Supporting Information

Concentrations and source attribution of poly- and perfluoroalkyl substances (PFASs) in surface waters from the Northeastern U.S.

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Section S1: Supplemental Information on Methods

Sample Preparation and Instrumental Analysis

PFASs were extracted from water samples using Oasis Wax (6 ml, 150 mg sorbent) solid phase extraction (SPE) cartridges following the method of Taniyasu et al.[1] Each 500 ml water sample was passed through a preconditioned Oasis Wax (6 ml, 150 mg sorbent) weak ion exchange SPE cartridge mounted on a vacuum manifold at a flow rate of ~1 drop/s. Target analytes were eluted off the cartridges using 6 ml 0.1% NH_4OH in methanol and collected in 15 ml centrifuge tubes (Corning). The extracts were concentrated to 0.5 ml under a gentle stream of high purity nitrogen (5.0 grade), centrifuged at 5000 rpm for 10 minutes, and transferred 1.5 ml polypropylene auto-sampler vials (Microsolv). Before instrumental analysis, 0.5 ml water was added to each sample and vortex mixed.

A 300 µL aliquot of each sample was injected and loaded to an Agilent Zorbax SB-Aq (4.6×12.5mm; 5µm) online SPE column with 0.85 ml 0.1% (v:v) formic acid at a flow rate of 1 ml/min. Following sample loading, the SPE were eluted and load the analytes to an Agilent Poroshell 120 EC-C18 (3.0×50mm; 2.7µm) reverse phase HPLC column. Methanol and water containing 2 mM ammonium acetate were used as mobile phases (flow rate: 0.5 ml/min). Starting from 3% methanol, the elution gradient was linearly increased to 61% in 7 minutes, held for 1 minute, then linearly increased to 100% methanol in 3 min, and was kept until the end of the sample run (14 min).

The tandem mass spectrometer equipped with an electrospray ionization source was operated in negative ion mode. Dynamic multiple reaction monitoring (dMRM) mode was used for data acquisition in order to increase sensitivity. The collision gas was 5.0 grade N_2. Optimized MS parameters are as follows: source temperature, 300 °C; capillary voltage, -3.8 kV; nitrogen nebulizer gas, 45 psi and 13 L/min. Methanol was injected and passed through the system to eliminate any potential carry-over after every sample (or calibration standard).

Shorter chain PFASs such as PFBA and 4:2 FtS were not analyzed due to their low retention on the C-18 reverse phase HPLC column, which would result in a low accuracy.[2] A different analytical method (e.g., using a normal phase HPLC column) that can accurately measure those shorter chain PFASs is needed to detect these compounds and represents a limitation of the present analysis.

Data analysis

Helsel[2] suggests statistical inference bias may occur for data with detection frequencies of less than 30%. PFASs with detection frequencies of 60-70% are included here because they are important for source identification. We tested results of principal component analysis with and without PFASs with low detection frequencies (60-65%: PFPeA, PFHpA, PFDoDA) and find no significant changes in PCA scores (Wilcoxson signed rank tests (p=0.06-0.5) and clustering included in the main results of this work.

Potential industrial PFAS point sources were retrieved from the US EPA Facility Registry Service (FRS) database and used in the geospatial analysis conducted as part of this research. Filtering of the database was based North American Industry Classification System (NAICS) codes. Facilities and their coordinates were retrieved based on the following NAICS codes: Sewage treatment facilities (22132); textile mills (313); paper manufacturing (322); printing and related support activities (323); petroleum and coal products manufacturing (324); paint, coating, and adhesive manufacturing (3255); printing ink manufacturing (32591); metal coating, engraving, heat treating and allied activities (3328); semiconductor manufacturing (3344); airport operation (48811); waste management and remediation (562)

Section S2: Supporting Tables and Figures

Table S1. Surface water sampling dates, site locations and description.

Site	Location	Coastal	Urban/Rural	Potential sources	Date	Longitude	Latitude
1	Slack's Tributary	N	Urban	No hydrologically connected point sources; a landfill is located 1.9 km to the north	06/19/ 2014	-71.55	41.85
2	Woonasqua-tucket River	N	Urban	Metal coating/plating	06/19/ 2014	-71.44	41.82
3	Woonasqua-tucket River (Greystone pond)	N	Urban	Wastewater treatment plant, printing activity	06/19/ 2014	-71.49	41.87
4	Pawtuxet River	N	Urban	Metal coating/plating, semiconductor manufacturing	06/19/ 2014	-71.40	41.77
5	Brook at Mill Cove	N	Urban	T.F. Green State Airport ~5km upstream	06/19/ 2014	-71.38	41.71
6	Buckeye Brook	N	Urban	No hydrologically connected point sources; a landfill is located 2.3 km to the west	06/19/ 2014	-71.39	41.70
7	Southern Creek	N	Urban	No hydrologically connected point sources	06/19/ 2014	-71.42	41.70
8	Mill Brook	N	Urban	One semiconductor manufacturer making thin film components, networks, and arrays on ceramic and silicon; one company conducting waste management providing service on hazardous waste removal, hazardous waste transportation, oil tank hazardous waste disposal (https://www3.epa.gov/region1/removal-sites/BradfordPrintingFinishing.html)	06/19/ 2014	-71.46	41.70
9	EG Town Dock	Y	Urban	Estuary of Greenwich Cove; next to an e-waste recycling company	06/19/ 2014	-71.45	41.65
10	Hunt River	Y	Urban	Two semiconductor manufacturers and one printing company	06/19/ 2014	-71.44	41.64
11	Sand Hill Brook (Saw Mill Pond Inlet)	N	Urban	A municipal waste transfer station and paint, coating, adhesive manufacturing	06/19/ 2014	-71.47	41.61
12	Secret Lake-Oak Hill Brook	N	Urban	A legacy landfill site is approximately 2 km to the west of this site	06/19/ 2014	-71.48	41.55
13	Narrow River Stuart Stream	N	Rural	Outlet of Carr Pond	06/19/ 2014	-71.44	41.52
14	Narrow	N	Rural	3 km downstream of site 13	06/19/	-71.45	41.49

