PFAS Analytic Tools
Providing Public Transparency about Chemical Use and Detections

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Background

- EPA began developing integrated information about Per- and Polyfluorinated Substances (PFAS) in 2016.
- The PFAS Analytic Tools project aimed to organize all known U.S. data sources containing PFAS information.
- The effort was initially internal and focused on identifying causes of potential contamination for purposes of conducting investigations.
- In 2021, the U.S. EPA released its PFAS Strategic Roadmap and committed to public release of the data and associated maps and analysis tools.

Goals of the PFAS Analytic Tools

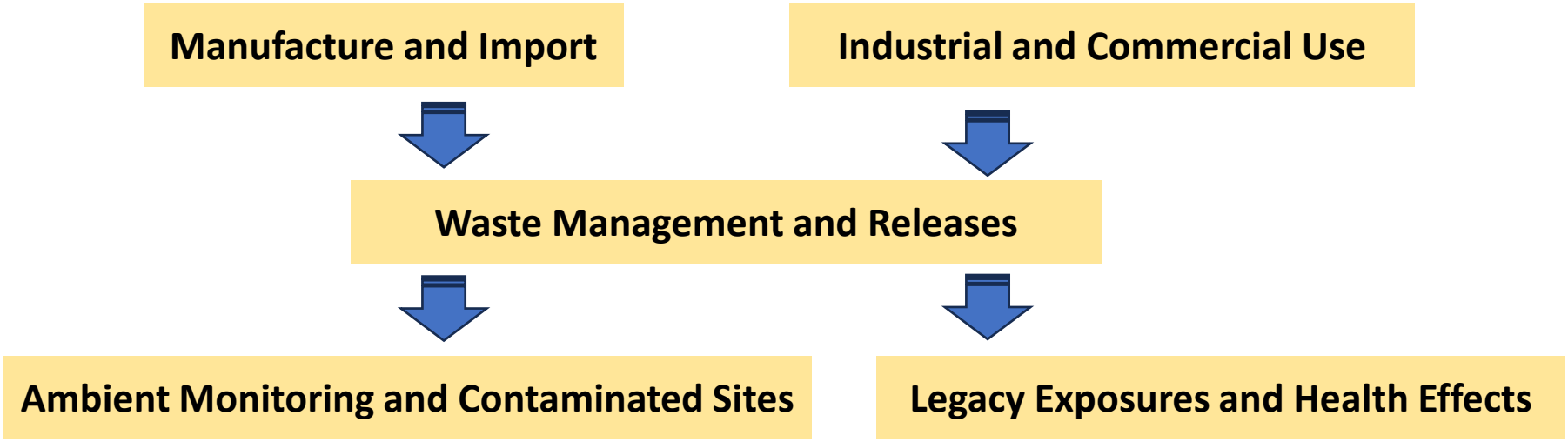
- Develop an integrated resource to understand where PFAS contamination has been identified across a wide set of databases
- Compile as much nationally available data on PFAS into an easy-to-use, automatically refreshed tool
- Develop standard methods to extract PFAS chemical data from national data systems
- Support EPA and State partnerships in planning, research, and investigations into PFAS contamination
- Provide the public with transparent information

Responding to Emerging Chemical Risks (PFAS)

1) Define PFAS

2) Establish likely sources of exposure and toxicity

3) Mine existing data sources to better understand risks and need for controls



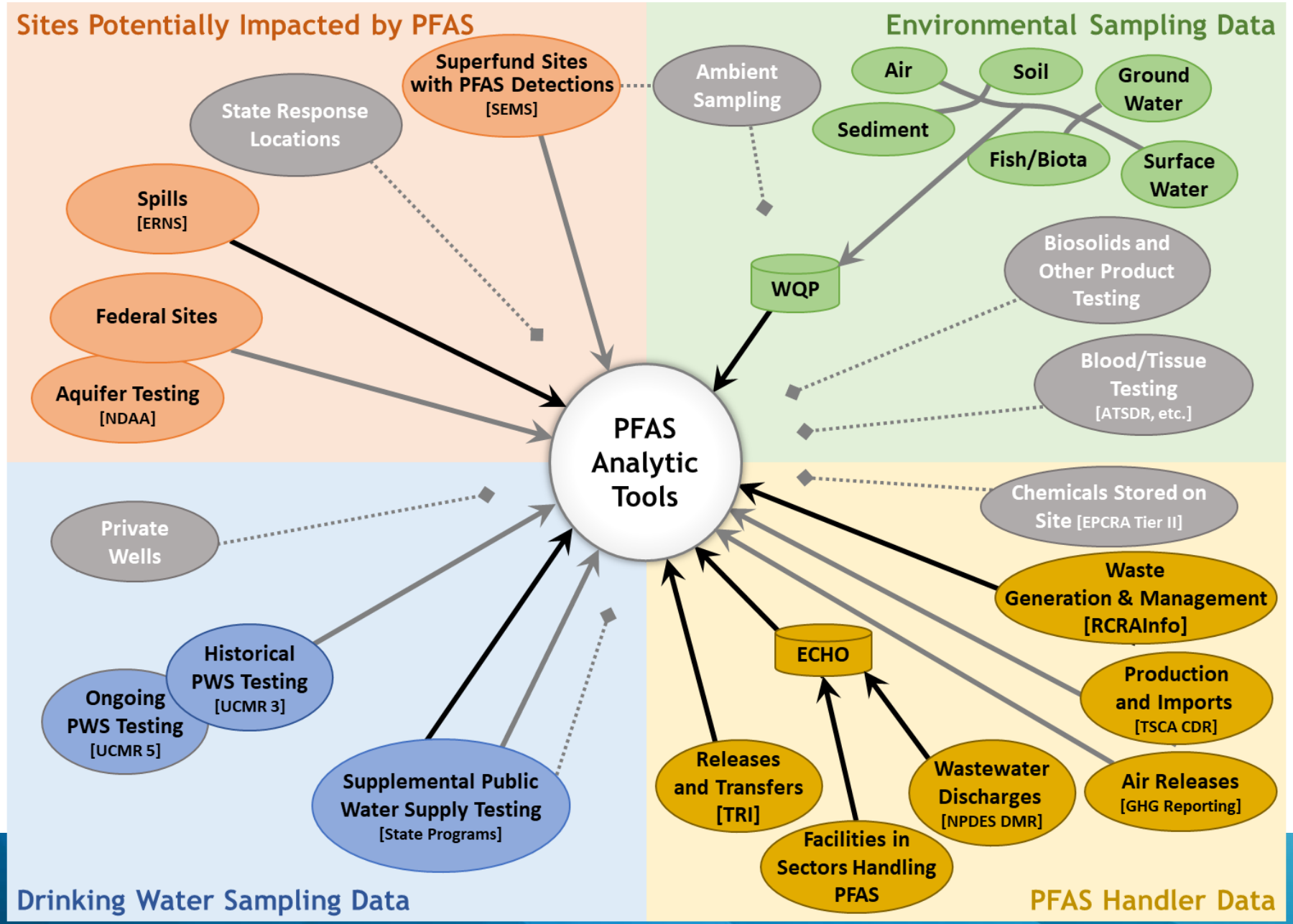
PFAS Analytic Tools – **The Data Model**

