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# PFAS in California

## Core Scientific Principles and Policy Recommendations

State Water Resources Control Board

Informational Hearing on PFAS

March 6, 2019



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Anna Reade, Ph.D. & Andria Ventura

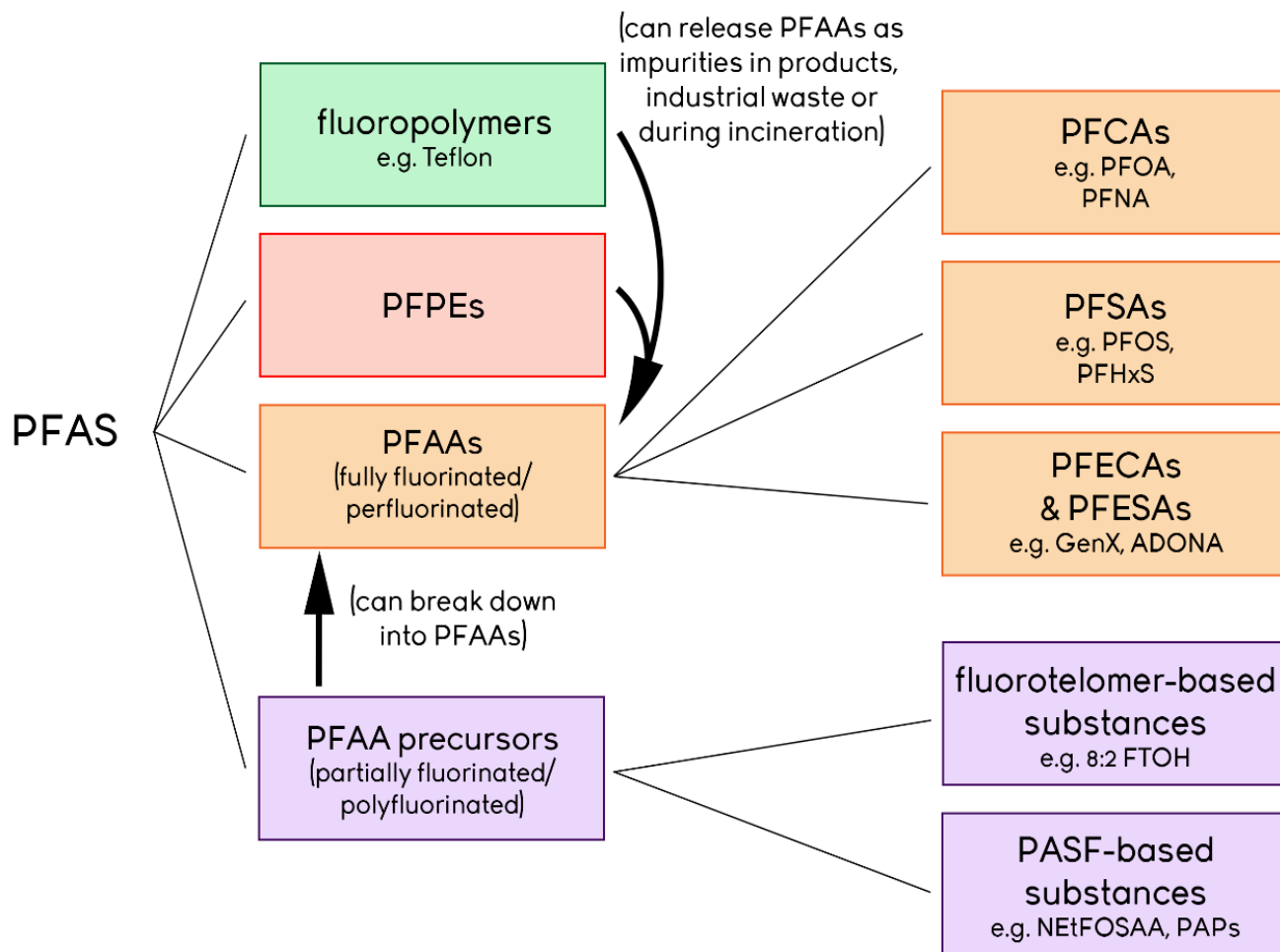


# Need for Strict Health Protections

*Lessons learned from existing toxicity assessments.*



# PFAS as a Class



# Health Effects Linked to PFAA Exposure

Summary of ATSDR's Findings on Health Effects from Perfluoroalkyl Acid Exposure

	Immune	Developmental & Reproductive	Lipids	Liver	Endocrine	Body Weight	Blood
PFOA	x	x	x	x	x	x	x
PFOS	x	x	x	x	x	x	x
PFHxS	x			x			x
PFNA	x		x			x	
PFDeA	x	x	x	x	x	x	
PFDoA	x	x				x	
PFUA	x	x				x	x
PFHxA		x					x
PFBA		x		x	x		x
PFBS		x		x	x		x
GenX	x	x		x			

