Appendix A

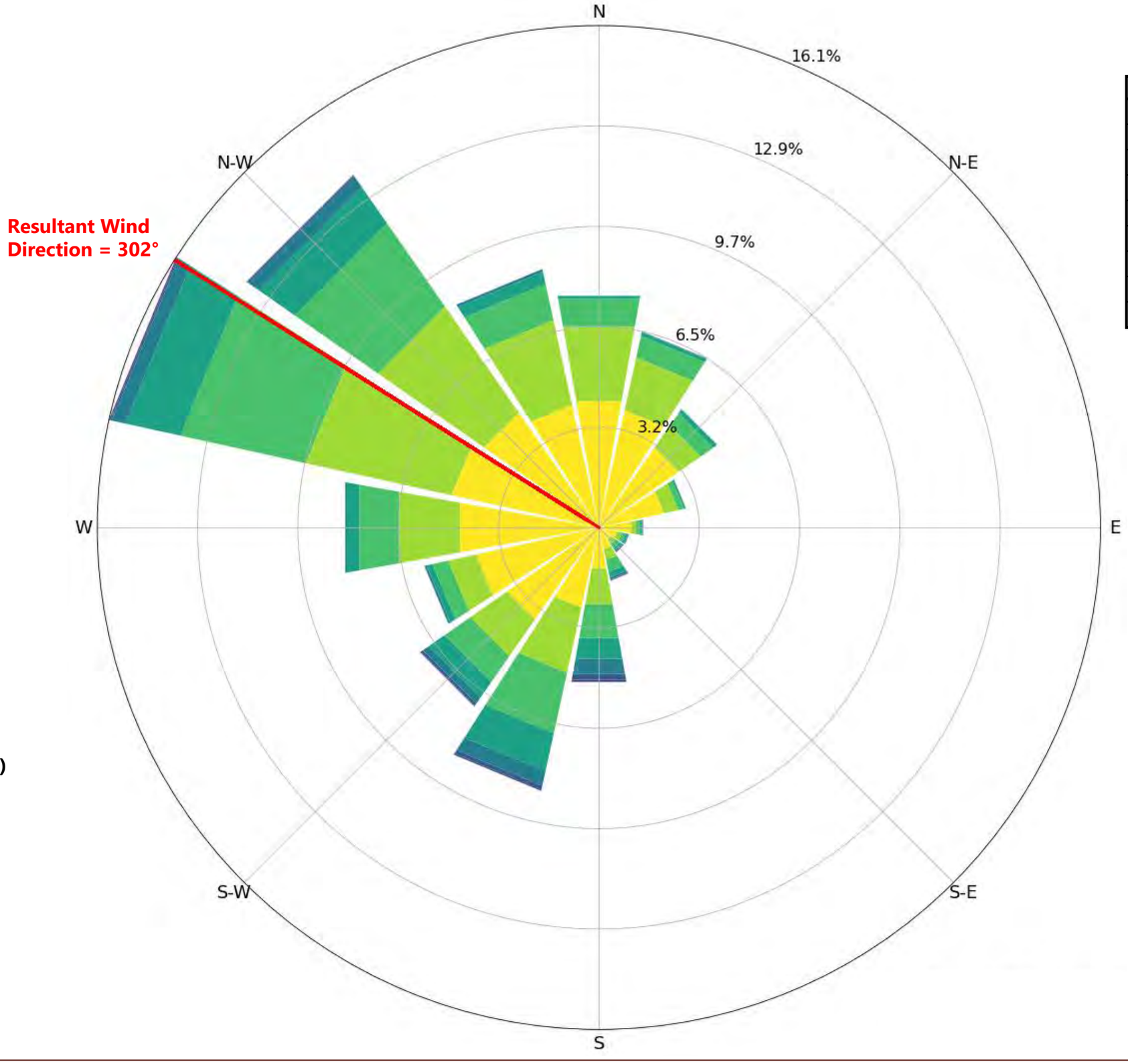
Weather Station Information

Appendix A1: Wind Roses
Appendix A2: McCaffrey Street Weather Station Data Review and Audit

Appendix A

Weather Station Information

Appendix A1: Wind Roses



Mph	%
<1.5	30.5
1.5 - 3.0	31.6
3.0 - 4.5	17.8
4.5 - 6.0	12.2
6.0 - 7.5	5.3
7.5 - 9.0	1.7
9.0 - 11.5	0.5
11.5 - 12.0	0.0
>12.0	0.1

Wind Speed (mph)

- 1.5 - 3.0
- 3.0 - 4.5
- 4.5 - 6.0
- 6.0 - 7.5
- 7.5 - 9.0
- 9.0 - 10.5
- 10.5 - 12.0
- >12.0

Figure A1

McCaffrey Street Station
Wind Rose (12/24/18 - 12/31/20)

Regional Air Deposition
Study Report
Hoosick Falls, NY

BEC
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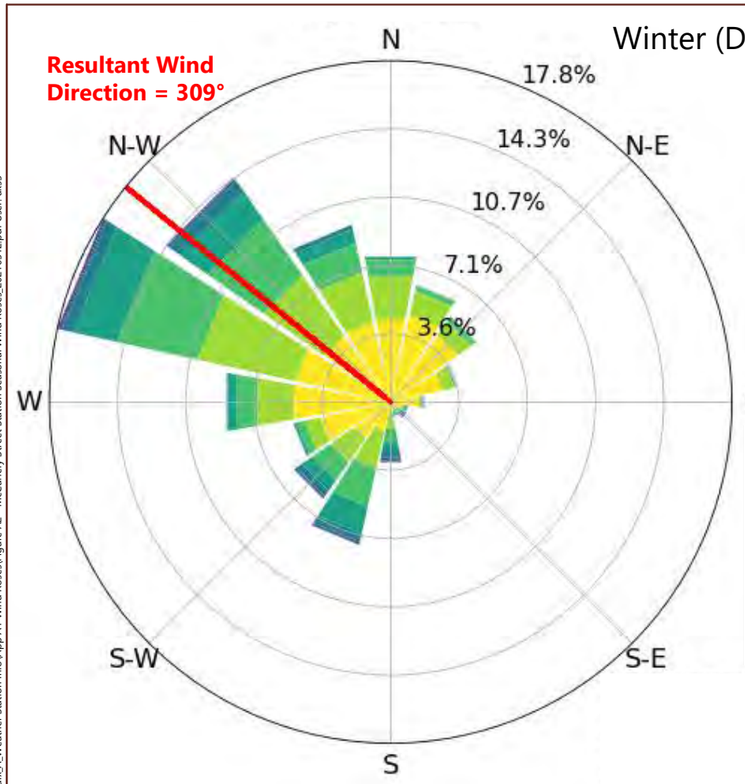
Geology, P.C.

Winter (Dec - Feb)

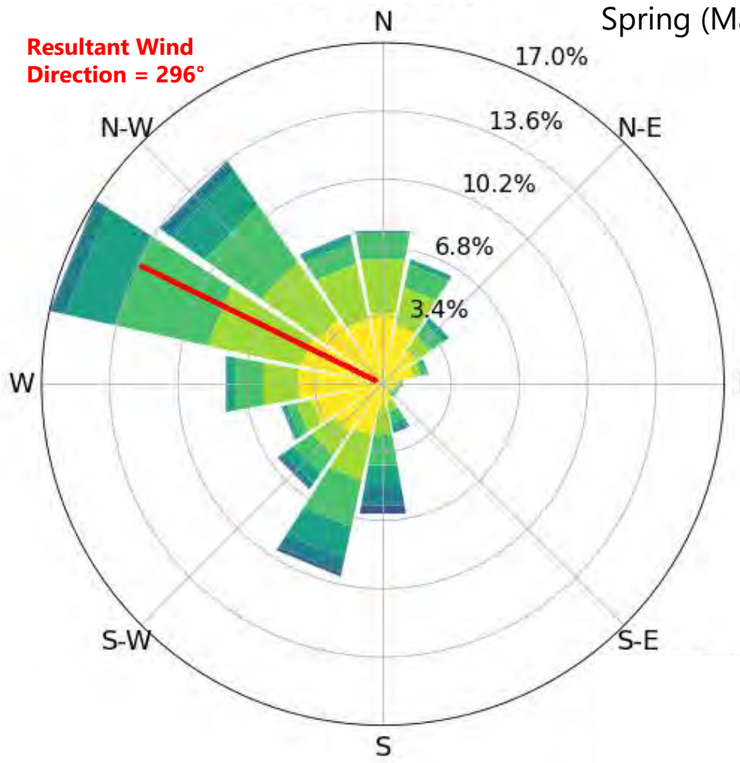
Resultant Wind Direction = 309°



Mph	%
<1.5	20.4
1.5 - 3.0	36.0
3.0 - 4.5	19.0
4.5 - 6.0	13.2
6.0 - 7.5	6.8
7.5 - 9.0	2.4
9.0 - 11.5	0.8
11.5 - 12.0	0.1
>12.0	0.1

Spring (Mar - May)

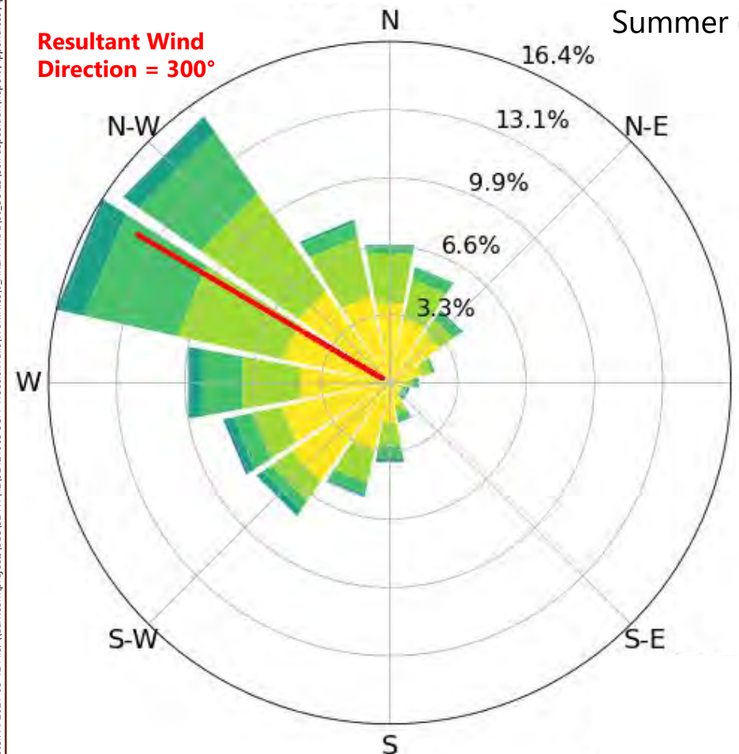
Resultant Wind Direction = 296°



Mph	%
<1.5	20.0
1.5 - 3.0	31.0
3.0 - 4.5	20.5
4.5 - 6.0	16.5
6.0 - 7.5	8.1
7.5 - 9.0	2.9
9.0 - 11.5	0.8
11.5 - 12.0	0.0
>12.0	0.0

Summer (Jun - Aug)

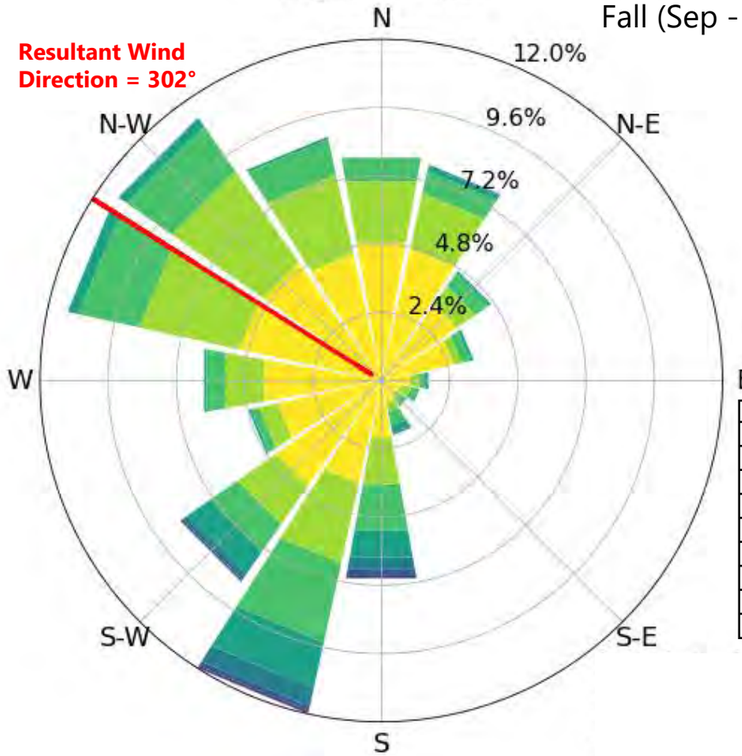
Resultant Wind Direction = 300°



Mph	%
<1.5	45.0
1.5 - 3.0	27.6
3.0 - 4.5	15.8
4.5 - 6.0	8.8
6.0 - 7.5	2.2
7.5 - 9.0	0.3
9.0 - 11.5	0.1
11.5 - 12.0	0.0
>12.0	0.0

Fall (Sep - Nov)

