

PFAS Contamination in Surface Water Samples taken from the Colorado River and tributaries in Bastrop County, December 2022

by

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for

Environmental Stewardship

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Introduction

Environmental Stewardship (ES) is an environmental non-profit in the Bastrop, TX area which conducts environmental research to inform policy and decision-making in Texas. In December 2022, ES conducted a preliminary test of surface water contamination of per-and polyfluoroalkyl substances (PFAS) in the Colorado river and its tributaries. The goal of this study is to ascertain the existence of PFAS contamination and report upon the results to the proper authorities so judgments can be made about the state of our environment and catalyze discussion regarding plans to move forward in a regulatory sense.

PFAS are a widely employed industrial chemical group used to create fluoropolymer coatings and products that resist heat and water, such as non-stick cooking products, clothing, furniture, food packaging, adhesives, and wire insulation. These chemicals do not break down in the environment, rather they are persistent and bioaccumulate in fish and wildlife, and infiltrate soil and water. The nature of their composition and multifunctional use makes them environmentally pervasive and globally widespread. The nature of their composition and bioaccumulation capacity has led to discoveries of the compound in the blood of humans and animals (Domingo, 2019).

Definitive claims about the impact of long-term exposure to PFAS on human health cannot be made as research is currently rudimentary and ongoing (Fenton, 2021). However, the EPA released an updated drinking water Health Advisory¹ (HA) about PFAS, for which the results of this study have been framed upon. This new HA states that the advised level of exposure to PFOA and PFOS are .004 ppt² (ng/L) and .002 ppt (ng/L) respectively³. The EPA is a regulatory agency with enforcement authority. However, the agency has authorized most states by a delegation

¹ Health Advisories Explained: <https://www.epa.gov/sdwa/drinking-water-health-advisories-has>

² ppt, parts per trillion

³ EPA Notice of PFAS Health Advisory, Federal Register Vol. 87 Number 118, June 21, 2022, page 36848. <https://www.govinfo.gov/content/pkg/FR-2022-06-21/pdf/2022-13158.pdf>

process whereby a memorandum of agreement guides the state in implementing and enforcing federal regulations on a local level. States, however, can independently set limits and enforce limits. Texas Commission on Environmental Quality (TCEQ) has been delegated this authority but has not issued regulatory standards or advisories about PFAS. Therefore, it is necessary for the proper authorities at TCEQ to address the concerns brought forth in this study.

Methods

ES worked with Cyclopure labs for PFAS testing of water samples. All eleven samples discussed in this report were collected with a Cyclopure product called Water Test Kit Pro. These kits do not require the collecting and shipping of large water samples, rather water is filtered through Cyclopure's patented filtration device DEXSORB®. This lab uses an isotope dilution method to determine the existence of 55 PFAS chemicals, including all listed in EPA health advisories. Cyclopure is not a certified lab, therefore these results serve as preliminary information and demand further inspection by a certified lab to be considered by state and federal regulatory agencies. For more information on Cyclopure's patented technology and laboratory efficacy, please consult their website⁴.



Image 2: Sample Collection at Colorado River at Smithville (ES-4)



Image 1: Cyclopure Water Test Kit in Use at Decker Creek (ES-3)

⁴ More information about Cyclopure Water Test Kit and DEXSORB® technology can be found here: <https://cyclopure.com/product-information/>

Eleven samples were collected along the Colorado River and its tributaries in and around Bastrop County. Each sample location was publicly accessible from main roads and did not broach private property (Images 3-5). The directions for use outlined by Cyclopure were followed. Gloves were worn and about 250 ml of water was directly collected into the Cyclopure testing kit. Before collecting the sample from the site, the data card from the test kit was filled out with the appropriate information from the sample location. Sample collection was executed with precaution. The inside of the sample cup was not touched and the blue extraction filter at the bottom of the cup containing the DEXSORB® was not detached or disturbed.



Image 3: Entrance to Onion Creek (ES-1) sampling location



Image 4: Piney Creek (ES-7) Sampling Location



Image 5: Cedar Creek (ES-6) Sampling Location

Once all the location and sample data were recorded, water samples were collected directly into the Cyclopure sample cup. When taking the sample, the cup was faced up-stream with little to no disturbance of the river/stream bottom. Each water sample cup was filled to the 250 ml line and the lid was placed directly back onto the cup immediately after the collection of water. Once all collected water was filtered through the testing kit, which took roughly about 15-20 minutes depending on turbidity, they were sealed, labeled, and returned to Cyclopure labs for analysis.