Additive and/or synergistic effects likely

# Short-chain PFAS Health Concerns

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- Introduced as ‘safer’ alternatives due to their supposed shorter half-lives in humans
  - Found to accumulate in organs, some at concentrations that are higher than long-chain PFAS<sup>1</sup>
- Highly persistent, more mobile in the environment and harder to treat than long-chain PFAS<sup>2</sup>
  - Continual exposure - elimination rate may be an inadequate measure of health threat to humans<sup>3,4</sup>

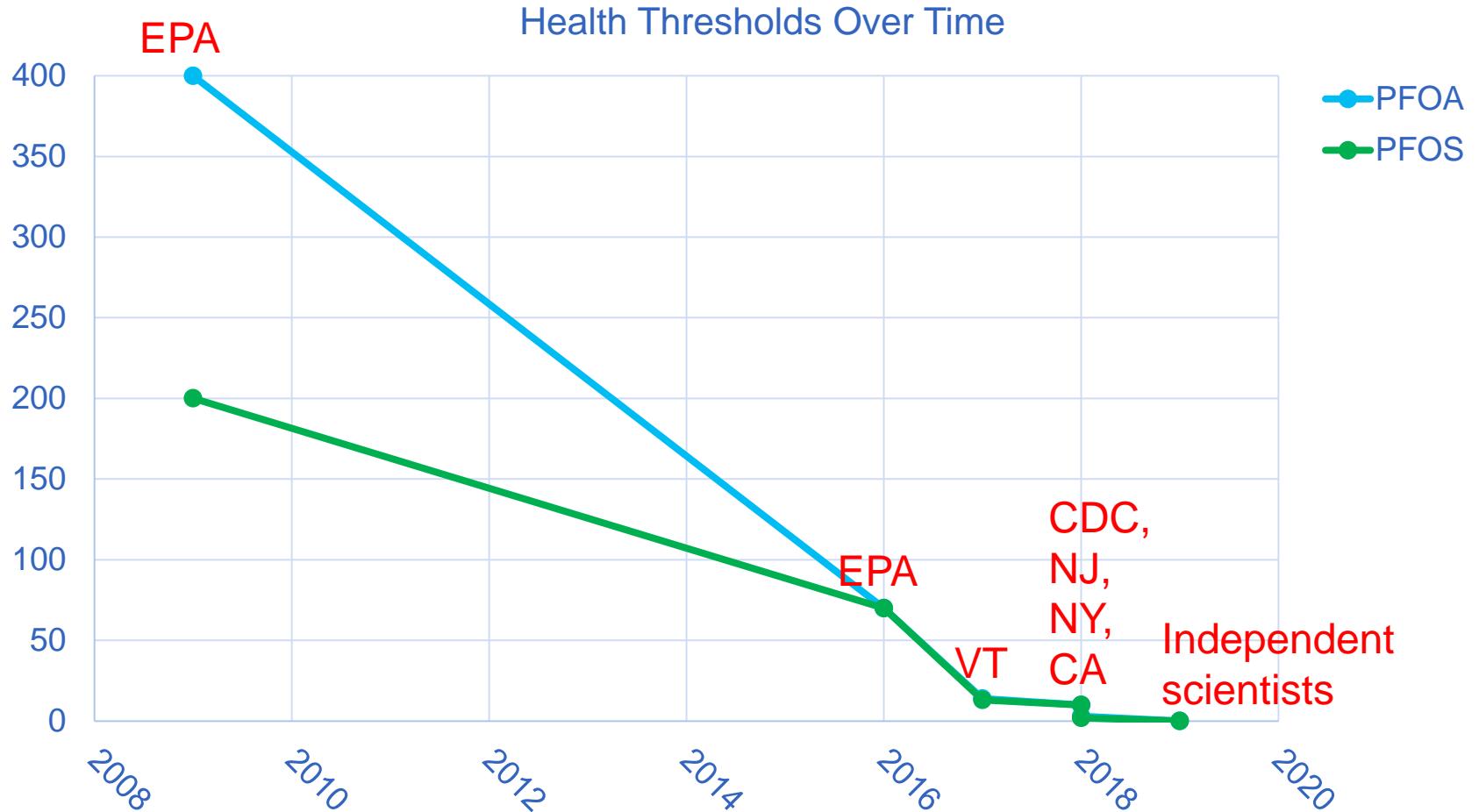
1. Pérez F, et al., 2013. Accumulation of perfluoroalkyl substances in human tissues. *Environ Int*, 59, 354-362.

