Iowa Department of Natural Resources

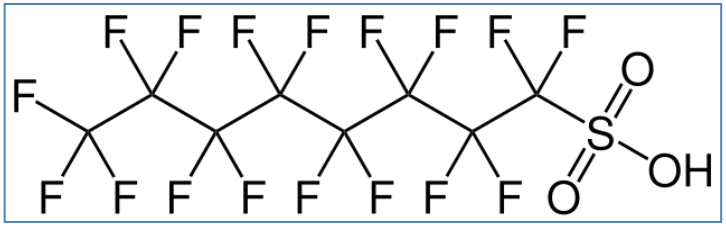
Leading Iowans in caring for our natural resources

Iowa DNR's PFAS Action Plan – Tiers 1, 2, and 3

Matthew Graesch
Iowa DNR

- Background
- Overview of DNR’s PFAS Action Plan
- Tiers 1 and 2 selection
- Results
- Water Supply Protocol
- Contaminated Sites Protocol
- Tier 3 selection
- Wrap-up and Questions

PFAS: Background

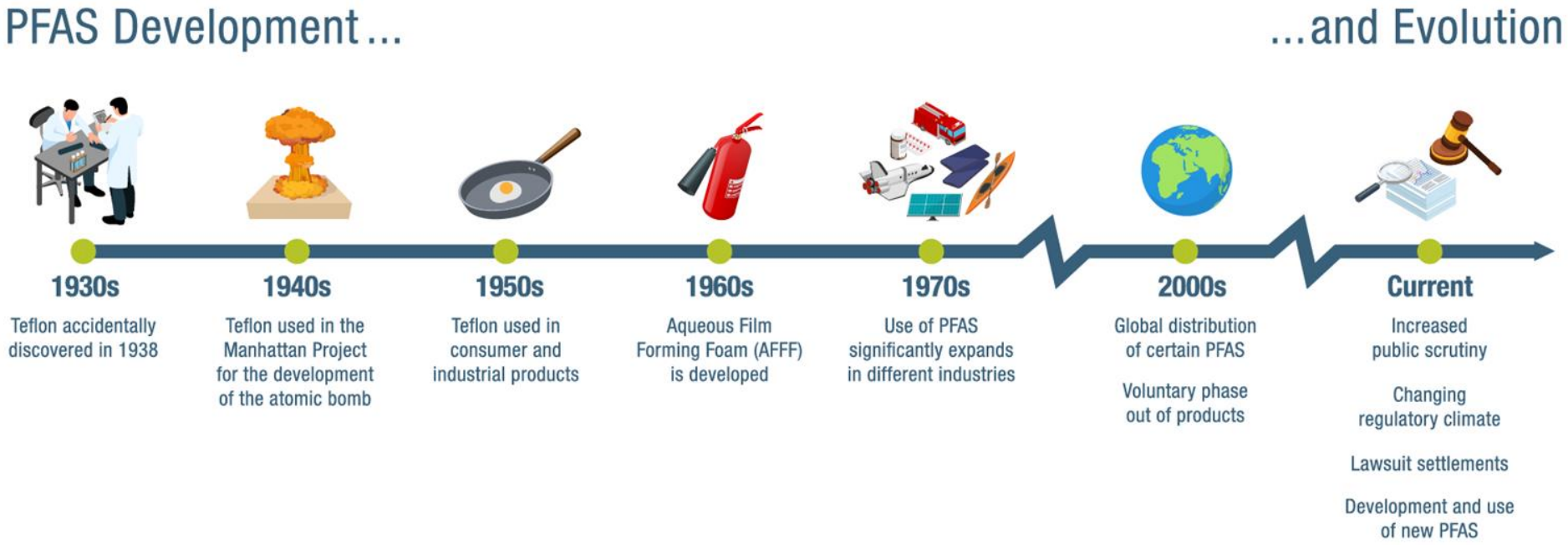


Per and poly-fluoro alkyl substances (PFAS)

- More than 5,000 compounds
- Persistent in environment
  - Do not degrade
  - C-F bond is one of the strongest known
  - Accumulates in the environment and in people
- Mobile - atmosphere, surface water, soil, etc.
- Chronic exposure is considered a health risk
  - Known or suspected toxicity, especially for PFOS and PFOA
  - Very long half-lives (several years) in humans

Where do PFAS chemicals come from?

- PFAS chemicals are man-made and used in many applications since the 1940s



PFAS: Health Effects

Studies in humans with PFAS exposure have shown that certain PFAS may:

- Affect growth, learning, and behavior of infants and older children
- Interfere with ability to become pregnant
- Increase cholesterol levels
- Increase cancer risk
- Affect the immune system
- Potential concern with pancreatic, thyroid, and liver function interference

– Until June 2022, EPA health advisory was 70 ppt for PFOA+PFOS

– Current EPA health advisories:

- Interim updated Health Advisory for PFOA = 0.004 parts per trillion (ppt)
- Interim updated Health Advisory for PFOS = 0.02 ppt
- Final Health Advisory for GenX chemicals = 10 ppt
- Final Health Advisory for PFBS = 2,000 ppt

DNR Action Plan

- Focus Area 1: Identify and Minimize Exposure of Iowans to PFAS in Public Drinking Water

Initial Actions Taken

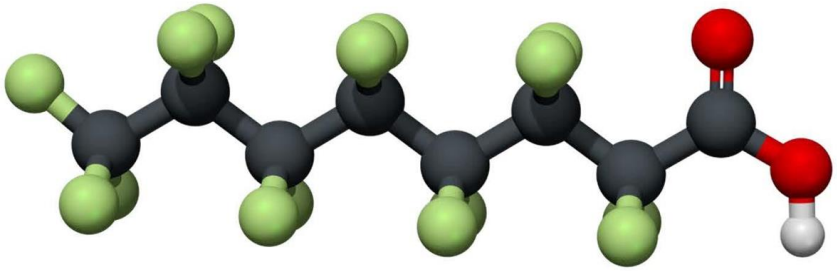
- Developed a surveillance project to evaluate the presence of PFAS in Iowa drinking water
- Used a phased approach prioritizing testing of public drinking water systems
- Developed protocols
- Data driven decisions

