

DNR Sampling Shows Elevated Levels of PFAS Contamination in Fish and Surface Water in Starkweather Creek and Lake Monona

In the summer and fall of 2019, DNR collected surface water and fish tissue samples from Starkweather Creek and Lake Monona (see page 3 for a map), due to its proximity to known or suspected PFAS contamination sites. Surface water and fish samples were collected both upstream and downstream on Starkweather Creek near the Dane County and Truax Airport complexes, and in Lake Monona.

All the sampling and analysis data has been received by the DNR. The surface water sample results from the fall 2019 sampling event are available on page 4. The fish tissue results are available on page 5.

Special fish consumption advisory issued for Lake Monona and Starkweather Creek

Because fish from most waters contain mercury, DNR and DHS provide statewide [safe eating guidelines for Wisconsin’s inland waters](#). However, there are special exceptions to the safe eating guidelines for locations where higher levels of contaminants have been found in fish.







Before 2020, DNR and DHS issued special advice based on PFOS levels using meal threshold values developed in the early 2000s by the Minnesota Department of Health. DNR has recently adopted meal threshold values developed by the [Great Lakes Consortium for Fish Consumption Advisories](#), of which Wisconsin is a member. These revised values, shown in the table to the right, incorporate additional research on the toxicity of PFAS that has occurred in the intervening years.






Levels of PFOS in Fish and Corresponding Meal Advice Categories for all Populations

PFOS in Fish (µg/kg)	Meal Frequency
≤ 10	Unrestricted
> 10-20	2 meals/week
> 20-50	1 meal/week
> 50-200	1 meal/month
> 200	DO NOT EAT

Great Lakes Consortium for Fish Consumption Advisories

Fish collected from Lake Monona and Starkweather Creek were found to contain higher levels of perfluorooctane sulfonate (PFOS). DNR and DHS are recommending that people consume some species of fish less frequently than the current safe eating guidelines.

Lake Monona		
Species	Up to 1 meal/week	Up to 1 meal/month
 Bluegill	All sizes	
 Common carp		All sizes
 Largemouth bass		All sizes
 Northern pike		All sizes
 Walleye		All sizes
 Yellow perch		All sizes

Starkweather Creek		
Species	Up to 1 meal/week	Up to 1 meal/month
 Bluegill	All sizes	
 Largemouth bass		All sizes
 Northern pike		All sizes
 Walleye		All sizes
 Yellow perch		All sizes

For more information, please read the full [handout about the new guidelines](#):

[PFAS Fish Advisory for Starkweather Creek and Lake Monona](#)

Where were the fish collected?

Fish were collected in Starkweather Creek and Lake Monona. Largemouth Bass, northern pike, walleye and yellow perch were collected in the lower part of Starkweather Creek near Olbrich Park. Largemouth bass and bluegill were collected from Lake Monona. Because fish move in response to water temperature and food availability, it is unknown how long the fish caught in Starkweather Creek had resided there.

What about fish caught in other parts of the Madison chain of lakes?

At this time, this advisory is only applicable to fish caught from Lake Monona and Starkweather Creek.

Why did sampling in Starkweather Creek and Lake Monona occur?

To further assess PFAS contamination in Starkweather Creek and Lake Monona, the DNR did additional sampling of the creek and Lake Monona in October 2019. The original four surface water locations were sampled along with an additional eleven (11) along the creek or associated tributaries. Five (5) water samples were collected from Lake Monona. The sampling locations and PFOS/PFOA concentrations are shown on the map on page 3. Fish were collected from the creek and Lake Monona.

Results of October 2019 sampling

The October sampling shows that PFAS compounds are present throughout Starkweather Creek and Lake Monona in samples taken of both fish and surface water. Concentrations upstream of the airport show lower levels of PFAS contaminants present in surface water. The highest concentrations of PFAS in surface water were found in Starkweather Creek and tributaries in the areas adjacent to the airport complex. The concentrations of PFOS found ranged from less than 5 parts per trillion (ppt) to 3700 ppt.

