ENVIRONMENTAL HEALTH: WHAT HEALTH PRACTITIONERS AND INFORMATION SPECIALISTS NEED TO KNOW

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Northeastern University

Alissa Cordner, PhD
Whitman College


Photo credit: Detoxie

PFAS Project Lab

Northeastern University

www.pfasproject.com

The PFAS Project Lab studies social, scientific, and political factors related to Per- and Polyfluoroalkyl substances (PFAS).

We produce rigorous, accessible research about the PFAS contamination crisis through collaborations with impacted communities, leading interdisciplinary researchers, and nonprofits.

We share this PFAS research with impacted communities and a broad range of other stakeholders.

Funding: NSF SES-1827817, SES-2120510, and "Systematizing Data on PFAS and Health" Northeastern University TIER 1 Award

Presentation Overview

Who we are

Overview of Environmental Health and Toxicants (Julia)

Case study of per- and polyfluoroalkyl substances (PFAS):

- PFAS 101 (Alissa)
- PFAS-Tox Database (Julia)
- Contamination Tracker (Alissa)
- Governance Database (Alissa)

Resources for health practitioners and information specialists (Julia)

Question and Answer

Post-session Activity

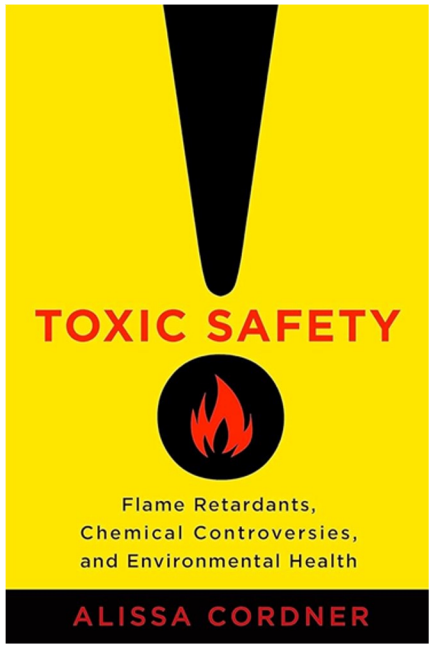
Alissa Cordner, PhD.

Environmental Sociologist

PFAS Project Lab
Northeastern University

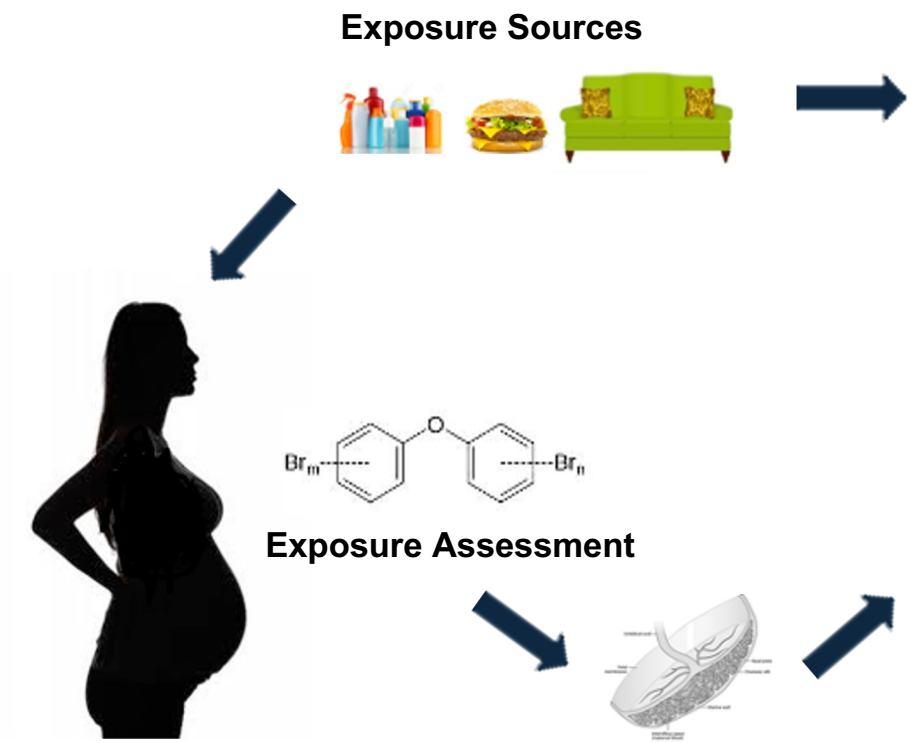
How do we[1] make decisions about what we do[2] or what we should do[3] in the face of uncertainty[4]?

1. ***As individuals, institutions, and society***
2. ***Individual and group level behaviors***
3. ***Norms, policy, and regulation***
4. ***Uncertainty is inevitable***



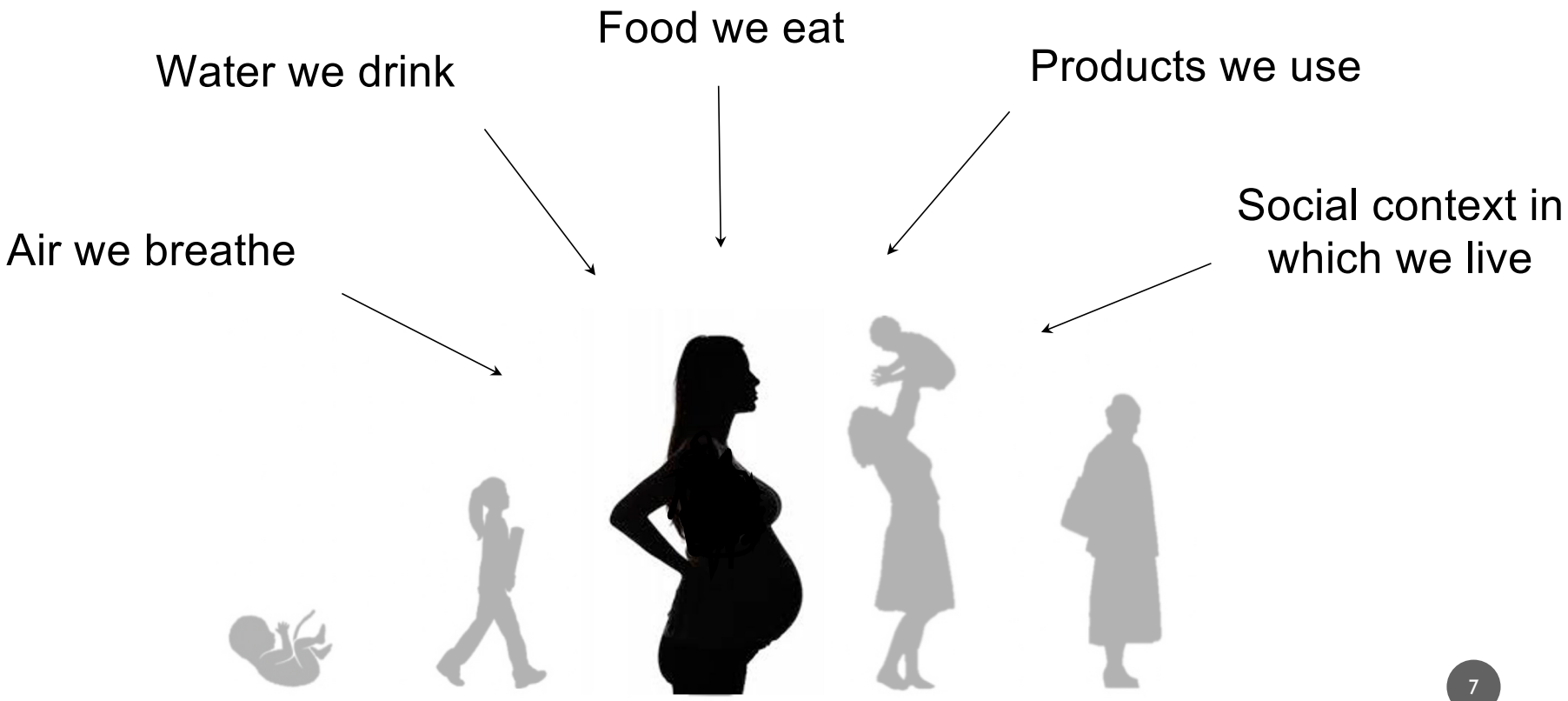
Julia Varshavsky, PhD, MPH

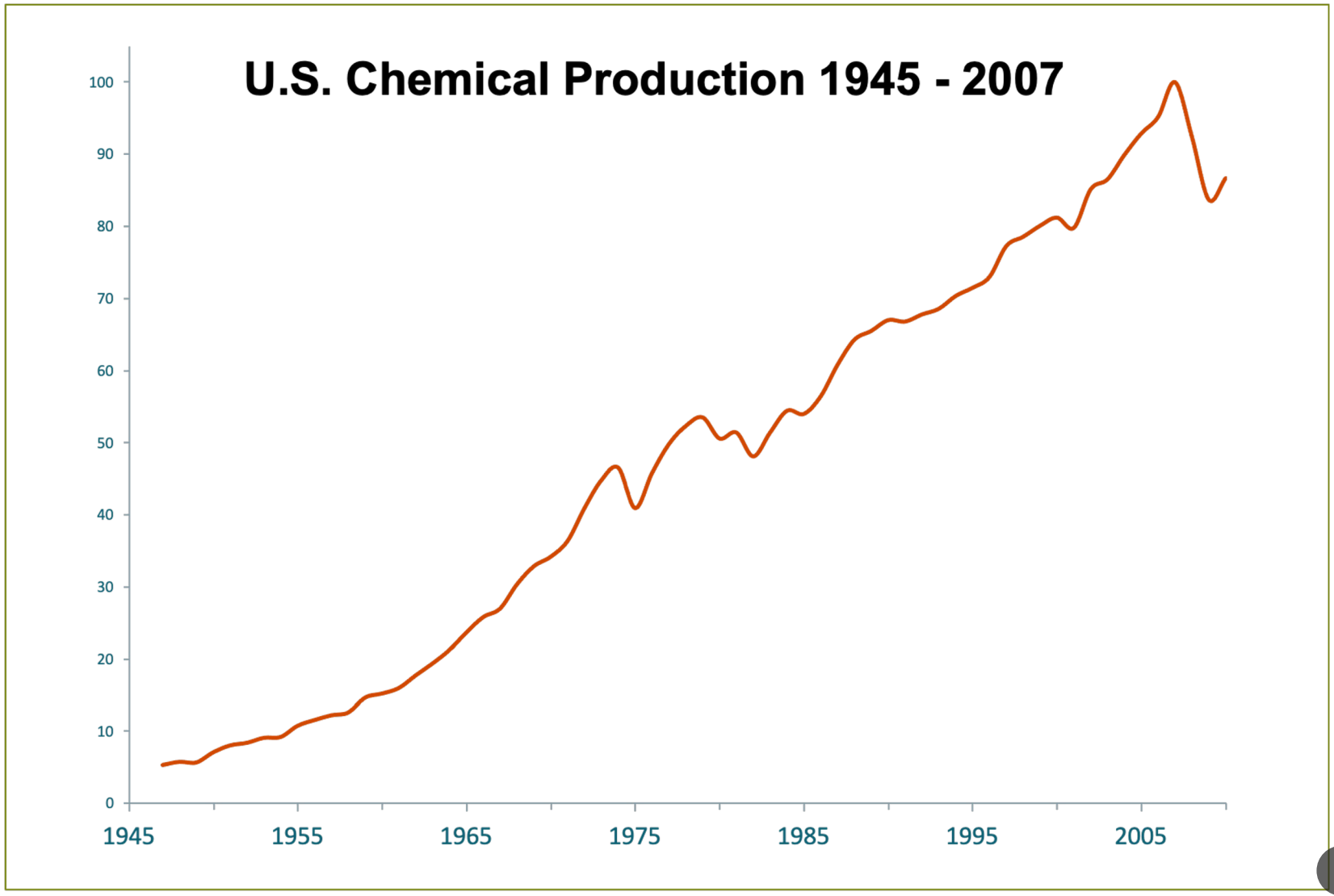
Expertise: Interdisciplinary expertise in exposure assessment, toxicology, and environmental epidemiology (also: translating science into action!)



OVERVIEW OF ENVIRONMENTAL HEALTH AND TOXICANTS

ENVIRONMENTAL EXPOSURES AND HUMAN HEALTH





Data from: U.S. Federal Reserve Board, Division of Research and Statistics

8

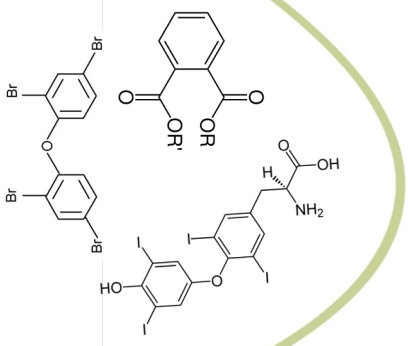
Limited toxicity data on >80,000 chemicals in widespread use

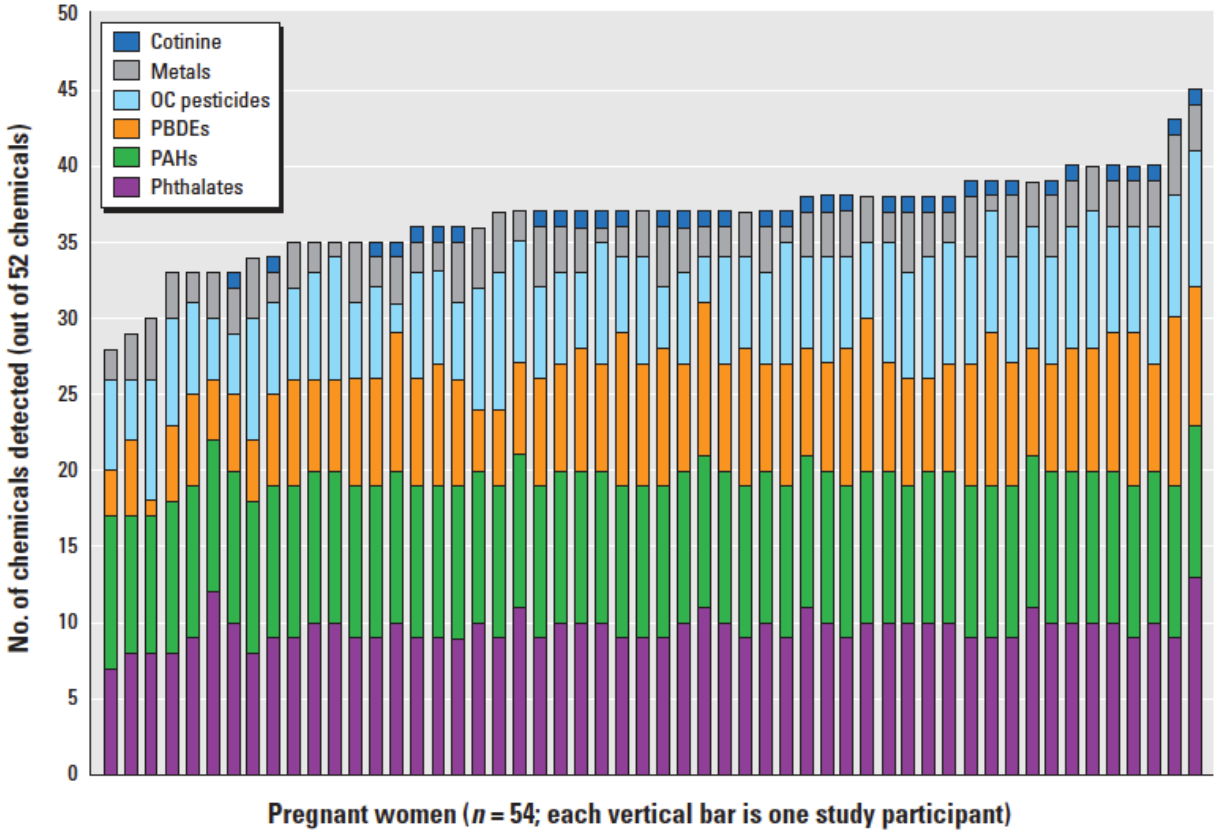
Phthalates, phenols/parabens, polybrominated flame retardants (PBDEs), organophosphate flame retardants (OPFRs), heavy metals, per- and polyfluoroalkyl substances (PFAS), etc.