- Captures **location-specific** data related to PFAS manufacture, use, release, and contamination from 13 existing data systems
- EPA leveraged existing data sources which were not created with PFAS in mind
- Uses a broad definition of Per- and Polyfluorinated Substances (PFAS)
  - EPA maintains lists of ~16,000 chemicals considered to have PFAS chemistry
- Automated scripts extract PFAS records weekly
- Provides users exploratory tools (Qlik platform) and downloads

Key Data Included in PFAS Analytic Tools

- Drinking water testing
- Fish tissue and surface water sampling
- Wastewater pipe discharges
- Sites potentially impacted by PFAS
- Waste transfers and pollutant releases from industrial operations
- Spills
- Industries and activities known or suspected to use PFAS

PFAS Analytic Tools – Data Acquisition



U.S. EPA Project Development Timeline

- 2016 – began working to develop integration models and selected the data visualization platform (Qlik)
- 2017-2021 – shared the tool with government partners, received feedback, and developed new features/datasets
- 2022-2023 – released data files to the public in March 2022 and released the PFAS Analytic Tools in January 2023
- 2024 Forward – new regulatory standards will bring new data; non-centralized information may be added; data will be used for research and modeling that will generate new empirical information

PFAS Manufacture and Imports

Current Data Sources

- **Self-Reported Production and Imports of Chemicals in Commerce**

What data do we have?

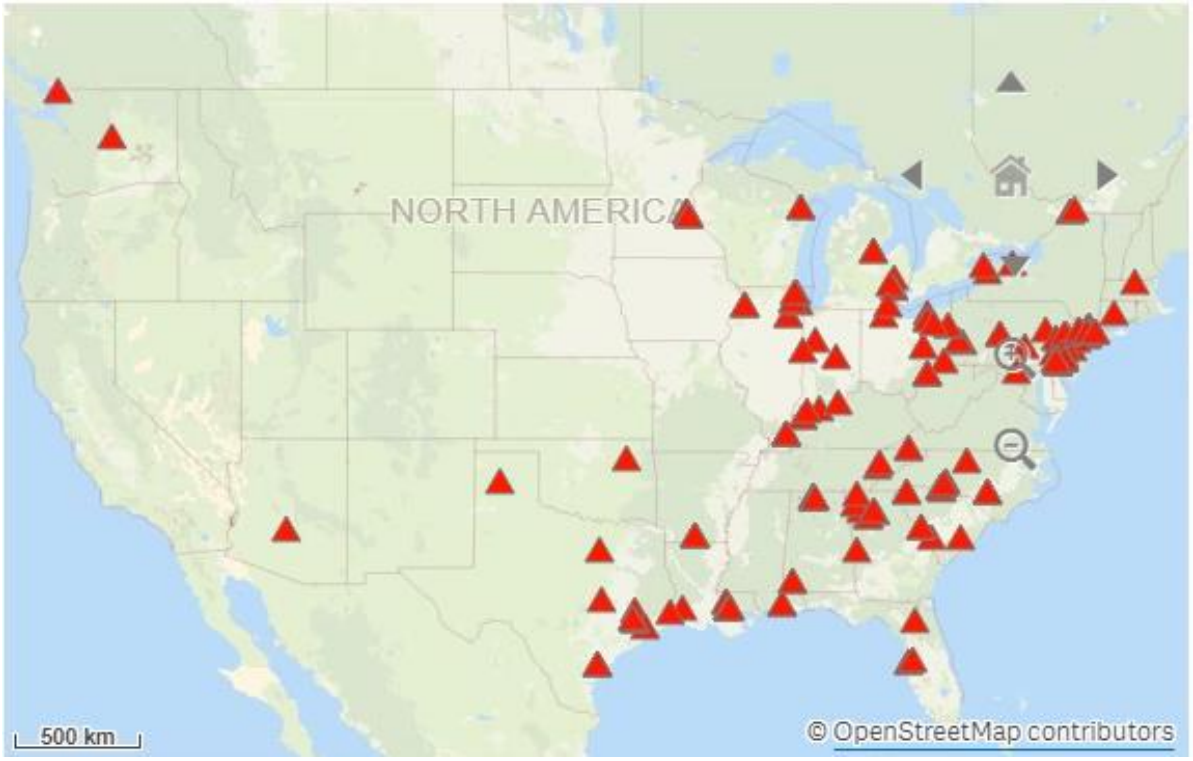
- Companies that manufacture or import more than 25,000lb/year report amounts to every four years

How are the data being used?