IOWA DEPARTMENT OF NATURAL RESOURCES

LEADING IOWANS IN CARING FOR OUR NATURAL RESOURCES

KAYLA LYON, DIRECTOR

PFAS Action Plan



An example of a family of Perfluoroalkyl Substances: Perfluorooctanoic acid

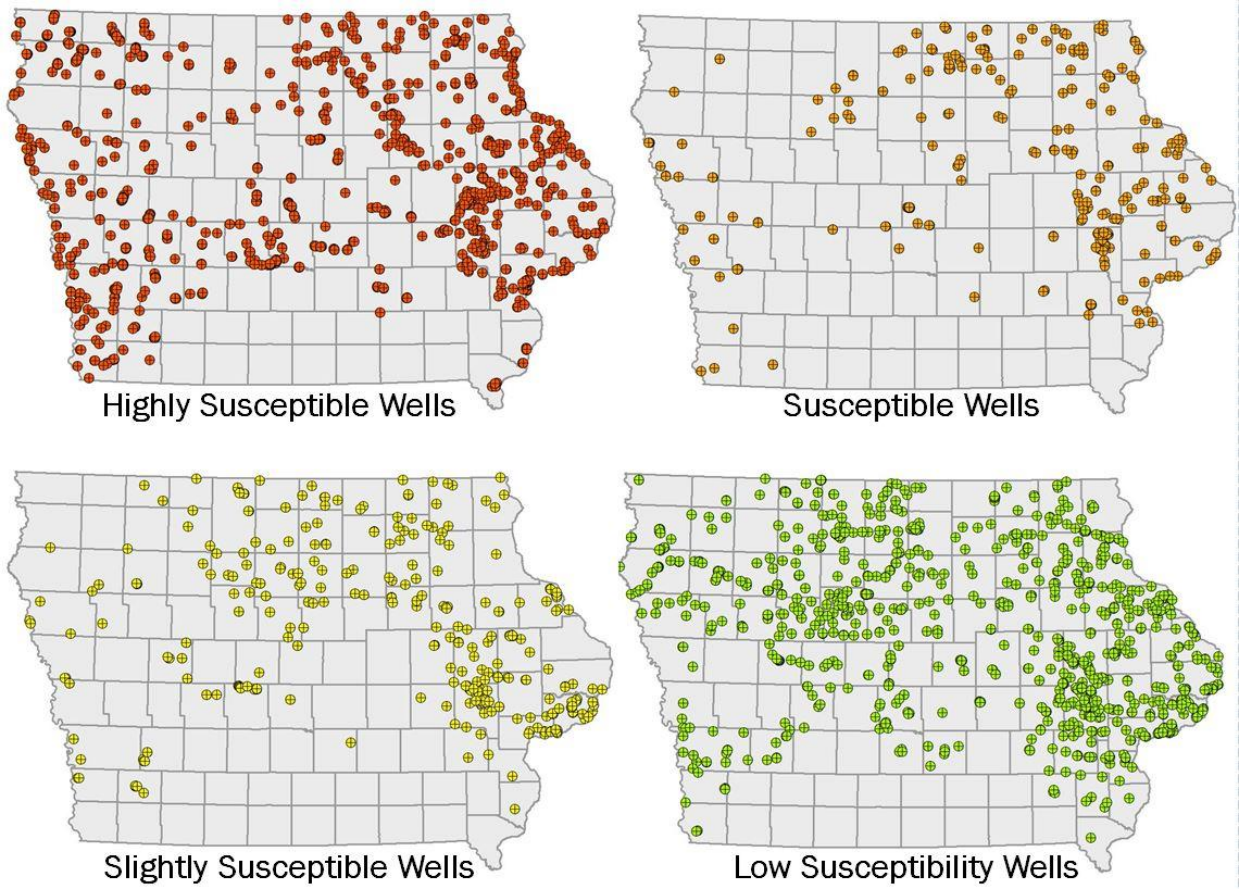
January 23, 2020

PFAS Action Plan Website and Documents

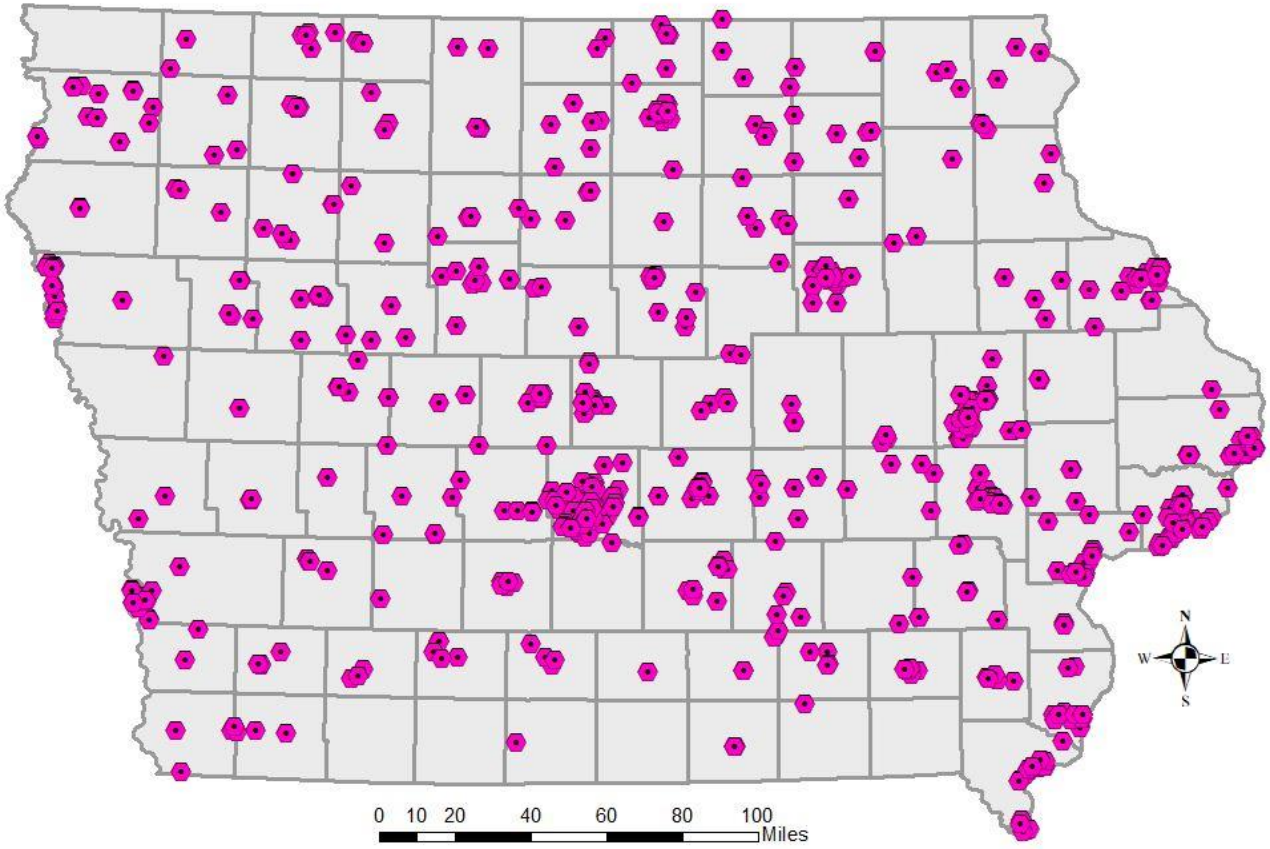
- Action Plan
- Draft Strategy for Sampling = development of tier ranking system
- Sampling Plan and SOP
- Water Supply Protocol
- Contaminated Sites Protocol
- PFAS Dashboard

Well Prioritization

- All active public wells in Iowa (~7,150) were grouped according to previously-assessed susceptibility to surficial impacts.
- Only wells in the "Highly Susceptible" classification (~1,300) were considered for inclusion in the Tier 1 list of potential locations for PFAS sampling.