Food contact materials and processing practices	Building materials and household furniture	Personal care products/cosmetics	Childcare articles and medical devices

https://www.epa.gov/tsca-inventory, http://www.feednavigator.com/Markets/Cargill-spends-10m-on-food-processing-upgrade; http://hydrangeahippo.com/tag/fast-food/; https://cathedralkitchen.org/about_us/fast_facts/, safbaby.com, https://www.houstonpress.com/, https://saferchemicals.org, https://cahealthynailsalons.org/.

Ubiquitous chemical exposures among pregnant individuals in the U.S. Population





Woodruff TJ, Zota AR, Schwartz JM 2011. Environmental Chemicals in Pregnant Women in the US: NHANES 2003-2004. Environ Health Perspect :-. doi:10.1289/ehp.1002727

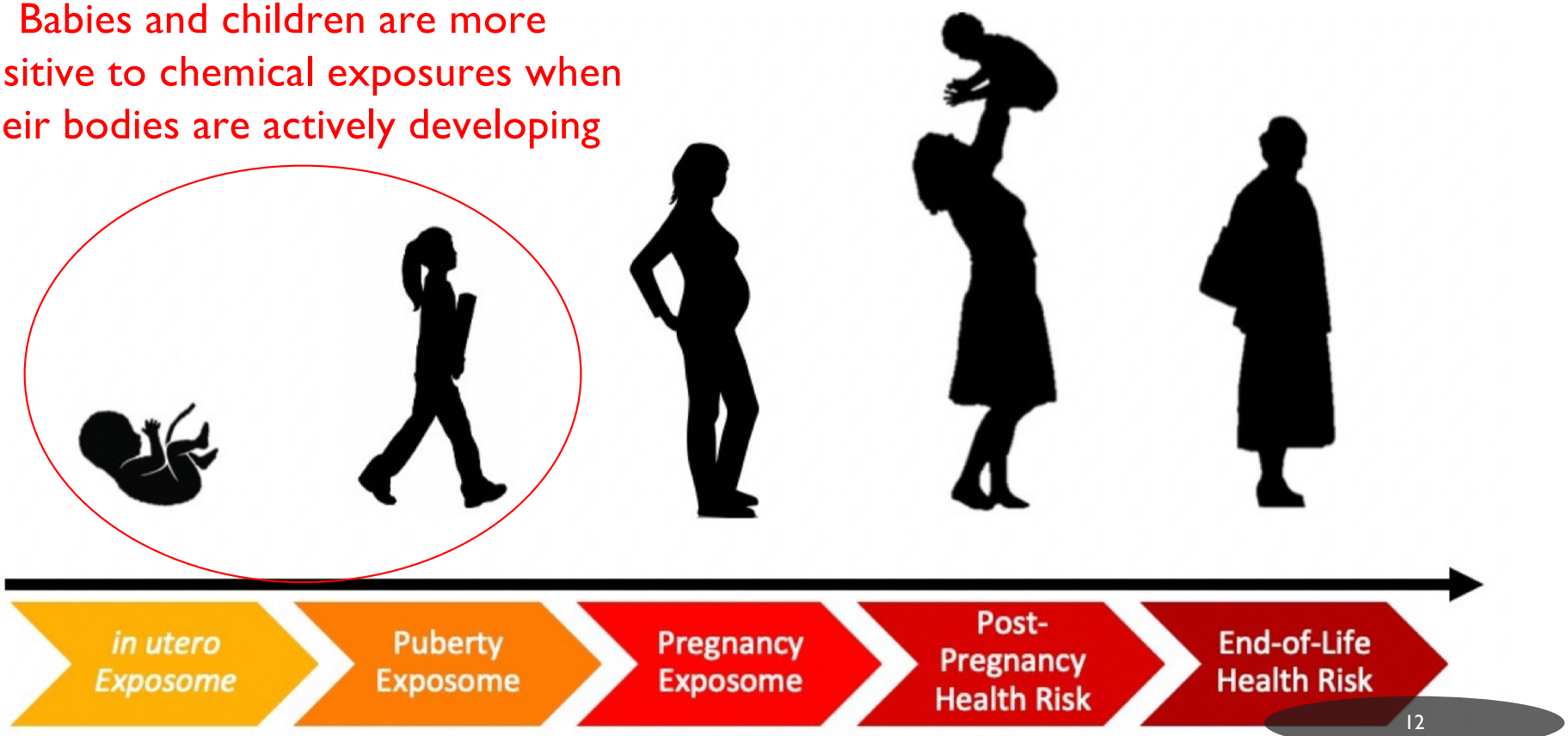
… “ to a disturbing extent, babies are born pre-polluted.”

National Cancer Institute

Photo credit: https://www.ucsf.edu/news/2017/06/407416/toxic-exposure-chemicals-are-our-water-food-air-and-furniture

Life span susceptibility to biologically active environmental chemical exposures

Babies and children are more sensitive to chemical exposures when their bodies are actively developing



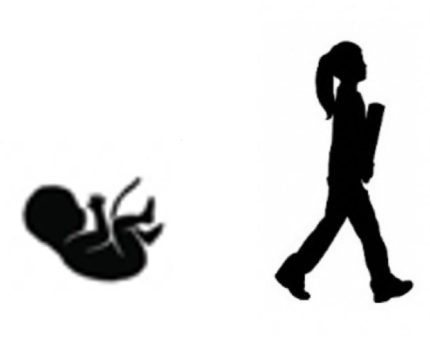
HUMAN HEALTH IMPACTS OF ENDOCRINE DISRUPTING CHEMICALS (EDCs)

Total U.S. EDC disease cost: $340 billion

- Neurodevelopmental
- Fertility/reproductive Health
- Pregnancy/maternal health complications
- Adverse birth outcomes
- Asthma, cancer, cardiovascular disease, diabetes, obesity, cancer

Leading drivers of cost

- Polybrominated Diphenyl Ethers (PBDEs)
  - Reduced intelligence quotient (IQ)
- Phthalates
  - Reproductive/developmental effects
- Per- and poly-fluoroalkyl substances (PFAS)
  - Low birthweight

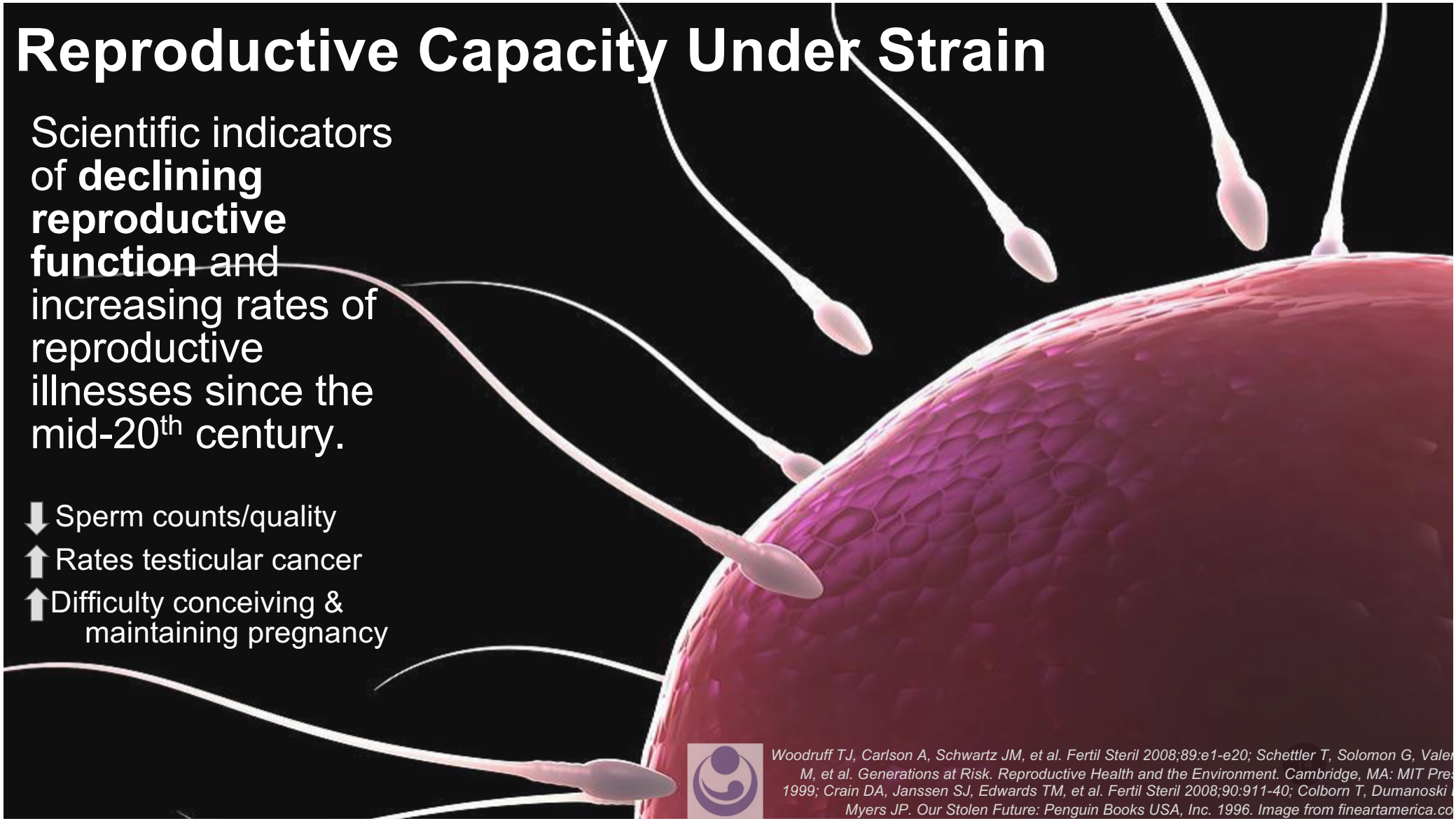


Attina et al. The Lancet 2016, Obsekov et al. Expo Health 2023

Reproductive Capacity Under Strain

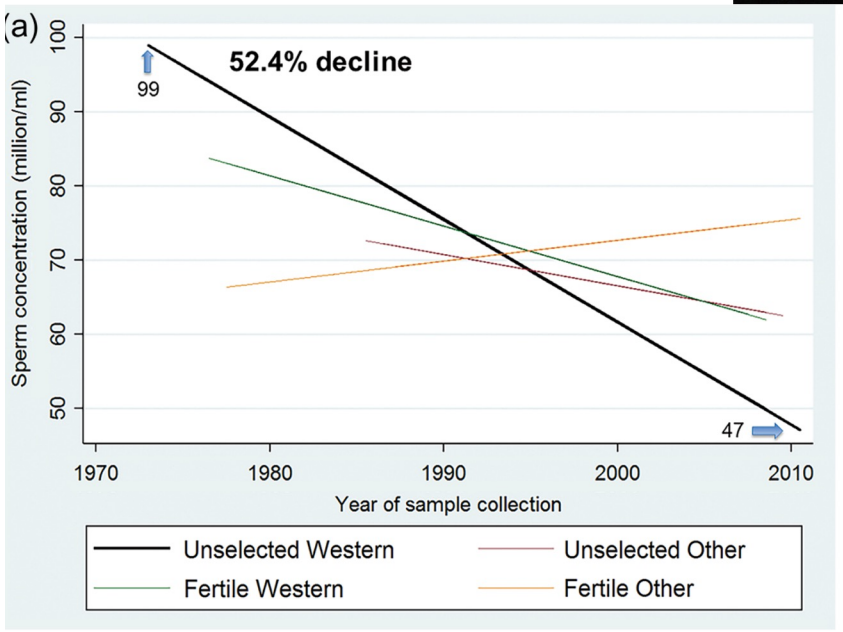
Scientific indicators of **declining reproductive function** and increasing rates of reproductive illnesses since the mid-20th century.

- ⬇ Sperm counts/quality
- ⬆ Rates testicular cancer
- ⬆ Difficulty conceiving & maintaining pregnancy



Woodruff TJ, Carlson A, Schwartz JM, et al. Fertil Steril 2008;89:e1-e20; Schettler T, Solomon G, Valen M, et al. Generations at Risk. Reproductive Health and the Environment. Cambridge, MA: MIT Pres 1999; Crain DA, Janssen SJ, Edwards TM, et al. Fertil Steril 2008;90:911-40; Colborn T, Dumanoski Myers JP. Our Stolen Future: Penguin Books USA, Inc. 1996. Image from fineartamerica.co

Systematic review and meta-analysis of 124 studies concludes 50% reduction in 40 years



"We should hope for the best and prepare for the worst," said Hagai Levine, a lead author of the study. "And that is the possibility that we will become extinct."

