

PFAS Data from over 200 California Wastewater Treatment Plants

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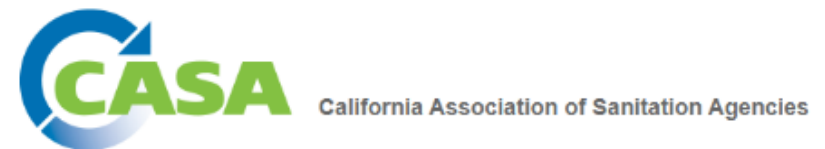
**CDM
Smith**



2023 Annual Conference & Exhibit
January 22-25 | Boston

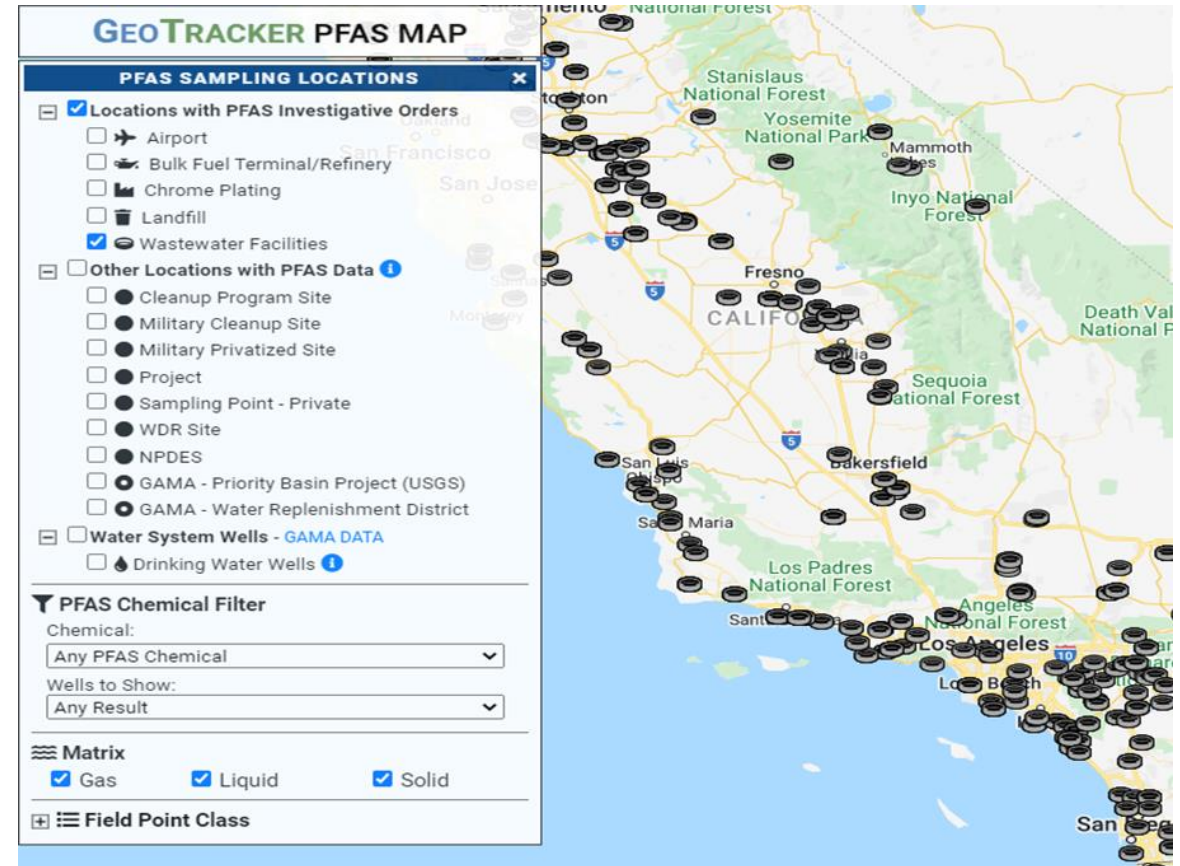
Project Background

- CDM Smith worked with California Association of Sanitation Agencies (CASA)
- Questions:
 1. What are the major uncertainties in the dataset?
 2. Is there a PFAS “baseline” for residential/commercial POTWs
 3. How do the data compare to MA standards?



What is GeoTracker?

- California water quality data management system
- Interactive map and PFAS database summarizing data from:
 - Wastewater facilities (POTWs)
 - Airports
 - Landfills
 - Chrome platers
 - Bulk fuel facilities
 - Military sites
 - Groundwater wells (GAMA)
- Investigative order requiring facilities to sample PFAS



