

## Investigation of Per- and Polyfluoroalkyl Substances (PFAS) in Michigan's Shiawassee River watershed: Surface Sampling Update July 2021

Rock bass were collected from the South Branch of the Shiawassee (SSW) in 2016 just upstream of its confluence with the main branch in Byron. These fish were collected as part of routine monitoring for EGLE's [Fish Contaminant Monitoring Program](#) (FCMP) and submitted for contaminant analysis including PFAS. The rock bass had a mean PFOS concentration of 14 parts per billion (ppb). This concentration would warrant a MDHHS consumption advisory for PFOS; however, PCBs cause a more restrictive, [Do Not Eat Advisory](#), in this species for this section of the river.

EGLE Water Resources Division (WRD), Surface Water Assessment Section (SWAS) conducted surface water sampling in the Shiawassee River watershed in September 2020 to track down the source for the PFAS concentrations in the fish from SSW and to determine if PFAS contamination exists elsewhere in the watershed. This watershed was selected for sampling as part of EGLE's [five-year rotating watershed monitoring strategy](#). Additional samples were collected from Bush and Rice Lakes in May 2021 to follow up on citizen concerns of potential contamination from a [former landfill](#) in Holly Township. Surface water samples were collected in accordance with the Michigan Per- and Polyfluoroalkyl Substances (PFAS) Sampling Guidance document (MDEQ 2018) and tested for 28 different PFAS following the Michigan Surface Water PFAS Investigation 2019 QAPP (EGLE 2019).

All PFOS and PFOA concentrations were below the Rule 57 Human Noncancer Values (HNV), which are 12,000 ppt for PFOA and 12 ppt for PFOS. In fact, 34 out of the 61 sampling locations had non-detectable concentrations of PFOS (Table 1, Figure 1). The two highest PFOS concentrations were observed in Birch Run: BR-0010 (8.3 ppt) and FM-0010 (11.4 ppt). PFOS and PFOA were non-detect in the Rice Lake sample. PFOS and PFOA were detected at 1.1 and 2.4 ppt, respectively, in the Bush Lake sample (Table, Figure 2).

Fish were collected from the Shiawassee River watershed for PFAS and other contaminant analyses at four locations: Downstream of Owosso near Chesaning; the Byron Millpond in Byron; Bush Lake in Holly; and Rice Lake in Holly. These fish were processed as fillets and submitted for contaminant analyses. The fish results are expected back in 2022. EGLE WRD is also conducting a passive sampler study in the Flint River watershed in 2021 which included placing passive samplers in Birch Run. Data from this study is expected back in early 2022 and will assist ongoing efforts to track down the source of PFAS contamination to Birch Run.

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Table 1. Surface water PFOS and PFOA concentrations (in ppt) in surface water samples in Shiawassee River watershed of Michigan in September 2020. As these water bodies are non-drinking water sources, results are compared to the Rule 57 Human Noncancer Value (HNV) of 12,000 ppts of 12 ppt for PFOS and 12,000 ppt for PFOA. No samples exceeded HNV for PFOS or PFOA.

