MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Reducing PFAS Discharged to WWTPs: the Michigan Experience

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Water Resources Division: PFAS Compliance Strategies

Public and Private Municipal Groundwater Discharges Compliance Strategy: Outlines how EGLE will prioritize, evaluate, and address PFAS from municipal groundwater discharges.

Industrial Stormwater and Industrial Direct Discharge Strategy: Requires PFAS characterization and mitigation of discharges to surface water and groundwater.

Industrial Pretreatment Program PFAS Initiative: Requires all IPP WWTPs to conduct PFAS source investigation.

Land Application of Biosolids Containing PFAS Interim Strategy: Requires all WWTPs to sample for PFAS prior to land application.

Municipal NPDES Permitting Strategy: Includes PFAS monitoring, limits, and compliance schedules, as applicable.

Michigan PFAS Criteria: Surface Water

Rule 57 Toxic Substances of the Part 4 Water Quality Standards

Natural Resources & Environmental Protection Act (NREPA) – Part 31, Water Resources Protection

PFAS	HNV* (drinking) (ppt)	HNV* (nondrinking) (ppt)
PFOS	11	12
PFOA	66	170
PFBS	8,300	670,000
PFHxS	59	210
PFNA	19	30

*Human Noncancer Value (HNV)

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Michigan PFAS Criteria: Groundwater

Part 201, Environmental Remediation, of NREPA - Generic Groundwater Clean Up Criteria

PFAS	Groundwater Cleanup Criteria (ppt)
PFOA	8
PFOS	16
PFNA	6
PFHxA	400,000
PFHxS	51
PFBS	420
HFPO-DA	370

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Industrial Pretreatment Program PFAS Initiative

- February 2018 – 95 WWTPs required to screen Industrial Users
  - Evaluate Industrial Users for potential sources of PFAS
  - Follow-up sampling of sources
  - Sample WWTP effluent if sources > screening criteria (12 ppt PFOS)
  - Sample biosolids if WWTP effluent ≥ 50 ppt PFOS
  - Reduce/Control/Eliminate PFAS discharge at source
  - Ongoing monitoring & reporting for WWTPs with sources

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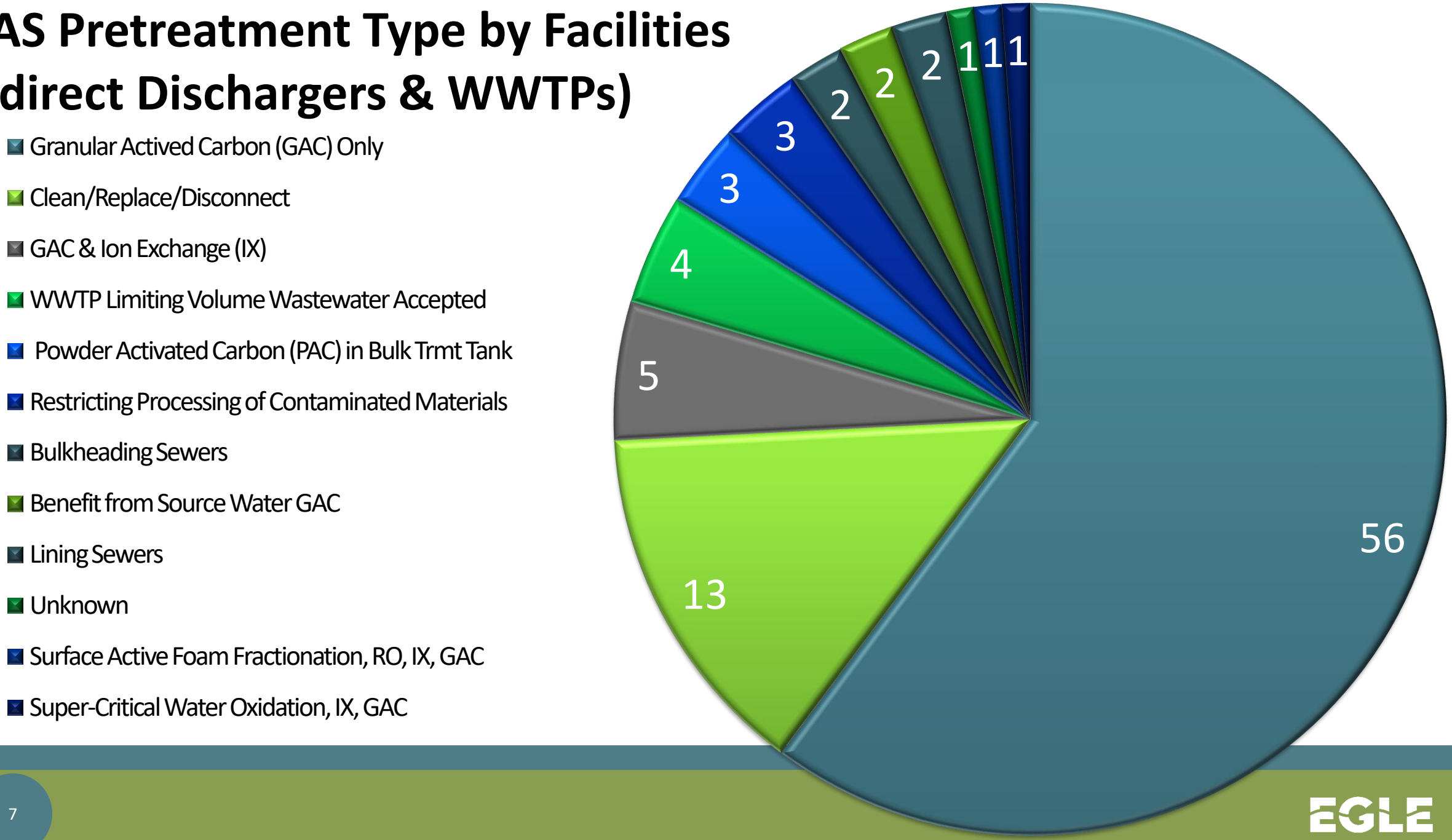
Findings: Sources of PFOS - Number by Type

Industrial Type	Total Number Evaluated[1]	Number (%) Sources of PFOS by Type[2]	PFOS Effluent Range Exceeding Screening Level of 12 ppt
Landfills	64	54 (84%)	13-9,800
Metal Finishing	323	50 (15%)	19-240,000
Contaminated Sites	47	23 (49%)	14-220,000
AFFF Use	21	16 (76%)	13-65,000
Centralized Waste Treaters (CWTs)	15	13 (87%)	13-53,000
Chemical Manufacturers	24	7 (26%)	13-4,600,000
Paper Manufacturing, Packaging	17	6 (35%)	13-810
Commercial Industrial Laundries	22	6 (27%)	13-98
Septage	6	5 (83%)	13-160
Leather Tanning and Finishing	4	2 (50%)	13-83
Transportation Equipment Cleaning	4	1 (25%)	15-640

