

# PFAS Characterization Study Results

Toxics Advisory Committee | January 28, 2021

Matthew Fritch, PWD Watershed Protection Program



**PHILADELPHIA**  
**WATER**  
— DEPARTMENT —

Presented to an advisory committee of the DRBC on January 28, 2021. Contents should not be published or re-posted in whole or part without permission of PWD.



# Overview

- **PFAS Background**
- **PWD Study Design**
- **Characterization Study Results**
- **Latest Results (2020-2021)**
- **Analysis and Discussion**



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# Per and polyfluoroalkyl Substances (PFAS)

- PFOA/PFOS contamination is **typically localized** and associated with releases from a specific facility:
  - manufacturing and industrial sites
  - firefighting training areas
  - industrial/municipal waste sites
- Media attention has focused on use of fire fighting foams containing AFFF. Willow Grove Naval Air Station contamination discovered in 2014.
- Highly soluble, persistent, mobile in groundwater and not effectively removed through conventional treatment
- Typically detected in water at the ng/L (or ppt) level – the equivalent of one grain of sand in an Olympic-sized swimming pool



Food Packaging



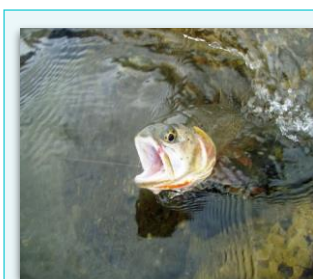
Commercial Household Products



Workplace



Drinking Water



Living Organisms



AFFF

# EPA Health Advisory and Testing Methods

Full Name	Abbreviation	Chemistry
N-ethyl Perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	C12
N-methyl Perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	C11
Perfluorobutanesulfonic acid (PFBS)	PFBS	C4
Perfluorodecanoic acid (PFDA)	PFDA	C10
Perfluorododecanoic acid (PFDoA)	PFDoA	C12
Perfluoroheptanoic acid (PFHpA)	PFHpA	C9
Perfluorohexanesulfonic acid (PFHxS)	PFHxS	C6
Perfluorohexanoic acid (PFHxA)	PFHxA	C6
Perfluorononanoic acid (PFNA)	PFNA	C9
<b>Perfluorooctanesulfonic acid (PFOS)</b>	<b>PFOS</b>	<b>C8</b>
<b>Perfluorooctanoic acid (PFOA)</b>	<b>PFOA</b>	<b>C8</b>
Perfluorotetradecanoic acid (PFTeDA)	PFTeDA	C14
Perfluorotridecanoic acid (PFTrDA)	PFTrDA	C13
Perfluoroundecanoic acid (PFUnA)	PFUnA	C11

- EPA Method 537 used in UCMR3 to test for 14 PFAS compounds
- Methods 537.1 (18 PFAS) and 533 (29 PFAS) also approved by EPA for testing finished drinking water
- EPA Lifetime Health Advisory level of 70 ng/L (ppt) for PFOS + PFOA in finished drinking water
- Health Advisory set in 2016
- A health advisory is **not** an enforceable regulation



# Public Interest in PFAS

JANUARY 23, 2020

## Philly Water Department refutes report claiming city's drinking water is contaminated

Environmental Working Group says PFAS surpass safe levels



BY ALLIE MILLER  
*PhillyVoice Staff*



HEALTH NEWS Drinking Water

- Environmental Working Group published PFAS test results from 44 cities' drinking water supplies
- Philadelphia ranked sixth highest for PFAS, however...
  - Sample location is not known
  - Laboratory method undisclosed
  - Collection method is not known
  - Reported test result is a sum of 30 different PFAS compounds (not just PFOS+PFOA)
  - n=1

PWD published a position statement expressing concerns about EWG's deficiencies





# PWD Public Messaging

- PWD’s Watershed Protection webpage: <https://www.phila.gov/water/sustainability/protectingwaterways/Pages/PFAS.aspx>
- Includes general PFAS information, PWD sampling results, resources provided by the AWWA, and PWD’s position statement on the Environmental Working Group’s PFAS report.
- Watershed Characterization Report published November 2020

**Water**

Home Topics Businesses Residents Visitors Government

Water Utility Sustainability Education & Outreach Water Rate Board

Phila > Water > Sustainability > Watershed Protection > PFAS Management

## PFAS Management

**Watershed Protection**

- Marcellus Shale Drilling
- » PFAS Management
- Harmful Algal Blooms
- Philly RiverCast

The subject of national attention due to concerns about potential health impacts, PFAS is a family of substances that have been widely used for decades in industry and consumer goods.

As part of our steadfast commitment to providing safe, reliable drinking water, we want to tell you what we do to safeguard our supply.

- Read the [PWD Position Statement on the Environmental Working Group's PFAS Report](#)

### PFAS: What Are They?

- Human-made perfluoroalkyl and polyfluoroalkyl substances—called PFAS—have been used in industrial applications and a wide range of consumer products including cookware, fabrics, paper products and firefighting foams.
- Substances in the PFAS family are not found in water alone. These compounds have been used globally for decades and do not break down easily or quickly. PFAS are widespread around the world, even found in remote environments such as the Arctic.
- Initial research suggests some PFAS substances have been tentatively linked to health problems, including cancer.

### Customer and Safety Concerns

- In our region, there have been media reports of PFAS being detected in groundwater near some military bases that used certain firefighting foams. There are still many other commercial and industrial sources that need to be evaluated.
- While there are no federal or state drinking water regulations for PFAS in Pennsylvania, the EPA set a health advisory level of 70 ng/L for PFOA and PFOS combined as a guideline in 2016.

### Philadelphia Water Department Actions

- Treated drinking water samples have been taken from all three of PWD’s drinking water treatment plants as part of the EPA’s national sampling program. All samples were below the EPA health advisory level of 70 ng/L for PFOA and PFOS combined. In addition, all samples were below the reporting limit (the smallest concentration that can be reported by a laboratory) for every PFAS compound during testing in 2013 and 2014:

PFAS Compound	Reporting Level (ng/L)	Result
PFOA	20	Not detected
PFOS	40	Not detected
PFNA	20	Not detected
PFHxS	30	Not detected
PFBS	90	Not detected
PFHpA	10	Not detected

**For more information concerning EPA’s sampling program and PWD’s results:**

- [2014 Report on 2013 Water Quality](#) (see p. 17)
- [2015 Report on 2014 Water Quality](#) (see p. 17)
- [EPA: Monitoring Unregulated Drinking Water Contaminants](#)

- PWD is proactively testing for PFAS in source water and has not detected concentrations above EPA’s advisory level.
- We are also collaborating with neighboring water utilities to better understand the influence of regional groundwater contamination and stay on top of the latest scientific information.
- PWD continues to follow the state and national discussion and latest scientific discoveries to ensure the integrity of our water supply.