https://geotracker.waterboards.ca.gov/map/pfas_map

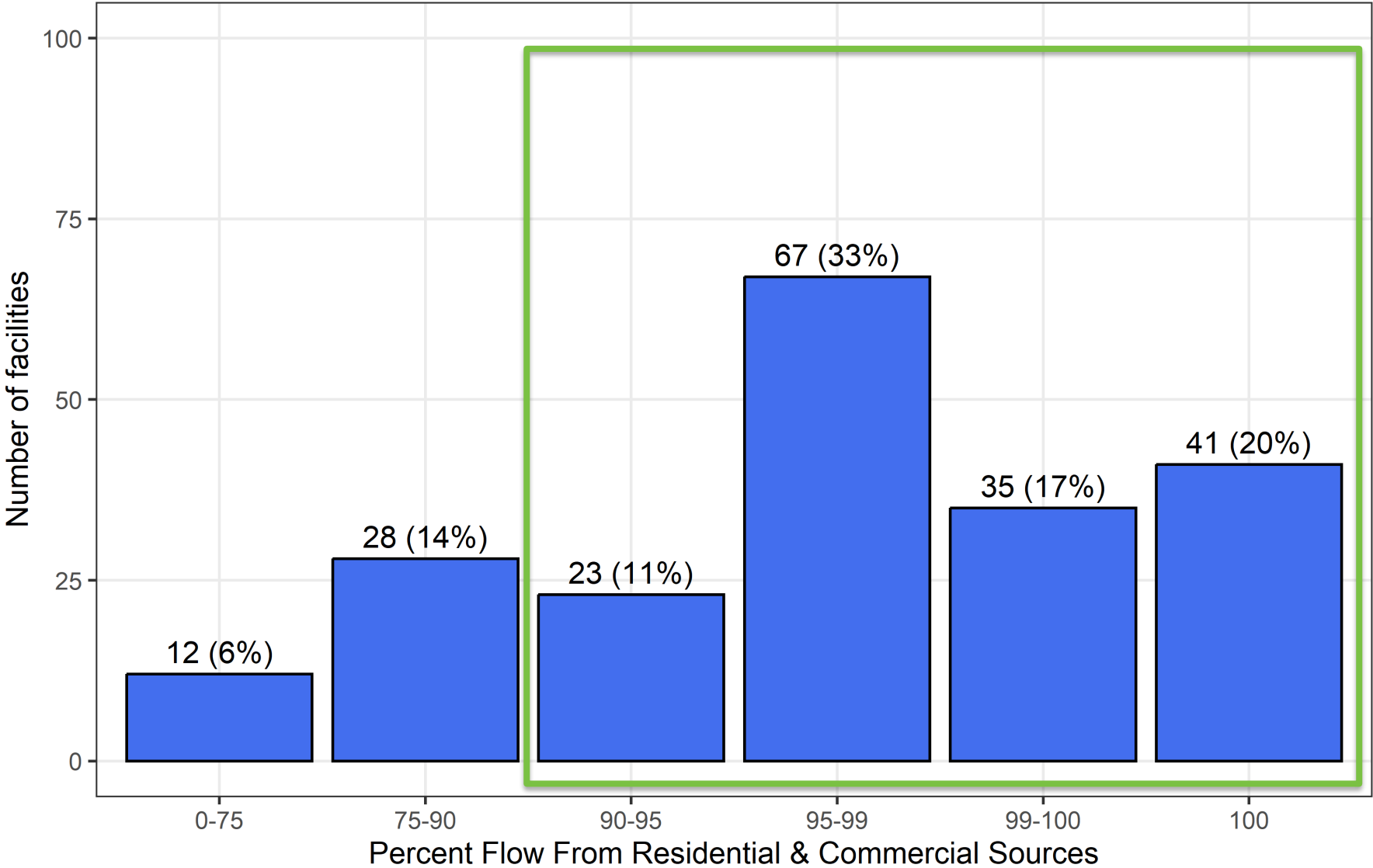
Chemicals in GeoTracker

- POTWs ordered to sample for at least 31 chemicals
- GeoTracker contains as many as **39 unique chemicals**

Class	Chain Type	Chemical	Chain Length
PFCA	Short Chain	PFBA	4
		PFPeA	5
		PFHxA	6
		PFHpA	7
	Long Chain	PFOA	8
		PFNA	9
		PFDA	10
		PFUnDA	11
		PFDoDA	12
		PFTTrDA	13
		PRTeDA	14
PFHxDA	16		
PFODA	18		
PFCA- Precursor	Short Chain	3:3FTCA	N/A
		4:2FTS	N/A
		5:3FTCA	N/A
		6:2FTS	N/A
	Long Chain	7:3FTCA	N/A
		8:2FTS	N/A
		10:2FTS	N/A

Class	Chain Type	Chemical	Chain Length
PFSA	Short Chain	PFBS	4
		PFPeS	5
		PFHxS	6
	Long Chain	PFHpS	7
		PFOS	8
		PFNS	9
		PFDS	10
		PFDOS	12
PFSA- Precursor	Long Chain	ETFOSA	N/A
		ETFOSE	N/A
		MEFOSA	N/A
		MEFOSE	N/A
		NETFOSAA	N/A
		NMEFOSAA	N/A
		PFOSA	N/A
Per- or Poly-fluoroether	Long Chain	11CIPF3OUDS	N/A
		9CIPF3ONS	N/A
		ADONA	N/A
		HFPO-DA (GenX)	N/A