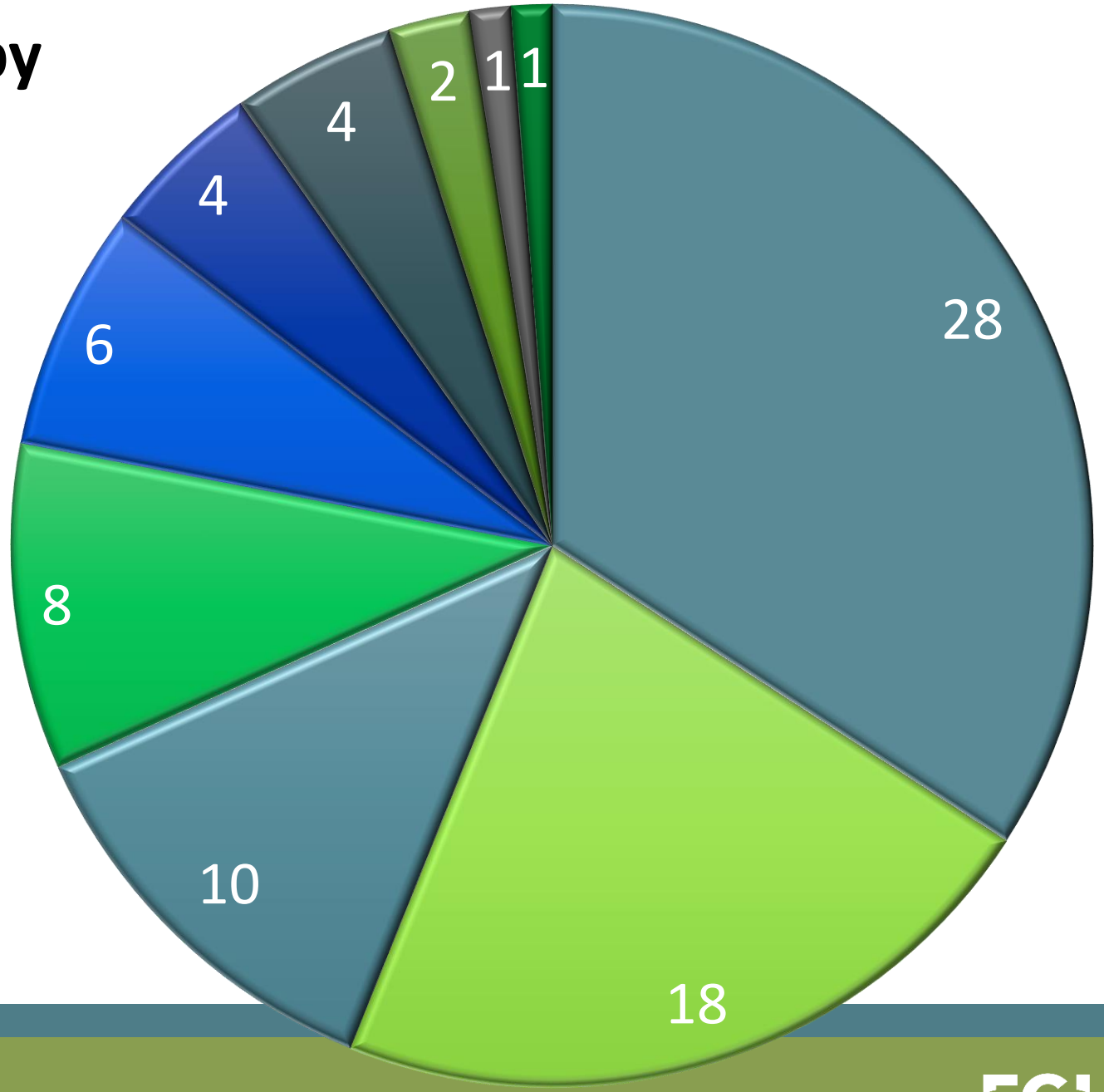
[1]Estimated based on industries surveyed and sampled from 2018-2023 during the IPP PFAS Initiative. Number of facilities per subcategory may be underestimated for some categories since sewer users that did not meet local screening criteria may not have been sampled. The information presented in this document has been compiled from many sources including, but not limited to, compliance submittals, laboratory reports, voluntary surveys, emails, internet searches and personal communications. These sources contained variable levels of detail. This document represents our best effort to compile, organize, and summarize this information at this point in time.

[2]*Sources* are those exceeding the screening level of 12 ppt PFOS and are considered a source by the WWTP.

PFAS Pretreatment Type by Facilities (Indirect Dischargers & WWTPs)



Installed PFAS Pretreatment by Industry Sector (Indirect Discharges Only)



Reductions in PFOS to WWTP Effluent and Biosolids (Industrially Impacted)

Municipal WWTP	Highest Effluent PFOS (ppt)	Most Recent* Effluent PFOS (ppt)	PFOS Reduction in Effluent	2018 Biosolids PFOS (ppb)	Most Recent* PFOS (ppb)	PFOS Reduction in Biosolids
WWTP #50	540	3.6	99%	983	18	98%
WWTP #14	360	4.72	99%	1060	27	97%
WWTP #57	2000	7.24	99%	1680	31	98%
WWTP #54	240	6.5	93%	387	57	85%
WWTP #92	4800	3.9	99%	2150	17	99%

*Data received by August 15, 2024

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Reductions in PFOS to WWTP Effluent and Biosolids

Municipal WWTP	Highest PFOS Effluent (ppt)	Most Recent* PFOS Effluent (ppt)	PFOS Reduction in Effluent	2018 Biosolids PFOS (ppb)	Most Recent* PFOS (ppb)	PFOS Reduction in Biosolids
WWTP #40	351	12	96%	21.8	NA	NA
WWTP #74	1150	14	99%	77.6	9.6	88%
WWTP #53	40	10	75%	6.49	NA	NA
WWTP #38	37	9.5	74%	9.4	3.5	63%
WWTP #49	130	4.7	96%	21	14	33%