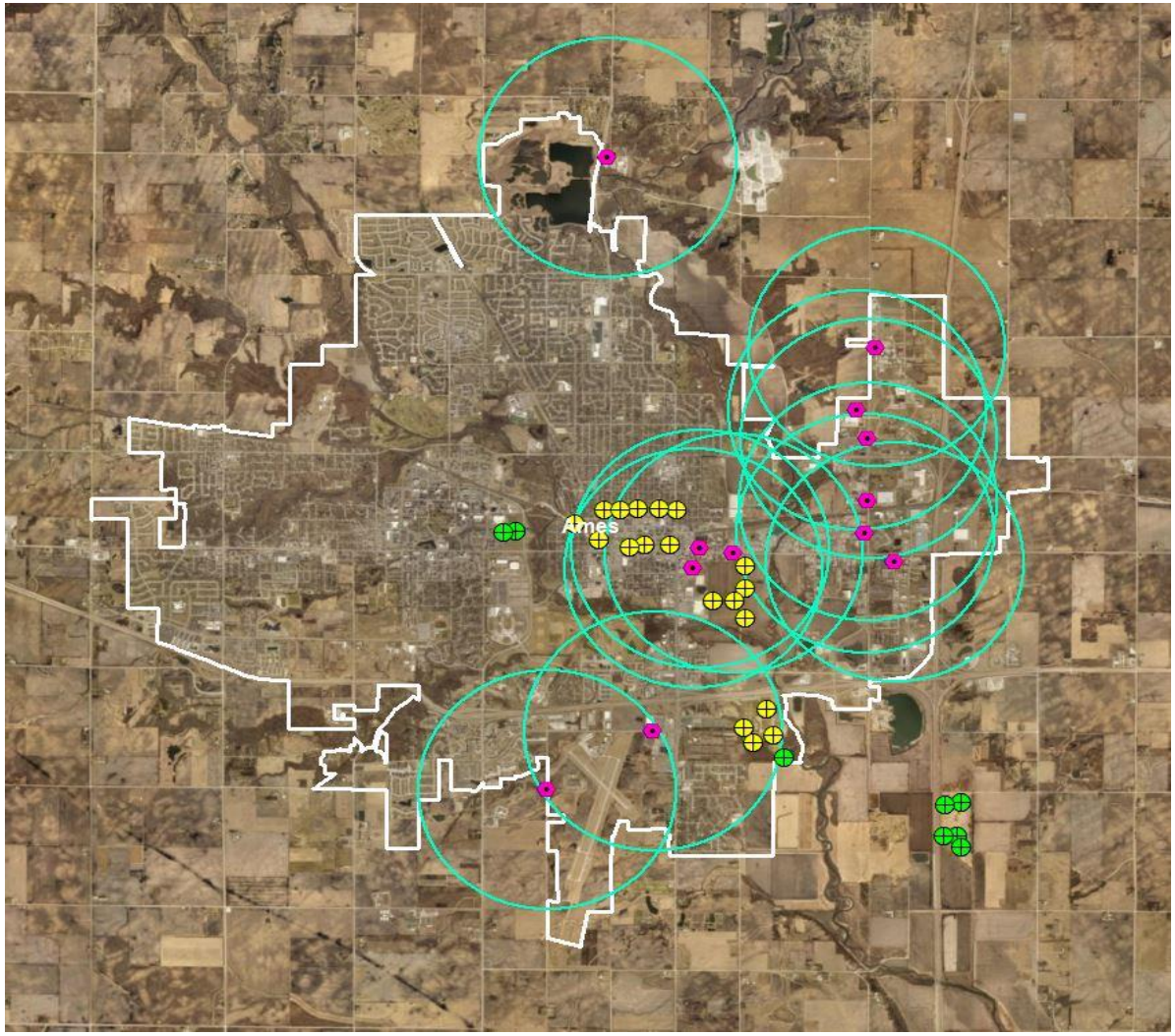


Potential Sources

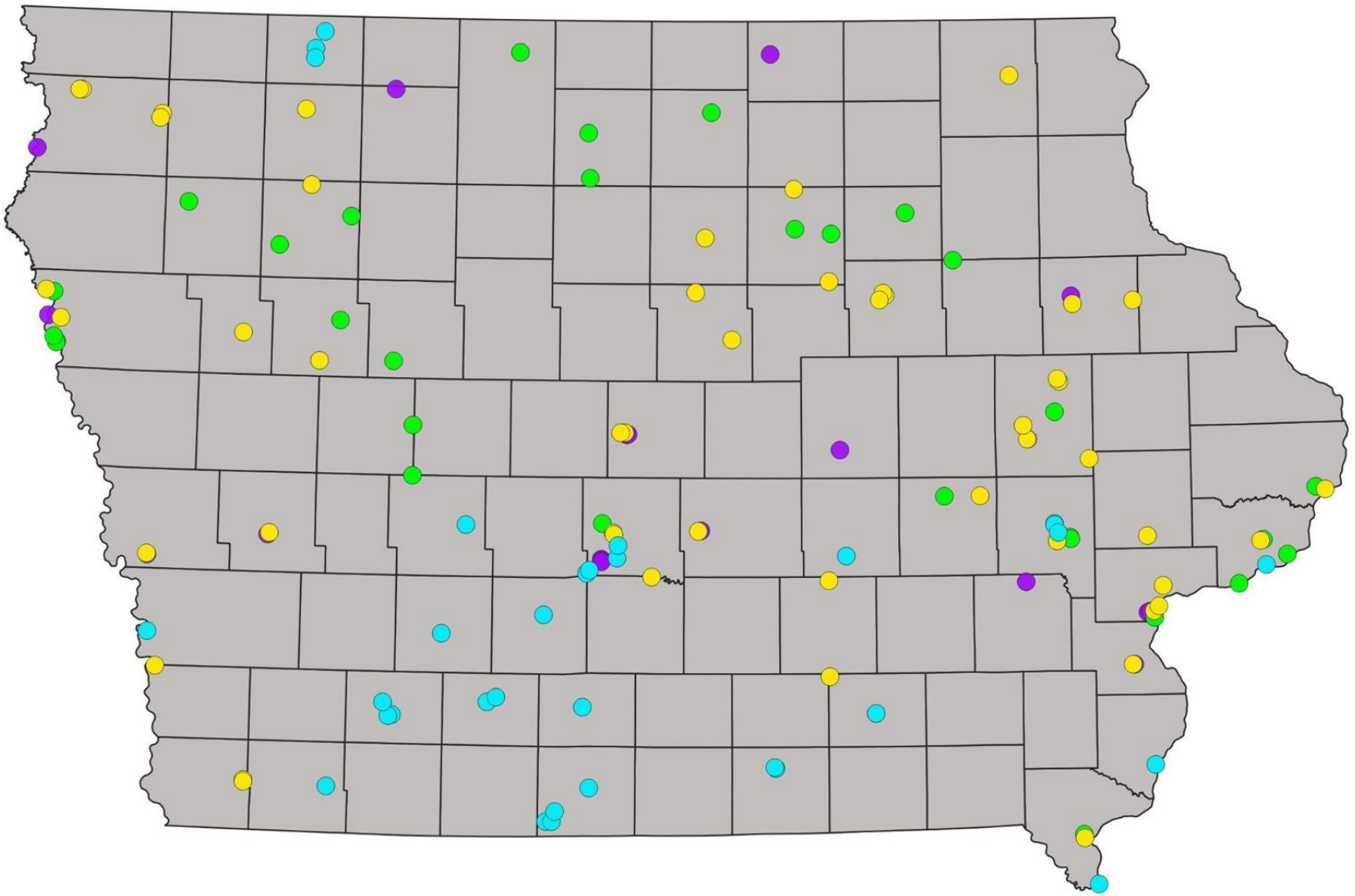


- Queries of EPA Databases revealed ~1,000 potential locations where PFAS chemicals may be stored and/or used.

Well Selection: Vulnerability and Proximity



Map of Tiers 1, 2, and 3 sites



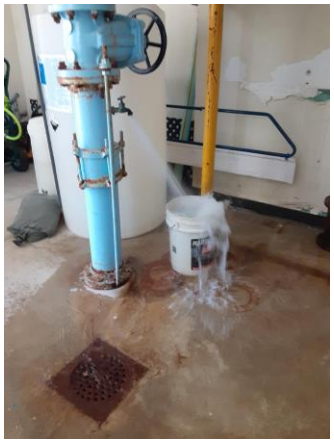
PANORA

SLOAN

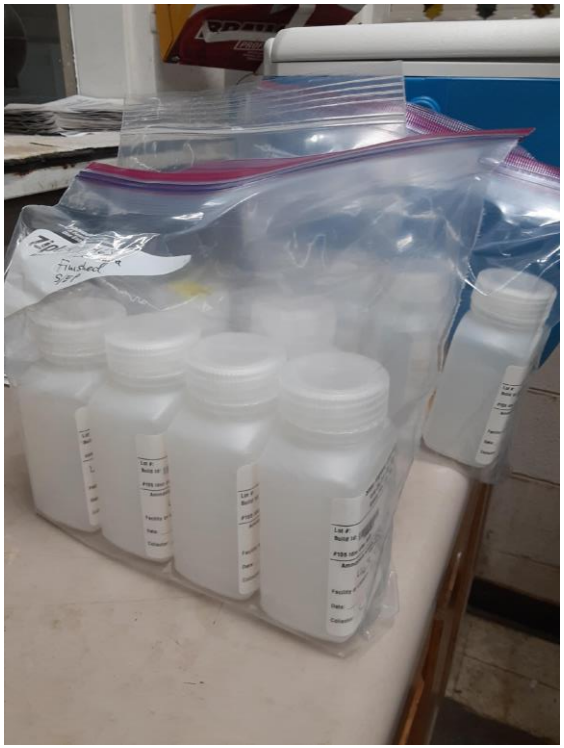
RUSSELL

KEOKUK

Sampling Plan



- Samples were taken from each Tier 1+2 site pre-treatment and finished water
  - Representative sample within normal pumping rates
  - Pumps run for 30 minutes, taps flushed prior to collection
  - Surface water samples through sample tap or direct sample
  - Sampling scheduled with water operators and used to help train for future sampling by water supply, if necessary



- Standard Operating Procedure (SOP)
  - PFAS-free clothing, personal-care products, PPE, etc.
  - No food or food packaging within the sampling zone
  - Bottles provided by lab
  - Clean-hands/Dirty-hands protocol (2 sample collectors)
  - New powderless nitrile gloves for each sample
  - Labeled bottles and chain-of-custody with ultra-fine sharpies
  - Sample bottles placed in Zip-loc bags, placed on ice, and shipped

DNR

Specials of the week
(Especiales de la semana)
Lunch: Taco Salad
beef or chicken $6.00
Almuerzo: Taco Salad de $6.00
Carne o pollo
Dinner: Quesadilla
With chorizo and steak or chicken. Served with rice, lettuce, sour cream & pico de gallo.
Cena: Quesadilla $9.75
de chorizo con pollo asado o carne asada, con arroz, lechuga, crema, & pico de gallo.
$9.75

Quality Assurance

- 1 field blank per sample location
- 1 duplicate per finished water sample

Results!

