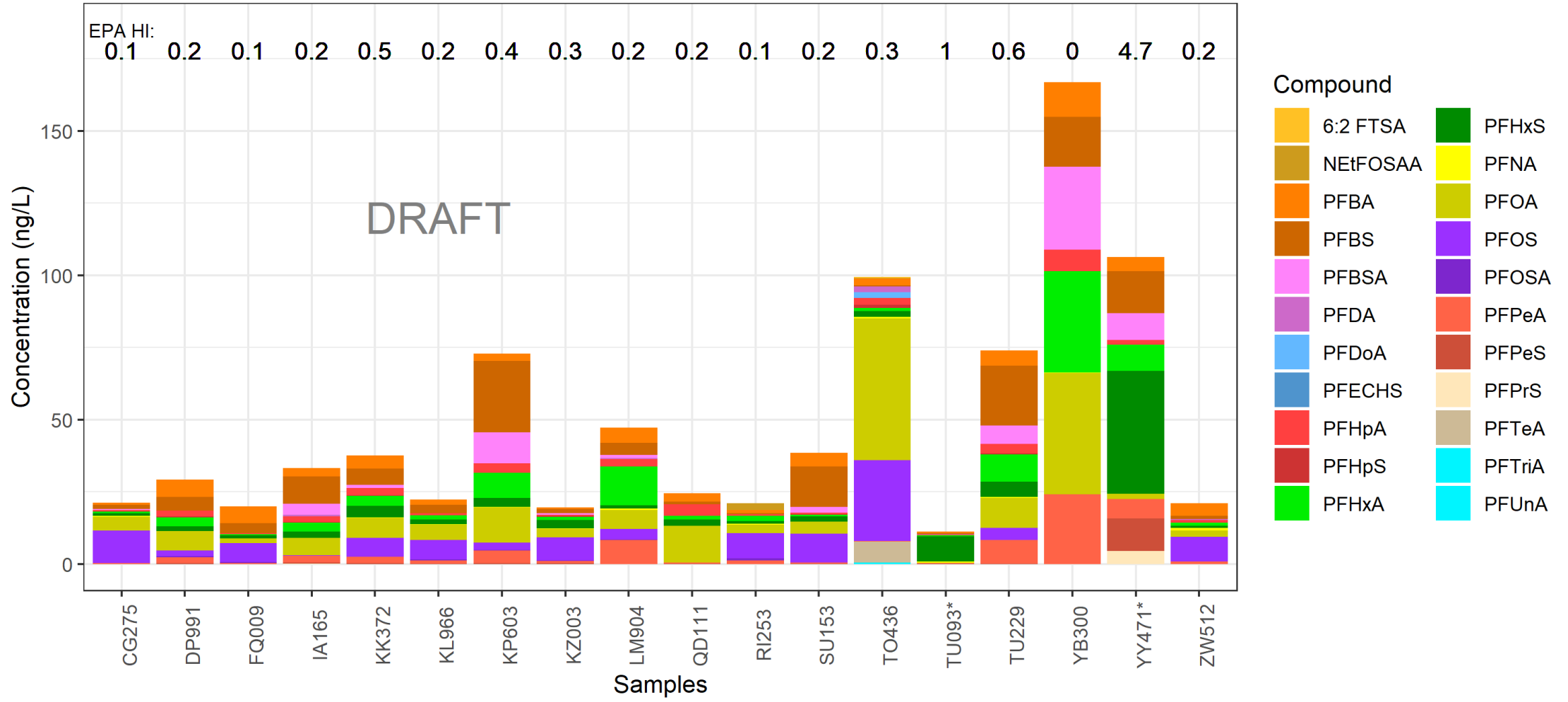
Comparison with proposed new EPA Maximum Contaminant Levels for PFAS (4% above proposed EPA MCLs for PFAS)

Of the 450 GW project samples:

- 13 samples with **PFOA** \geq 4 ppt
- 11 samples with **PFOS** \geq 4 ppt
- 2 samples with **PFHxS** \geq 9 ppt (a third has result of 8.88 ppt)
- 1 sample with **PFNA** \geq 10 ppt
- No samples with **PFBS** \geq 2000 ppt (highest detected = 44.4 ppt)
- No detections of **HFPO-DA**

Samples above proposed EPA PFAS MCLs

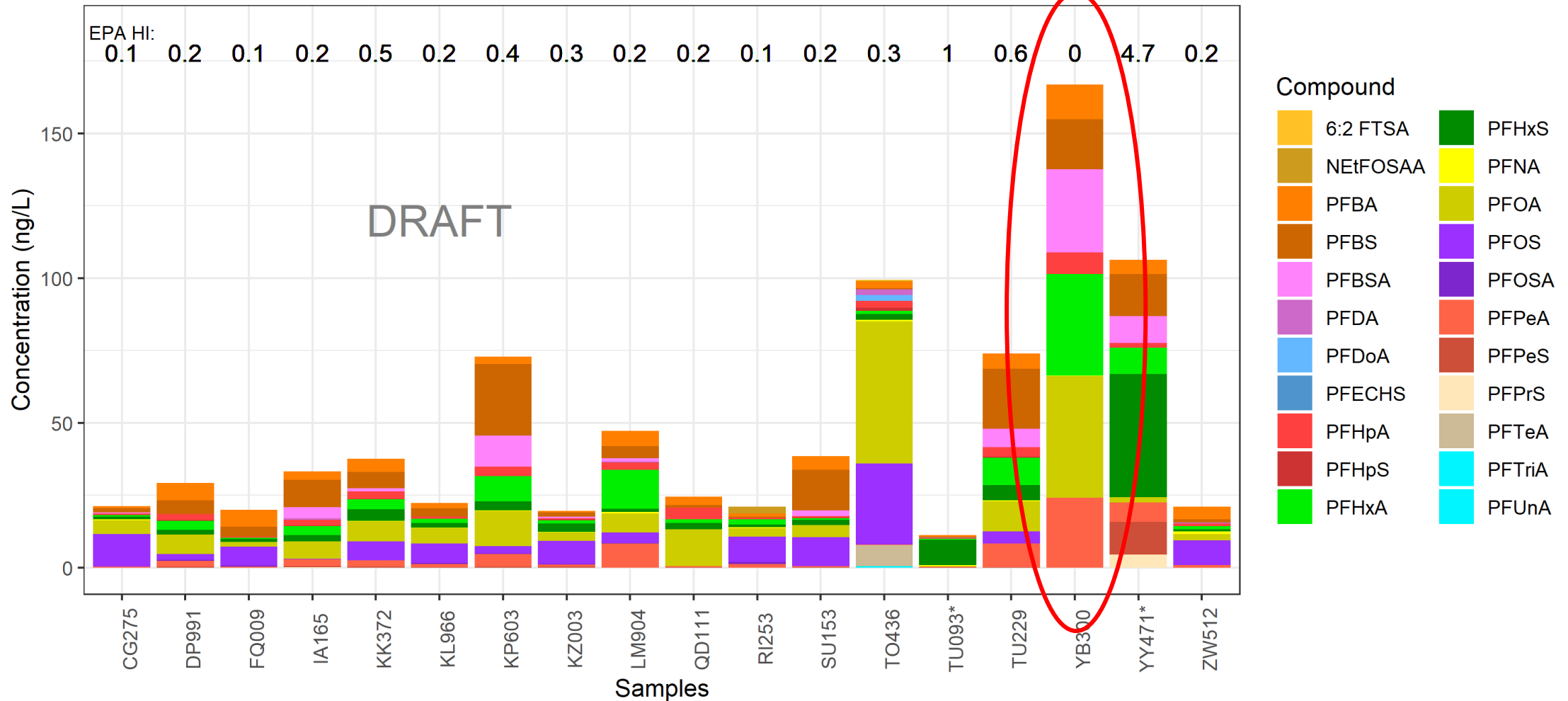
18 out of 19 project samples above the EPA proposed MCLs (not shown: EJ981)