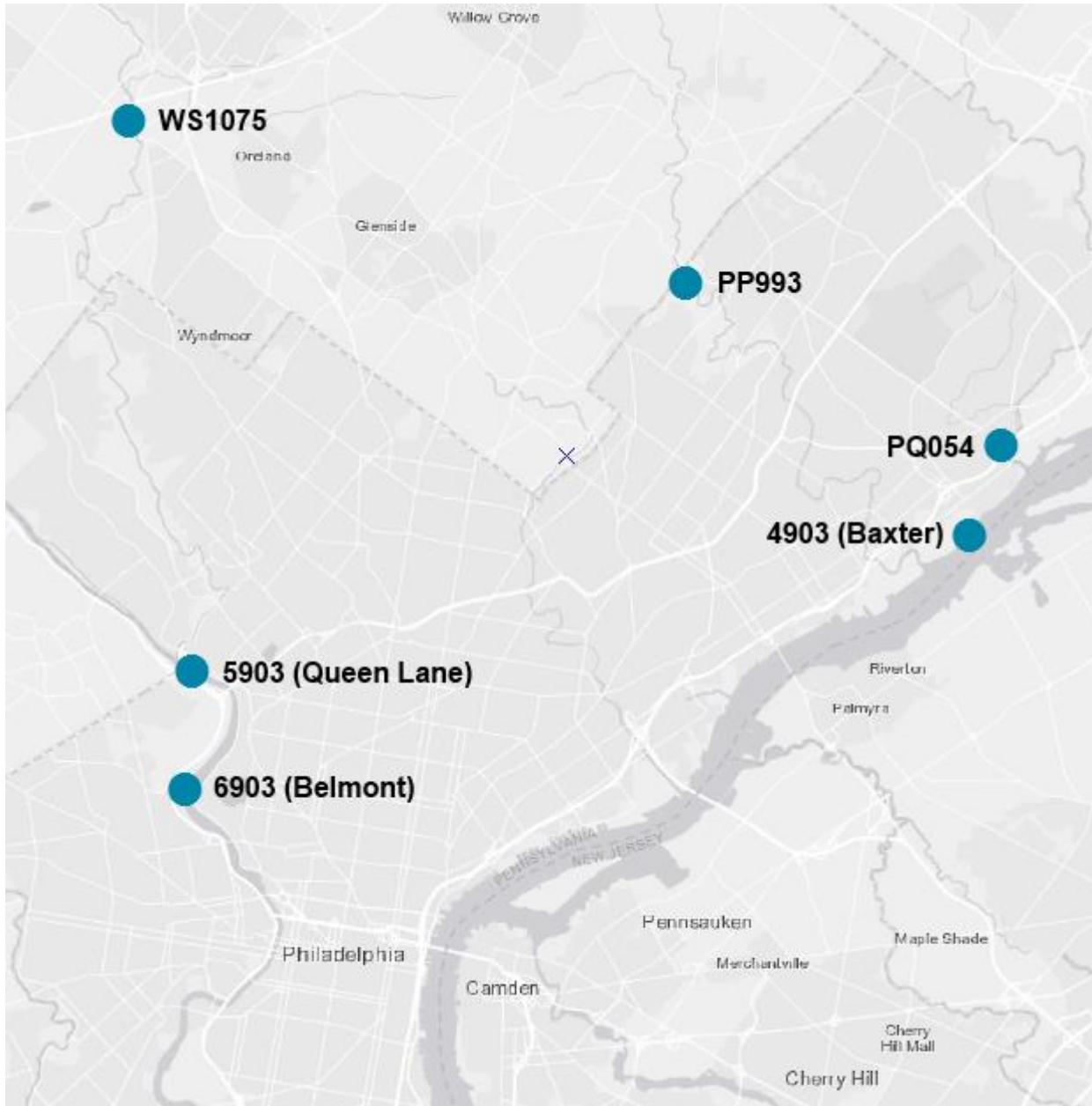
### PFAS Resources from the American Water Works Association

- [AWWA Briefing on PFAS](#)
- [PFAS Cycle Infographic](#)
- [Summary of State Regulation to Protect Drinking Water](#)
- [PFAS Treatment](#)
- [PFAS Overview and Prevalence](#)
- [Monitoring, Sampling, and Analysis](#)
- [EPA Methods for PFAS in Drinking Water](#)

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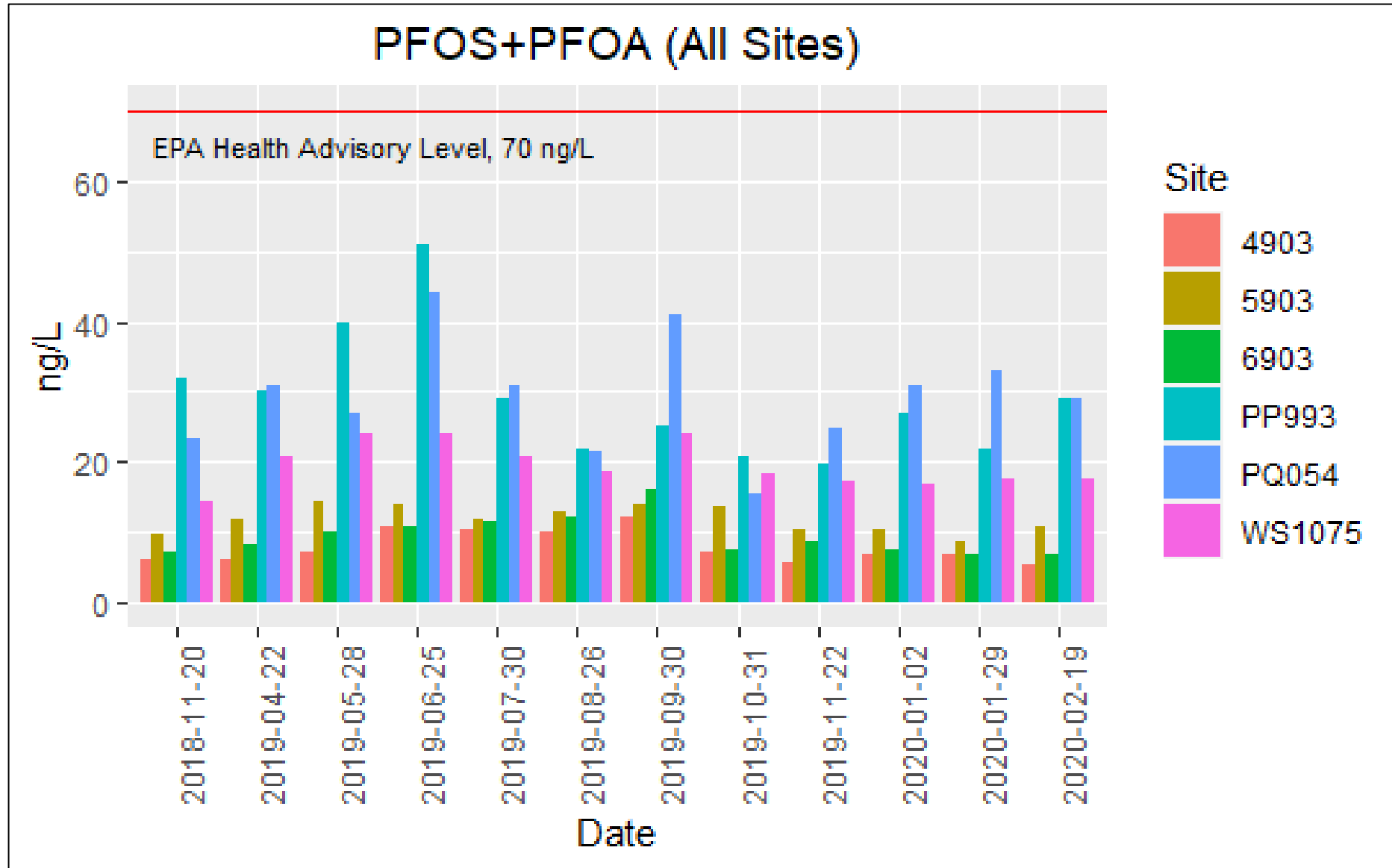
# PFAS Sampling Sites



- 6 sites sampled monthly April 2019 – February 2020
- 3 WTP intakes and 3 tributary sites
- EPA Method 537 (14 PFAS compounds) analysis by Eurofins Eaton Analytical
- No low-flow target
- 12 sampling dates analyzed, including Aqua collaborative sample November 2018

