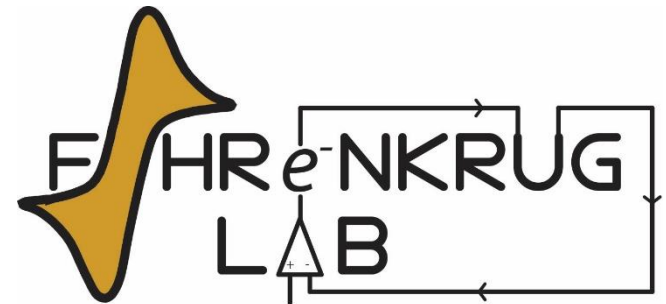


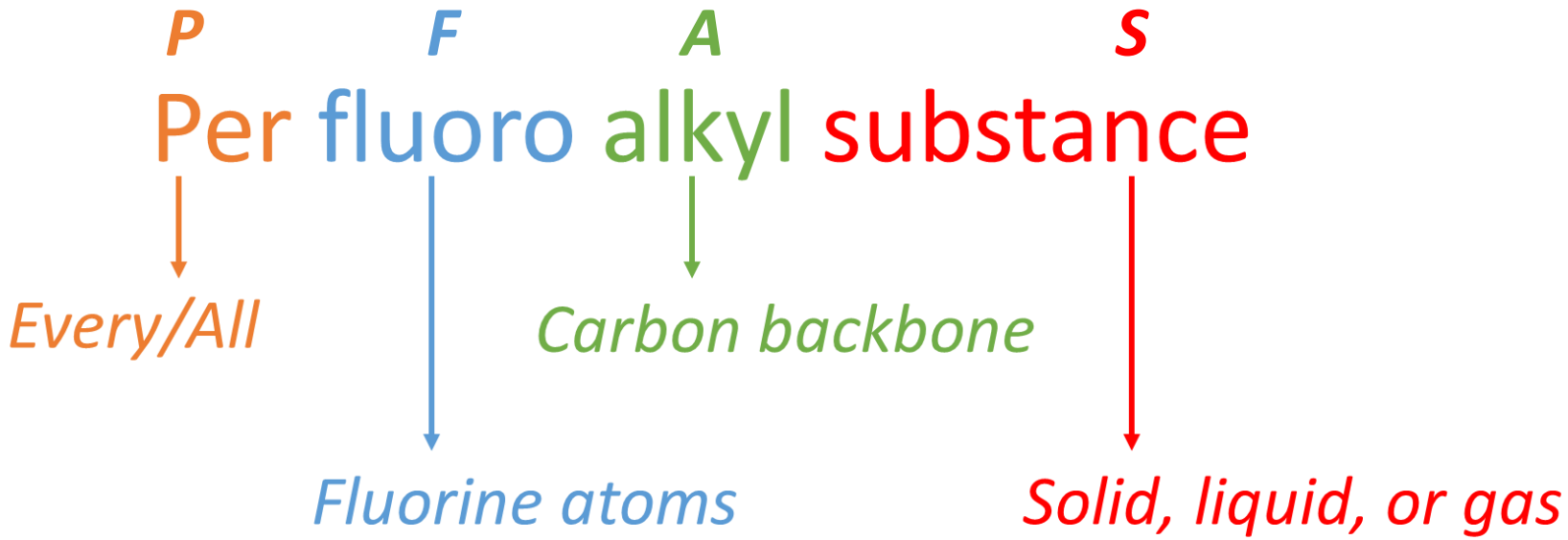
The Fountain Valley Water Project

Understanding PFAS Contamination in the Fountain, Security, and Widefield, CO

Dr. Eli Fahrenkrug
Keenan Wright



How to Speak Chemistry *What is PFAS?*



Properties

- Surfactant
- Persistent
- Bioaccumulative
- Toxic

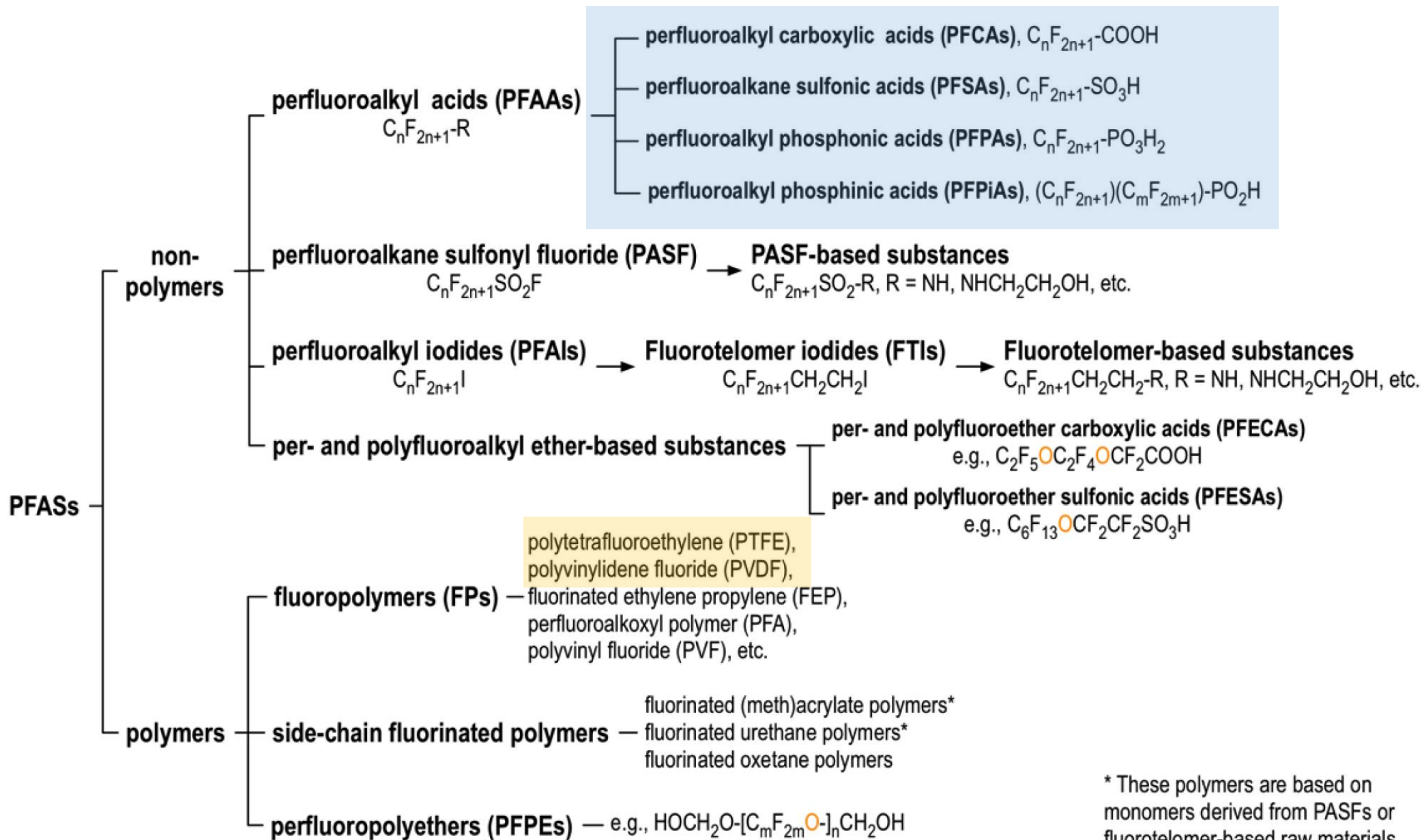
Health Effects:

- Cancer(s)
- Thyroid
- Neurodevelopment
- Long ½ lives

Perfluorooctane carboxylate (PFOA)



PFASs as a *Class* of Compounds



* These polymers are based on monomers derived from PASFs or fluorotelomer-based raw materials.