2. Wang Z, et al., 2015. Hazard assessment of fluorinated alternatives to long-chain perfluoroalkyl acids (PFAAs) and their precursors: Status quo, ongoing challenges and possible solutions. *Environ Int* 75:172-179

3. Gomis MI, et al., 2018. Comparing the toxic potency in vivo of long-chain perfluoroalkyl acids and fluorinated alternatives. *Environ Int* 113:1–9.

4. Brendel S., et. al. (2018) Short-chain perfluoroalkyl acids: environmental concerns and a regulatory strategy under Reach. *Environ Sci Eur*, 30(1): 9

# EPA's 70 ppt is Not Health Protective



# EPA's 70 ppt is Not Health Protective

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- Michigan PFAS Science Advisory Panel estimated blood serum levels from exposure to 70 ppt PFOA in drinking water<sup>1</sup>
  - Results in blood serum levels at which health effects are seen in epidemiology studies (including C8 study)
- Risk assessment analysis:
  - Protective of infants: lowers threshold to 20 ppt
  - Based on most sensitive health effect: below 1 ppt

1. Michigan PFAS Science Advisory Panel, 2018. Scientific Evidence and Recommendations for Managing PFAS Contamination in Michigan.

2. Vermont Department of Health, 2018. Drinking Water Health Advisory for Five PFAS (per- and polyfluorinated alkyl substances).

3. Calculations based on RfD for altered mammary gland development, generated by New Jersey Drinking Water Quality Institute, 2017. Health-based maximum contaminant level support document: Perfluorooctanoic acid (PFOA). February 2017.

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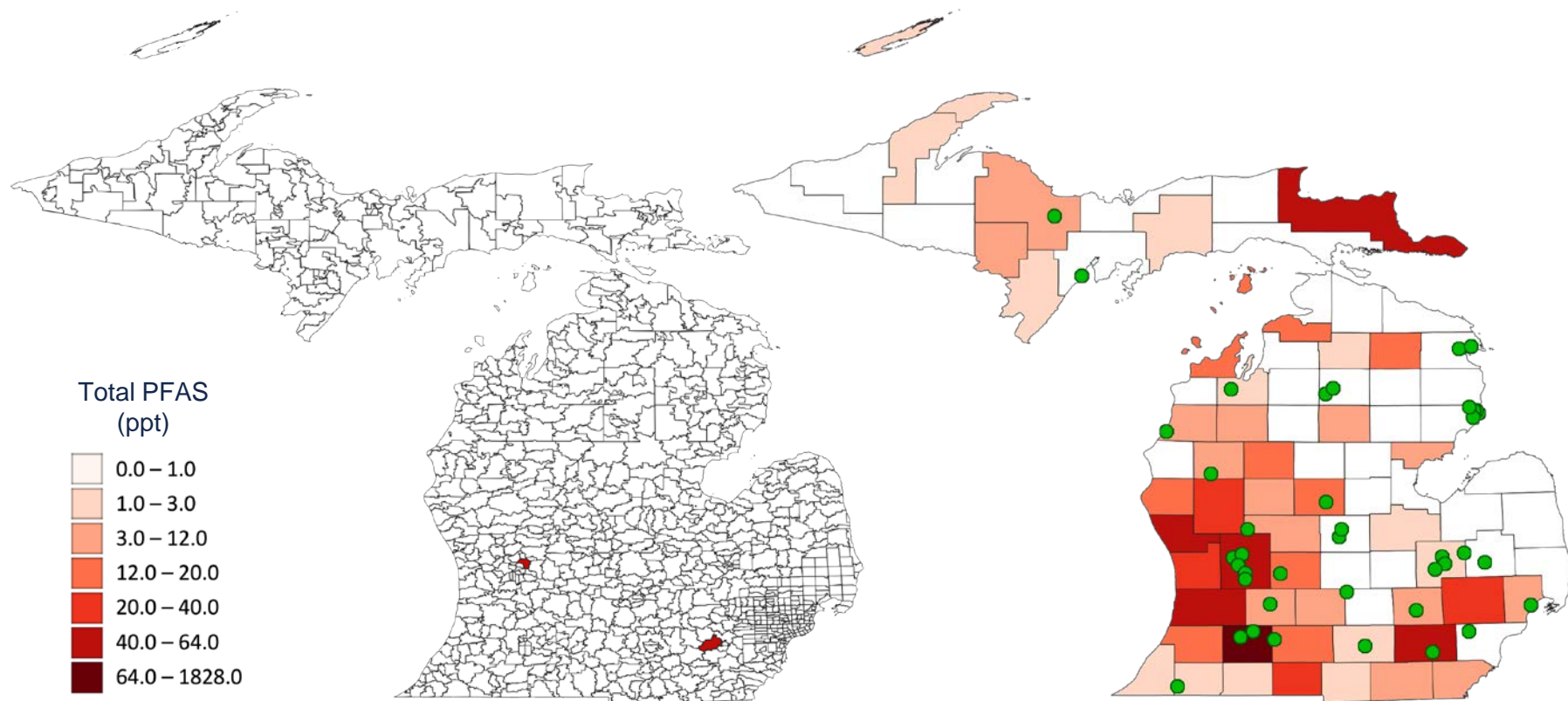
# Possible Extent of PFAS Contamination in California

