

# Thurston Water Testing for PFAS

Full 2023 Results

December 20th, 2023



**SIERRA CLUB**  
ATLANTIC CHAPTER

## Sources / Disclaimer

### 1. Analysis is for discussion purposes only

- A. 77 water samples were tested by Cyclopure Labs (Illinois). Results shown here are from the Cyclopure lab reports.
- B. 6 water samples were tested by Eurofin Labs (Lancaster, PA). Results shown here are from the Eurofin lab reports.
- C. The Cyclopure PFAS test is a solid phase extraction method that uses the company's DEXSORB adsorbent to capture PFAS in a **point-of-sampling extraction**. The method does not require the shipment of water samples to the lab for in-lab extraction. Cyclopure follows EPA methods for analysis on LC-MS. (Cyclopure SPE Method).
- D. The Eurofins PFAS test is a solid phase extraction that follows EPA methods, involving collection of water samples and use of WAX and SDVB adsorbents to capture PFAS for **in-lab extraction** and analysis. (EPA SPE Methods) Eurofins is certified for PFAS analysis using the EPA SPE Methods.
- E. We have included the Cyclopure and Eurofin results together reporting on the 83 samples. The 6 Eurofin samples taken in October 2023 (Fall 6) were taken at the same location as 6 Cyclopure samples taken in March 2023 (Spring 6). The PFAS profiles of the Spring 6 and Fall 6 were very similar. Variations between Spring and Fall testing illustrate effects of temporal and seasonal effects on PFAS concentrations.
- F. All other data in this presentation are publicly available, with sources listed in the Appendix of this document.



### 2. Results are preliminary, subject to change with additional analysis

# Overview

1. Purpose
2. Scope
3. Defining the Sample Zones
4. Methodology
5. NYS / EPA Guidance
6. Results
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  - c) Stream / Pond Water
  - d) By PFAS Compound
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  - f) All Results and Proximity to Landspreading



## Purpose

*Test results will support property owners, and regional decision-making.*

**Scope:** Thurston residents, and properties adjacent to selected land spreading operations in Thurston / Bath / Cameron.

### Funding Sources:

Source	Amount	% of Total
Sierra Club	\$4,500	47%
Green Amendment For The Generations	\$2,000	21%
Private Donations	\$744	13%
Donated Water Tests	\$480	
<i>Remaining Gap</i>	<i>\$1,756</i>	<i>19%</i>
<b>Total</b>	<b>\$9,480</b>	



### Why are we doing this?

- Bring awareness of PFAS levels in local drinking water
- Inform local decision-makers
- Collect for broader review of PFAS contamination

### Volunteers on the ground are residents of:

- Bath
- Cameron
- Painted Post
- Thurston

\*See Appendix for details on how to donate.

## Scope (what, how, where we tested)

*In Phase 2, we focused on the regions where we found the highest results in Phase 1.*

	Total # of PFAS Tests	Type		Town**			Water Source			# Adjacent to Land-spreading (%)
		Certified *	Uncertified	Bath	Cameron	Thurston	Well	Stream	Pond	
<b>Phase 1</b> (March / April 2023)	35	-	35	4	4	27	32	3	-	16 (46%)
<b>Phase 2</b> (September / October 2023)	48	6	42	19	5	24	35	10	3	30 (62%)
<b>Total</b>	<b>83</b>	<b>6</b> (7%)	<b>77</b> (93%)	<b>23</b> (28%)	<b>9</b> (11%)	<b>51</b> (61%)	<b>67</b> (80%)	<b>13</b> (16%)	<b>3</b> (4%)	<b>46</b> (55%)

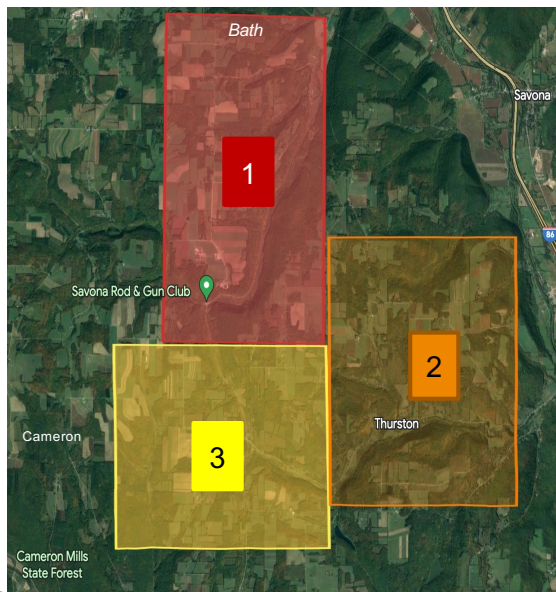


\*Certified tests took samples from wells that had been previously tested with uncertified tests

\*\*Town mappings based on where residents pay property taxes.

## Defined Sample Zones

*We created 3 zones within the sample region to better understand the test results.*



**Source:** Google Earth Pro, March 2023. Zone overlay manually added for visualization.

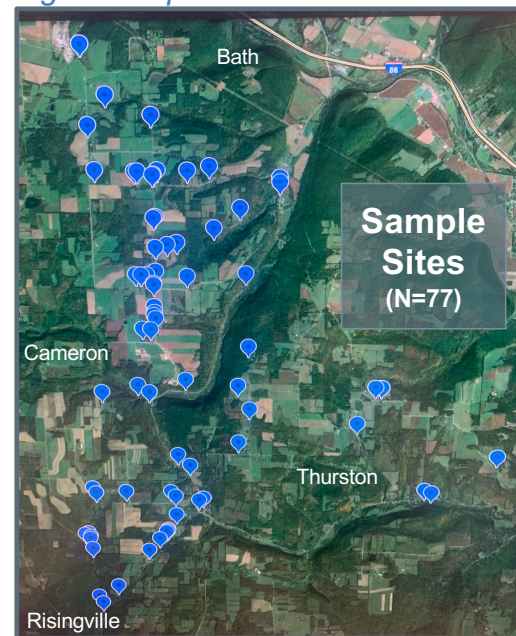
Zone	# of Samples			Land Spreading Est. Start <sup>1</sup>
	Phase 1	Phase 2	Total	
1: Bonny Hill	9	37	46	Legacy
2: Thurston	8	5	13	After 2010
3: Cameron / Risingville	18	6	24	After 2010
	35	48	83	

**1:** "Legacy" defined as land spreading operation initiated prior to 1990. Source: 15 residents adjacent to spreading operation, as of March 2023.

## Methodology

*We collected / merged data, and mapped to look for high-level patterns.*

- Cyclopure Lab tested for **55 PFAS compounds**
- Eurofin Lab tested for **26 PFAS compounds**
- Results compared to guidelines from:
  - EPA
  - NYS DEC
- Compare PFAS results by:
  - **Total** Contamination Level (Parts per Trillion - ppt)
  - **Zones**
  - **Proximity to Landspreading**
  - **Compound** (PFAS type)



**Source:** Google Earth Pro, December 2023. Total # of samples = 83 (6 certified tests completed at existing sites).

## Current NYS and EPA PFAS Guidelines

*Not all compounds have defined safety limits.*

	EPA (Proposed)		NYS DEC
	Enforceable (Proposed – March 2023)	Advisory (June 2022)	Human Health – Ambient / Raw Water Source
PFOA	4	0.004	6.7
PFOS	4	0.02	2.7
PFBS	-	2,000	-
Hazard Index	1.0 (unitless)		

Measures above and throughout this deck are in Parts per Trillion (ppt) unless otherwise noted.