Resultant Wind Direction = 302°



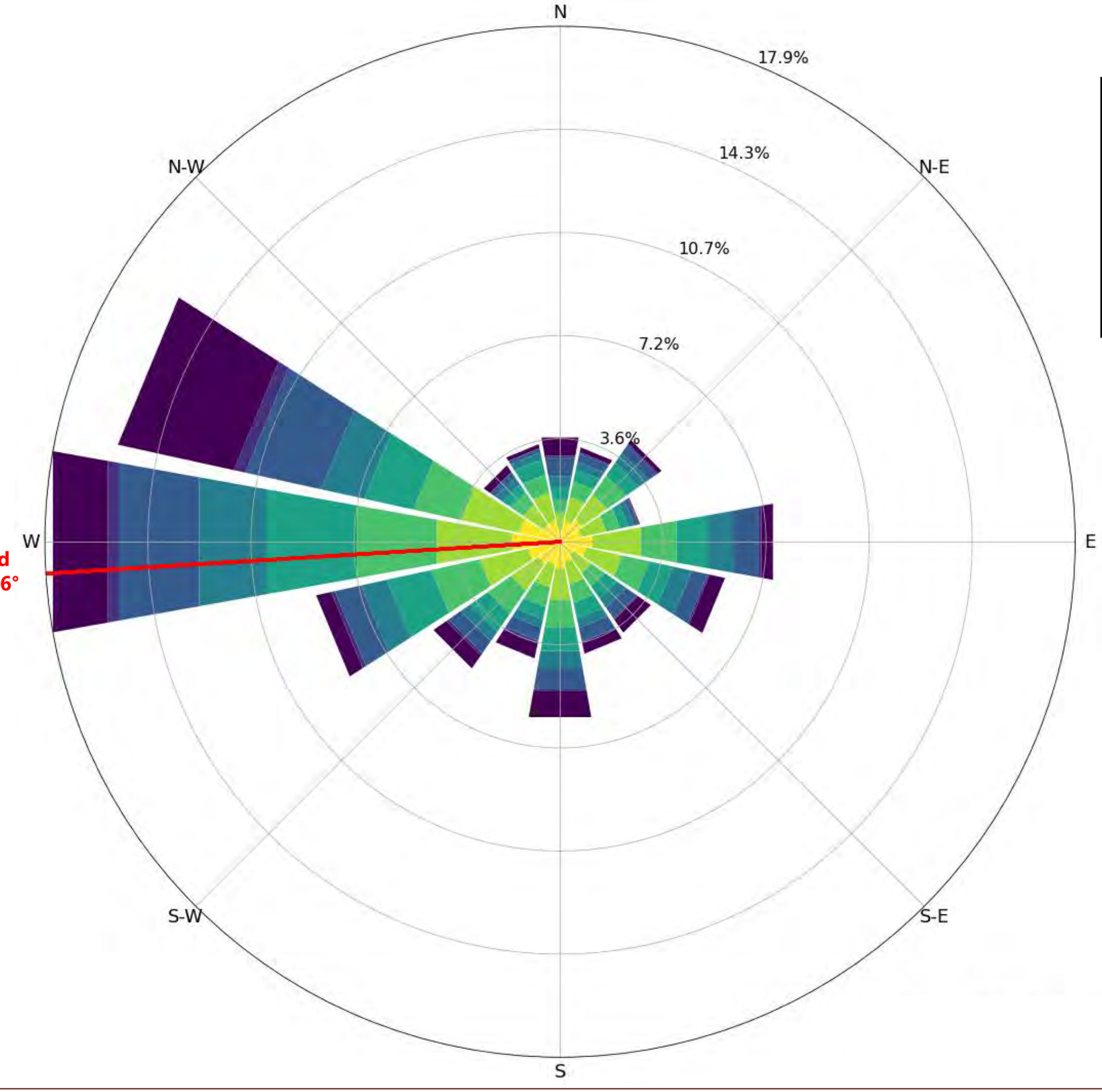
Mph	%
<1.5	39.0
1.5 - 3.0	31.4
3.0 - 4.5	15.3
4.5 - 6.0	9.6
6.0 - 7.5	3.3
7.5 - 9.0	1.0
9.0 - 11.5	0.4
11.5 - 12.0	0.0
>12.0	0.0

Wind Speed (mph)

- 1.5 - 3.0
- 3.0 - 4.5
- 4.5 - 6.0
- 6.0 - 7.5
- 7.5 - 9.0
- 9.0 - 10.5
- 10.5 - 12.0
- >12.0

Figure A2
McCaffery Street Station Seasonal Wind Roses (12/24/18 - 12/31/20)
Regional Air Deposition Study Report
Hoosick Falls, NY

BEC
Engineering and Geology, P.C.



Mph	%
<1.5	27.3
1.5 - 3.0	10.7
3.0 - 4.5	14.0
4.5 - 6.0	11.5
6.0 - 7.5	10.4
7.5 - 9.0	7.4
9.0 - 11.5	8.9
11.5 - 12.0	1.2
>12.0	8.6

Figure A3

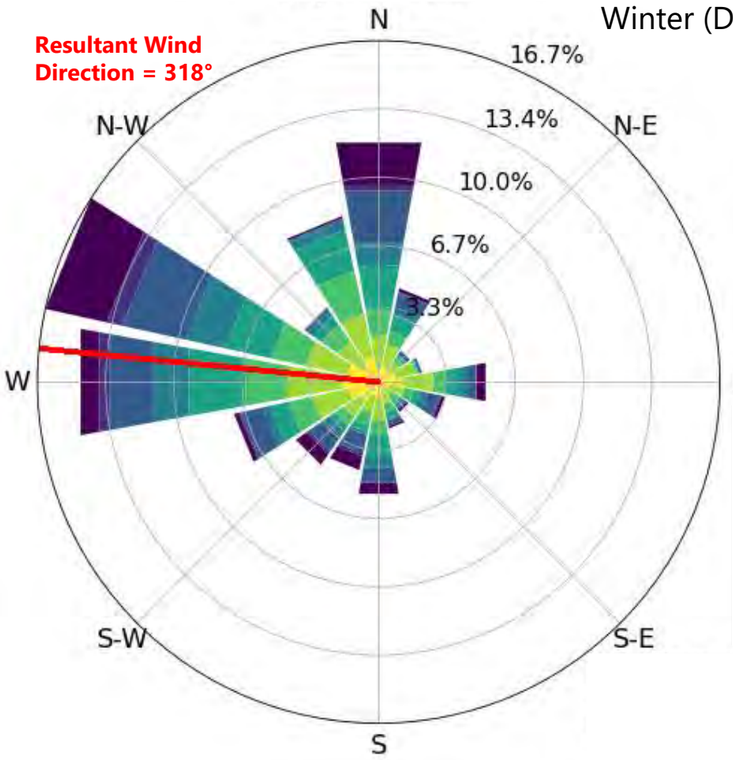
Southwest Hoosick Falls
Wind Rose (12/24/18 - 12/31/20)

Regional Air Deposition
Study Report
Hoosick Falls, NY

BEC
Engineering and
Geology, P.C.

Winter (Dec - Feb)

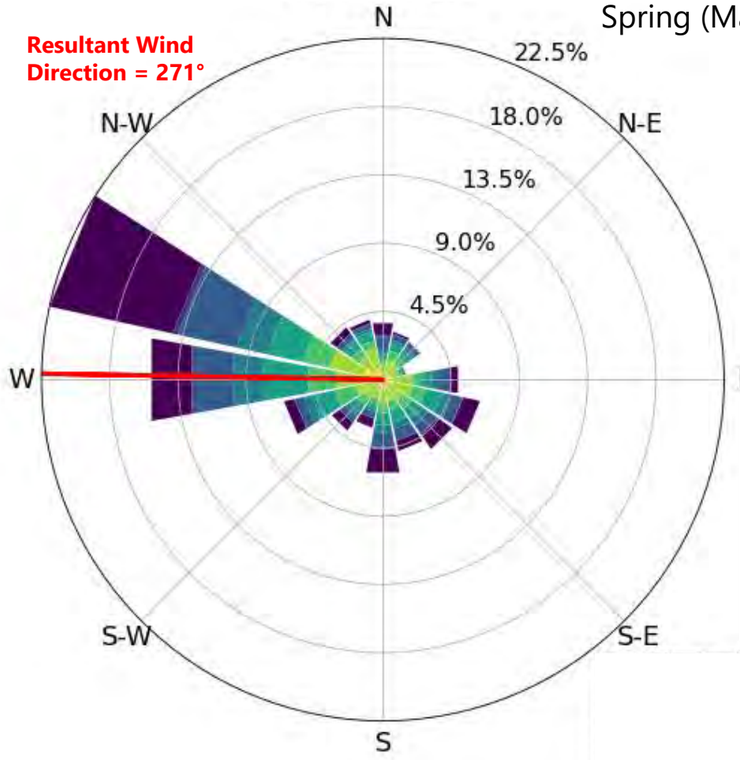
Resultant Wind Direction = 318°



Mph	%
<1.5	29.8
1.5 - 3.0	10.5
3.0 - 4.5	14.5
4.5 - 6.0	9.9
6.0 - 7.5	11.1
7.5 - 9.0	6.2
9.0 - 11.5	9.8
11.5 - 12.0	1.5
>12.0	6.7

Spring (Mar - May)

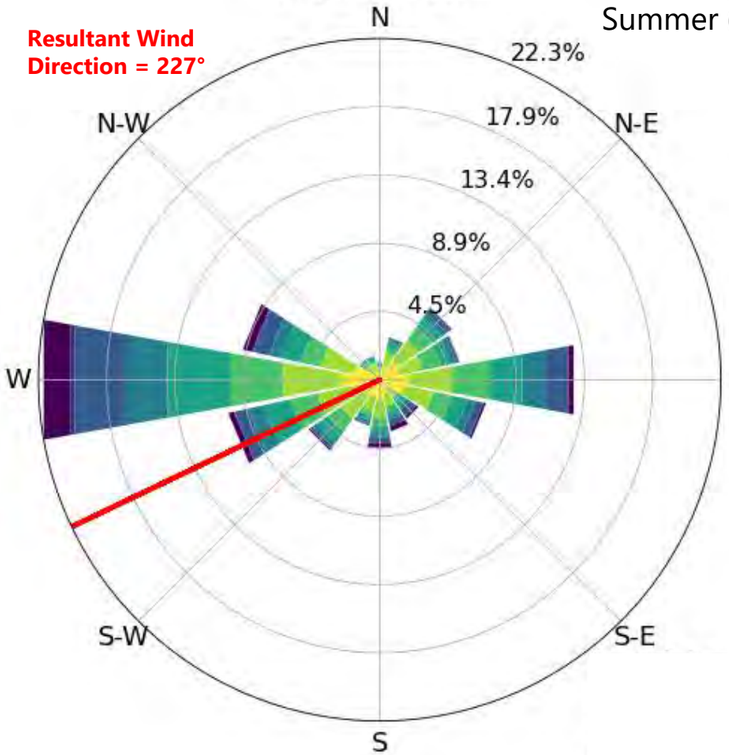
Resultant Wind Direction = 271°



Mph	%
<1.5	17.6
1.5 - 3.0	8.9
3.0 - 4.5	15.1
4.5 - 6.0	10.2
6.0 - 7.5	12.2
7.5 - 9.0	7.3
9.0 - 11.5	12.0
11.5 - 12.0	0.7
>12.0	16.0

Summer (Jun - Aug)

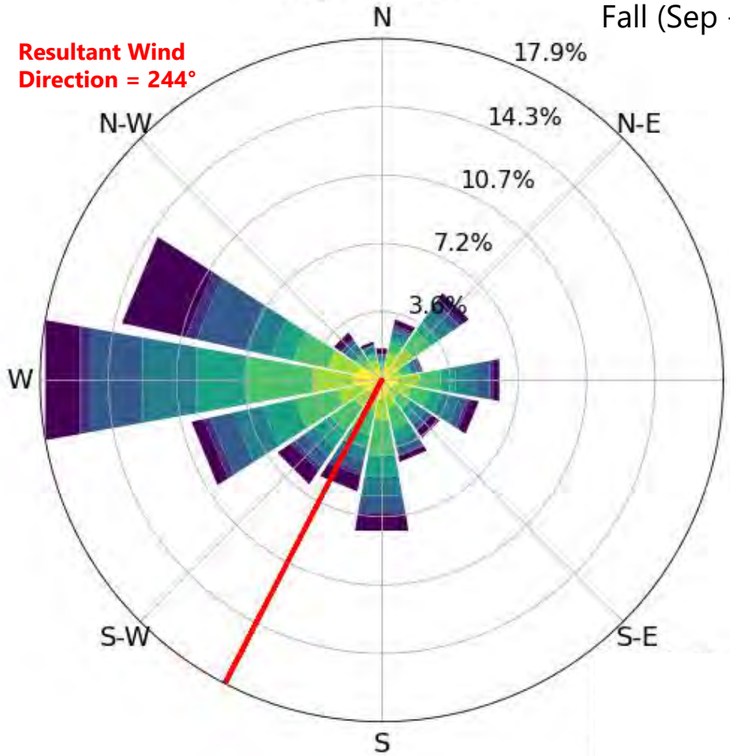
Resultant Wind Direction = 227°



Mph	%
<1.5	36.1
1.5 - 3.0	13.2
3.0 - 4.5	15.6
4.5 - 6.0	10.6
6.0 - 7.5	9.6
7.5 - 9.0	5.5
9.0 - 11.5	6.1
11.5 - 12.0	0.4
>12.0	2.8

Fall (Sep - Nov)

Resultant Wind Direction = 244°



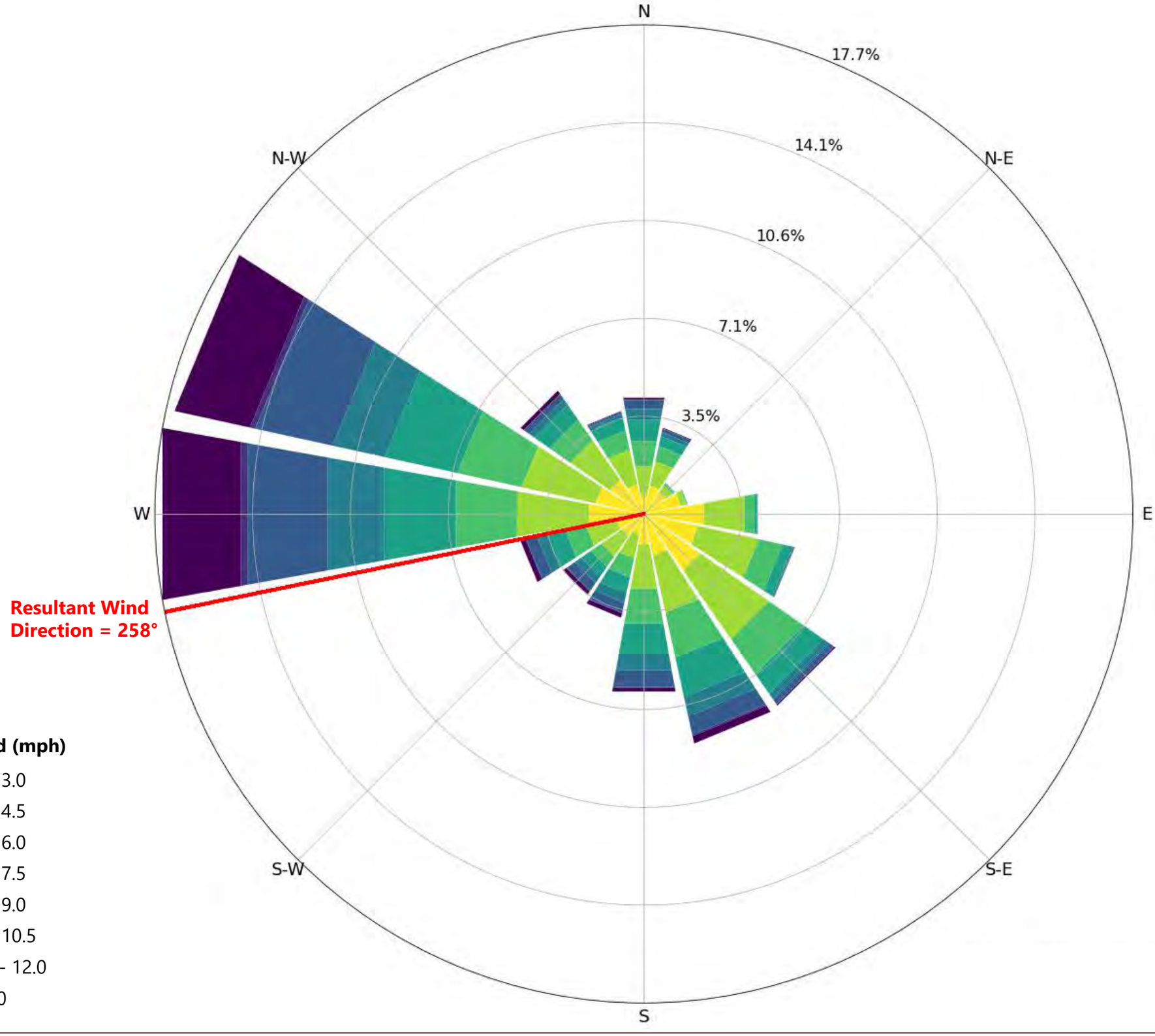
Mph	%
<1.5	25.9
1.5 - 3.0	9.9
3.0 - 4.5	10.9
4.5 - 6.0	14.7
6.0 - 7.5	8.9
7.5 - 9.0	10.3
9.0 - 11.5	8.5
11.5 - 12.0	2.3
>12.0	8.5