Torres del Paine, Southern Chile



King George Island, Antarctica



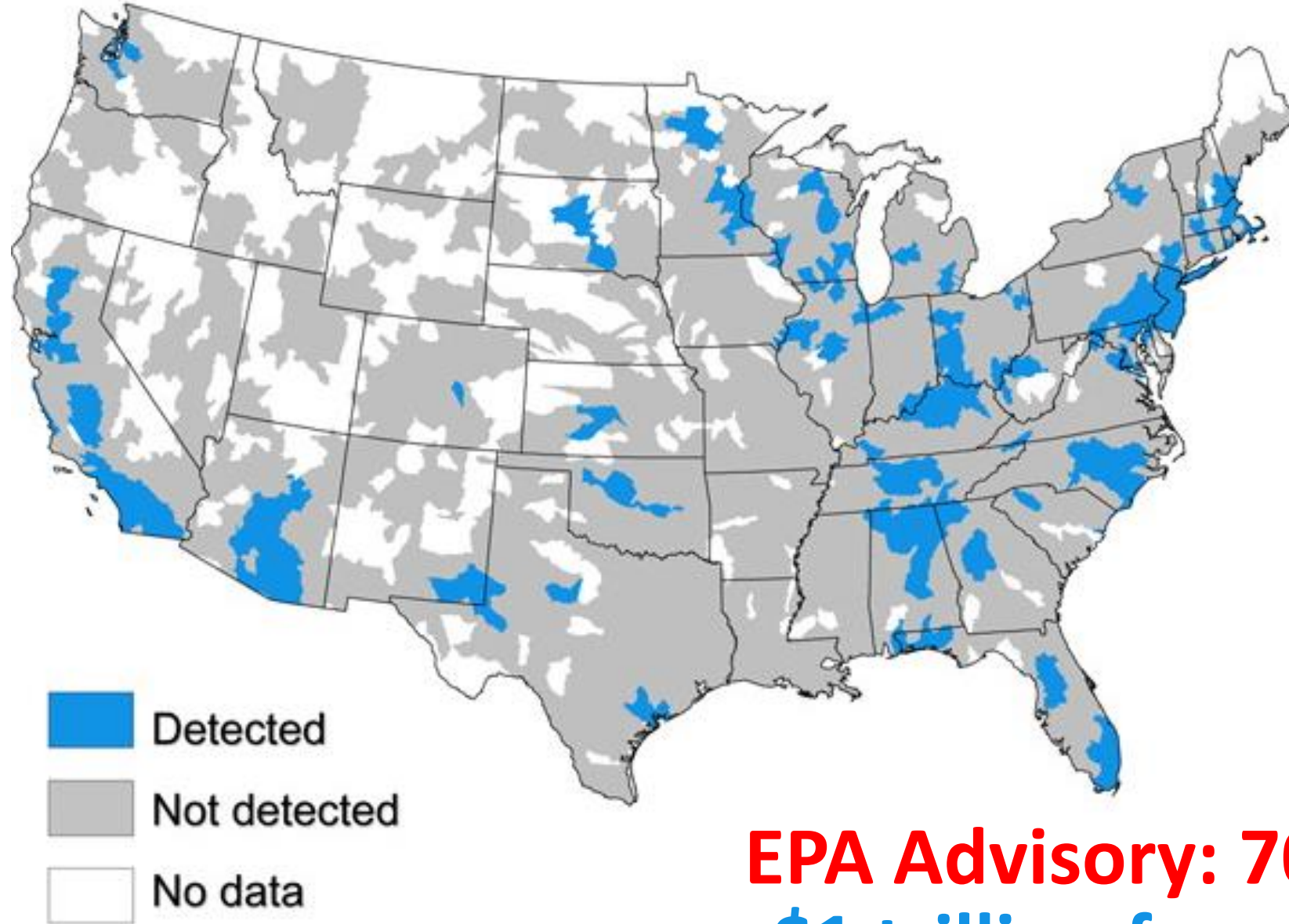
Treriksröset, northern tips of Sweden, Finland, Norway



Haba Xueshan, Yunnan, China



PFASs in >200 municipal water supplies in US



EPA Advisory: 70 ppt
>\$1 trillion for remediation

Where do they come from?

Aqueous Film Forming Foams (AFFFs)

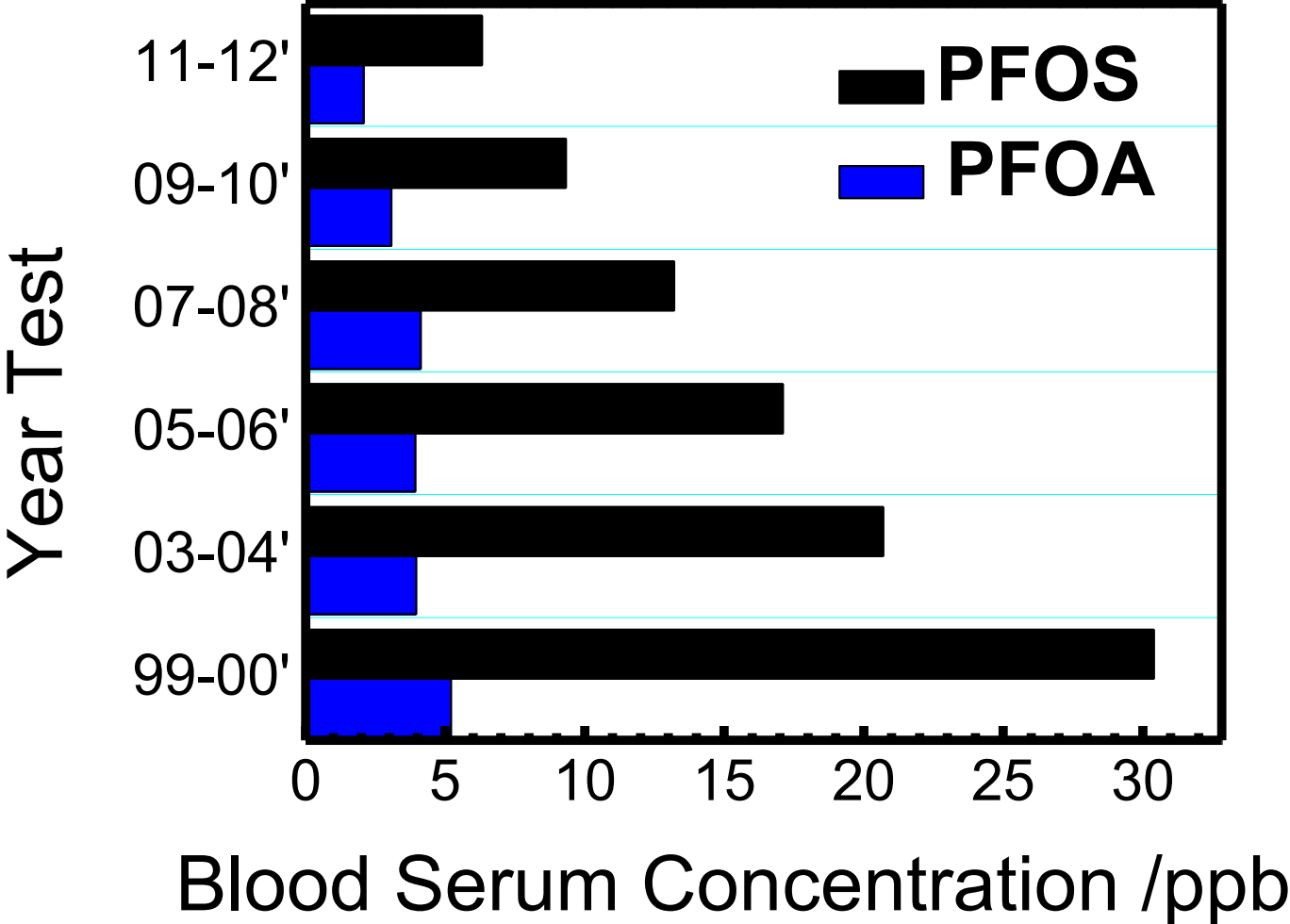


Peterson AFB started use in 1970

Where *else* do they come from?