- Quantify worker exposures during manufacture and handling
- Quantify exposure in general population
- Ensure regulatory controls on manufacture, use, and disposal are protective of human health and the environment

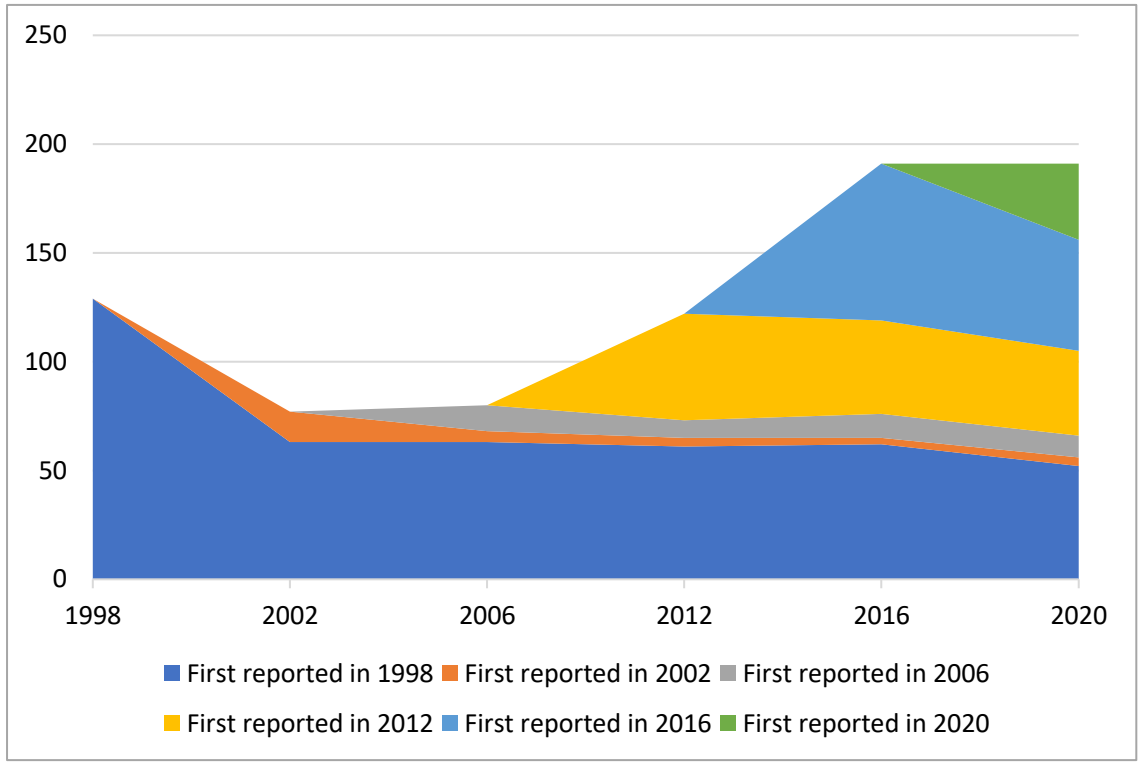
EPA | Integrated Map | Drinking Water (UCMR) | Drinking Water (State) | Production | Environmental Media | Discharge Monitoring
Superfund Sites | Federal Sites | Industry Sectors | Transfers | Spills | Toxic Releases | Greenhouse Gases

Location of PFAS manufacturers



- Is there is contamination nearby?
- Which sewerage systems are handling PFAS and are biosolids contaminated?

New PFAS are continually being brought to market

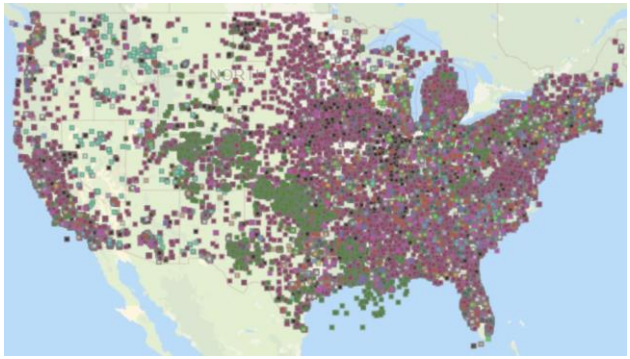


- Need to balance research and testing on both legacy and new chemicals.

Commercial and Industrial PFAS Use

Current Data Sources

- **Literature review +**
- **Universe of regulated facilities**



What data do we have?

- Literature review used to identify 24 industrial sectors and activities that use PFAS
- Location, owner, operational details, and environmental releases of other pollutants for 165,000 facilities that operate in those sectors

How are the data being used?

- Identify potential sources of PFAS release and contamination
- Prioritize site investigations and community health assessments
- Evaluate environmental and health risks associated with PFAS

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PFAS Handlers and Wastewater Treatment

- Which facilities may be sending PFAS to wastewater treatment plant?
- Which sewerage systems are handling PFAS and are biosolids contaminated?

Regulated Facilities Potentially Using PFAS

Industry	Facilities	Active Facilities
Oil and Gas	44,556	29,390
Waste Management	35,335	20,659
Chemical Mfg	11,477	7,114
Metal Coating	10,669	6,805
Petroleum	8,242	4,756
Electronics Industry	7,810	4,410
Plastics and Resins	7,618	4,932
Mining and Refining	6,617	794
Metal Machinery Mfg	6,038	3,917
Printing	4,913	2,818
Airports	3,527	2,109
Textiles and Leather	3,081	1,567
Paints and Coatings	2,942	1,861
Paper Mills	2,403	1,736
Cleaning Product Mfg	2,155	1,086
National Defense	2,100	1,369
Industrial Gas	1,135	727
Fire Protection	815	231
Airports (Part 139)	536	518
Fire Training	499	7

- Density of potential PFAS handlers in an area can be used to predict contamination.

PFAS Waste Management and Releases to the Environment

Current Data Sources

- **Annual self reporting of specified chemicals**
- **Wastewater monitoring**
- **Hazardous waste shipments**
- **Spills**

What data do we have?

- PFAS records extracted from mandatory reporting of ongoing releases to land, water, and air, management of wastes, and spills.

How are the data being used?

- Identify sources of PFAS releases and contamination.
- Prioritize site investigations and community health assessments.
- Identify sectors using PFAS and opportunities for substitution of PFAS.

