

Investigation of Per- and Polyfluoroalkyl Substances (PFAS)
in the Huron River Watershed
Surface Water Sampling Update
December 2018

The Michigan Department of Environmental Quality (MDEQ), Water Resources Division (WRD), Surface Water Assessment Section (SWAS) conducted surface water sampling in the Huron River watershed in September and October 2018. This effort was initiated to follow-up near sites with elevated surface water or fish PFOS concentrations and to track potential sources within the watershed. There is currently a “Do Not Eat” fish consumption advisory for the Huron River and lakes in Oakland, Livingston, Washtenaw, Wayne, and Monroe Counties. The advisory begins at N. Wixom Road (Oakland County) and extends downstream to the mouth of the river at Lake Erie (Wayne County). The advisory also includes Norton Creek (Oakland County), a tributary to the Huron River.

Michigan has developed Rule 57 surface water quality values for the protection of human health for both PFOS and PFOA. The Human Non-Cancer Value (HNV) for PFOS is 12 ng/L (parts per trillion) in surface water not used as a source of drinking water, and 11 ng/L for those waters used as a drinking water source. The HNV for PFOA is 420 ng/L and 12,000 ng/L for drinking and non-drinking water, respectively.

Surface water grab samples were collected by SWAS from the Huron River, lakes, and select tributaries on four occasions between September and October 2018 (Table 1; Figures 1-5). Samples from Argo and Barton Ponds were collected on 9/28/2018. Samples from Hubbell and Mill Ponds were collected on 10/2/2018 and 10/4/2018, respectively. All other samples were collected from 10/29/2018 or 10/30/2018. Initial ambient surface water samples were collected on 7/24/2018 and 8/30/2018 (shown in Table 1 for comparison). Samples were collected in accordance with the draft Michigan Per- and Polyfluoroalkyl Substances (PFAS) Sampling Guidance (MDEQ 2018a) and Draft MDEQ Surface Water PFAS Sampling Guidance documents (MDEQ 2018c). QA/QC procedures followed the Michigan Surface Water PFAS Investigation 2018 QAPP (MDEQ 2018b).

Findings:

- PFOS was detected in samples from 27 sites. Concentrations greater than the detection limit ranged from 1.8 ng/L to 88 ng/L.
- PFOS exceeded the HNV at 12 sites (Table 1; bold values) in September and October.
- Samples collected from Norton Creek downstream of the Wixom wastewater treatment plant (NC0010 and NC0100) exceeded the HNV but were lower than previous samples collected in July and August 2018 (Table 1).
- A sample collected from the Huron River just downstream of the confluence with Norton Creek (HR0235) exceeded the HNV for PFOS but was lower than samples collected in July and August 2018.
- Concentrations of PFOS exceeded the HNV in Hubbell Pond, Argo Pond, and Barton Pond (Table 1).
- Follow-up samples from the west branch of Norton Creek (NCW0100 and NCW0400) were below the HNV. In August 2018, the HNV was exceeded at NCW0100 with 80 ng/L PFOS (Table 1).
- PFOA values were all below the HNV and ranged from non-detect to 6.7 ng/L.

- All replicates and duplicates passed QA/QC for PFOS and PFOA in the September and October samples. PFOS and PFOA concentrations in the method blanks, equipment blanks, and field blanks were non-detect.

Overall, these results suggest that source(s) exist in Norton Creek and downstream of N. Wixom Road on the Huron River. Source(s) may exist in Mann Creek and Pettibone Creek, although concentrations of PFOS in these waterbodies were variable over time. Repeat visits to sample sites throughout the watershed show that PFOS concentrations in surface water are variable. Fish tissue analysis can provide a more complete evaluation of water quality when the surface water concentrations of a bioaccumulative compound like PFOS are highly variable. Therefore, fish were collected from Argo Pond, Barton Pond, Hubbell Pond, Moraine Lake, Belleville Lake, Flat Rock Impoundment, and Milford Millpond in 2018. These results are still pending.

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Table 1: PFOS concentrations (ng/L) in surface water samples collected from the Huron River watershed from July through October 2018. Bold values indicate a concentration that exceeded the HNV. For each stream or creek, the furthest sampled point downstream is listed first in the table. Columns with two numbers include the original sample and a replicate or duplicate. ND = non-detect; US = upstream; DS = downstream; WWTP = wastewater treatment plant; WB = west branch; EB = east branch; SB = south branch.