97 % of Americans have PFASs in Blood Serum



Fourth National Report on Human Exposure to Environmental Chemicals; Centers for Disease Control and Prevention: Atlanta, 2015.

Hu, X. C.; et al. *Environ. Sci. Tech. Let.* 2016, 3, 344.

FEATURE

The Lawyer Who Became DuPont's Worst Nightmare

Rob Bilott was a corporate defense attorney for eight years. Then he took on an environmental suit that would upend his entire career — and expose a brazen, decades-long history of chemical pollution.

*Jan. 2016*

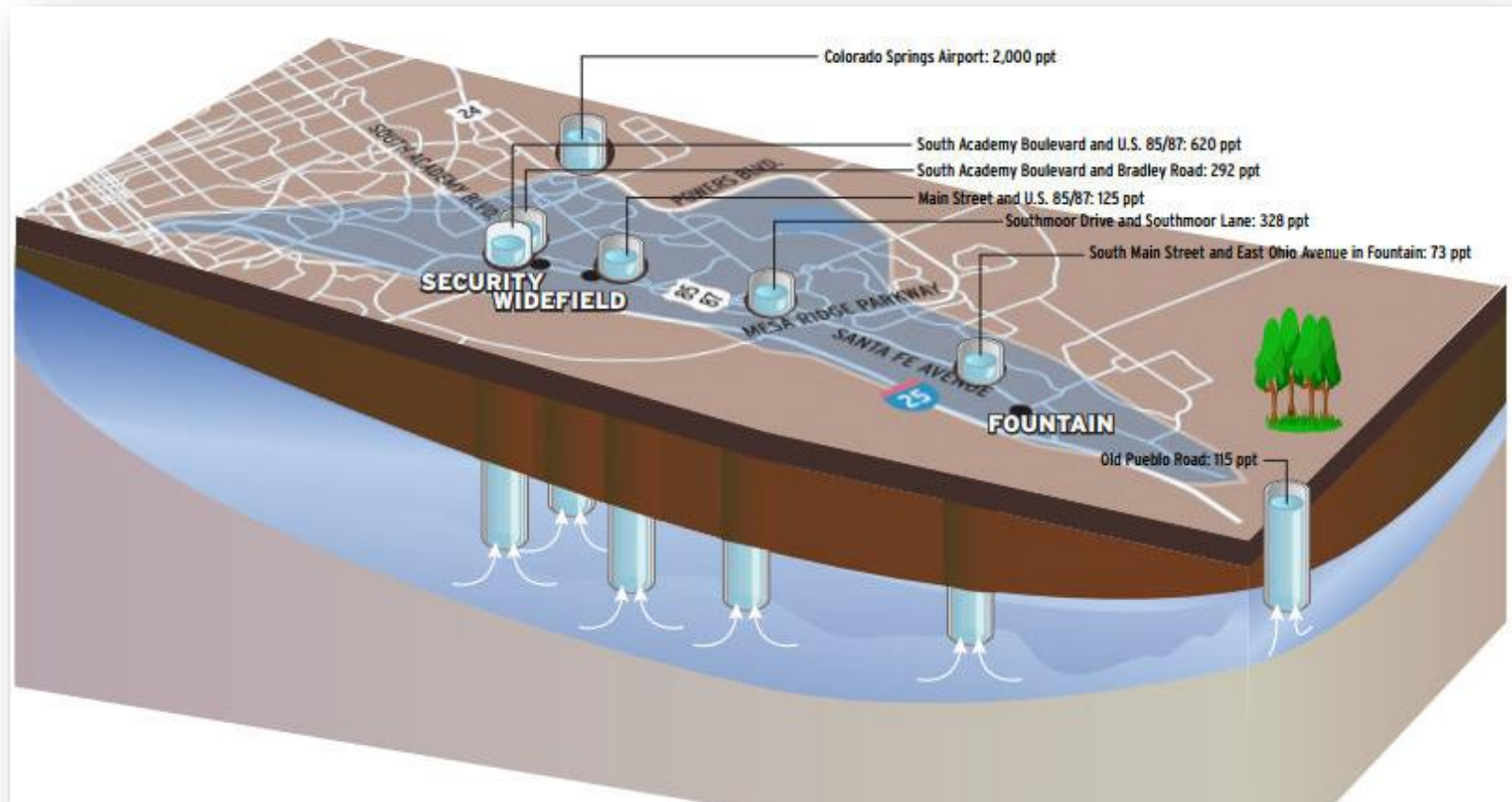
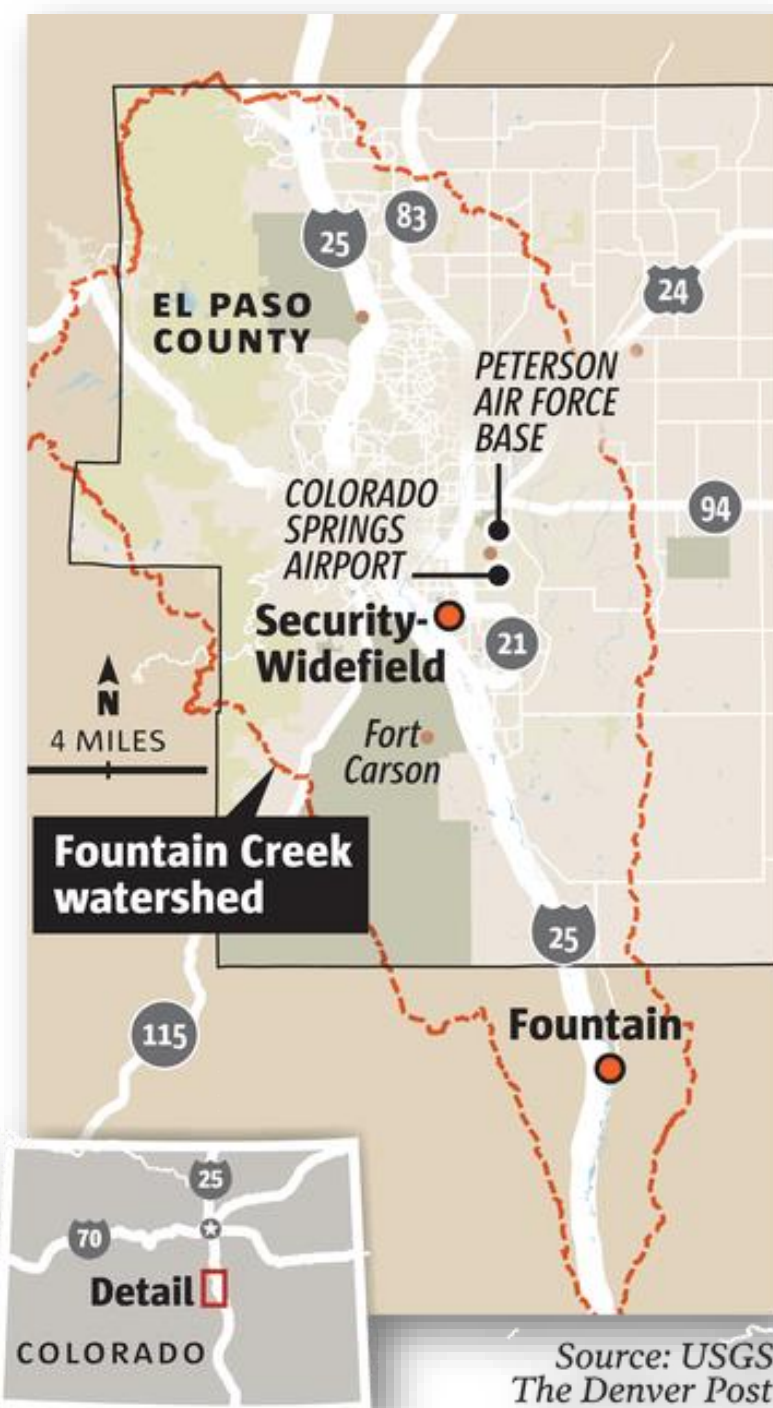
The New York Times