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# Results: PFOS + PFOA



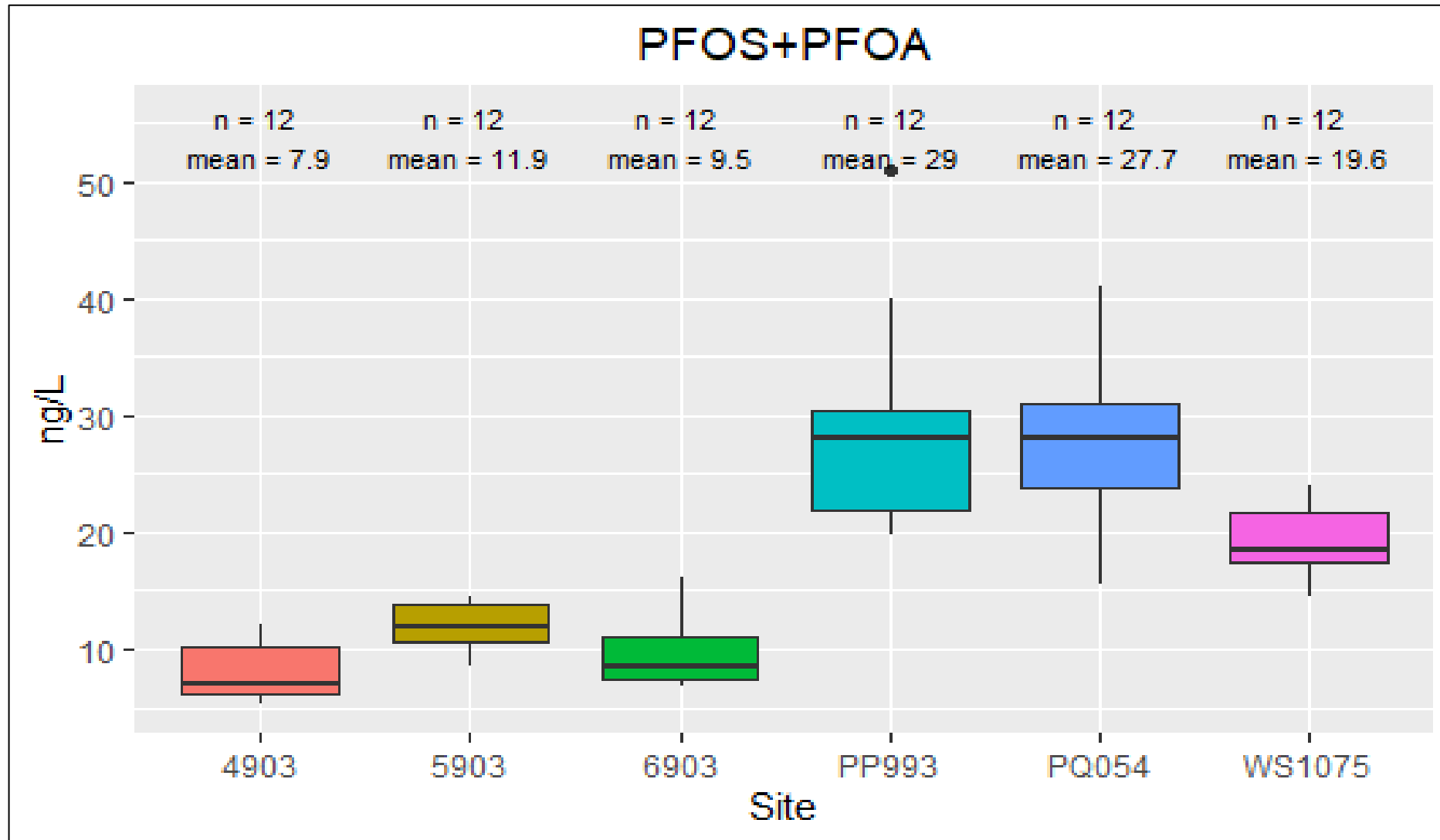
All sample results were below EPA Health Advisory level of 70 ng/L

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# Results: PFOS + PFOA



Intake sites on large rivers exhibited lower levels of PFOS + PFOA than tributary sites

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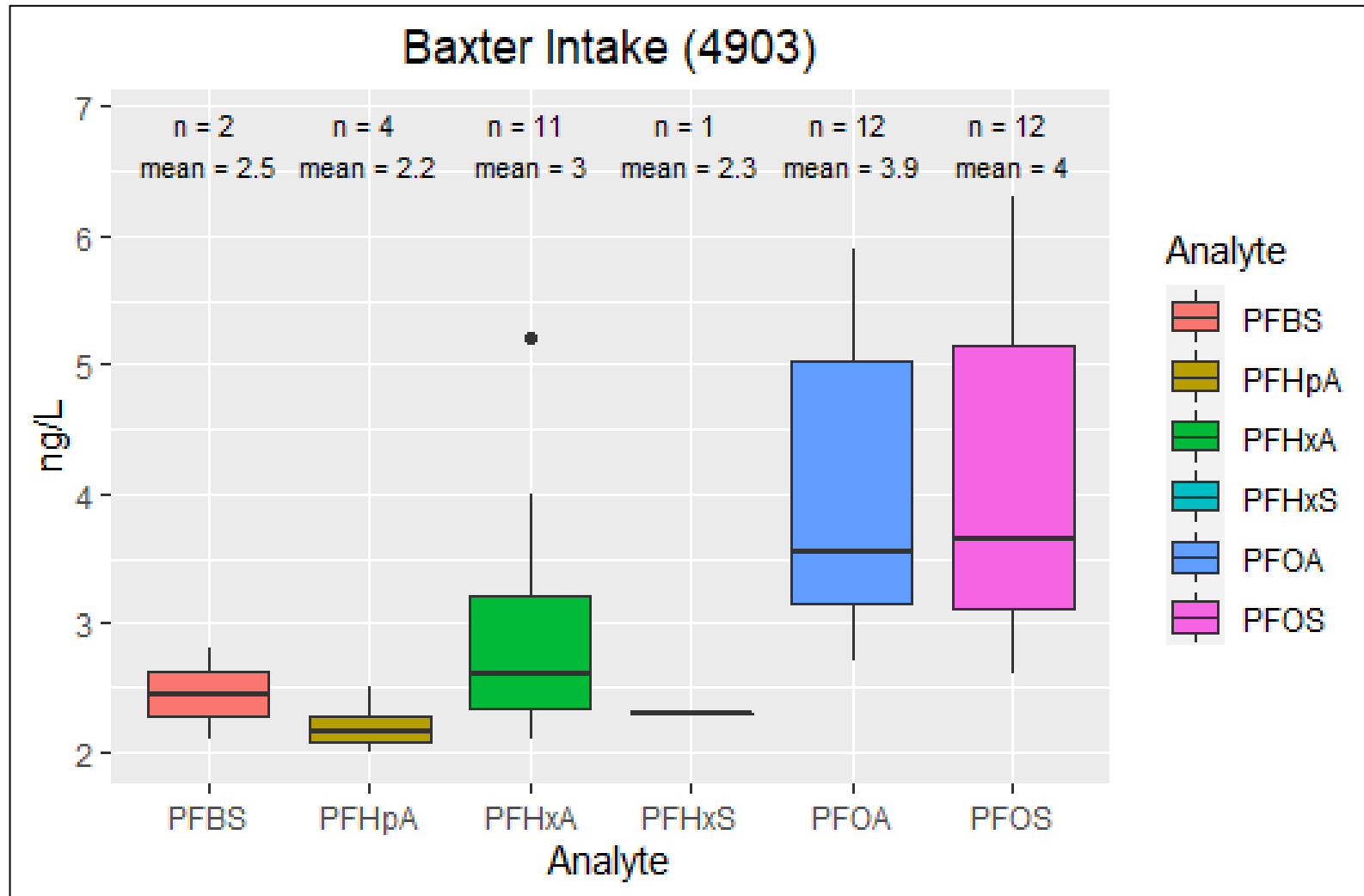
# Results: PFOS + PFOA

Location ID	Description	n	Mean	Min	Max
<b>4903</b>	Delaware River at Baxter WTP intake	12	7.9	5.3	12.2
<b>5903</b>	Schuylkill River at Queen Lane WTP intake	12	11.9	8.6	14.5
<b>6903</b>	Schuylkill River at Belmont WTP intake	12	9.5	6.8	16.2
<b>PP993</b>	Pennypack Creek at Pine Rd.	12	29.0	19.7	51.0
<b>PQ054</b>	Poquessing Creek at Holy Family	12	27.7	15.5	41.0
<b>WS1075</b>	Wissahickon Creek at Ft. Washington	12	19.6	14.5	24.0

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# Results By Site: Baxter Intake