*Data received by August 15, 2024

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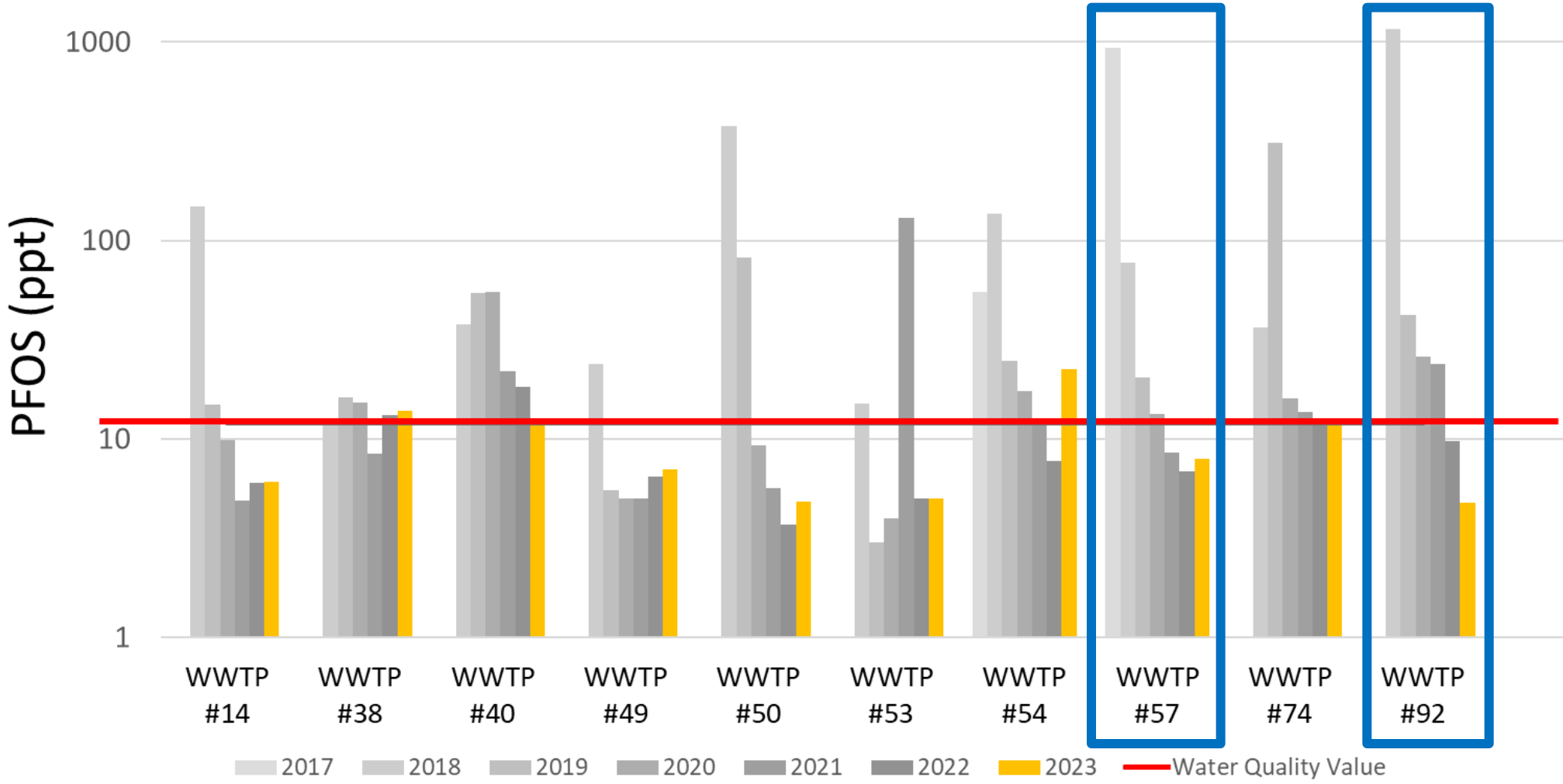
Effluent Annual Average of 10 IPP WWTPs (log scale)