Levine et al. 2017. Temporal trends in sperm count: a systematic review and meta-regression analysis. Hum Reaprod Update. doi:10.1093/humupd/dmx022

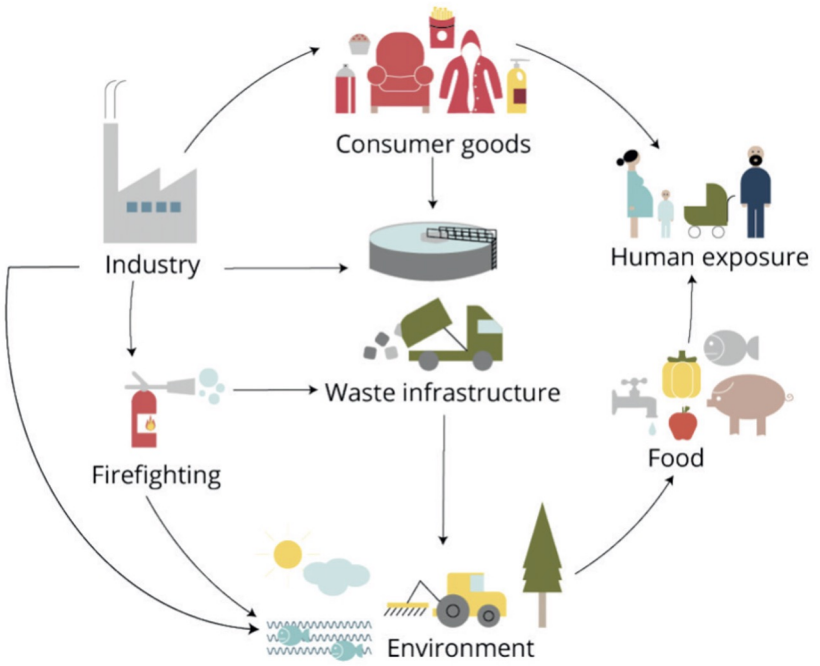
OTHER CONCERNING HEALTH TRENDS NOT SUFFICIENTLY EXPLAINED BY KNOWN FACTORS

- ***Pregnancy complications***: preeclampsia in younger pregnant people, gestational diabetes
- ***Cardiometabolic diseases***: diabetes, obesity, non-alcoholic fatty liver disease, cardiovascular disease
- ***Learning and developmental disabilities***: autism spectrum disorders, cognitive and behavioral issues
- ***Increased autoimmune disease***: Ulcerative colitis, rheumatoid arthritis, asthma, allergies
- ***Cancer***: pediatric, reproductive, other types

Case study of per- and polyfluoroalkyl substances (PFAS)

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

- Large class of chemicals: +/- 14,000 depending on what "counts" as a PFAS
- Highly persistent in the environment and human body
- Bioaccumulative in wildlife and people
- Mobile in water
- >99% of people have detectable levels of PFAS in blood
- Used in countless industrial and consumer applications



https://www.eea.europa.eu/publications/emerging-chemical-risks-in-europe

PFAS USES AND EXPOSURE SOURCES

Consumer Products:

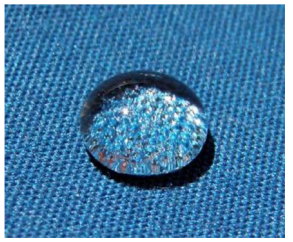
countless uses, including…

- Non-stick cookware
- Waterproof clothing
- Mattresses, carpeting
- Grease-proof food packaging
- Dental floss
- Cosmetics
- Pesticides
- Climbing and mountaineering equipment
- COVID-19 testing equipment and PPE

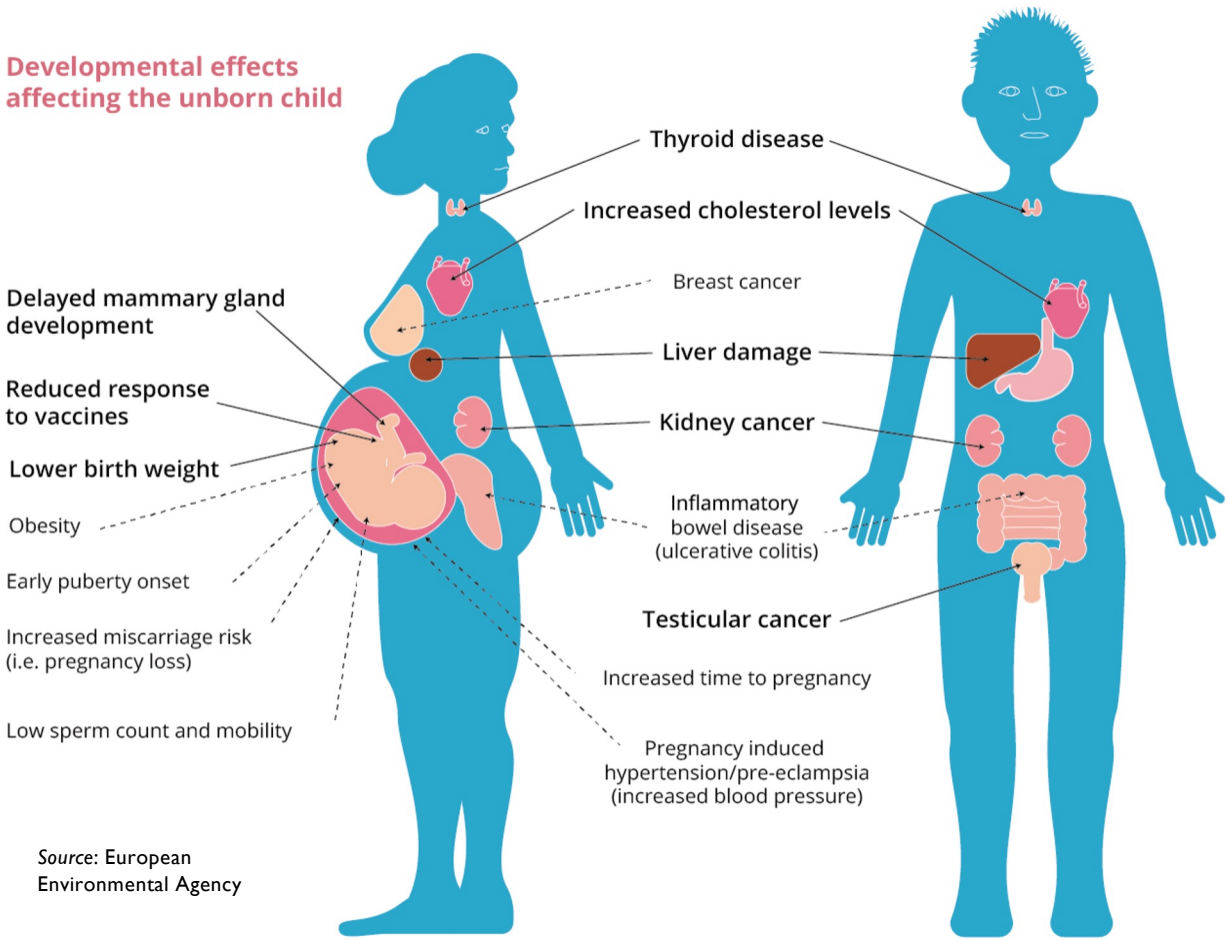
Industrial Processes:

>200 use categories (Glüge et al. 2020), including…

- Air conditioning
- Class-B firefighting foam (AFFF)
- Mining and fracking
- Paper and packaging production
- Semi-conductor manufacturing
- Textile production and processing
- Water and effluent treatment
- Wire and cable insulation



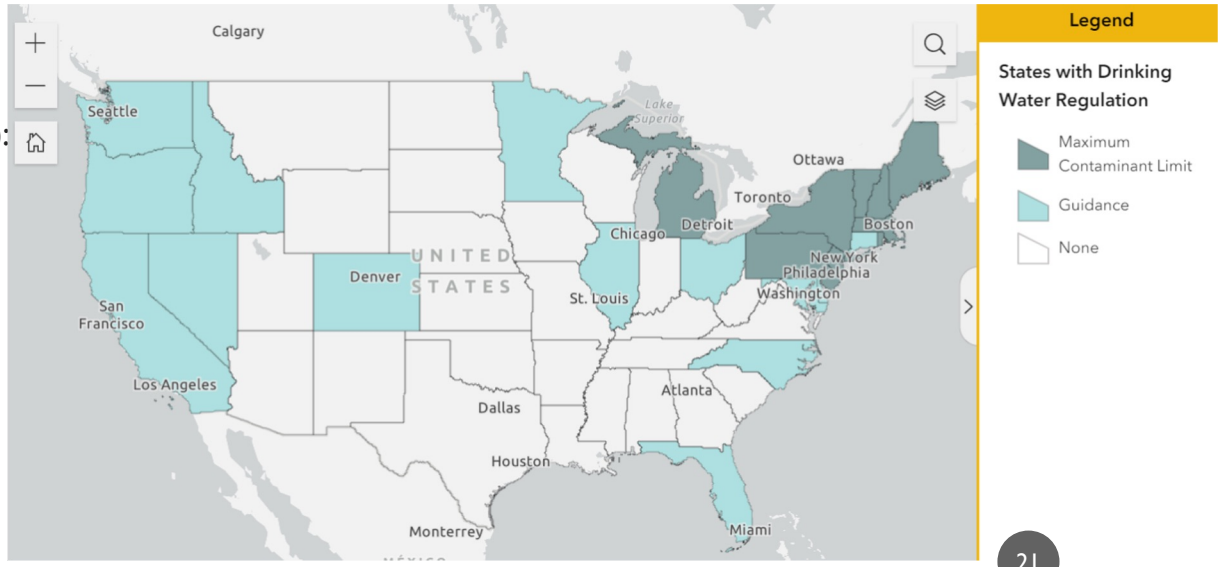
HUMAN HEALTH EFFECTS



Source: European Environmental Agency

REGULATION AND MONITORING

- Proposal to designate PFOA and PFOS as hazardous under CERCLA
- Several states have enacted enforceable regulation and have conducted additional testing
- March 2023 EPA proposed Maximum Contaminant Levels
  - PFOA: 4ppt
  - PFOS: 4ppt
  - PFNA, PFHxS, PFBS, and GenX (HFPO-DA):
    - 1.0 unit "hazard index" approach:
      - PFNA: equivalent of 10 ng/L
      - PFHxS: equivalent of 9 ng/L
      - PFBS: equivalent of 2,000 ng/L
      - GenX: equivalent of 10 ng/L

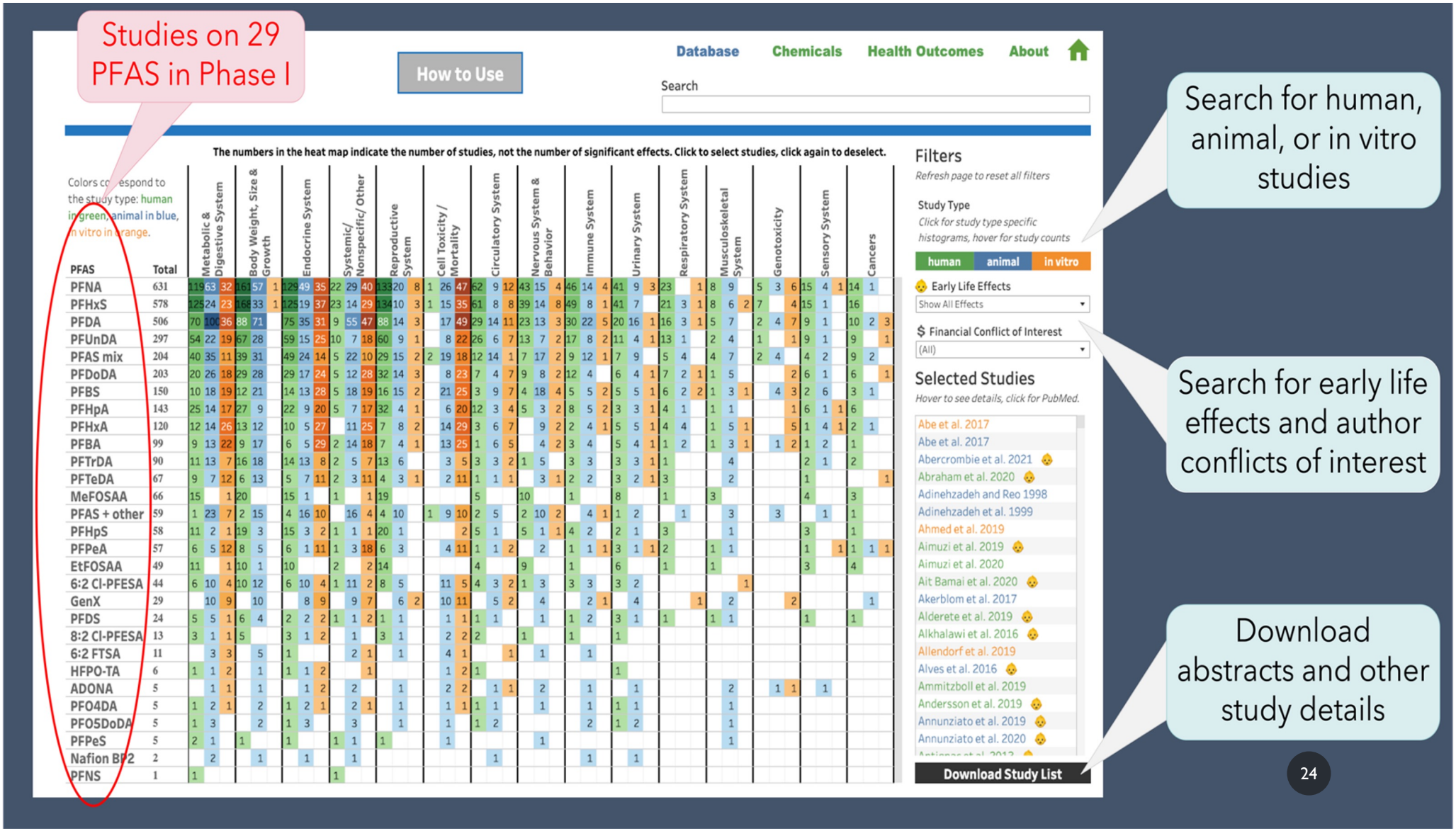


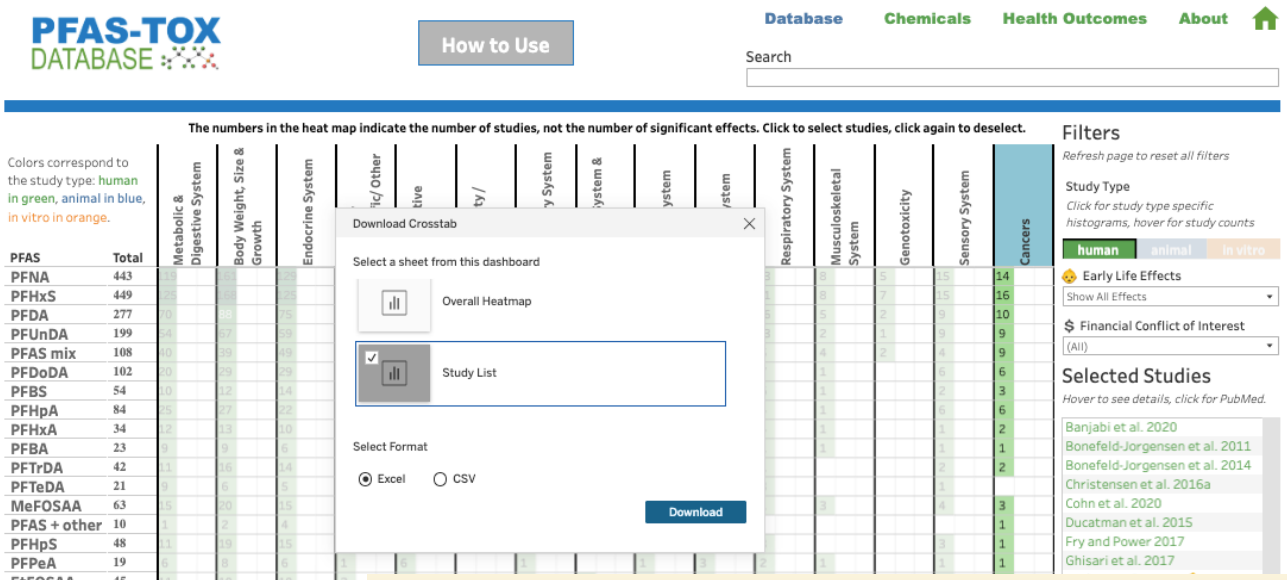
PFAS-TOX DATABASE

The PFAS-Tox Database

A systematic evidence map of over 1,000 studies on health and toxicology outcomes related to PFAS