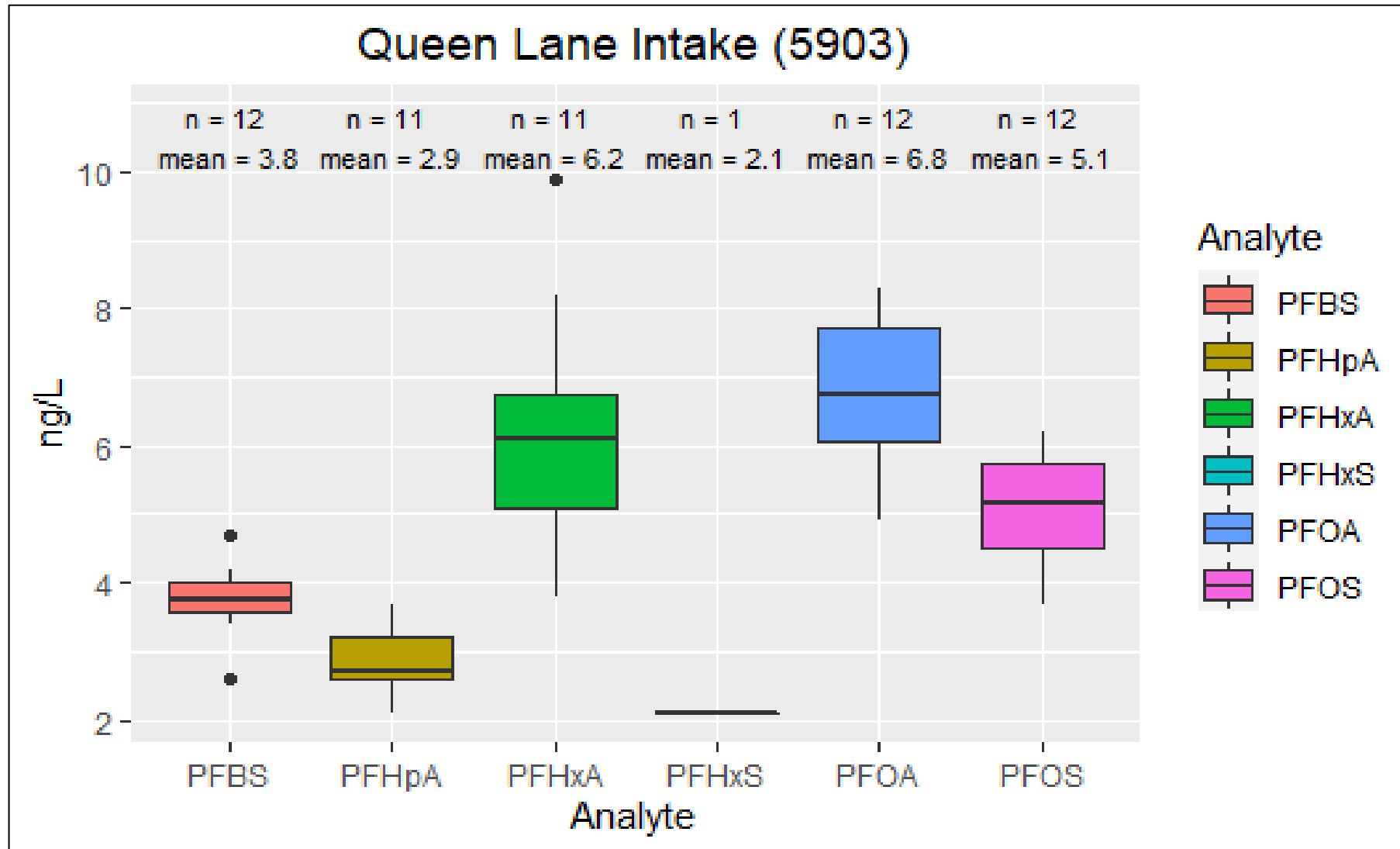


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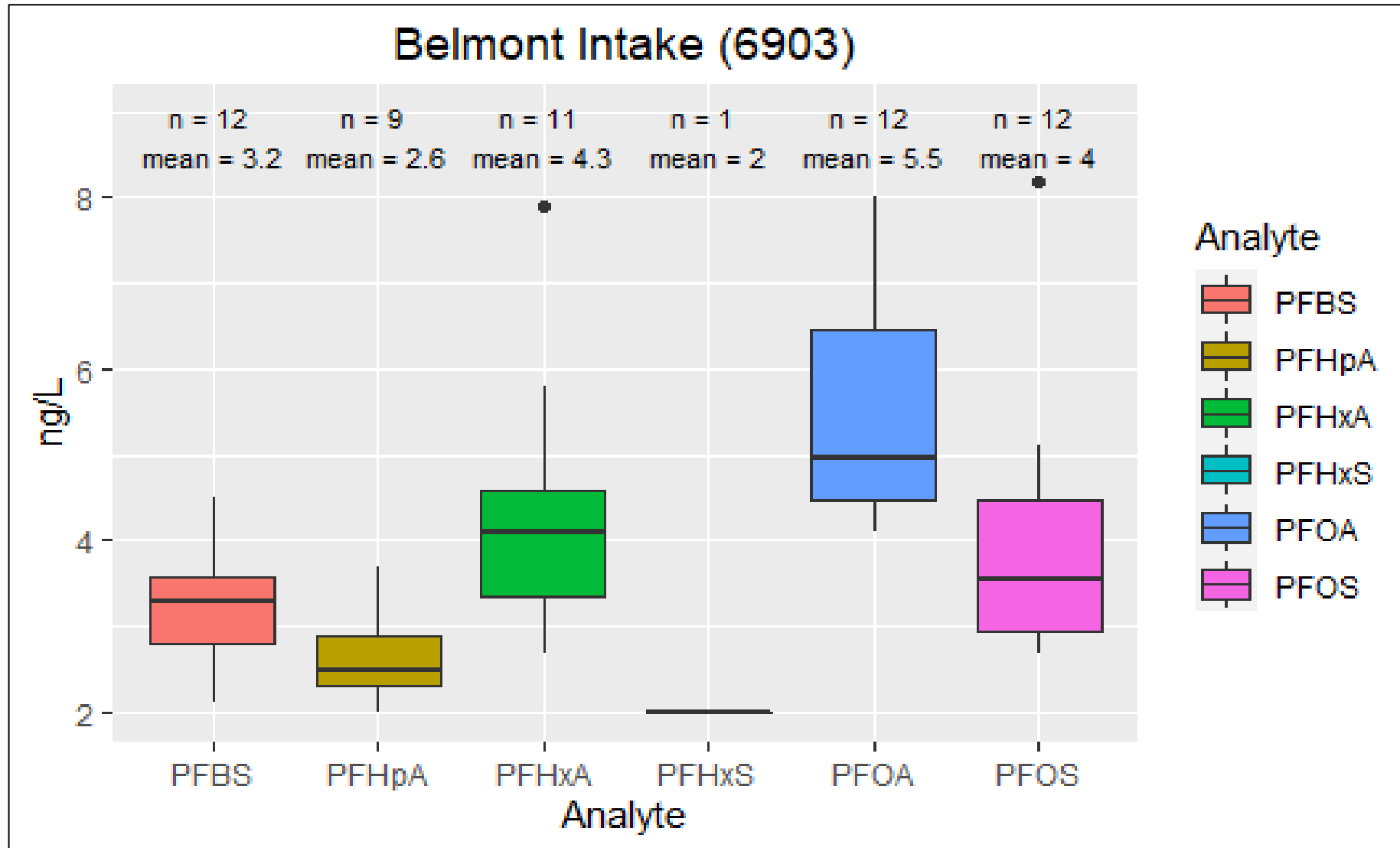
# Results By Site: Queen Lane Intake



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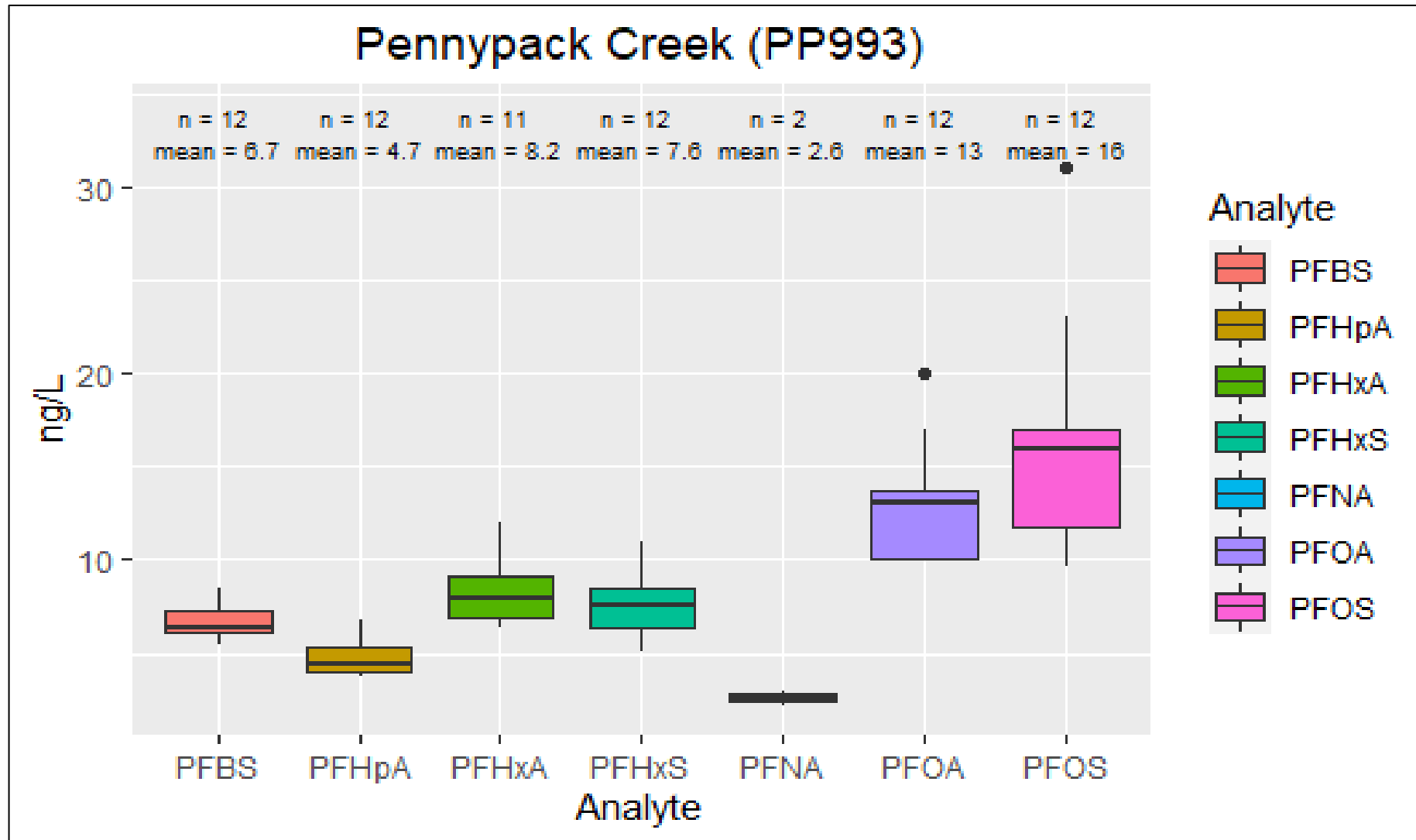
# Results By Site: Belmont Intake



