

Investigation of Per- and Polyfluoroalkyl Substances (PFAS)
in Burtchville and Clyde Townships, North Street, Jeddo, and Lakeport/St. Clair County
Surface Water Sampling Update
August 2020

Perfluorinated and polyfluorinated alkyl substances (PFAS) are a very large class of man-made organic chemicals that have been used in numerous industrial processes and consumer products for over 60 years. Validated analytical methods are available for relatively few of the thousands of compounds. Much of the environmental monitoring of PFAS in Michigan has focused on measuring only perfluorinated chemicals.

Many PFAS are persistent, some bioaccumulate in the environment, and several are toxic to mammals and/or birds in laboratory tests. The toxicities of most PFAS have not been evaluated. Two perfluorinated compounds; perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), have been the subject of the most toxicological work and environmental monitoring. Both compounds were manufactured intentionally, but they can also be generated as byproducts when other fluorinated compounds break down. In addition, several PFAS are key ingredients in firefighting foams. These foams have been used extensively in fire training exercises at military bases nationwide; in recent years, PFAS have been detected in surface and groundwater near many military facilities. Many products containing PFAS are used in numerous industrial processes, including metal plating, textile production and treatment, and specialty paper production. Industrial and domestic waste containing these compounds can enter the environment through municipal or private waste treatment systems, storm water runoff, venting groundwater, or as deposits after emissions into the atmosphere. Both PFOS and PFOA have been measured in surface waters across the state, and PFOS has been detected in most fish tissue samples from Michigan waters that have been analyzed for PFAS.

The Michigan Department of Environment, Great Lakes, and Energy (EGLE) has generated Rule 57 surface water quality values for the protection of human health and aquatic life for PFOS and PFOA. The Rule 57 Human Non-Cancer Value (HNV) for PFOS is 12 nanograms per liter (ng/L; parts per trillion) in surface waters not used as a source of drinking water, and 11 ng/L for those surface waters used as a drinking water source. The HNVs for PFOA are 420 ng/L and 12,000 ng/L for drinking and non-drinking water sources, respectively. The Aquatic Maximum Value (AMV) is the highest concentration of a substance to which an aquatic community can be exposed briefly without resulting in adverse effects; whereas the Final Chronic Value (FCV) is the highest concentration of a substance to which an aquatic community can be exposed for a long period of time without experiencing adverse effects. The Rule 57 AMV and FCV for PFOS is 880,000 and 7,700 ng/L, respectively. The Rule 57 AMV and FCV for PFOA is 780,000 and 140,000 ng/L, respectively.

EGLE, Water Resources Division (WRD), Emerging Pollutant Section (EPS), conducted surface water sampling in the Birch Creek and Lake Huron coastal watersheds in August 2020. This sampling is a continuation of the sampling effort the WRD, EPS, conducted in December 2019. Read a [summary of the December 2019 surface water sampling](#). The WRD, EPS, collected surface water samples in the Doe Creek, Rattle Run, Sheldon Drain, Belle River, Milwaukee Creek, Galbraith Drain, Kettle Creek (proposed name), Brace Drain, Pine River, and Burtch Creek drainages (Table 1; Figure 1, Figure 2, and Figure 3). These sample locations are upstream of previously-measured locations to aid in our investigation of identifying the source(s) of PFAS in these drainages.

Surface water samples were collected in accordance with the Michigan General PFAS Sampling Guidance (MDEQ 2018a) and Surface Water PFAS Sampling Guidance (MDEQ 2018b). Quality Assurance/Quality Control (QA/QC) procedures followed the Fort Gratiot Area PFAS Investigation August 2020 Quality Assurance Project Plan (QAPP). The analysis of samples for select PFAS compounds will be performed by Vista Analytical Laboratories in El Dorado Hills, California. Surface water samples were analyzed for the PFAS listed in Table 2.

References:

Michigan Department of Environmental Quality. (2018a). General PFAS Sampling Guidance.

Michigan Department of Environmental Quality. (2018b). Surface Water PFAS Sampling Guidance.

Michigan Department of Environment, Great Lakes, and Energy Fort Gratiot Area Perfluoroalkyl and Polyfluoroalkyl Compound (PFAS) Investigation August 2020 Quality Assurance Project Plan (QAPP).