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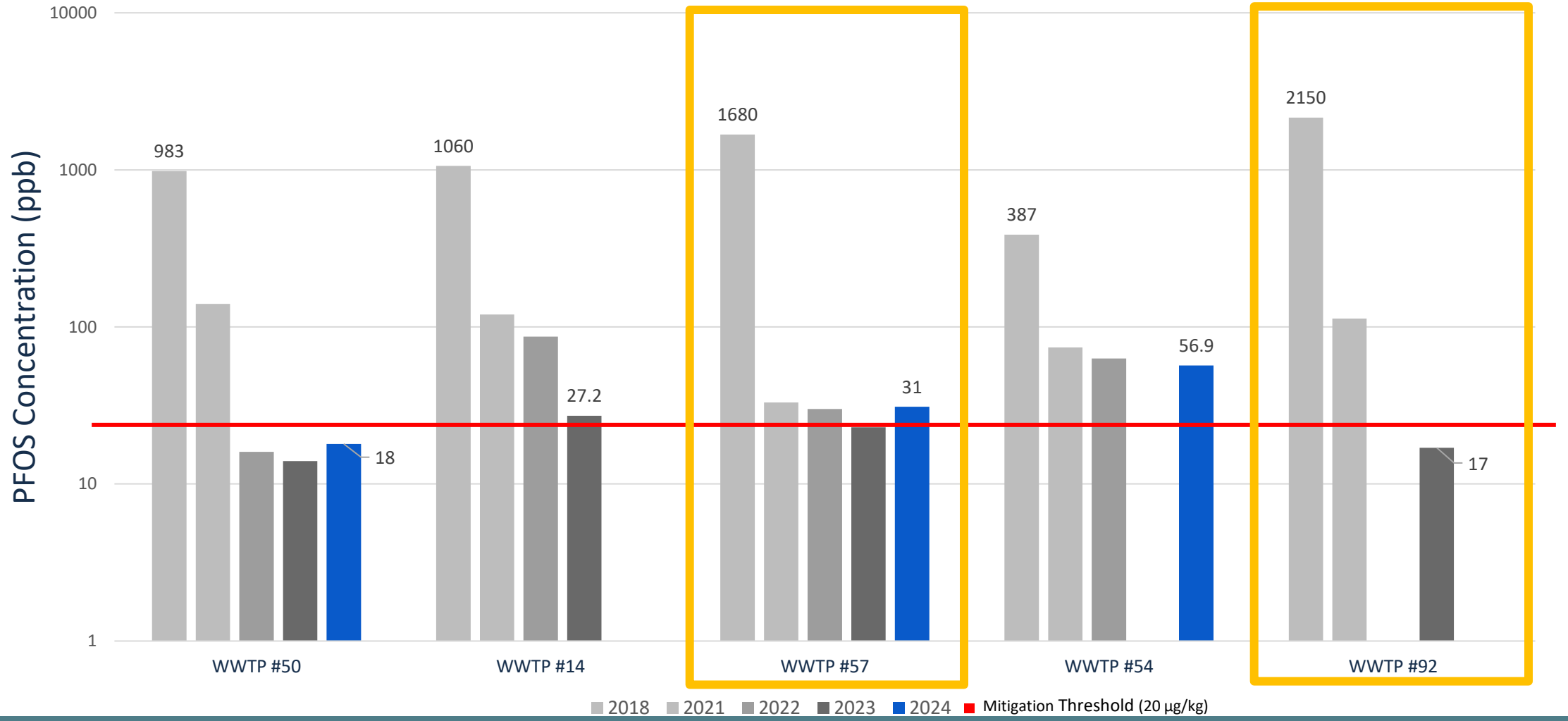
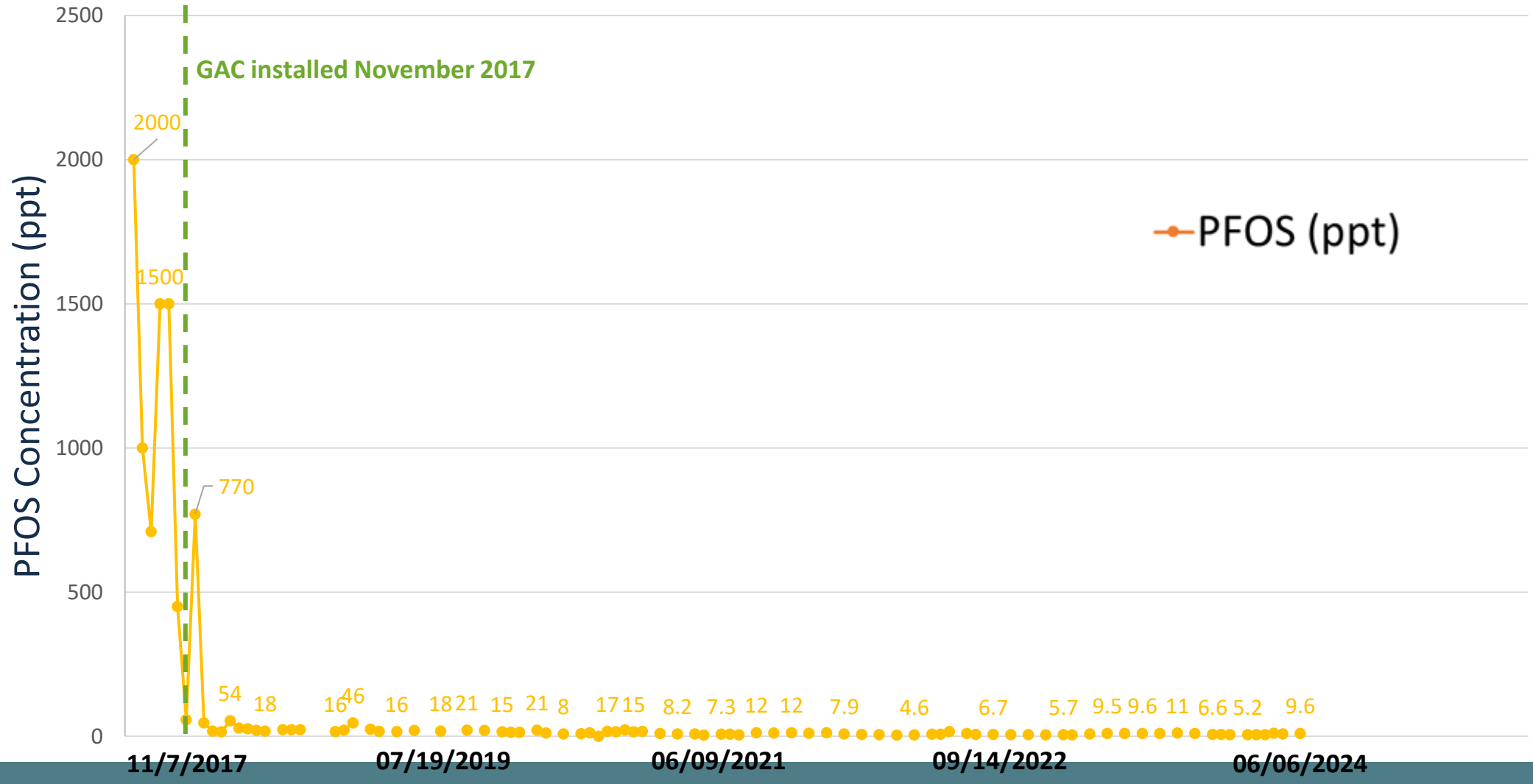
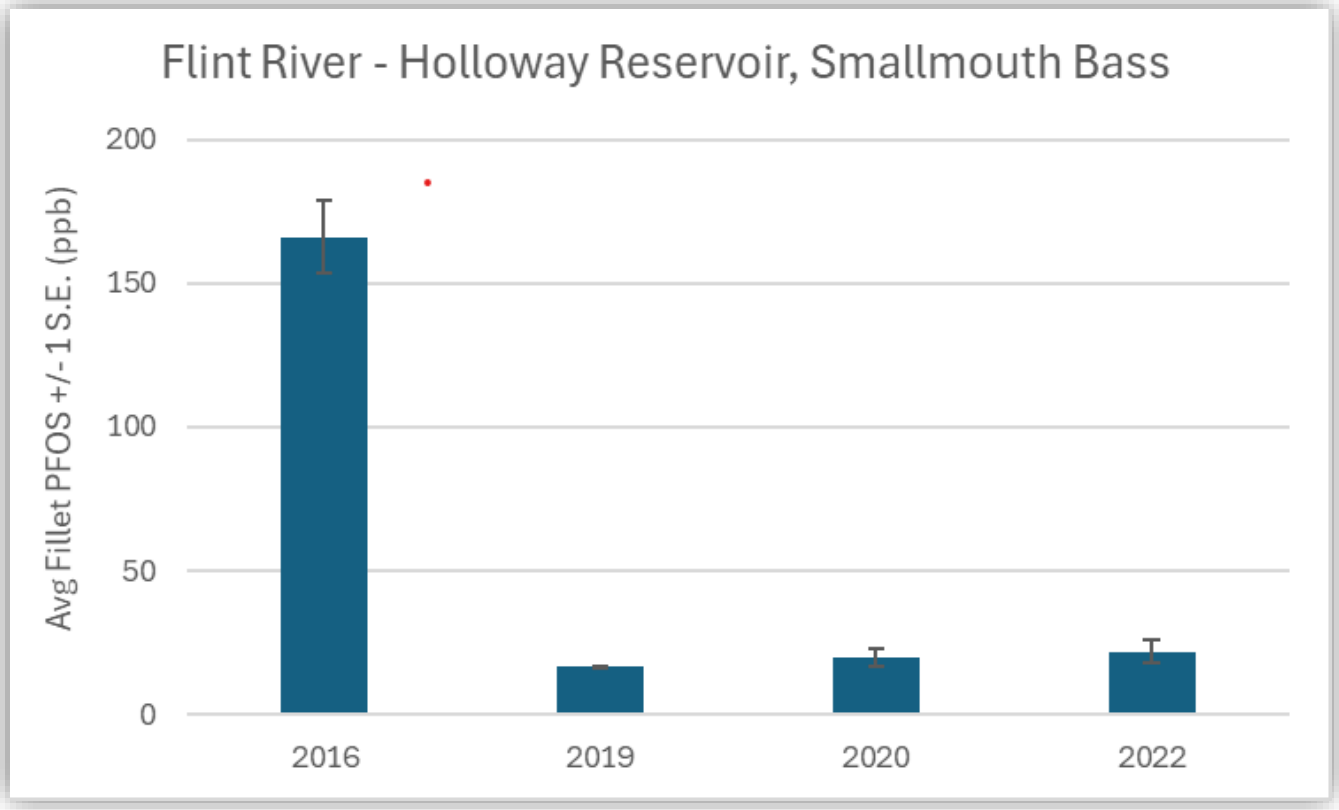
PFOS Concentration Reductions in Industrially Impacted Biosolids (log scale)