Site	Location	Coastal	Urban/Rural	Potential sources	Date	Longitude	Latitude
	River Lakeside Dr.				2014		
15	Narrow River	N	Rural	2.5 km downstream of site 14	06/19/ 2014	-71.45	41.47
16	Narrow River	N	Rural	2 km downstream of site 15	06/19/ 2014	-71.45	41.45
17	Queens River	N	Rural	One river branch upstream of Pawcatuck River (background site)	06/19/ 2014	-71.56	41.54
18	Chickashee n Brook	N	Rural	River branch upstream of Pawcatuck River; a manufacturer of uninterruptible power supplies, electronics peripherals and data center products is downstream	06/19/ 2014	-71.56	41.49
19	Pawcatuck River	N	Rural	Where Beaver River merges into Pawcatuck River; a manufacture of military, tactical, and performance synthetic and synthetic blend textiles ~1 km upstream	06/19/ 2014	-71.63	41.45
20	Pawcatuck River	N	Rural	Adjacent to Bradford Printing & Finishing facility, a textile finishing plant from 1911 until 2012; a large fire occurred in 2007; heavy flooding occured in 2010; another fire occurred in 2012; Several hundred containers of highly flammable liquid, dyes and unknown compounds were stored next to each another and many containers were visibly leaking in 2012.[3]	06/19/ 2014	-71.75	41.41
21	Green Falls River	N	Rural	Background site; no upstream industrial facilities recorded in FRS database	06/19/ 2014	-71.82	41.45
22	Green Falls River	N	Rural	~ 2 km downstream of site 21 where Parmenter Brook merges into Green Falls River; no upstream industrial facilities recorded in FRS database	06/19/ 2014	-71.80	41.44
23	Fall River	N	Rural	Background site; no upstream industrial facilities recorded in FRS database	06/19/ 2014	-71.69	41.58
24	Allen Cove - Inflow (Green Hill Pond)	N	Rural	Close to Charlestown beach; residential area	06/19/ 2014	-71.62	41.37
25	Bristol Harbor	Y	Rural	Coastal site; east shore of Bristol Harbor	06/19/ 2014	-71.29	41.67
26	Bristol Harbor	Y	Rural	Coastal site; east shore of Bristol Harbor	06/19/ 2014	-71.28	41.67
27	Bristol Harbor	Y	Rural	Coastal site; west shore of Bristol Harbor	06/19/ 2014	-71.27	41.66
28	South Ferry Rd Pier	Y	Rural	Coastal site; Narragansett Bay	06/19/ 2014	-71.42	41.49

Site	Location	Coastal	Urban/Rural	Potential sources	Date	Longitude	Latitude
	Dock						
29	Hudson River	N	Urban	There are a sewage treatment plant, a plastic bag manufacturing and printing company, a printing ink manufacture, and a floor coating manufacture within 10 km upstream along the river	10/24/2014	-73.93	40.87
30	Passaic River	N	Urban	West Paterson Recycling Center 2.5 km upstream	10/24/2014	-74.19	40.91
31	Passaic River	N	Urban	Highly industrialized between 30 and 31, including paint, coating, adhesive manufacturing, textile mills, printing ink manufactures, paper manufacturers; semiconductor manufactures and metal coating/plating companies.	10/24/2014	-74.13	40.91
32	Harbortown Rd, NJ	Y	Urban	At the mouth of a tidal strait and a kill separating Staten Island, New York City from mainland New Jersey; some petroleum/coal related industrials within 2 km upstreams	10/25/2014	-74.25	40.52
33	Lower NY Harbor	Y	Urban	A printing ink manufacture 1 km away	10/25/2014	-74.06	40.62
34	Staten Island NY	N	Urban	A company with printing activity; a paint, coating, adhesive manufacture, and a paper manufacture within 1.5 km upstream	10/25/2014	-74.13	40.64
35	Hudson River	Y	Urban	Morris Canal close to Jersey city; two companies on Paint, coating, adhesive manufacturing 1 km away	10/26/2014	-74.04	40.71
36	Passaic River	N	Urban	Close to the city of Newark and the airport; highly industrialized area; Newark wastewater treatment plant is 2.5 km upstream	10/26/2014	-74.15	40.73
37	Passaic River	N	Urban	Upstream of site 36; highly industrial area; within 1 km upstream there is a company related to metal plating and a textile mill.	10/26/2014	-74.12	40.83

Table S2. Full names and acronyms of PFASs measured in surface waters, limits of detection (LOD), concentration ranges measured across sites, and percent of sites with detection. PFASs measured in >60% of samples analyzed in this study are highlighted in bold