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Table 1: PFOS and PFOA concentrations measured above their detection limit in surface water samples collected from locations in the Black River, Mill Creek, Pine River, and Belle River Watersheds in August 2020. Concentrations exceeding the Rule 57 HNV are in bold and italicized.

SAMPLE ID	SAMPLE LOCATION DESCRIPTION	LAT	LONG	PFOS (NG/L)	PFOA (NG/L)
FG1	No Flow, Not Sampled	43.1493	-82.5434	--	--
FG2	Unnamed Ditch @ Harris Road	43.1377	-82.5738	155	37.8
FG3	No Flow, Not Sampled	43.0603	-82.5569	--	--
FG4	Pond north of Beard Road and east of Vincent Road	43.0450	-82.5487	66.5	16.5
FG5	Unnamed Ditch on east side of North Road	43.0795	-82.5283	3.7	<2.13
FG6	Unnamed Ditch on west side of North Road	43.0758	-82.5283	49.5	6.21
FG7	Unnamed Ditch east of GLWA Lake Huron Water Plant	43.0751	-82.4815	1.65	1.52
FG8	Unnamed Ditch on east side of North Road	43.0849	-82.5285	1.55	1.14
FG9	Burtch Creek @ Jeddo Road	43.1532	-82.5702	<2.02	<2.02
FG10	No Flow, Not Sampled	43.1277	-82.5815	--	--
FG11	Unnamed Ditch on east side of Wildcat Road	43.1240	-82.5812	9.77	5.84
FG12	Burtch Creek @ Babcock Road	43.1513	-82.5435	18.1	4.05
FG13	Unnamed Ditch east of GLWA Lake Huron Water Plant	43.0752	-82.4788	2.07	1.44
FG14	Unnamed Ditch on east side of State Road	43.0997	-82.5002	4.45	29.8
FG15	Unnamed Ditch on east side of Babcock Road	43.0993	-82.5397	<2.16	<2.16
FG16	Pine River at Smiths Creek Road	42.9184	-82.5585	3.02	11.7
FG17	Rattle Run @ Rattle Run Road	42.8635	-82.5966	58.2	9.10
FG18	Sheldon Drain @ Rattle Run Road	42.8571	-82.5851	2.52	8.09
FG19	Unnamed Ditch on east side of Wadhams Road	42.8367	-82.5558	247	33.1
FG20	Unnamed Ditch on east side of Rattle Run Road	42.8308	-82.5449	8.8	4.1
FG21	Unnamed Ditch @ Allington Street	42.8016	-82.5940	221	29.1

Table 2: Perfluoroalkyl and polyfluoroalkyl substances analyzed.

Compound	Abbreviation	CAS #
Perfluorotetradecanoic acid	PFTeA	376-06-7
Perfluorotridecanoic acid	PFTriA	72629-94-8
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorodecanoic acid	PFDA	335-76-2
Perfluorononanoic acid	PFNA	375-95-1
Perfluorooctanoic acid	PFOA	335-67-1
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorobutanoic acid	PFBA	375-22-4
Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluorononanesulfonic acid	PFNS	68259-12-1
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluoropentanesulfonic acid	PFPeS	2706-91-4
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluorooctanesulfonamide	PFOSA	754-91-6
Fluorotelomer sulphonic acid 8:2	FtS 8:2	39108-34-4
Fluorotelomer sulphonic acid 6:2	FtS 6:2	27619-97-2
Fluorotelomer sulphonic acid 4:2	FtS 4:2	757124-72-4
2-(N-Ethylperfluorooctanesulfonamido) acetic acid	N-EtFOSAA	2991-50-6
2-(N-Methylperfluorooctanesulfonamido) acetic acid	N-MeFOSAA	2355-31-9
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11CI-PF3OUdS	763051-92-9
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	9CI-PF3ONS	756426-58-1
4,8-dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4

Figure 1: Overview map of surface water PFOS concentrations (ng/L) at locations in the Black River and Mill Creek Watersheds sampled in August 2020. The blue area is the Mill Creek-Frontal Lake Huron Watershed, whereas the red area is the Black River (St. Clair) Watershed. Concentrations exceeding the Rule 57 HNV are displayed as red circles.