Step 1: Check lab report for quality control

Step 2: Call operator

Step 3: Email operator/FO/Water Supply results

Step 4: Authorize release of data to SDWIS

Step 5: Data posted on interactive map

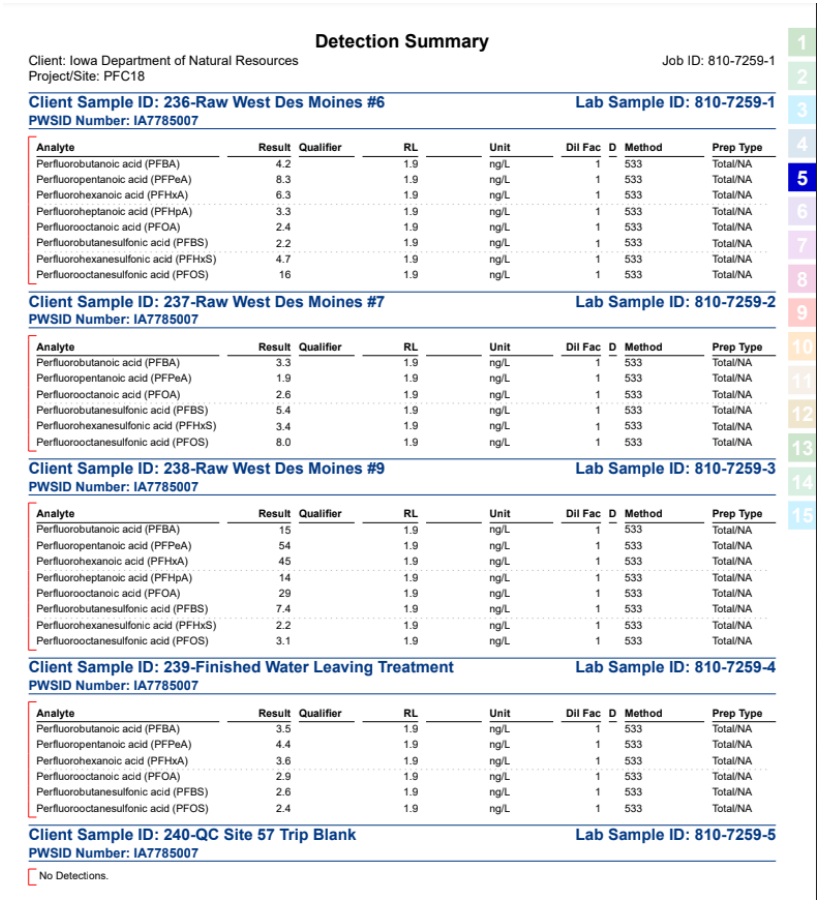
Step 6: Deal with media requests

Repeat steps 1 – 6 for each community

Step 7: Compile results

Step 8: Analysis

Step 9: Reporting



Detection Summary

Client: Iowa Department of Natural Resources
Project/Site: PFC18

Job ID: 810-7259-1

Client Sample ID: 236-Raw West Des Moines #6 — **Lab Sample ID: 810-7259-1**
PWSID Number: IA7785007

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	4.2		1.9	ng/L	1		533	Total/NA
Perfluoropentanoic acid (PFPeA)	8.3		1.9	ng/L	1		533	Total/NA
Perfluorohexanoic acid (PFHxA)	6.3		1.9	ng/L	1		533	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.3		1.9	ng/L	1		533	Total/NA
Perfluorooctanoic acid (PFOA)	2.4		1.9	ng/L	1		533	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.2		1.9	ng/L	1		533	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.7		1.9	ng/L	1		533	Total/NA
Perfluorooctanesulfonic acid (PFOS)	16		1.9	ng/L	1		533	Total/NA

Client Sample ID: 237-Raw West Des Moines #7 — **Lab Sample ID: 810-7259-2**
PWSID Number: IA7785007

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	3.3		1.9	ng/L	1		533	Total/NA
Perfluoropentanoic acid (PFPeA)	1.9		1.9	ng/L	1		533	Total/NA
Perfluorooctanoic acid (PFOA)	2.6		1.9	ng/L	1		533	Total/NA
Perfluorobutanesulfonic acid (PFBS)	5.4		1.9	ng/L	1		533	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.4		1.9	ng/L	1		533	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.0		1.9	ng/L	1		533	Total/NA

Client Sample ID: 238-Raw West Des Moines #9 — **Lab Sample ID: 810-7259-3**
PWSID Number: IA7785007

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	15		1.9	ng/L	1		533	Total/NA
Perfluoropentanoic acid (PFPeA)	54		1.9	ng/L	1		533	Total/NA
Perfluorohexanoic acid (PFHxA)	45		1.9	ng/L	1		533	Total/NA
Perfluoroheptanoic acid (PFHpA)	14		1.9	ng/L	1		533	Total/NA
Perfluorooctanoic acid (PFOA)	29		1.9	ng/L	1		533	Total/NA
Perfluorobutanesulfonic acid (PFBS)	7.4		1.9	ng/L	1		533	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.2		1.9	ng/L	1		533	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.1		1.9	ng/L	1		533	Total/NA

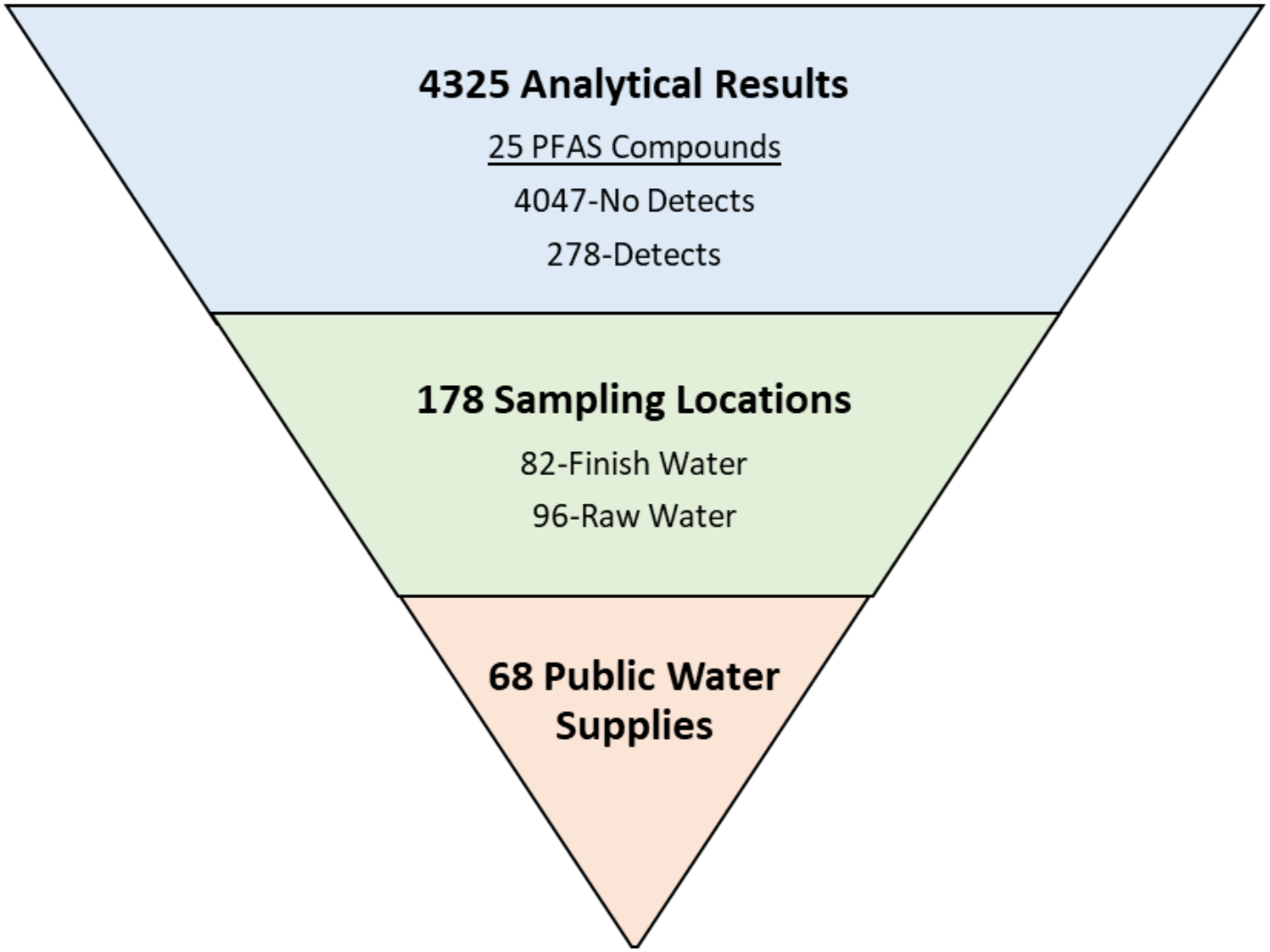
Client Sample ID: 239-Finished Water Leaving Treatment — **Lab Sample ID: 810-7259-4**
PWSID Number: IA7785007