*Lessons learned from Michigan*

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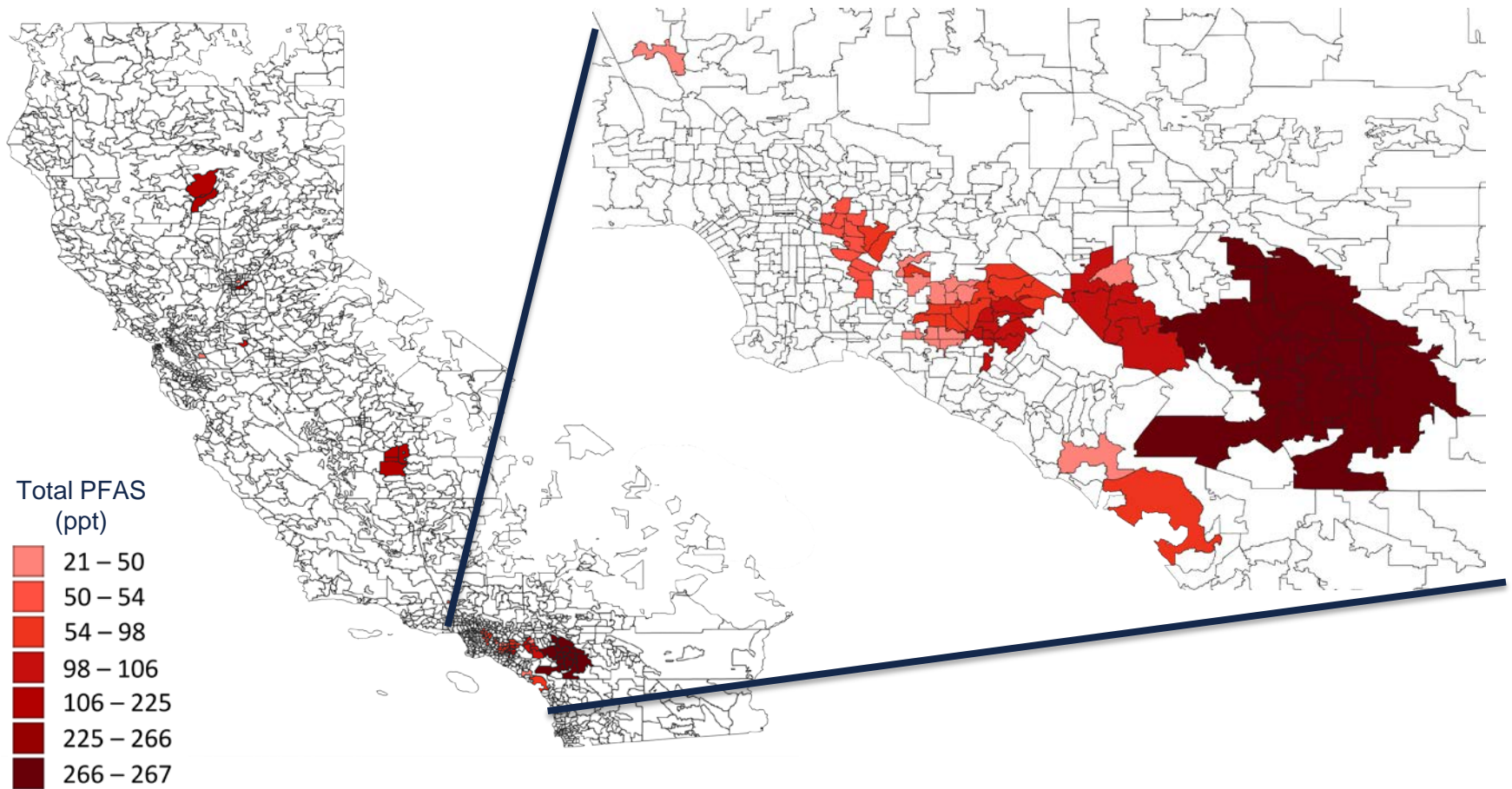
# National UCMR3 vs. Michigan Testing