Site Code	Description	Latitude	Longitude	PFOS (ppt)					
				2018					
				7/24	8/30	9/28	10/2 to 10/4	10/29 to 10/30	
Huron River (HR)									
HR0010	HR at W Jefferson Ave	42.04256	-83.21419	6.9					
HR0050	HR at E Huron River Dr	42.21079	-83.43472	7.2 7.4 ^R					
HR0060	HR at Rawsonville Rd	42.20961	-83.54343	7.1					
HR0095	HR at Stark Strasse	42.27228	-83.65539	6.5					
ARGO0010	Argo Pond	42.29118	-83.74536				37		
BART0010	Barton Pond	42.31791	-83.76618				42		
HR0130	Barton Pond	42.31822	-83.76502	6.6					
HR0140	HR at Delhi Rd	42.33380	-83.80919	7.1					
HR0150	HR at Central Rd	42.34117	-83.87973	7.5					
HR0160	HR at N Territorial Rd	42.38715	-83.91113	8.7 7.8 ^R					
HR0165	HR DS Base Line and Portage Lk	42.41488	-83.90695	11					88
HR0190	HR US Strawberry Lake	42.46031	-83.82491	15					46
HR0195	HR at McCabe Rd.	42.48313	-83.74197						65
HR0200	Kent Lake	42.52845	-83.64574						22
HR0205	Kent Lake at W. Buno Rd	42.54926	-83.63156						17
HR0210	HR at GM Road	42.57927	-83.62692		300				15
HUBBELL0010	Hubbell Pond	42.58965	-83.61521				61		
HR0235	HR at Burns Rd	42.57870	-83.58002	1,400	480				21 21^R
HR0240	HR at Wixom Rd	42.57425	-83.55990	2.4	1.1 ^J 1.1 ^{JD}				1.2 ^J
HR0250	HR at Benstein Rd.	42.56922	-83.50434		1.5 ^J				
HR0270	HR at White Lake Road	42.69320	-83.49917	0.58 ^J					
Mann Creek (MC)									
MoraineLake 01	Moraine Lake	42.55800	-83.71807						1.1 ^J
MC1000	MC at Pleasant Valley Rd.	42.56392	-83.71116		150				0.98 ^J
MC2000	MC at Kensington Rd	42.56944	-83.69932						ND ND ^D
MCS0050	MC SB at N Hickory Rdg	42.58968	-83.65879						9.5
MC5000	MC at Hickory Ridge Road	42.60093	-83.66067						ND
Mill Creek (MCW)									
MCW0010	MCW in Dexter	42.34252	-83.88476	ND					
Willow Run (WR)									
WR0010	WR at service drive	42.21930	-83.53661	26					

Table 1 (Cont.)

Site Code	Description	Latitude	Longitude	PFOS (ppt)				
				2018				
				7/24	8/30	9/28	10/2 to 10/4	10/29 to 10/30
Woodruff Creek (WC)								
WC0050	WC at Grand River Ave	42.51662	-83.70946					1.7 ^J
Pettibone Creek (PC)								
PC0010	PC at Liberty St. (DS Mill Pond)	42.58944	-83.60277		500			ND ND ^R
MILL001	Mill Pond	42.58965	-83.60278				0.61 ^J	
PC0050	PC US Mill Pond	42.59267	-83.60149					0.75 ^J
PC0100	PC at Reid Rd	42.61785	-83.60624					1.3 ^J
Norton Creek (NC)								
NC0010	NC US Huron River (DS Wixom WWTP)	42.57256	-83.57001	5,500 5,600 ^D	1,500			88
NC0100	NC at E Buno Rd. (DS Wixom WWTP)	42.55270	-83.56223		1,900 1,800 ^D			75
NC0150	NC DS Wixom WWTP	42.54433	-83.55160		190			
NC0200	NC US Wixom WWTP	42.54296	-83.54661		8.4 13 ^R			
NC0300	NC US East Branch	42.54257	-83.54716		26			
NC0400	NC at West Maple Rd	42.53142	-83.54761		5.1			
NC0500	NC at Oak Crk Dr	42.52099	-83.54469		10 10 ^R			
NC0600	NC at Grand River Ave	42.50248	-83.57310		4.1			
NCW0100	WB NC at E Maple Rd.	42.53542	-83.55863		80			5.2
NCW0400	WB NC at Old Plank Rd	42.52913	-83.57693					1.8
NCE0100	EB NC at Wixom Habitat trail	42.53837	-83.53852		7.7			
NCL0200	NC at Charms Rd.	42.54595	-83.54046		11			
UT0001	Unnamed trib at Wixom assem.	42.50731	-83.54631		38			
UT0002	Unnamed trib US Wixom assem.	42.50091	-83.54678		6.5			
Ore Creek (OC)								
OC0010	OC at Riverside Dr.	42.47327	-83.79694					2.2
Arms Creek (AC)								
AC0010	AC at Strawberry Lk Rd	42.42301	-83.87978					ND
Portage River (PR)								
PR0010	PR US Little Portage Lake	42.41908	-83.93010					0.85 ^J
UTS0050	Unnamed Trib at D19	42.40728	-83.94222					ND
Honey Creek (HC; Washtenaw County)								
HC0100	HC at Wagner Road	42.31808	-83.79538	0.73 ^J				
Honey Creek (HCL; Livingston County)								
HCL0100	HCL at Darwin Rd	42.44285	-83.92494					0.58 ^J 0.65 ^{J,D}
Davis Creek (DC)								
DC0010	DC at Silver Lake Rd	42.46885	-83.74407					1.3 ^J