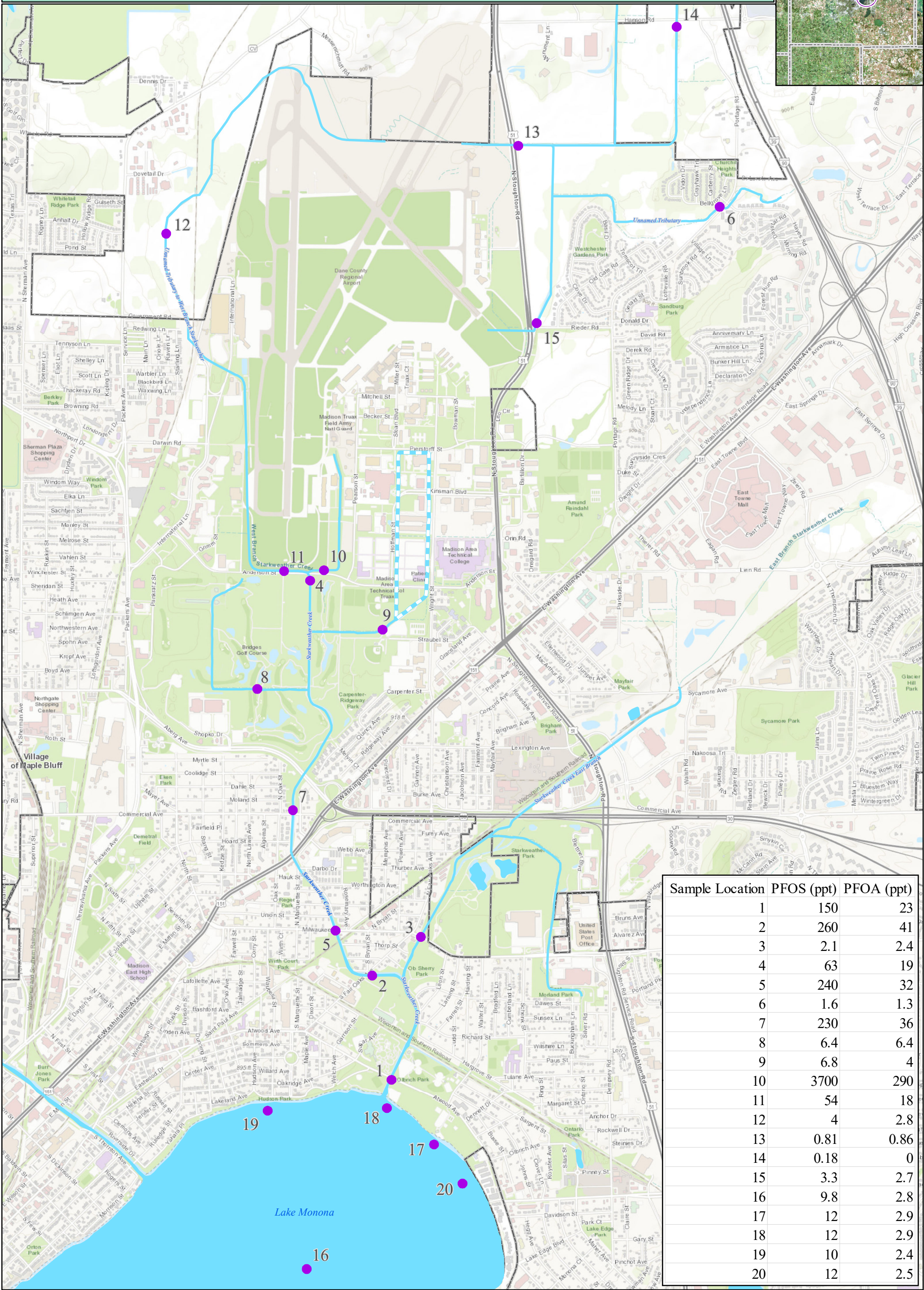
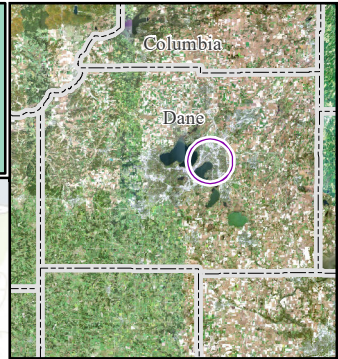
The samples from the west and east sides of the airport indicate that the airport complex is a source of PFAS contamination of Starkweather Creek. The October sampling results indicate that PFAS concentrations remain relatively consistent from Anderson Road until the East Branch joins the West Branch. At that point, there are lower concentrations of PFAS due to the two waterbodies joining together.