Sample Code*	Water Body	Sample Description	Collection Date	Latitude	Longitude	PFOS (ppt)	PFOS Flag	PFOA (ppt)	PFOA Flag
SG-0110	Saginaw River	Hess Ave	9/21/2020	43.40080	-83.96590	3.25	J, Q	1.61	J
CR-0010	Cass River	East Rd	9/21/2020	43.36500	-83.95500	1.07	J	1.02	K
BR-0010	Birch Run	end of Evon Rd	9/21/2020	43.35800	-83.99900	8.26		2.68	J
FM-0010	Unnamed Drain to Birch Run	end of Evon Rd	9/21/2020	43.35778	-83.99792	11.40		2.89	J
BR-0020	Birch Run	Houlihan Rd	9/21/2020	43.35080	-83.98880	5.13		2.34	J
SD-0020	Spaulding Drain	W Curtis Rd	9/21/2020	43.32200	-84.00170	7.71		2.76	J
FR-0010	Flint River	end of Curtis Rd	9/21/2020	43.32100	-84.04500	5.70		2.45	J
SC-0010	Swan Creek	end of S. Miller Rd	9/21/2020	43.35500	-84.07200	2.23	J	1.47	J
SC-0010D	Swan Creek	end of S. Miller Rd	9/21/2020	43.35500	-84.07200	2.02	J	1.35	J
BD-0100	Bad River	end of Randolph	9/21/2020	43.30050	-84.13290	1.13	J	1.23	J, Q
BD-0100R	Bad River	end of Randolph	9/21/2020	43.30050	-84.13290	1.87	J	1.05	K
SW-0100	Shiawassee River	Fergus Rd	9/21/2020	43.25500	-84.10500	1.01	J, Q	1.19	J
SW-0120	Shiawassee River	Near Sharon Rd	9/21/2020	43.20120	-84.11710	1.08	J	1.18	J
SW-0130	Shiawassee River	E Broad St	9/21/2020	43.18430	-84.11420	1.02	J	0.99	K
SW-0150	Shiawassee River	Ditch Rd	9/21/2020	43.14380	-84.13510	1.00	K	1.12	J
SW-0160	Shiawassee River	Johnstone Rd	9/21/2020	43.12880	-84.16270	1.13	J, Q	1.19	J
SW-0170	Shiawassee River	Hwy 52	9/21/2020	43.09090	-84.16800	1.07	K	1.07	K
SW-0175	Shiawassee River	Juddville Rd	9/21/2020	43.05680	-84.18120	1.30	J, Q	1.20	J
SW-0175R	Shiawassee River	Juddville Rd	9/21/2020	43.05680	-84.18120	1.08	K	1.08	J
SW-0180	Shiawassee River	near Chippewa Trail	9/21/2020	43.01890	-84.18160	1.25	J	1.25	J
SW-0185	Shiawassee River	near Chippewa Trail	9/21/2020	43.01490	-84.18010	1.43	J, Q	1.47	J
SW-0190	Shiawassee River	W Oliver St	9/21/2020	43.00320	-84.18670	1.04	K	1.31	J
SW-0192	Shiawassee River	N Shiawassee St	9/21/2020	43.00020	-84.17660	1.24	J	1.30	J
SW-0196	Shiawassee River	S Washington St	9/21/2020	42.99470	-84.17040	1.02	K	1.33	J
SW-0200	Shiawassee River	S Gould St	9/21/2020	42.99330	-84.15740	1.03	K	1.10	J
SW-0200D	Shiawassee River	S Gould St	9/21/2020	42.99330	-84.15740	1.03	K	1.93	J
SW-0210	Shiawassee River	N James S Miner Riverwalk	9/22/2020	42.98830	-84.13660	0.98	K	1.42	J
CD-0010	Caledonia Drain	N James S Miner Riverwalk	9/22/2020	42.98870	-84.13520	1.05	K	1.05	K
SW-0220	Shiawassee River	N James S Miner Riverwalk	9/22/2020	42.98590	-84.12540	1.03	K	1.37	J
SW-0240	Shiawassee River	end of Martin Rd	9/22/2020	42.96890	-84.05590	1.06	K	1.24	J
WC-0010	Webb Creek	S. Vernon Rd	9/22/2020	42.95900	-84.02720	1.38	J, Q	1.02	K
SW-0250	Shiawassee River	Goodall Rd	9/22/2020	42.95000	-84.03390	1.06	K	2.02	J
SW-0260	Shiawassee River	Benington Rd	9/22/2020	42.93060	-84.07420	1.09	K	1.70	J
SW-0260R	Shiawassee River	Benington Rd	9/22/2020	42.93060	-84.07420	1.04	K	2.07	J
KD-0010	Keller Drain	S Byam Rd	9/22/2020	42.88480	-84.04980	1.03	K	1.03	K
SW-0280	Shiawassee River	Exchange Rd	9/22/2020	42.88340	-84.04610	1.04	K	1.88	J