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	3.5		1.9	ng/L	1		533	Total/NA
Perfluoropentanoic acid (PFPeA)	4.4		1.9	ng/L	1		533	Total/NA
Perfluorohexanoic acid (PFHxA)	3.6		1.9	ng/L	1		533	Total/NA
Perfluorooctanoic acid (PFOA)	2.9		1.9	ng/L	1		533	Total/NA
Perfluorobutanesulfonic acid (PFBS)	2.6		1.9	ng/L	1		533	Total/NA
Perfluorooctanesulfonic acid (PFOS)	2.4		1.9	ng/L	1		533	Total/NA

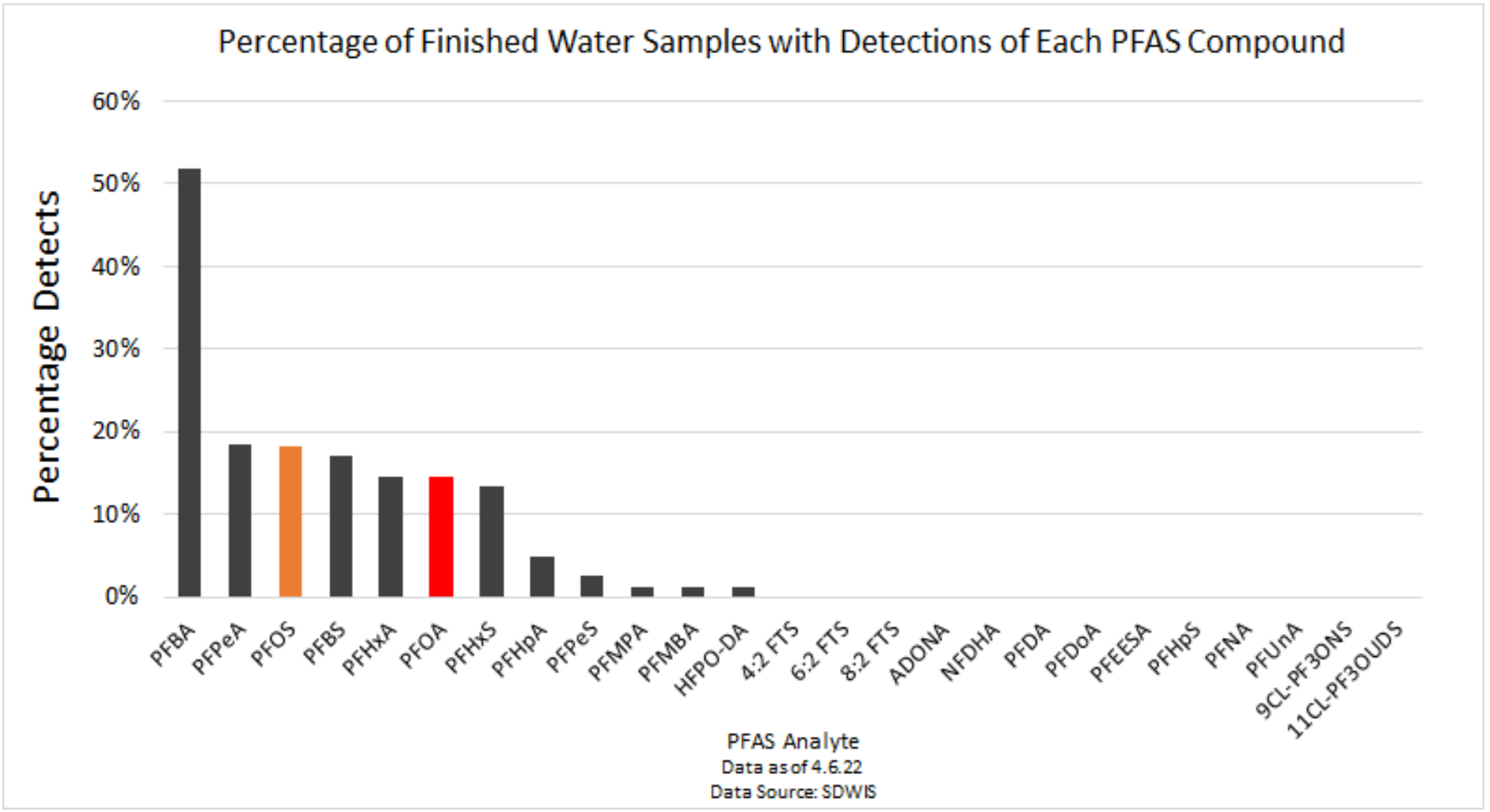
Client Sample ID: 240-QC Site 57 Trip Blank — **Lab Sample ID: 810-7259-5**
PWSID Number: IA7785007

No Detections.