*The NYS DOH public water maximum contamination level is 10 ppt. None of the water tested fell under this guideline because our sources were wells and streams.*

*These are all examples of PFAS compounds. There are many more that do not have a limit defined by oversight agencies at this time.*



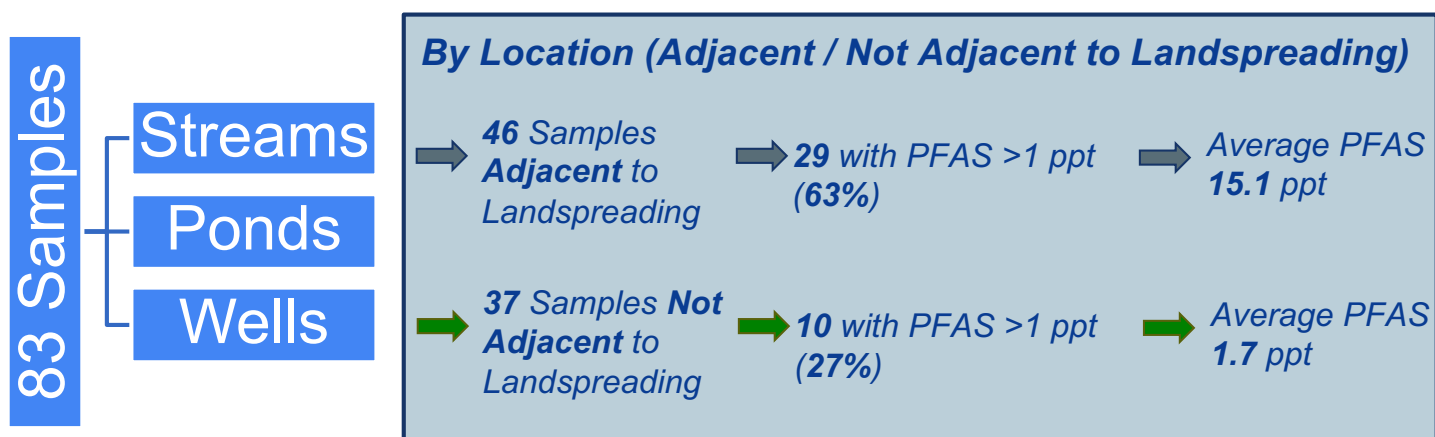
**Note:** EPA: Proposed as of 3/16/23. EPA (2023 Proposed PFAS National Primary Drinking Water Regulation). NYS DEC: Proposed as of 3/15/23. NYS DEC (DEC Issues Ambient Water Guidance). See appendix for source links and Hazard Index formula.



# Executive Summary



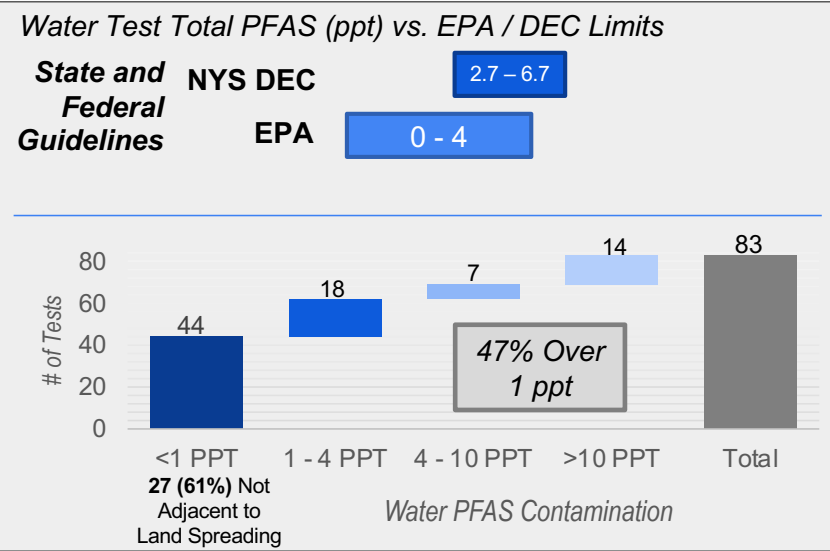
Results from 83 water samples show water adjacent to landspreading is, on average, 9 times more contaminated with PFAS compounds than samples not adjacent to landspreading.



Based on the findings from 83 samples in the Towns of Thurston, Cameron, and Bath, we urge the DEC to investigate water contamination adjacent to landspreading and in regions of associated runoff.

# Results by Total PFAS vs. EPA / DEC Guidelines

We conducted 2 phases of testing in Spring and Fall 2023.



## Key Findings:

- 47% (39 sites) samples >1 ppt\*
- By zone, Bonny Hill had the most samples over 1 ppt (25).



\*Includes Cyclopure Spring 6 samples and Eurofin Fall 6 samples taken at the same location.

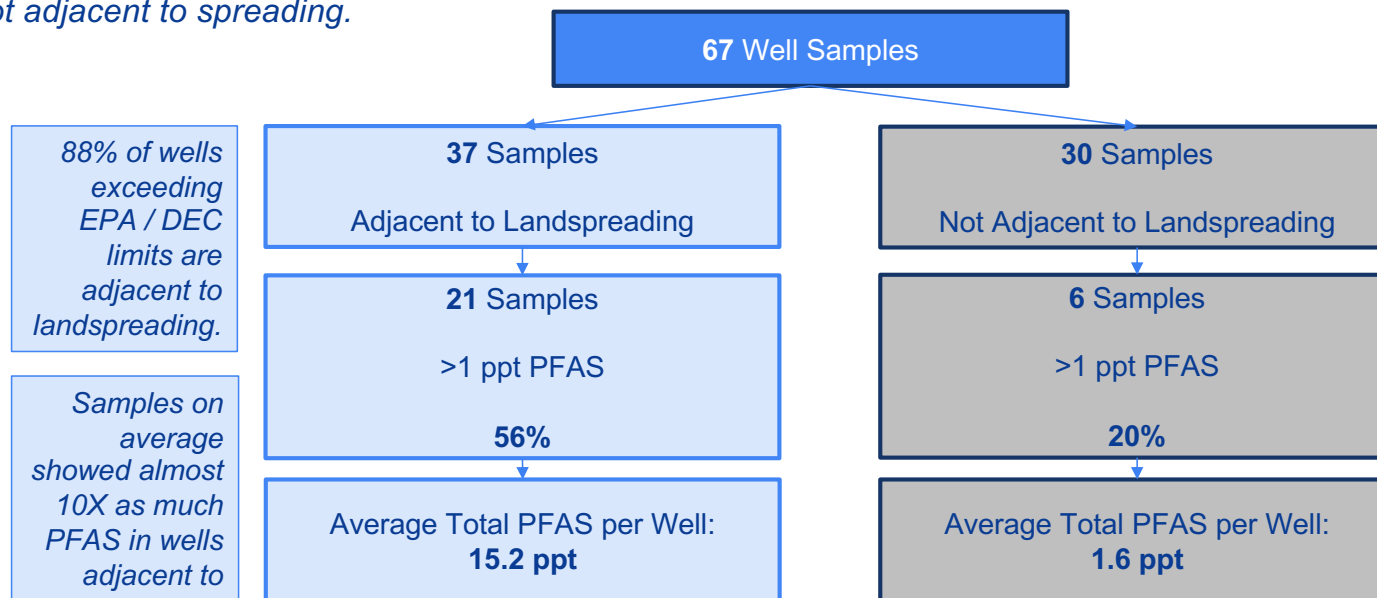
**Note:** EPA: Proposed as of 3/16/23. EPA (2023 Proposed PFAS National Primary Drinking Water Regulation). NYS DEC: Proposed as of 3/15/23. NYS DEC (DEC Issues Ambient Water Guidance). See appendix for source links. Measures above are in ppt unless otherwise noted.