Wind Speed (mph)

- 1.5 - 3.0
- 3.0 - 4.5
- 4.5 - 6.0
- 6.0 - 7.5
- 7.5 - 9.0
- 9.0 - 10.5
- 10.5 - 12.0
- >12.0

Figure A4
Southwest Hoosick Falls Seasonal Wind Roses (12/24/18 - 12/31/20)
Regional Air Deposition Study Report
Hoosick Falls, NY

BEC
Engineering and Geology, P.C.



Mph	%
<1.5	31.8
1.5 - 3.0	15.4
3.0 - 4.5	16.7
4.5 - 6.0	10.7
6.0 - 7.5	9.1
7.5 - 9.0	5.2
9.0 - 11.5	6.2
11.5 - 12.0	0.4
>12.0	4.6

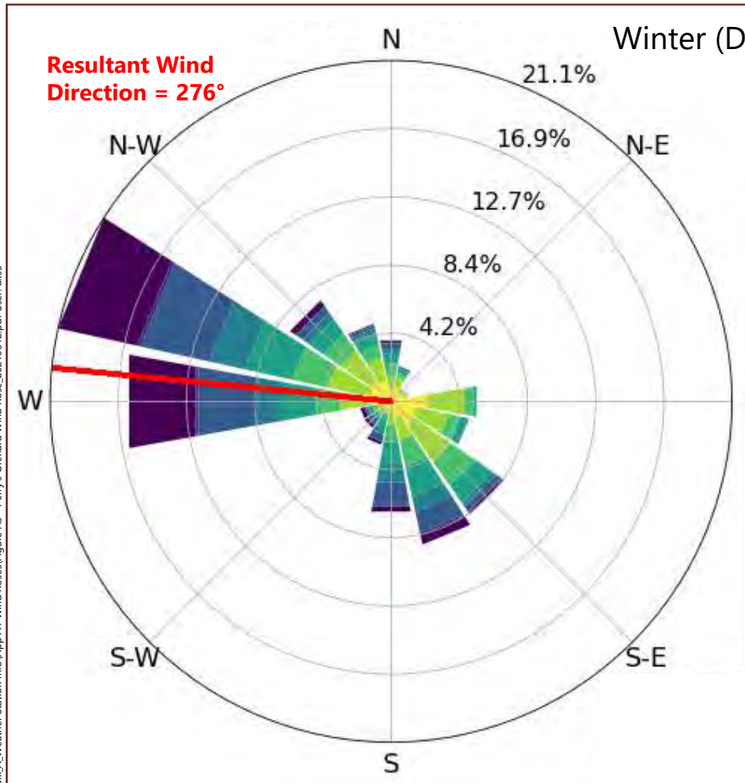
Figure A5

Perry's Orchard
Wind Rose (12/24/18 - 12/31/20)

Regional Air Deposition
Study Report
Hoosick Falls, NY

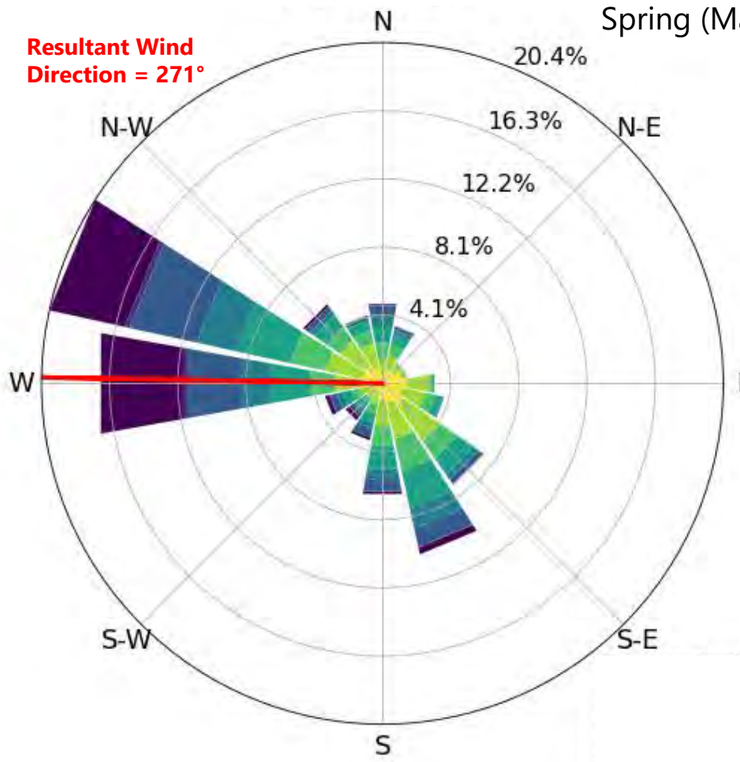
BEC
Engineering and
Geology, P.C.

Winter (Dec - Feb)



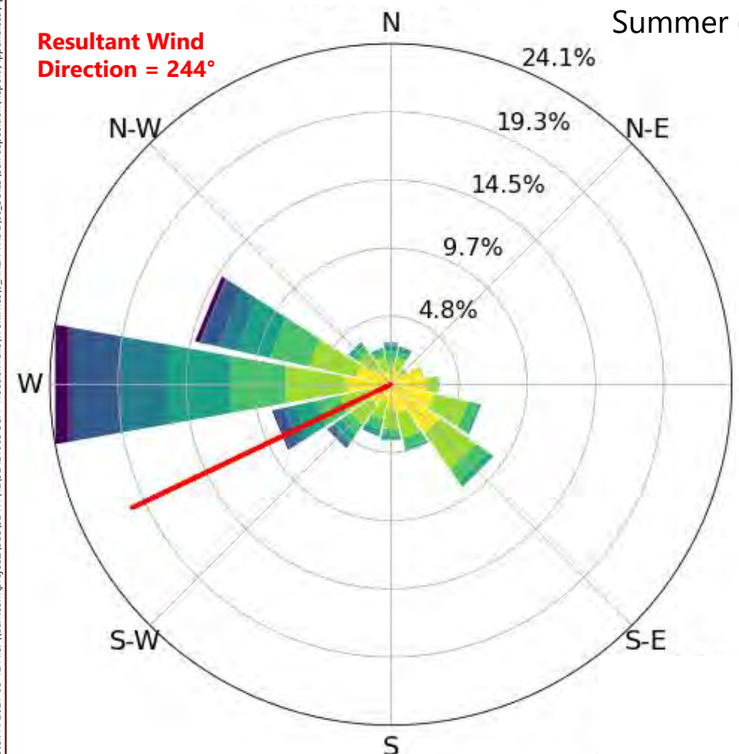
Mph	%
<1.5	28.6
1.5 - 3.0	12.3
3.0 - 4.5	15.4
4.5 - 6.0	9.8
6.0 - 7.5	10.1
7.5 - 9.0	5.9
9.0 - 11.5	9.2
11.5 - 12.0	0.6
>12.0	8.1

Spring (Mar - May)



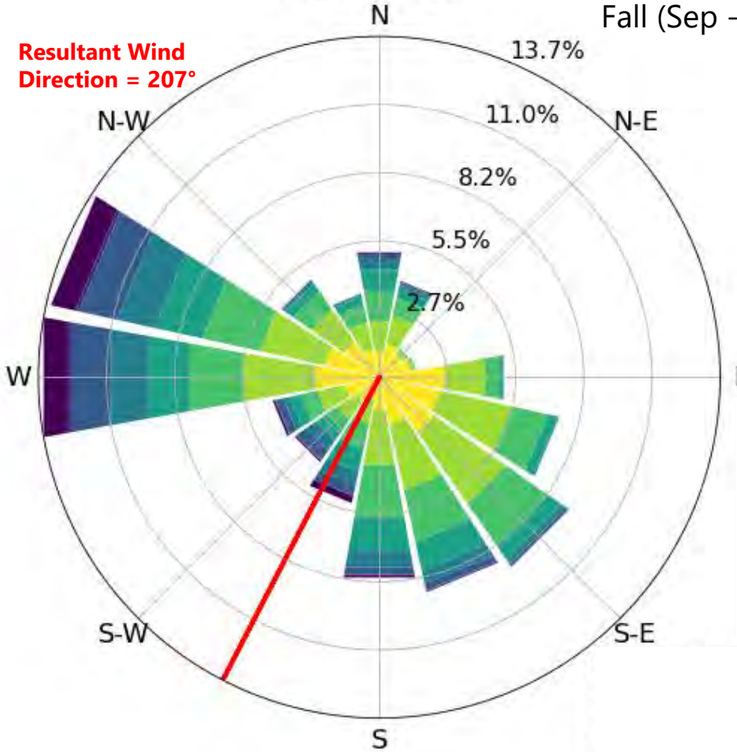
Mph	%
<1.5	22.0
1.5 - 3.0	12.3
3.0 - 4.5	17.0
4.5 - 6.0	11.0
6.0 - 7.5	12.5
7.5 - 9.0	6.9
9.0 - 11.5	9.3
11.5 - 12.0	0.6
>12.0	8.5

Summer (Jun - Aug)



Mph	%
<1.5	42.6
1.5 - 3.0	18.1
3.0 - 4.5	15.7
4.5 - 6.0	8.9
6.0 - 7.5	6.6
7.5 - 9.0	3.6
9.0 - 11.5	3.4
11.5 - 12.0	0.2
>12.0	0.9

Fall (Sep - Nov)



Mph	%
<1.5	33.3
1.5 - 3.0	18.1
3.0 - 4.5	18.3
4.5 - 6.0	12.8
6.0 - 7.5	7.5
7.5 - 9.0	4.5
9.0 - 11.5	3.5
11.5 - 12.0	0.4
>12.0	1.7

Wind Speed (mph)

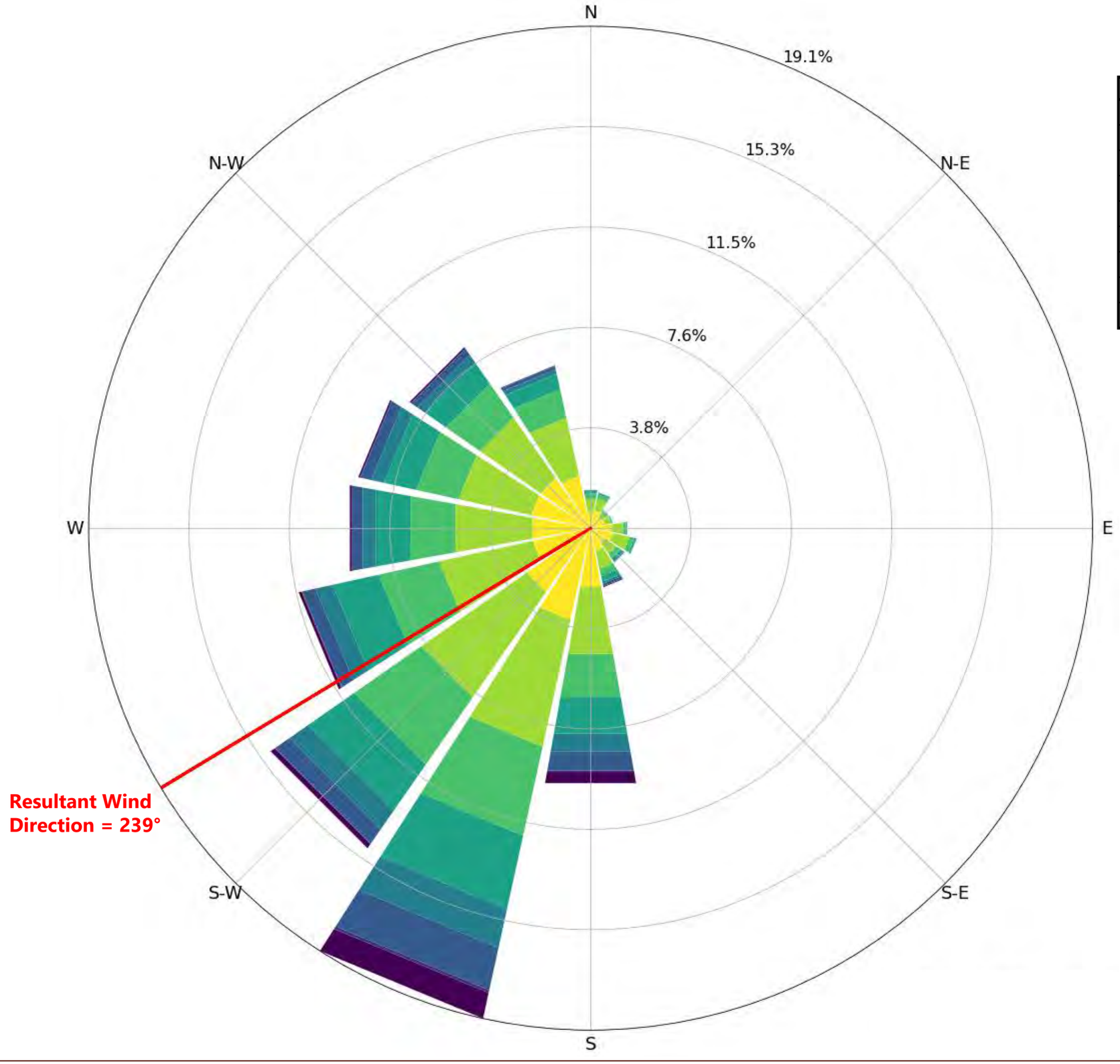
- 1.5 - 3.0
- 3.0 - 4.5
- 4.5 - 6.0
- 6.0 - 7.5
- 7.5 - 9.0
- 9.0 - 10.5
- 10.5 - 12.0
- >12.0

Figure A6
Perry's Orchard
Seasonal Wind Roses
(12/24/18 - 12/31/20)
Regional Air Deposition
Study Report
Hoosick Falls, NY

BEC
Engineering and
Geology, P.C.