^J Result is less than the reporting limit, but greater than or equal to the method detection limit.; ^R Replicate sample. ^D Duplicate sample.

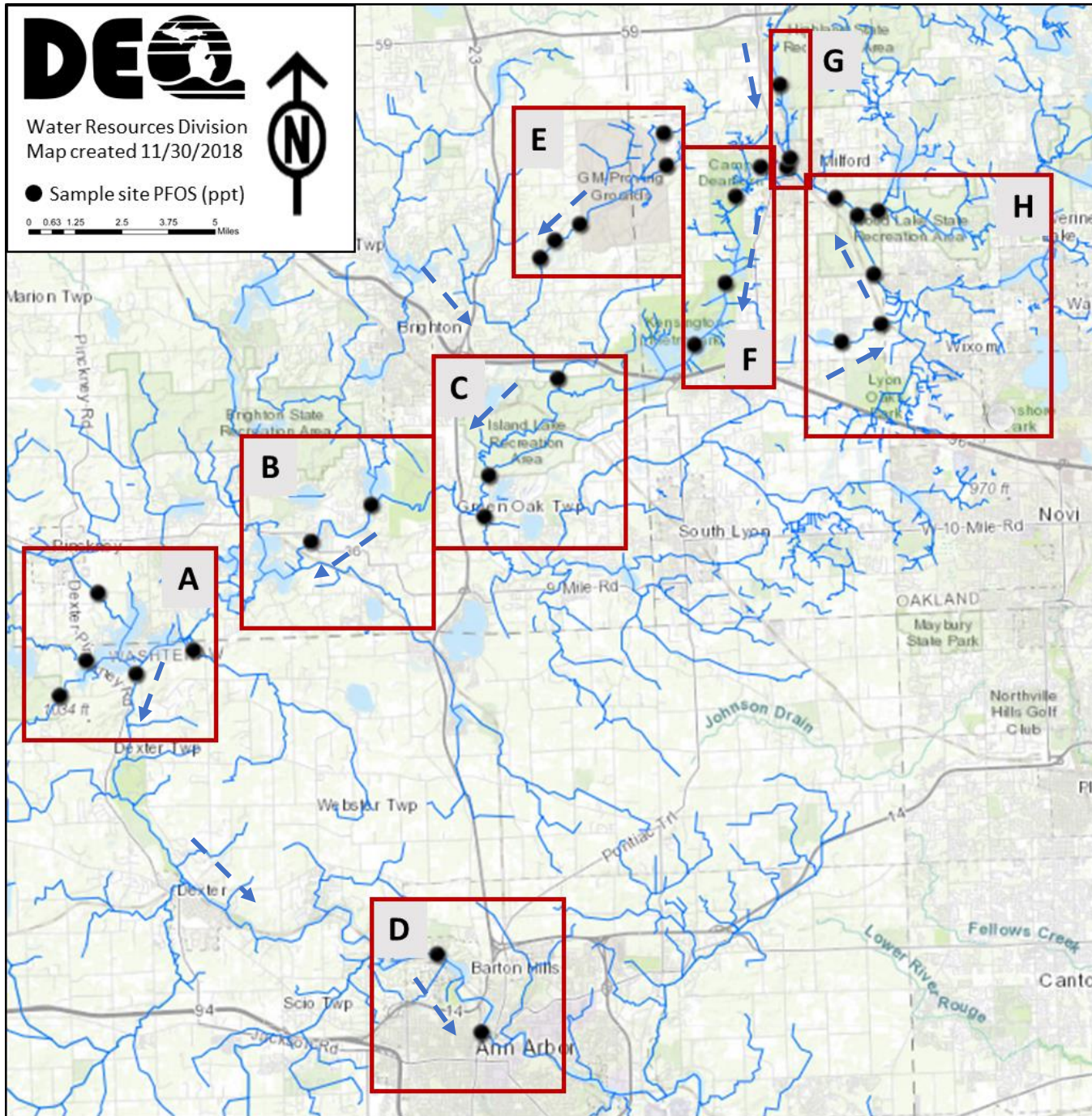


Figure 1: Overview of sample sites in the Huron watershed (n = 31) and Rouge watershed (n = 1). Samples were collected in September and October of 2018. Insets are displayed in Figures 2-4.