# Well Water



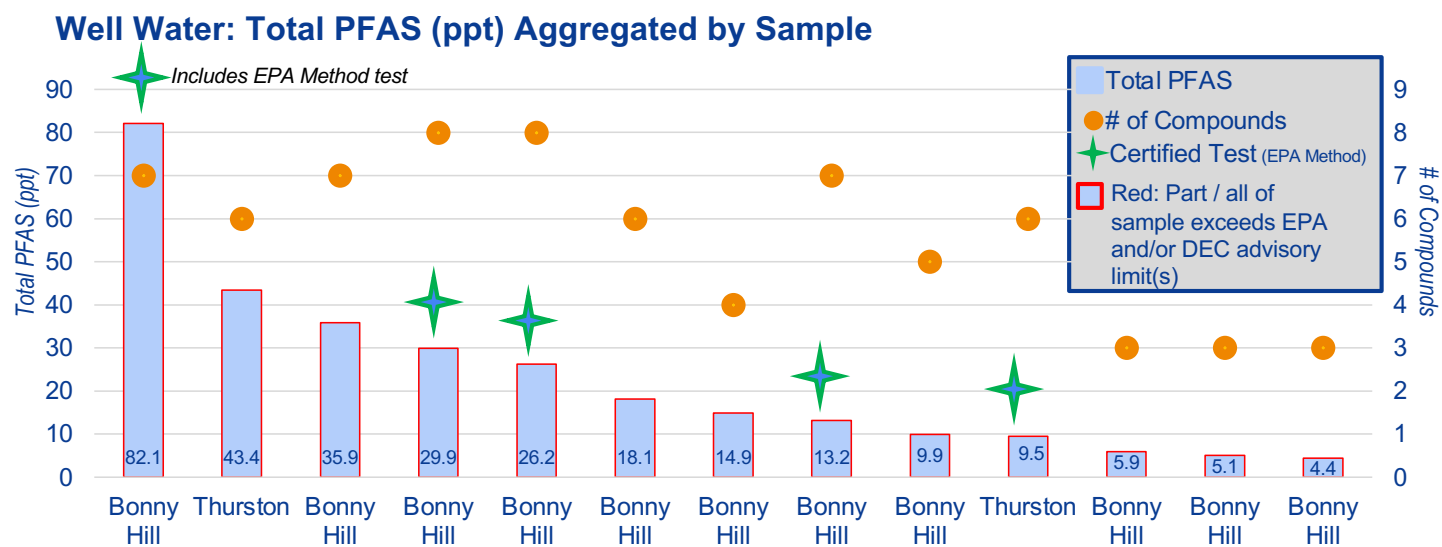
## Wells Closer to Landspreading Had Higher Levels of PFAS

*Wells adjacent to landspreading are almost 3X as likely to have PFAS contamination than wells not adjacent to spreading.*



## Samples with PFAS concentrations at 4.1 – 82.1 ppt

All results on this page are adjacent to landspreading.

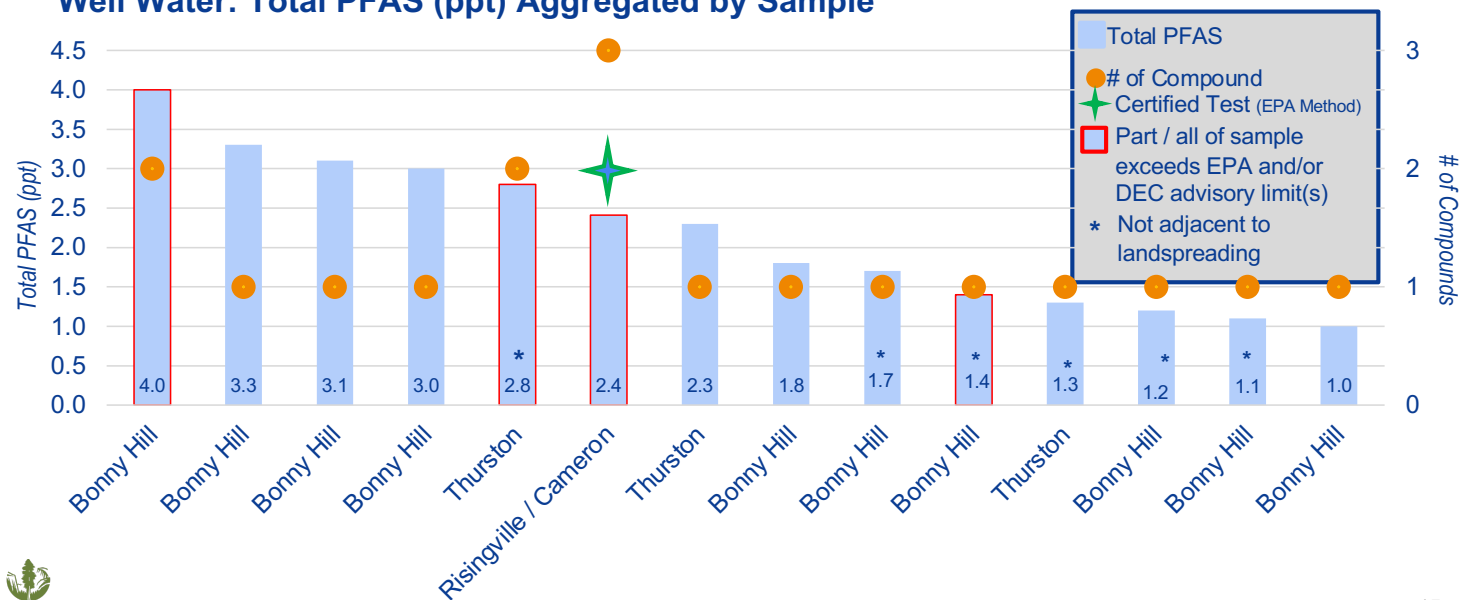


Note: Slide 1 of 2. 27 total well samples exceeding 1 ppt.