WWTP #57 Effluent

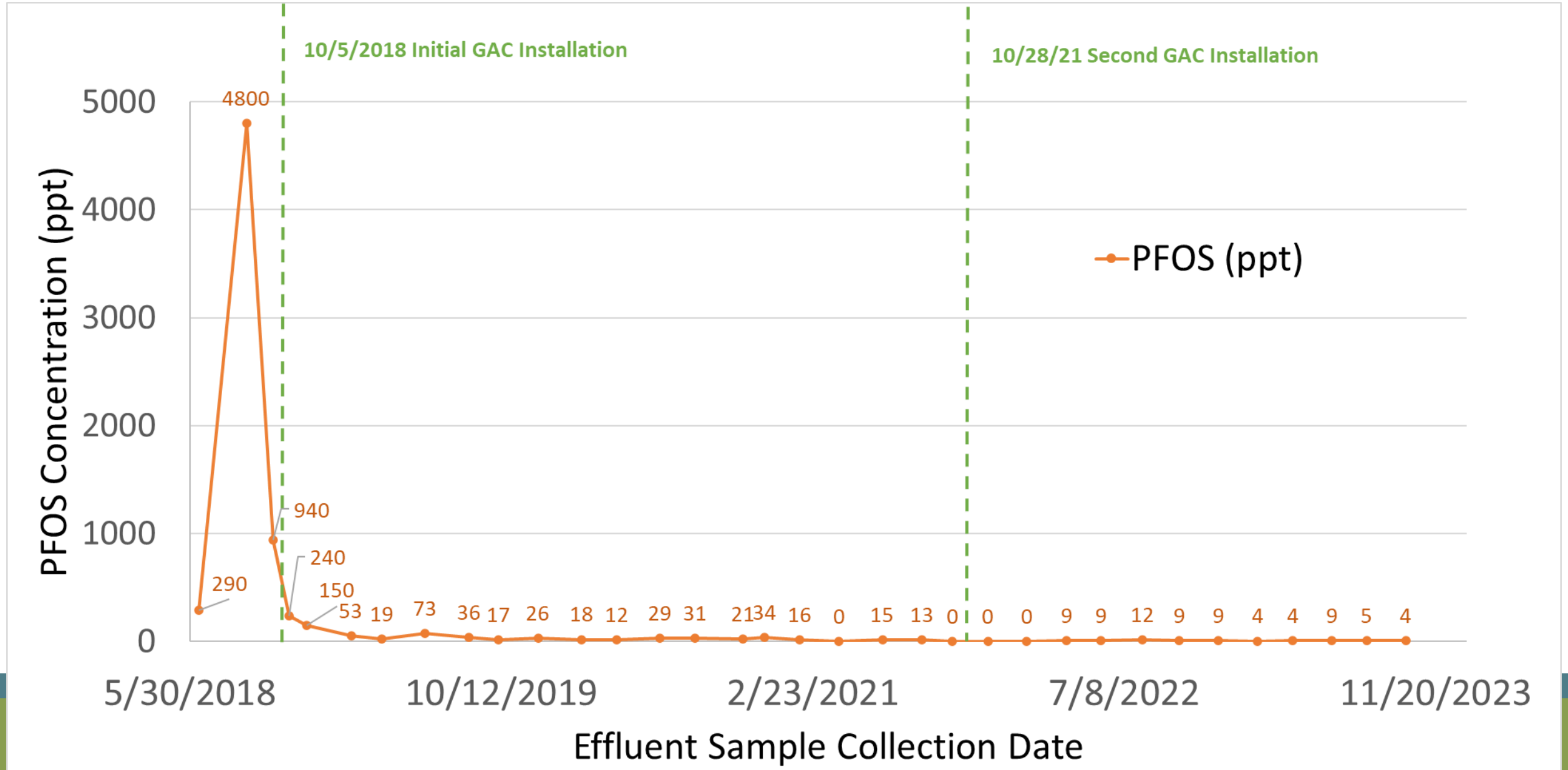


Corresponding reductions observed in fish downgradient of industrially impacted discharges from WWTP #57 once source control was implemented