Ambient Monitoring and Sites Potentially Impacted by PFAS

Current Data Sources

- **Monitoring of drinking water supplies**
- **Ambient monitoring of soils, surface water, groundwater, and biota**
- **Sites identified for clean-up**

What data do we have?

- Surveillance of drinking water – 29 PFAS reported for all drinking water systems serving 3,300 people or more.
- Inventory of ambient testing results from environmental investigations (fish tissue, surface water, ground water, sediments).
- Government-owned and former industrial sites with PFAS.

How are the data being used?

- Identify geospatial extent and potential sources of PFAS contamination.
- Identify locations where PFAS in fish tissue~~s~~ indicates fishing advisory may be warranted.

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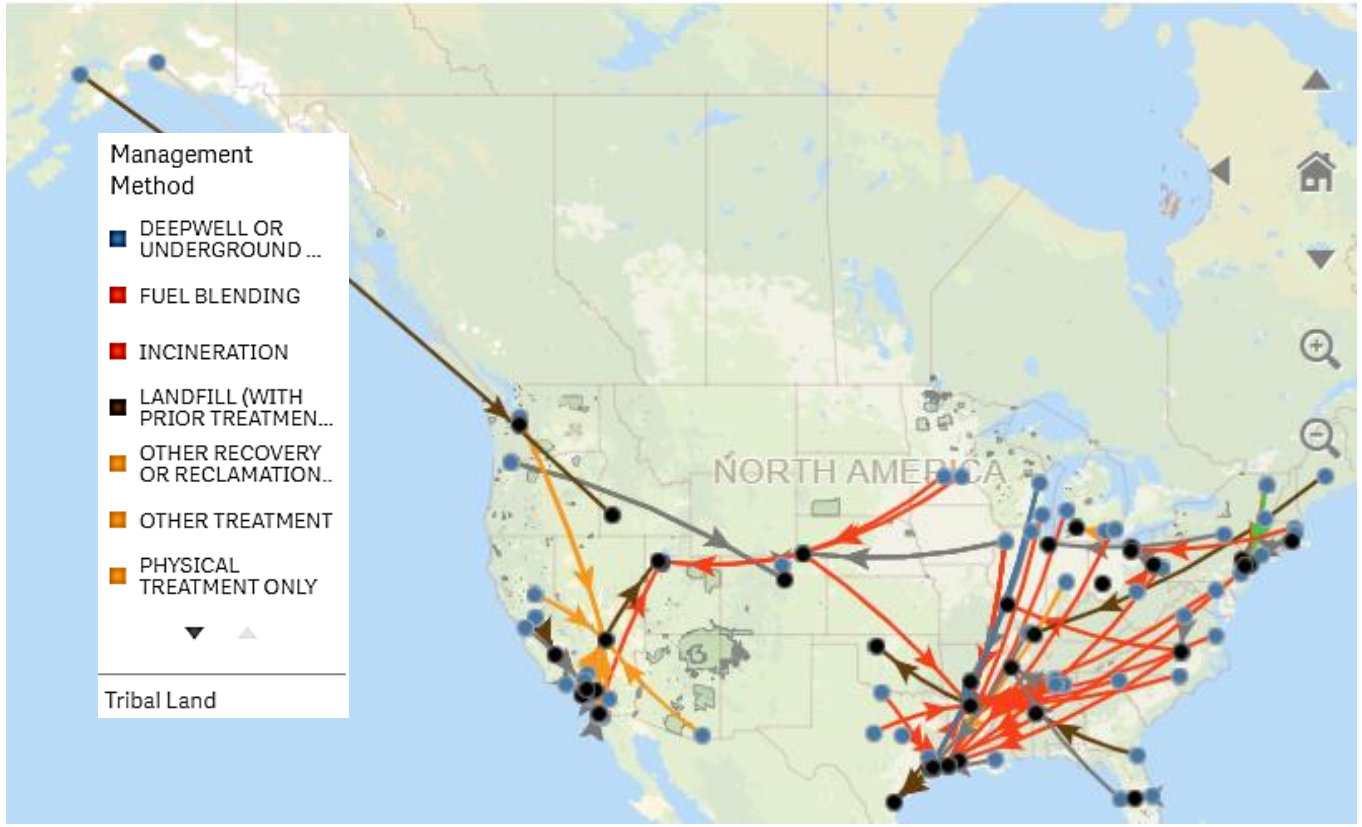
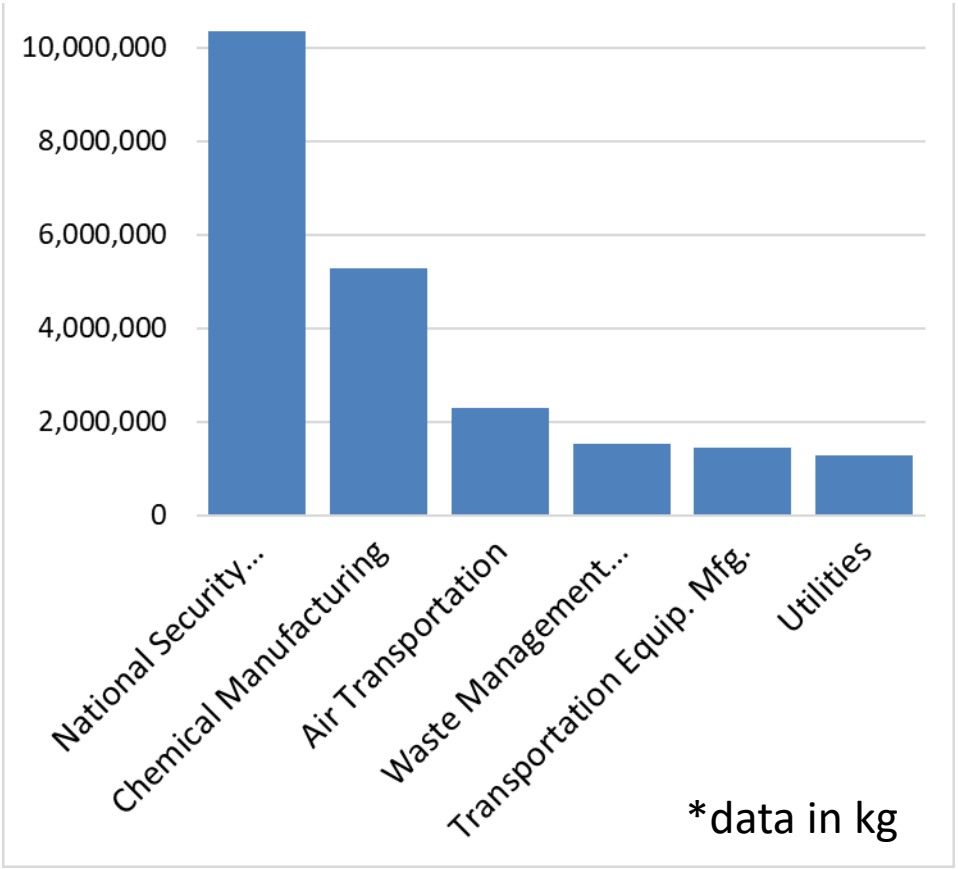
PFAS Waste Transfers and Management Methods