POTWs Distribution by Residential & Commercial Contribution

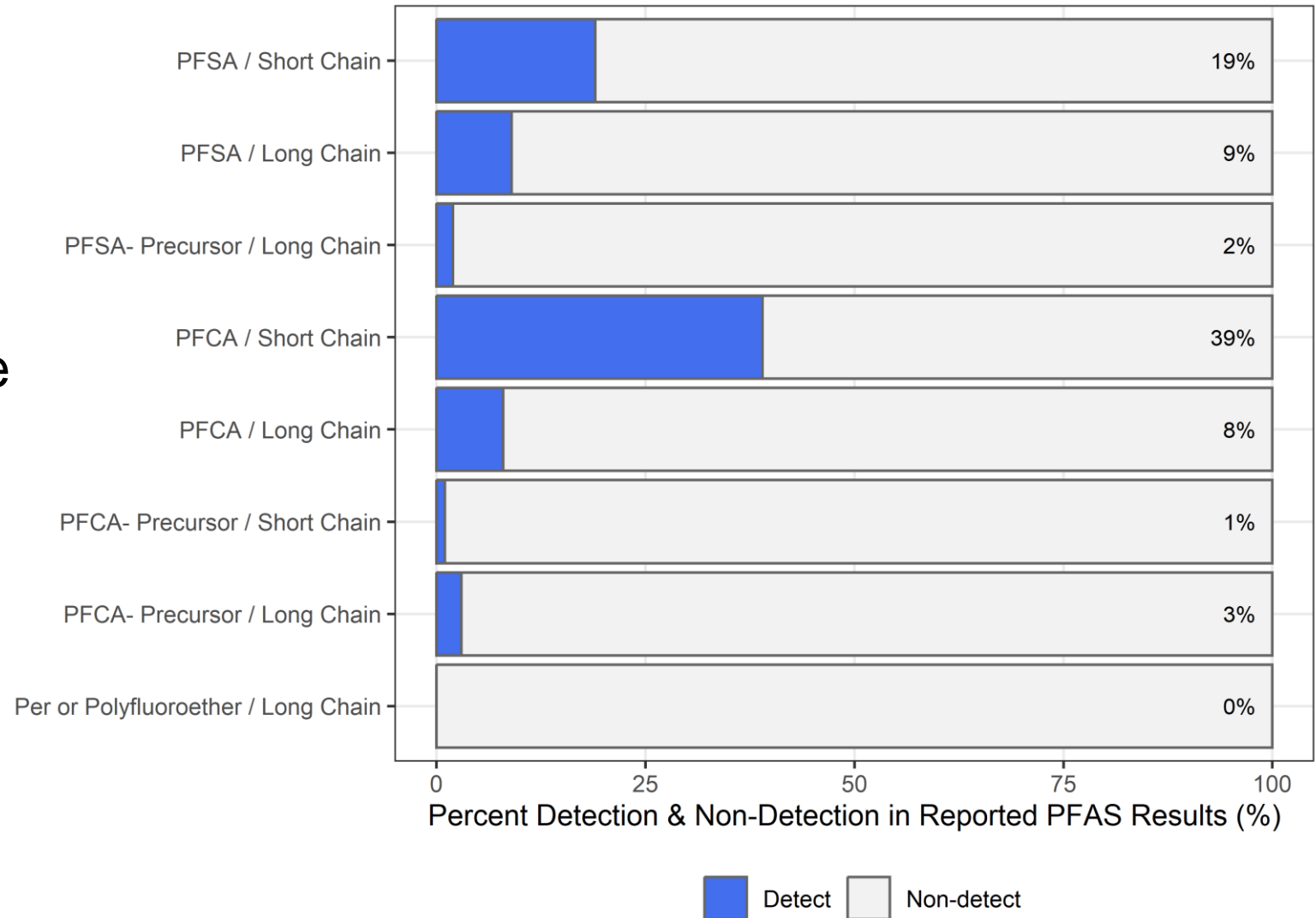


Analyzed data at **206 facilities**

81% of facilities have less than 10% industrial contribution

Detection Rates (Example)