***Toxic 'Forever Chemicals' in Drinking
Water Leave Military Families Reeling***



PFAS in Our Community

1. One of the largest affected groups (64-70k)
2. Source = Peterson AFB – EPA vs. DOD
3. Water districts took steps to mitigate



Specific Aims of the *Fountain Valley Water Project*



Science

- Free testing (\$300/sample!)
- Map plume
- Citizen science

Communication

- K-12 modules
- Website
- Public data
- Discussions

Environmental Justice

- Case studies/law comparisons

Goal of increasing **scientific accessibility** and **scientific literacy** in communities with less direct representation

How to measure PFASs?

*High Pressure Liquid Chromatography
Triple Quadrupole Mass Spectrometry
= LC-MS/MS or triple quad*



***\$300 per sample + \$100/hr for
sample collection***

Capable of measuring sub Parts per Trillion (ppt)

Less than half of a drop of PFOA in a super tanker containing six million gallons of oil would comprise about one part per trillion.

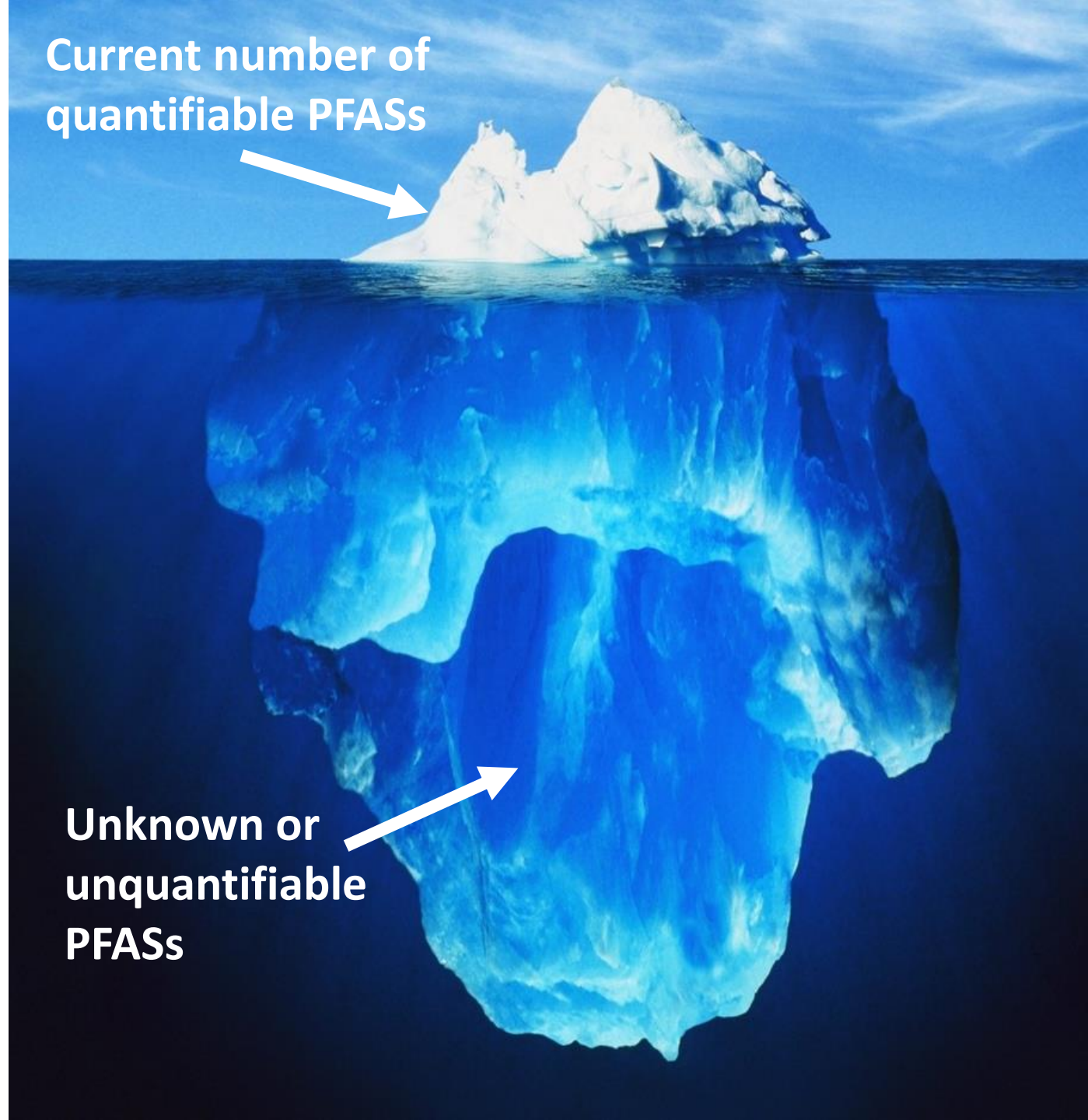
How to measure PFASs?

Worse than it seems

10's of thousands of potential PFASs

Hundreds to thousands that could be **environmentally relevant**

Current commercial labs **can quantify 20-35!**



What about the Law(s)?

Safe Drinking Water Act

- *Allows EPA to set Maximum Contaminant Level (MCL) for chemicals (currently 90 chemicals under Act)*
- *Currently **no MCL for PFAS** – only health advisory = non-regulatory*

Third Unregulated Contaminant Monitoring Rule (UCMR3)

- *SDWA Amendment: up to 30 unregulated chemicals added to list every 5 years for public water systems **monitoring**.*
- *Includes PFOS, PFOA, PFNA, PFHxS, PFHpA, PFBS*

Toxic Substances Control Act (TSCA)

- *Requires industry to obtain approval for PFAS import, manufacture, & use*

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, aka **Superfund**)

- *Allows for federally managed cleanup (i.e. federal \$\$ and resources)*
- *Requires ‘**hazardous substance**’ designation – 500,000 currently, but not PFAS*

Current Legislation: *national*

116TH CONGRESS
1ST SESSION

H. R. _____

To require the Administrator of the Environmental Protection Agency to shall designate per- and polyfluoroalkyl substances as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

← **The PFAS Action Act:**
*A bipartisan bill
introduced Jan. 2019*

**Dept. of Defense pushes EPA to
adopt *weaker* standard (380 ppt)
in suppressed report** →

Department of Defense
Alternatives to Aqueous Film Forming Foam
Report to Congress



Current Legislation: *local*

Pikes Peak Community Foundation & Security Water District sue US Gov for \$18.3 million

Air Force officials say they “have no authority to reimburse communities for money spent to combat the pollution that its bases may have caused.”