## Samples with PFAS concentration at 1.0 – 4.0 ppt

*High levels of PFAS detected in well water samples adjacent to land spreading.*

### Well Water: Total PFAS (ppt) Aggregated by Sample



Note: Slide 2 of 2. 27 total well samples exceeding 1 ppt.

## Comparing Results to Established Guidelines

Your Results				Guidelines / Limit*					
Total PFAS (Ref#)	By Compound			EPA Advisory		EPA Enforcement		DEC Human Health Limit	
	PFOA	PFOS	All Other PFAS	PFOA	PFOS	PFOA	PFOS	PFOA	PFOS
★ 82.1	ND	7.6	74.5		×		×		×
43.4	9.0	ND	34.4	×		×		×	
35.9	10.9	3.0	22.0	×	×	×		×	×
★ 29.9	3.4	9.1	17.4	×	×		×		×
★ 26.2	4.0	2.0	20.2	×	×	×			
18.1	4.6	5.0	8.5	×	×	×	×		×
14.9	1.7	6.2	7.1	×	×		×		×



All values in parts per trillion (ppt) unless otherwise noted. "Star" symbol indicates certified result (EPA Method Test). ND="Non Detect".  
 \*See "Established NYS / DEC Guidelines" slide for details. PFBS was excluded from this table because no results exceeded the limit.



## Comparing Results to Established Guidelines

Your Results				Guidelines / Limit*					
Total PFAS (Ref#)	By Compound			EPA Advisory		EPA Enforcement		DEC Human Health Limit	
	PFOA	PFOS	All Other PFAS	PFOA	PFOS	PFOA	PFOS	PFOA	PFOS
★ 13.2	2.5	1.5	9.2	×	×				
9.9	3.3	1.4	5.2	×	×				
★ 9.5	2.7	1.0	5.8	×	×				
5.9	ND	1.1	4.8		×				
5.1	1.6	1.3	2.2	×	×				
4.4	2.1	1.3	1.0	×	×				
4.0	1.1	ND	2.9	×					



All values in parts per trillion (ppt) unless otherwise noted. "Star" symbol indicates certified result (EPA Method Test). ND="Non Detect".  
 \*See "Established NYS / DEC Guidelines" slide for details. PFBS was excluded from this table because no results exceeded the limit.

## Comparing Results to Established Guidelines

Your Results				Guidelines / Limit*					
Total PFAS (Ref#)	By Compound			EPA Advisory		EPA Enforcement		DEC Human Health Limit	
	PFOA	PFOS	All Other PFAS	PFOA	PFOS	PFOA	PFOS	PFOA	PFOS
3.3	ND	ND	3.3						
3.1	ND	ND	3.1						
3.0	ND	ND	3.0						
2.8**	ND	1.3	1.5		✗				
★ 2.4	0.8	0.8	0.8	✗	✗				
2.3	ND	ND	2.3						
1.8	ND	ND	1.8						



All values in parts per trillion (ppt) unless otherwise noted. "Star" symbol indicates certified result (EPA Method Test). ND="Non Detect".

\*See "Established NYS / DEC Guidelines" slide for details. PFBS was excluded from this table because no results exceeded the limit.

## Comparing Results to Established Guidelines

Your Results				Guidelines / Limit*					
Total PFAS (Ref#)	By Compound			EPA Advisory		EPA Enforcement		DEC Human Health Limit	
	PFOA	PFOS	All Other PFAS	PFOA	PFOS	PFOA	PFOS	PFOA	PFOS
1.7	ND	ND	1.7						
1.4	ND	1.4	-		✗				
1.3	ND	ND	1.3						
1.2	ND	ND	1.2						
1.1	ND	ND	1.1						
1.0**	ND	ND	1.0						

\*\*Adjacent to landspreading



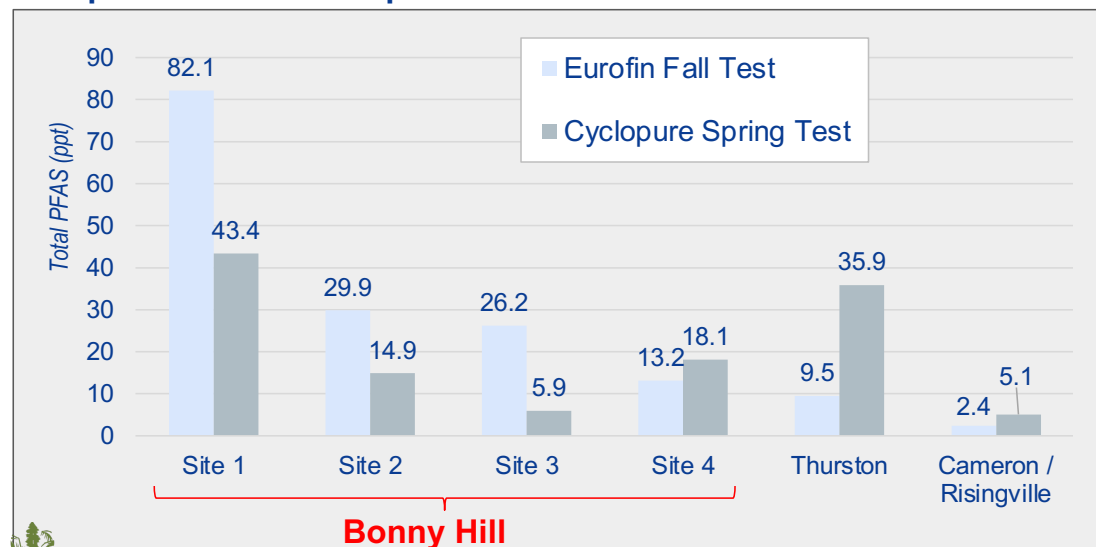
All values in parts per trillion (ppt) unless otherwise noted. "Star" symbol indicates certified result (EPA Method Test). ND="Non Detect".

\*See "Established NYS / DEC Guidelines" slide for details. PFBS was excluded from this table because no results exceeded the limit.

## Well Water – Temporal Sampling Differences

All Eurofin testing was completed in October; Cyclopure tests on this page were completed in March.

### Comparison of Six Samples Taken at Same Location



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Note: Certified and uncertified results by site are not cumulative.