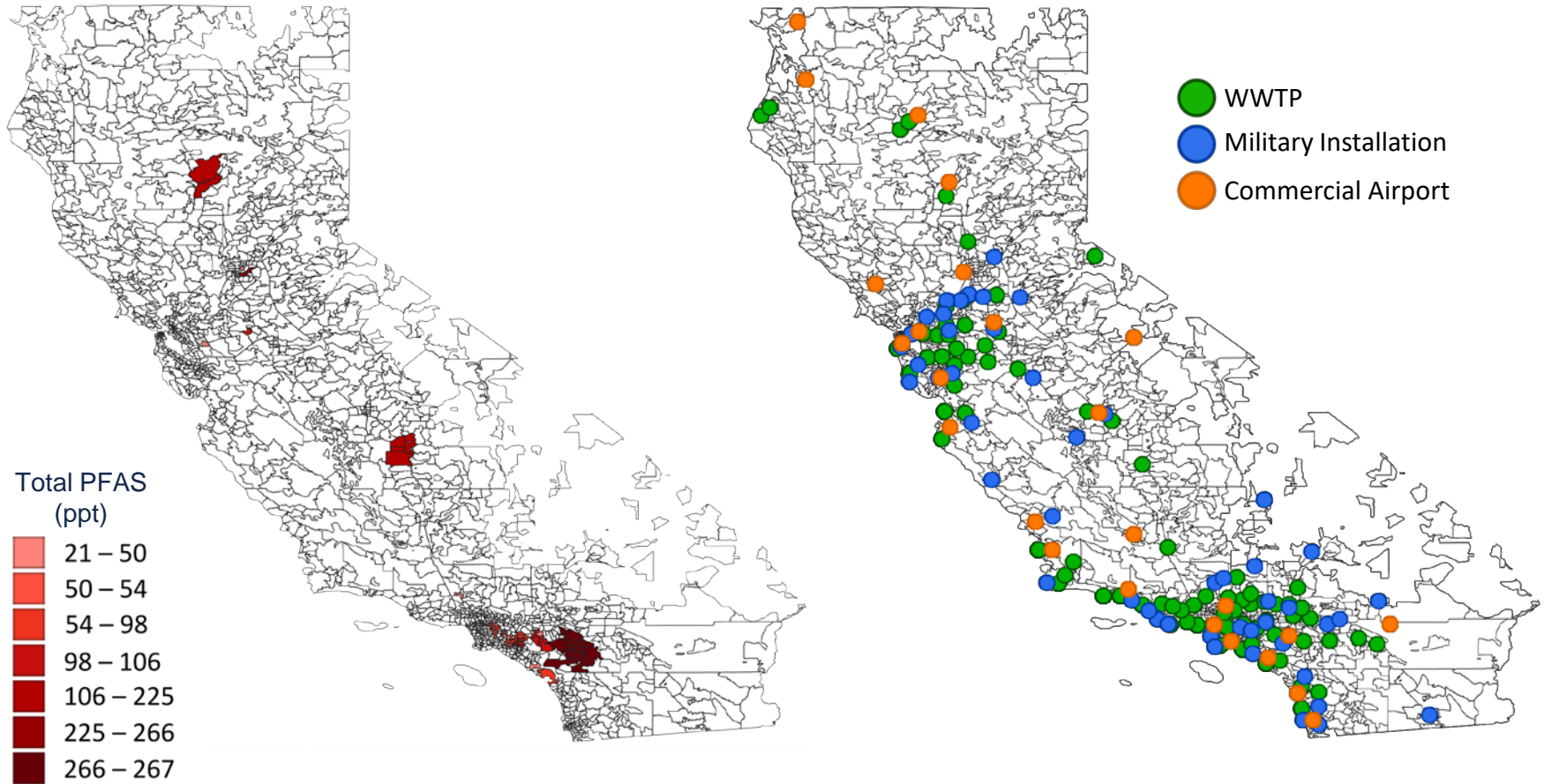
3 detects in 2 zip codes

40+ contamination sites  
100+ public water systems

# CA PFAS Contamination - UCMR3



# Potential PFAS Contamination in CA



<https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule#3>

Hu XC, et al., 2016. Detection of PFASs in US drinking water linked to industrial sites, military fire training areas, and waste water treatment plants. *Env Sci and Tech Letters* 3(10):344–350



# Conclusions

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1. PFAS are a serious public health threat
2. Health risks at extremely low level exposures
3. Likely additive/synergistic effects
4. A class-based approach is needed
5. Potential for significant PFAS contamination in CA

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# Policy Recommendations

*Steps to addressing PFAS in California water.*

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*Erin Brockovich Foundation, Inc.*



Integrated Resource Management, Inc.



# What We Know

Chemical	National		California	
	PWSs with results $\geq$ MRL (4,920 PWS total)	Percent	PWSs with results $\geq$ MRL (455 PWS total)	Percent
PFOA	95	1.9%	16	3.5%
PFOS	117	2.4%	19	4.2%
PFNA	15	0.3%	0	0%
PFHxS	55	1.1%	7	1.5%
PFHpA	86	1.7%	6	1.3%
PFBS	8	0.2%	0	0%

# Consensus for Concern

Perspectives | Brief Communication

A Section 508–conformant HTML version of this article is available at <http://dx.doi.org/10.1289/ehp.1509934>.

## The Madrid Statement on Poly- and Perfluoroalkyl Substances (PFASs)

<http://dx.doi.org/10.1289/ehp.1509934>

As scientists and other professionals from a variety of disciplines, we are concerned about the production and release into the environment of an increasing number of poly- and perfluoroalkyl substances (PFASs) for the following reasons:

1. PFASs are man-made and found everywhere. PFASs are highly

d. Increasing use of fluorinated alternatives will lead to increasing levels of stable perfluorinated degradation products in the environment, and possibly also in biota and humans. This would increase the risks of adverse effects on human health and the environment.

Chemosphere 114 (2014) 337–339



Contents lists available at [ScienceDirect](#)

Chemosphere

journal homepage: [www.elsevier.com/locate/chemosphere](http://www.elsevier.com/locate/chemosphere)



## Helsingør Statement on poly- and perfluorinated alkyl substances (PFASs)



Martin Scheringer<sup>a,\*</sup>, Xenia Trier<sup>b</sup>, Ian T. Cousins<sup>c</sup>, Pim de Voogt<sup>d</sup>, Tony Fletcher<sup>e</sup>, Zhanyun Wang<sup>a</sup>, Thomas F. Webster<sup>f</sup>

<sup>a</sup>Institute for Chemical and Bioengineering, ETH Zürich, 8093 Zürich, Switzerland

<sup>b</sup>Technical University of Denmark, Division of Food Chemistry, 2860 Søborg, Denmark

<sup>c</sup>Department of Applied Environmental Science (ITM), Stockholm University, 10691 Stockholm, Sweden

<sup>d</sup>Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, 1090 GE Amsterdam, The Netherlands

<sup>e</sup>London School of Hygiene & Tropical Medicine, London WC1H 9SH, United Kingdom

<sup>f</sup>School of Public Health, Boston University, Boston, MA 02118, USA





# What We Don't Know Can Hurt Us

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- What additional PFAS are contaminating our environment?
- What PFAS are currently produced and released?
- Sources of contamination in CA?
- Impact of being exposed to a unknown mixture of PFAS?
- Contribution of drinking water to total human exposure?