**Center for Disease Control (CDC) chose Fountain
as one of eight communities to take part in
random blood/urine tests**

Science Aims of the *Fountain Valley Water Project*



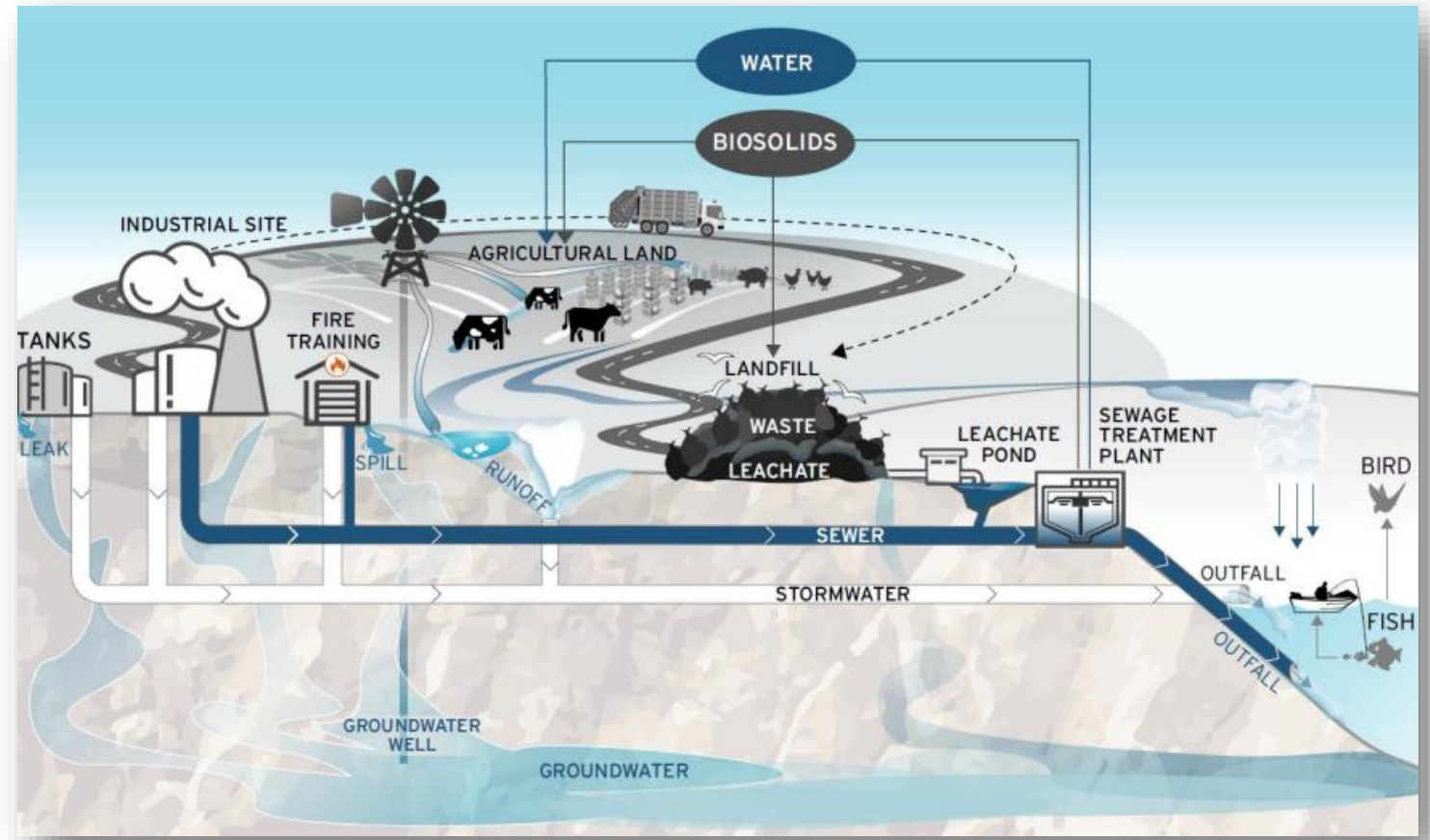
1. **Surface Waters** (streams & tributaries)

- Where/how is PFAS moving?