Results

Environmental Stewardship, TX PFAS Testing Dec 2022						
Detects Highlighted in Yellow by Cyclopure						
Format part per trillion (ng/L); LOQ 1.0 ppt all PFAS, except Genx 2.0 ppt						
ES Name	Colorado River, Webberville	Big Sandy Creek	Piney Creek	Cedar Creek	Wilbarger Creek	Texas PFAS Regulations. EPA has set Health Advisory Levels for PFOA (0.004 ppt); PFOS (0.02); GenX (10 ppt) and PFBS (2,000 ppt). Texas Commission on Environmental Quality has not established PFAS drinking limits at this time. Per Cyclopure
ES Kit Number	Upstream (U)	ES-9	ES-7	ES-6	ES-8	
Sampling Location	Colorado River, Boat Ramp @ Webberville, TX	Bastrop, TX 78602 ES-9; BSC	Bastrop, TX 78602 ES-7; PINC	Bastrop, TX 78602 ES-6; CEDC	Elgin, TX 78621 ES-8; WILC	
Filtered/Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	
Sampling Date	9/16/22	12/17/22	12/17/22	12/17/22	12/17/22	
Order ID	wtk-22-00126	P-140680472	P-140680472	P-140680472	P-140680472	
PFBA	2.3	1.6	1.6	1.9	2.2	
PFPeA	3.9	4.4	< 1 ng/L	< 1 ng/L	8.4	
PFHxA	3.8	2.9	< 1 ng/L	< 1 ng/L	2.8	
PFHpA	1.9	< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L	
PFOA	2.7	2.1	< 1 ng/L	< 1 ng/L	1.8	
PFNA		< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L	
PFDA		< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L	
HFPO-DA (GenX)		< 2 ng/L	< 2 ng/L	< 2 ng/L	< 2 ng/L	
PFBS	1.9	1.1	1.2	< 1 ng/L	3.4	
PFHxS	5.1	< 1 ng/L	1.8	< 1 ng/L	< 1 ng/L	
PFOS	4.2	< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L	
Total PFAS (11 Compounds)		12.1	4.6	1.9	18.6	
Additional PFAS						
6:2 FTS		< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L	
FBSA		< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L	
PFHpS		< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L	
PFPeS		< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L	
Total PFAS (All Detected)	25.8	12.1	4.6	1.9	18.6	
ES Name	Colorado River, Bastrop	Alum Creek	Gilliland Creek	Onion Creek	Decker Creek	Colorado River, Smithville
ES Kit Number	Downstream (D)	ES-5	ES-2	ES-1	ES-3	ES-4 (54)
Sampling Location	Colorado River downstream of HWY 71 Bridge, Bastrop, TX	Smithville, TX 78957 ES-5; ALC	Manor, TX 78653 ES-2; GILC	Austin, TX 78617 ES-1; ONC	Austin, TX 78725 ES-3; DEC	Smithville, TX 78957 ES-4; CRS
Filtered/Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered
Sampling Date	9/16/22	12/17/22	12/16/22	12/16/22	12/16/22	12/17/22
Order ID	wtk-22-00126	P-140680472	P-140680472	P-140680472	P-140680472	P-140680472
PFBA	1.9	2.1	2.4	4.8	3	7.8
PFPeA	2.8	2.6	10.3	12.4	3	12
PFHxA	3.1	3.5	6	13.9	2.1	12.7
PFHpA	1.5	1.1	1.7	8	1.2	5.1
PFOA	1.7	1.4	4.7	7.9	2	6.7
PFNA		< 1 ng/L	1.2	1.1	< 1 ng/L	1.6
PFDA		< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L	< 1 ng/L
HFPO-DA (GenX)		< 2 ng/L	< 2 ng/L	< 2 ng/L	< 2 ng/L	< 2 ng/L
PFBS	1.3	4.3	6.7	7.1	1.9	7.4
PFHxS	2.1	< 1 ng/L	2.1	37.5	1.4	16.2
PFOS	3	< 1 ng/L	2.2	53.4	1.9	12.2
Total PFAS (11 Compounds)		15	37.3	146.1	16.5	81.7
Additional PFAS						
6:2 FTS		< 1 ng/L	< 1 ng/L	1.8	< 1 ng/L	2.5
FBSA		< 1 ng/L	< 1 ng/L	1.4	< 1 ng/L	1.2
PFHpS		< 1 ng/L	< 1 ng/L	1.3	< 1 ng/L	< 1 ng/L
PFPeS		< 1 ng/L	< 1 ng/L	3.2	< 1 ng/L	1.5
Total PFAS (All Detected)	17.4	15	37.3	153.8	16.5	86.9
Environmental Stewardship					Compiled	REV 0, 12-Jan-23