- What waste management methods are used at centralized waste management facilities - incineration, deep well injection, landfilling?

PFAS Waste Generation, by Industry Sector*

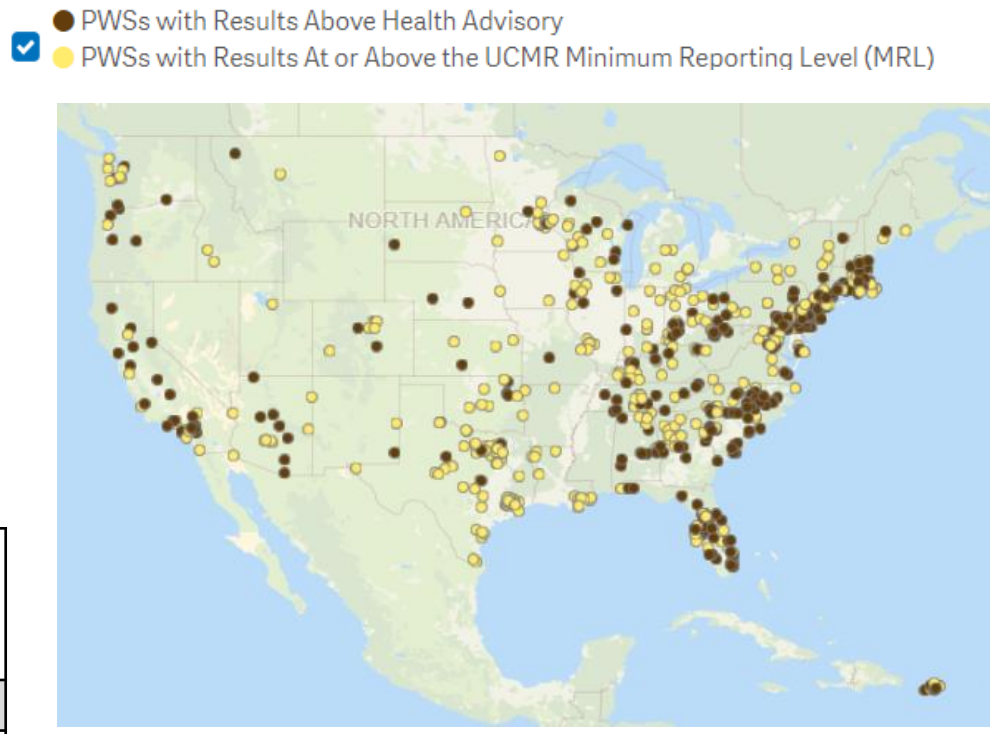


- The top 3 sectors generating PFAS waste: national security, chemical manufacturing, and airports.

PFAS Detected at 27% of Public Water Systems (PWS)

Data Summary	Total Count	With Detection(s) above Minimum Reporting Limit (MRL)	Result ≥ Health Advisory Level
PWSs	3,196	854 (27%)	418 (13%)

PWSs in All States Detected PFAS



PFPeA and PFHxA Were the Most Frequently Detected PFAS

Contaminant	PWSs in Selection	PWSs with Results ≥ MRL	PWSs with Results > HA	Minimum Reporting Level (ng/L)	Health Advisory (ng/L)
PFPeA	3,072	345	0	3	N/A
PFHxA	3,072	300	0	3	N/A
PFBS	3,072	298	0	3	2000
PFBA	3,073	295	0	5	N/A
PFOS	3,070	253	253	4	0.02
PFOA	3,072	221	221	4	0.004
PFHxS	3,072	188	0	3	N/A

- PFAS occurrence data helps inform public health response and water treatment infrastructure planning.