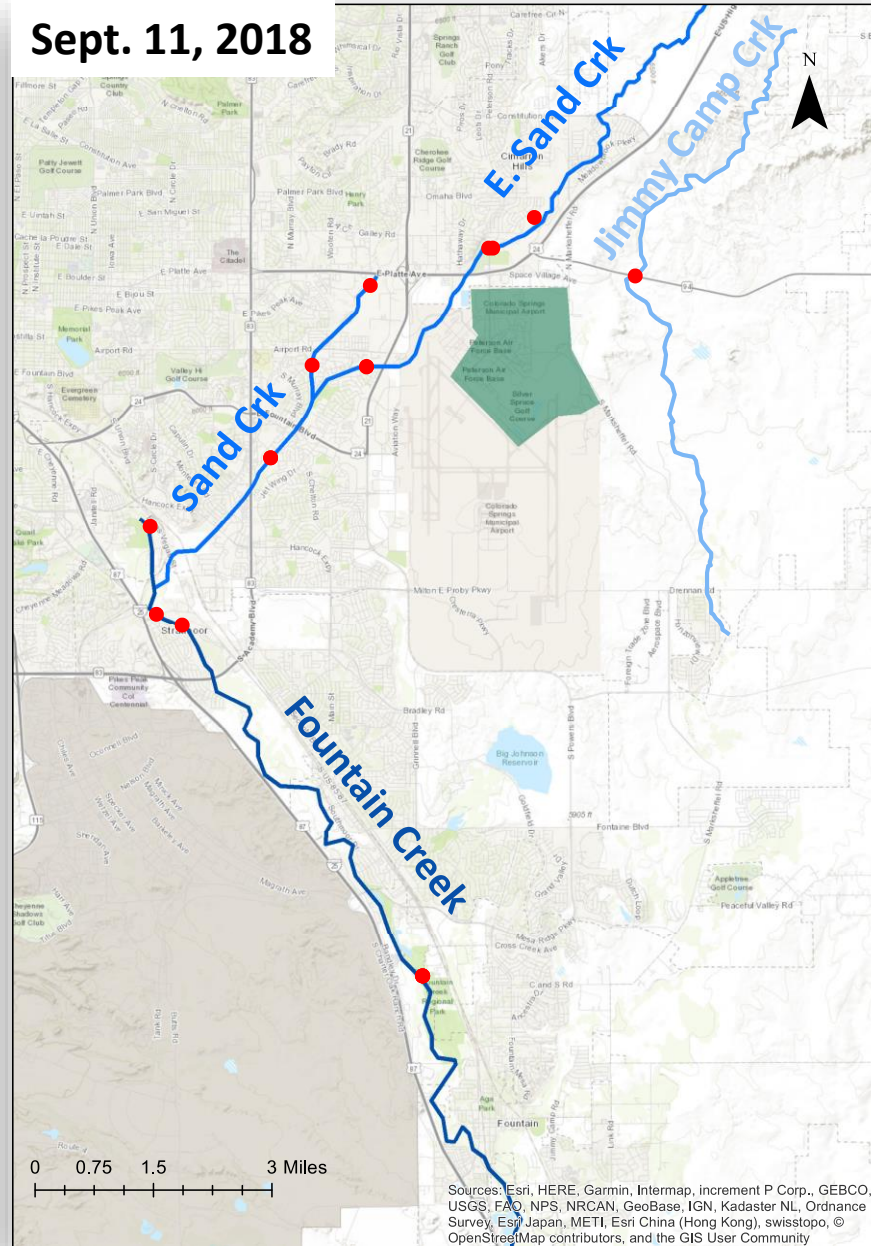
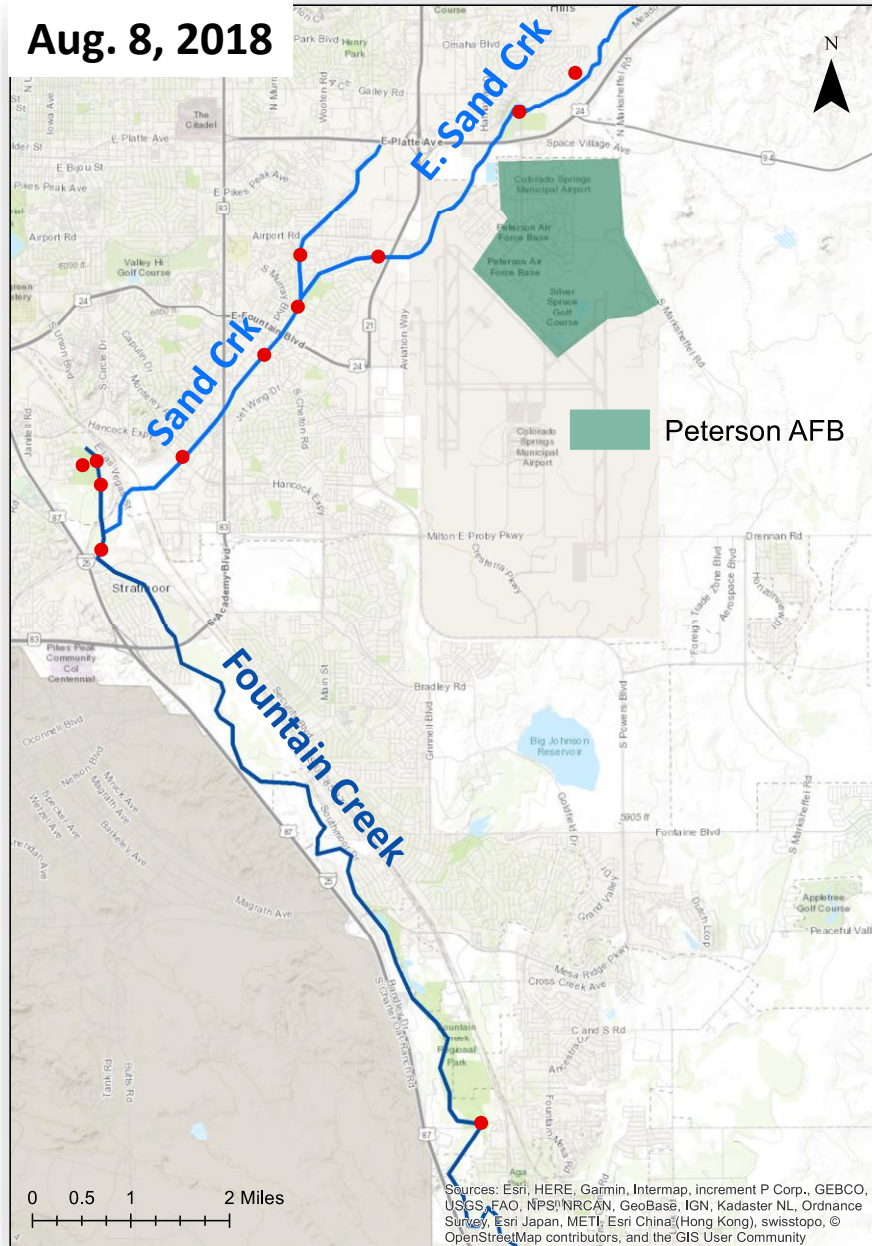
2. **Groundwater** (wells, ag, drinking water)

- Underground 'plume'

3. **Soils** (ag, gardens)