Wind Speed (mph)

- 1.5 - 3.0
- 3.0 - 4.5
- 4.5 - 6.0
- 6.0 - 7.5
- 7.5 - 9.0
- 9.0 - 10.5
- 10.5 - 12.0
- >12.0



Mph	%
<1.5	37.9
1.5 - 3.0	16.0
3.0 - 4.5	19.2
4.5 - 6.0	11.2
6.0 - 7.5	8.0
7.5 - 9.0	3.3
9.0 - 11.5	3.0
11.5 - 12.0	0.2
>12.0	1.2

Figure A7

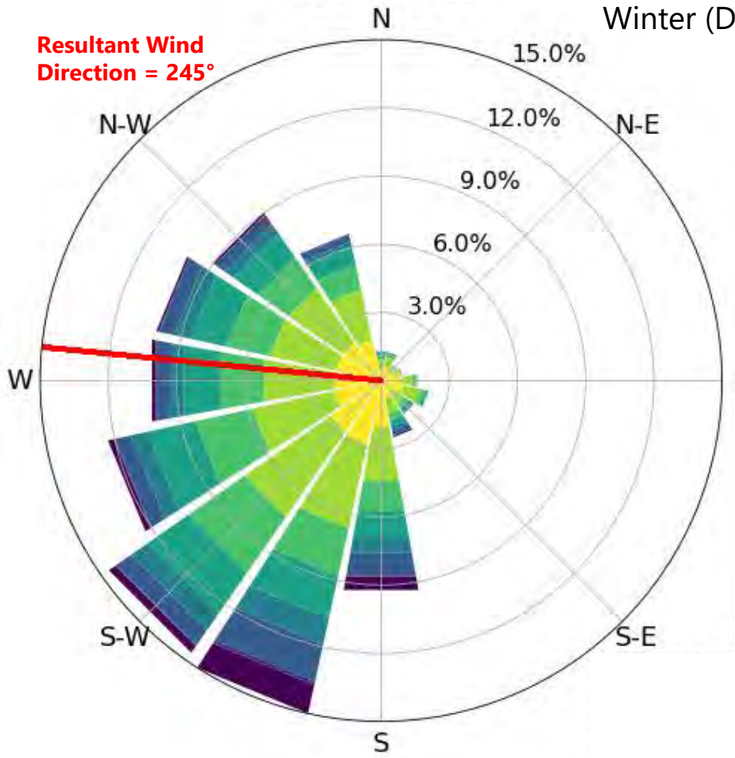
Hoosick NY
Wind Rose (12/24/18 - 12/31/20)

Regional Air Deposition
Study Report
Hoosick Falls, NY

BEC
Engineering and
Geology, P.C.

Winter (Dec - Feb)

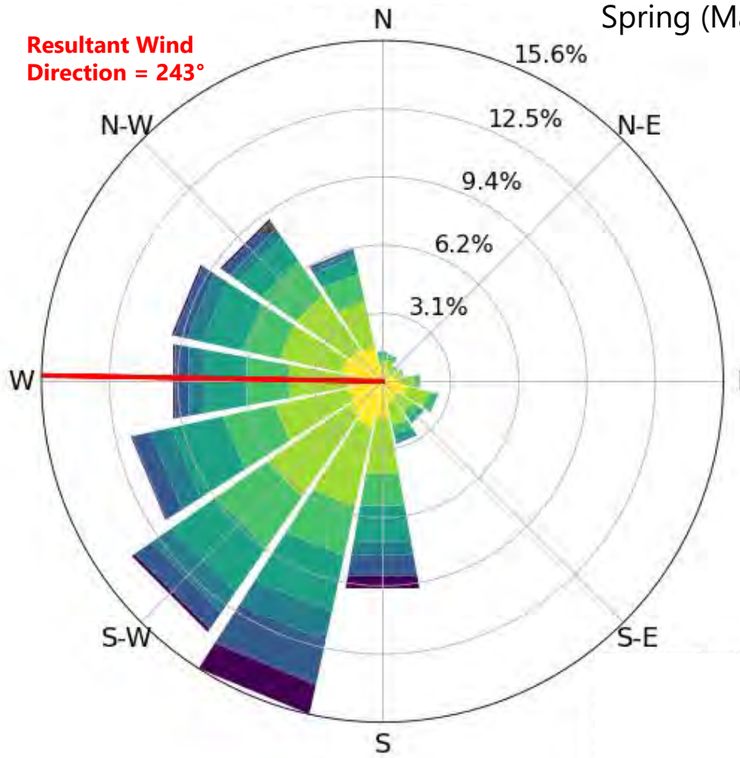
Resultant Wind Direction = 245°



Mph	%
<1.5	29.9
1.5 - 3.0	16.6
3.0 - 4.5	21.0
4.5 - 6.0	12.0
6.0 - 7.5	9.5
7.5 - 9.0	4.1
9.0 - 11.5	4.5
11.5 - 12.0	0.3
>12.0	2.1

Spring (Mar - May)

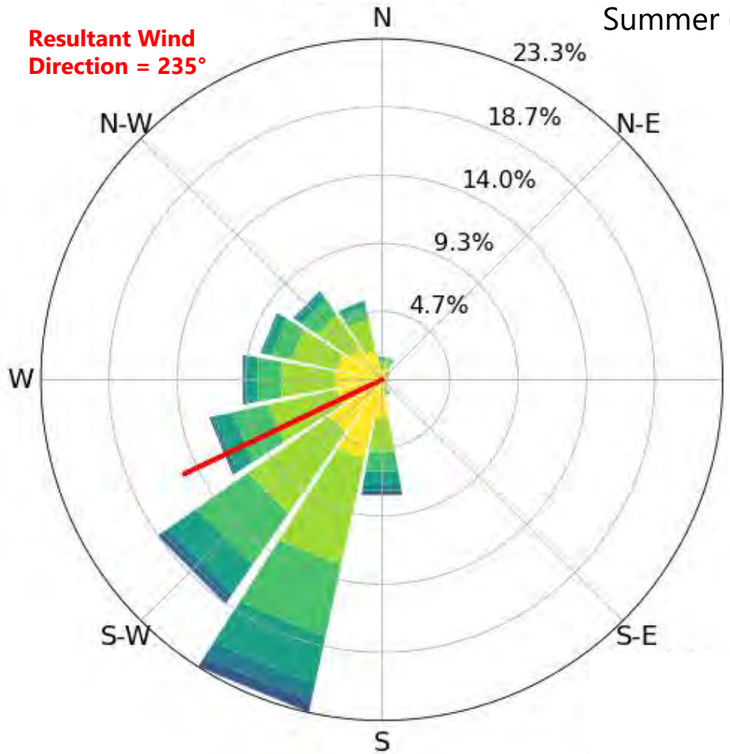
Resultant Wind Direction = 243°



Mph	%
<1.5	28.5
1.5 - 3.0	14.5
3.0 - 4.5	21.8
4.5 - 6.0	12.8
6.0 - 7.5	11.3
7.5 - 9.0	4.6
9.0 - 11.5	4.6
11.5 - 12.0	0.1
>12.0	1.7

Summer (Jun - Aug)

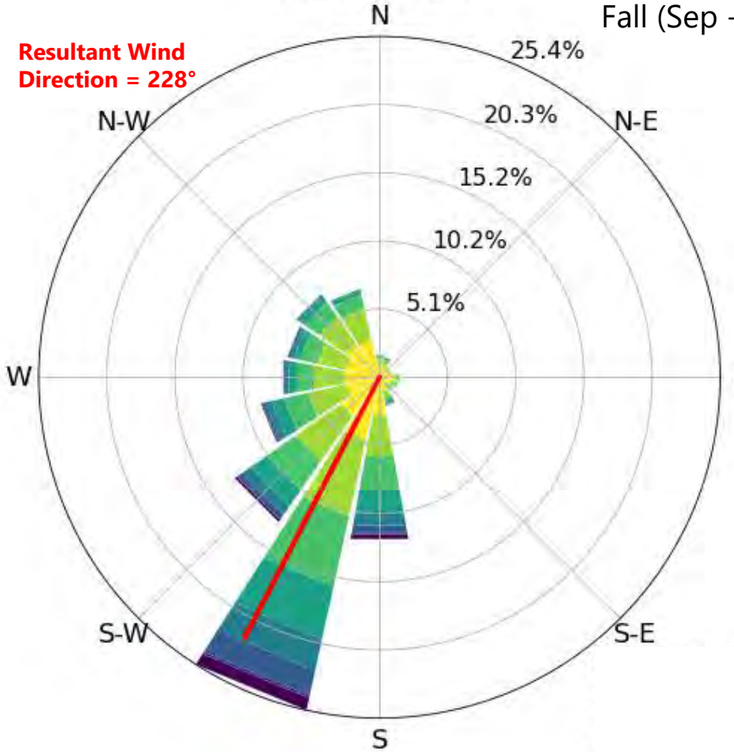
Resultant Wind Direction = 235°



Mph	%
<1.5	53.4
1.5 - 3.0	14.2
3.0 - 4.5	16.5
4.5 - 6.0	8.9
6.0 - 7.5	4.8
7.5 - 9.0	1.4
9.0 - 11.5	0.8
11.5 - 12.0	0.0
>12.0	0.0

Fall (Sep - Nov)

Resultant Wind Direction = 228°



Mph	%
<1.5	40.6
1.5 - 3.0	18.8
3.0 - 4.5	17.2
4.5 - 6.0	10.8
6.0 - 7.5	6.2
7.5 - 9.0	3.2
9.0 - 11.5	2.1
11.5 - 12.0	0.2
>12.0	1.0

Wind Speed (mph)

- 1.5 - 3.0
- 3.0 - 4.5
- 4.5 - 6.0
- 6.0 - 7.5
- 7.5 - 9.0
- 9.0 - 10.5
- 10.5 - 12.0
- >12.0

Figure A8
Hoosick NY
Seasonal Wind Roses
(12/24/18 - 12/31/20)
Regional Air Deposition
Study Report
Hoosick Falls, NY

BEC
Engineering and
Geology, P.C.

Appendix A

Weather Station Information

Appendix A2: McCaffrey Street Weather Station Data Review and Audit

Technical Memorandum

To: File
From: C.T. Male Associates and BEC Engineering and Geology, P.C.
Subject: McCaffrey Street Weather Station Data Completeness Review and Audit
Regional Air Deposition Study
Village of Hoosick Falls, Rensselaer County
Date: February 23, 2021

The purpose of this technical memorandum is to summarize the operation and maintenance of the weather station installed on the rooftop of the McCaffrey Street facility in November 2018. The MetOne, All In One (AIO) Sonic Weather Sensor (model AIO-2) with a precipitation gauge (model 360) continuously records meteorological data (including ambient air temperature, relative humidity, wind direction, wind speed, barometric pressure, and precipitation) and transmits data every 15 minutes. Data monitoring and visual inspections have been conducted in accordance with the station's Operation and Maintenance Plan, which was included in the Work Plan (C.T. Male, 2019). This technical memorandum was originally prepared for and included in the Interim Report (C.T. Male and BEC, 2020) and has been updated as Appendix A2 to the Regional Air Deposition Study Report (C.T. Male and BEC, 2021).

Completeness Review

A data completeness summary by parameter and quarter through 2020 is included in Table A1. As shown, data for each parameter was at least 93% complete for each quarter, except for fourth quarter 2019 and 2020. In late 2019, the McCaffrey Street Station did not transmit data for a period of approximately 25 days beginning October 31, 2019. Attempts to restart the system remotely were unsuccessful and a manual/on-site reset of the system was required, indicating the issues were likely software related. Data transmittal continued following the successful manual system reset on November 26, 2019. In the fourth quarter of 2020, a storm-related power outage prevented data collection from October 7th to October 9th and a sensor connectivity issue prevented data collection from October 26 to November 13th as noted on Table A1.

Audit

An audit was conducted on May 28, 2020 in accordance the Operation and Maintenance Plan. Prior to the audit, the rain gauge was partially cleaned and inspected. In accordance with the manufacturer's operation manual, the rain gauge was audited by slowly introducing a measured volume of water into the gauge funnel and comparing the recorded result versus the expected result. For the audit of the remaining sensors, a portable weather station (Kestrel 5500) was tripod-mounted within meters of the AIO-2 on the roof of the McCaffrey Street Facility. Data from this station was logged for approximately four hours, concurrent with data collection at the McCaffrey Street Station, and downloaded for comparison. The average reading of each sensor for three hour-long periods was calculated, compared, and evaluated based on USEPA criteria (USEPA, 2008). The results of this comparison and evaluation are summarized in Table A2. Based on the data

comparison, the audit found that all sensors were within acceptable accuracy benchmarks for each hour-long period, except for wind speed and direction which do not require additional calibration or maintenance as described below.

Wind direction was within the acceptance criteria (±5°) for two out of the three hour-long periods, but the wind speed was outside of the USEPA's proposed acceptance criteria (±0.25 meters per second) for each of the three hour-long measurement periods. For each of the hour-long averages, the McCaffrey Street Station was higher, but within 0.09 meters per second of the Kestrel 5500. As noted in Table A2, the wind vane and anemometer for the portable weather station are mechanical, while the McCaffrey Street Station uses an ultrasonic anemometer (with no moving parts), which can register and record wind speed lower than the starting thresholds of mechanical anemometers. Because these measurements are based on different principles, they can produce different results, especially at low wind speeds (USEPA, 2008). Based on the results of the audit, no calibration or additional maintenance is recommended at this time.

References

C.T. Male, 2019. Final Regional Air Deposition Study Work Plan for the Village of Hoosick Falls, Rensselaer County, New York. August 23, 2019.