*PFAS profiles of Spring Tests and Fall Tests were very similar.*

*Variations between Spring and Fall testing illustrate effects of temporal and seasonal effects on PFAS concentrations.*

*Similar PFAS variations were observed for Cyclopure tests taken at same location in Spring (Phase 1) and Fall (Phase 2). (Results not shown here).*

# Stream / Pond Water

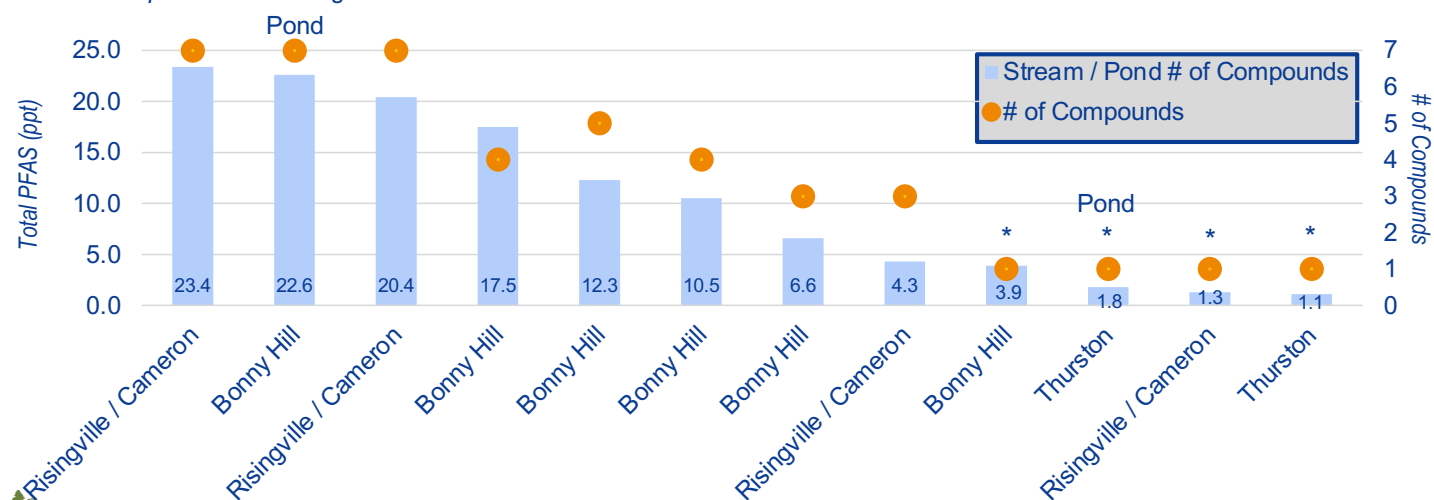


## Streams / Ponds

12 of 16 (75%) samples taken from streams / ponds had total PFAS greater than 1 ppt.

### Stream and Pond Water: Total PFAS (ppt) Aggregated by Sample

In 7 of the top 8 highest total PFAS levels, PFOA and PFOS were the compounds found in greatest concentration.

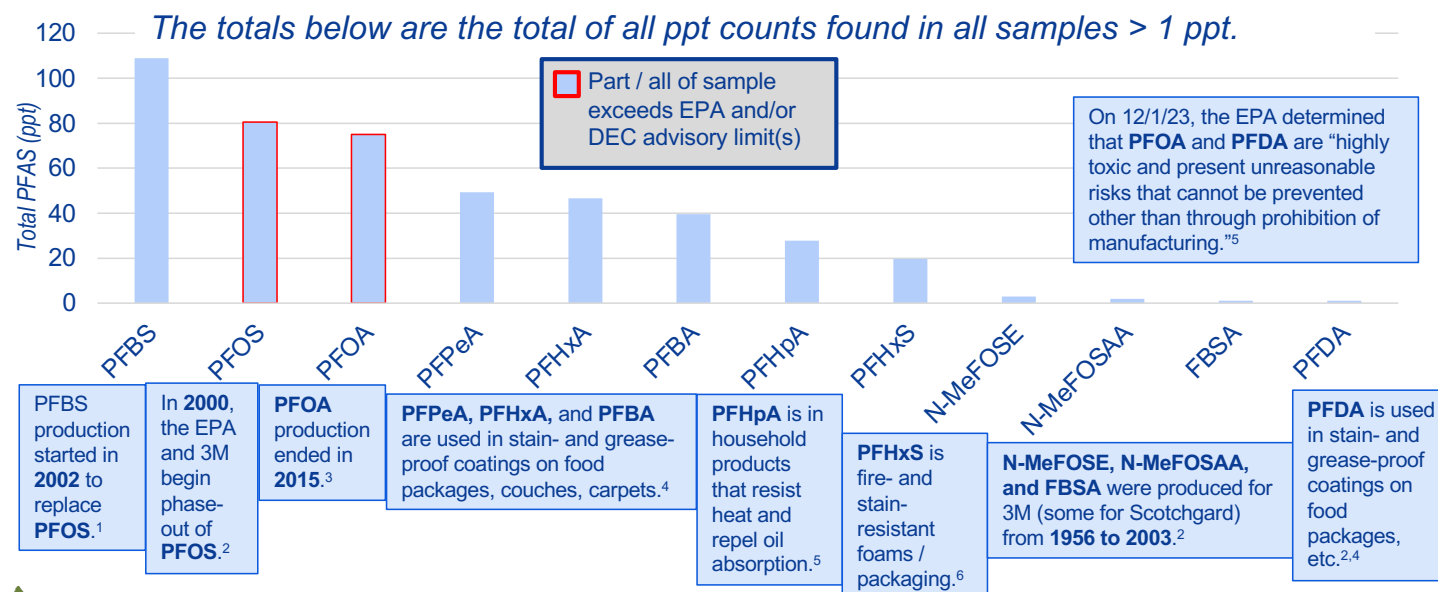


# Trends Across All Samples



## Total PFAS by Compound

*PFBS, PFOS, and PFOA all have discreet EPA and/or DEC ppt guidelines.*



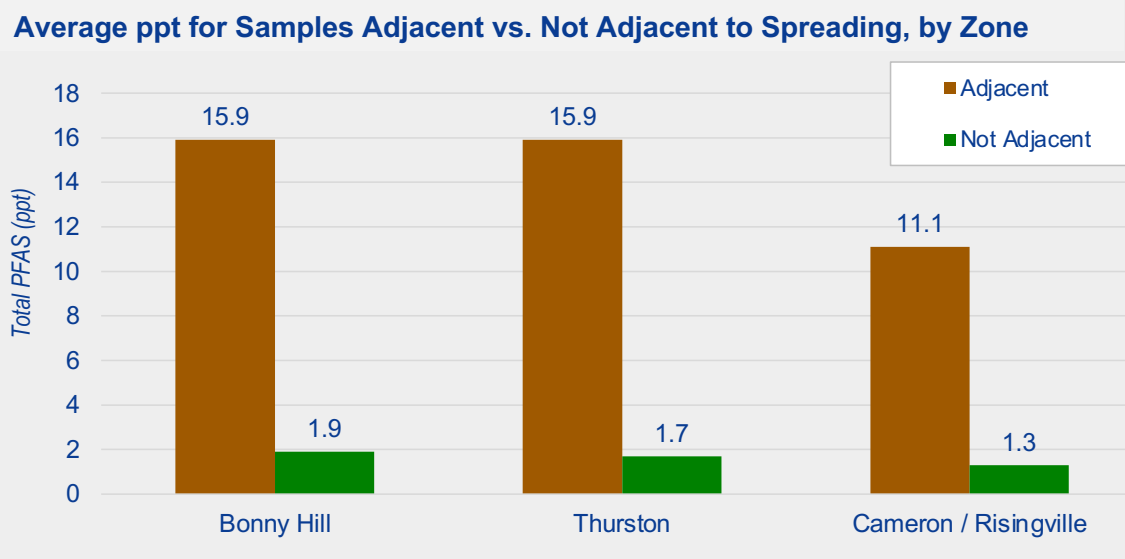
1 – EPA, April 2021. 2 – EPA, May 2000. 3 – NIH, 2010. 4/5 – HTP, 2023; EPA, 2023. See Appendix for link.