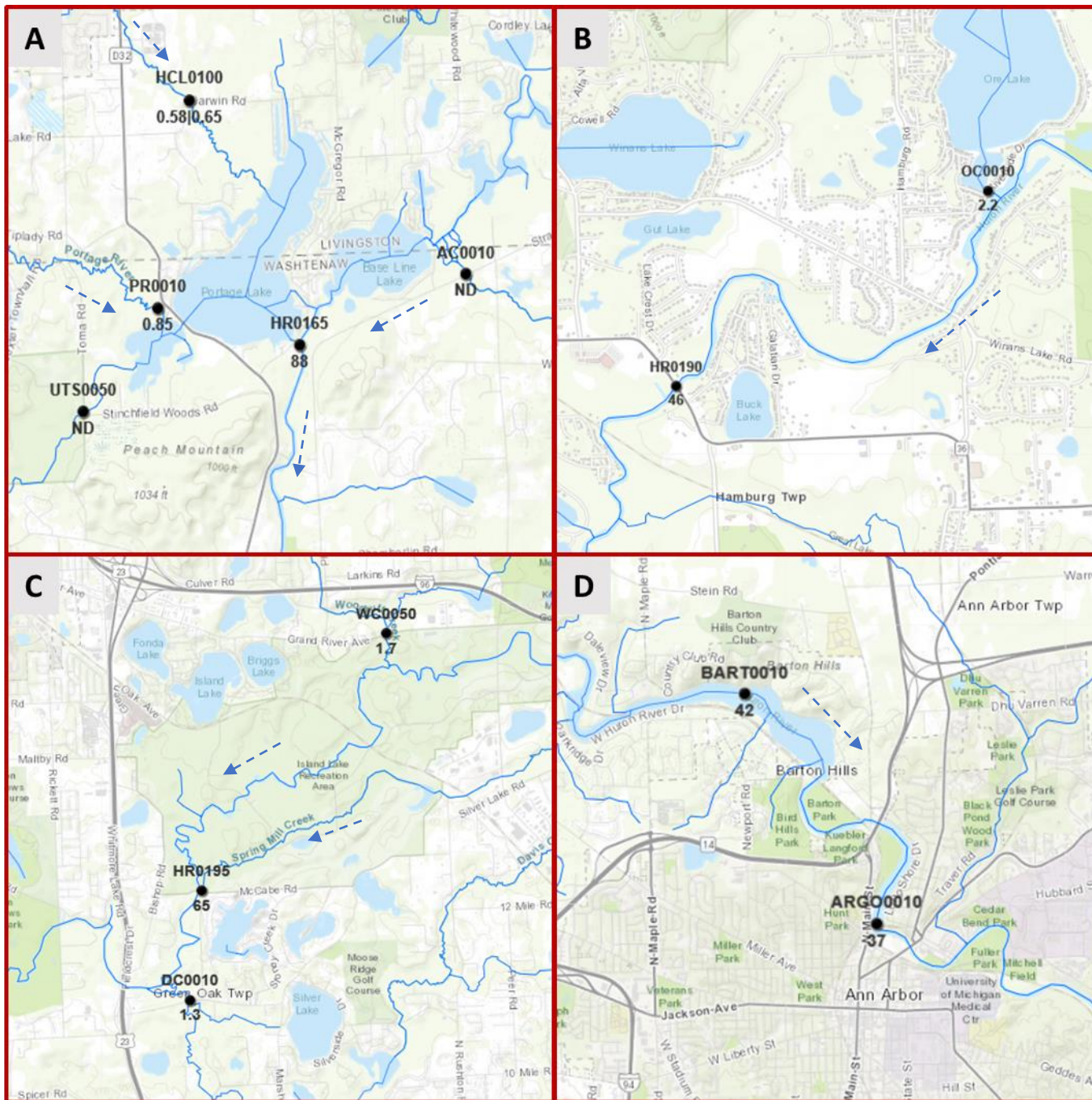


Figure 2: PFOS (ng/L) concentrations in surface water samples collected in September and October 2018 from: (A) Huron River and tributaries near Base Line and Portage Lakes; (B) Huron River and Ore Creek near Brighton; (C) Huron River, Davis Creek, and