# Aqueous Film Forming Foam

- 19 California military sites with PFOA/PFOS above 70 ppt  
*Range = 70 to 8,000,000 ng/L*
- No data on 57 subgroups of PFAS found in AFFF or AFFF-impacted groundwater<sup>1</sup>
- 97.6% airports conduct foam tests 1-3 times/yr.<sup>2</sup>
- 78.9% airports discharge foam onto the ground.



[https://commons.wikimedia.org/wiki/File:US\\_Navy\\_060820-N-3455P-004\\_Sailors\\_conduct\\_a\\_scrubbing\\_exercise\\_on\\_the\\_flight\\_deck\\_aborde\\_the\\_amphibious\\_assault\\_ship\\_USS\\_Boxer\\_\(LHD\\_4\)\\_as\\_after\\_testing\\_the\\_ship%27s\\_Aqueous\\_Film\\_Forming\\_Foam\\_\(AFFF\)\\_stations.jpg](https://commons.wikimedia.org/wiki/File:US_Navy_060820-N-3455P-004_Sailors_conduct_a_scrubbing_exercise_on_the_flight_deck_aborde_the_amphibious_assault_ship_USS_Boxer_(LHD_4)_as_after_testing_the_ship%27s_Aqueous_Film_Forming_Foam_(AFFF)_stations.jpg)

1. Airport Cooperative Research Program. (2017) Use and Potential Impacts of AFFF Containing PFASs at Airports. National Academy of Science <http://nap.edu/24800>.
2. Barzen-Hanson K.A., et al. (2017) Discovery of 40 classes of per-and polyfluoroalkyl substances in historical aqueous film-forming foams (AFFFs) and AFFF-impacted groundwater. Environ Sci Technol 51:2047-2057.



# Other Sources

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## Wastewater and Recycled water

PFOA, PFOS, PGHxS, PFDS, PFHxA, PFHpA, PFNA, PFDA, 6:2  
FtS, FOSA, N-EtFOSAA.\*

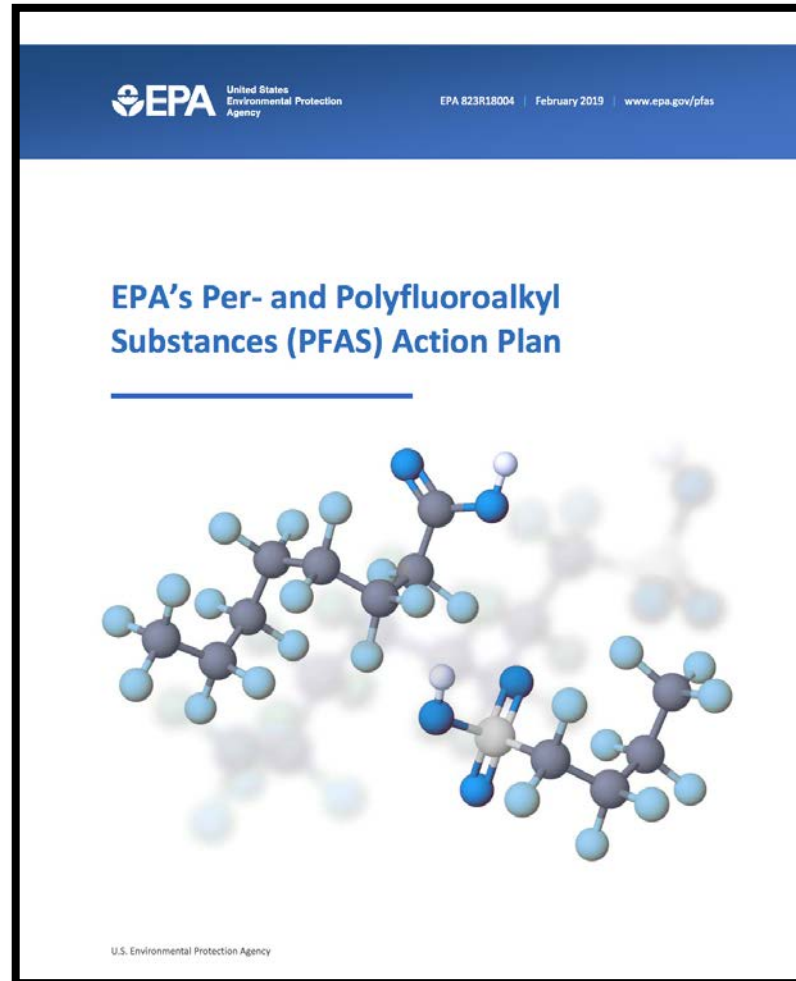
Metal plating and other industrial sites