## PFAS by Zone – Adjacent vs. Not Adjacent to Land Spreading

*Across all zone, total PFAS contamination is 8-9X greater at water sources adjacent to landspreading.*

Sites adjacent to landspreading had **greater % of contaminated water** vs. sites not adjacent to spreading



Note: 6 locations have two sets of results based on Cyclopure and Eurofin Spring and Fall sample collection.

## Adjacent vs. Not Adjacent: **Bonny Hill**

*On Bonny Hill, the samples adjacent to landspreading averaged almost 16 ppt; samples not adjacent to landspreading averages 1.9 ppt.*

46 Samples			
31 Samples <b>Adjacent to Landspreading</b>		15 Samples <b>Not Adjacent to Landspreading</b>	
<b>21 Samples Greater than 1 ppt (68%)</b>	<b>10 Samples Less Than 1 ppt (32%)</b>	<b>11 Samples Less Than 1 ppt (73%)</b>	<b>4 Samples Greater Than 1 ppt (27%)</b>

**Avg Total PFAS per Sample:  
15.9 ppt**

**Avg Total PFAS per Sample:  
1.9 ppt**



Note: 4 locations have two sets of results based on Cyclopure and Eurofin Spring and Fall sample collection.

## Adjacent vs. Not Adjacent: **Thurston**

*Similar to Bonny Hill, samples adjacent to landspreading average over 15 ppt; samples not adjacent to landspreading averaged 1.7 ppt.*

13 Samples			
4 Samples <b>Adjacent to Landspreading</b>		9 Samples <b>Not Adjacent to Landspreading</b>	
3 Samples <b>Greater than 1 ppt</b> (75%)	1 Samples <b>Less Than 1 ppt</b> (25%)	5 Samples <b>Less Than 1 ppt</b> (55%)	4 Samples <b>Greater Than 1 ppt</b> (45%)

**Avg Total PFAS per Sample:  
15.9 ppt**

**Avg Total PFAS per Sample:  
1.7 ppt**



Note: 1 location had two sets of results based on Cyclopure and Eurofin Spring and Fall sample collection.

Results

By Zone

## Adjacent vs. Not Adjacent: **Risingville / Cameron**

*The average PFAS in samples adjacent to landspreading was 8.5 times as high as samples not adjacent to landspreading.*

24 Samples			
11 Samples <b>Adjacent to Landspreading</b>		13 Samples <b>Not Adjacent to Landspreading</b>	
5 Samples <b>Greater than 1 ppt</b> (45%)	6 Samples <b>Less Than 1 ppt</b> (55%)	11 Samples <b>Less Than 1 ppt</b> (85%)	2 Samples <b>Greater Than 1 ppt</b> (15%)

**Avg Total PFAS per Sample:  
11.1 ppt**

**Avg Total PFAS per Sample:  
1.3 ppt**



Note: 1 location had two sets of results based on Cyclopure and Eurofin Spring and Fall sample collection.

## Debunking “PFAS is Everywhere”

*Consistent with USDA “poorly suited” findings<sup>1</sup> on Bonny Hill, PFAS levels suggest migration of compounds after application, to adjacent wells and streams.*

83 Samples			
46 Samples Adjacent to Landspreading		37 Samples Not Adjacent to Landspreading (54%)	
29 Samples Greater than 1 ppt (63%)	17 Samples Less Than 1 ppt (37%)	27 Samples Less Than 1 ppt (73%)	10 Samples Greater Than 1 ppt (27%)
Avg Total PFAS per Sample: 15.1 ppt		Avg Total PFAS per Sample: 1.7 ppt	

**The average PFAS contamination is 9 times greater at locations closest to landspreading.**



<sup>1</sup> – USDA Natural Resources Conservation Service’s Web Soil Survey (cited 2023).

Note: 6 locations have two sets of results based on Cyclopure and Eurofin Spring and Fall sample collection.

# Appendix



## How to Donate to Support Water Testing in Thurston / Bath / Cameron

To **make a direct donation to the Sierra Club** to support water testing efforts in Thurston/Bath/Cameron, please write a check payable to the Sierra Club Atlantic Chapter.

Indicate “Thurston PFAS Water Testing” in the Memo section.

**Send to:**

Sierra Club Atlantic Chapter  
PO Box 38225  
Albany, NY 12203



Contact [ThurstonWater@gmail.com](mailto:ThurstonWater@gmail.com) with any questions.

## Reference: Sources (page 1 of 2)

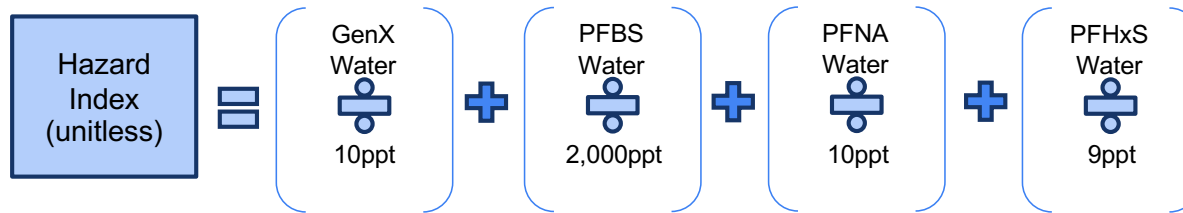
Description	Link
EPA (2023 Proposed PFAS National Primary Drinking Water Regulation)	<a href="https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas">https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas</a>
NYS DEC (2023 DEC Issues Ambient Water Guidance)	<a href="https://www.dec.ny.gov/chemical/122803.html">https://www.dec.ny.gov/chemical/122803.html</a> <a href="https://www.dec.ny.gov/press/127293.html">https://www.dec.ny.gov/press/127293.html</a>
NYS DEC (2023 NYS Mines and Well Map)	<a href="https://gisservices.dec.ny.gov/gis/maw/">https://gisservices.dec.ny.gov/gis/maw/</a>
Steuben County Parcel Finder (March 2023)	<a href="https://scnygis.maps.arcgis.com/apps/webappviewer/index.html?id=52e7258379e24f27a634111d2493d386">https://scnygis.maps.arcgis.com/apps/webappviewer/index.html?id=52e7258379e24f27a634111d2493d386</a>
EPA Guidance on PFAS Contamination (March 2023)	<a href="https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas">https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas</a>
EPA Biosolids PFOA & PFOS Problem Formulation Meeting Summary (November 2020)	<a href="https://www.epa.gov/sites/default/files/2021-02/documents/biosolids-pfoa-pfos-meeting-summary-nov-2020.pdf">https://www.epa.gov/sites/default/files/2021-02/documents/biosolids-pfoa-pfos-meeting-summary-nov-2020.pdf</a>
"PFHxS and Groundwater". Minnesota Department of Public Health (April 2019)	<a href="https://www.health.state.mn.us/communities/environment/risk/docs/guidance/gw/pfhxsinfo.pdf">https://www.health.state.mn.us/communities/environment/risk/docs/guidance/gw/pfhxsinfo.pdf</a>
"EPA Releases Updated PFBS Toxicity Assessment After Rigorous Scientific Review". EPA (April 2021)	<a href="https://www.epa.gov/newsreleases/epa-releases-updated-pfbs-toxicity-assessment-after-rigorous-scientific-review-0">https://www.epa.gov/newsreleases/epa-releases-updated-pfbs-toxicity-assessment-after-rigorous-scientific-review-0</a>