Class /
Chain Type

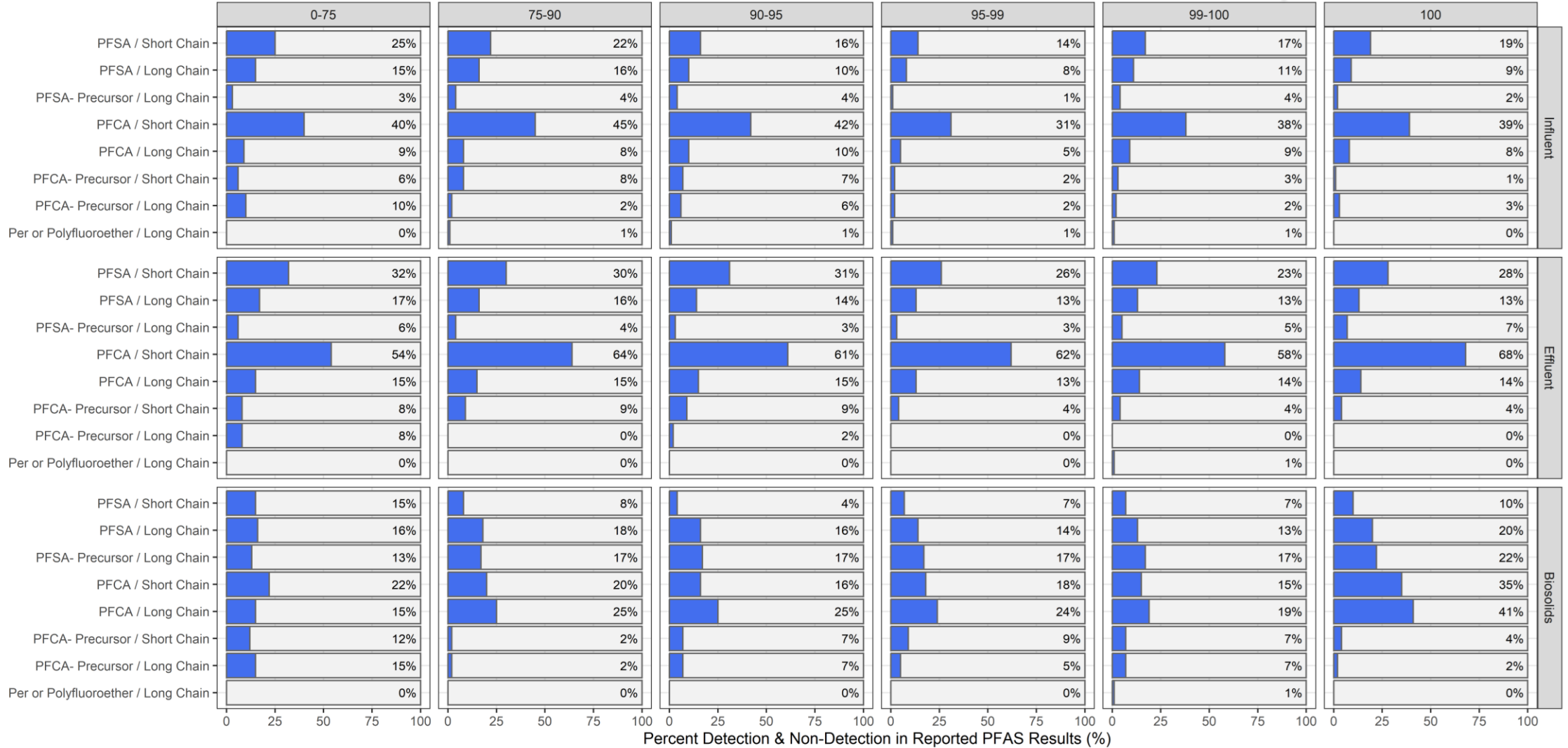


Overall low
detection rates!

Percent Flow from Residential or Commercial Sources (Non-Industrial) (%)



Class / Chain Type



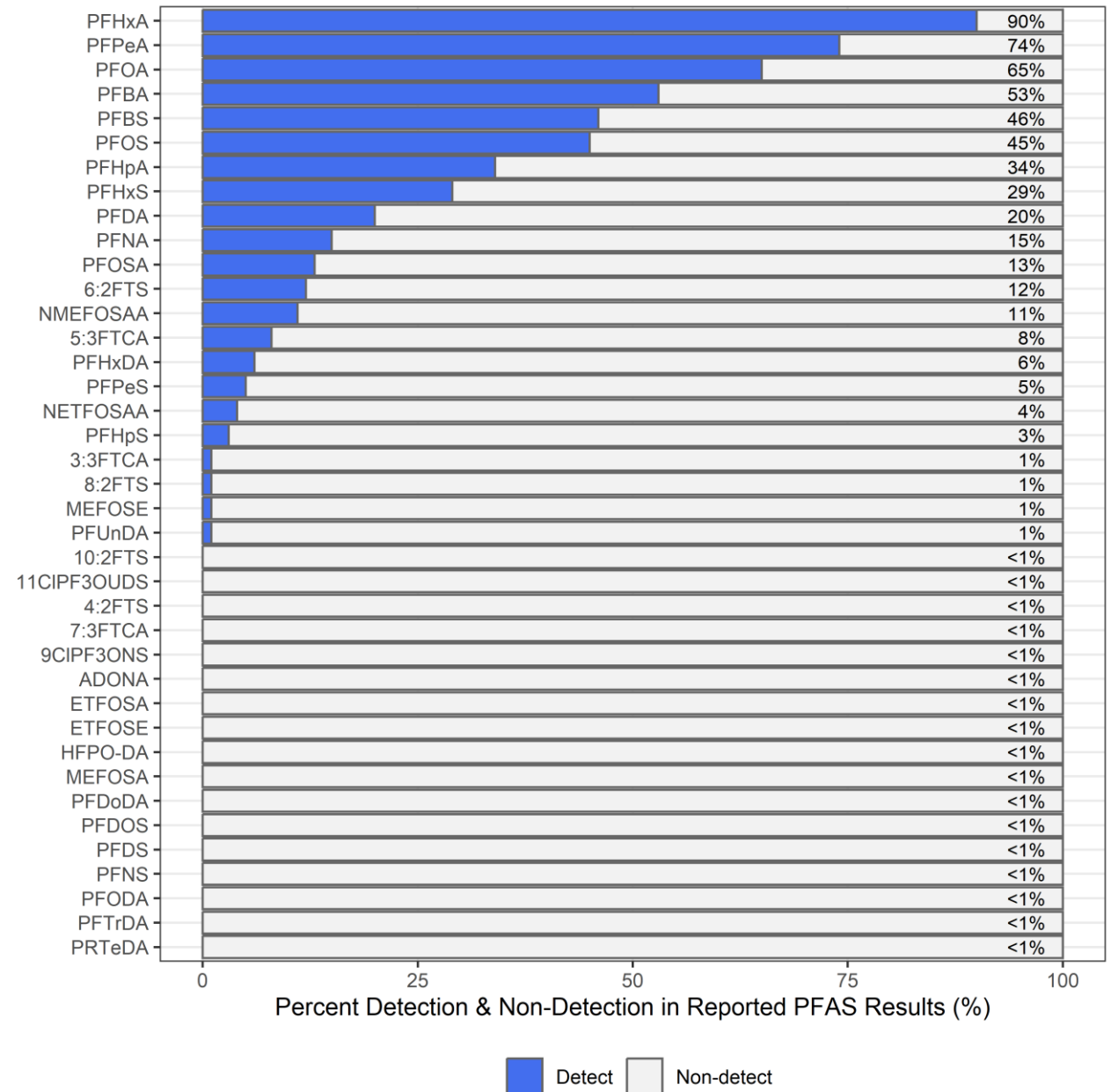
■ Detect ■ Non-detect

Detection Rates by Chemical

- **6 chemicals > 50% detection**
 - PFHxA (90%)
 - PFPeA (74%)
 - PFOA (65%)
 - PFBA (53%)
 - PFBS (46%)
 - PFOS (45%)