Surface water samples collected from Lake Monona were very consistent for PFOS and PFOA. Five (5) samples were collected from the lake, four near the mouth of Starkweather Creek and one further to the southwest away from any immediate effects of water from Starkweather entering the lake. The PFOS concentrations ranged 9.8-12 ppt and the PFOA concentrations ranged from 2.4-2.9 ppt.

Does Wisconsin have surface water quality standards for PFAS?

Wisconsin does not have a surface water standard for PFOS and PFOA, or for any PFAS compounds. The state of Michigan does have surface water standard for PFOS and PFOA for waters that are not drinking water sources. Neither Starkweather Creek nor Lake Monona are drinking water sources for the Madison Water Utility. The Michigan PFOS standard is 12 ppt and the PFOA standard is 12,000 ppt.

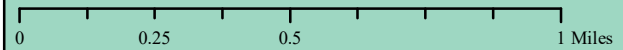
PFAS Surface Water Sampling: Starkweather Creek, City of Madison



Sample Location	PFOS (ppt)	PFOA (ppt)
1	150	23
2	260	41
3	2.1	2.4
4	63	19
5	240	32
6	1.6	1.3
7	230	36
8	6.4	6.4
9	6.8	4
10	3700	290
11	54	18
12	4	2.8
13	0.81	0.86
14	0.18	0
15	3.3	2.7
16	9.8	2.8
17	12	2.9
18	12	2.9
19	10	2.4
20	12	2.5

Water samples were collected from waterways at a depth of 3-6" below the surface of the water as part of the DNR's Water Quality PFAS Initiatives; For more information visit <https://dnr.wi.gov/topic/Contaminants/WaterQuality.html>

- Municipal Boundaries
- Rivers/Streams
- Water Sample Locations
- Counties
- Water



WISCONSIN DEPARTMENT OF NATURAL RESOURCES

dnr.wi.gov

Starkweather Creek Sampled - October 24th, 2019
Lake Monona Sampled - October 25th, 2019