C.T. Male Associates (C.T. Male) and BEC Engineering and Geology, P.C. (BEC), 2020. *Interim Report: Regional Air Deposition Study for the Village of Hoosick Falls.* June 2020.

C.T. Male and BEC, 2021. *Regional Air Deposition Study Report for the Village of Hoosick Falls.* April 2021.

USEPA, 2008. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements Version 2.0 (Final) (EPA-454/B-08-002) March, 2008.

Attachments

Table A1 McCaffrey Street Weather Station Data Completeness

Table A2 McCaffrey Street Weather Station Audit Summary (05/28/20)

Table A1: McCaffrey Street Weather Station Data Completeness

Interim Report: Regional Air Deposition Study

Village of Hoosick Falls, New York

Parameter	Data Capture*								
	2018	2019				2020			
	Q4 (11/13-12/13)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Wind Speed	99.0%	98.2%	99.7%	99.0%	68.4%	100.0%	96.6%	93.7%	78.1% [2]
Wind Direction	99.0% [1]	98.2%	99.7%	99.0%	68.4%	100.0%	96.6%	93.7%	78.1% [2]
Temperature	99.0%	99.0%	99.7%	99.0%	69.2%	100.0%	96.6%	93.7%	78.1% [2]
Relative Humidity	99.0%	99.0%	99.7%	99.0%	69.2%	100.0%	96.6%	93.7%	78.1% [2]
Precipitation	99.0%	99.0%	99.7%	99.0%	69.2%	100.0%	96.6%	93.7%	78.1% [2]
Barometric Pressure	99.0%	99.0%	99.7%	99.0%	69.2%	100.0%	96.6%	93.7%	78.1% [2]

Notes:

* - Data transmitted at 15 minute intervals. % calculated based on at least three valid readings per hour.

(1) The declination of the wind sensor needed to be manually set for the location; the sensor was sent back to MetOne on 12/13/2018 and the declination was corrected via post processing.

(2) The MetOne sensor went offline on 10/7/2020 due to power loss during a storm and was power was restored on 10/9/2020. The MetOne sensor went offline on 10/26/2020 due to a sensor connectivity issue; the station came back online on 11/13/2020.

Table A2: McCaffrey Street Weather Station Audit Summary (05/28/20)

Interim Report: Regional Air Deposition Study

Village of Hoosick Falls, New York

Time Period[a]	Parameter	McCaffrey St. Station[b]	Kestrel 5500[c]	Δ[d]	Acceptance Criteria[e]	Passed
11-12 AM EST	Wind Speed (m/s)	2.5	2.2	0.34	± 0.25	No (f)
	Wind Direction (degrees)	193.7	197.8	-4.1	± 5	Yes
	Temperature (°C)	25.8	25.9	-0.2	± 1.0	Yes
	Relative Humidity (%)	63.4	63.3	0.0	± 10	Yes
	Barometric Pressure (mBar)	1002.3	1004.0	-1.7	± 3	Yes
12-1 PM EST	Wind Speed (m/s)	2.1	1.8	0.30	± 0.25	No (f)
	Wind Direction (degrees)	206.6	202.9	3.7	± 5	Yes
	Temperature (°C)	25.6	26.0	-0.4	± 1.0	Yes
	Relative Humidity (%)	64.7	65.2	-0.5	± 10	Yes
	Barometric Pressure (mBar)	1002.0	1003.7	-1.7	± 3	Yes
1-2 PM EST	Wind Speed (m/s)	1.9	1.6	0.29	± 0.25	No (f)
	Wind Direction (degrees)	196.6	203.2	-6.7	± 5	No
	Temperature (°C)	26.5	26.8	-0.3	± 1.0	Yes
	Relative Humidity (%)	61.4	62.0	-0.6	± 10	Yes
	Barometric Pressure (mBar)	1001.3	1002.9	-1.7	± 3	Yes

Rain Gauge Calibration Audit[g]					
Parameter	Expected Result	Actual Result	Δ[d]	Acceptance Criteria[e]	Passed
Rain Gauge (inches)	1.00	1.09	0.09 (9%)	± 10%	Yes

Notes:

a- Data comparison based on hour-long averages.

b- McCaffrey St. Station is a MetOne All In One (AIO) Sonic Weather Sensor (model:AIO-2) with precipitation gauge (model: 360); logs and transmits 15-minute averaged data.

c- Kestrel 5500 Weather Meter with external wind vane; logs 1-minute averaged data. Unit was tripod mounted on roof for duration of audit.

d- Difference in measurements between McCaffrey Street Station and Kestrel 5500.

e- From Table 0-6 of the USEPA Quality Assurance Handbook for Air Pollution Measurements (USEPA, 2008).

f- The starting threshold for the Kestrel 5500 mechanical anemometer is 0.6 m/s. The starting threshold for the MetONE AIO-2 sonic anemometer is 0.2 m/s. More than 25% of the Kestrel 5500 recorded wind speeds were less than 1 m/s. These anemometers are based on different principles and can produce different results at wind speeds less than 1 m/s (USEPA, 2008). This is likely the cause of the MetONE AIO-2 recording wind speeds slightly higher (0.09 m/s) than the acceptance criteria.

g- Rain gauge audited by slowly introducing 500 mL of water through the rain gauge. Based on manufacturer's specifications this should result in a reading of 1 inch of rain.

m/s = meters per second
% = percent
mBar = millibar
mL = milliliter

Appendix B

Statistical Evaluation

Technical Memorandum

To: File
From: C.T. Male Associates and BEC Engineering and Geology, P.C.
Subject: Statistical Evaluation
Regional Air Deposition Study
Village of Hoosick Falls, Rensselaer County
Date: April 13th, 2021

The purpose of this technical memorandum is to summarize the methods and results used in the statistical evaluation of data collected as a part of the Regional Air Deposition Study which commenced in October 2019 and is to be included as an appendix to the Report. Sampling activities were completed by C.T. Male in accordance with the approved Regional Air Deposition Work Plan (C.T. Male, 2019a), the Draft Quality Assurance Project Plan (QAPP; C.T. Male, 2019b), and in coordination with New York State Department of Environmental Conservation (NYSDEC) staff. This technical memorandum has been prepared as Appendix B to the Regional Air Deposition Study Report (C.T. Male and BEC, 2021).

Data

The soil data set for the statistical evaluation described herein includes 165 soil samples (three depth intervals at 55 locations). Duplicate samples collected for data quality assurance and quality control were not included. Two of the 57 locations sampled (01D and 10B) were also excluded because they did not meet the vetting criteria established in the workplan based on field observations made at the time of sampling.

Data Evaluation Methods

This section presents the statistical methods and assumptions used in the evaluation of soil data. Unless otherwise noted, an alpha of 0.05 was used for statistical methods, meaning that a test with a p-value of less than or equal to 0.05 was considered significant or that the probability of something as extreme as the statistical test result happening by chance is below a 5% threshold (95% significance). Analyses were conducted using the R statistical software (R Core Team, 2020).

Data below Detection

Detection frequencies were low for many PFAS. In cases where the detection frequency was less than half or in cases where there were fewer than five detections within a sample subset (i.e., the values for a particular parameter within any grouping evaluated), statistical methods were generally not applied. In cases where sufficient detected data were available, various non-parametric statistical methods were employed to account for data below detection limits. The particular methods or adjustments for each type of analysis are described within the statistical methods below.

Summary Statistics

Summary statistics are presented in the Regional Air Deposition Study Report. The statistics included are number of samples, number of detections, minimum, maximum, arithmetic mean, geometric mean, median (50th percentile), 25th percentile (first quartile), and 75th percentile (third quartile). Note that arithmetic mean, geometric mean, median, 25th percentile, and 75th percentile are presented where detection frequencies are greater than or equal to 50% and the total number of detections was at least five.

Parametric summary statistics include the arithmetic and geometric means. Non-parametric summary statistics are rank-based and include minimum, maximum, median, and quartiles, and these statistics are less likely to be influenced by outlier samples than parametric statistics are. Parametric statistics can be approximated using one of several estimation methods. The summary statistics in the Regional Air Deposition Study Report were calculated using the Kaplan-Meier method, which is based on a non-parametric survival function and no underlying distribution need be assumed (Helsel, 2012). Kaplan-Meier is well-suited for environmental data sets because it can accommodate multiple reporting limits and is routinely used with where data sets with up to 50% detection frequency. If the data population conforms to a normal or symmetric data distribution, the arithmetic mean and the median are equal. For a right-skewed, log-normal data distribution, the geometric mean and median are equal (USEPA, 2009). With a sufficient fraction of detected data, non-parametric statistics such as the median can be simply calculated.

Visual Evaluation: Box-and-Whisker Plots

Box-and-whisker plots were produced to visualize the large amount of data and its variation by different categories. Box-and-whisker plots visually illustrate the spread of a data set and can be used to discern group differences. Box-and-whisker plots consist of a central box, with the lower limit of the box indicating the first quartile and the upper limit of the box indicating the third quartile. The height of the box (the difference between the first and third quartiles) is called the interquartile range. Within the box is a heavy line indicating the median. Extending in each direction from the box are "whiskers," which extend to the most extreme values within one and a half times the interquartile range from each end of the box. Values beyond the whiskers are potential outliers. All sample values within the data set are shown on the plot as individual points. Symbol color and/or shape were used to distinguish values below detection limits from detected values. Except as otherwise noted, values below detection limits were plotted at the detection limit and were included in plot computations, such as box-and-whisker plot quartiles. For data sets with an insufficient detection frequency (<50%) or count of detected values (<5), only data values were plotted (as a strip plot); no box-and-whiskers plot was shown.

Box-and-whisker plots are included in several appendices of the Regional Air Deposition Study (C.T. Male and BEC, 2021) including:

- Appendix C: Plots by Sample Depth Interval
- Appendix E2: Pots by Quadrant

- Appendix F2: Parameter vs. Parameter Plots
- Appendix G1: Plots with Existing Soil Data

Analysis of Variance

The non-parametric ANOVA Kruskal-Wallis test was used to assess whether statistically significant differences existed among depth intervals and among groupings based on site factors, including soil type, tree cover percentage range, tree cover type, and slope location and village direction. The same test was also used to evaluate whether statistically significant differences existed among directional quadrants formed by grouping the sampling location sectors into four groups of four sectors. The Kruskal-Wallis test compares the ranks of the data values (i.e., the order from smallest to largest) to evaluate whether the medians of all of the groups are equal. A statistically significant result for this test (i.e., if the p-value is less than alpha) indicates that the median of one or more of the groups differs from the median of one or more of the other groups. For parameters with non-detects, values below the highest detection limit were reset as 0 (tied values) for the test (Helsel, 2012). Because the test was run for multiple parameters, an alpha (significance level) of 0.01 was used to better balance error rates (USEPA, 2009).

If the Kruskal-Wallis test indicated statistical significance and there were more than two groups, a post-hoc Dunn test was conducted to assess between-group differences. The Dunn test is a follow-up test to the Kruskal-Wallis test that compares each of the groups to each of the other groups. The Benjamini-Hochberg adjustment was used in the Dunn test to control error rates resulting from multiple comparisons; running many ANOVA tests at once on interrelated data (i.e., data that are not independent) can compound the likelihood of a false positive result, and so a statistical correction was incorporated to control for that error.

Because the visual analysis and Kruskal-Wallis and Dunn tests indicated significant differences among depths for PFAS and TOC concentrations, subsequent statistical analyses were conducted separately for each depth interval.

Summarized results of the Kruskal-Wallis tests (p-values) can be seen in Table B1 and Table B2 of this technical memorandum. Significant Kruskal-Wallis and Dunn test results are contained in Attachment 1 of this technical memorandum. The attachment includes both test statistics and their associated p-values. Asterisks denote significant Dunn test p-values, indicating that two groups are significantly different.

Correlation

Correlations between parameters were assessed using Kendall's tau for monotonic trend. Kendall's tau is a non-parametric statistical test used to assess whether two parameters systematically increase (significant positive correlation) or decrease (significant negative correlation) together, but it does not require the change to follow a specific pattern (e.g., linear). For parameters with non-detects, values below the highest detection limit were reset as 0 (tied values) for the test (Helsel, 2012). The Benjamini-Hochberg adjustment was used in

the correlation tests to control error rates resulting from multiple comparisons. PFAS parameters were evaluated based on their measured values and their measured values normalized to TOC. Correlations were evaluated separately for each depth interval, and the specific PFAS parameters with sufficient data for analysis varied by interval. In addition to PFAS, TOC, pH, and elevation were also included in the correlation analysis. Results can be seen in Table B3 of this technical memorandum. Scatter plots of the parameter pairings are included in Appendix E Regional Air Deposition Study Report.

Results

Evaluation by Sample Depth Interval

As noted above and shown in Table B1 below, PFAS concentrations and TOC were significantly different among depth intervals. Of the four PFAS evaluated (PFHpA, PFHxA, PFOS, and PFOA), the only depth interval pairing that was not statistically significantly different was PFOA in sub-surface and near surface soils.

Table B1 Results of Kruskal-Wallis Depth Interval Test

Parameter* Evaluated by Depth Interval	p-value
PFHpA	**4.31E-12**
PFHxA	**8.52E-08**
PFOS	**3.19E-23**
PFOA	**9.33E-14**
Total Organic Carbon	**2.26E-27**
Moisture	**1.06E-22**
pH	0.518

Bold p-value indicates significant difference among depth intervals. A p-value is considered significant if less than 0.01.
*Only parameters with sufficient detections were included.

Concentrations were compared among various groupings, which included soil type (silt, silt-organic, clay, and silty clay), tree cover percentage (25-50%, 50-75%, and 75-100%), tree cover type (deciduous and both deciduous and coniferous), and slope location and village direction (Mid-slope - Facing Village; Mid-slope - Not Facing Village; No Slope, Top of Slope - Facing Village, and Top of Slope - Partially Facing Village). Additional categories were present in some of these groupings but did not contain sufficient data for the analysis. If the result of the Kruskal-Wallis test indicated significance (Table B2 of this technical memorandum) and more than two groups existed within the data, a post-hoc Dunn test was conducted to evaluate the groups by pairs (Attachment 1 of this technical memorandum).