PFAS	Acronym	# of carbons	Internal standard	LOD (ng/L)	Range (ng/L)	Detect. %
Perfluorocarboxylates	*PFCAs*					
Perfluoropentanate	**PFPeA**	**C5**	$^{13}C_2$-PFHxA	**0.38**	**BD – 10**	**62%**
Perfluorohexanate	**PFHxA**	**C6**	$^{13}C_2$-PFHxA	**0.29**	**BD–48**	**87%**
Perfluoroheptanate	**PFHpA**	**C7**	$^{13}C_4$-PFOA	**0.62**	**BD–48**	**64%**
Perfluorooctanate	**PFOA**	**C8**	$^{13}C_4$-PFOA	**0.07**	**0.27 – 47**	**100%**
Perfluorononanate	**PFNA**	**C9**	$^{13}C_5$-PFNA	**0.04**	**0.07 – 14**	**100%**
Perfluorodecanate	**PFDA**	**C10**	$^{13}C_2$-PFDA	**0.03**	**BD – 5.8**	**92%**
Perfluoroundecanate	**PFUnDA**	**C11**	$^{13}C_2$-PFUnDA	**0.02**	**BD –1.9**	**77%**
Perfluorododecanate	**PFDoDA**	**C12**	$^{13}C_2$-PFDoDA	**0.02**	**BD–2.6**	**64%**
Perfluorotridecanate	PFTrDA	C13	$^{13}C_2$-PFDoDA	0.02	BD–1.2	31%
Perfluorotetradecanate	PFTeDA	C14	$^{13}C_2$-PFDoDA	0.02	BD0.4	18%
Perfluorohexaadecanate	PFHxDA	C16	$^{13}C_2$-PFDoDA	0.01	BD–0.2	26%
Perfluorooctadecanate	PFODA	C18	$^{13}C_2$-PFDoDA	0.08	BD–0.4	8%
Perfluoroalkane sulfonates	*PFSAs*					
Perfluorobutane sulfonate	**PFBS**	**C4**	$^{18}O_2$-PFHxS	**0.08**	**BD–6.2**	**85%**
Perfluorohexane sulfonate	**PFHxS**	**C6**	$^{18}O_2$-PFHxS	**0.06**	**BD – 35**	**90%**
Perfluorooctane sulfonate	**PFOS**	**C8**	$^{13}C_4$-PFOS	**0.05**	**BD – 23**	**95%**
Perfluorododecane sulfonate	PFDS	C10	$^{13}C_4$-PFOS	0.07	BD–0.6	15%
6:2 fluorotelomer sulfonate	**6:2 FtS**		$^{13}C_2$-6:2 FtS	**0.003**	**BD – 15**	**97%**
8:2 fluorotelomer sulfonate	8:2 FtS		$^{13}C_2$-6:2 FtS	0.4	BD–0.8	41%
Perfluorooctane sulfonamide	FOSA	C8	$^{13}C_8$-FOSA	0.02	BD–0.2	41%
N-ethyl perfluorooctanesulfon-amidoacetic acid	**N-EtFOSAA**		D_5 N-EtFOSAA	**0.001**	**BD-9.9**	**67%**
N-methyl perfluorooctanesulfon-amidoacetic acid	**N-MeFOSAA**		D_5 N-MeFOSAA	**0.002**	**BD-0.6**	**69%**

BD = below detection.