Table 1. Results of PFAS sampling in the Colorado River and tributaries in Bastrop County, TX. (See also Appendix)

The highlighted yellow portions indicate detected levels of PFAS that were of concern by Cyclopure. Highlighted values do not necessarily indicate these locations exceeded advisory levels as outlined by the EPA, rather the chemical was detected by Cyclopure's lab. However, based upon these results many test sites are contaminated beyond the advisory levels published by EPA.

Results of the study are recorded in Table 1. The sampling locations, relative levels of contamination, and locations of wastewater treatment plants discharging into the Colorado River basin⁵ are depicted in Figure 1. Cedar Creek (ES-6) and Piney Creek (ES-7) were the only tributaries tested that contained levels of PFOA, PFOS, and PFBS that are below the EPA's Health

⁵ The Colorado River Basin covers 40,000 square miles from eastern New Mexico to the Gulf of Mexico. Onion Creek (ES-1) is an important tributary to the Colorado River Basin.

Advisory Standards. Big Sandy Creek (ES-9), Alum Creek (ES-5), and Wilbarger Creek (ES-8) contained low levels of PFOS and PFBS but not of PFOA, which was above the Health Advisory levels. All other samples, Onion Creek (ES-1), Gilliland Creek (ES-2), Decker Creek (ES-3), Colorado River at Smithville (ES-4), Colorado River at Webberville Upstream (U), and Colorado River at Bastrop Downstream (D), indicated levels of contamination of PFOA and PFOS above the levels defined by the EPA per the 2022 update to the health advisory. No test sites exceeded the recommended levels of PFBS.

Other PFAS compounds that do not currently have drinking water Health Advisory levels were detected at all sites.