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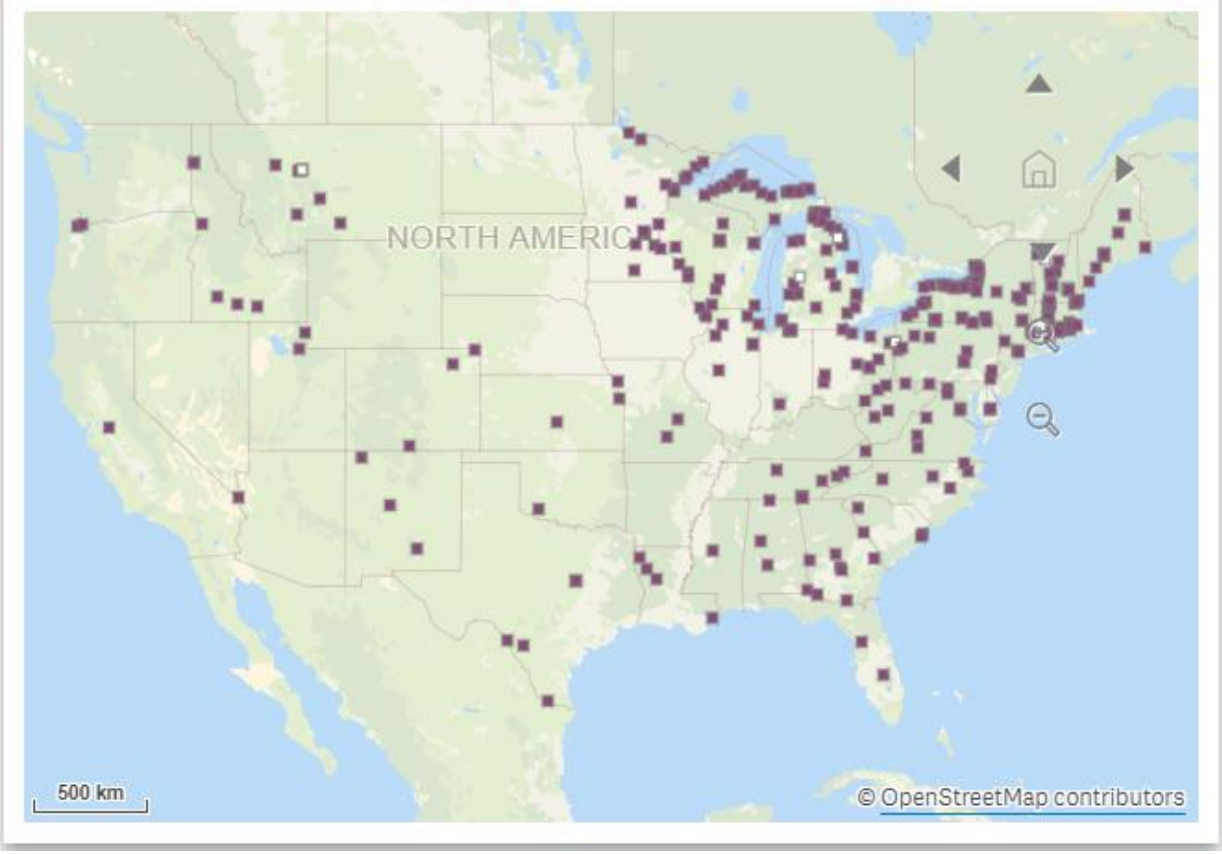
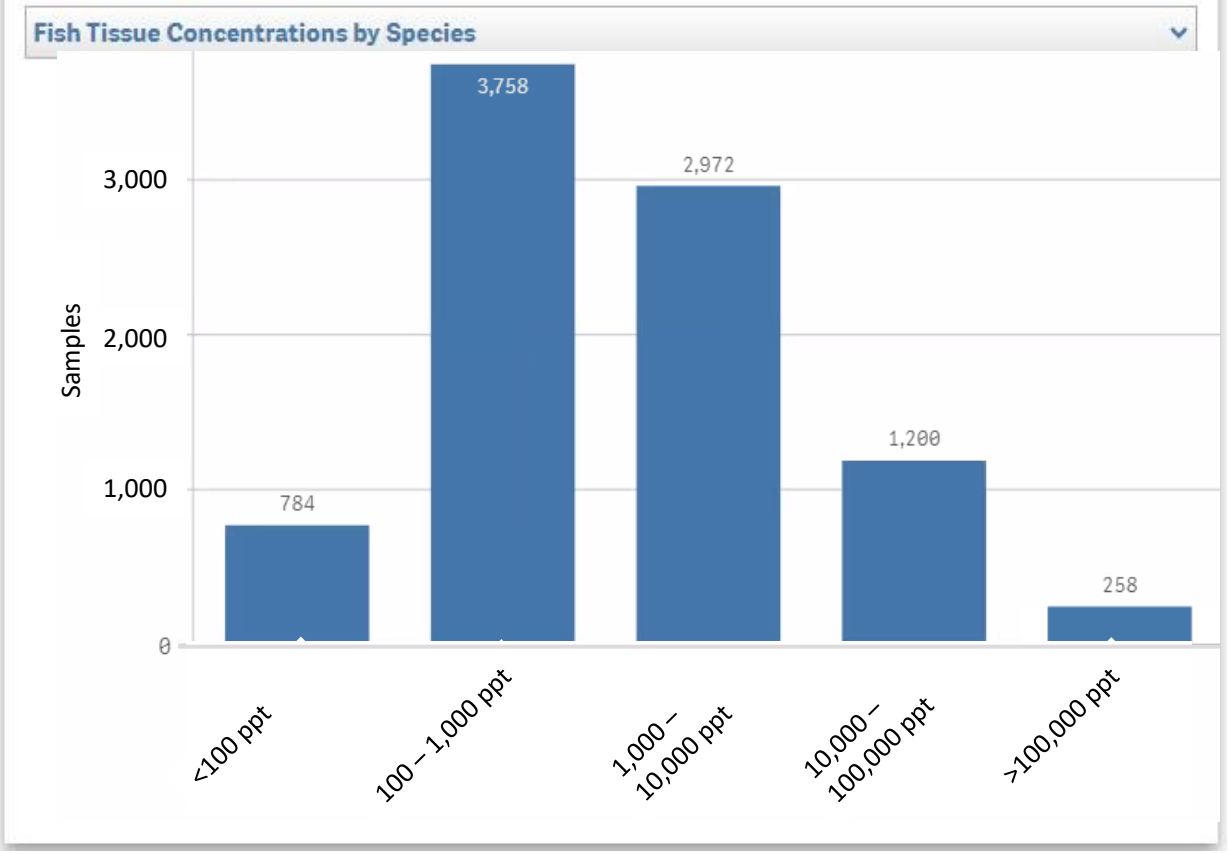
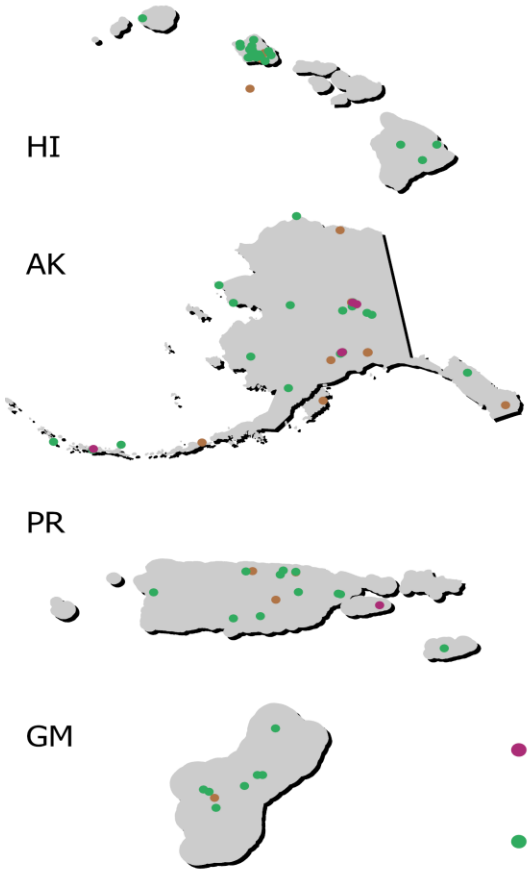
Fish Tissue Testing