- **21 chemicals <= 1% detection.**

Effluent detection rates by chemical (all POTWs)



Detection/Reporting Limits

Detection Limit:

Smallest concentration detectable by instrument
(below reporting limit)

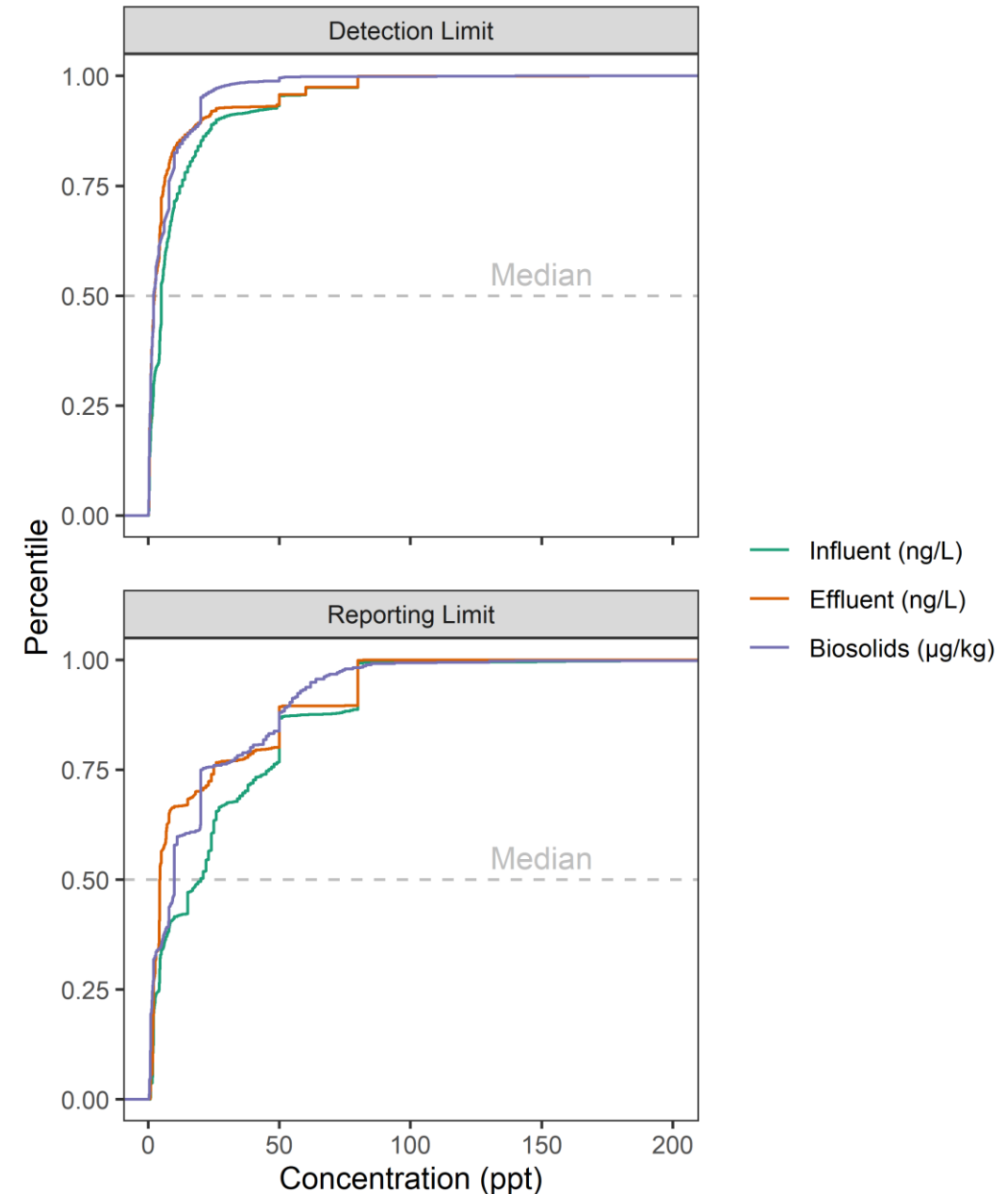
Reporting Limit:

Smallest concentration a lab can reliably report

Median detection limits and reporting limits by sample type.

Sample	Detection Limit (pptr)	Reporting Limit (pptr)
Influent	5.0	20.0
Effluent	2.4	4.4
Biosolids	2.7	10.0

Low detection rates and high reporting limits.