SW-0300	Shiawassee River	Lehring Rd	9/22/2020	42.84020	-84.00980	1.04	J, Q	1.88	J
SW-0310	Shiawassee River	S New Lorthrop Rd	9/22/2020	42.82830	-83.96420	1.05	K	1.88	J
SW-0330	Shiawassee River	S Saginaw St	9/22/2020	42.82060	-83.94360	1.01	K	1.89	J
SSW-0010	South Branch Shiawassee River	Byron Rd	9/22/2020	42.81790	-83.94260	1.04	K	1.64	J
SSW-0100	South Branch Shiawassee River	Cohoctah Rd	9/22/2020	42.76120	-83.91140	1.05	K	1.58	J
BG-0010	Bogue Creek	W Jones Rd	9/22/2020	42.72170	-83.93170	0.99	K	0.99	K
UB-0010	Unnamed Tributary to Bogue Creek	E. Highland Rd	9/22/2020	42.62240	-83.92380	1.31	J	2.22	J
SSW-0150	South Branch Shiawassee River	Oak Grove Rd	9/22/2020	42.72620	-83.94900	1.70	J, Q	2.92	J
SSW-0200	South Branch Shiawassee River	Bowen Rd	9/22/2020	42.63640	-83.96740	1.96	J, Q	3.39	J
SSW-0220	South Branch Shiawassee River	W. Grand River	9/22/2020	42.61610	-83.96550	1.94	J	3.15	J
SSW-0230	South Branch Shiawassee River	Norton Rd	9/22/2020	42.59370	-83.96100	1.00	K	2.48	J
SSW-0230D	South Branch Shiawassee River	Norton Rd	9/22/2020	42.59370	-83.96100	1.25	J	2.36	J
MG-0010	Marion and Genoa Drain	near Norton Rd	9/22/2020	42.59290	-83.96060	3.10	J	4.58	
MG-0020	Marion and Genoa Drain	Fisk Rd	9/22/2020	42.58350	-83.91410	1.02	K	1.02	K
MG-0020R	Marion and Genoa Drain	Fisk Rd	9/22/2020	42.58350	-83.91410	1.04	K	1.04	K
SW-0340	Shiawassee River	S Duffield Rd	9/22/2020	42.81680	-83.89520	1.03	K	2.02	J
SW-0350	Shiawassee River	Bird Rd	9/22/2020	42.80870	-83.87500	1.04	K	1.93	J
NC-0010	North Ore Creek	near McCaslin Lake Rd	9/22/2020	42.80180	-83.85340	1.21	J	1.41	J
SW-0360	Shiawassee River	McCaslin Lake Rd	9/22/2020	42.80420	-83.85450	1.23	J	1.75	J
SW-0370	Shiawassee River	Cole Rd	9/22/2020	42.81170	-83.83540	1.02	K	2.13	J
SW-0385	Shiawassee River	d/s WWTP outfall	9/22/2020	42.81330	-83.80750	1.04	K	1.36	J
SW-0390	Shiawassee River	Hogan Rd	9/22/2020	42.81560	-83.80210	1.01	K	1.42	J
SW-0400	Shiawassee River	Beach Buggy Ln	9/22/2020	42.81940	-83.79210	1.02	K	1.64	J
SW-0410	Shiawassee River	Ripley Rd	9/22/2020	42.82040	-83.76730	0.99	K	1.51	J
ED-0010	Egyptian Drain	Ponemah Dr	9/22/2020	42.81080	-83.73990	1.05	K	1.56	J
SW-0420	Shiawassee River	North Rd	9/22/2020	42.80630	-83.70870	1.03	K	1.03	K
SW-0430	Shiawassee River	Fish Lake Rd	9/22/2020	42.79880	-83.64760	1.02	K	1.02	K
SW-0440	Shiawassee River	Oakland St	9/22/2020	42.79230	-83.63540	0.99	K	0.99	K
BH-0010	Buckhorn Creek	E. Rattalee Lake Rd	9/22/2020	42.77020	-83.60670	1.01	K	1.01	K
SW-0450	Shiawassee River	Eagle Rd	9/22/2020	42.76680	-83.57360	1.04	K	1.04	K
CL-0010	Cole Drain	W Moore Rd	9/21/2020	43.33610	-83.98780	2.61	J	1.87	J
BL-0100	Bush Lake	Center of Lake	5/27/2021	42.80237	-83.61562	1.14	J	2.35	J
RL-0100	Rice Lake	East side of Lake	5/27/2021	42.79951	-83.60948	1.04	K	1.04	K

Sample ID Codes:

D = Duplicate

R = Replicate

**PFAS Laboratory Codes**

K: Result is below detection limit; therefore, the method detection limit is displayed

J: Result is above detection limit, below the reporting limit

Q: The ion transition ratio is outside of the acceptance criteria.