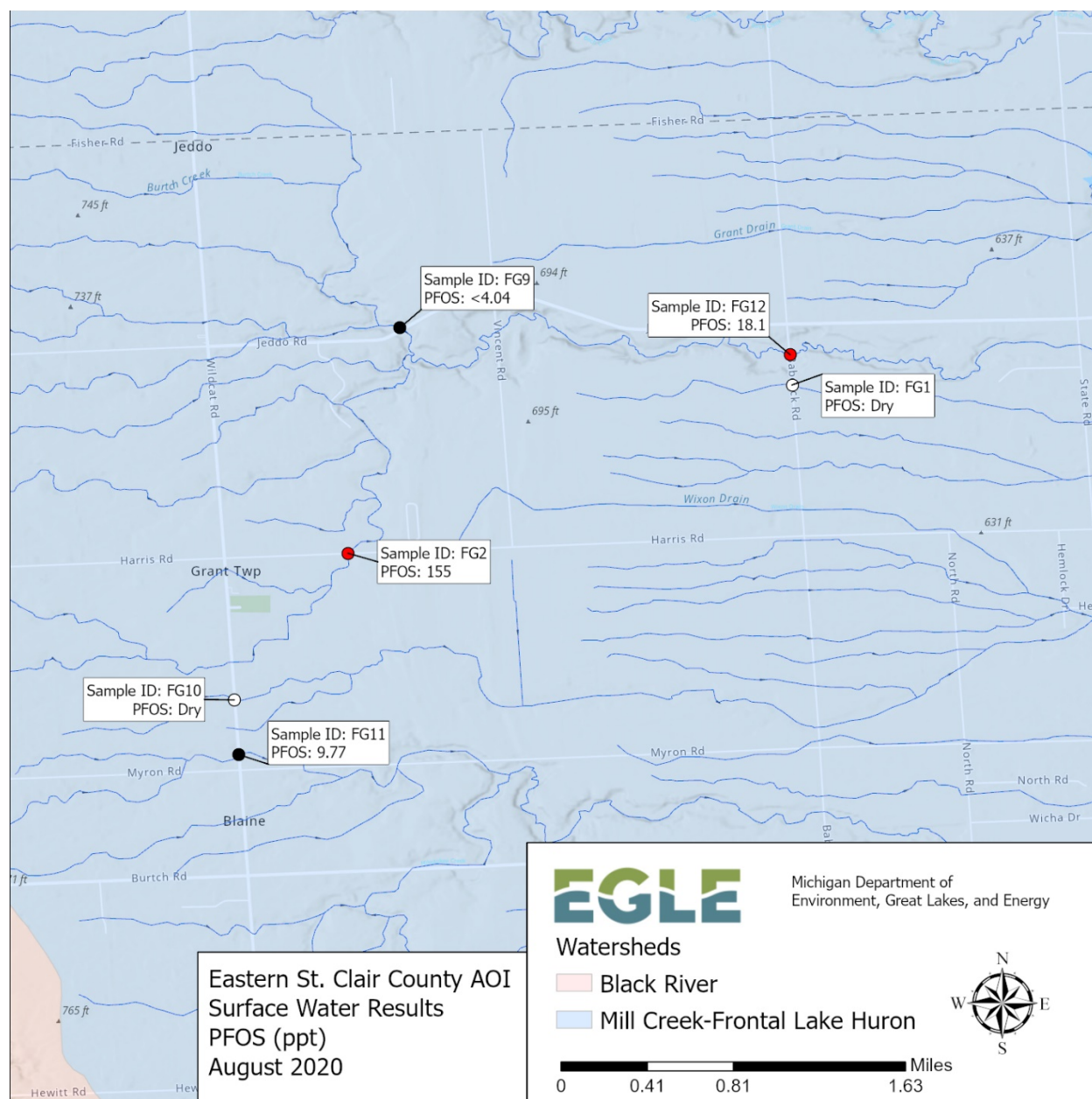


Figure 2: Overview map of surface water PFOS concentrations (ng/L) at locations in the Black River and Mill Creek Watersheds sampled in August 2020. The blue area is the Mill Creek-Frontal Lake Huron Watershed, whereas the red area is the Black River (St. Clair) Watershed. Concentrations exceeding the Rule 57 HNV are displayed as red circles.