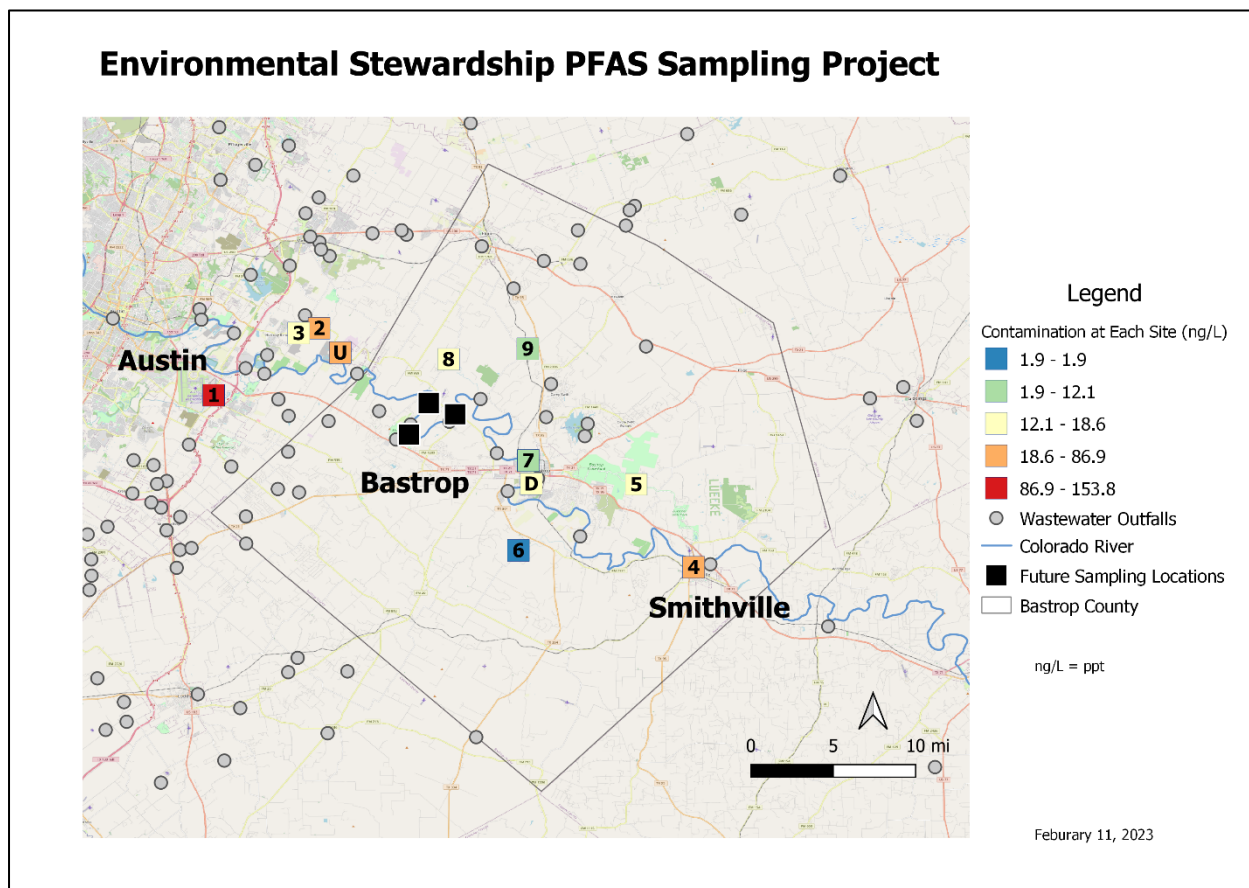


Figure 1: Map showing the location of samples taken, the relative level of contamination present, and the location of wastewater treatment plants discharging into the river basin in the region.

Discussion

The study conducted is preliminary and not designed to comment on the impact of this contamination on potential adverse effects on citizens in this area, fish and wildlife, or consumption of fish and wildlife containing PFAS compounds. The impacts of PFAS on human health and wildlife require further study.

The result of widespread contamination of PFAS in the surface water was the expected outcome due to the prolific and widespread use of PFAS chemicals for industrial purposes. This study does not provide a comprehensive view of PFAS contamination in Bastrop County, and further field research must be conducted to grasp the entirety of the current outlook on PFAS contamination. Furthermore, the testing methods employed in this study do not meet the federal and state standards for toxicity testing. ES does not claim these results should become the basis for legislation, rather inform policy and decision-makers of the existence of contamination and draw attention to the need for further in-depth research in this area. As a preliminary study, we have identified contamination in most testing sites and must further research the extent of PFAS in the ecosystem.

Conclusion

Upon the discovery of widespread contamination of surface water in the Bastrop/Austin area, it is imperative to conduct a study of groundwater used for drinking. ES will embark on another round of testing in the alluvial aquifers in the Willcox group. The alluvial aquifer exchanges water with the Colorado River, and it is likely that PFAS contamination may also be found in the other aquifers based upon the results of this study.

References

Domingo, José L., and Martí Nadal. "Human exposure to per-and polyfluoroalkyl substances (PFAS) through drinking water: A review of the recent scientific literature." *Environmental research* 177 (2019): 108648.

EPA Notice of PFAS Health Advisory, Federal Register Vol. 87 Number 118, June 21, 2022, page 36848. <https://www.govinfo.gov/content/pkg/FR-2022-06-21/pdf/2022-13158.pdf>

Fenton, Suzanne E., et al. "Per-and polyfluoroalkyl substance toxicity and human health review: Current state of knowledge and strategies for informing future research." *Environmental toxicology and chemistry* 40.3 (2021): 606-630.

Health Advisories Explained: <https://www.epa.gov/sdwa/drinking-water-health-advisories-has>

APPENDIX

Environmental Stewardship, TX PFAS Testing Dec 2022									
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PFOA	1.7	1.4	4.7	7.9	2				
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Environmental Stewardship					Complied	REV 0, 12-Jan-23			