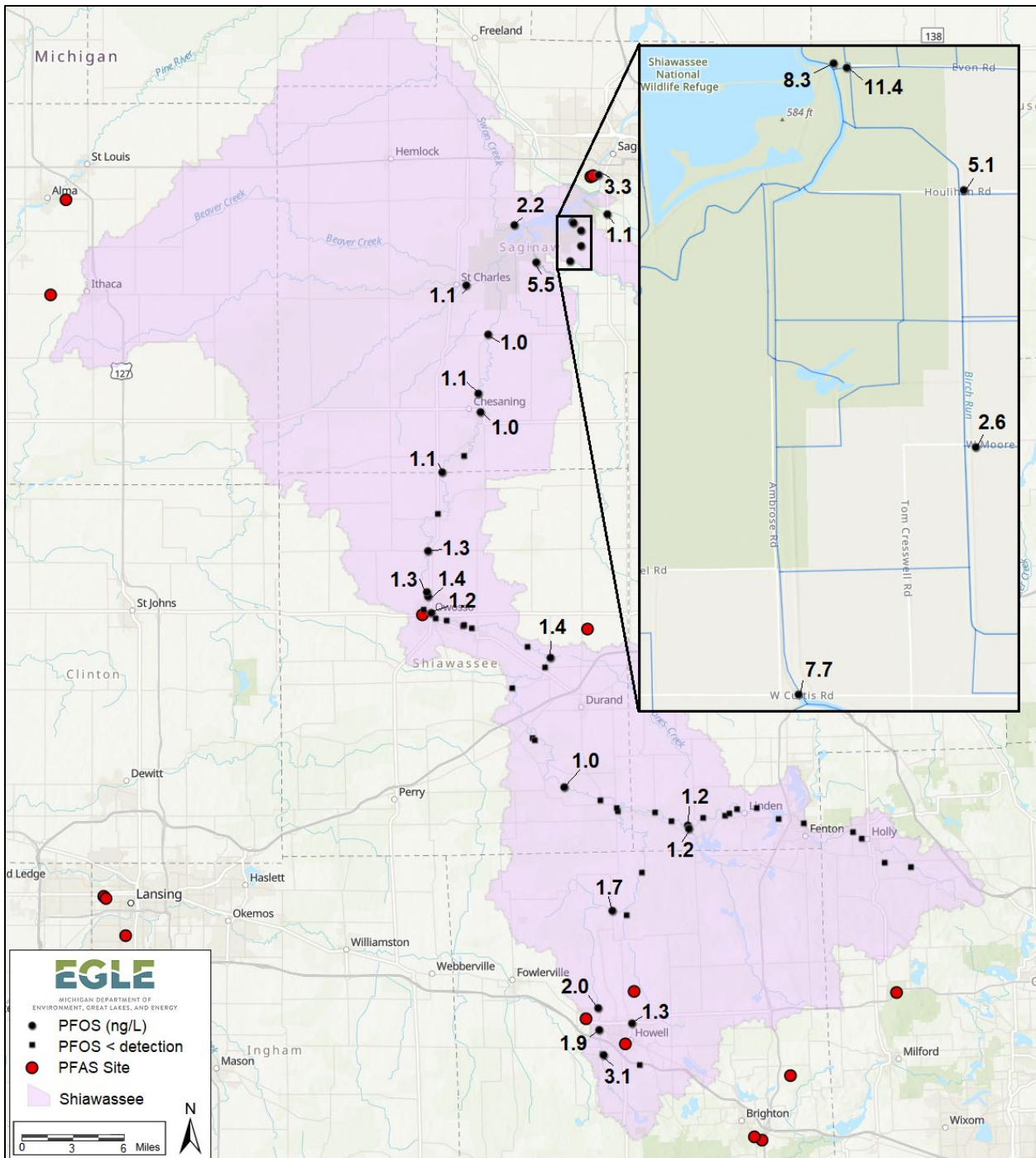


Figure 1. Surface water PFAS sampling locations in the Shiawassee River watershed collected in September 2020. PFOS concentrations are depicted in parts per trillion (ppt). The square symbols indicate the sample had a non-detectable PFOS concentration.