pfastoxdatabase.org


Studies on 29 PFAS in Phase I
How to Use
Database
Chemicals
Health Outcomes
About
Search
The numbers in the heat map indicate the number of studies, not the number of significant effects. Click to select studies, click again to deselect.
Colors correspond to the study type: human in green, animal in blue, in vitro in orange.
PFAS
Total
Metabolic & Digestive System
Body Weight, Size & Growth
Endocrine System
Systemic/ Nonspecific/ Other
Reproductive System
Cell Toxicity / Mortality
Circulatory System
Nervous System & Behavior
Immune System
Urinary System
Respiratory System
Musculoskeletal System
Genotoxicity
Sensory System
Cancers
PFNA 631
PFHxS 578
PFDA 506
PFUnDA 297
PFAS mix 204
PFDoDA 203
PFBS 150
PFHpA 143
PFHxA 120
PFBA 99
PFTrDA 90
PFTeDA 67
MeFOSAA 66
PFAS + other 59
PFHpS 58
PFPeA 57
EtFOSAA 49
6:2 Cl-PFESA 44
GenX 29
PFDS 24
8:2 Cl-PFESA 13
6:2 FTSA 11
HFPO-TA 6
ADONA 5
PFO4DA 5
PFO5DoDA 5
PFPeS 5
Nafion BP2 2
PFNS 1
Filters
Refresh page to reset all filters
Study Type
Click for study type specific histograms, hover for study counts
human
animal
in vitro
Early Life Effects
Show All Effects
$ Financial Conflict of Interest
(All)
Selected Studies
Hover to see details, click for PubMed.
Abe et al. 2017
Abe et al. 2017
Abercrombie et al. 2021
Abraham et al. 2020
Adinehzadeh and Reo 1998
Adinehzadeh et al. 1999
Ahmed et al. 2019
Aimuzi et al. 2019
Aimuzi et al. 2020
Ait Bamai et al. 2020
Akerblom et al. 2017
Alderete et al. 2019
Alkhalawi et al. 2016
Allendorf et al. 2019
Alves et al. 2016
Ammitzboll et al. 2019
Andersson et al. 2019
Annunziato et al. 2019
Annunziato et al. 2020
Download Study List
Search for human, animal, or in vitro studies
Search for early life effects and author conflicts of interest
Download abstracts and other study details



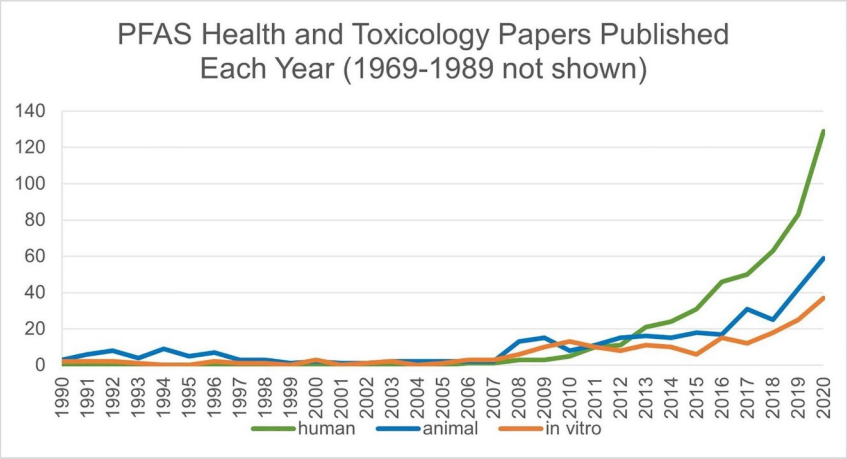
SEARCH FOR ALL HUMAN STUDIES ON CANCER

Choose "Study List" for a list of your search results in excel or CSV format that will include a number of useful study details, including abstract, study design, sample size, and information about exposure and outcome measurements.

N1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Human studies on cancer and all PFAS														
2	Authors	Type	Absract	Funding	COI	Study Design	PFAS	Sex	N (total)	Location	Age at Exposur	Exposure	Exposure Values	Age at Outcon	Outcomes Measured
3	Banjabi et al. 2020	human	Human exposure	The author	Conflict of	Case control	PFBA, PFPeA, PFI	Male, F	208	Jeddah Saudi A	20+ years	serum	<0.006 - 77.4 ng/mL	20+ years	Osteoporosis, calcium, vitamir
4	Bonefeld-Jorgensen et al.	human	BACKGROUND:	We thank a	The author	Case control	PFHpA, PFOA, PF	Female	146	Greenland	20+ years	serum	0.2 - 184 ng/mL	20+ years	Breast cancer
5	Bonefeld-Jorgensen et al.	human	OBJECTIVE: Ani	We thank t	The author	Case control	PFPeA, PFHxA, Pf	Female	483	Denmark	pregnancy	serum	<0.02 - 30.6 ng/mL	20+ years	Breast cancer, BMI
6	Christensen et al. 2016a	human	BACKGROUND:	The author	Conflict of	Cohort	PFBA, PFPeA, PFI	Male	154	United States	20+ years	serum	0.12 - 71.6 µg/L	20+ years	Cardiovascular, thyroid, and li
7	Cohn et al. 2020	human	We tested the hy	We acknov	The author	Case control	PFHpA, PFOA, PF	Female	412	United States	pregnancy	serum	0.1 - 58.2 ng/mL	20+ years	Breast cancer
8	Ducatman et al. 2015	human	PURPOSE: To in	The author	Dr Ducatma	Cohort	PFOA, PFNA, PFH	Male	25,412	United States	20+ years	serum	1.5 - 46.0 ng/mL	20+ years	Prostate-specific antigen
9	Fry and Power 2017	human	BACKGROUND:	We thank t	The author	Cross sectiona	PFOA, PFNA, PFH	Male, F	1,043	United States	20+ years	serum	1.0 - 23.7 ng/g	20+ years	Total mortality, death from ca
10	Ghisari et al. 2017	human	In the present ca	We thank a	The author	Case control	PFPeA, PFHxA, Pf	Female	411	Denmark	pregnancy	serum	0.61 - 40.10 ng/mL	20+ years	Breast cancer
11	Graber et al. 2019	human	INTRODUCTION:	We would l	The author	Cross sectiona	PFPeA, PFHxA, Pf	Male, F	105	Paulsboro Unite	12+ to 20 yea	serum	0.5 - 21.7 µg/L	12+ to 20 yea	BMI, 32 self-reported symptor
12	Hardell et al. 2014	human	Perfluorinated all	Ms Iréne L	Conflict of	Case control	PFHxA, PFOA, PFI	Male	387	Sweden	20+ years	whole blo	0.02 - 69 ng/mL	20+ years	Prostate cancer
13	Hurley et al. 2018	human	BACKGROUND:	We expres	The author	Case control	PFHpA, PFOA, PF	Female	1760	United States	20+ years	serum	0.006 - 99.8 ng/mL	20+ years	Risk of breast cancer
14	Li et al. 2020d	human	Even though the	No acknow	The author	Case control	PFHpA, PFOA, PF	Female	397	Oakland United	pregnancy, 20	serum	na - na Not reported	pregnancy, 2(	Breast cancer, metabolomics
15	Lin et al. 2020b	human	Environmental er	We also ac	The author	Case control	PFHpA, PFOA, PF	Male, F	84	Shanghai China	birth to 1 year	serum	0.03 - 360.5 ng/mL	0 to 1 years, 1	Germ cell tumor
16	Mastrantonio et al. 2018	human	Background: Per	Authors tha	None decla	Ecological	PFBA, PFPeA, PFI	Male, F	N/A	Italy	20+ years	drinking w	10 - 500 ng/L	20+ years	All cause and specific mortalit
17	Omoike et al. 2020a	human	BACKGROUND:	No acknow	The author	Cross sectiona	PFOA, PFNA, PFD	Male, F	11,631	United States	20+ years	serum	<0.1 - 281.0 ng/mL	20+ years	Ovarian cancer, Prostate can
18	Shearer et al. 2020	human	BACKGROUND:	The author	The author	Case control	PFOA, PFNA, PFD	Male, F	648	United States	20+ years	serum	<0.1 - 154.2 µg/L	20+ years	Renal cell carcinoma
19	Tsai et al. 2020	human	Breast cancer (B	No acknow	Conflict of	Case control	PFHxA, PFHpA, Pf	Female	239	Taiwan	20+ years	plasma	0.24 - 5.73 ng/mL	20+ years	Breast cancer risk
20	Wielsoe et al. 2017	human	BACKGROUND:	The author	The author	Case control	PFPeA, PFHxA, Pf	Female	161	Greenland	20+ years	serum	0.03 - 283.68 ng/mL	20+ years	Breast cancer
21	Wielsoe et al. 2018	human	This study invest	The author	The author	Case control	PFHpA, PFOA, PF	Female	161	Nuuk Greenlan	20+ years	serum	Not reported	20+ years	Genotype frequencies as mea
22	Wielsøe et al. 2018	human	Studies on assoc	The author	The author	Case control	PFHpA, PFOA, PF	Female	161	Greenland	20+ years	serum	7.0 - 73.9 ng/mL	20+ years	Breast cancer, estrogenic and

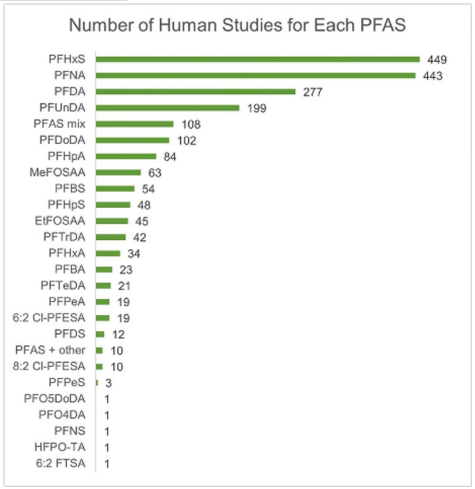
PFAS and health/toxicology studies have increased dramatically in recent years, with human studies increasing almost exponentially since 2010

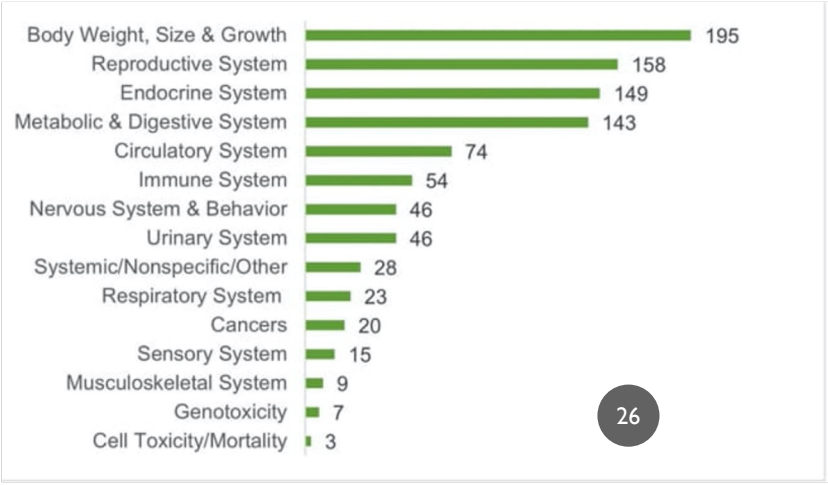


Over 15,000 studies retrieved from the literature search, 1,067 studies (505 human, 385 animal, and 220 *in vitro*) identified and included as investigating health or toxicological effects of one or more PFAS of interest.

Most human studies were cross-sectional (48%) or cohort (39%) designs, with body weight/size/growth (n=195), reproductive (n=158), endocrine (n=149), and metabolic/digestive systems (n=143) examined as the most common health outcomes.