*HI only, PFOA and PFOS both less than 4 ng/L

Samples above proposed EPA PFAS MCLs

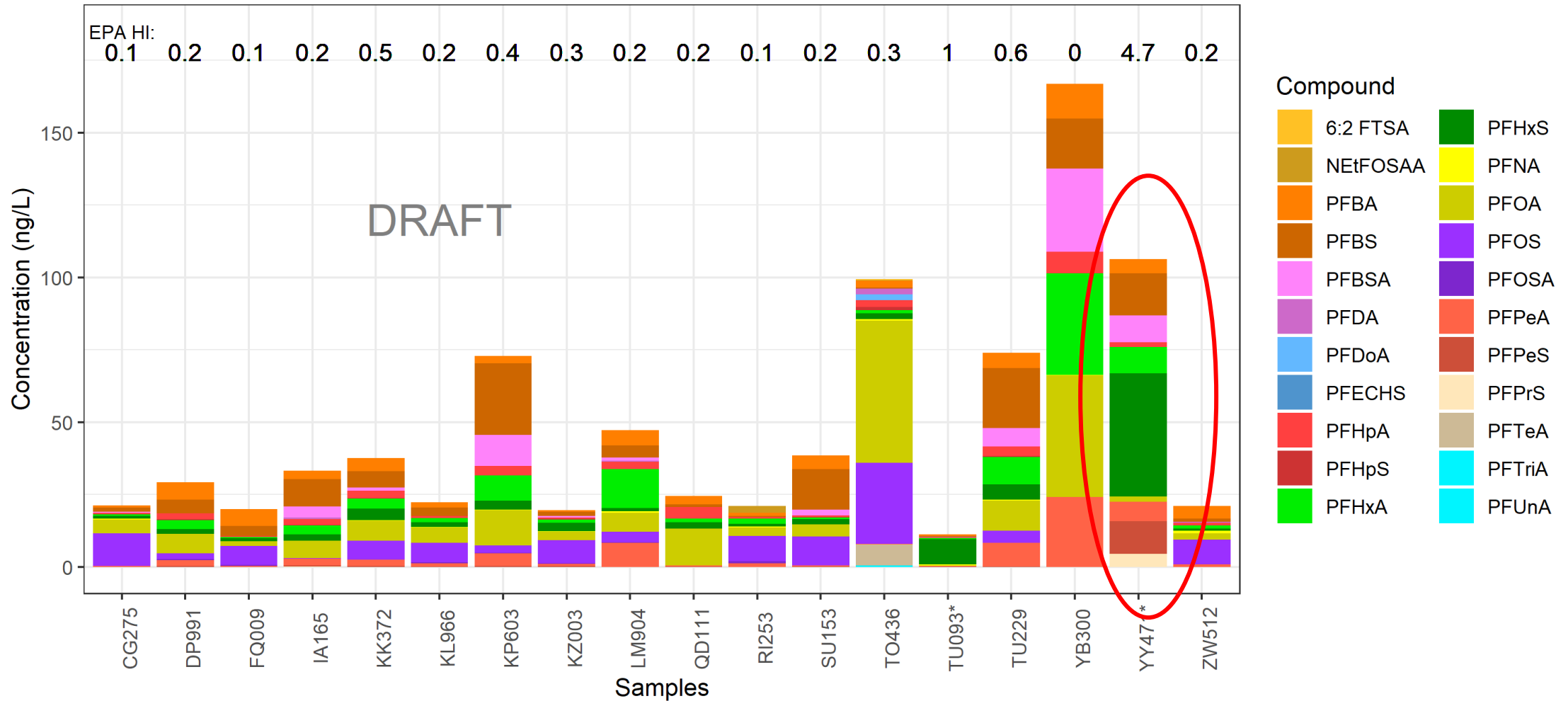
18 out of 19 project samples above the EPA proposed MCLs (not shown: EJ981)