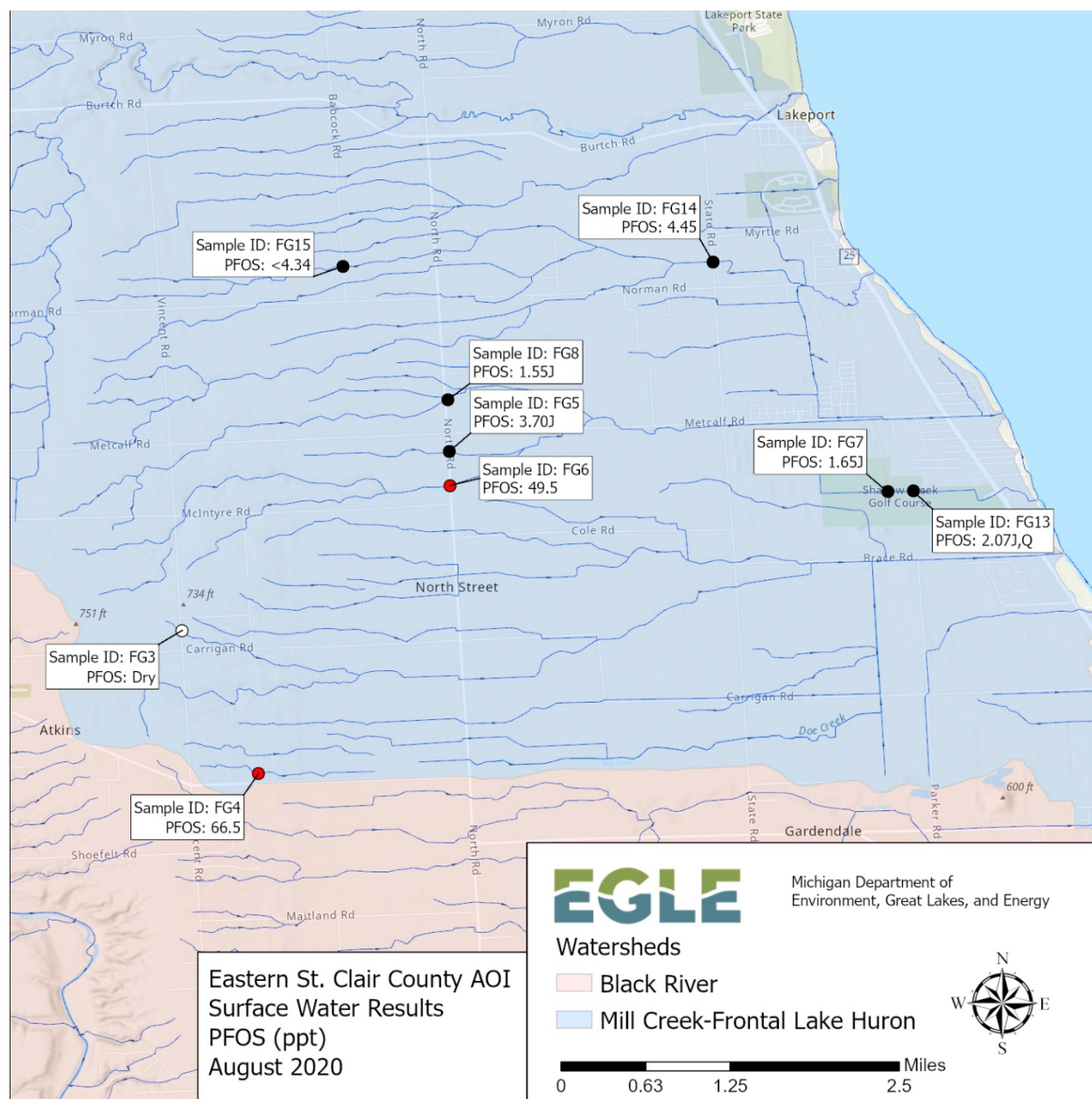


Figure 3: Overview map of surface water PFOS concentrations (ng/L) at locations in the Pine and Belle River Watersheds sampled in August 2020. The green area is the Pine River-Frontal Saint Clair River Watershed, whereas the gold area is the Belle River Watershed. Concentrations exceeding the Rule 57 HNV are displayed as red circles.