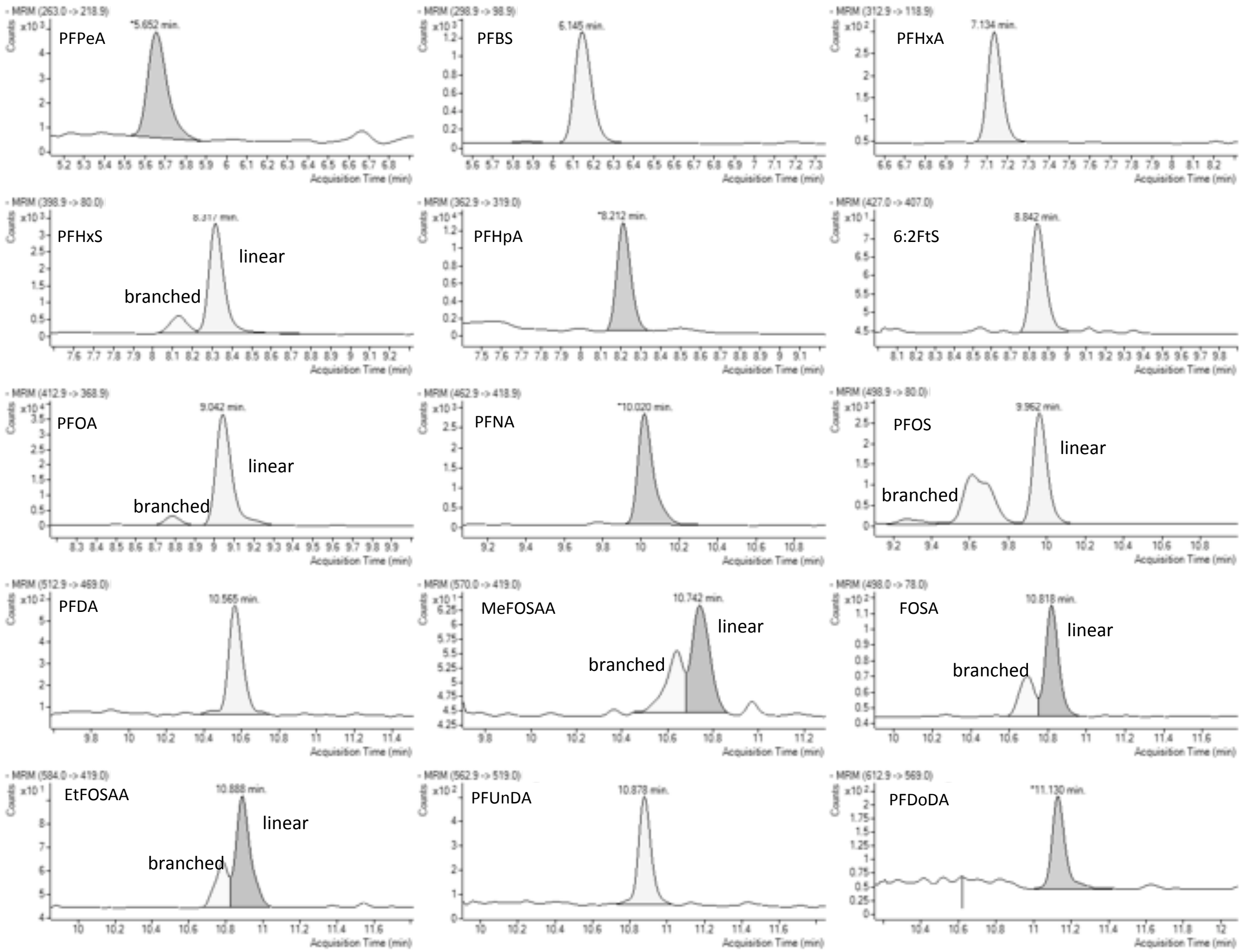

Figure S1. Chromatograms of PFASs in a sample analyzed using an Agilent 6460 LC-MS/MS equipped with an online-SPE system (Agilent 1290 Infinity Flex Cube) in dynamic multiple reaction mode.

Table S3a. Concentrations (pg/L) of poly- and perfluoroalkyl substances with detection frequency greater than 60%.

Site	PFPeA	PFHxA	PFHpA	PFOA[a]	PFNA	PFDA	PFUnDA
1	4550	2191	2409	2363	390	405	607
2	10357	12137	13577	8832	3134	1133	308
3	<LOD	6310	3371	5236	1476	894	1853
4	4228	7337	12301	7546	2735	957	114
5	<LOD	48414	48159	36806	13986	5625	1286
6	4359	5408	7640	8455	733	367	167
7	4828	6715	9236	10080	1275	205	46
8	5611	5649	<LOD	9237	923	176	48
9	927	1562	1597	1972	336	127	97
10	3064	2987	3090	6978	308	125	<LOD
11	6361	6678	<LOD	6905	799	226	177
12	555	565	<LOD	849	165	59	38
13	1413	1170	<LOD	1480	253	104	<LOD
14	<LOD	665	<LOD	663	104	<LOD	33
15	732	556	<LOD	851	136	31	<LOD
16	631	543	<LOD	946	174	87	62
17	681	550	<LOD	898	155	59	62
18	2138	663	<LOD	1006	293	<LOD	<LOD
19	<LOD	3740	11793	18974	6182	3808	482
20	<LOD	4138	9728	14985	7235	5824	888
21	<LOD	<LOD	<LOD	586	232	73	41
22	<LOD	493	<LOD	708	206	83	<LOD
23	<LOD	<LOD	<LOD	640	200	152	97
24	1221	2121	2479	3784	260	52	55
25	843	1214	897	1320	400	169	97
26	821	964	751	1014	323	134	<LOD
27	617	900	800	1170	355	166	78
28	<LOD	<LOD	<LOD	267	74	38	<LOD
29	<LOD	<LOD	<LOD	11862	2188	685	257
30	<LOD	815	947	871	151	59	28
31	<LOD	<LOD	<LOD	47254	6658	2154	464
32	3032	3529	3226	3738	601	301	<LOD
33	1870	1802	1907	2020	363	182	49
34	3434	5188	3431	4049	726	347	115
35	1111	1710	1852	2805	411	211	59
36	7998	9277	3426	15137	2022	719	238
37	<LOD	10901	8455	11335	757	152	79

[a] Linear isomers with calibration standards for quantification

Table S3b. Concentrations (pg/L) of poly- and perfluoroalkyl substances with detection frequency greater than 60%.