*HI only, PFOA and PFOS both less than 4 ng/L

Samples above proposed EPA PFAS MCLs

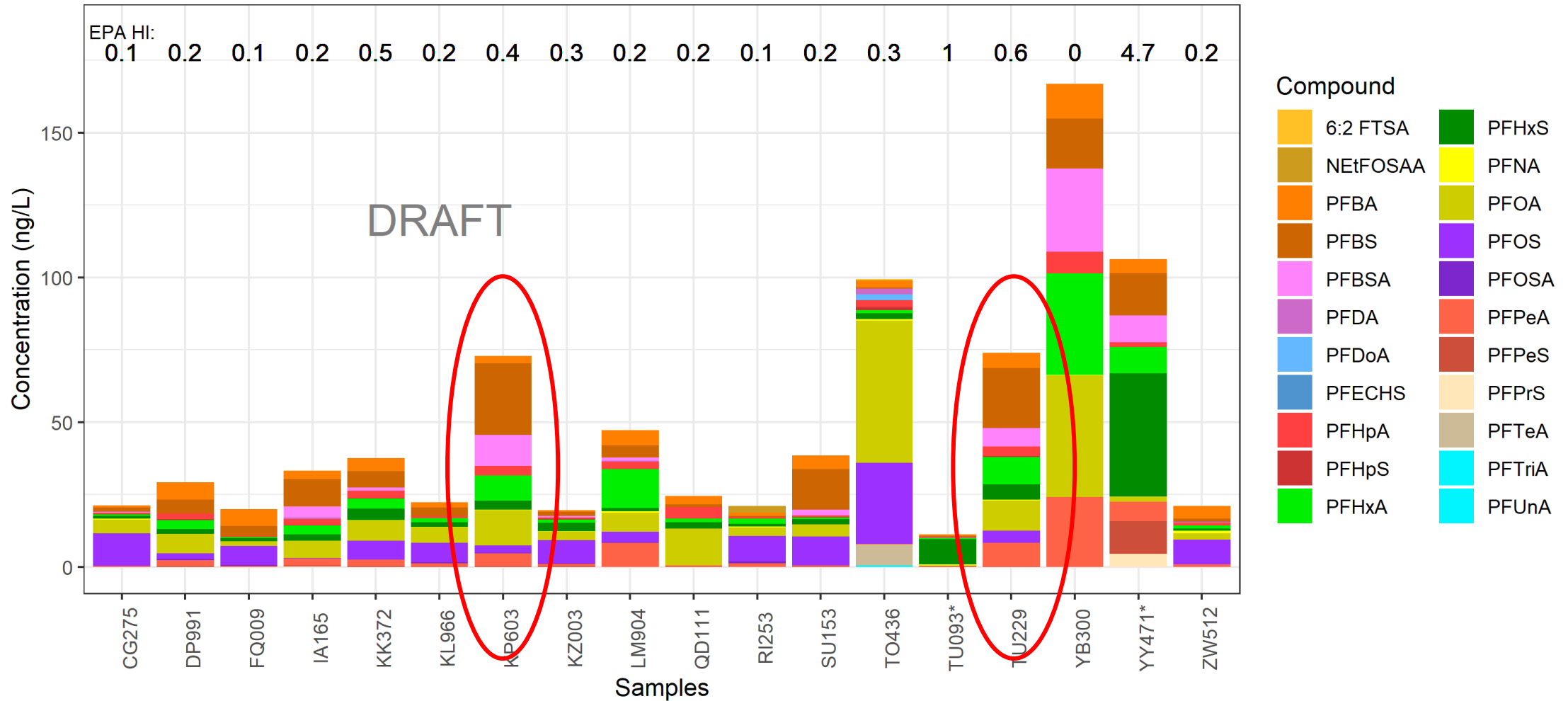
18 out of 19 project samples above the EPA proposed MCLs (not shown: EJ981)