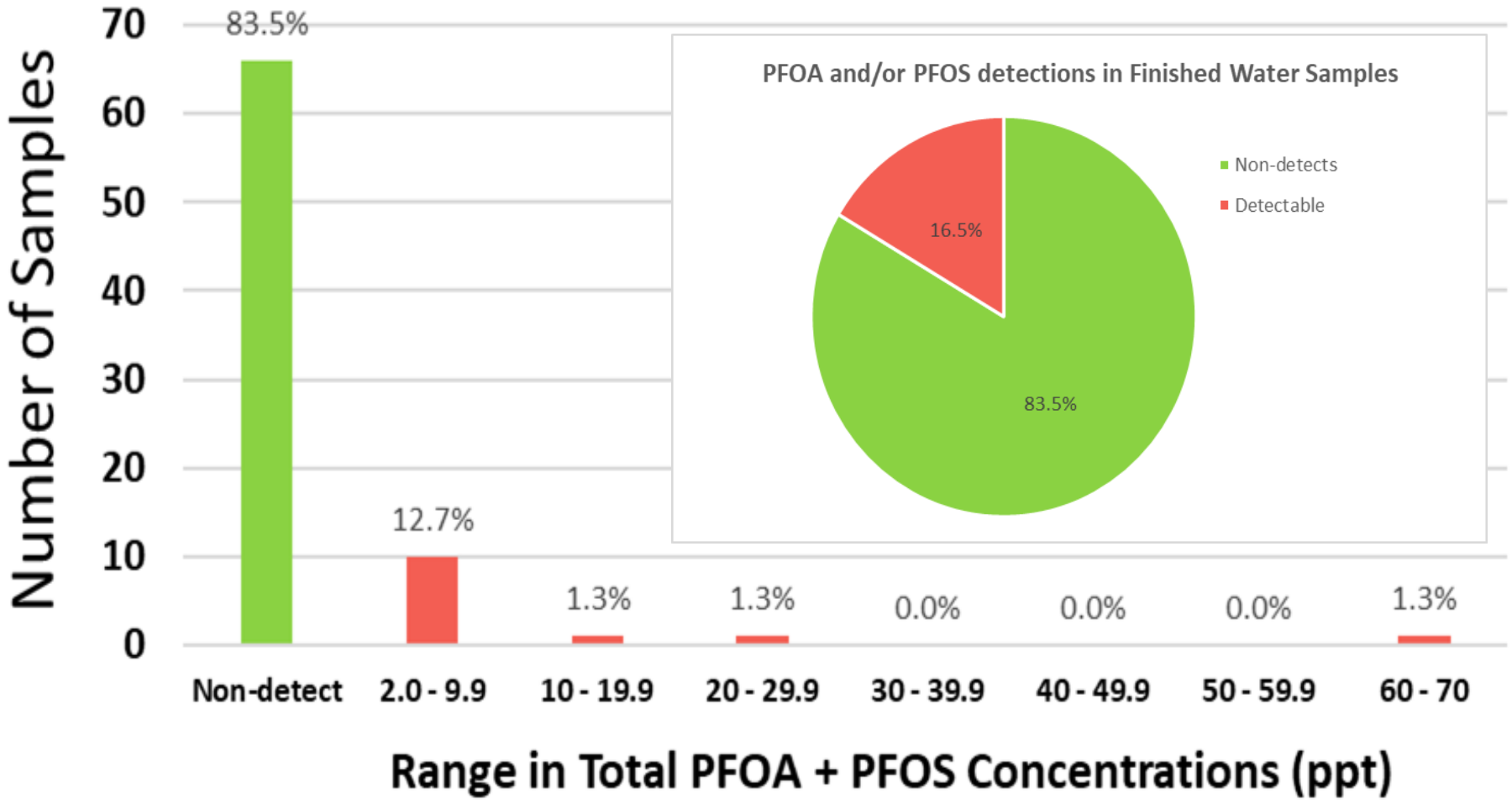
Tiers 1 and 2: Summary (October 2021 - February 2022)