## Reference: Sources 2 of 2

Description	Link
USDA Web Soil Survey / NRCS (December 2023)	<a href="https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx">https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx</a>
"EPA and 3M Announce Phase Out of PFOS". EPA (May 2000)	<a href="https://www.epa.gov/archive/epapages/newsroom_archive/newsreleases/33aa946e6cb11f35852568e1005246b4.html">https://www.epa.gov/archive/epapages/newsroom_archive/newsreleases/33aa946e6cb11f35852568e1005246b4.html</a>
"Immunotoxicity Associated with Exposure to PFOA or PFOS". NIH (2010)	<a href="https://ntp.niehs.nih.gov/whatwestudy/assessments/noncancer/completed/pfoa#:~:text=PFOS%20was%20phased%20out%20of,at%20the%20end%20of%202015.">https://ntp.niehs.nih.gov/whatwestudy/assessments/noncancer/completed/pfoa#:~:text=PFOS%20was%20phased%20out%20of,at%20the%20end%20of%202015.</a>
"PFPeA". Human Toxome Project (2023)	<a href="https://www.ewg.org/sites/humantoxome/chemicals/chemical.php?chemid=100309">https://www.ewg.org/sites/humantoxome/chemicals/chemical.php?chemid=100309</a>
"EPA Takes Action to Protect People from PFAS that Leaches from Plastic Containers into Pesticides and Other Products". EPA (12/1/2023).	<a href="https://www.epa.gov/newsreleases/epa-takes-action-protect-people-pfas-leach-plastic-containers-pesticides-and-other">https://www.epa.gov/newsreleases/epa-takes-action-protect-people-pfas-leach-plastic-containers-pesticides-and-other</a>

## Hazard Index



Source: EPA, 2023. <https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas>

## Cyclopure Water Test Kit

Tested over **7000** water samples from all 50 states



- Collection: Fill the collection cup with 250 mL of water sample
- Extraction: Pass water through the DEXSORB extraction disc
- Elution: Recover PFAS analytes with standard elution process
- Analysis: Use isotope dilution for PFAS quantification
- Method validated against the EPA Method 537.1



### Test Method Comparison

PFAS Test Method	Cyclopure SPE <i>Tap Water + Surface Water</i>	EPA SPE (Certified) <i>Tap Water + Surface Water</i>
<b>Water Sample</b>	No shipping water	Ship water to lab
<b>Extraction</b>	Point of Sampling <ul style="list-style-type: none"> <li>• PFAS extracted at time of collection</li> <li>• No trip blank</li> </ul>	In Lab <ul style="list-style-type: none"> <li>• PFAS extracted from water sample</li> <li>• Trip blank</li> </ul>
<b>Adsorbent</b>	DEXSORB®	WAX or SDVB
<b>Recovery</b>	SPE	SPE
<b>Quantification</b>	Isotope Dilution Orbitrap - HPLC/HRMS LOQ 1.0 ppt	Isotope Dilution Triple Quad LOQ Varies
<b>PFAS Tested</b>	55 Analytes EPA 1633 – 40 Analytes	Eurofins - 70 Analytes EPA 1633 - 40 Analytes

## Cyclopure: Index of Compounds Tested with EPA Mappings (1 of 4)



### Appendix.

PFAS detected by Cyclopure analytical methods.

Compound	Abbreviation	CAS#	EPA 1633
Perfluorobutanoic Acid	PFBA	375-22-4	Y
Perfluoropentanoic Acid	PFPeA	2706-90-3	Y
Perfluorohexanoic Acid	PFHxA	307-24-4	Y
Perfluoroheptanoic Acid	PFHpA	375-85-9	Y
Perfluorooctanoic Acid	PFOA	335-67-1	Y
Perfluorononanoic Acid	PFNA	375-95-1	Y
Perfluorodecanoic Acid	PFDA	335-76-2	Y
Perfluoroundecanoic Acid	PFUnA	2058-94-8	Y
Perfluorododecanoic Acid	PFDoA	307-55-1	Y
Perfluorotridecanoic Acid	PFTTrDA	72629-94-8	Y
Perfluorotetradecanoic Acid	PFTeA	376-06-7	Y
Perfluoropropane Sulfonic Acid	PFPrS	423-41-6	
Perfluorobutane Sulfonic Acid	PFBS	375-73-5	Y
Perfluoropentane Sulfonic Acid	PFPeS	2706-91-4	Y
Perfluorohexane Sulfonic Acid	PFHxS	355-46-4	Y
Perfluoroheptane Sulfonic Acid	PFHpS	375-92-8	Y
Perfluorooctane Sulfonic Acid	PFOS	1763-23-1	Y
Perfluorononane Sulfonic Acid	PFNS	474511-07-4	Y
Perfluorodecane Sulfonic Acid	PFDS	335-77-3	Y
Perfluorododecane Sulfonic Acid	PFDoS	79780-39-5	Y



## Cyclopure: Index of Compounds Tested with EPA Mappings (2 of 4)



### Appendix.

PFAS detected by Cyclopure analytical methods.

Compound	Abbreviation	CAS#	EPA 1633
4:2 Fluorotelomer Sulfonate	4:2 FTS	414911-30-1	Y
6:2 Fluorotelomer Sulfonate	6:2 FTS	425670-75-3	Y
8:2 Fluorotelomer Sulfonate	8:2 FTS	481071-78-7	Y
10:2 Fluorotelomer Sulfonate	10:2 FTS	120226-60-0	
Perfluorobutane Sulfonamide	FBSA	30334-69-1	
N-Methylperfluorobutanesulfonamide	MeFBSA	68298-12-4	
Perfluorohexane Sulfonamide	FHxSA	41997-13-1	
Perfluorooctane Sulfonamide	PFOSA	754-91-6	Y
Perfluorodecane Sulfonamide	FDSA	N/A	
N-Ethylperfluorooctane-1-Sulfonamide	NEtFOSA	4151-50-2	Y
N-Methylperfluorooctane-1-Sulfonamide	NMeFOSA	31506-32-8	Y
Perfluorooctane Sulfonamido Acetic Acid	FOSAA	2806-24-8	



## Cyclopure: Index of Compounds Tested with EPA Mappings (3 of 4)



### Appendix.

PFAS detected by Cyclopure analytical methods.