Pelch et al. Env Int 2022

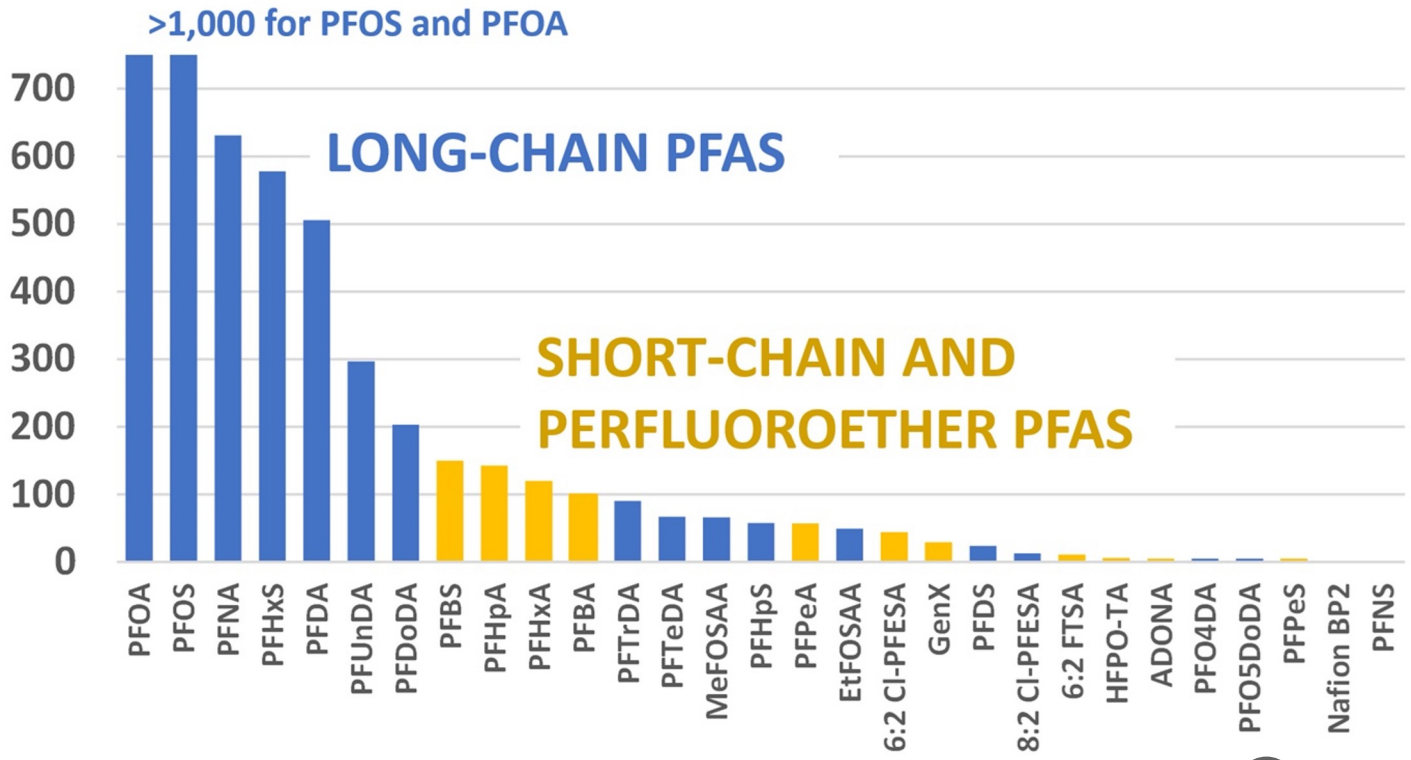




Most studies have focused on long-chain PFAS, newer PFAS are far less studied

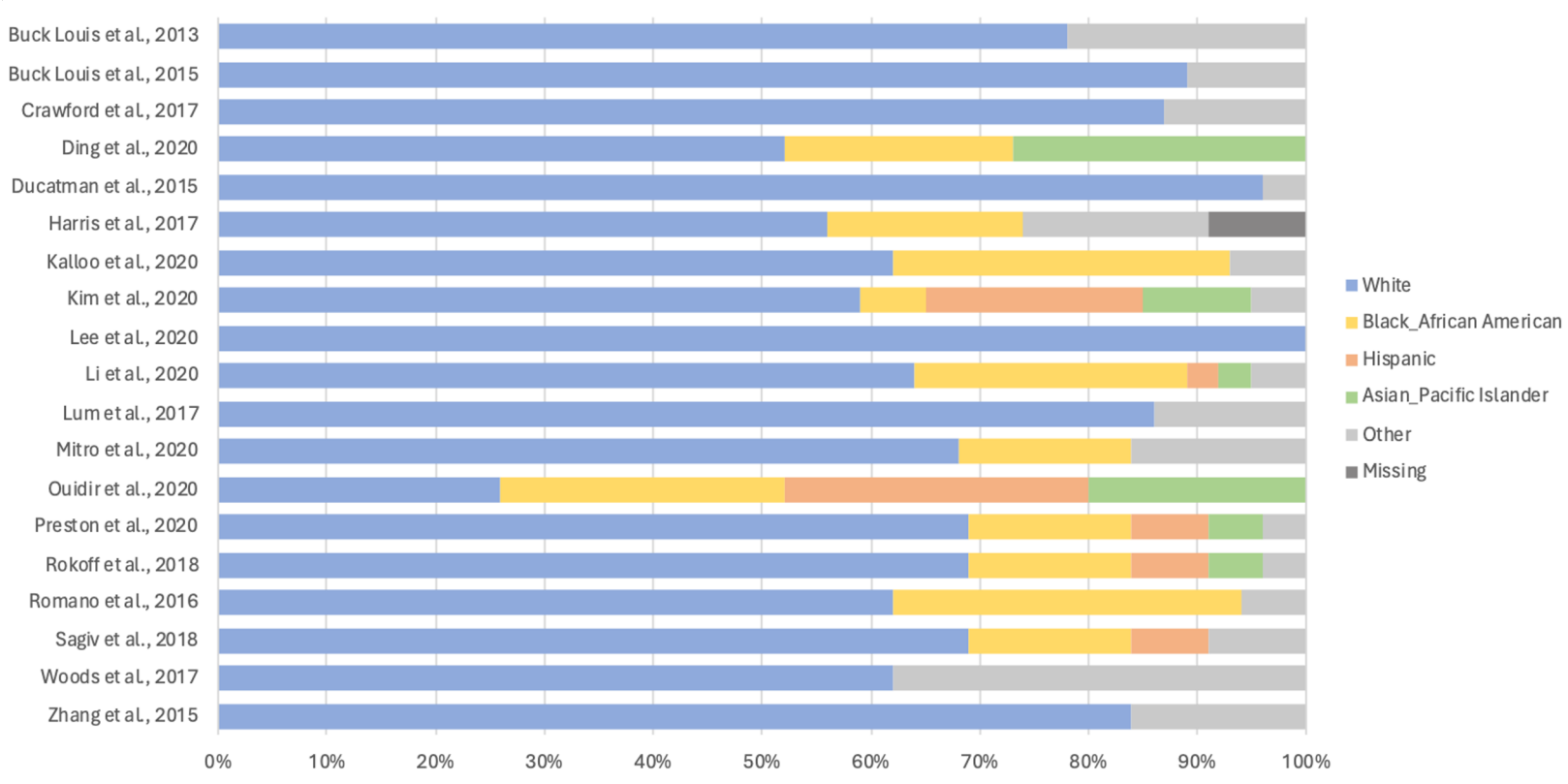
PFAS-TOX DATABASE

Number of studies on each PFAS



Slide courtesy of Laurel Schaider

White compared to BIPOC participants disproportionately represented in epidemiologic studies on PFAS and reproductive health



Few studies included Asian/Pacific Islander

No studies included Native American

Figure credit: Lauren Ellis

Balmaseda et al. In Progress

RIGOROUS SYSTEMATIC REVIEWS ON PFAS AND HEALTH OUTCOMES OF INTEREST TO DECISION-MAKERS AND OTHER STAKEHOLDERS

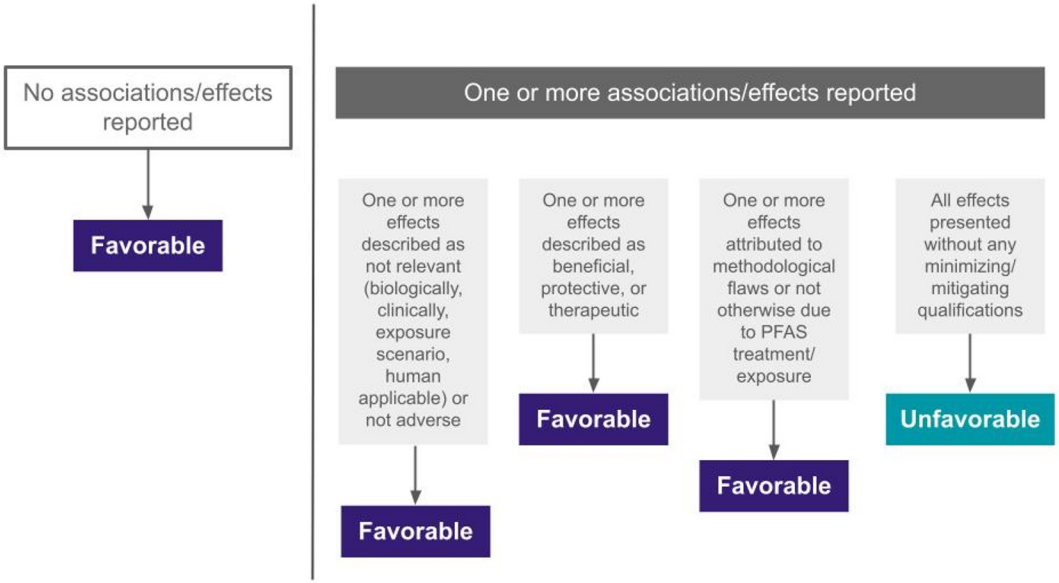
The effect of PFAS exposure on gestational diabetes mellitus (GDM) and its subclinical risk factors: A systematic review and meta-analysis protocol

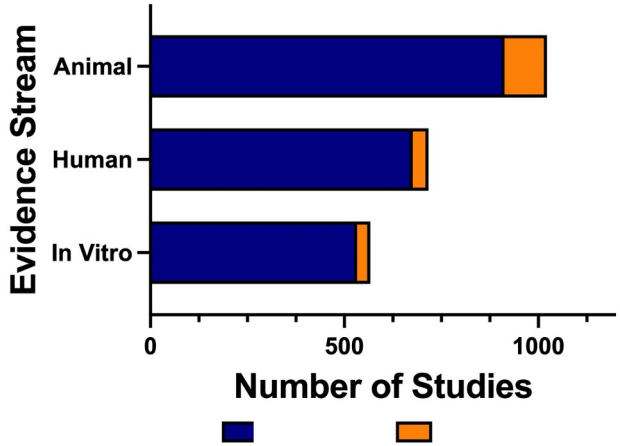
Category	Criteria
Population	People who are pregnant at the time of outcome assessment
Exposure	Any individual PFAS/PFAS mixture based on measurement in maternal blood or urine, including both legacy (long-chain) PFAS such as PFOA and PFOS and newer replacement (short-chain) PFAS such as GenX.
Comparators	Unexposed to PFAS (if applicable) or lowest PFAS exposure group
Outcomes	Both clinical and subclinical measures of gestational diabetes: GDM diagnosis, impaired glucose tolerance (IGT) diagnosis, fasting plasma glucose, postprandial plasma glucose, random plasma glucose, blood HbA1C, fasting plasma insulin, fasting plasma C-peptide, HOMA-IR value, HOMA-IS value, blood TNFα and FABP4

Bline et al. Under Review, Environment International

OTHER APPLICATIONS OF PFAS-TOX DATABASE IN OUR LAB

Determine if epidemiological and experimental animal studies with a financial conflict of interest (COI) related to PFAS production/use report industry-favorable results more frequently than studies without a financial COI.

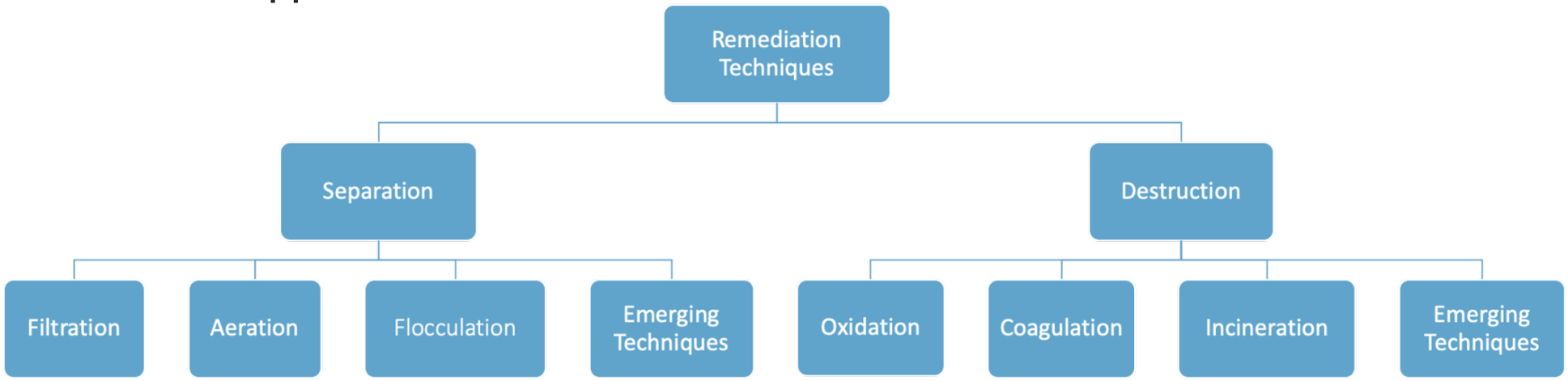




Bline et al. In Progress

OTHER APPLICATIONS OF PFAS-TOX DATABASE IN OUR LAB

Comparative analysis of 329 remediation studies (10 soil, 157 aqueous, 162 water) to better understand which remediation strategies are most viable for real-world application.



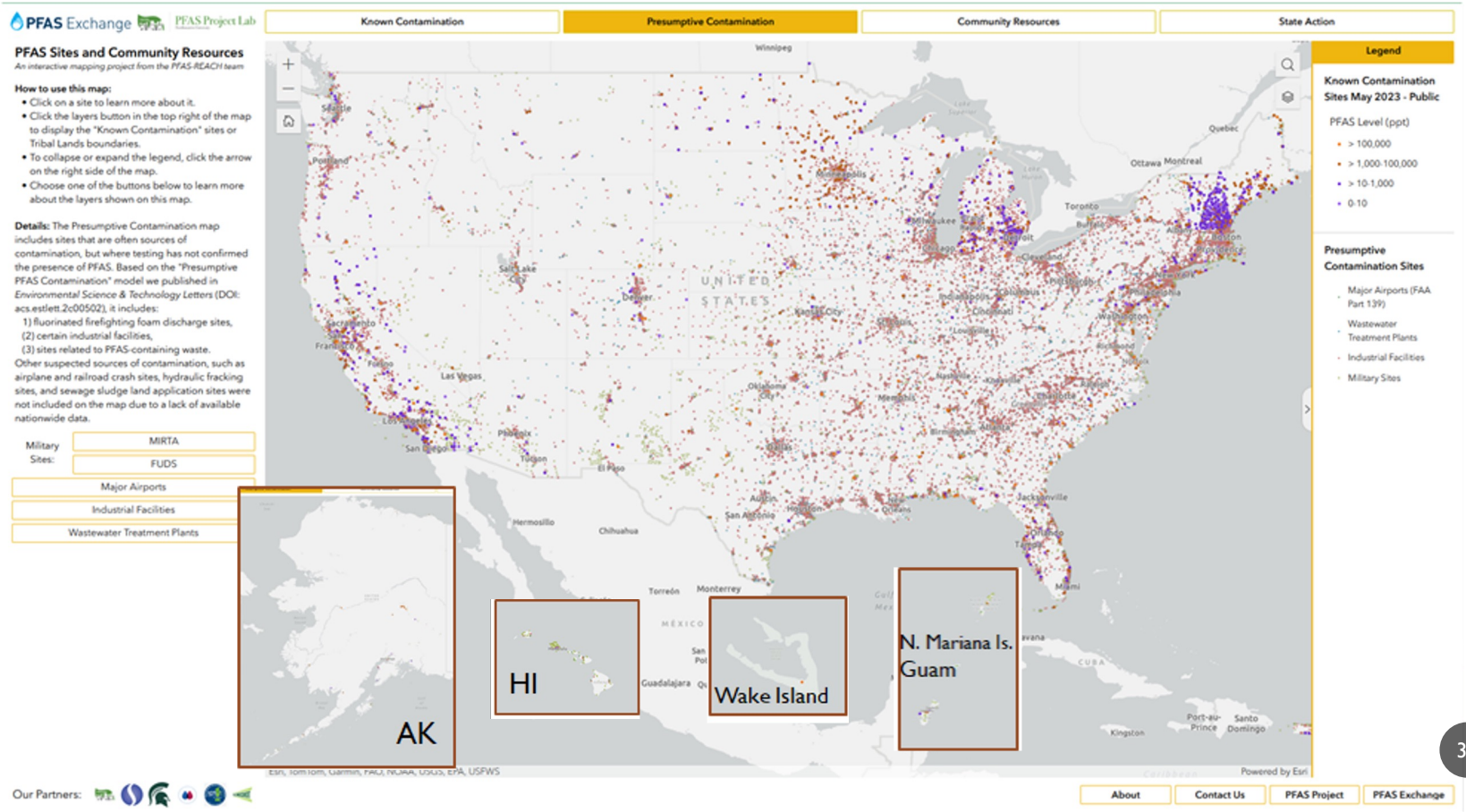
Peerman et al. In Progress

USES OF PFAS-TOX DATABASE AMONG DIVERSE STAKEHOLDERS IN THE FIELD

- Supports policy and advocacy on PFAS in drinking water, including community members and environmental lawyers
- Informs high-level decision-making in the regulatory and clinical settings through systematic reviews
- Links to EPA CompTox Dashboard and other information databases that can be used in a variety of settings
- Provides content for preliminary literature reviews that researchers can use to develop original research questions