Site	PFBS	PFHxS[a]	PFOS[a]	6:2 FtS	MeFOSAA[a]	EtFOSAA [a]	PFDoDA
1	669	864	777	15	241	348	618
2	1652	3758	23226	15292	147	278	89
3	1327	3583	5868	55	610	937	2598
4	2290	2558	2185	380	227	152	28
5	6181	35022	9804	239	113	240	117
6	1087	2637	4127	24	90	694	96
7	2102	4130	3743	30	<LOD	122	<LOD
8	3355	4664	3937	9	23	53	23
9	296	695	735	26	38	65	61
10	1161	5075	1477	8	<LOD	36	<LOD
11	546	2418	1822	5	106	94	313
12	278	<LOD	<LOD	<LOD	43	14	25
13	889	645	347	6	<LOD	<LOD	<LOD
14	368	476	176	<LOD	<LOD	<LOD	<LOD
15	705	421	180	10	<LOD	<LOD	<LOD
16	226	323	488	3	82	<LOD	131
17	466	372	334	7	82	<LOD	131
18	973	208	<LOD	10	27	<LOD	<LOD
19	2485	<LOD	509	10	60	<LOD	194
20	1465	361	612	4	159	24	35
21	92	<LOD	290	10	34	<LOD	24
22	341	133	292	13	39	<LOD	<LOD
23	<LOD	143	238	12	<LOD	<LOD	42
24	1185	916	1198	6	55	46	41
25	281	343	626	16	<LOD	49	<LOD
26	254	282	437	12	47	<LOD	<LOD
27	229	320	460	22	80	58	<LOD
28	131	<LOD	161	4	<LOD	<LOD	<LOD
29	<LOD	2149	2835	1087	160	148	59
30	220	224	244	69	<LOD	<LOD	<LOD
31	<LOD	8526	9988	4377	166	593	99
32	<LOD	1390	1929	464	32	59	25
33	226	408	755	58	<LOD	48	31
34	467	963	1661	5918	<LOD	92	34
35	278	640	790	82	33	31	<LOD
36	<LOD	3087	5384	89	40	57	99
37	<LOD	3162	2748	43	<LOD	18	128

[a] Linear isomers with calibration standards for quantification

Table S3c. Concentrations (pg/L) of branched isomers[a] of poly- and perfluoroalkyl substances

Site	br-PFHxS	br-PFOA	br-PFOS	br-MeFOSAA	br-EtFOSAA
1	201	550	181	56	81
2	695	1635	4298	27	51
3	777	1135	1272	132	203
4	590	1741	504	52	35
5	8228	8647	2303	27	56
6	481	1542	753	<17	127
7	741	1808	671	<17	22
8	896	1775	756	<17	<12
9	<64	114	<51	<17	<12
10	982	1350	286	<17	<12
11	483	1378	364	21	19
12	<64	249	<51	<17	<12
13	76	174	<51	<17	<12
14	76	106	<51	<17	<12
15	<64	125	<51	<17	<12
16	<64	146	75	<17	<12
17	<64	118	<51	<17	<12
18	<64	151	<51	<17	<12
19	<64	3015	81	<17	<12
20	78	3250	133	35	<12
21	<64	74	<51	<17	<12
22	<64	<68	<51	<17	<12
23	<64	<68	<51	<17	<12
24	164	678	215	<17	<12
25	80	306	145	<17	<12
26	93	333	144	<17	<12
27	<64	227	89	<17	<12
28	<64	284	171	<17	<12
29	471	2602	622	35	32
30	<64	193	54	<17	<12
31	1578	8745	1848	31	110
32	294	790	408	<17	12
33	113	557	208	<17	13
34	176	739	303	<17	17
35	158	691	195	<17	<12
36	539	2660	953	<17	<12
37	700	2512	609	<17	<12

[a]Branched isomers were quantified based on peak areas assuming the same response factors as the linear isomers.

Table S4. PFAS concentrations measured in U.S. surface waters in this study and previous work.

Location/ (sites, sampling year)	PFASs, ng/L (minimum/median/maximum)										
	PFPeA	**PFHxA**	**PFHpA**	**PFOA**	**PFNA**	**PFDA**	**PFUnDA**	**PFDoDA**	**PFBS**	**PFHxS**	**PFOS**
Tennessee (*n*=40, 2000)[4]				<25							17
				<25							52
				598							144
North Carolina (*n*=11, 2006)[5]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		5.14	14.8	12.6	5.7	13.2	5.67	1.95	2.46	5.66	28.9
		23	329	287	194	120	52.1	4.46	9.41	35.1	132
Georgia (*n*=11, 2006)[6]				3	<0.6	<0.1	<0.1				1
				238	5.6	2.1	<0.1				6
				1150	369	131	99				318
Upper Mississippi River Basin (*n*=177, 2008)[7]	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
	0.71	1.59	2.16	2.07	0.71	0.71	0.71	0.71	0.71	0.71	3.01
	31.5	53.4	90.2	125	72.9	42	29.1	24.7	84.1	169	245
Georgia (*n*=8, 2008)[8]	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
	57	68	46	102	21	25			124	13	150
	149	149	100	204	46	46			260	31	321
New Jersey (*n*=12, 2009)[9]	<5	<5	<5	<5	<5	<5			<5	<5	<5
	<5	<5	<5	11	<5	<5			<5	<5	<5
	15	17	10	100	19	ND			6	46	43
Rhode Island and New York Metropolitan Region (*n*=37, 2014, this study)*	<0.4	<0.3	<0.6	0.3	0.1	<0.03	<0.03	<0.03	<0.08	<0.12	<0.10
	0.8	1.7	0.9	3.5	0.4	0.2	0.1	0.0	0.4	0.7	0.96
	10.4	48.4	48.2	56.0	14.0	5.8	1.9	2.6	6.2	43.0	27.5

*PFOA, PFHxS and PFOS reported here include both linear and branched isomers. The branched isomers were quantified based on peak areas assuming the same response factors as the linear isomers