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# Results By Site: Pennypack Creek

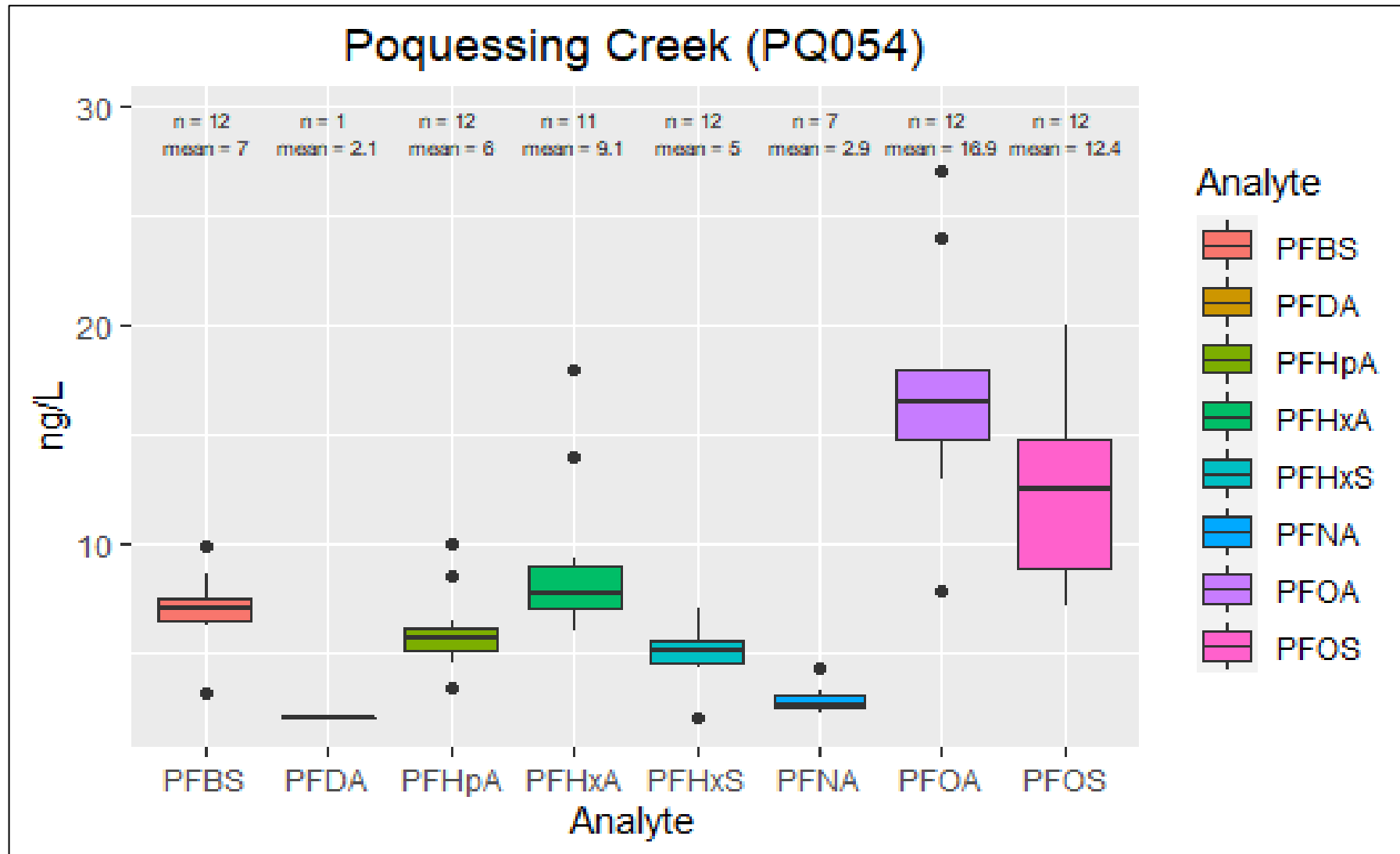


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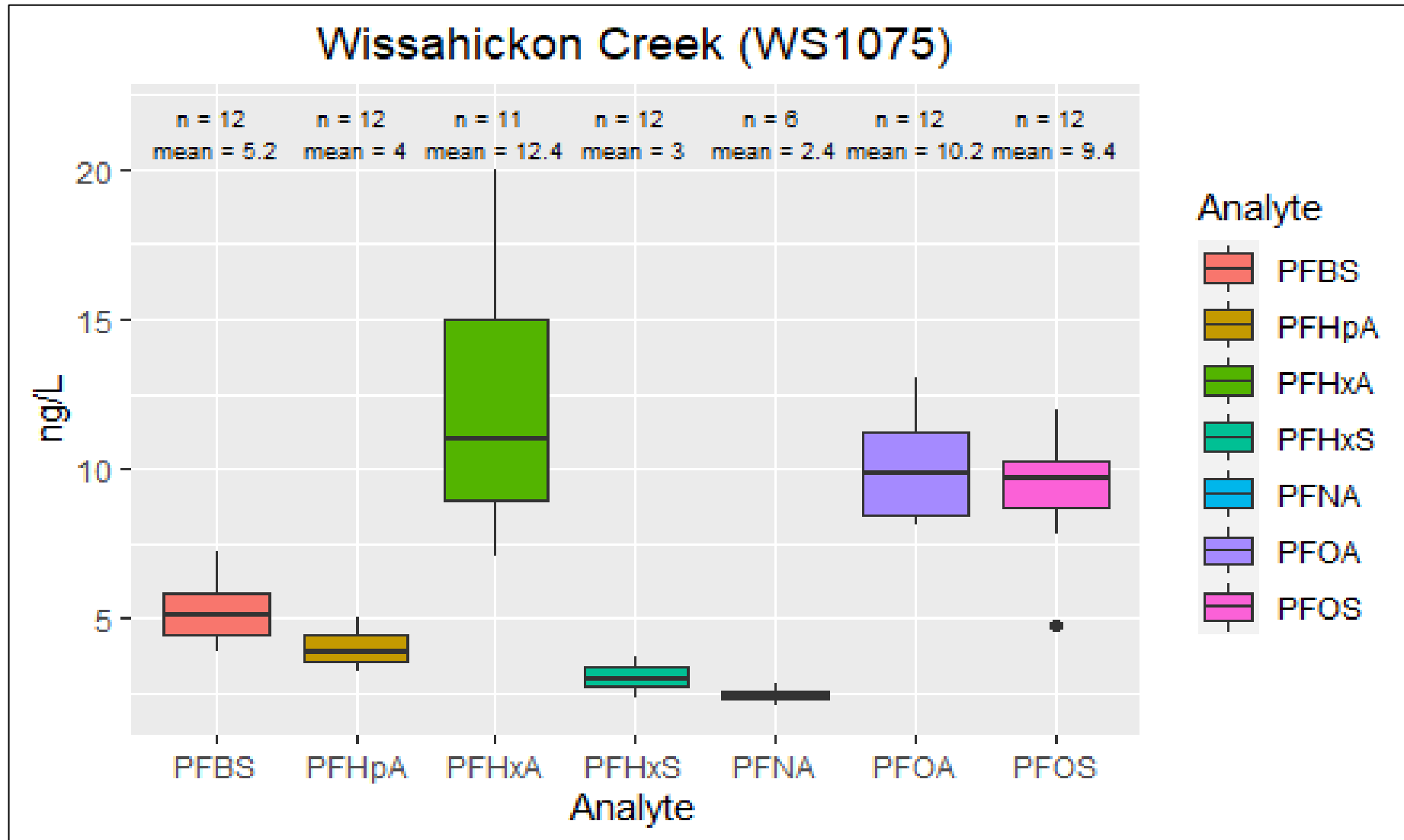
# Results By Site: Poquessing Creek