Table B2 Results of Kruskal-Wallis Tests

Depth Interval	Parameter*	p-values			
		Soil Type	Tree Cover Percentage	Tree Cover Type	Slope Location and Village Direction
Surface	PFDA	**0.004**	0.070	0.045	0.443
Surface	PFOS	0.021	0.321	**0.002**	0.276
Surface	PFOA	0.054	0.132	0.013	0.230
Surface	PFUnA	**0.010**	0.051	0.087	0.499
Near Surface	PFHpA	0.199	0.328	0.592	0.668
Near Surface	PFHxA	0.896	0.987	0.108	0.915
Near Surface	PFOS	0.305	0.837	0.597	0.250
Near Surface	PFOA	0.329	0.304	0.960	0.534
Sub-surface	PFHpA	0.784	0.185	0.894	0.277
Sub-surface	PFOA	0.443	0.493	0.455	0.551
Surface	TOC	0.023	0.961	0.801	0.456
Near Surface	TOC	0.431	0.867	0.592	0.148
Sub-Surface	TOC	0.511	0.546	0.016	0.107
Surface	pH	0.016	0.084	0.125	0.240
Near Surface	pH	0.274	0.031	0.887	0.051
Sub-Surface	pH	0.201	0.069	0.992	0.539

Bold p-value indicates significant difference. A p-value is considered significant if less than 0.01.
* Only parameters with sufficient detections were included (e.g., PFOS in sub-surface did not have sufficient detections and is not included in Table B2).

Relationship Between Parameters

Correlations were assessed using Kendall's tau for TOC, moisture, pH, elevation, and PFAS with sufficient data. With the except of pH and PFAS, the statistically significant correlations were positive, meaning that samples with higher values for one parameter were tied to samples with higher values for the other parameter. No statistically significant correlations were found with elevation. The statistically significant decreasing trends with pH occurred for PFAS in the surface soils. PFOA, which was the only PFAS with sufficient data in all three depth intervals, was correlated with TOC in the near surface and sub-surface soils, but not in the surface soils.

Table B3 Kendall's Tau Correlation Results for Soil

	Parameter*	TOC	pH	Elevation
Surface	**TOC**	*n/a*	-0.300	0.108
	Moisture	**0.402**	-0.086	-0.152
	pH	-0.300	*n/a*	-0.049
	Elevation	0.108	-0.049	*n/a*
	PFOS	**0.358**	**-0.405**	-0.033
	PFOA	0.157	-0.066	-0.219
	PFDA	**0.475**	**-0.372**	-0.042
	PFUnA	**0.532**	**-0.443**	0.027
Near Surface	**TOC**	n/a	-0.063	0.001
	Moisture	0.248	0.163	-0.203
	pH	-0.063	n/a	0.062
	Elevation	0.001	0.062	n/a
	PFHxA	0.203	-0.131	-0.129
	PFHpA	0.316	-0.138	-0.070
	PFOS	**0.433**	-0.029	-0.118
	PFOA	**0.346**	-0.149	-0.129
Sub-Surface	**TOC**	n/a	0.126	0.130
	Moisture	0.099	-0.052	-0.215
	pH	0.126	n/a	0.001
	Elevation	0.130	0.001	n/a
	PFHpA	**0.357**	-0.060	0.092
	PFOA	**0.391**	-0.145	0.085

Bold tau value indicates significant correlation (i.e., corresponding p-value is less than 0.05). **Red** indicates positive correlation; **blue** indicates negative correlation.

*Only parameters with sufficient detections were included (e.g., PFOS in sub-surface did not have sufficient detections and is not included in Table B3).

n/a: parameter correlation with itself is not applicable to this analysis.

Relationship Between Soil and SPLP Results

Concentrations of PFOS and PFOA in leachate from SPLP conducted on select soil samples were assessed for correlation with soil concentrations and with soil concentrations normalized to soil TOC. Results are presented in Table B4 of this technical memorandum and Appendix G of the Regional Air Deposition Study Report (C.T. Male and BEC, 2021). When all soil depths were aggregated, PFOA concentrations in soil and

leachate and TOC-normalized soil and leachate exhibited a statistically significant positive correlation. When considering individual depth intervals, soil concentrations of PFOA and TOC-normalized PFOA were significantly correlated with SPLP leachate concentrations of PFOA from the near-surface soils, and sub-surface soil PFOA was correlated with SPLP PFOA, but no significant correlations were found between surface soil and SPLP PFOA concentrations. In addition, no significant correlations were found between SPLP PFOS and soil PFOS or TOC-normalized PFOS.

Table B4 Kendall's Tau Correlation Results for SPLP Leachate and Soil

	All Depths	Surface	Near-Surface	Sub-Surface
PFOS	0.178	0.164	0.290	i.d.
PFOA	**0.711**	0.425	**0.677**	**0.760**
PFOS/TOC*	0.243	-0.407	0.375	i.d.
PFOA/TOC*	**0.593**	0.287	**0.548**	0.306

Bold tau value indicates significant correlation (i.e., corresponding p-value is less than 0.05). No multiple comparison correction was used for the analysis presented in this table.
*TOC-normalized
i.d.: insufficient data for analysis

Evaluation by Sample Collection Location

For this study, and as described in the Work Plan (C.T. Male, 2019), the soil samples were collected from sectors designated radially and correlated with the display of wind conditions by direction on a wind rose (16 sectors). The target number of sampling locations in each sector was two to six. To provide a more robust data set for statistical analysis, the sectors were grouped into quadrants consisting of four sectors. Four sets of quadrants were used so that all possible groupings of four adjacent sectors were evaluated as shown at the top of Table B5 below. The results of the comparisons are presented in Table B5 of this technical memorandum. If the result of the Kruskal-Wallis test indicated significance (Table B5 of this technical memorandum), a post-hoc Dunn test was conducted to evaluate the groups by pairs (Attachment B1 of this technical memorandum).

Most quadrant comparisons indicated no statistically significant differences based on direction. Statistically significant differences were found at all three depths but for different PFAS. Three of the five significant differences occurred when the quadrants were divided based on a northeast grouping of sectors 2 through 5 (approximately 22.5 to 112.5 degrees east of north), but each of the significant results was for a different parameter and depth.

Table B5 Results of Kruskal-Wallis Tests by Quadrants

	Parameter*	(1-4), (5-8), (9-12), (13-16)	(2-5), (6-9), (10-13), (14-1)	(3-6), (7-10), (11-14), (15-2)	(4-7), (8-11), (12-15), (16-3)
Surface	**PFOS**	0.378	0.058	0.166	0.114
	PFOA	0.382	0.109	0.183	0.312
	PFDA	0.074	0.020	0.078	**0.010**
	PFUnA	0.061	**0.009**	0.023	0.012
Near Surface	**PFHxA**	0.853	0.807	0.131	0.578
	PFHpA	0.060	0.012	0.035	0.027
	PFOS	0.667	0.708	0.497	0.251
	PFOA	0.171	**0.005**	0.073	0.206
Sub-Surface	**PFHpA**	0.058	**0.007**	**0.001**	0.024
	PFOA	0.151	0.012	0.011	0.053

Bold tau value indicates significant difference (i.e., corresponding p-value is less than 0.01.
*Only parameters with sufficient detections were included (e.g., PFOS in sub-surface did not have sufficient detections and is not included in Table B5).

References

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C.T. Male, 2019a. Final Regional Air Deposition Study Work Plan for the Village of Hoosick Falls, Rensselaer County, New York. August 23, 2019.

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Attachments

Attachment B1 Dunn Test Results

Attachment B1: Dunn Test Results

Appendix B

Regional Air Deposition Study Report

Village of Hoosick Falls, New York

Introduction

This attachment includes results output from Dunn tests, conducted for pairwise comparison after significant results from a Kruskal-Wallis test. Tests were conducted for four data groupings: depth interval, soil type, tree cover percentage, and tree cover type. In some cases, the available data consisted of only two groups; in those cases, the test is equivalent to a Mann-Whitney-Wilcoxon test.

The results consist of a repeat of the Kruskal-Wallis results and a table of Dunn test results. The table shows all groups considered. For each group pairing, the Dunn z-test statistic is presented on one line, and the corresponding p-value is given on the next line. If the p-value is less than the alpha given underneath the table (alpha = 0.05), the null hypothesis (Ho) is rejected. The null hypothesis is that there is no difference between the groups. If the null hypothesis is rejected ($p \leq$ alpha), the p-value is followed by an asterisk. This marker of significance indicates a between-group difference for that pairing.

data: PFHpA and Depth

Kruskal-Wallis chi-squared = 52.3416, df = 2, p-value = 0

Comparison of PFHpA by Depth

(Benjamini-Hochberg)

	Near Surface	Subsurface
Subsurface	2.329	
	0.0199*	
Surface	7.096	4.768
	0.0000*	0.0000*

data: PFHxA and Depth

Kruskal-Wallis chi-squared = 32.5575, df = 2, p-value = 0

Comparison of PFHxA by Depth

(Benjamini-Hochberg)

	Near Surface	Subsurface
Subsurface	2.817	
	0.0048*	
Surface	5.706	2.889
	0.0000*	0.0058*

data: PFOS and Depth

Kruskal-Wallis chi-squared = 103.599, df = 2, p-value = 0

Comparison of PFOS by Depth

(Benjamini-Hochberg)

	Near Surface	Subsurface
Subsurface	4.700	
	0.0000*	
Surface	-5.468	-10.169
	0.0000*	0.0000*

Attachment B1: Dunn Test Results

Appendix B

Regional Air Deposition Study Report

Village of Hoosick Falls, New York

data: PFOA and Depth

Kruskal-Wallis chi-squared = 60.0069, df = 2, p-value = 0

Comparison of PFOA by Depth

(Benjamini-Hochberg)

	Near Surface	Subsurface
Subsurface	1.210	
	0.226	
Surface	7.231	6.021
	0.0000*	0.0000*

data: Total Organic Carbon and Depth

Kruskal-Wallis chi-squared = 122.711, df = 2, p-value = 0

Comparison of Total Organic Carbon by Depth

(Benjamini-Hochberg)

	Near Surface	Subsurface
Subsurface	4.169	
	0.0000*	
Surface	-6.803	-10.973
	0.0000*	0.0000*

Attachement B1: Dunn Test Results

Appendix B

Regional Air Deposition Study Report

Village of Hoosick Falls, New York

data: PFUnA and Quadrant_2 (Surface)

Kruskal-Wallis chi-squared = 11.4711, df = 3, p-value = 0.01

Comparison of PFUnA by Quadrant

(Benjamini-Hochberg)

	10-13	14-1	2-5
14-1	0.026		
	0.979		
2-5	-2.773	-2.577	
	0.0167*	0.0199*	
6-9	0.076	0.044	2.800
	1.000	1.000	0.0306*

data: PFDA and Quadrant_4 (Surface)

Kruskal-Wallis chi-squared = 11.4226, df = 3, p-value = 0.01

Comparison of PFDA by Quadrant

(Benjamini-Hochberg)

	12-15	16-3	4-7
16-3	-2.290		
	0.0661*		
4-7	-0.201	2.278	
	0.840	0.0455*	
8-11	0.922	3.298	1.216
	0.428	0.0058*	0.3361

data: PFOA and Quadrant_2 (Near Surface)

Kruskal-Wallis chi-squared = 12.8676, df = 3, p-value = 0

Comparison of PFOA by Quadrant

(Benjamini-Hochberg)

	10-13	14-1	2-5
14-1	1.089		
	0.276		
2-5	-1.306	-2.290	
	0.287	0.0440*	
6-9	-2.445	-3.328	-1.162
	0.0435*	0.0053*	0.2945

Attachement B1: Dunn Test Results

Appendix B

Regional Air Deposition Study Report

Village of Hoosick Falls, New York

data: PFHpA and Quadrant_2 (Subsurface)

Kruskal-Wallis chi-squared = 12.2596, df = 3, p-value = 0.01

Comparison of PFHpA by Quadrant

(Benjamini-Hochberg)

	10-13	14-1	2-5
14-1	1.058		
	0.348		
2-5	-2.089	-2.979	
	0.074	0.0174*	
6-9	-1.824	-2.725	0.228
	0.102	0.0193*	0.8196

data: PFHpA and Quadrant_3 (Subsurface)

Kruskal-Wallis chi-squared = 16.9025, df = 3, p-value = 0

Comparison of PFHpA by Quadrant

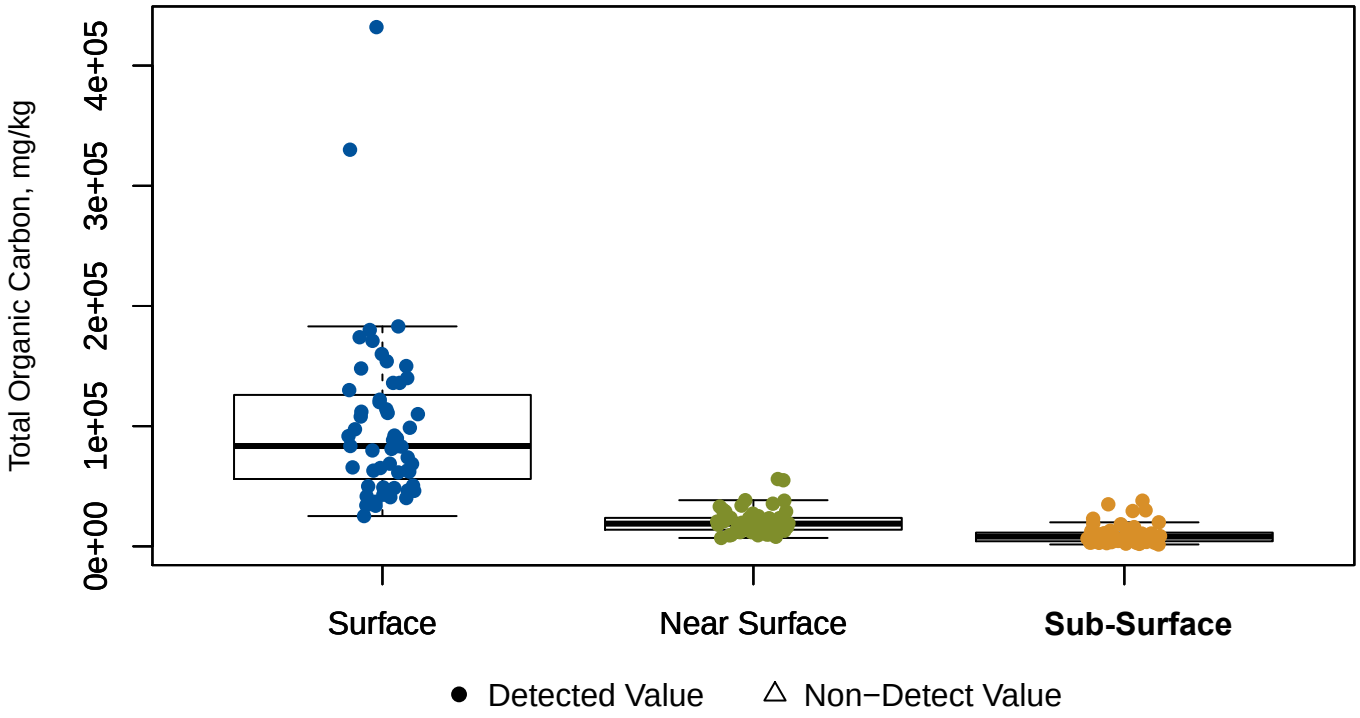
(Benjamini-Hochberg)