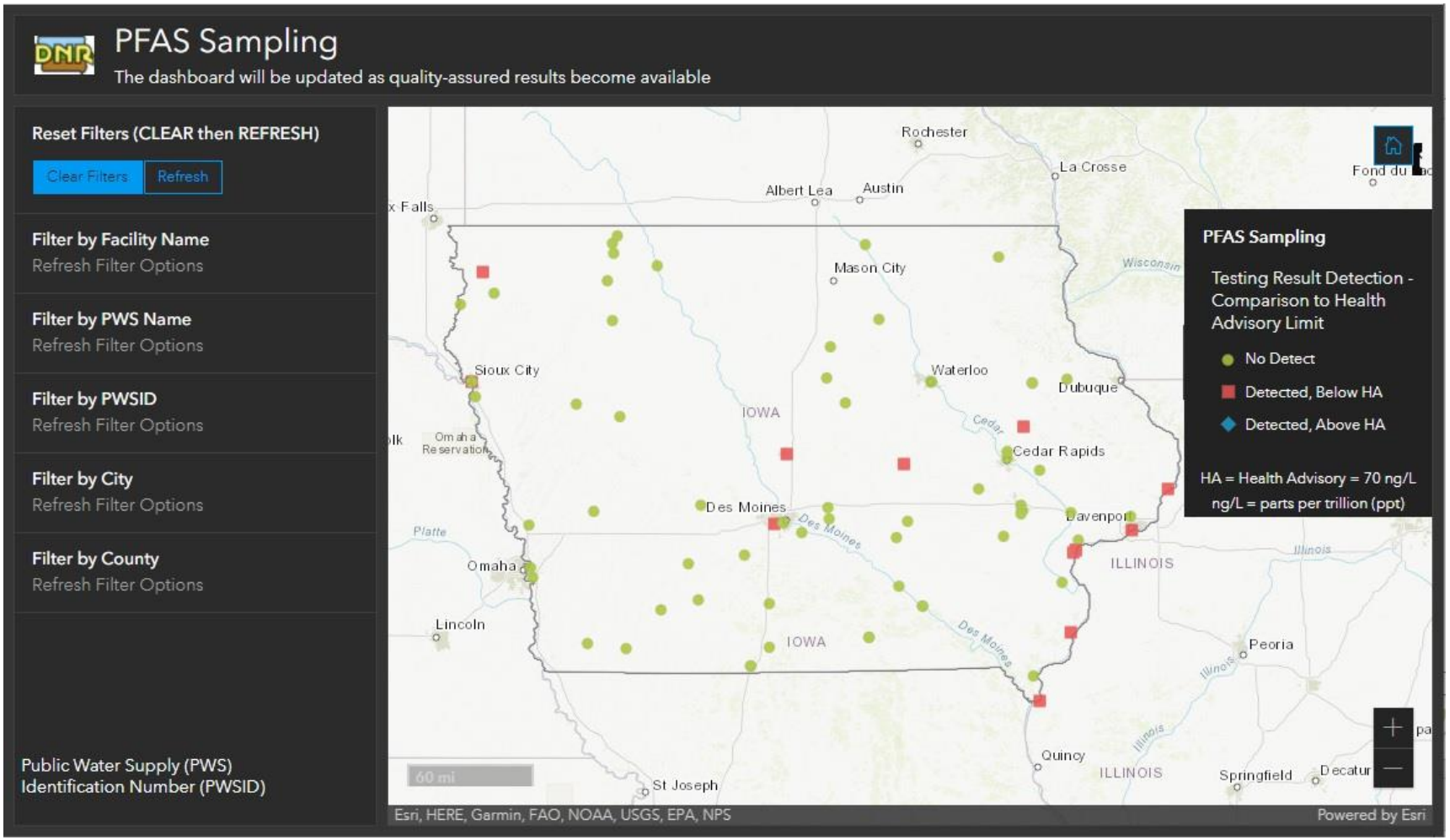
PFAS Detections in Finished Water



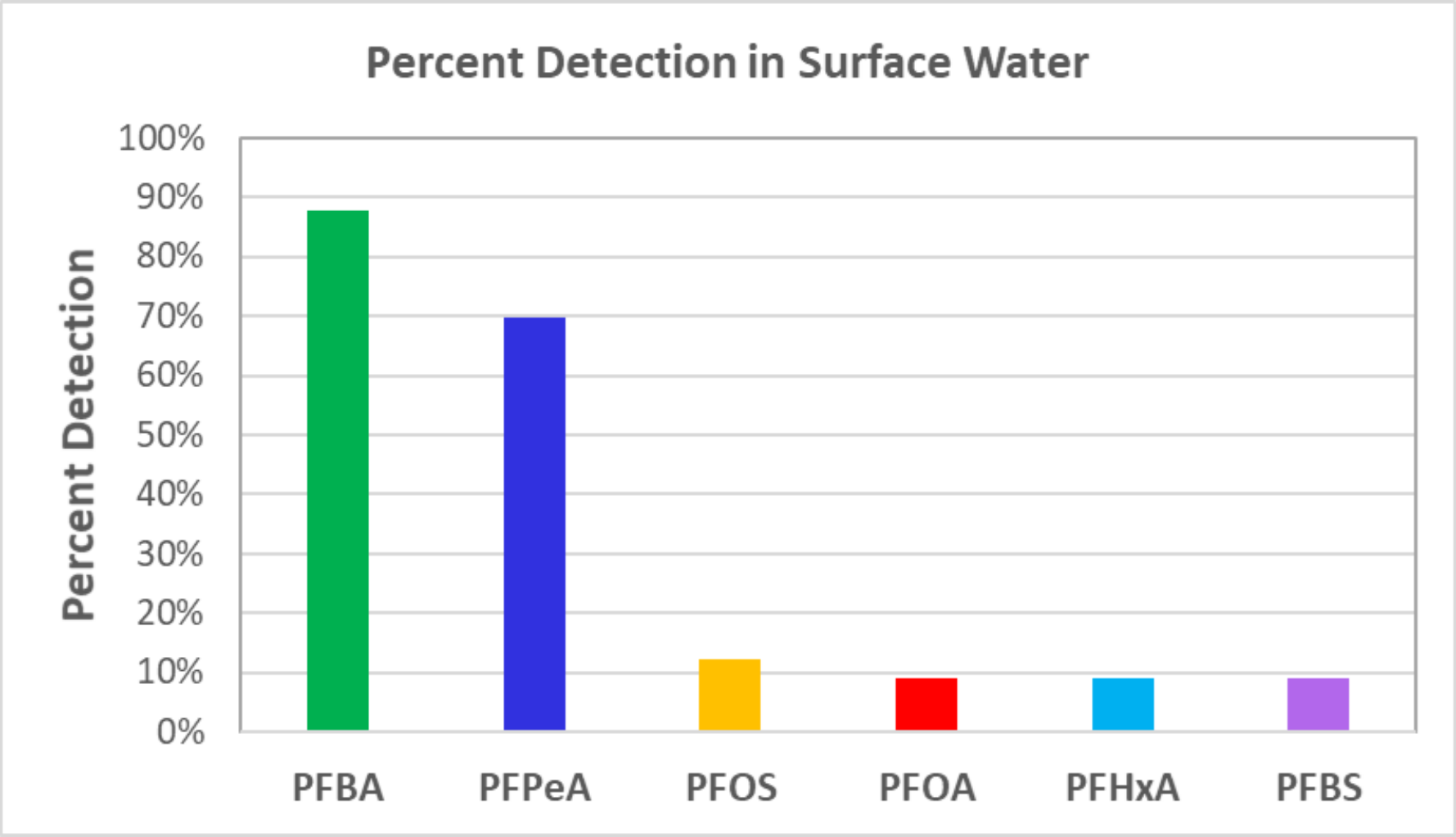
Range of Concentrations in Finished Water



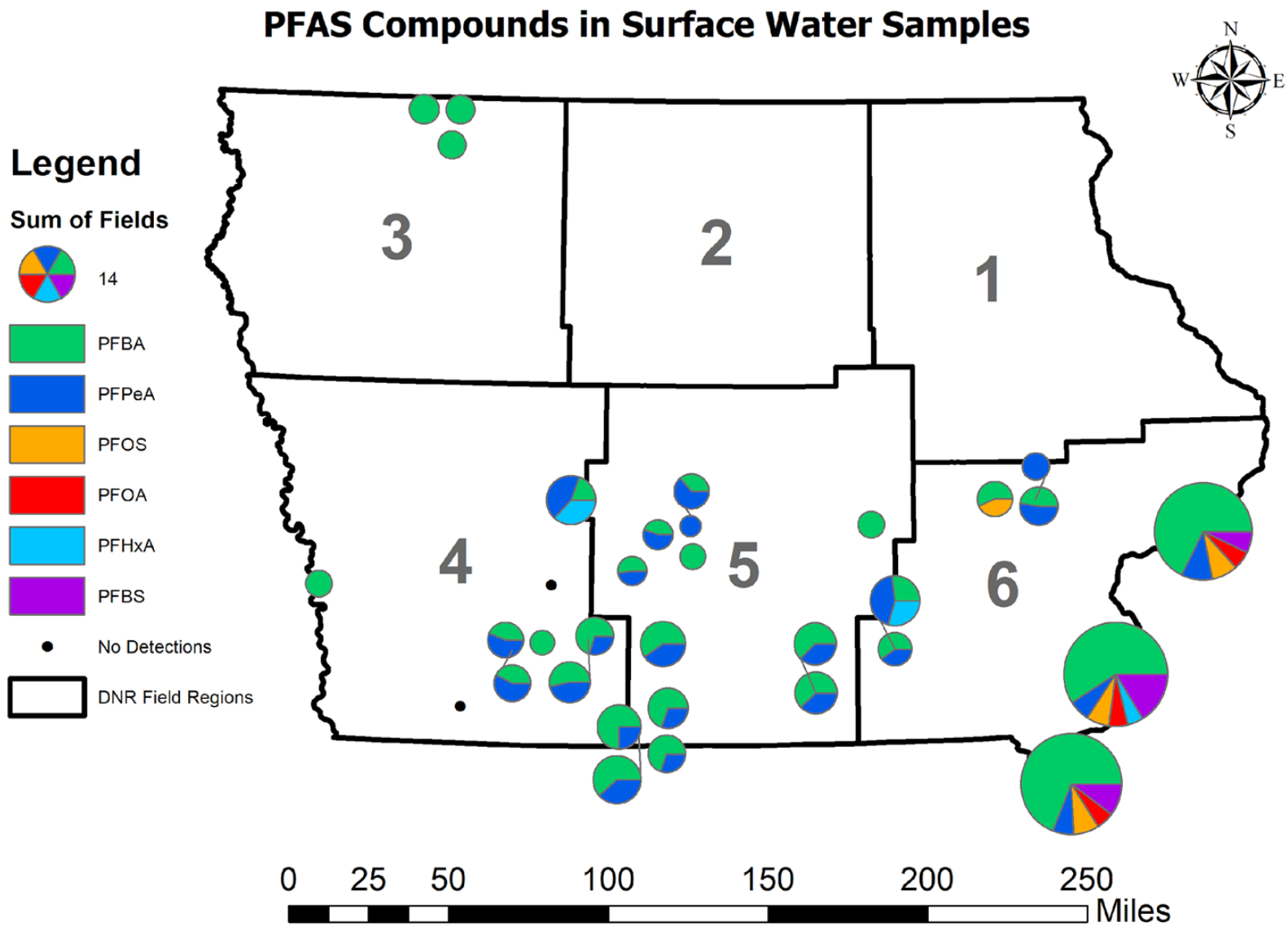
Where were PFOA and/or PFOS in finished water? - Interactive Map