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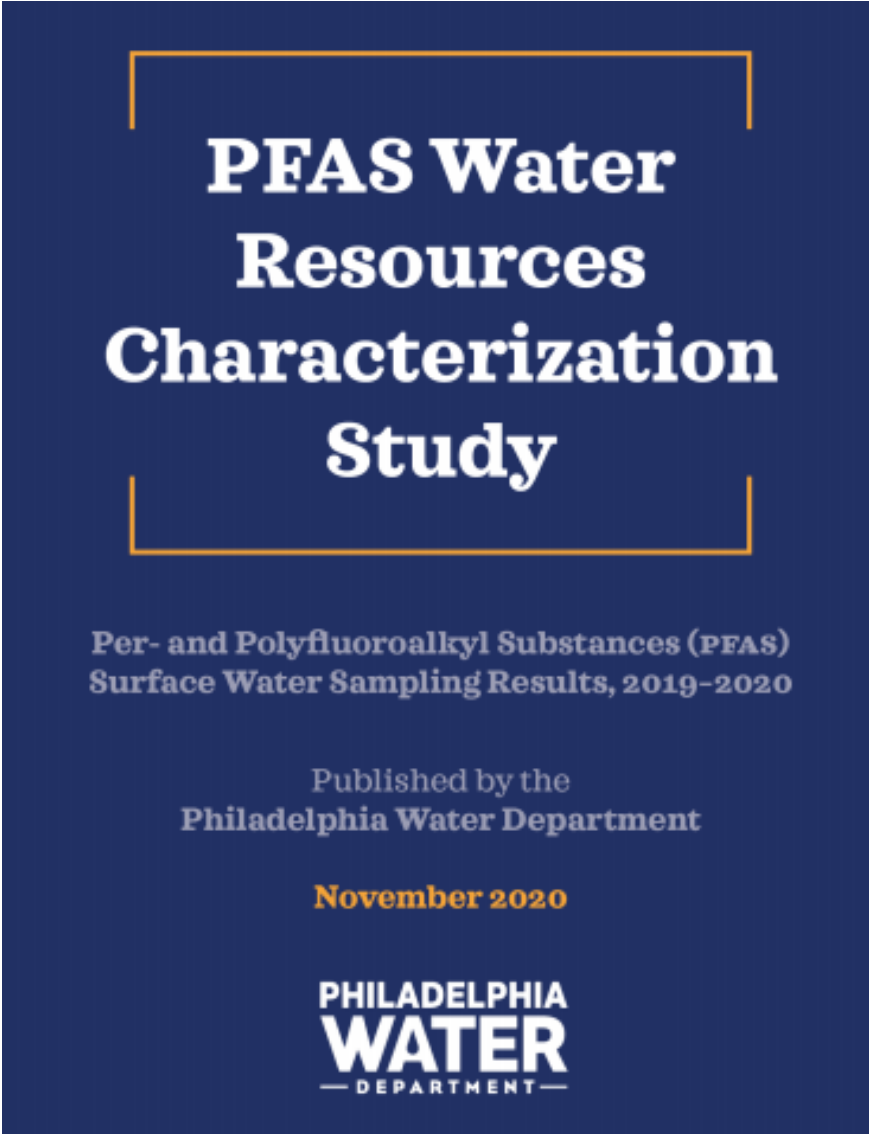
# Results By Site: Wissahickon Creek



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<https://water.phila.gov/pool/files/20201030-pfas-report.pdf>



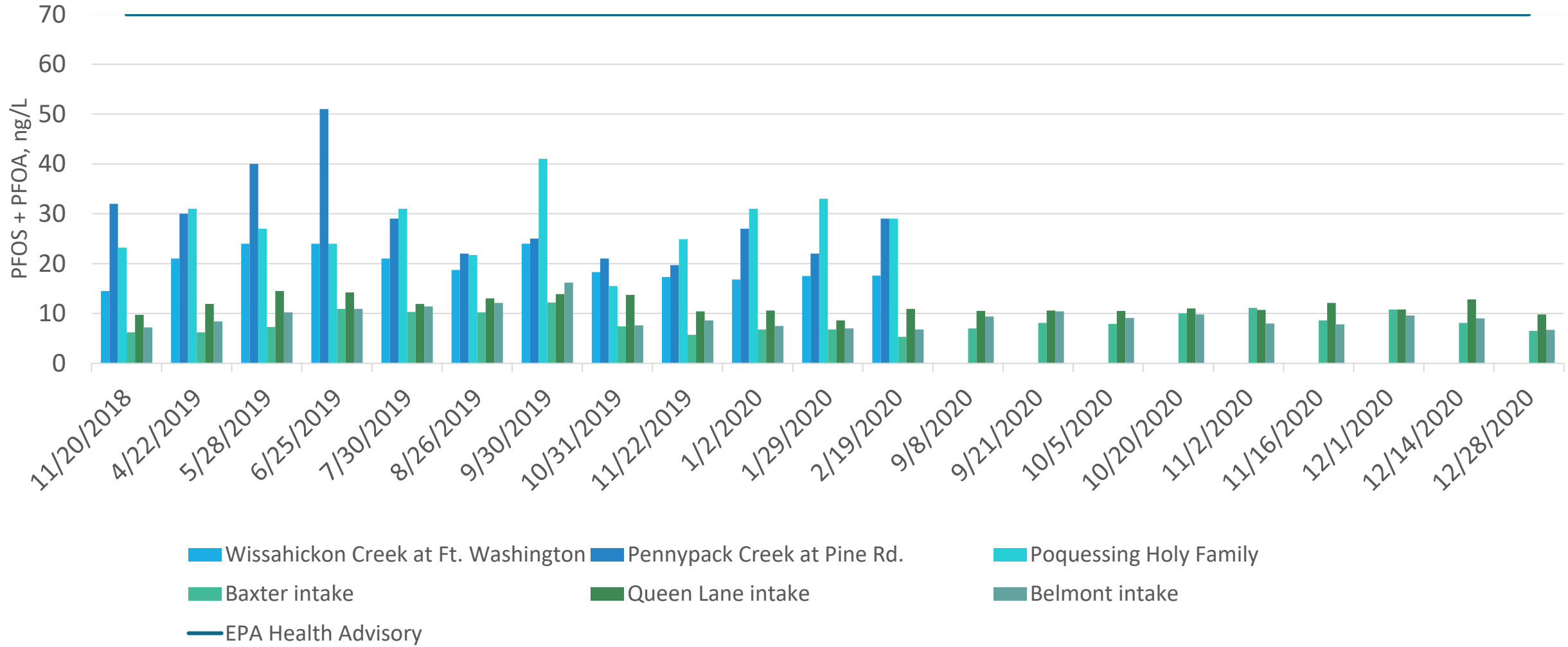
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# Latest Results: Intake Sampling 2020-2021