*HI only, PFOA and PFOS both less than 4 ng/L

Samples above proposed EPA PFAS MCLs

18 out of 19 project samples above the EPA proposed MCLs (not shown: EJ981)



*HI only, PFOA and PFOS both less than 4 ng/L

Summary and preliminary findings

- PFAS detected in 71% of samples but only 4% were above proposed EPA MCLs for PFAS (1% above WI DHS public health guidance levels)
 - Reminder: samples from homes with “shallow” wells
- Human waste indicators and developed land use correlated with PFAS occurrence
 - **Septic systems** appear to be a likely source of PFAS to groundwater
- Overall, agricultural tracers and agricultural land not closely related with PFAS occurrence
- Developed areas more frequently have above-median concentrations than agricultural or forested areas, but 3 of 4 highest PFAS concentrations found in agricultural areas where land application of waste is permitted

Web Site:

PFAS AMBIENT SHALLOW GROUNDWATER STUDY

<https://dnr.wisconsin.gov/topic/Groundwater/PFASStudy.html>

Study Mailbox:

DNRDGPFASGWSTUDY@wisconsin.gov

Paper in Environmental Science & Technology:

Prevalence and Source Tracing of PFAS in Shallow Groundwater Used for Drinking Water in Wisconsin, USA

Matthew Silver, William Phelps, Kevin Masarik, Kyle Burke, Chen Zhang, Alex Schwartz, Miaoyan Wang, Amy L. Nitka, Jordan Schutz, Tom Trainor, John W. Washington, and Bruce D. Rheineck**

Environ. Sci. Technol. 2023, 57, 45, 17415–17426

Study Data – WI DNR Open Data Portal:

<https://data-wi-dnr.opendata.arcgis.com/explore?query=shallow%20well%20pfas>

Questions?

Break

Member Roundtable

Chris Groh | Wisconsin Rural Water Association

Camille Danielson | Wisconsin State Lab of Hygiene

Lawrie Kobza | Municipal Environmental Group

Paul Junio | Pace Labs

Jeff Kramer | Wisconsin Well Water Association

John Richmond | Wisconsin Section – American Waterworks Association

Sarah Yang | Department of Health Services

Rick Wietersen | Wisconsin Association of Local Health Departments and Boards

Craig Summerfield | Wisconsin Manufacturers & Commerce

Sara Walling | Clean Wisconsin

Internal Updates

Drinking Water and Groundwater Administrative Rules Update



NR 811 – Community Water System Design and Operation

- Final approval was granted at the Natural Resources Board meeting April 12, 2023
- Legislative committee did not call for a hearing
- Rule changes went into effect on Feb. 1, 2024

Drinking Water and Groundwater Administrative Rules Update



NR 140 – Groundwater Standards

- PFAS groundwater standards (4 PFAS): Final Economic Impact Analysis (EIA) indicated the rule change impact would exceed \$10 million in any 2-year period
- Rule draft and EIA were submitted to the legislature
- DNR must wait for the legislature to authorize additional work under this scope
- Considering proposing a new scope statement that would include additional PFAS recommended by DHS

Drinking Water and Groundwater Administrative Rules Update



NR 809 – Lead and Copper Rule

- Proposed scope statement that would incorporate 2021 LCRR and anticipated 2024 final LCRI
- Preliminary public hearing on the scope statement was held January 9, 2024
- Will be asking for approval of the scope statement at the February 28, 2024 Natural Resources Board meeting
- Note: DNR provided comments to EPA on the proposed Lead and Copper Rule Improvements by the Feb. 5th, 2024 deadline

Drinking Water and Groundwater Administrative Rules Update



NR 812 – Well and Pump Code

- Revision to allow limestone cement took effect on Nov. 1
- A scope statement related to pump installation was approved at the September, 2023 Natural Resources Board (NRB) meeting