PFAS CONTAMINATION SITE TRACKER

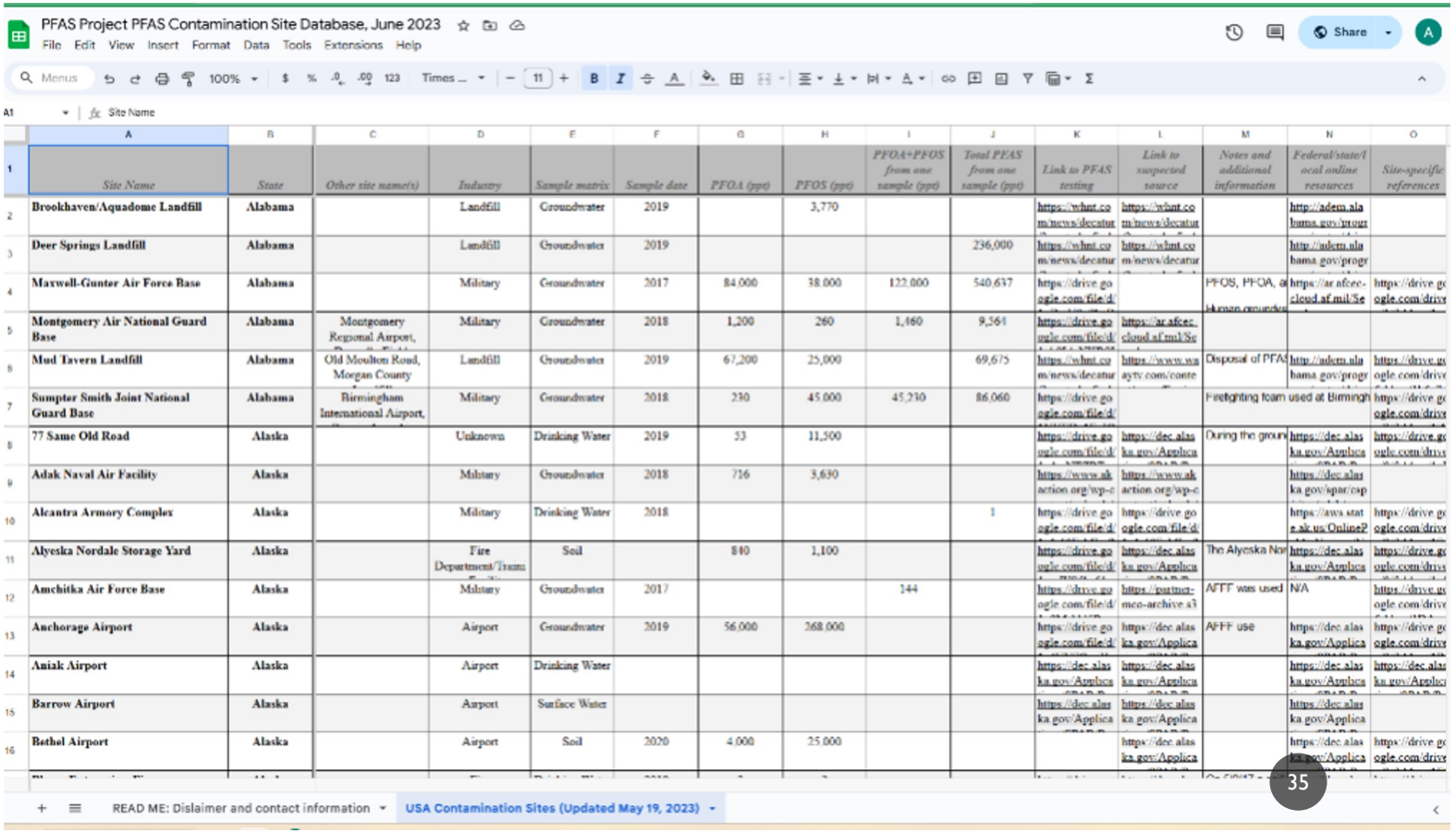
PFAS Sites and Community Resources Map: https://tinyurl.com/mappfas



Known PFAS Contamination Sites:
https://tinyurl.com/pfassites

2016: 12 sites

2024: 1,940 sites



Site Name	State	Other site name(s)	Industry	Sample matrix	Sample date	PFOA (ppt)	PFOS (ppt)	PFOA+PFOS from one sample (ppt)	Total PFAS from one sample (ppt)	Link to PFAS testing	Link to suspected source	Notes and additional information	Federal/state/local online resources	Site-specific references
Brookhaven/Aquadome Landfill	Alabama		Landfill	Groundwater	2019		3,770			https://whnt.com/news/decatur	https://whnt.com/news/decatur		http://adem.alabama.gov/progr	
Deer Springs Landfill	Alabama		Landfill	Groundwater	2019				236,000	https://whnt.com/news/decatur	https://whnt.com/news/decatur		http://adem.alabama.gov/progr	
Maxwell-Gunter Air Force Base	Alabama		Military	Groundwater	2017	84,000	38,000	122,000	540,637	https://drive.google.com/file/d/		PFOS, PFOA, a	https://ar.afcec-cloud.af.mil/Se	https://drive.google.com/drive
Montgomery Air National Guard Base	Alabama	Montgomery Regional Airport,	Military	Groundwater	2018	1,200	260	1,460	9,561	https://drive.google.com/file/d/	https://ar.afcec-cloud.af.mil/Se			
Mud Tavern Landfill	Alabama	Old Moulton Road, Morgan County	Landfill	Groundwater	2019	67,200	25,000		69,675	https://whnt.com/news/decatur	https://www.waaytv.com/conte	Disposal of PFAS	http://adem.alabama.gov/progr	https://drive.google.com/drive
Sumpter Smith Joint National Guard Base	Alabama	Birmingham International Airport,	Military	Groundwater	2018	230	45,000	45,230	86,060	https://drive.google.com/file/d/		Firefighting foam used at Birmingh		https://drive.google.com/drive
77 Same Old Road	Alaska		Unknown	Drinking Water	2019	53	11,500			https://drive.google.com/file/d/	https://dec.alaska.gov/Applica	During the groun	https://dec.alaska.gov/Applica	https://drive.google.com/drive
Adak Naval Air Facility	Alaska		Military	Groundwater	2018	716	3,630			https://www.akaction.org/wp-c	https://www.akaction.org/wp-c		https://dec.alaska.gov/spar/csp	
Alcantra Armory Complex	Alaska		Military	Drinking Water	2018				1	https://drive.google.com/file/d/	https://drive.google.com/file/d/		https://awss.state.ak.us/OnlineP	https://drive.google.com/drive
Alyeska Nordale Storage Yard	Alaska		Fire Department/Train	Soil		840	1,100			https://drive.google.com/file/d/	https://dec.alaska.gov/Applica	The Alyeska Nor	https://dec.alaska.gov/Applica	https://drive.google.com/drive
Amchitka Air Force Base	Alaska		Military	Groundwater	2017			144		https://drive.google.com/file/d/	https://partner-mco-archive.s3	AFFF was used	N/A	https://drive.google.com/drive
Anchorage Airport	Alaska		Airport	Groundwater	2019	56,000	268,000			https://drive.google.com/file/d/	https://dec.alaska.gov/Applica	AFFF use	https://dec.alaska.gov/Applica	https://drive.google.com/drive
Aniak Airport	Alaska		Airport	Drinking Water						https://dec.alaska.gov/Applica	https://dec.alaska.gov/Applica		https://dec.alaska.gov/Applica	https://dec.alaska.gov/Applica
Barrow Airport	Alaska		Airport	Surface Water						https://dec.alaska.gov/Applica	https://dec.alaska.gov/Applica		https://dec.alaska.gov/Applica	
Bethel Airport	Alaska		Airport	Soil	2020	4,000	25,000				https://dec.alaska.gov/Applica		https://dec.alaska.gov/Applica	https://drive.google.com/drive

Example: PFAS near Spokane, WA

1883	Deer Lake Area PFAS	Washington		Other	Groundwater	2022	3	3	5	15	https://drive.google.com/file/d/	https://drive.google.com/file/d/		https://drive.google.com/drive/
1884	Eastside Fire Rescue	Washington		Fire Department Train	Groundwater				2,220	2,354	https://www.issaquahwa.gov/1	https://www.issaquahwa.gov/P	AFFF used at Eastside Fire	https://www.dohwa.gov/Cons	https://drive.google.com/drive/
1885	Fairchild Air Force Base	Washington		Military	Groundwater	2017	22,000	150,000	167,000	176,200	https://drive.google.com/file/d/	https://www.epa.gov/pfas	AFFF used at Fairchild Air	https://www.do	https://drive.google.com/drive/
1886	Fort Lewis Logistics Center	Washington		Military	Unknown							https://www.epa.senate.gov/pu	Identified by the	https://cumulis.epa.gov/supers	
1887	Harrington Lagoon Area	Washington		Other	Groundwater	2022	3	80	83	251	https://drive.google.com/file/d/	https://drive.google.com/file/d/		https://apps.ecology.wa.gov/cle	https://drive.google.com/drive/
1888	Issaquah Valley Elementary School	Washington		Other	Groundwater	2022	1	85			https://drive.go	https://drive.go		https://apps.eco	https://drive.go

PFAS is in the groundwater west of Spokane. What's known about the contamination is only growing.

Oct. 29, 2023 at 6:00 am | *Updated Oct. 29, 2023 at 6:00 am*

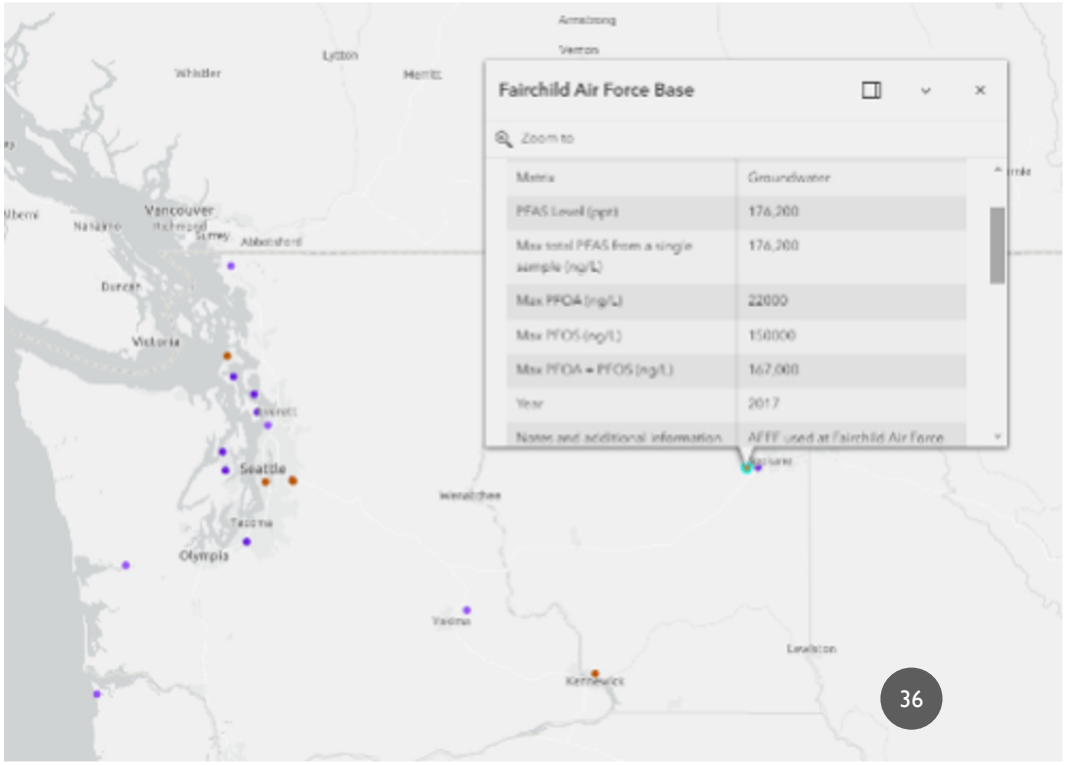
By Manuel Villa and Isabella Breda

Seattle Times staff reporters

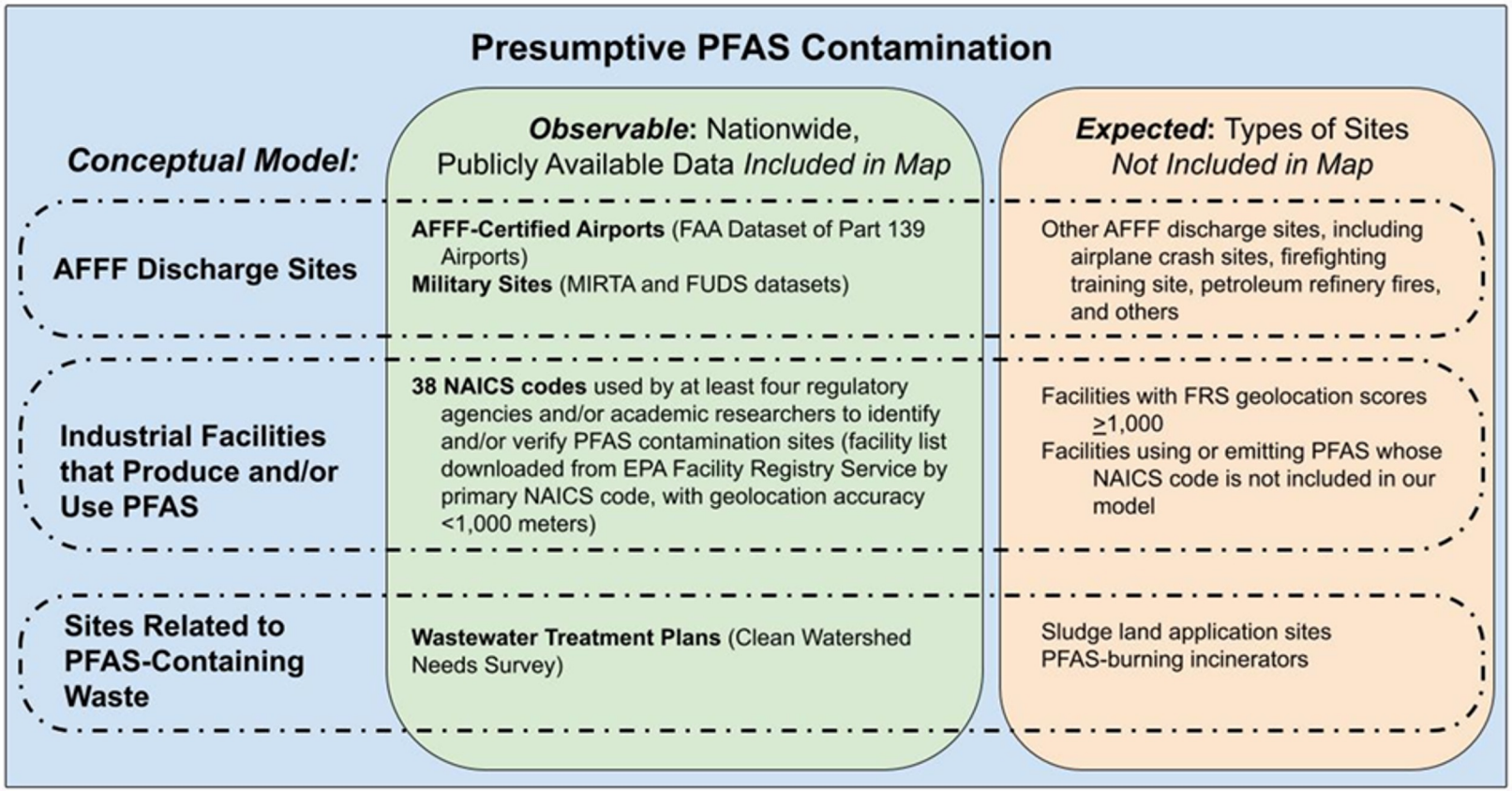
TIMES WATCHDOG Times Watchdog stories dig deep to hold power accountable, right wrongs and create change. This work is made possible by The Seattle Times Investigative Journalism Fund. Donate today to support watchdog journalism in our community.