## PFOS + PFOA



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# Analysis and Discussion

## Caveats

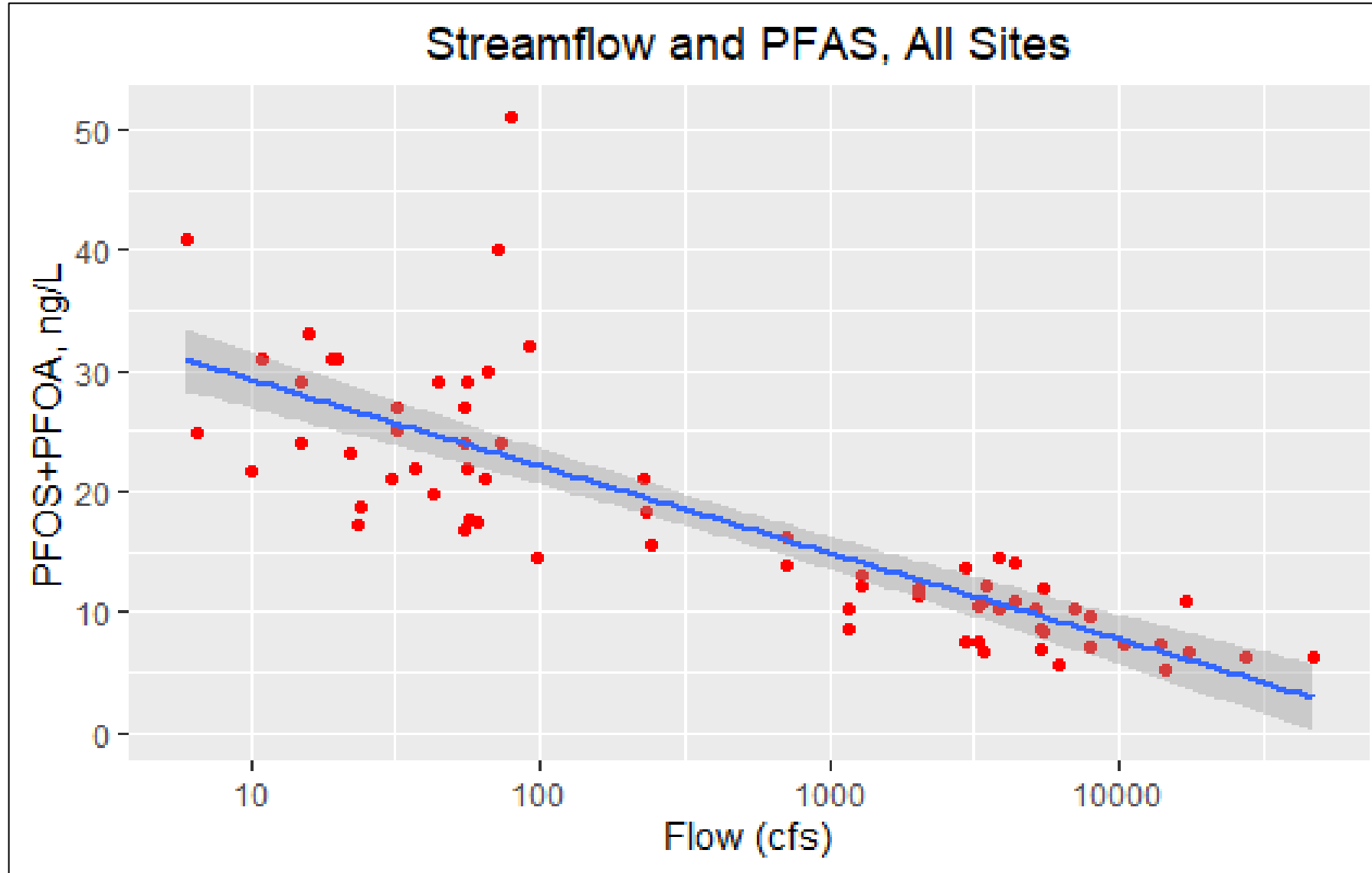
- This study sampled surface water, not treated drinking water
- PFAS contamination may occur at any point between river and tap

## Questions

- What laboratory method will be used for PFAS analysis?
- What is the appropriate sample collection point and procedure?
- What is the sampling framework in terms of frequency, number of samples, and method of calculation (e.g., averaged or threshold)?
- Which PFAS compounds or combination of compounds will be regulated?
- What is the responsibility of a water utility to remediate a contamination issue if it is only acting as a pathway and not a contaminant source?



# Discussion: Dilution Effects



- PFAS levels negatively correlated with streamflow
- This is true for pooled data but not necessarily true for each individual site
- Proximity to known PFAS contamination site may be driving factor

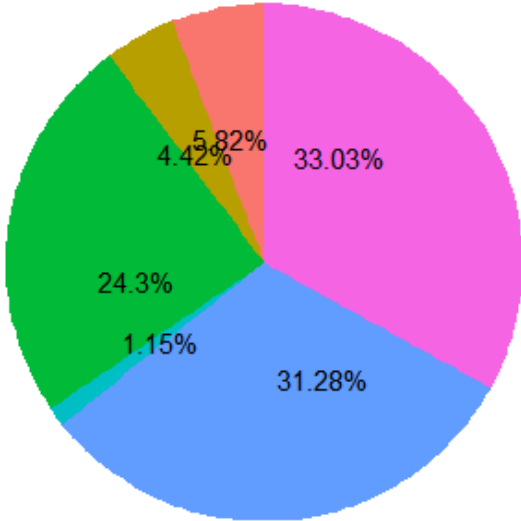
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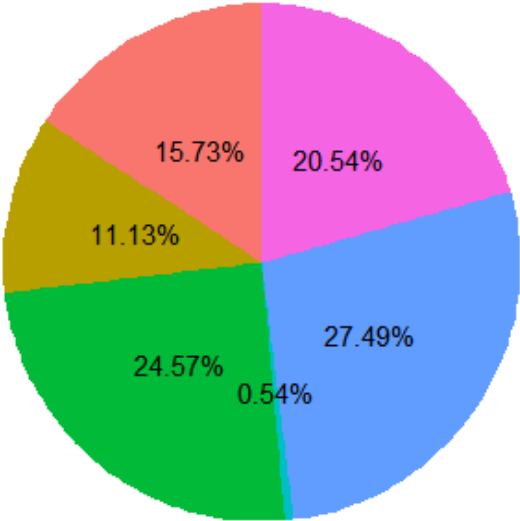