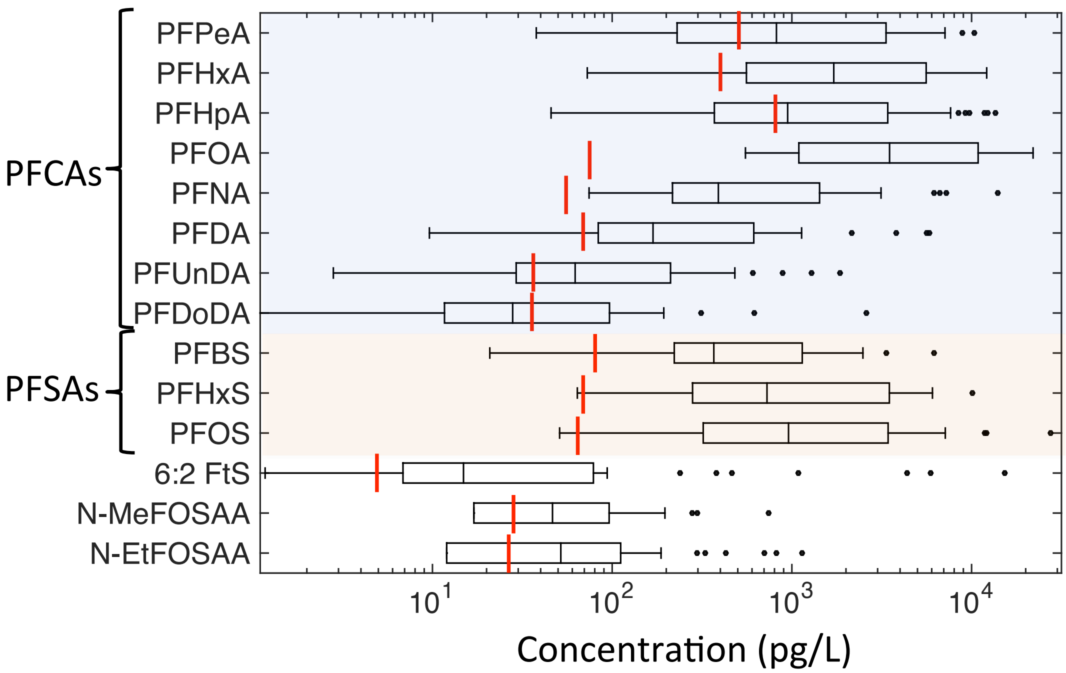

Figure S2. Concentrations of 14-PFASs measured in 37 rivers and estuaries in Rhode Island (RI) and the New York Metropolitan area (NY/NJ). The limit of detection (LOD) for each compound is shown as a red bar. Those below detection are assigned values based on the robust ROS (Regression on Order Statistics) approach for censored log-normally distributed environmental data as described by Helsel.[2]

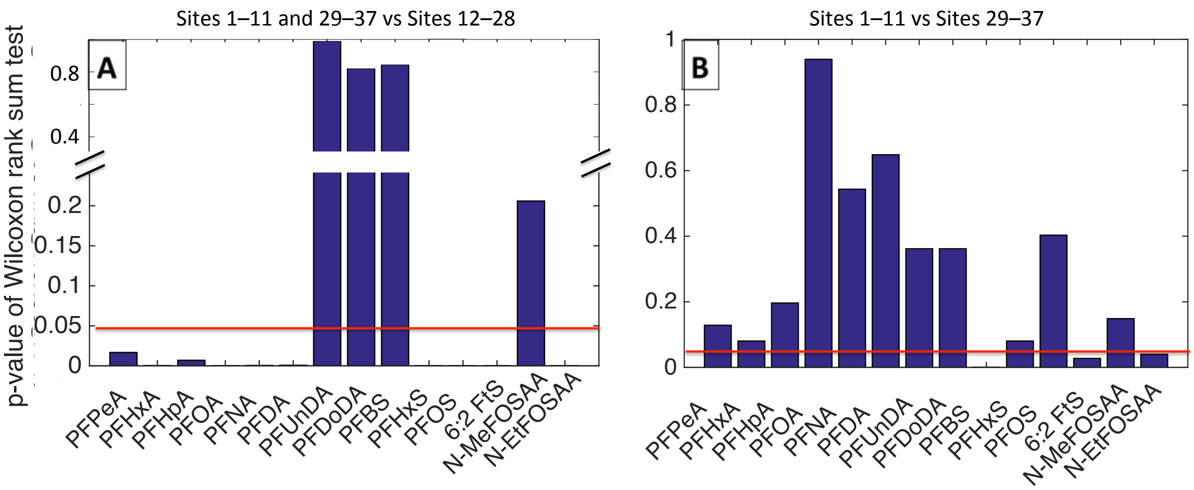

Figure S3. Significance levels for Wilcoxon rank sum tests comparing PFAS concentrations (a) between urban sites (RI sites 1–11 and NY/NJ sites 29–37) and rural sites 12-28 (b) RI sites 1–11 and NY/NJ sites 29–37. Red line denotes *p*=0.05, which we use to indicate statistical significance.