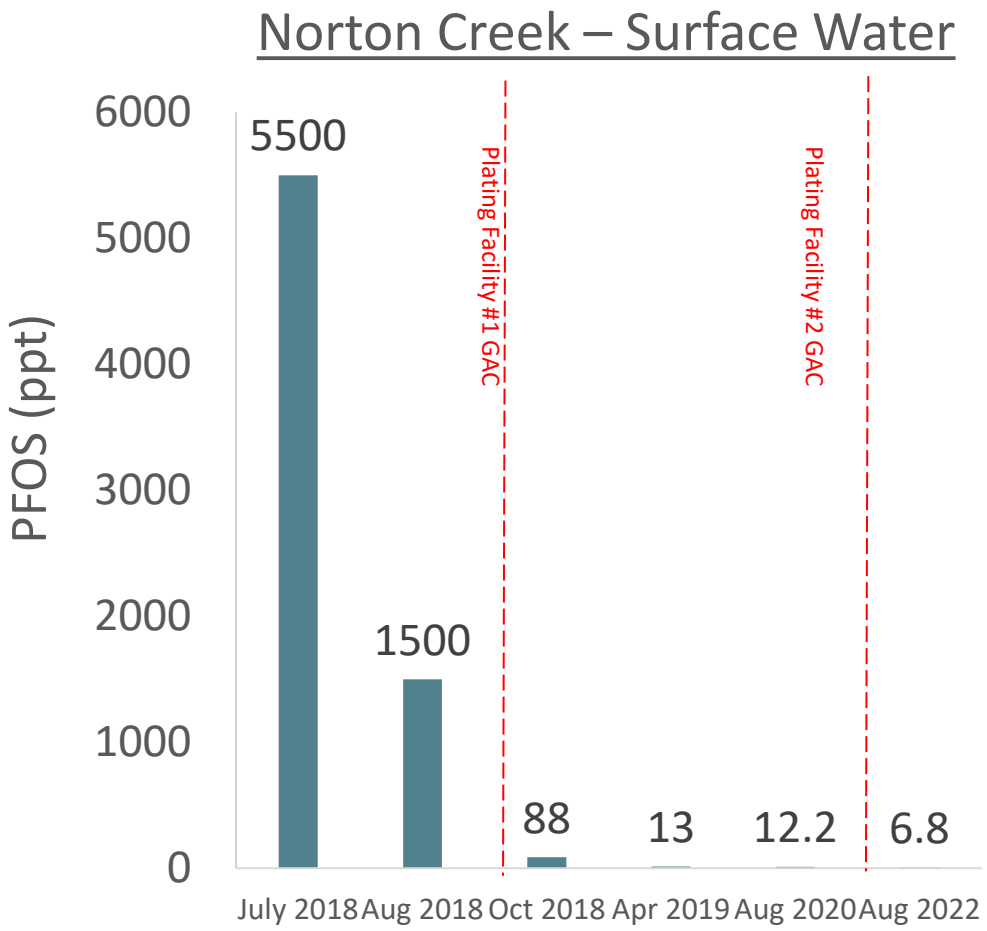


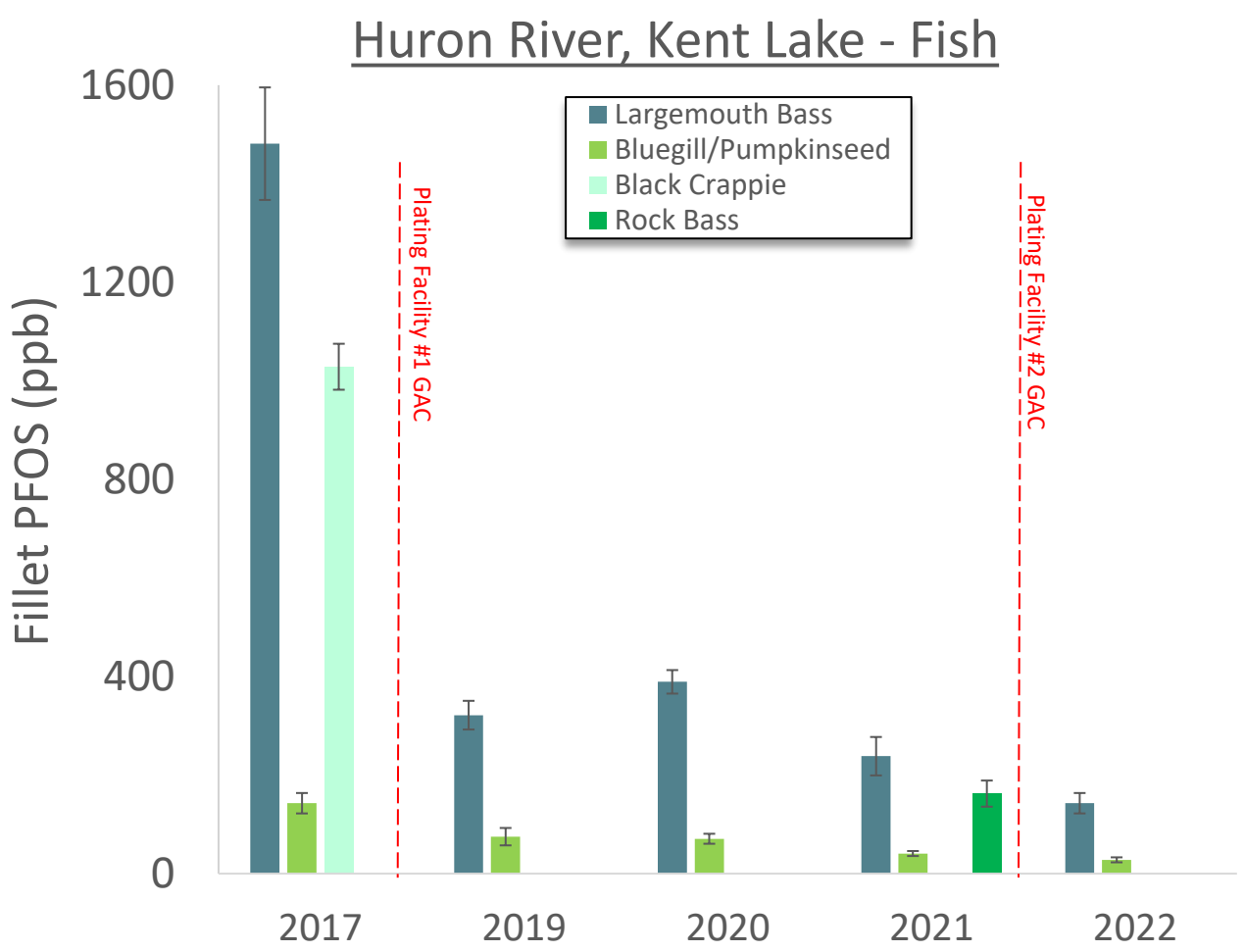
87% reduction in PFOS concentrations in smallmouth bass in the Holloway Reservoir (Flint River)

WWTP #92 Effluent



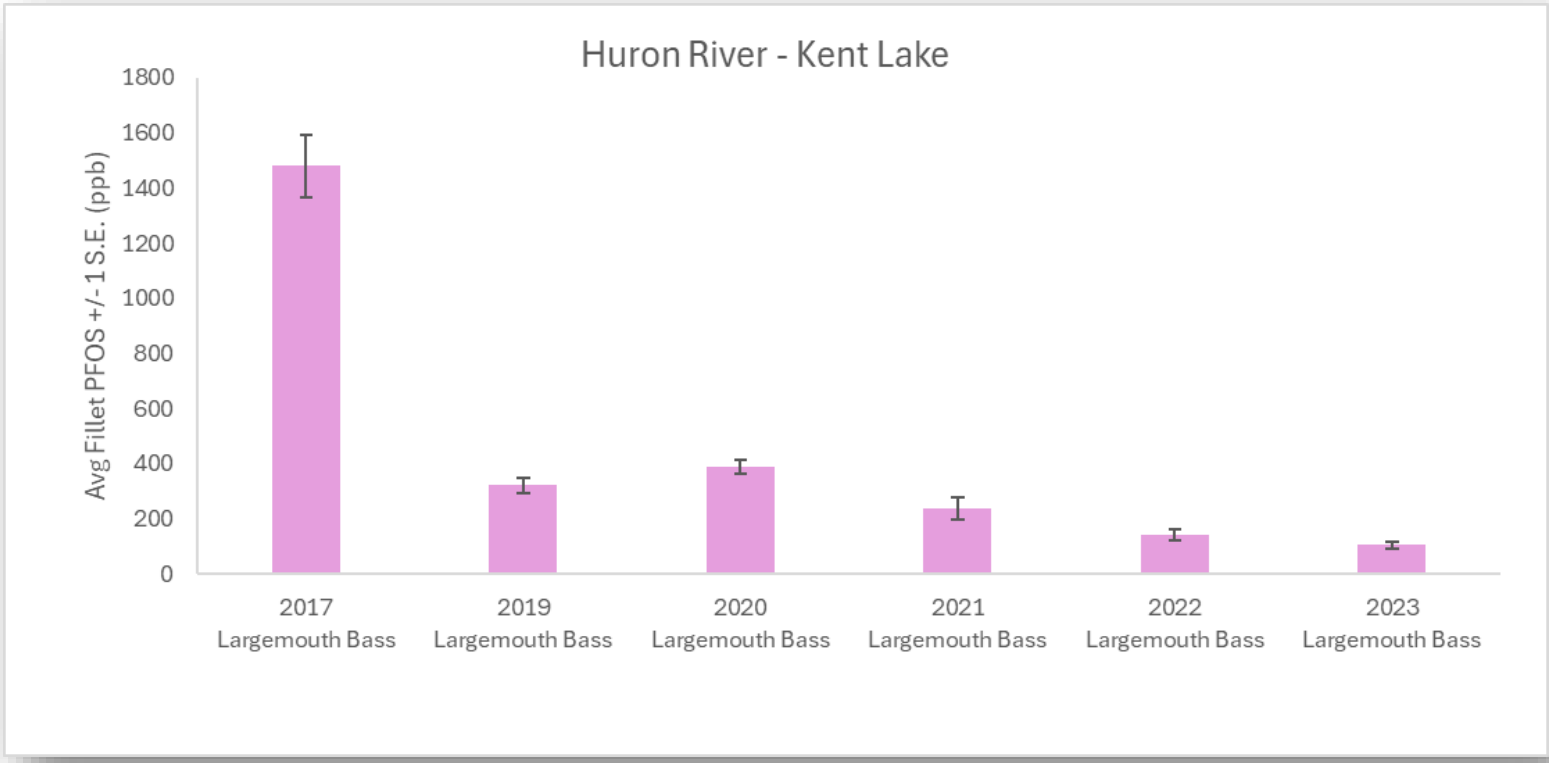
“Quick” response in fish and surface water after source control