SPOKANE COUNTY — Millions of years ago, lava poured through Eastern Washington, cooling and hardening to form the foundation of this land. Then, near the end of the last ice age, massive floods carved out river channels that would then be filled with sediment and groundwater as glaciers crept northward.

In late August, Chad Pritchard, a hydrogeologist at Eastern Washington University, drove his white minivan along Craig Road in Airway Heights. He pointed to power lines along the road. One of those ancient rivers, or paleochannels, lies beneath them, he explained.



Presumptive PFAS Contamination



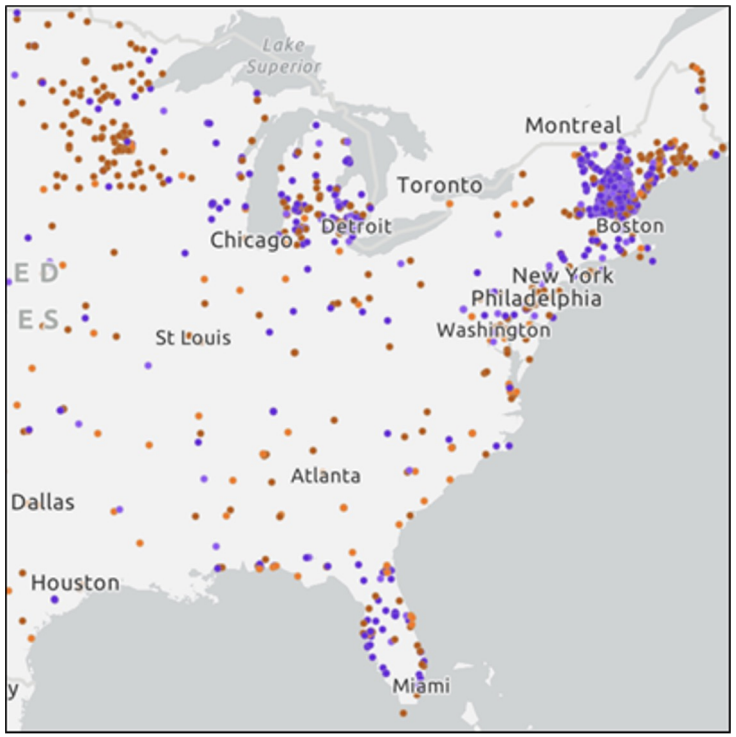
Peer-reviewed methodology:

Salvatore et al. 2022, *ES&T Letters*

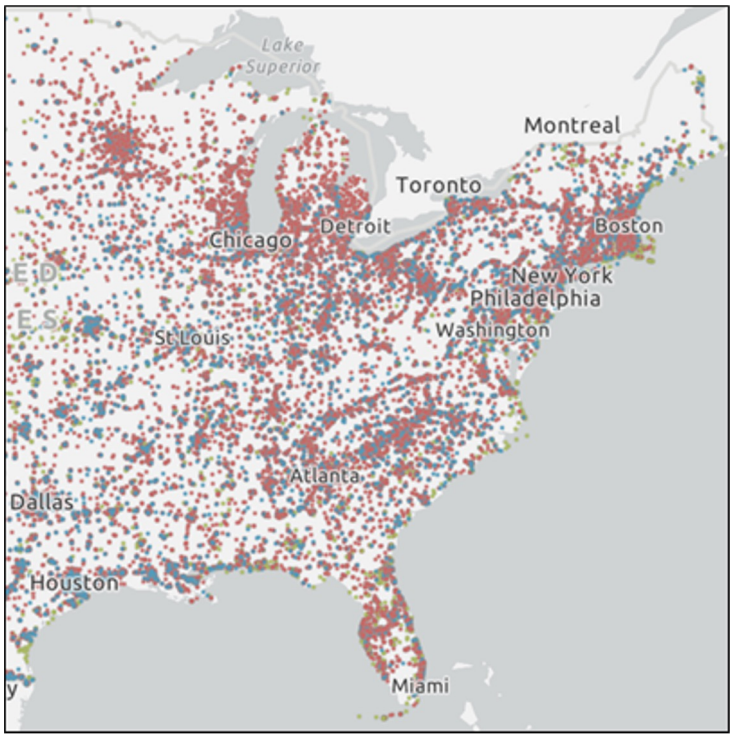
Data available upon request:
pfasproject@gmail.com

Presumptive PFAS Contamination

Known PFAS Contamination Sites



Presumptive PFAS Contamination Sites



Peer-reviewed methodology:

Salvatore et al. 2022, *ES&T Letters*

Data available upon request:
pfasproject@gmail.com

PFAS GOVERNANCE TRACKER

PFAS Governance

General types:

- **Legislative** (bills and laws)
- **Regulatory** (binding policies)
- **Non-regulatory** (non-binding advisories, voluntary programs)
- **Peri-governmental** (non-governmental organizations)

Multiple scales:

- International
- Federal
- State
- Local

Many topics, including:

- Agriculture
- Air
- Appropriations
- Chemical bans and substitutions
- Clean-up and disposal
- Data or research
- Definitions
- Drinking water
- *and dozens more*

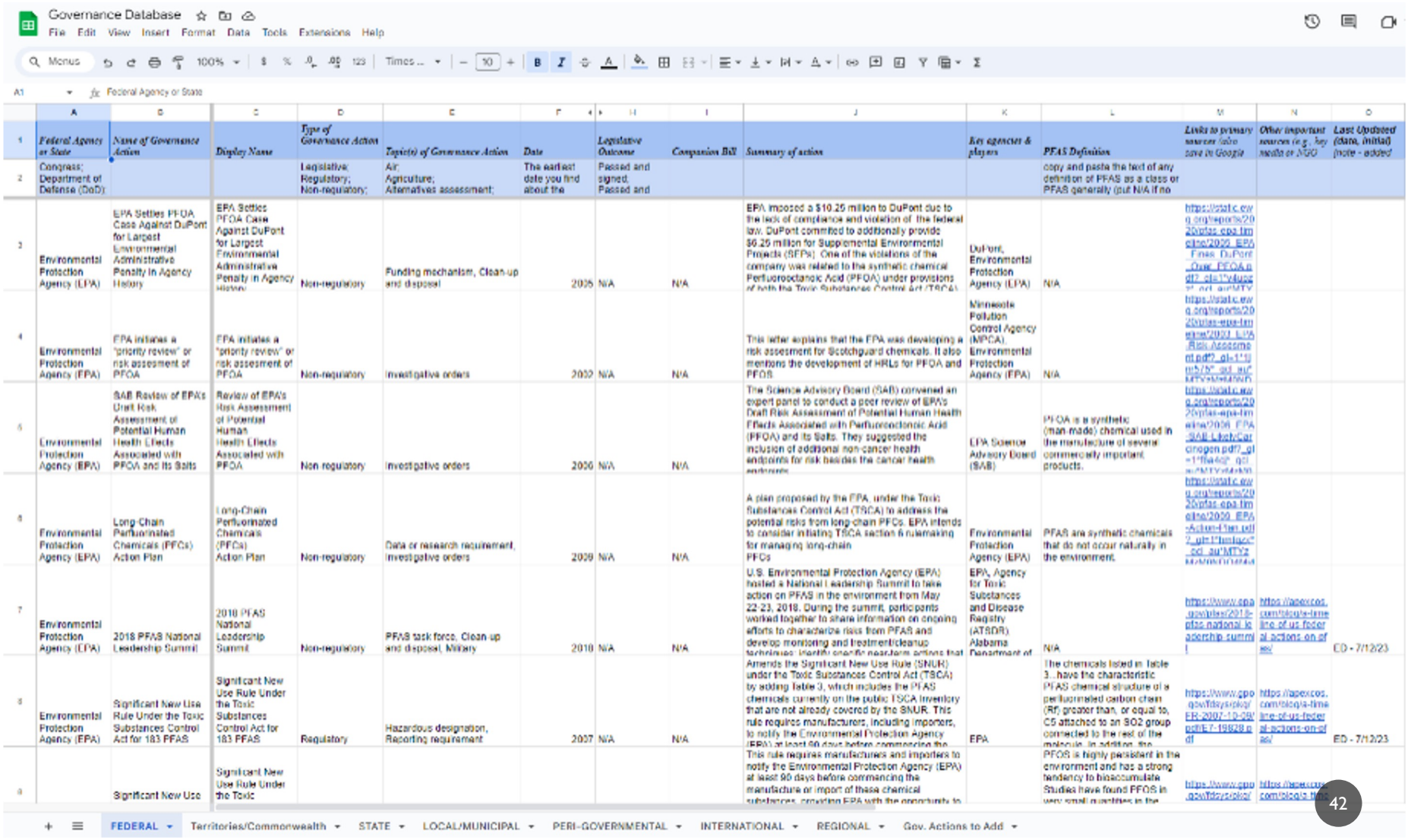
Photo: Wisconsin Examiner 2021

PFAS Governance Tracker: https://governance.pfasproject.com/

- **Goal**: Compile information about PFAS-related governance actions in one place and make that data publicly available and user-friendly

- **Funding from**: National Science Foundation, Northeastern University's ROUTES program, and Whitman College's Faculty-Student Summer Research program

- Thanks to Safer States for feedback and legislation tracking information.