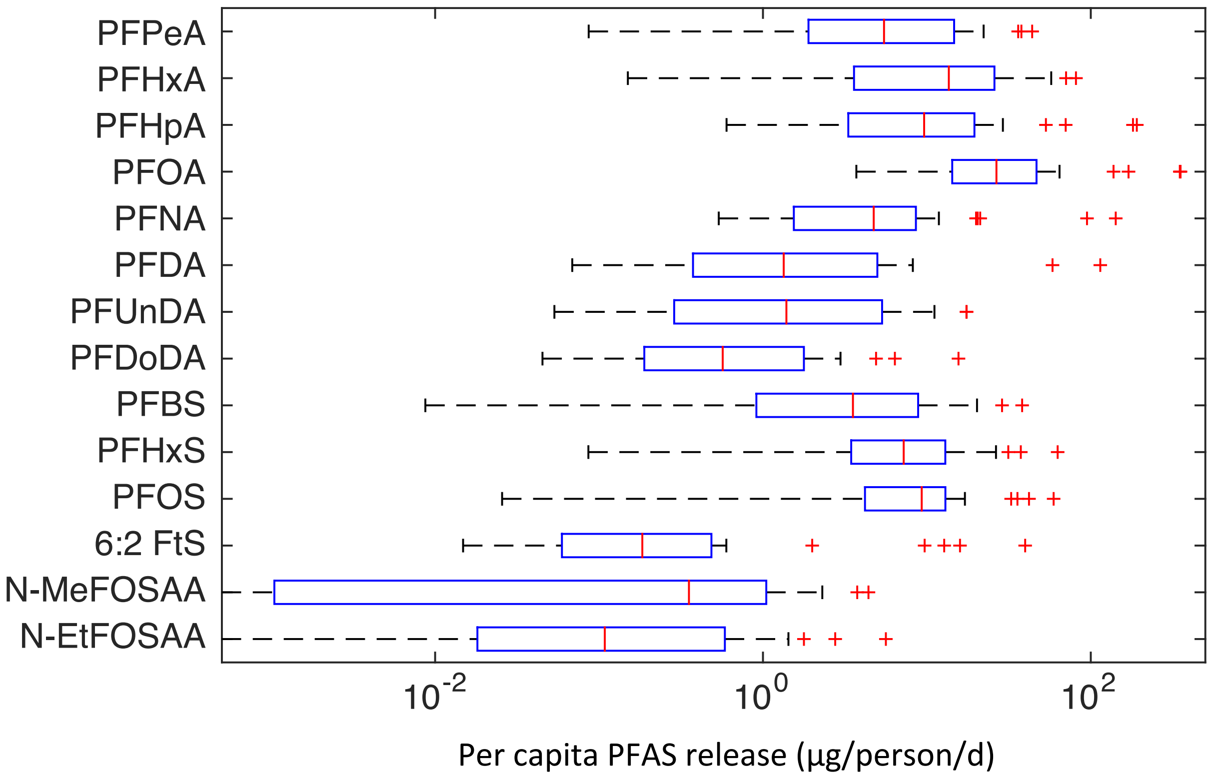

Figure S4. Per-capita release of PFAS (µg/person/d) estimated based on measured PFAS concentrations, water flow rate and upstream population at each sampling site.