Water Sample Results

DNR			Site																			
Parameter	Abbreviation	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
97409	PFOcDA	Perfluoro-n-octadecanoic acid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97410	PFHxDA	Perfluoro-n-hexadecanoic acid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97412	10:2 FTS	10:2 Fluorotelomer sulfonic acid	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.13*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97413	8:2 FTS	8:2 Fluorotelomer sulfonic acid	3.1	8.4	ND	3.2	7.1	ND	6.6	ND	ND	71	3.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
97414	6:2 FTS	6:2 Fluorotelomer sulfonic acid	35	60	0.31	10	57	ND	59	1.7	0.56	860	9.3	1.1	ND	ND	0.078*	0.78	1.1	1.2	0.78	1
97415	4:2 FTS	4:2 Fluorotelomer sulfonic acid	0.49	0.87	ND	0.099*	0.95	ND	0.85	ND	ND	8.1	0.077*	ND	ND	ND	ND	ND	ND	ND	ND	ND
97416	EtFASE	N-Ethyl perfluorooctanesulfonamidoethanol	1.5	0.46	0.74	ND	ND	24	ND	ND	ND	ND	ND	ND	2.5	ND	ND	ND	ND	ND	ND	ND
97417	MeFASE	N-Methyl perfluorooctanesulfonamidoethanol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97420	EtFOSA	N-ethyl perfluorooctanesulfonamide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97421	MeFOSA	N-methyl perfluorooctanesulfonamide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97422	PFOSA	Perfluorooctanesulfonamide	0.65	0.94	ND	0.95	0.94	0.099*	0.96	0.19*	0.14*	4.7	0.82	0.11*	0.16*	ND	ND	0.098*	0.099*	0.11*	0.11*	0.1*
97423	PFDoDS	Perfluorododecanesulfonic acid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97424	PFNS	Perfluorononanesulfonic acid	ND	0.17	ND	0.046*	0.13*	ND	0.12*	ND	ND	3.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97425	PFPeS	Perfluoropentanesulfonic acid	14	25	ND	7.5	24	ND	25	ND	0.7	340	6.9	2.3	ND	ND	ND	0.76	0.9	1	0.82	0.99
97432		9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97433		11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97434		4,8-Dioxa-3H-perfluorononanoic acid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97435		Hexafluoropropylene oxide dimer acid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
97436	nEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid	0.25*	ND	ND	ND	ND	0.29*	ND	0.77	0.22*	ND	ND	ND	ND	ND	ND	0.17*	0.19*	ND	ND	ND
97437	NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid	0.086*	ND	0.14*	ND	ND	ND	ND	0.28*	0.089*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
99597	PFOA	<i>Perfluoro-n-octanoic acid</i>	23	41	2.4	19	32	1.3	36	6.4	4	290	18	2.8	0.86	2.7	2.7	2.8	2.9	2.9	2.4	2.5
99598	PFOS	<i>Perfluoro-n-octanesulfonic acid</i>	150	260	2.1	63	240	1.6	230	6.4	6.8	3700	54	4	0.81	0.18*	3.3	9.8	12	12	10	12
99923	PFTrDA	PERFLUORO-N-TRIDECANOIC ACID	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
99924	PFTeDA	PERFLUORO-N-TETRADECANOIC ACID	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
99987	PFBS	Perfluoro-n-butanesulfonic acid	16	25	4.7	8.6	25	2.3	24	ND	2.5	270	7.8	3.1	1.8	0.75	3.2	1.6	1.9	2	1.8	1.8
99988	PFHxS	<i>Perfluoro-n-hexanesulfonic acid</i>	97	160	3.1	71	150	0.47	160	4.4	14	2200	66	22	2.2	0.58	1.8	9	9.1	9.4	8.2	9.1
99989	PFHpS	Perfluoro-n-heptanesulfonic acid	3.7	6.9	ND	1.7	6.4	ND	6.4	ND	0.17	67	1.4	0.3	ND	ND	ND	0.23	0.29	0.26	0.24	0.27
99990	PFDS	Perfluoro-n-decanesulfonic acid	ND	ND	ND	0.35*	0.89	0.46	0.51	2.1	0.29*	ND	0.46	ND	0.69	0.72	2	0.14*	0.19*	0.19*	0.17*	0.24*
99991	PFBA	PERFLUORO-N-BUTANOIC ACID	14	18	ND	8.3	15	ND	15	ND	ND	110	12	8.2	7.5	4.3	ND	5.9	6.5	5.8	6.6	6.7
99992	PFPeA	PERFLUORO-N-PENTANOIC ACID	16	32	ND	12	29	ND	27	ND	ND	340	13	4.8	ND	ND	ND	ND	ND	ND	ND	ND
99993	PFHxA	PERFLUORO-N-HEXANOIC ACID	23	39	3.1	15	39	ND	36	ND	ND	420	14	4.1	ND	ND	ND	2.2	2.7	2.9	2.8	2.5
99994	PFHpA	PERFLUORO-N-HEPTANOIC ACID	7.9	13	1.6	6.5	11	ND	11	ND	ND	110	6.5	1.6	ND	ND	ND	1.1	1.5	1.7	1.2	1.5
99995	PFNA	PERFLUORO-N-NONANOIC ACID	1.4	2.6	0.35	0.84	2	0.41	2	ND	0.5	19	0.84	ND	0.18*	ND	0.79	0.51	0.51	0.54	0.47	0.49
99996	PFDA	PERFLUORO-N-DECANOIC ACID	0.42*	1.3	ND	ND	0.8	ND	0.58	ND	ND	1.8	ND	ND	ND	ND	0.6	ND	ND	ND	ND	ND
99997	PFUnA	PERFLUORO-N-UNDECANOIC ACID	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
99998	PFDoA	PERFLUORO-N-DODECANOIC ACID	ND	0.33	ND	ND	0.21*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Detectable PFAS			406.74	694.97	18.4	227.59	641.08	30.54	640.9	21.77	29.23	8815.4	214.32	54.3	16.36	6.35	14.39	34.68	39.4	39.7	35.31	38.85