# Discussion: PFAS Fingerprinting

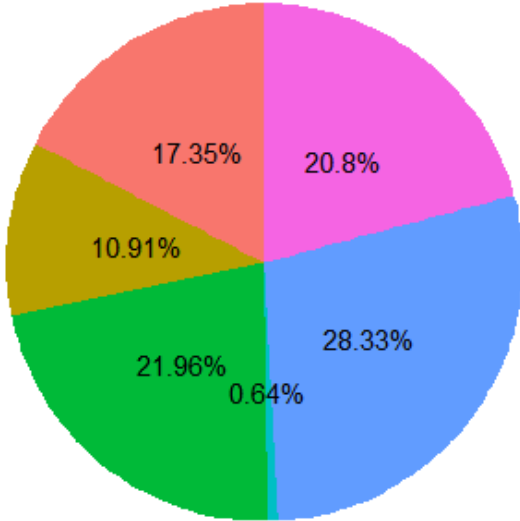
Baxter PFAS



Queen Lane PFAS



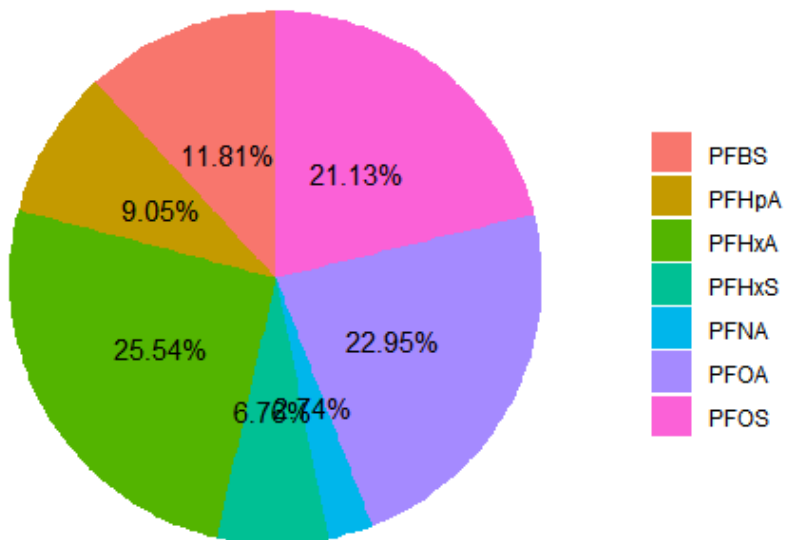
Belmont PFAS



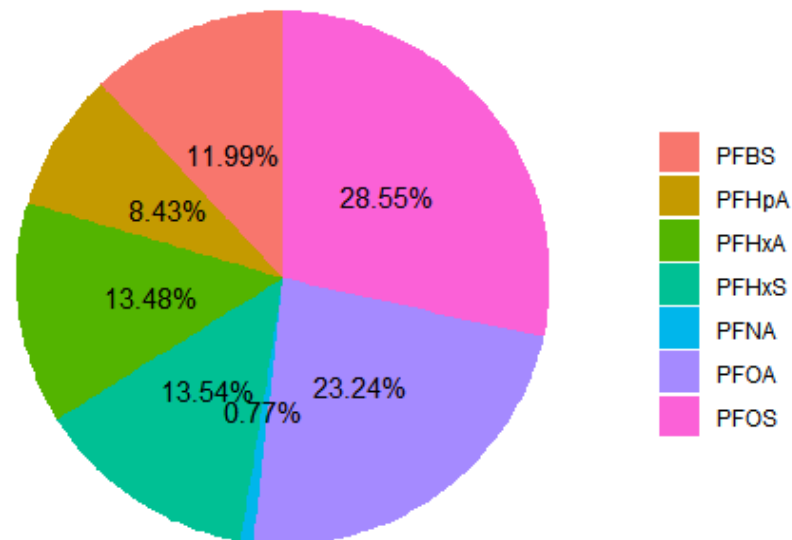
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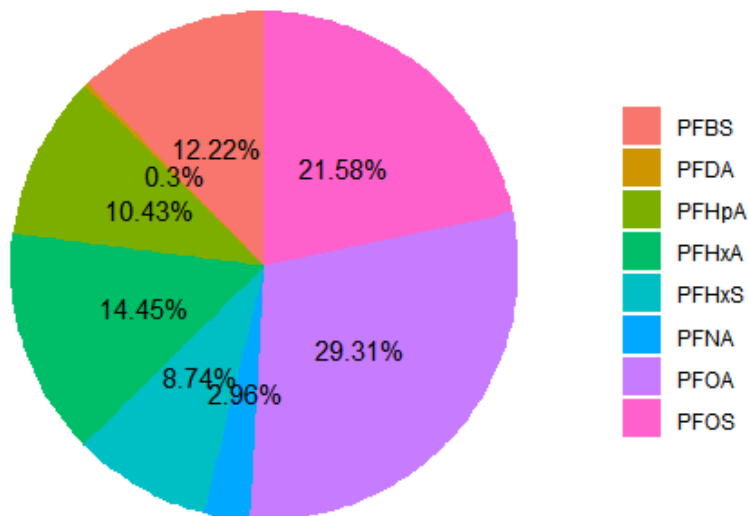
Wissahickon PFAS



Pennypack PFAS



Poquessing PFAS



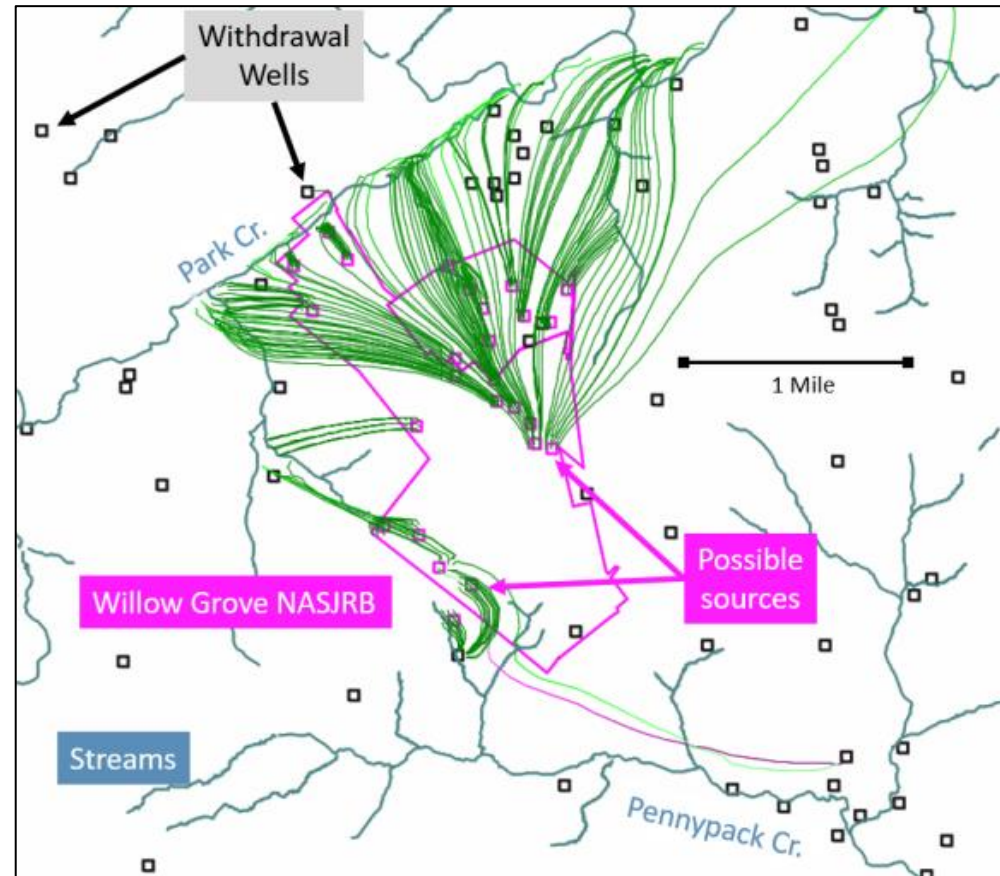
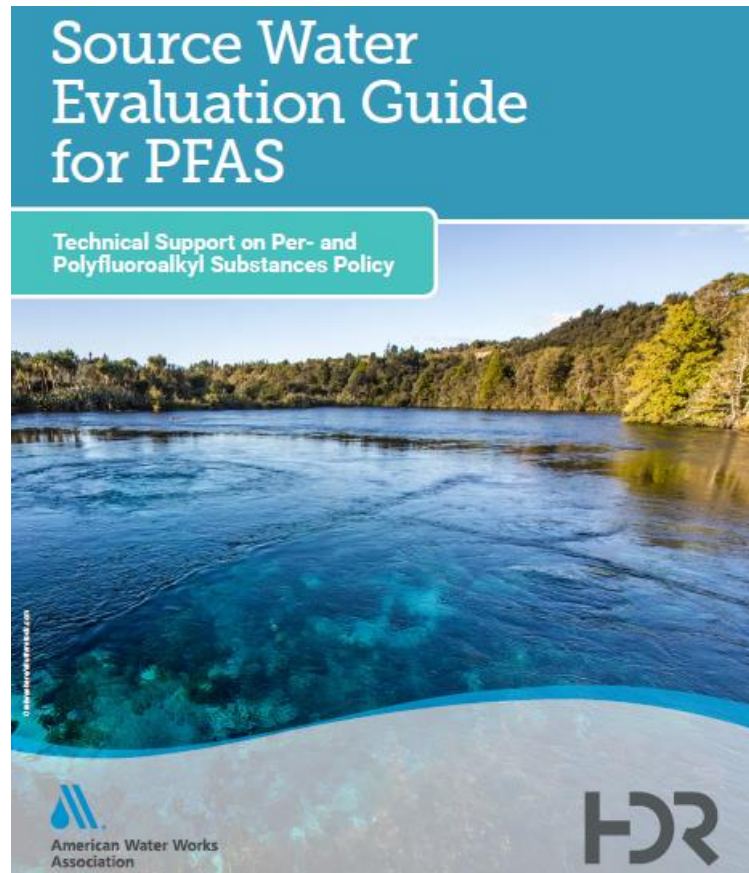
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# Resources

AWWA Resources: <https://www.awwa.org/Resources-Tools/Resource-Topics/PFAS>

USGS Report: <https://pubs.usgs.gov/of/2019/1137/ofr20191137.pdf>



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# Next Steps

- **Continued Monitoring**
  - Pennypack Creek
- **Track regulatory developments**
  - PA DEP (Gov. Wolf PFAS Action Team)
  - EPA – making final determinations to regulate PFOS and PFOA
- **Study treatment technologies**
- **Regional Coordination**
  - USGS, DRBC, PWD et al. quarterly meeting

Thank You! Questions? [matthew.fritch@phila.gov](mailto:matthew.fritch@phila.gov)



# Appendix: PA DEP and PWD Sampling Comparison

	PA DEP	PWD
Sampling Sites	1	6
Samples (n)	1	72 (12 per site)
Analytical Method	EPA Method 537.1	EPA Method 537
Reporting Limit(s)	3.4-3.8 ng/L	2.0 ng/L
PFAS Compounds Sampled	18	14
Sample Matrix	Finished water	Source water
Sampling Point	Baxter Entry Point	Delaware River at Baxter Intake