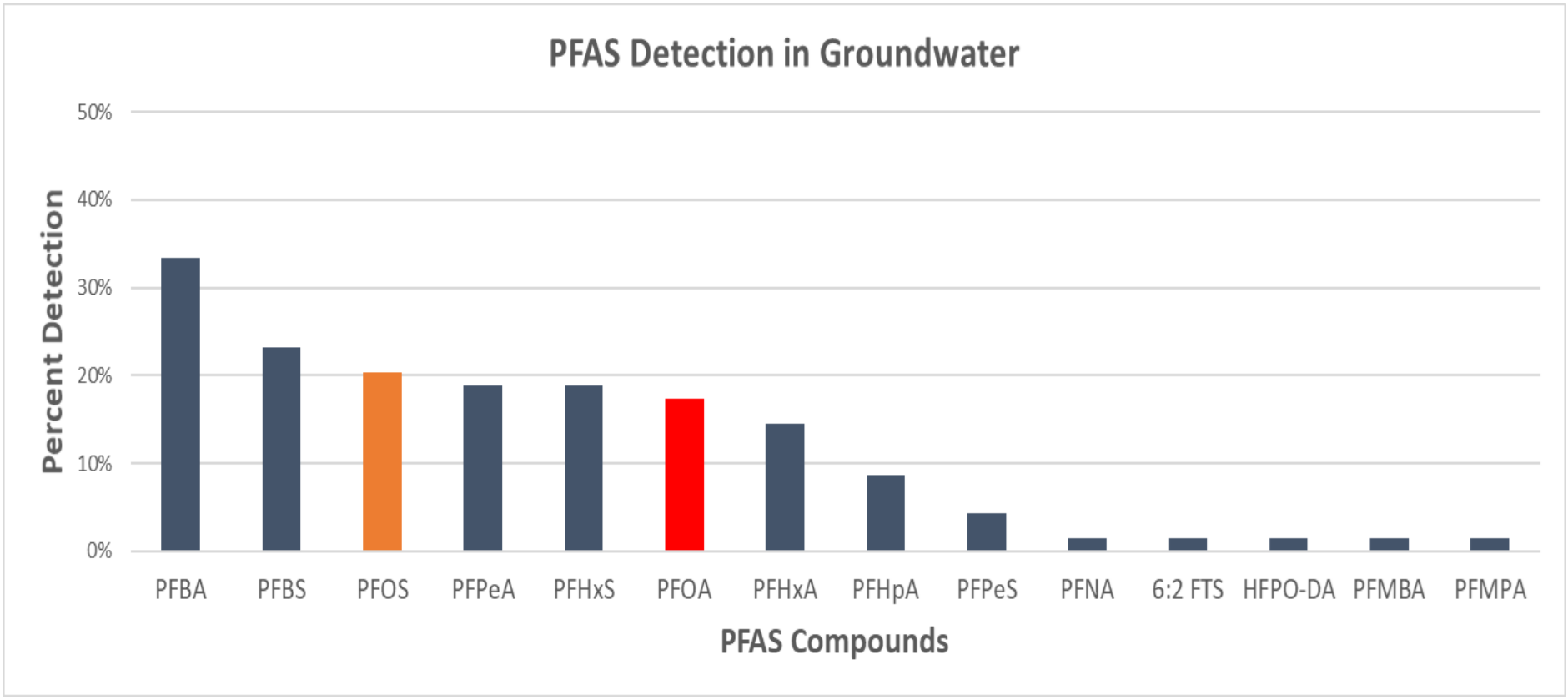
Raw Surface Water PFAS Detections



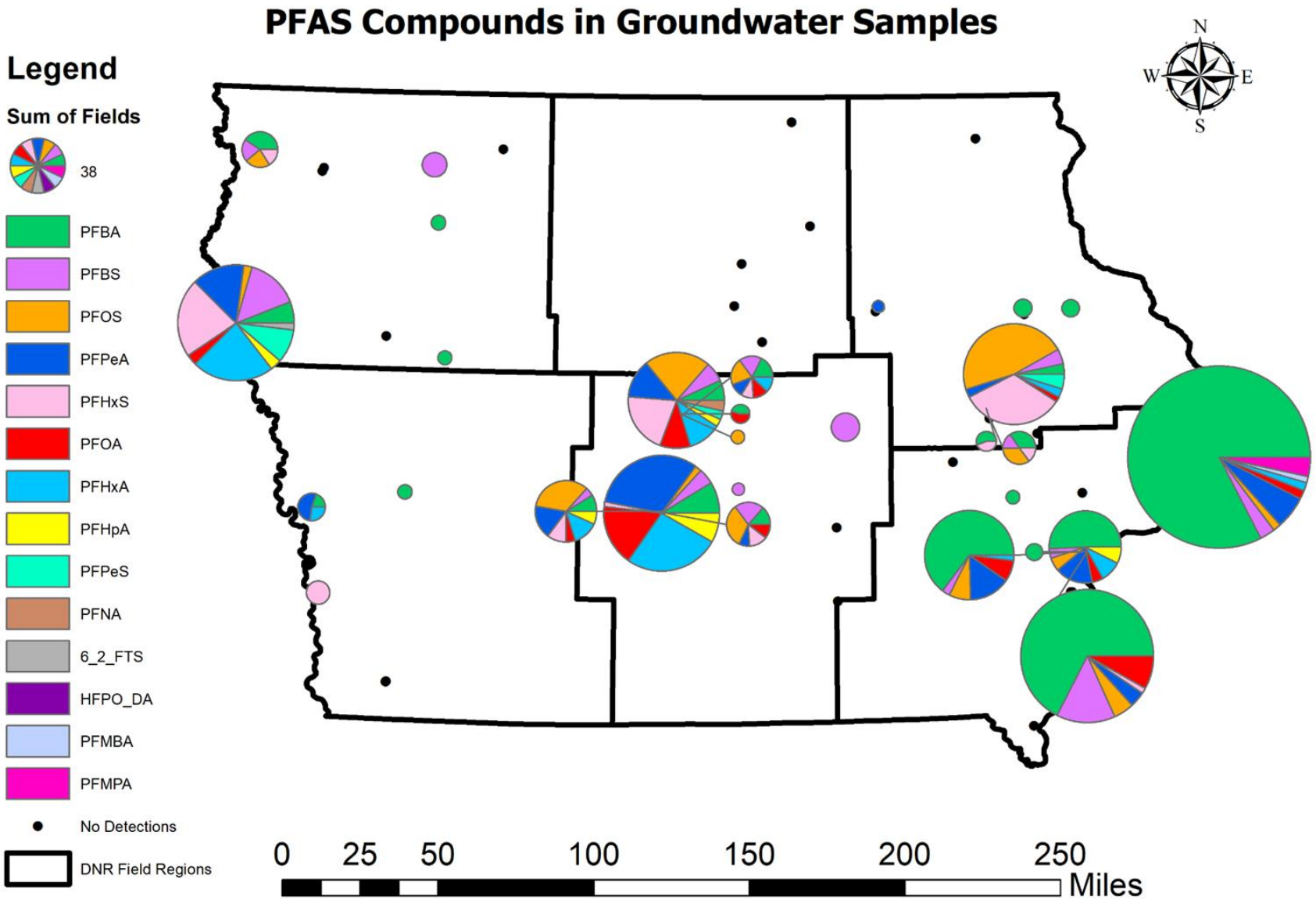
PFAS in Surface Waters (untreated river and lake water)



Raw Groundwater PFAS Detections



PFAS in Wells (untreated groundwater)



Water Supply Protocol for PFAS Detections

- **Purpose** - To ensure a consistent response by the DNR to a public water supply (PWS) with a detection of a PFAS chemical with a Health Advisory (HA) in the untreated or finished water
  - The protocol only applies to PFOA, PFOS, PFBS, and GenX at this time
  - DNR only has regulatory authority for chemicals known to pose a threat to human health (567 IAC 41.15)
  - EPA may establish additional HA's in the future for which the protocol will be updated

Water Supply Monitoring Plan

- Initiated when compounds with HAs are detected in the raw or finished water
  - Minimum of 4 quarterly samples will be assigned in a revised operation permit at the Source Entry Point for which the detection occurred
  - If any sample is above a HA at the Source Entry Point, then Tier 2 public notice is required within 30 days (567 IAC 42.1(1))
  - Public notice required quarterly until levels are below the HA
- May be reduced to annual after 4 quarters
- May be reduced to triennial after 3 annual samples
- May be discontinued if water source is eliminated and monitoring shows no more risk

PFAS: Water Removal Treatment

Activated Carbon

- Treatment for removal from drinking water
  - Granular activated carbon (GAC)
  - Anion exchange: specialty media required
  - Membrane filtration (Reverse osmosis): excellent removal
    - Must treat(?) reject water
  - Advanced oxidation processes: not particularly useful ($$$)
- Disposal of waste must be considered (toxic?)
- Concern in wastewater treatment and biosolids land application

Iowa DNR Contaminated Sites Section PFAS Response

Involvement of the DNR Contaminated Sites Section will be initiated when:

- PFOA and PFOS are detected at >40ppt cumulative (raw or finished water)
- Quarterly monitoring for PFOA/PFOS shows an increasing trend.

Initially, a report similar to a Phase 1 document will be prepared for the site. The document will be used to accumulate and present all pertinent information regarding the history of the location, local geology, well construction details, any known or suspected nearby PFAS sources, and recommendations for future work.

Field work may be conducted when/if a suspected source is identified near an impacted public well. A more extensive report will be prepared in this situation.

More information: Iowa DNR Contaminated Sites PFAS Protocol

Tier 3 Site Selection and Sampling (Ongoing)

- Derived in a similar fashion to Tier 1 & Tier 2
- Focus on smaller systems that will not sample for UCMR5 such as HOAs, NTNCs, food processing, alchohol production, and communities less than 3,300
- Other areas of focus:

-Follow-up samples at sites of interest

-Wells in capture zone of biosolids application

-Wells in *capture zone* of PFAS source

-Proximate to Mississippi River/alluvial sources

-Proximate to Superfund Sites

Questions?

Special thanks to my PFAS co-sampler Dr. Claire Hruby!