Woodruff Creek; and (D) Barton Pond and Argo Pond in Ann Arbor.

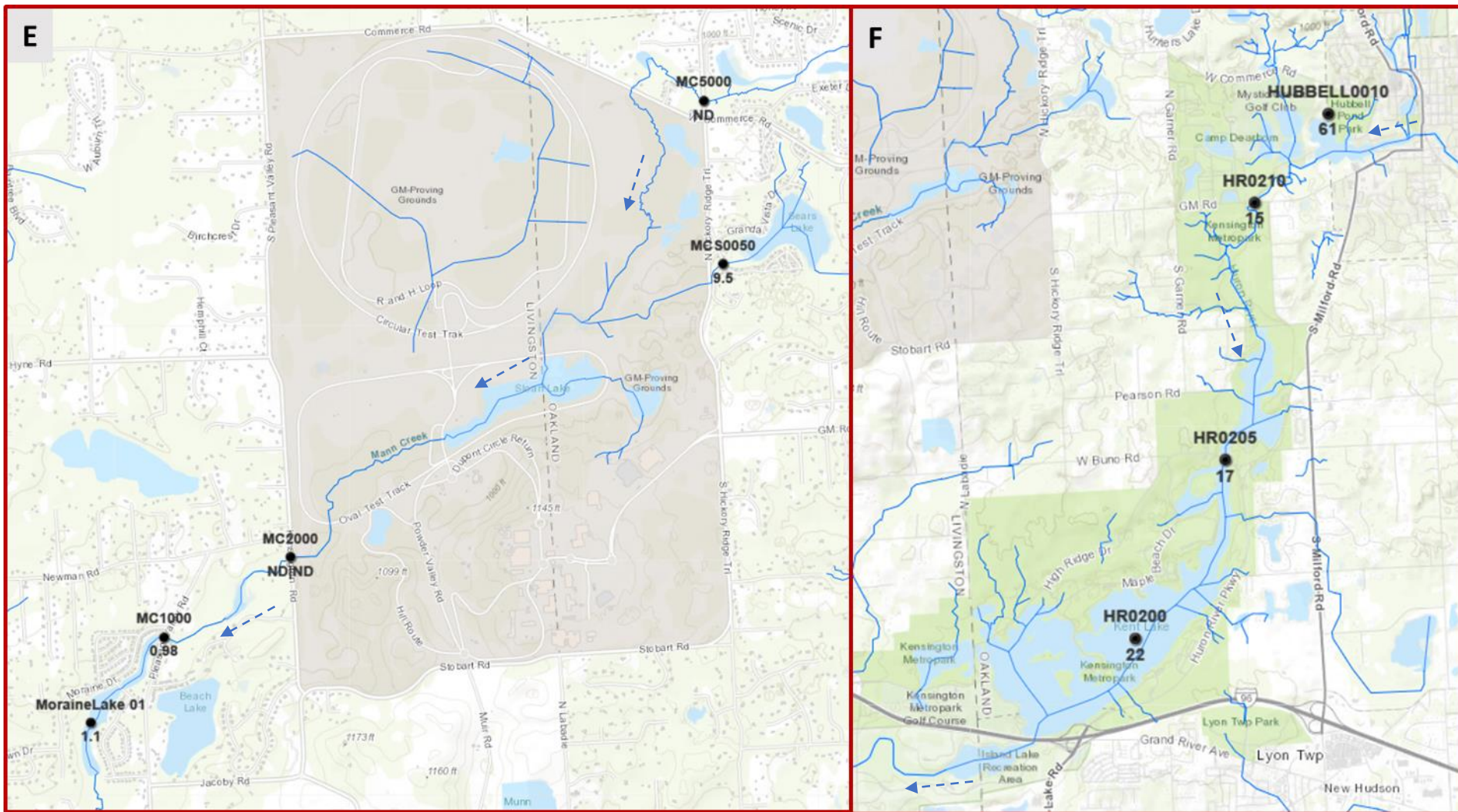


Figure 3: PFOS (ng/L) concentrations in surface water samples collected in September and October 2018 from: (E) Mann Creek and Moraine Lake; and (F) Hubbell Pond, Huron River, and Kent Lake.