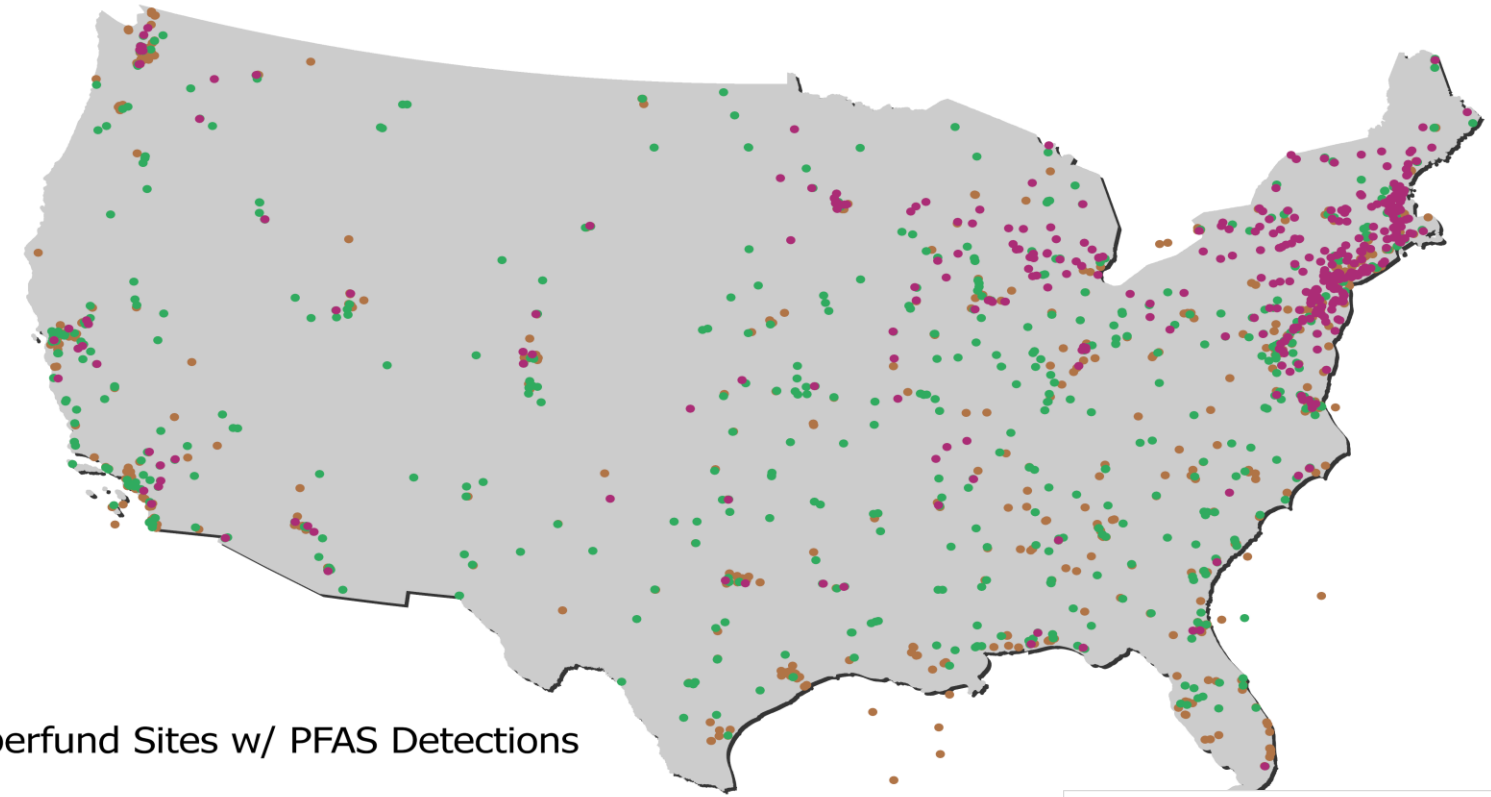


Fish Tissue Samples by Concentration Category



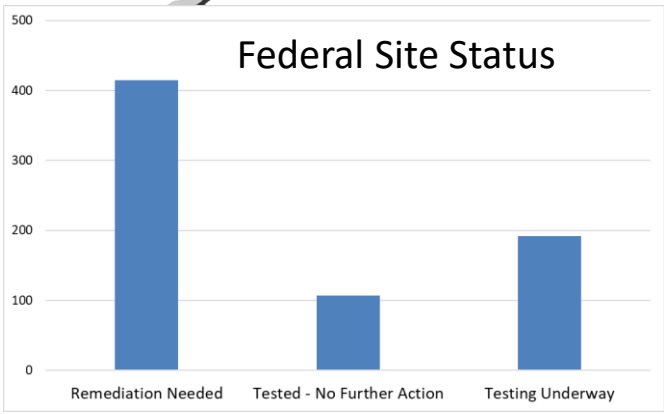
- PFAS in fish tissue detected in every state where testing has been conducted.