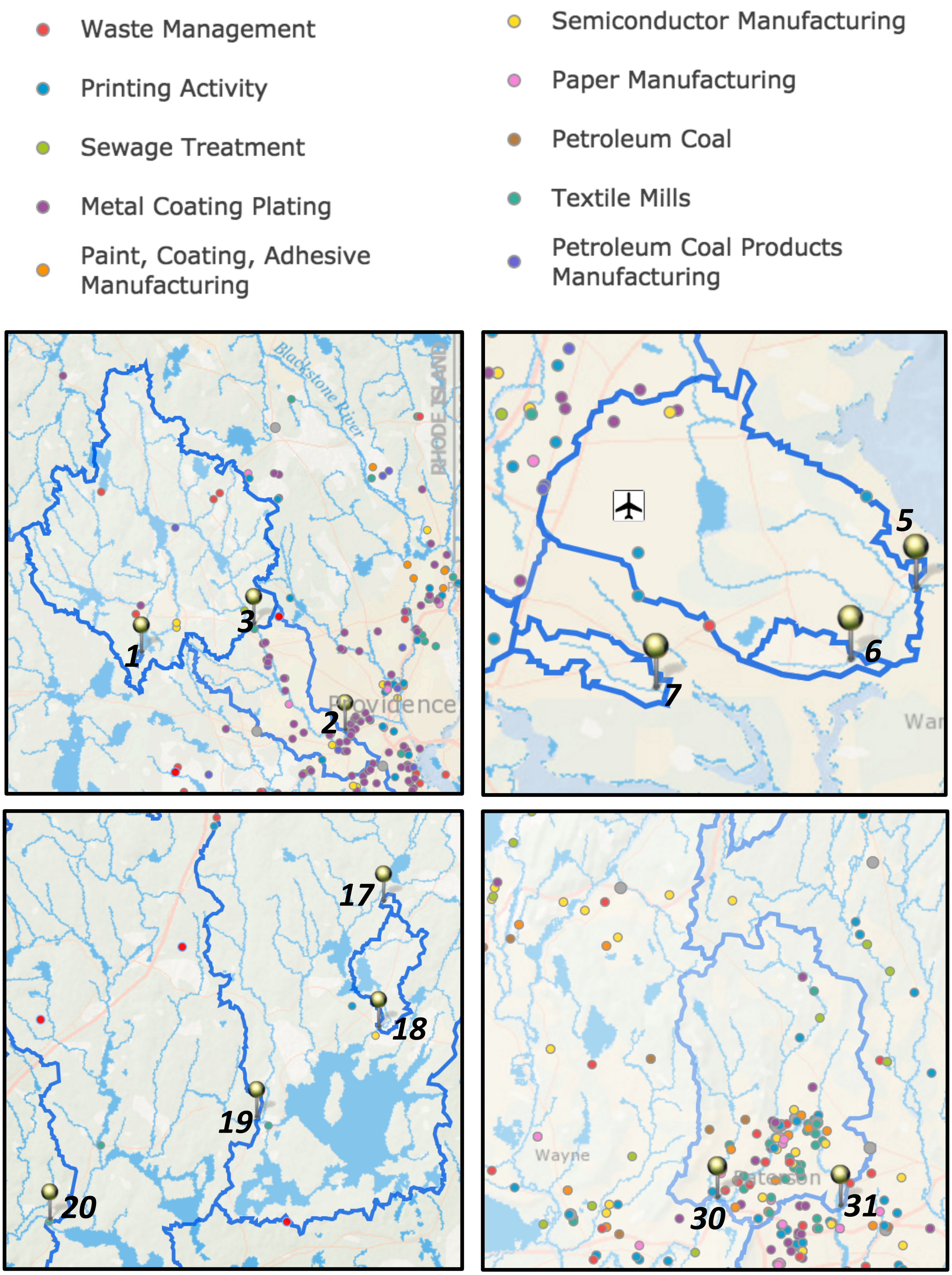

Figure S5. Maps showing sampling sites with distinct PFAS composition profiles, the upstream watersheds and the potential source contributions.

Table S5. Impact factors for potential PFAS sources in watersheds upstream of the non-estuarine sampling sites.

				Impact from facilities upstreams											
sites	Upstream Area (km^2)	Upstream Population	Upstream Population Density (Person/km^2)	Metal Coating Plating	Paint, Coating, Adhesive Manufacturing	Paper Manufacturing	Petroleum Coal Products Manufacturing	Printing Activity	Printing Ink Manufacturing	Semiconductor Manufacturing	Sewage Treatment	Textile Mills	Waste Management (incl. Landfills)	Airport
1	0.1	26	190											
2	124.4	87446	703	1.7E+00	3.7E-01	1.3E-02	2.6E-01	5.5E-05		5.1E-01		1.1E-01	5.5E-08	
3	97.6	24495	251	3.2E-04		1.7E-06				1.2E-06	3.7E-01		3.5E-04	
4	598.2	208255	348	1.3E-01	5.2E-04	1.7E-04	5.8E-04	5.5E-03	1.4E-08	2.8E-02	4.9E-03	1.7E-04	1.6E-01	
5	16.0	16509	1032	9.9E-04				3.0E-03					3.4E-04	4.1E-03
6	1.0	1174	1196											
7	1.4	1792	1306											
8	15.9	12476	783	7.1E-01			2.5E-04	6.1E-04		6.0E-01				
10	59.3	14886	251	4.4E-03	1.3E-03			9.1E-05		3.3E-04			3.0E-04	
11	5.5	1394	254		2.1E-01								6.9E-01	
12	0.6	123	218											
13	12.1	1951	161											
14	21.2	4811	226											
15	24.4	5870	240											
16	33.8	8835	262											
17	0.5	20	42											
18	10.2	746	73											
19	235.3	23112	98					2.0E-04		4.3E-05		3.9E-01		
20	561.1	43081	77			3.8E-15		4.8E-13		1.1E-13		9.1E-01		
21	0.01	1	69											
22	65.7	2647	40											
23	0.3	12	44											
29	12799.8	1994644	156	9.6E-02	1.4E+00	2.2E+00	4.9E-09	5.6E+00	2.0E+00	7.5E-02	3.6E+00	2.8E-01	1.8E+00	
30	2015.8	854842	424	1.2E-02	4.7E-03	6.5E-04	8.0E-04	9.8E-02	1.8E-05	6.3E-02	9.4E-04	3.8E-03	3.8E-04	
31	2090.0	1050694	503	3.2E-02	1.1E-01	2.6E-02	7.6E-04	4.2E-02	1.6E-01	1.2E-01	2.4E-04	1.6E-01	3.1E-02	
34	3345.1	3737691	1117	2.1E-01	5.2E-04	1.8E-01	6.2E-03	2.7E-01	1.5E-04	3.6E-01	2.9E-03	1.7E-01	6.1E-02	2.5E-04
36	2406.9	1903628	791	1.7E+00	3.5E-01	1.8E-01	4.2E-01	7.8E-01	7.6E-03	4.8E-02	6.0E-01	4.2E-02	7.0E-01	
37	2303.7	1494335	649	1.9E+00	5.5E-01	1.9E-01	8.0E-02	1.1E+00	3.7E-02	1.4E-01	1.3E-03	5.8E-01	5.7E-02	

*Facilities are based on the U.S. EPA Facility Registry Service database.[10] Impact of potential point sources as a function of distance from sampling locations by assuming exponential decay in the concentration (i.e., *Impact* = $1/e^d$, where *d* = hydrological distance, km)

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