Compound	Abbreviation	CAS#	EPA 1633
N-Ethyl Perfluorooctane Sulfonamido Acetic Acid	NEtFOSAA	2991-50-6	Y
N-Methyl Perfluorooctane Sulfonamido Acetic Acid	NMeFOSAA	2355-31-9	Y
N-methyl perfluorooctanesulfonamidoethanol	NMeFOSE	24448-09-7	Y
N-ethyl perfluorooctanesulfonamidoethanol	NEtFOSE	1691-99-2	Y
Hexafluoropropylene Oxide Dimer Acid	HFPO-DA	13252-13-6	Y
4,8-Dioxa-3H-Perfluorononanoate	ADONA	919005-14-4	Y
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1	Y
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5	Y
Perfluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6	Y
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1	Y
11-Chloroeicosafluoro-3-Oxanonane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9	Y
Perfluoro(2-ethoxyethane) Sulfonic acid	PFEESA	113507-82-7	Y
Perfluoro-4-ethylcyclohexane Sulfonic Acid	PFECHS	646-83-3	
8-Chloroperfluoro-1-Octanesulfonic Acid	8Cl-PFOS	777011-38-8	
3-Perfluoropropyl Propanoic Acid	3:3FTCA	356-02-5	Y
2h,2h,3h-Perfluorooctanoic Acid	5:3FTCA	914637-49-3	Y
3-Perfluoroheptyl propanoic acid	7:3FTCA	812-70-4	Y



## Cyclopure: Index of Compounds Tested with EPA Mappings (4 of 4)



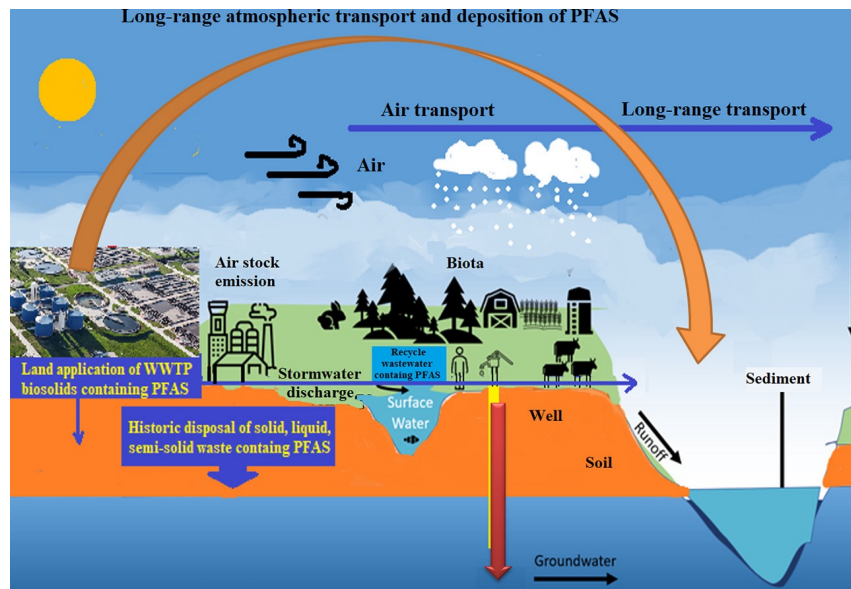
### Appendix.

PFAS detected by Cyclopure analytical methods.

Compound	Abbreviation	CAS#	EPA 1633
2H-Perfluoro-2-dodecenoic acid	FDUEA	70887-94-4	
2H-perfluoro-2-decenoic acid	FOUEA	70887-84-2	
Bis(perfluorohexyl)phosphinic acid	6:6PFPI	40143-77-9	
(Heptadecafluorooctyl) (tridecafluorohexyl) Phosphinic Acid	6:8PFPI	610800-34-5	
Bis(perfluorooctyl)phosphinic acid	8:8PFPI	40143-79-1	
N-(3-dimethylaminopropan-1-yl) perfluoro-1-hexanesulfonamide	N-AP-FHxSA	50598-28-2	

## Why It Matters in Thurston

*"Time heals all wounds" may not apply to PFAS contamination.*



"WWTP" = Waste Water Treatment Plant

Visual Source: Science Direct, February 2022.

<https://www.sciencedirect.com/science/article/pii/S0048969721060812>

- Land application of biosolids containing PFAS **collects in the ground and water**
- PFOS and PFOA are both **highly persistent in the environment and highly mobile**. Both chemicals have a tendency to **bioaccumulate in humans, terrestrial organisms, and aquatic organisms**.
- PFOS and PFOA have been **measured in biosolids** in multiple published studies.<sup>1</sup>

**Source:** 1EPA Biosolids Meeting, November 2020 (see appendix for details).



## Health Effects of PFAS Exposure



Increased cholesterol levels



Increased risk of high blood pressure or pre-eclampsia in pregnant women



Decreased vaccine response in children



Small decreases in infant birth weights



Changes in liver enzymes

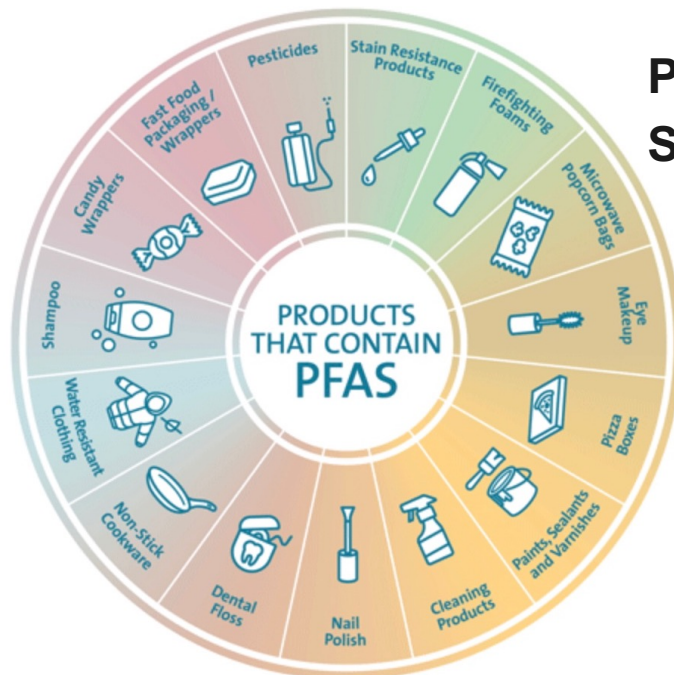


Increased risk of kidney or testicular cancer



Source: CDC, April 2023: <https://www.atsdr.cdc.gov/pfas/health-effects/index.html>

## What are PFAS?



## PFAS: Per- and Polyfluoroalkyl Substances

**Note: PFAS are widely used as manufacturing aids in diverse industries. Industrial discharge is an important source of PFAS contamination in wastewater treatment.**



Image Source: Veolia Consulting, March 2023. Used with permission. <https://www.veolianorthamerica.com/sites/g/files/dvc1836/files/image/2022/03/veolia-pfas-wheel.png>