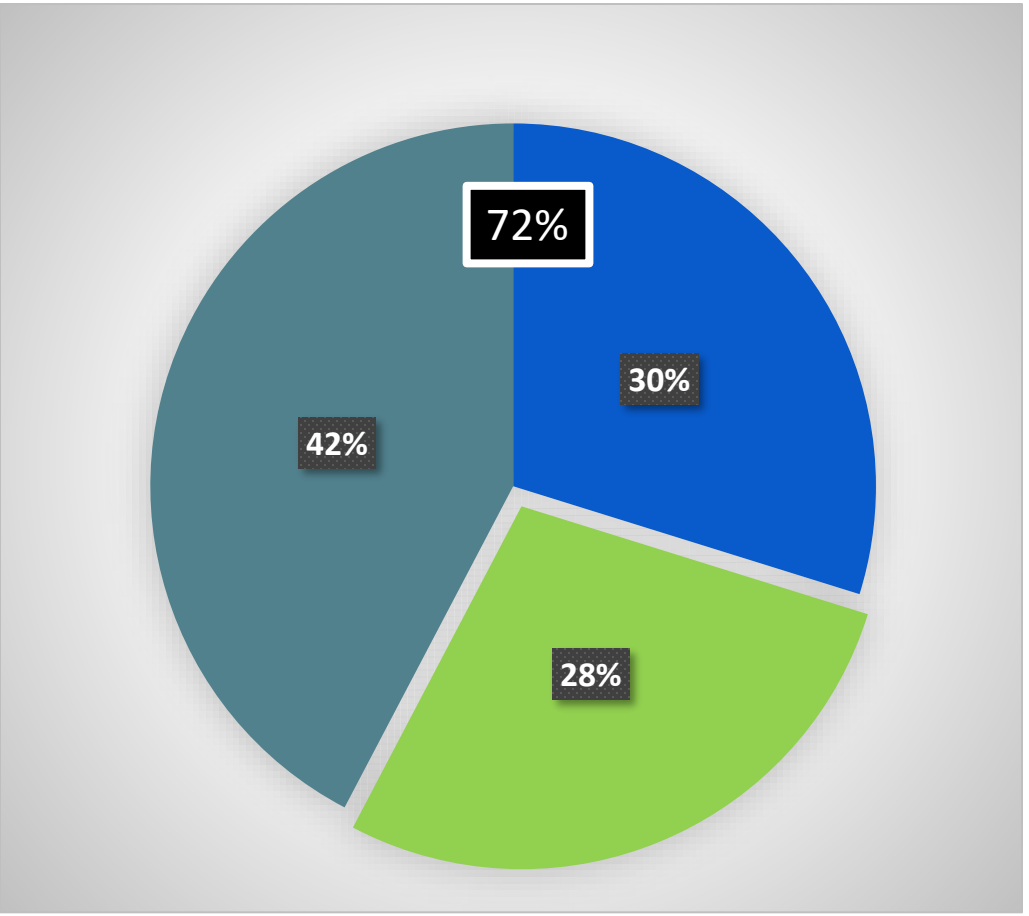
Corresponding reductions observed in fish downgradient of industrially impacted discharge from WWTP #92 once source control was implemented

90% reduction in average PFOS concentrations in largemouth bass in Kent Lake (Huron River)

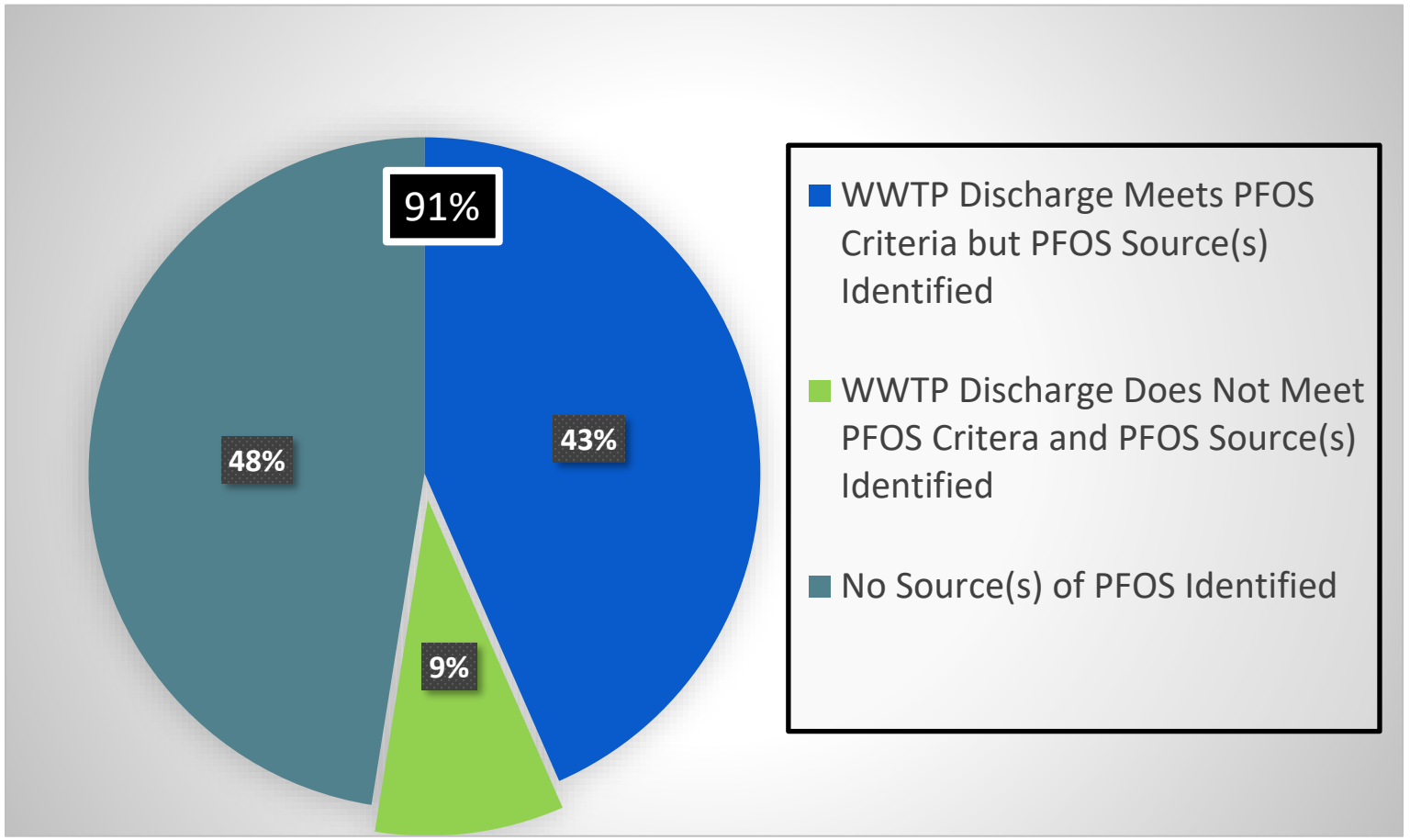


Effluent Compliance with PFOS Water Quality Value for IPP WWTPs

December 2019



July 2024



Mean and Median Values of Biosolids/Sludge Concentrations Since 2018

Year	PFOS (ppb)		PFOA (ppb)	
	Mean	Median	Mean	Median
2018*	184	13	25	7
2021	21	9	8	4
2022	16	10	7	3
2023	11	7	6	3
2024**	8	5	5	2