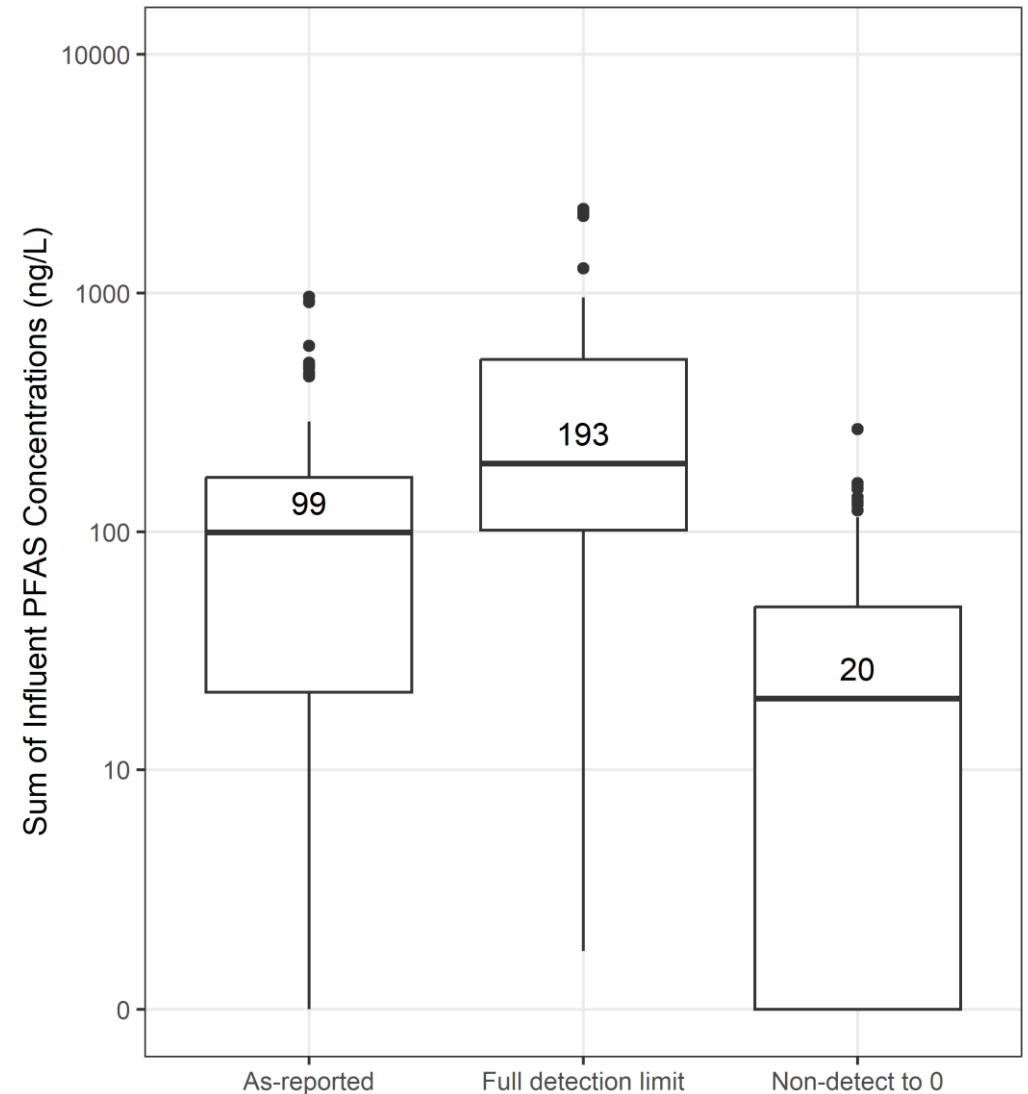
Handling Non-Detects

Compared three approaches to handling non-detects (NDs):

- 1. As-reported:** NDs set to values as provided by GeoTracker (e.g., 0, detection limit, reporting limit)
- 2. Full detection limit:** NDs are substituted with the detection limit reported by the laboratory
- 3. Non-detect to 0:** NDs set to 0 ng/L

“Book end” range in distributions

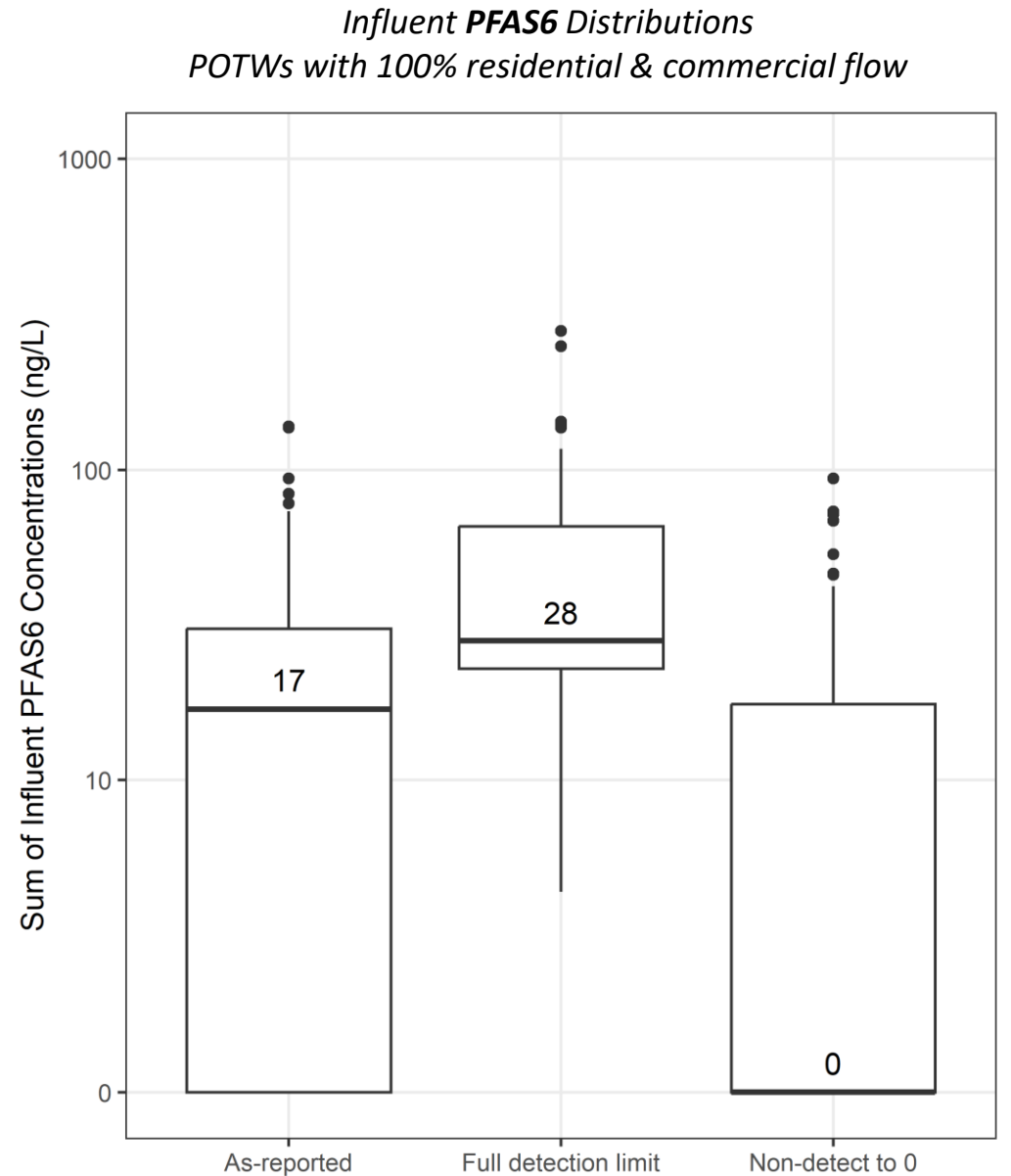
*Influent PFAS Distributions
POTWs with 100% residential & commercial flow*