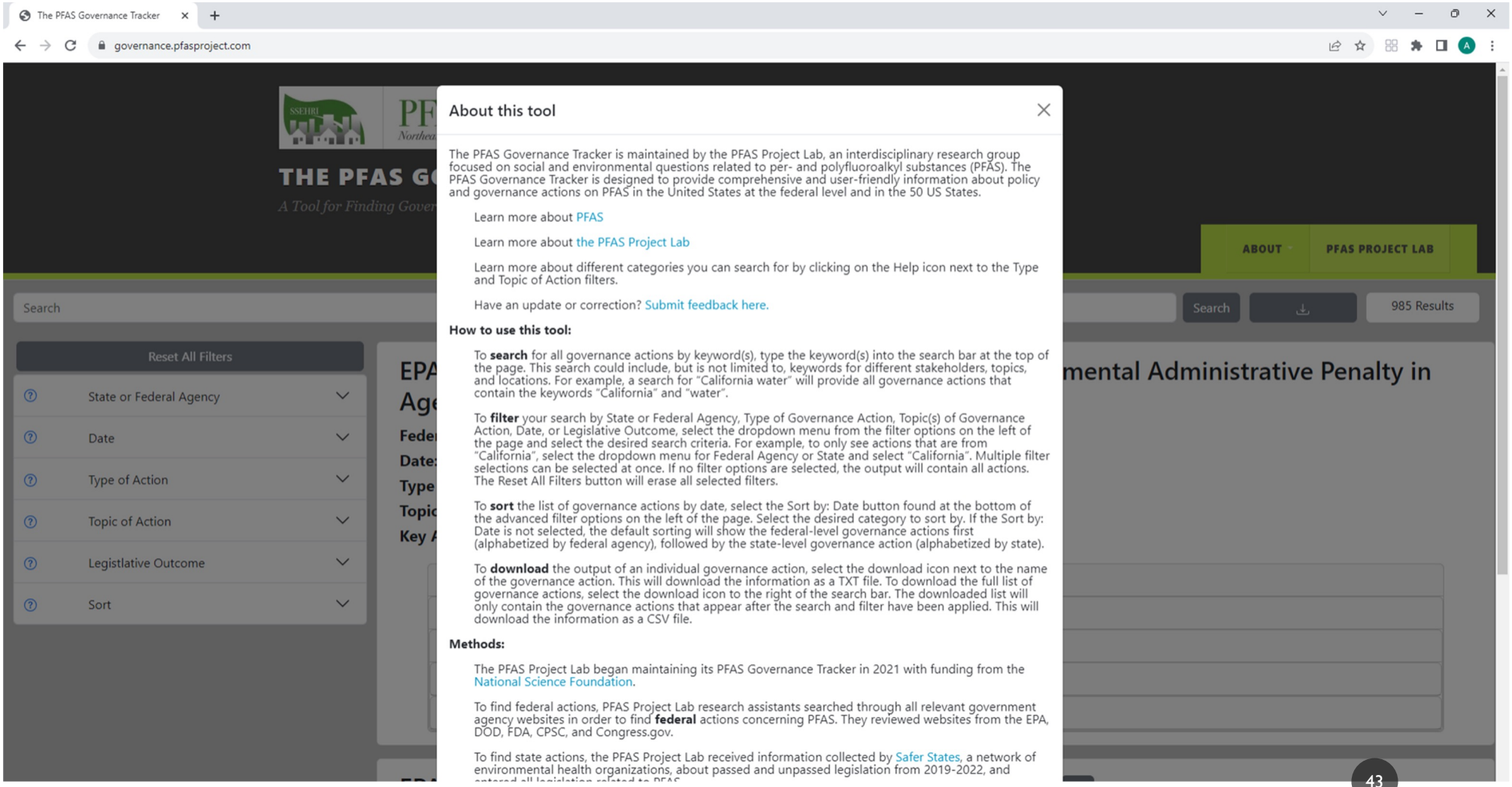


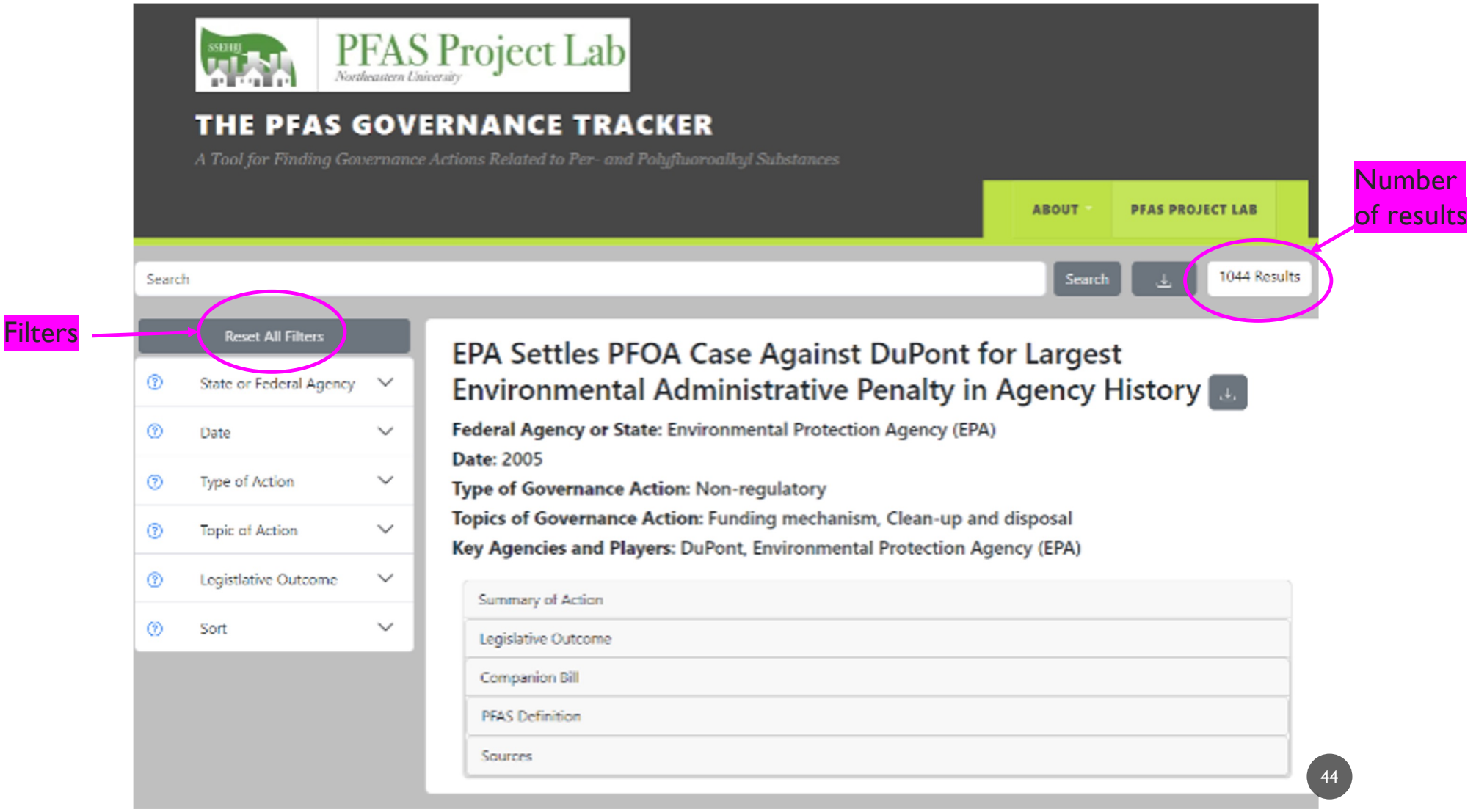
Governance Database

File Edit View Insert Format Data Tools Extensions Help

	A	B	C	D	E	F	H	I	J	K	L	M	N	O
1	*Federal Agency or State*	*Name of Governance Action*	*Display Name*	*Type of Governance Action*	*Topic(s) of Governance Action*	*Date*	*Legislative Outcome*	*Companion Bill*	*Summary of action*	*Key agencies & players*	*PFAS Definition*	*Links to primary sources (also save to Google*	*Other important sources (e.g., key results or NGO*	*Last Updated (date, initial) (note - added*
2	Congress; Department of Defense (DoD);			Legislative; Regulatory; Non-regulatory;	Air; Agriculture; Alternatives assessment;	The earliest date you find about the	Passed and signed, Passed and				copy and paste the text of any definition of PFAS as a class or PFAS generally (put N/A if no			
3	Environmental Protection Agency (EPA)	EPA Settles PFOA Case Against DuPont for Largest Environmental Administrative Penalty in Agency History	EPA Settles PFOA Case Against DuPont for Largest Environmental Administrative Penalty in Agency History	Non-regulatory	Funding mechanism, Clean-up and disposal	2005	N/A	N/A	EPA imposed a $10.25 million to DuPont due to the lack of compliance and violation of the federal law. DuPont committed to additionally provide $6.25 million for Supplemental Environmental Projects (SEPs). One of the violations of the company was related to the synthetic chemical Perfluorooctanoic Acid (PFOA) under provisions of both the Toxic Substances Control Act (TSCA)	DuPont, Environmental Protection Agency (EPA)	N/A	https://static.ewg.org/reports/2020/epas-epa-timeline/2005_EPA_Fines_DuPont_Over_PFOA.pdf?_gl=1*vjuqz*_gcl_au*MTY		
4	Environmental Protection Agency (EPA)	EPA initiates a "priority review" or risk assessment of PFOA	EPA initiates a "priority review" or risk assessment of PFOA	Non-regulatory	Investigative orders	2002	N/A	N/A	This letter explains that the EPA was developing a risk assessment for Scotchguard chemicals. It also mentions the development of HRLs for PFOA and PFOS.	Minnesota Pollution Control Agency (MPCA), Environmental Protection Agency (EPA)	N/A	https://static.ewg.org/reports/2020/epas-epa-timeline/2003_EPA_Risk_Assessment.pdf?_gl=1*ijnb7k*_gcl_au*MTY		
5	Environmental Protection Agency (EPA)	SAB Review of EPA's Draft Risk Assessment of Potential Human Health Effects Associated with PFOA and its Salts	Review of EPA's Risk Assessment of Potential Human Health Effects Associated with PFOA	Non-regulatory	Investigative orders	2006	N/A	N/A	The Science Advisory Board (SAB) convened an expert panel to conduct a peer review of EPA's Draft Risk Assessment of Potential Human Health Effects Associated with Perfluorooctanoic Acid (PFOA) and its Salts. They suggested the inclusion of additional non-cancer health endpoints for risk besides the cancer health	EPA Science Advisory Board (SAB)	PFOA is a synthetic (man-made) chemical used in the manufacture of several commercially important products.	https://static.ewg.org/reports/2020/epas-epa-timeline/2006_EPA_SAB_LikelyCarcinogen.pdf?_gl=1*ffa4q2*_gcl_au*MTY2		
6	Environmental Protection Agency (EPA)	Long-Chain Perfluorinated Chemicals (PFCs) Action Plan	Long-Chain Perfluorinated Chemicals (PFCs) Action Plan	Non-regulatory	Data or research requirement, Investigative orders	2009	N/A	N/A	A plan proposed by the EPA, under the Toxic Substances Control Act (TSCA) to address the potential risks from long-chain PFCs. EPA intends to consider initiating TSCA section 6 rulemaking for managing long-chain PFCs	Environmental Protection Agency (EPA)	PFAS are synthetic chemicals that do not occur naturally in the environment.	https://static.ewg.org/reports/2020/epas-epa-timeline/2009_EPA-Action-Plan.pdf?_gl=1*bnlqcv*_gcl_au*MTY2		
7	Environmental Protection Agency (EPA)	2018 PFAS National Leadership Summit	2018 PFAS National Leadership Summit	Non-regulatory	PFAS task force, Clean-up and disposal, Military	2018	N/A	N/A	U.S. Environmental Protection Agency (EPA) hosted a National Leadership Summit to take action on PFAS in the environment from May 22-23, 2018. During the summit, participants worked together to share information on ongoing efforts to characterize risks from PFAS and develop monitoring and treatment/cleanup techniques; identify specific near-term actions that	EPA, Agency for Toxic Substances and Disease Registry (ATSDR), Alabama Department of	N/A	https://www.epa.gov/pfas/2018-pfas-national-leadership-summit	https://apercos.com/blog/a-timeline-of-us-federal-actions-on-pfas/	ED - 7/12/23
8	Environmental Protection Agency (EPA)	Significant New Use Rule Under the Toxic Substances Control Act for 183 PFAS	Significant New Use Rule Under the Toxic Substances Control Act for 183 PFAS	Regulatory	Hazardous designation, Reporting requirement	2007	N/A	N/A	Amends the Significant New Use Rule (SNUR) under the Toxic Substances Control Act (TSCA) by adding Table 3, which includes the PFAS chemicals currently on the public TSCA inventory that are not already covered by the SNUR. This rule requires manufacturers, including importers, to notify the Environmental Protection Agency (EPA) at least 90 days before commencing the	EPA	The chemicals listed in Table 3...have the characteristic PFAS chemical structure of a perfluorinated carbon chain (Rf) greater than, or equal to, C5 attached to an SO2 group connected to the rest of the molecule. In addition, the	https://www.govinfo.gov/content/pkg/FR-2007-12-28/pdf/E7-19828.pdf	https://apercos.com/blog/a-timeline-of-us-federal-actions-on-pfas/	ED - 7/12/23
9		Significant New Use	Significant New Use Rule Under the Toxic						This rule requires manufacturers and importers to notify the Environmental Protection Agency (EPA) at least 90 days before commencing the manufacture or import of these chemical substances, providing EPA with the opportunity to		PFOS is highly persistent in the environment and has a strong tendency to bioaccumulate. Studies have found PFOS in very small quantities in the	https://www.govinfo.gov/content/pkg/	https://apercos.com/blog/a-time	

FEDERAL | Territories/Commonwealth | STATE | LOCAL/MUNICIPAL | PERI-GOVERNMENTAL | INTERNATIONAL | REGIONAL | Gov. Actions to Add


The PFAS Governance Tracker
governance.pfasproject.com
THE PFAS G
A Tool for Finding Gover
ABOUT
PFAS PROJECT LAB
Search
Search
985 Results
Reset All Filters
State or Federal Agency
Date
Type of Action
Topic of Action
Legislative Outcome
Sort
mental Administrative Penalty in
About this tool
The PFAS Governance Tracker is maintained by the PFAS Project Lab, an interdisciplinary research group focused on social and environmental questions related to per- and polyfluoroalkyl substances (PFAS). The PFAS Governance Tracker is designed to provide comprehensive and user-friendly information about policy and governance actions on PFAS in the United States at the federal level and in the 50 US States.
Learn more about PFAS
Learn more about the PFAS Project Lab
Learn more about different categories you can search for by clicking on the Help icon next to the Type and Topic of Action filters.
Have an update or correction? Submit feedback here.
How to use this tool:
To search for all governance actions by keyword(s), type the keyword(s) into the search bar at the top of the page. This search could include, but is not limited to, keywords for different stakeholders, topics, and locations. For example, a search for "California water" will provide all governance actions that contain the keywords "California" and "water".
To filter your search by State or Federal Agency, Type of Governance Action, Topic(s) of Governance Action, Date, or Legislative Outcome, select the dropdown menu from the filter options on the left of the page and select the desired search criteria. For example, to only see actions that are from "California", select the dropdown menu for Federal Agency or State and select "California". Multiple filter selections can be selected at once. If no filter options are selected, the output will contain all actions. The Reset All Filters button will erase all selected filters.
To sort the list of governance actions by date, select the Sort by: Date button found at the bottom of the advanced filter options on the left of the page. Select the desired category to sort by. If the Sort by: Date is not selected, the default sorting will show the federal-level governance actions first (alphabetized by federal agency), followed by the state-level governance action (alphabetized by state).
To download the output of an individual governance action, select the download icon next to the name of the governance action. This will download the information as a TXT file. To download the full list of governance actions, select the download icon to the right of the search bar. The downloaded list will only contain the governance actions that appear after the search and filter have been applied. This will download the information as a CSV file.
Methods:
The PFAS Project Lab began maintaining its PFAS Governance Tracker in 2021 with funding from the National Science Foundation.
To find federal actions, PFAS Project Lab research assistants searched through all relevant government agency websites in order to find federal actions concerning PFAS. They reviewed websites from the EPA, DOD, FDA, CPSC, and Congress.gov.
To find state actions, the PFAS Project Lab received information collected by Safer States, a network of environmental health organizations, about passed and unpassed legislation from 2019-2022, and


PFAS Project Lab
Northeastern University
THE PFAS GOVERNANCE TRACKER
A Tool for Finding Governance Actions Related to Per- and Polyfluoroalkyl Substances
ABOUT
PFAS PROJECT LAB
Search
Search
1044 Results
Number of results
Filters
Reset All Filters
State or Federal Agency
Date
Type of Action
Topic of Action
Legislative Outcome
Sort
EPA Settles PFOA Case Against DuPont for Largest Environmental Administrative Penalty in Agency History
Federal Agency or State: Environmental Protection Agency (EPA)
Date: 2005
Type of Governance Action: Non-regulatory
Topics of Governance Action: Funding mechanism, Clean-up and disposal
Key Agencies and Players: DuPont, Environmental Protection Agency (EPA)
Summary of Action
Legislative Outcome
Companion Bill
PFAS Definition
Sources

RESOURCES

PFAS Project Lab Resources

PFAS Project Lab

https://pfasproject.com/

General information about PFAS Project Lab projects and collaborators

PFAS-Tox Database

https://pfastoxdatabase.org/

Systematic evidence map of >1,000 PFAS health and toxicology studies

PFAS Contamination Tracker

https://pfasproject.com/pfas-sites-and-community-resources/

PFAS Contamination and Community Resources Map

PFAS Governance Tracker

https://pfasproject.com/pfas-governance-tracker-2/

U.S. PFAS policy and government actions

OTHER TRUSTWORTHY RESOURCES

PFAS-Exchange

https://pfas-exchange.org/

Many online resources and fact sheets about PFAS

Silent Spring Institute

https://silentspring.org/detox-me-app-tips-healthier-living

"Detox Me" App, tip sheets for avoiding exposure

Collaborative for Health and Environment (CHE)

https://www.healthandenvironment.org/

Webinars/resources translating environmental health science for clinicians

Green Science Policy Institute

https://greensciencepolicy.org/

Science-policy information about environmental health with a focus on toxic chemicals

NASEM "Guidance on PFAS Testing and Health Outcomes"

https://www.nationalacademies.org/our-work/guidance-on-pfas-testing-and-health-outcomes

Consensus document on health effects and screening recommendations

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