	11-14	15-2	3-6
15-2	-0.449		
	0.654		
3-6	-3.617	-3.139	
	0.0018*	0.0051*	
7-10	-2.168	-1.729	1.232
	0.060	0.126	0.2614

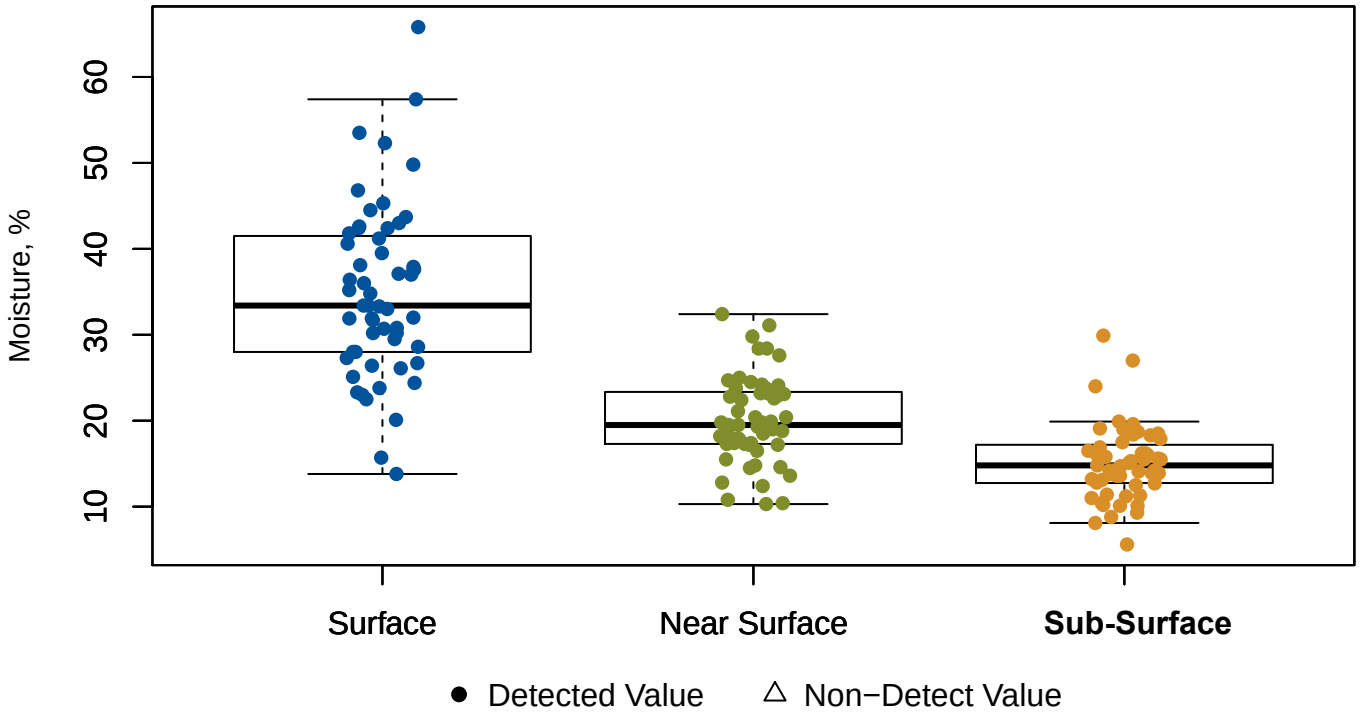
Appendix C

Plots- Study Results by Sample Depth Interval

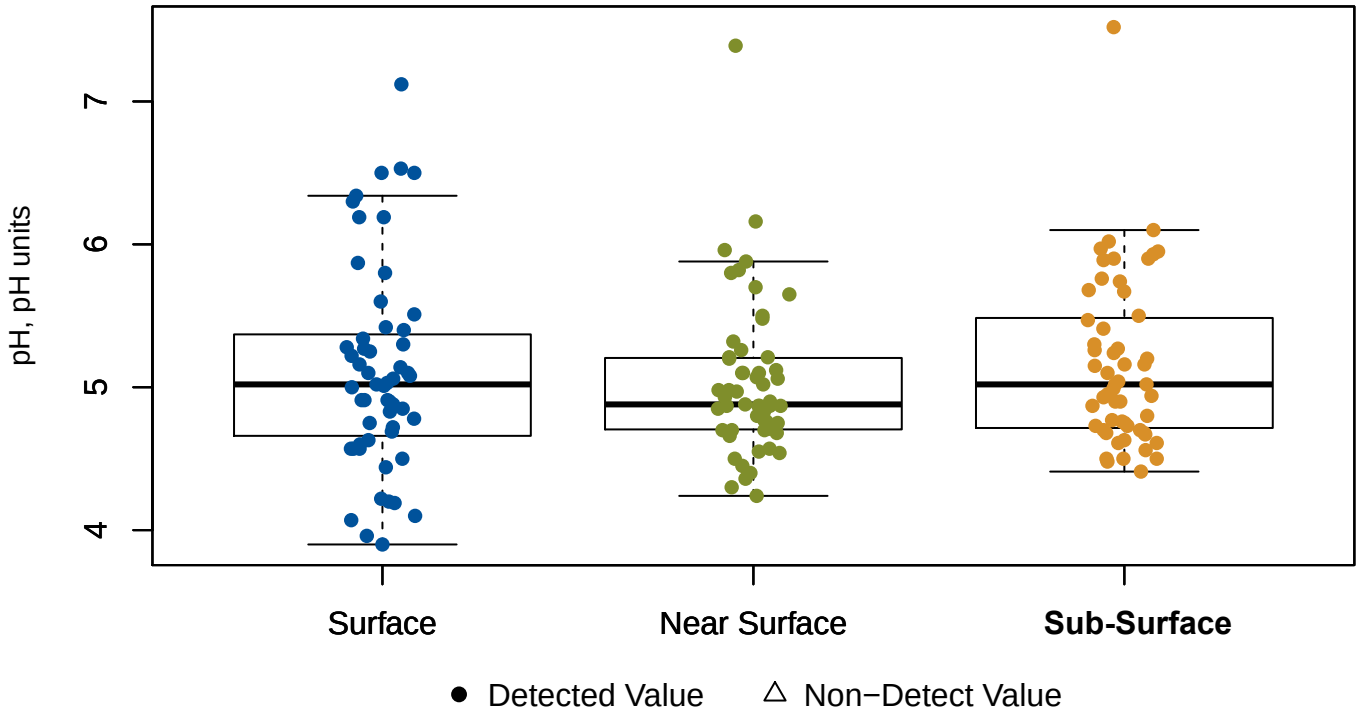
Total Organic Carbon



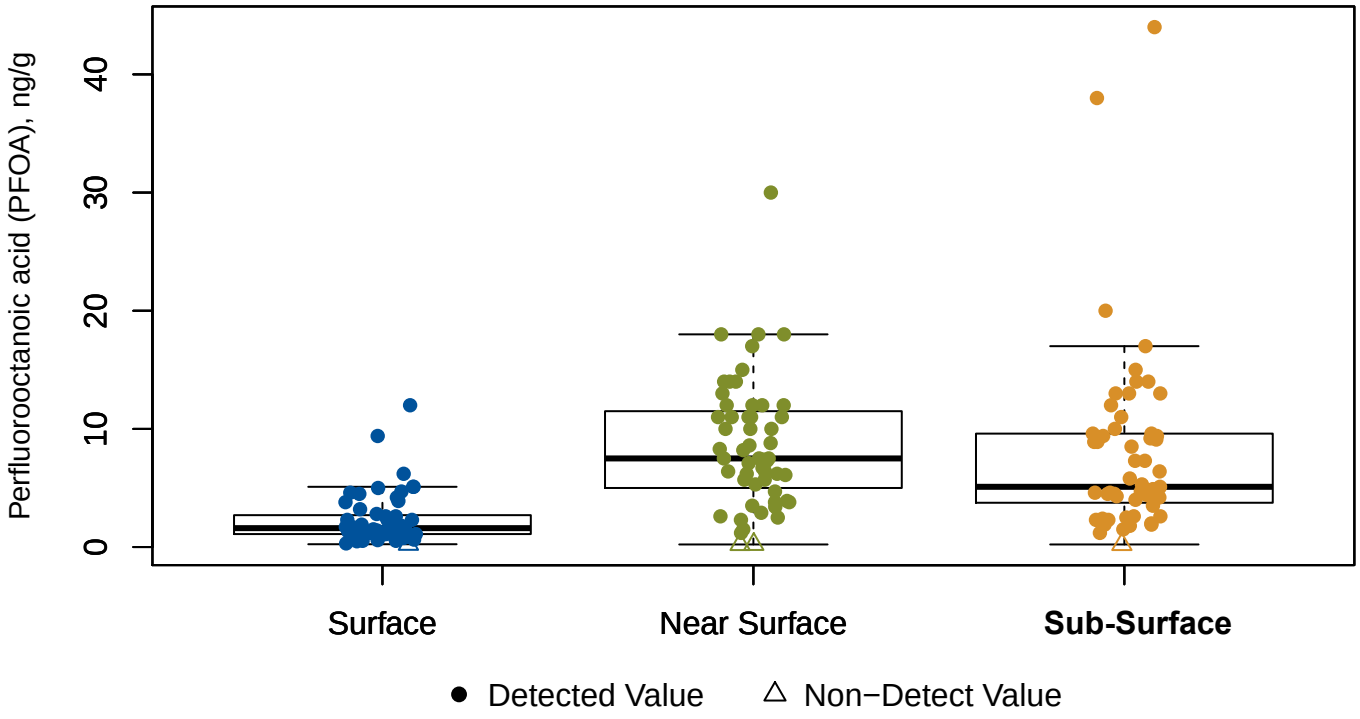
Moisture



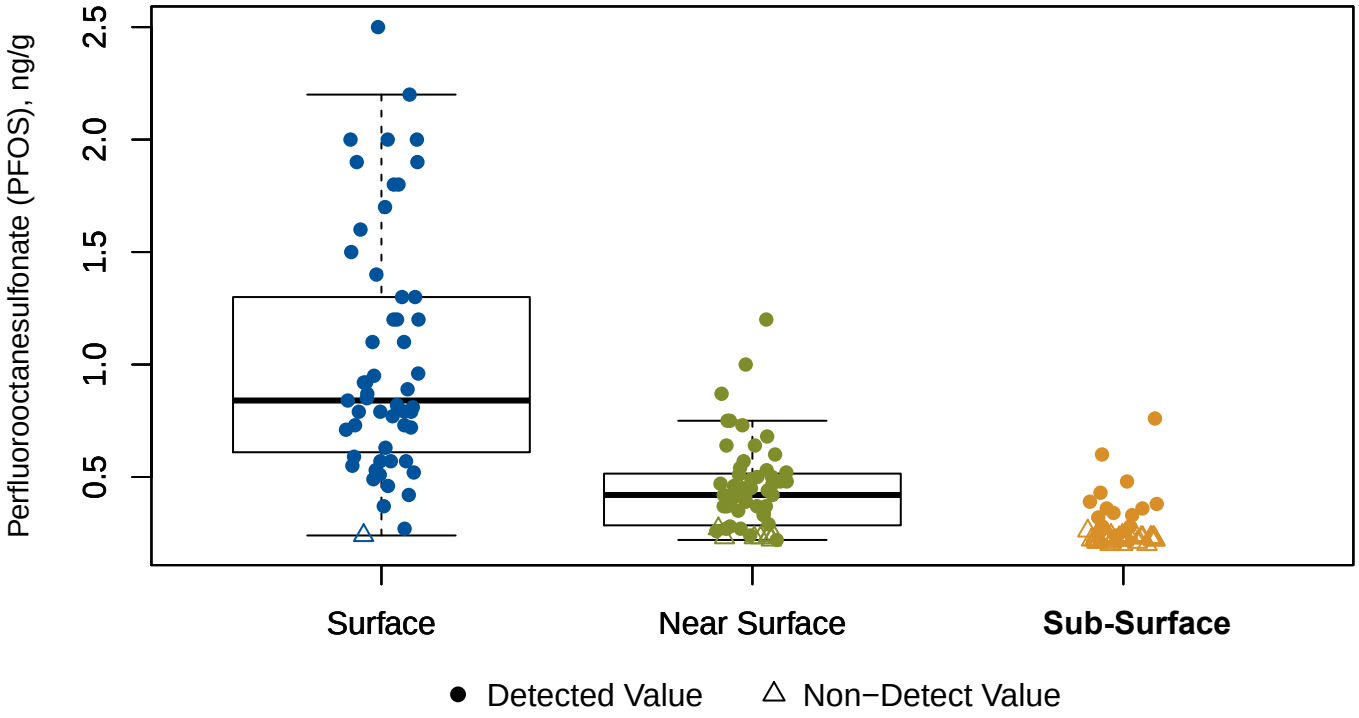
pH



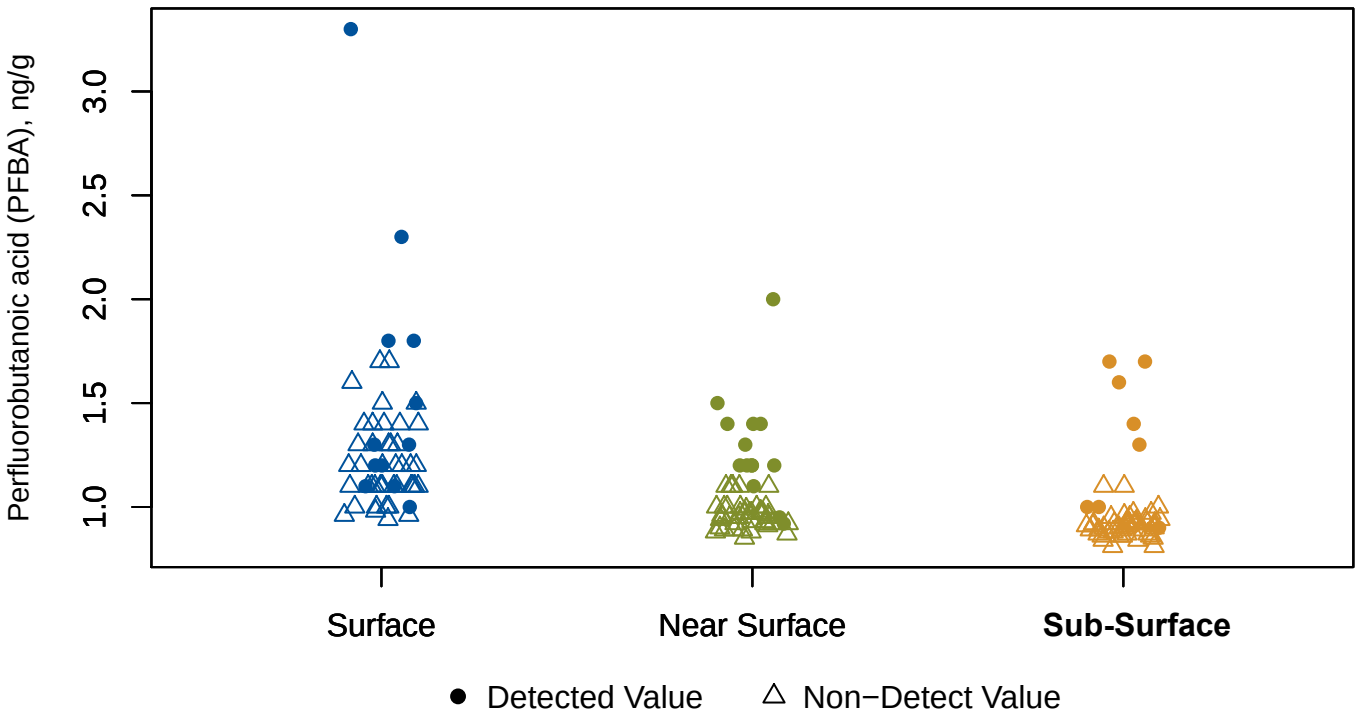
Perfluorooctanoic acid (PFOA)