Handling Non-Detects (PFAS6)

MA maximum contaminant level (MCL) for PFAS6 = **20 ng/L** for sum of:

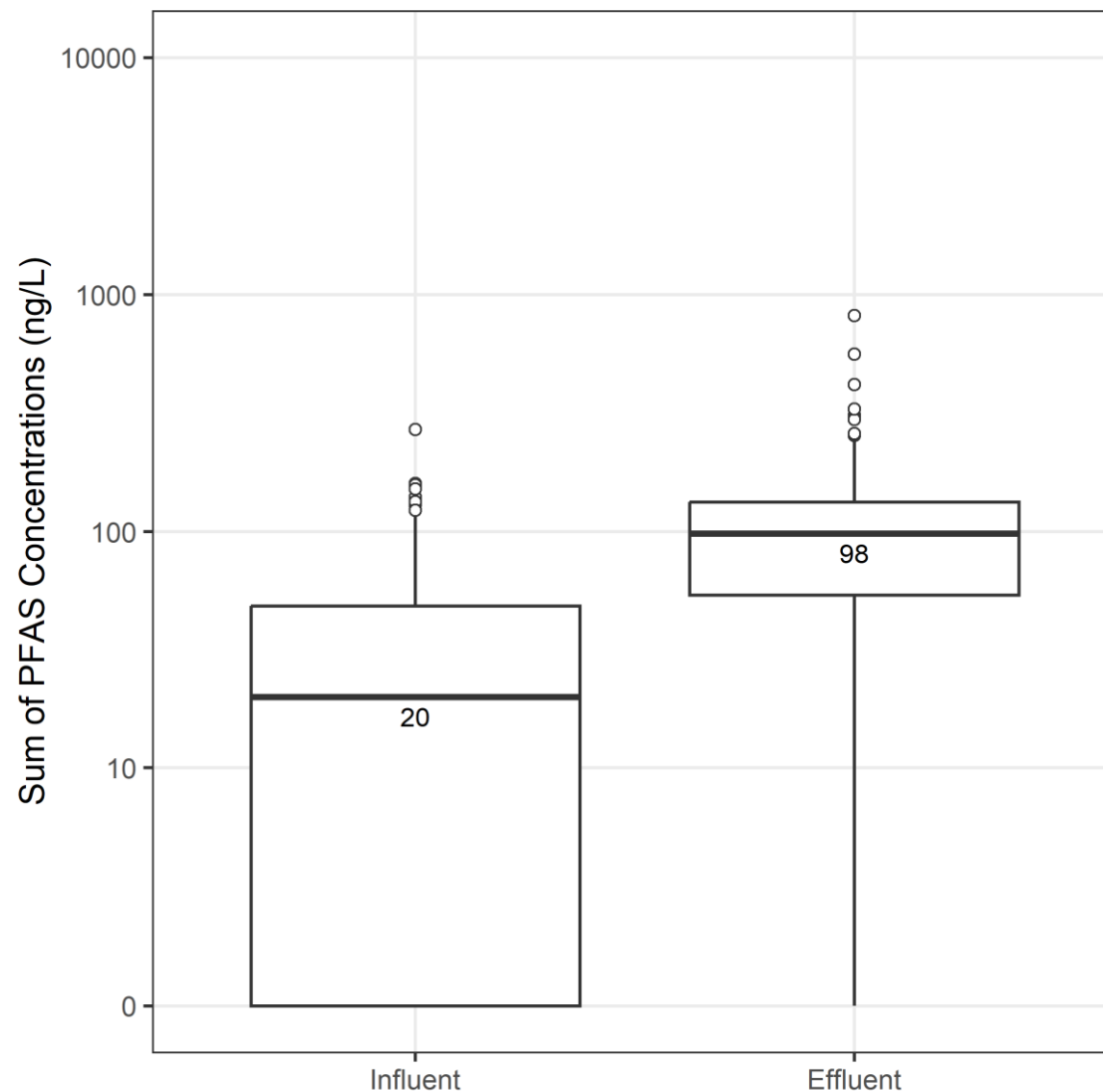
- PFOS
- PFOA
- PFHxS
- PFNA
- PFHpA
- PFDA