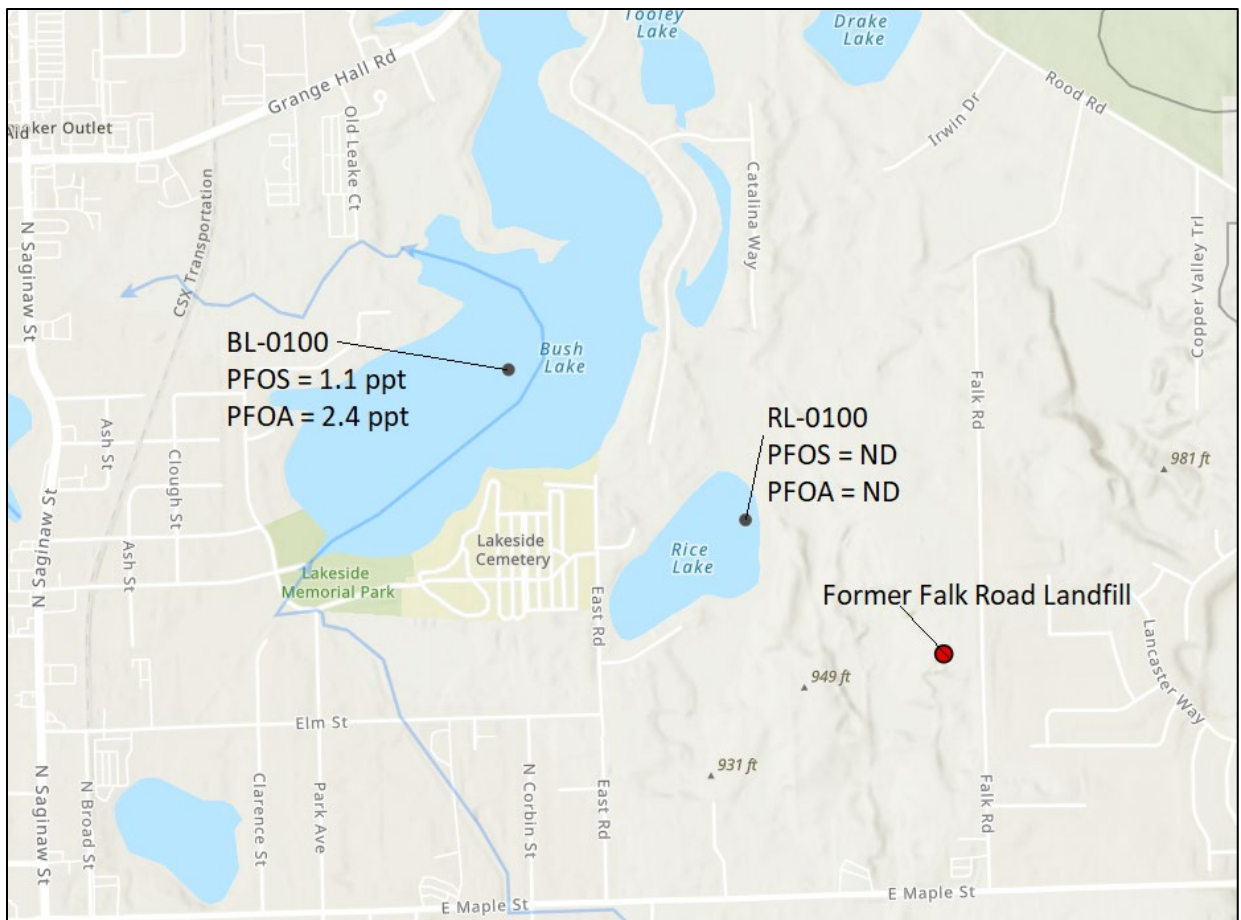


Figure 2. Surface water PFAS sampling locations in Bush and Rice Lakes in Holly township collected in May 2021. PFOS and PFOA concentrations are depicted in parts per trillion (ppt). ND indicates that sample was non-detect for that particular PFAS. The location of the former Falk Road Landfill MPART PFAS site is shown as a red circle.