All Values in ng/L (ppt)

*Detected between the LOD and LOQ (varies by compound)

Compound in italics indicates the compound was also detected in fish

Fish Tissue Sample Results

Name	Starkweather Creek Fish Tissue Results (ng/g (ppb))											Lake Monona Fish Tissue Results (ng/g (ppb))										
	Largemouth	Largemouth	Largemouth	Northern	Northern	Northern	Northern	Walleye	Walleye	Yellow	Yellow	Bluegill	Bluegill	Bluegill	Bluegill	Bluegill	Bluegill	Largemouth	Largemouth	Largemouth	Largemouth	Largemouth
	Bass	Bass	Bass	Pike	Pike	Pike	Pike			Perch	Perch							Bass	Bass	Bass	Bass	Bass
PFOS {Perfluoro octanesulfonate (n-sulfonic acid)}	33	140	180	72	21	59	52	55	91	120	120	48	48	30	46	43	30	77	84	97	92	110
PFOA {Perfluoro octanoate (n-octanoic acid)}	ND	ND	ND	ND	ND	4.8	4.1	5.2	1.7*	1.2*	1.5*	3.3	1.9*	1.5	4.4	2.2*	1.3*	ND	ND	ND	ND	ND
PFDA {Perfluoro decanoate (n-decanoic acid)}	1.4*	3.1	2.8*	ND	ND	5	4.4	4.8	1.5*	1.5*	1.7*	3.1	1.2*	ND	2.9	2*	ND	ND	2*	1.8*	0.99*	2.4*
PFDoA {Perfluoro dodecanoate (n-dodecanoic acid)}	2.4*	2.3	2.2*	ND	ND	3*	2.2*	2.9*	1.8*	1.7*	2.1*	1.4*	1.1*	ND	2.6	1.3*	ND	ND	1.1*	3.1	ND	1.2*
PFHxS {Perfluorohexane sulfonate (n-hexanesulfonic acid)}	ND	ND	2.4*	ND	ND	ND	ND	ND	1.3*	ND	3.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFUnA {Perfluoroundecanoate (n-undecanoic acid)}	1.8*	1.5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.87*	1.3*	ND	ND
PFHxA {Perfluorohexanoate (n-hexanoic acid)}	ND	ND	ND	ND	ND	1.4*	1.1*	1.1*	ND	ND	ND	0.92*	ND	ND	1.7*	ND	ND	ND	ND	ND	ND	ND
PFPeA {Perfluoropentanoate (n-pentanoic acid)}	ND	ND	ND	ND	ND	ND	0.65*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFTeDA {Perfluorotetranoate (n-tetradecanoic acid)}	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.2*	ND
Total Detectable PFAS	33	145.4	180	72	21	68.8	60.5	65	91	120	123.5	54.4	48	31.5	55.9	43	30	77	84	100.1	92	110