Influent vs Effluent

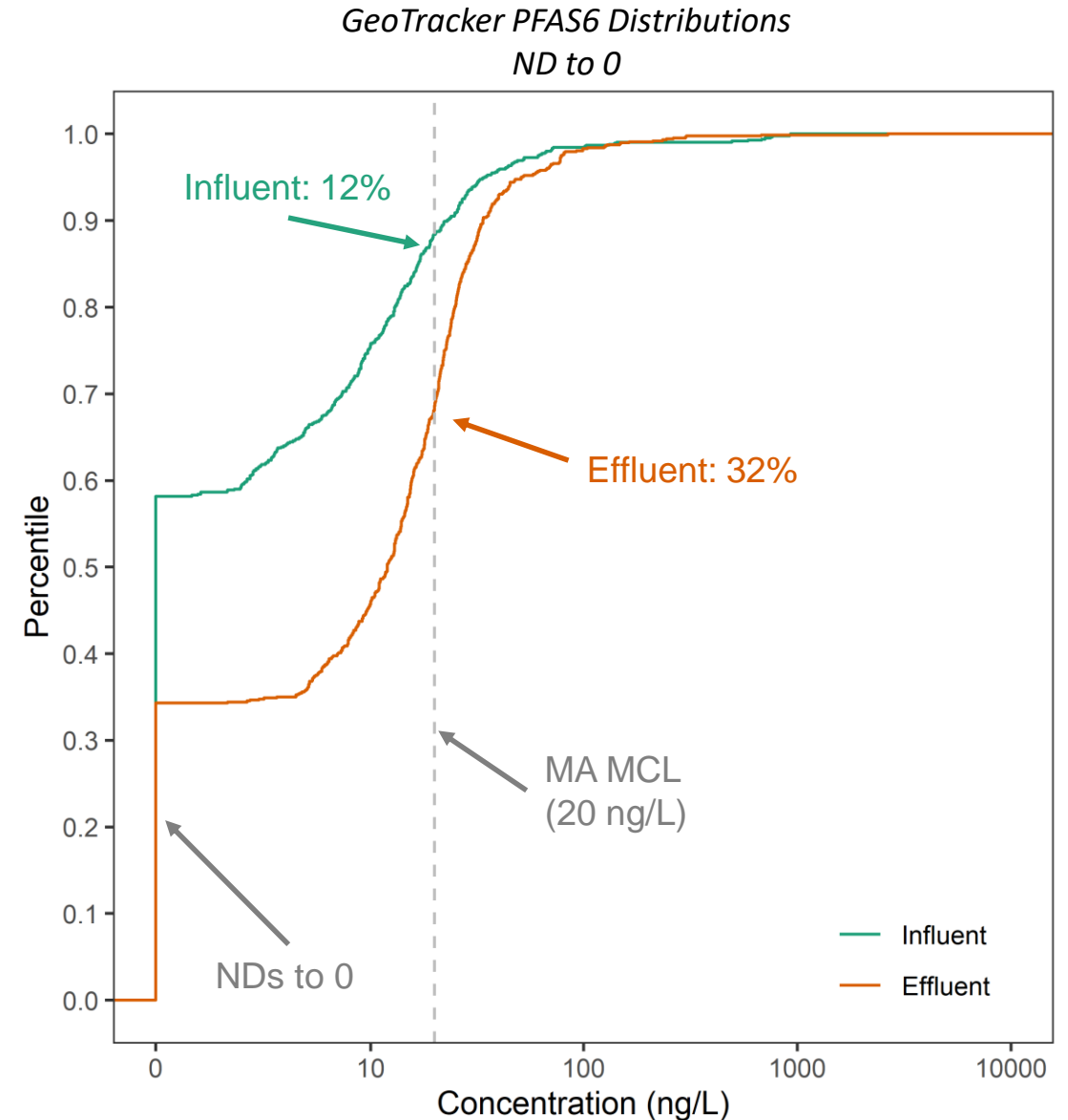
- Observed higher effluent concentrations
- Potentially attributed to:
 - Cleaner effluent is easier to analyze
 - Precursor transformations during treatment

Not suggesting POTWs are adding PFAS during treatment



GeoTracker in Context – Comparison to Drinking Water Standards

- **MA** maximum contaminant level (MCL):
 - 20 ng/L for sum of PFOS, PFOA, PFHxS, PFNA, PFHpA, and PFDA (PFAS6)
- **CA** notification levels (health-based advisories):
 - PFOA: 5.1 ng/L
 - PFOS: 6.5 ng/L
 - PFBS: 500 ng/L
 - PFHxS: 3 ng/L
- June 15, 2022: **U.S. EPA** updated “lifetime health advisories” for PFOA (0.004 ng/L) and PFOS (0.02 ng/L)



Takeaways

- State-wide publicly available PFAS database in GeoTracker offers context for PFAS samples in New England
- Data analysis will improve as labs decrease reporting limits
- Higher effluent concentrations may indicate precursor transformation
- 32% of effluent samples exceed MA MCL (PFAS6)

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