*Includes data from industrially impacted facilities as part of a statewide study

**Calculations based on 148 results received as of 8/26/2024

All values listed are in parts per billion (ppb[µg/kg])

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Municipal WWTPs* NPDES PFAS Permitting Strategy

Effluent Limits for Regulated PFAS (mainly PFOS)

- Based on reasonable potential evaluation
- Monitoring with schedules to comply with applicable limits

Effluent Monitoring Requirements

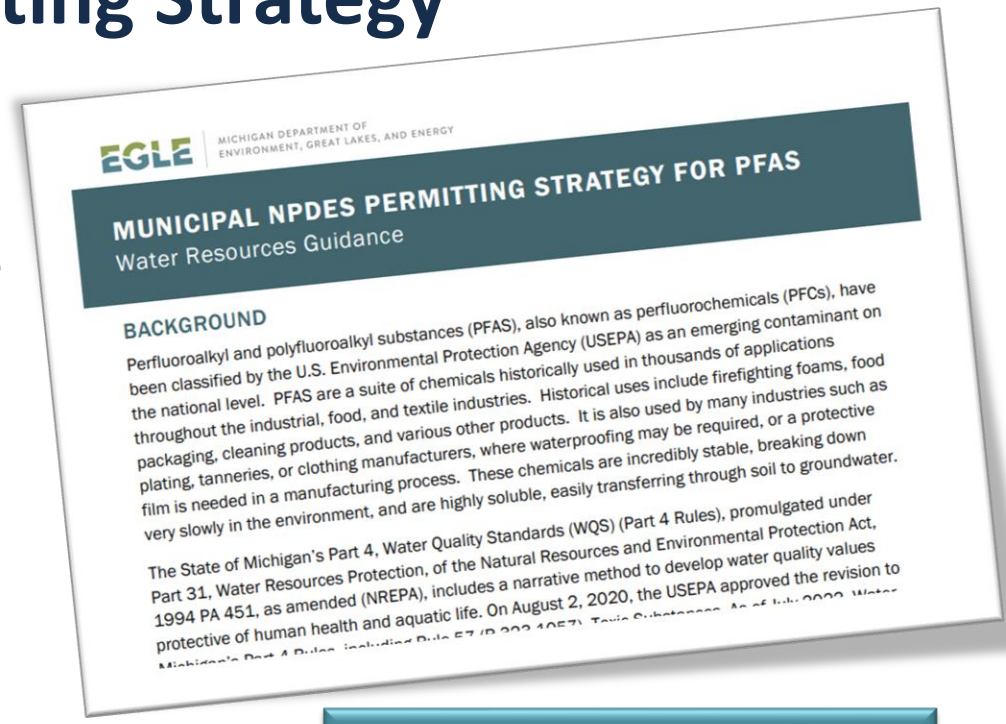
- Monthly, Quarterly, 3x/Year or Annual
- Based on effluent and biosolids quality

IPP WWTPs:

- Establish Local Limit(s)
- Source Reduction/Control, Compliance & Enforcement under IPP
- Corrective Action Plans in rare cases

Non-IPP WWTPs:

- Minimization & Source Evaluation Plans if needed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MUNICIPAL NPDES PERMITTING STRATEGY FOR PFAS

Water Resources Guidance

BACKGROUND

Perfluoroalkyl and polyfluoroalkyl substances (PFAS), also known as perfluorochemicals (PFCs), have been classified by the U.S. Environmental Protection Agency (USEPA) as an emerging contaminant on the national level. PFAS are a suite of chemicals historically used in thousands of applications throughout the industrial, food, and textile industries. Historical uses include firefighting foams, food packaging, cleaning products, and various other products. It is also used by many industries such as plating, tanneries, or clothing manufacturers, where waterproofing may be required, or a protective film is needed in a manufacturing process. These chemicals are incredibly stable, breaking down very slowly in the environment, and are highly soluble, easily transferring through soil to groundwater.

The State of Michigan's Part 4, Water Quality Standards (WQS) (Part 4 Rules), promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), includes a narrative method to develop water quality values protective of human health and aquatic life. On August 2, 2020, the USEPA approved the revision to

*Applies to:

- IPP WWTPs
- Non-IPP EPA Majors (design flow > 1 MGD)
- Minors with elevated biosolids/effluent

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PFAS Local Limits

- Primary local limit is for PFOS
  - Some have set limits for PFOA, PFBS, PFNA & PFHxS
- Range for PFOS local limits approved/proposed: 12 – 192 ppt
- Safety factor range: 0 – 25%
- Mix of industrial user contribution method & uniform allocation method
- Concentration based limit rather than loading limit

PFAS Pollutant Minimization & Source Evaluation

1

Evaluate Non-Domestic Users/Other Sources

- Survey Industry, Commercial Operations, AFFF Use
- Evaluate contaminated sites, collection system, drinking source water

2

Submit Findings and Monitoring Plan/Schedule

WRD Review and Approval

3

Address Sources PFAS

- Develop legal authority to control nondomestic users
- Conduct I/I study and/or additional sampling to ID sources
  - Submit Ongoing Progress Reports

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- **IPP PFAS Initiative:** IPP PFAS Initiative Webpage
- **PFAS Source Doc**: Industrial Sources of PFOS to Municipal Wastewater Treatment Plants as identified through the Michigan Department of Environment, Great Lakes, and Energy Industrial Pretreatment program Per-and Polyfluoroalkyl Substances Initiative
- **Summary Report**: Initiatives to Evaluate the Presence of PFAS in Municipal Wastewater and Associated Residuals (Sludge/Biosolids) in Michigan
- **Detailed Report**: Evaluation of PFAS in Influent, Effluent, and Residuals of Wastewater Treatment Plants (WWTPs) in Michigan
- **Municipal NPDES Permit Strategy:** Municipal NPDES Permitting Strategy for PFAS
- **Industrial Direct Discharge/Stormwater Strategy:** Compliance Strategy for Addressing PFAS From Industrial Direct Dischargers and Industrial Stormwater Discharges
- **Biosolids PFAS Strategy:** EGLE Biosolids PFAS Webpage
- **Groundwater Discharge Strategy:** Compliance Strategy for Addressing PFAS from Public and Private Municipal Groundwater Discharges
- **Fume Suppressant Study:** PFAS in Fume Suppressant Products at Chrome Plating Facilities

Questions?

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