- Superfund Sites w/ PFAS Detections
- Federal Sites Being Investigated for PFAS Use and Release
- Releases of PFAS and Firefighting Foam Reported to National Response Center

Service Layer Credits: Esri, Tor



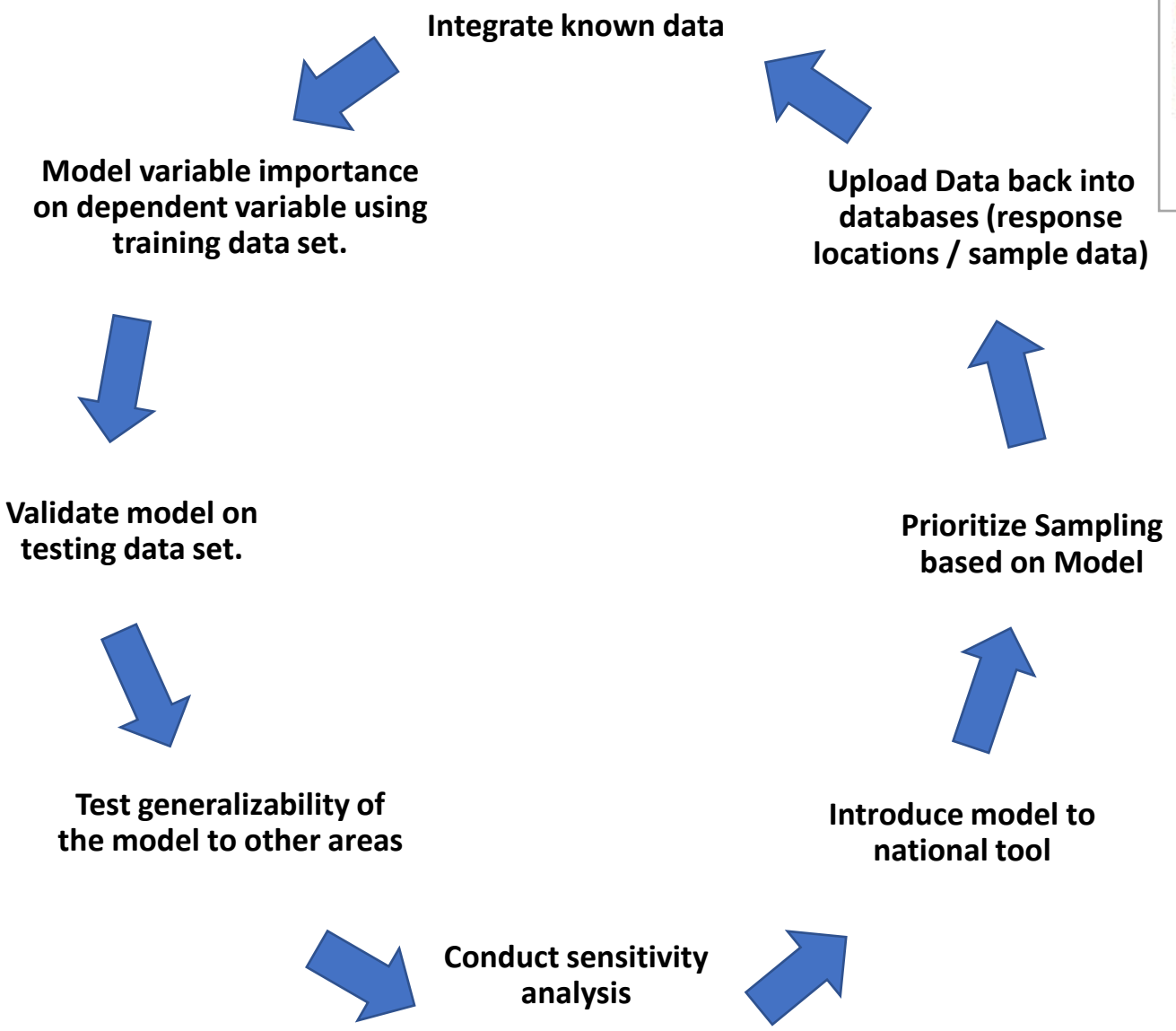
Key Information Not Universally Available

- No readily available national database
  - Drinking water private well testing
  - Sampling of the majority of small drinking water systems
  - Blood test results or local concentrated health studies
  - Detailed analysis relating to sites under study/investigation

- Database available, but no required entry (sparse data amount)
  - Fish tissue data (weak in some jurisdictions)
  - Air and Soil Detections (rarely available)

Note: some of the data above is posted by states or localities but is not in a national system.

Potential Future Direction - Predictive Analytics



Perfluoroalkyl and Polyfluoroalkyl Substances in Groundwater Used as a Source of Drinking Water in the Eastern United States

Peter B. McMahon*, Andrea K. Tokranov, Laura M. Bexfield, Bruce D. Lindsey, Tyler D. Johnson, Melissa A. Lombard, and Elise Watson

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

Using Geospatial Data and Random Forest To Predict PFAS Contamination in Fish Tissue in the Columbia River Basin, United States

Nicole M. DeLuca*, Ashley Mullikin, Peter Brumm, Ana G. Rappold, and Elaine Cohen Hubal

https://pubs.acs.org/doi/full/10.1021/acs.est.3c03670

- Integration of data has allowed agencies and academia to identify trends and patterns across data sets.
- If sampling data and investigations are fed back into the application models can learn a large-scale reinforced learning process.

Key Take Aways

- Mine existing data sources and implement data visualization software to portray PFAS detections across a wide variety of environmental media
- Start with what is available rather than waiting for data to be complete
- Develop an internal testing period to integrate data sets and conduct software testing
- Be ready to expand to new data sources as new regulations or reporting become required
- U.S. EPA encourages other countries use similar strategies to better understand PFAS contamination and ensure communities receive full data access

Comments or questions can be sent to barrette.michael@epa.gov