Constructing the *Surface Water* study



Identify all surface waters

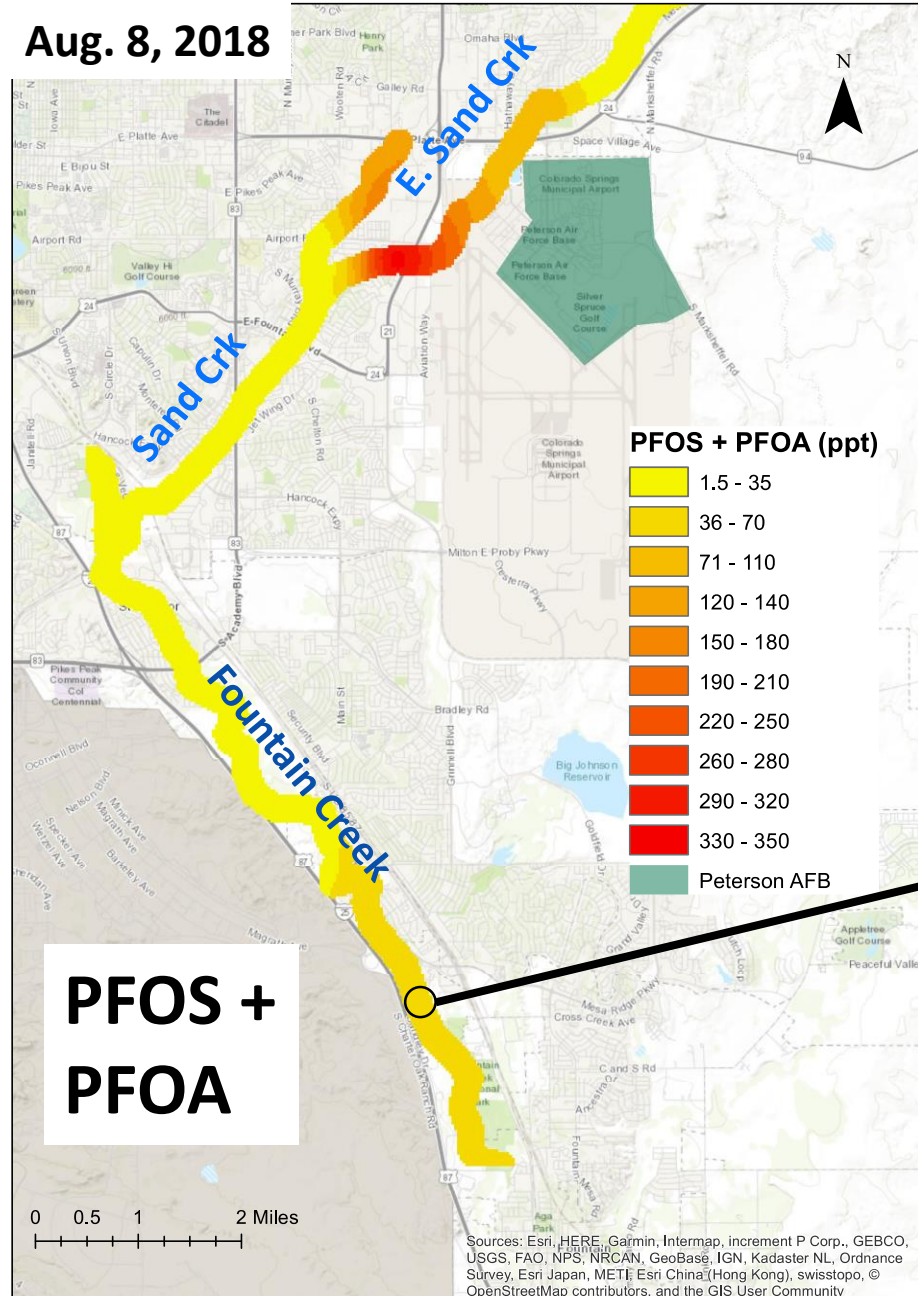
Establish sampling sites

Determine how PFAS is moving

Collect every 6 mo.

Surface Water study: *initial results*

Aug. 8, 2018



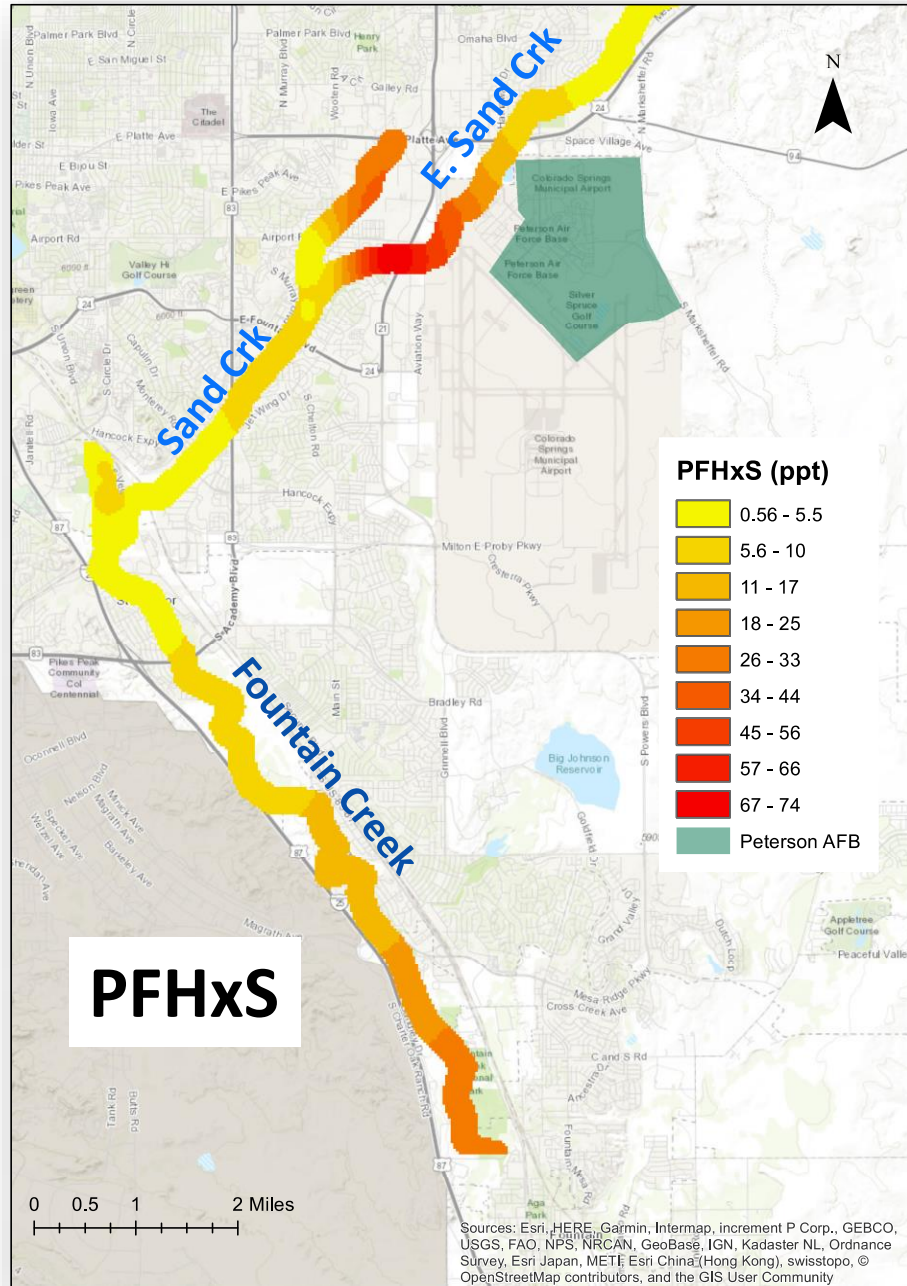
EPA Advisory: 70 ppt (PFOS + PFOA)



Hot spot by PAFB (5x EPA advisory)

Sample into Pueblo County?