NR 146 – Driller and Pump Installer Licensing Code

- A scope statement related to licensing and continuing education requirements was approved at the September, 2023 NRB meeting

Drinking Water and Groundwater Administrative Rules Update



NR 851 – Great Lakes Diversions

- Code revisions were approved by the NRB in January, 2024
- The rule package is with the legislature awaiting final approval

NR 854 – Water Supply Service Area Planning

- Code revisions were approved by the NRB in January, 2024
- The rule package is with the legislature awaiting final approval

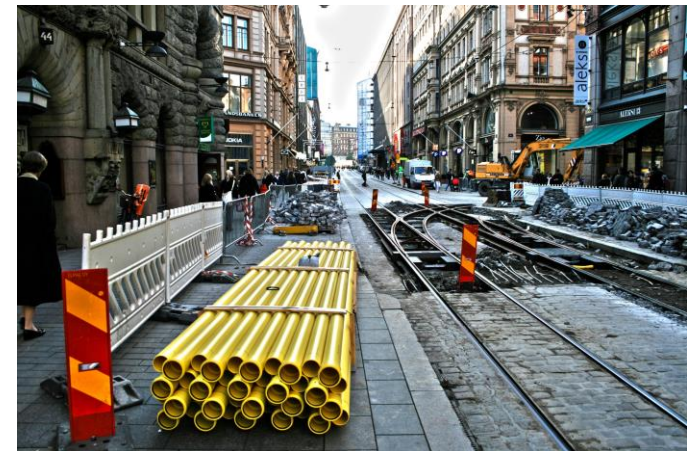
DG Budget Update

Dive Inspection of Finished Water Storage

- 5-Year Requirement for Water Storage Inspection, s. NR 810.14. Every other inspection may be dive, float down/partial drain, or robotic, in lieu of full drain down inspection.
- s. NR 810.14(2)(c) requires that dive inspections comply with Section 4.4 of AWWA Standard C652-02, including dry suits and disinfection.
- DNR has received a credible complaint about dive inspections conducted in violation of standards in Wisconsin.
 - Alleged use of wet suits, not dry suits, inside finished water tank.
 - Alleged improper disinfection or no disinfection of diver and equipment.
- DNR is working with a dive inspection expert to provide training for DNR staff and water system operators.
- Please help us spread the word to ensure fully compliant dive inspections.

ARPA Well Compensation **Update**

- \$10,000,000 allocated from America Recovery Plan Act (ARPA)
- Contaminated wells and well filling and sealing
- Expanded eligibility requirements
 - Additional contaminants – ex. Nitrate, bacteria, PFAS
 - Non-Community Public Water Systems
 - Increased income eligibility
- Program is expected to allocate all funds early
 - Program was slated to end December 2024



ARPA Well Compensation **Update**

Data as of 10/12/2023	American Rescue Plan Act (ARPA) Well Compensation Grant Statistics	
Grant Type	Well Compensation	Well Abandonment
Private Well Applications	329	143
Non-Community Well Applications	<u>60</u>	<u>4</u>
Applications Received	389	147
Contaminants Reported for Awarded Grants		
Contaminant	Well Compensation	Well Abandonment
Nitrate	192	N/A
Arsenic	17	N/A
PFAS	13	N/A
Other Contaminant	<u>31</u>	N/A
Awards Issued	253	N/A
	Well Compensation and Well Abandonment	Remaining Balances
Grant Awards (estimated obligation)	\$4,449,254.43	\$4,935,745.57

1/22/2024	American Rescue Plan Act (ARPA) Well Compensation Grant Statistics	
Grant Type	Well Compensation	Well Abandonment
Private Well Applications	410	171
Non-Community Well Applications	<u>72</u>	<u>4</u>
Applications Received	482	175
Contaminants Reported for Awarded Grants		
Contaminant	Well Compensation	Well Abandonment
Nitrate	251	N/A
Arsenic	22	N/A
PFAS	18	N/A
Other Contaminant	<u>49</u>	N/A
Awards Issued	340	N/A
	Well Compensation and Well Abandonment	Remaining Balances
Grant Awards (estimated obligation)	\$6,265,485.47	\$3,119,514.53