Packaging waste

Carpet/textile waste

Personal care products

# California Needs to Act



# What California Needs

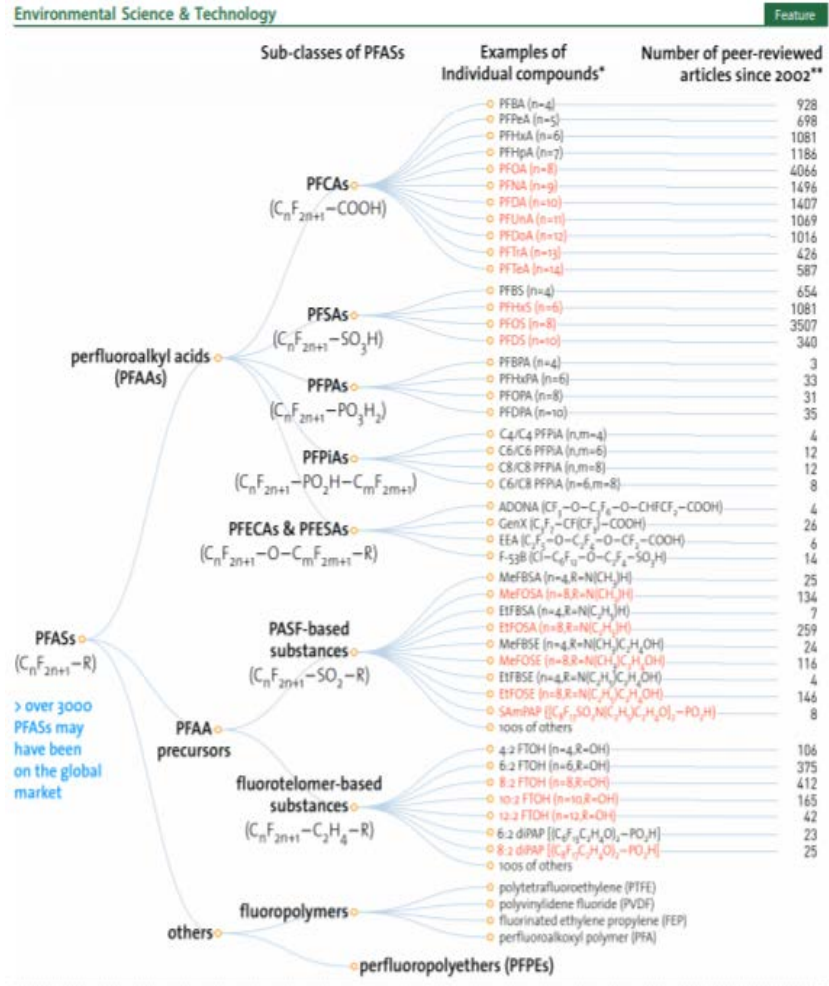


<https://stablekernel.com/the-iceberg-understanding-the-depth-of-your-mobile-software-partner/>

- Clearer understanding of PFAS environmental contamination, requiring a class approach
- Strategies to stop further PFAS contamination of water sources and other environmental media
- Regulations to address current environmental contamination
- A comprehensive, multiagency approach to addressing PFAS

# Recommendation 1

## Approach PFAS as a class





# Recommendation 2

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Require monitoring of all PFAS for which there are validated testing methods.

- EPA Method 537 v1.1 = 18 PFAS chemicals
- Total Oxidizer Precursor (TOP) Assay – possible surrogate for total PFAS in drinking water.



# Recommendation 3

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Request class-based  
Public Health Goal

Precedents include  
PCBs, Dioxins, Disinfection By-products



# Recommendation 4

## Multi-agency/stakeholder task force





# Include Public Interest Groups

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1. AFFF restrictions
2. Food packaging with PFAS testing/restrictions
3. Initiatives to hold manufacturers accountable
4. Public education
5. Support of initiatives on carpet & textiles



# Thank you

Anna Reade  
Staff Scientist  
Natural Resources Defense Council  
415-875-8231  
[areade@nrdc.org](mailto:areade@nrdc.org)

Andria Ventura  
Toxics Program Manager  
Clean Water Action  
415-369-9160, Ext. 306  
[aventura@cleanwater.org](mailto:aventura@cleanwater.org)