Surface Water study: *initial results*

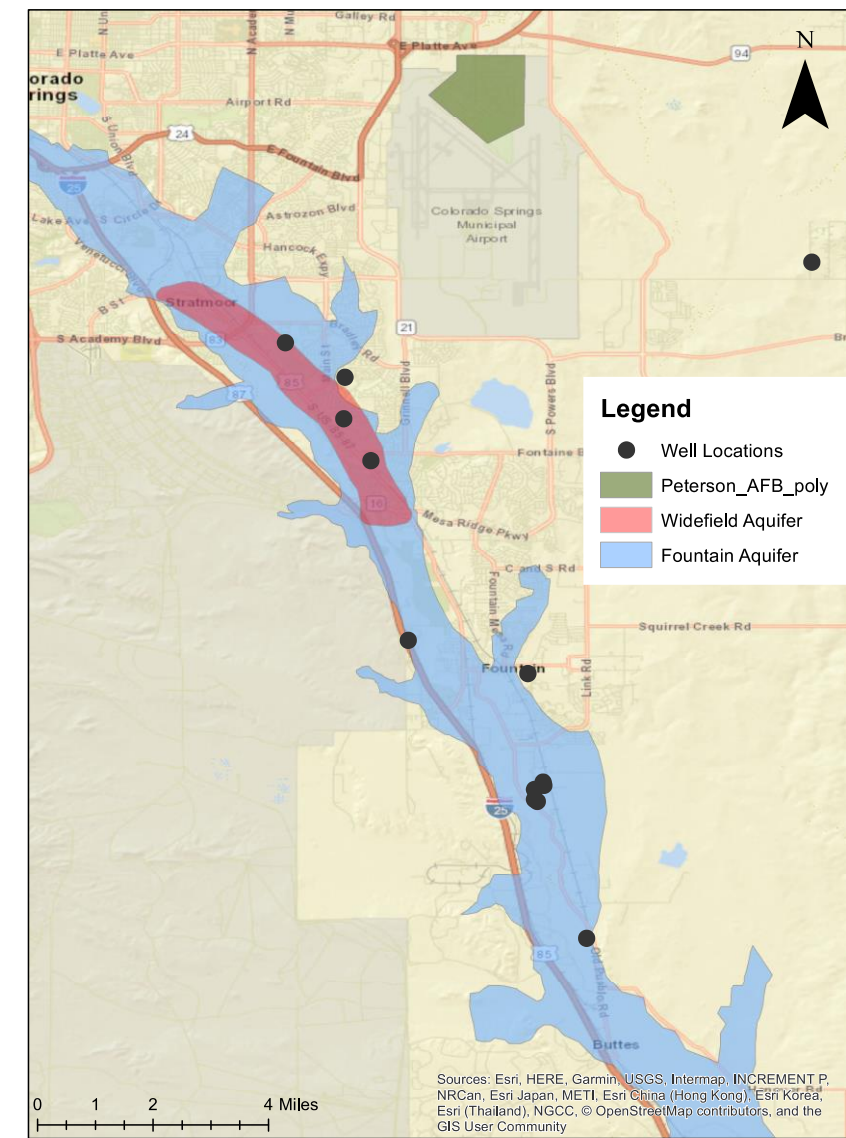
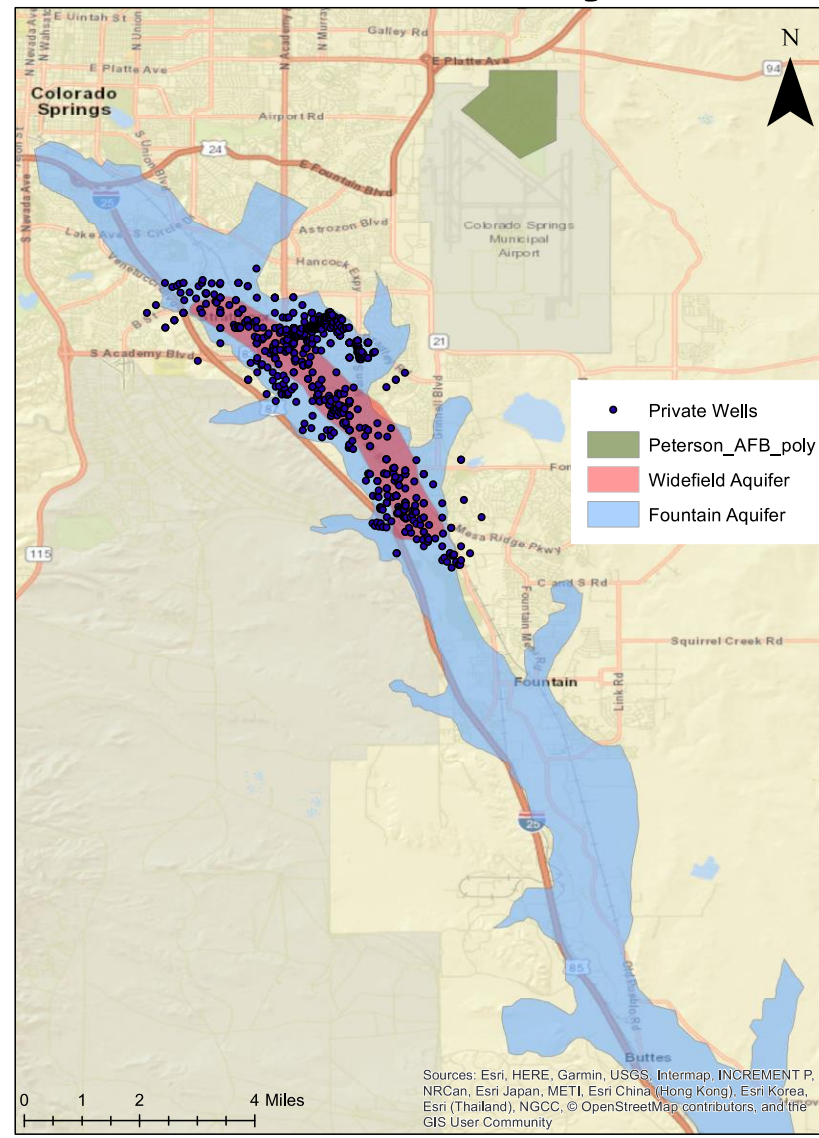
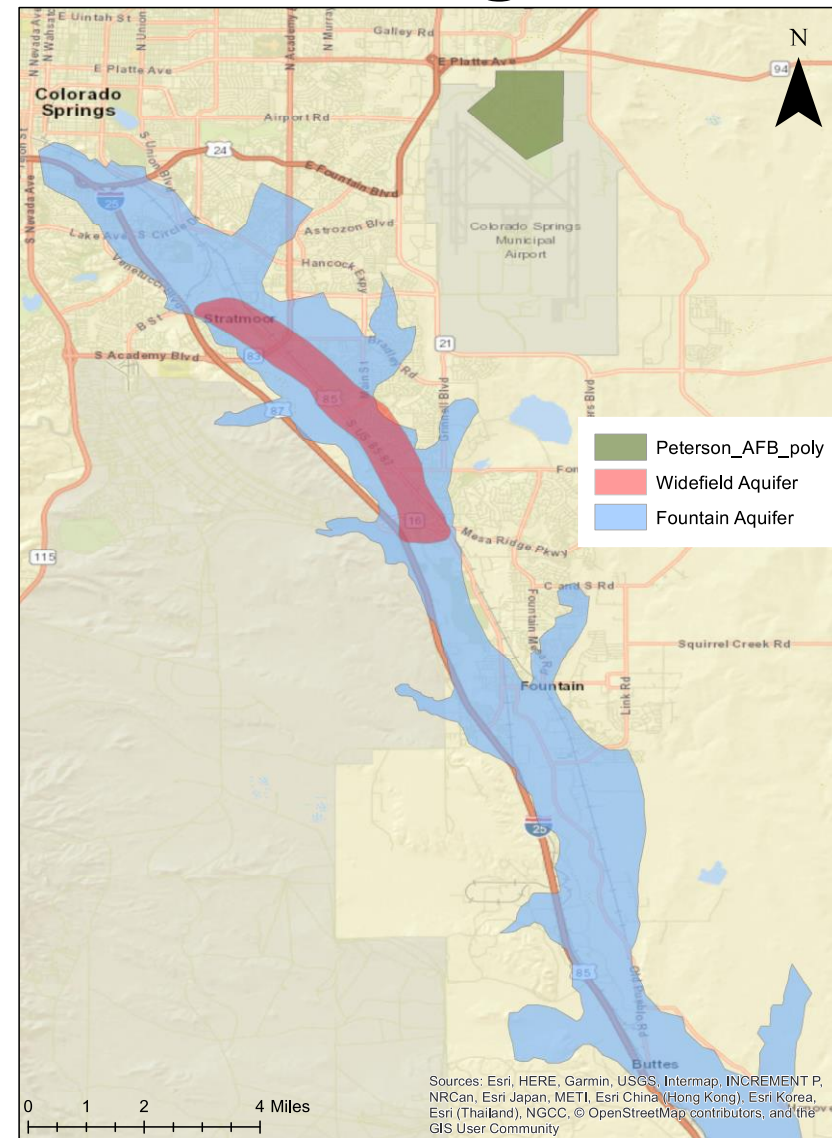


Blood tests show southern El Paso County residents have high levels of toxic chemicals from contaminated water

By: Jakob Rodgers Dec 14, 2018



Constructing the *Groundwater* study



Thousands of groundwater wells: *How to sample them?*

Challenges in constructing the *Groundwater* study



Mailers, door-to-door,
e-mail, website,
newspaper...

Thanks for listening!

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Fountain Valley
Water Project