ARPA Well Compensation **Update**

IMPORTANT MESSAGE REGARDING PROGRAM FUNDING: It is now anticipated that all funding for the ARPA Well Compensation Grant Program will be awarded by Spring of 2024. Once funding is exhausted, the DNR will maintain a waiting list of approved applications. If funds become available, DNR will issue additional grant awards from the waiting list up to the December 6, 2024 deadline. Some previously awarded ARPA Well Grants may end up with actual costs that are less than originally estimated, leaving residual grant money available after the grant is closed out. DNR will immediately use these leftover funds to issue awards to applicants on the waiting list.

[American Rescue Plan Act of 2021 \(ARPA\) | | Wisconsin DNR](#)

PFAS Compliance Sampling **Update**

All data is available publicly online

- [Drinking Water System Portal: Home Page \(wi.gov\)](https://www.wisconsin.gov/dnr/water/water-quality/pfas)
- [PFAS Interactive Data Viewer | Wisconsin DNR](#)

SUMMARY OF PFAS DATA

- 1,890 PWSs are required to sample for PFAS
- As of 1/22/24, 1,860 PWSs have submitted samples
- 565 PWSs (30%) had a PFAS detect (>limit of detection)
- 32 PWSs (2%) have exceeded the DHS HI ≥ 1 and required a public notice to all customers
- 1 PWS has an MCL violation (based on annual average of PFOA+PFOS >70 ppt)
- 89 PWSs would exceed EPA's proposed MCLs (5% of PWSs)
- 30 PWSs still need to submit samples (3 from 3rd quarter)

PFAS Compliance Sampling **Update**



EPA PROPOSED PFAS MCLs

- EPA's proposed PFAS MCL exceedances are:
 - PFOA >4.0 ng/L
 - PFOS >4.0 ng/L
- EPA's proposed Hazard Index is:
$$\left(\frac{PFBS}{2,000 \text{ ppt}}\right) + \left(\frac{PFHxS}{9 \text{ ppt}}\right) + \left(\frac{Gen X}{10 \text{ ppt}}\right) + \left(\frac{PFNA}{10 \text{ ppt}}\right)$$
- An HI >1.0 would exceed the MCL

PFAS Compliance Sampling **Update**

- EPA expected to finalize proposed standards March 2024
- DNR required to adopt federal rule – estimated timeline mid 2026
- DNR developing communications and roll out plan which will include:
 - Press release
 - GovDelivery Email
 - Targeted communications to systems that will be impacted
 - Timelines
 - Funding availability
 - Risk communication information

PFAS Compliance Sampling **Update**

- **Funding Availability for Impacted Systems**
 - Federal Bipartisan Infrastructure Law (BIL) provides PFAS specific grant and loan money for impacted public water systems.
 - For municipal systems, this money is available through the Safe Drinking Water Loan Program - [Safe Drinking Water Loan Program Summary \(wisconsin.gov\)](https://www.wisconsin.gov/dnr/water/programs/sdwlp)
 - For Other-than-Municipal community (OTM) and non-profit Non-Transient Non-Community (NN) systems grant money is available through our EC-SDC program - [EC-SDC Grant Program for OTM / Non-Profit NN Systems | Emerging Contaminants-Small or Disadvantaged Communities Grant Program for Other-than-Municipal/Non-Profit Non-transient Non-community Public Water Systems | Wisconsin DNR](https://www.wisconsin.gov/dnr/water/programs/ec-sdc)

CONNECT WITH US

Next Meeting | May 2, 2024

The meeting recording will be posted on the Drinking Water and Groundwater Study Group webpage.



/WIDNR



@WIDNR



@WI_DNR



/WIDNRTV



"WILD WISCONSIN:
OFF THE RECORD"