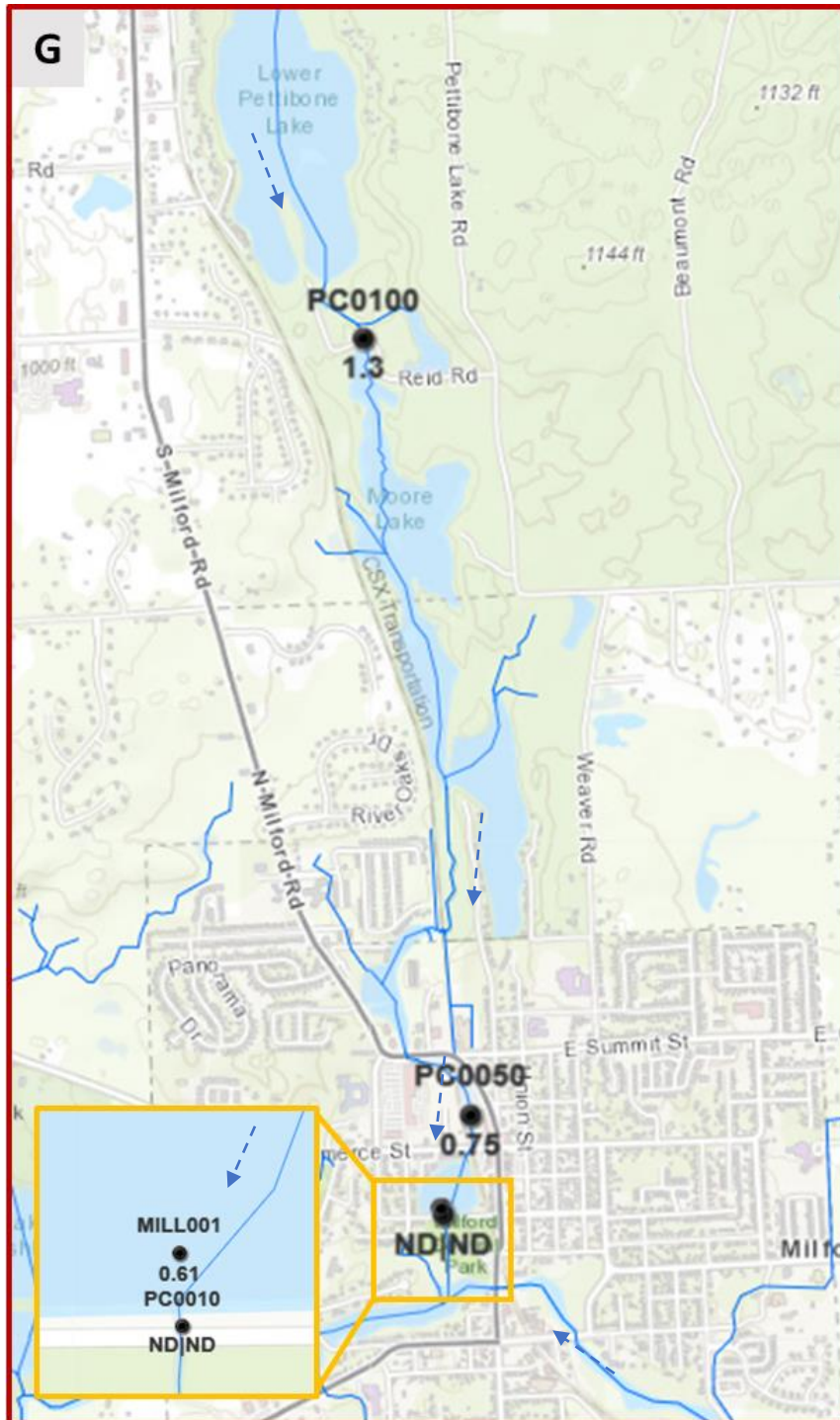


Figure 4: PFOS (ng/L) concentrations in surface water samples collected in September and October 2018 from: (G) Pettibone Creek and the Mill Pond (inset) near Milford, Michigan; and (H) the Huron River, Norton Creek, and Davis Drain (Rouge Watershed).