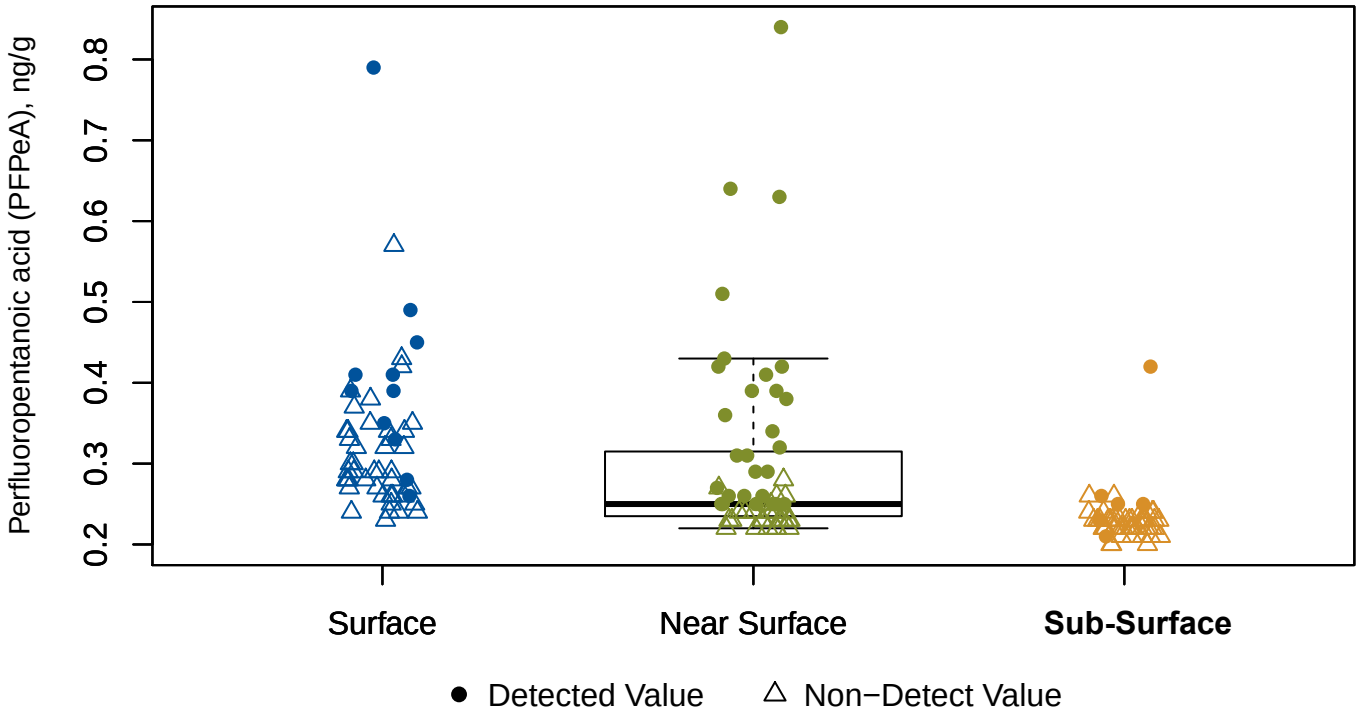
Perfluorooctanesulfonate (PFOS)



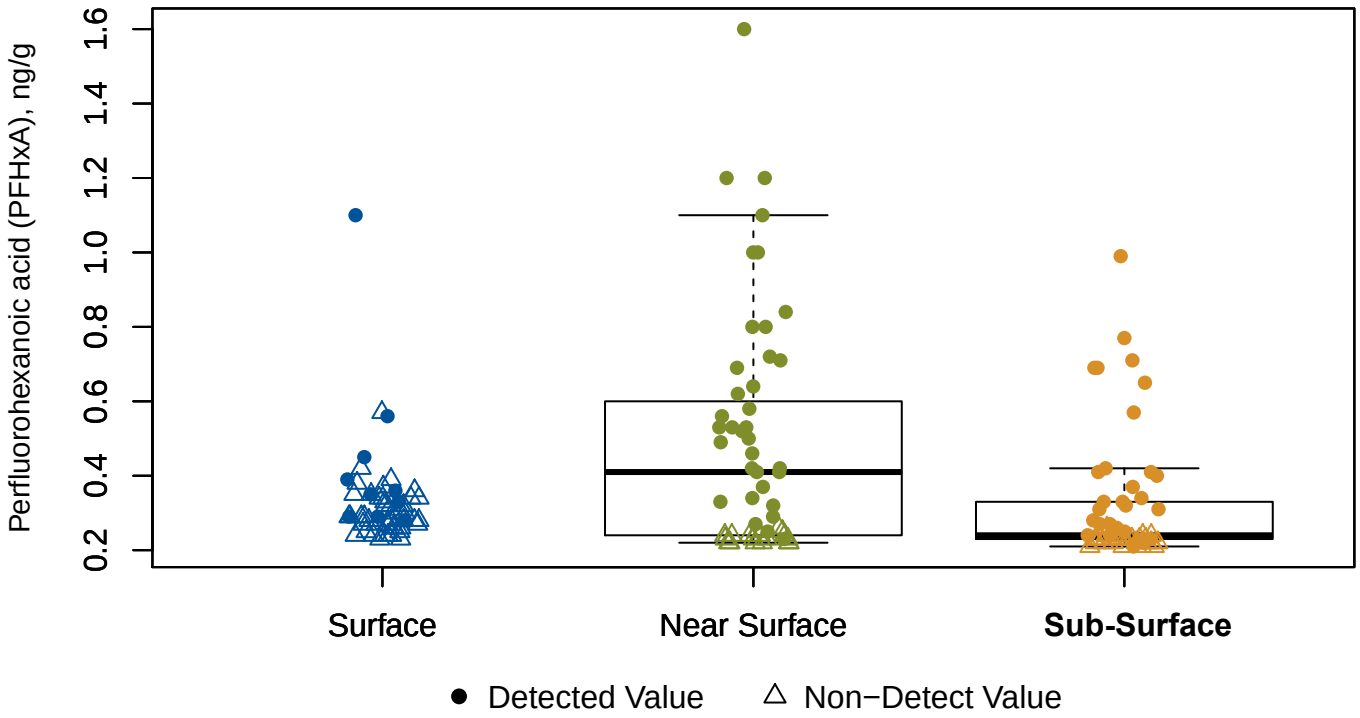
Perfluorobutanoic acid (PFBA)



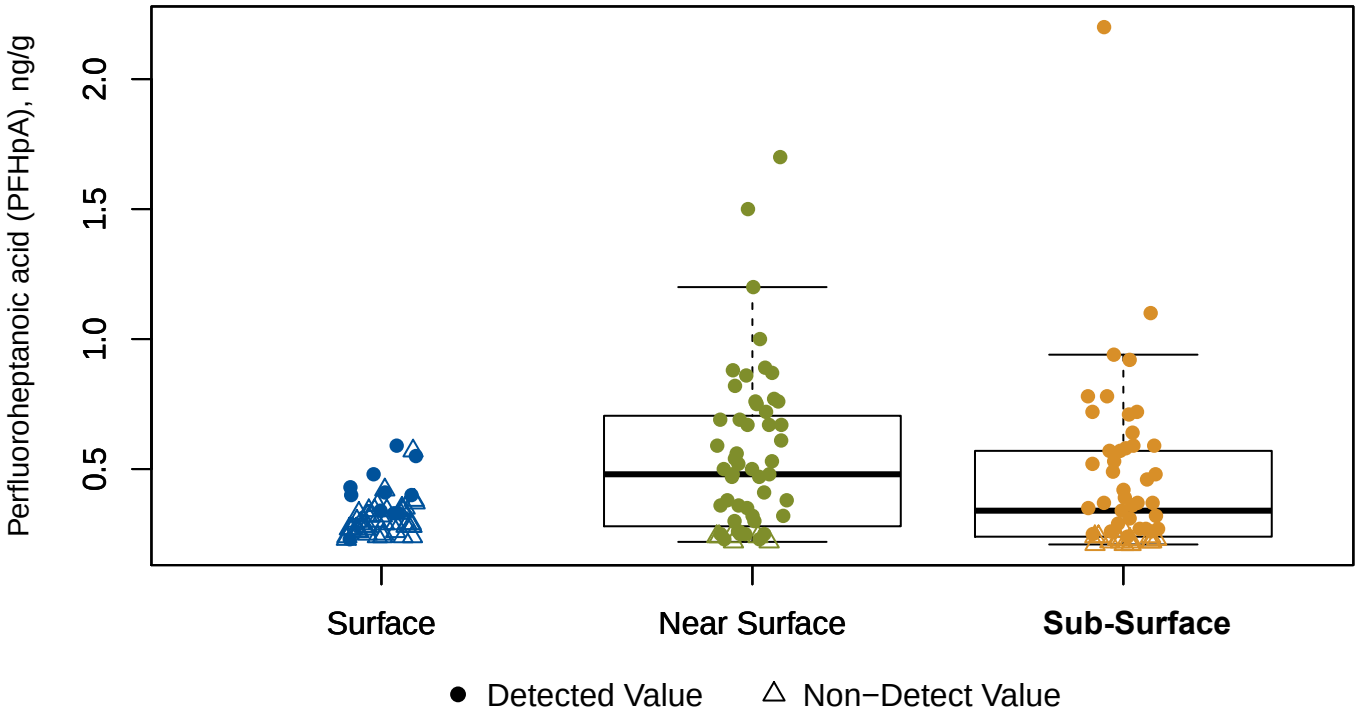
Perfluoropentanoic acid (PFPeA)



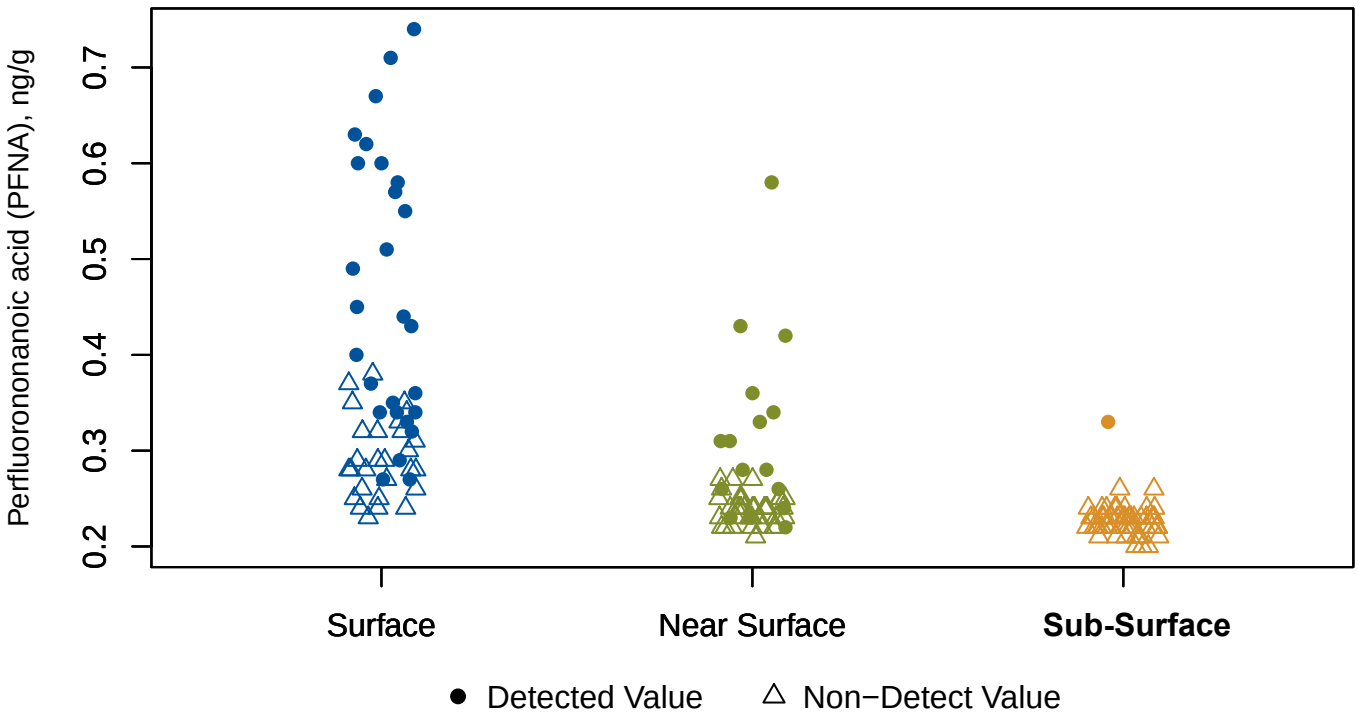
Perfluorohexanoic acid (PFHxA)



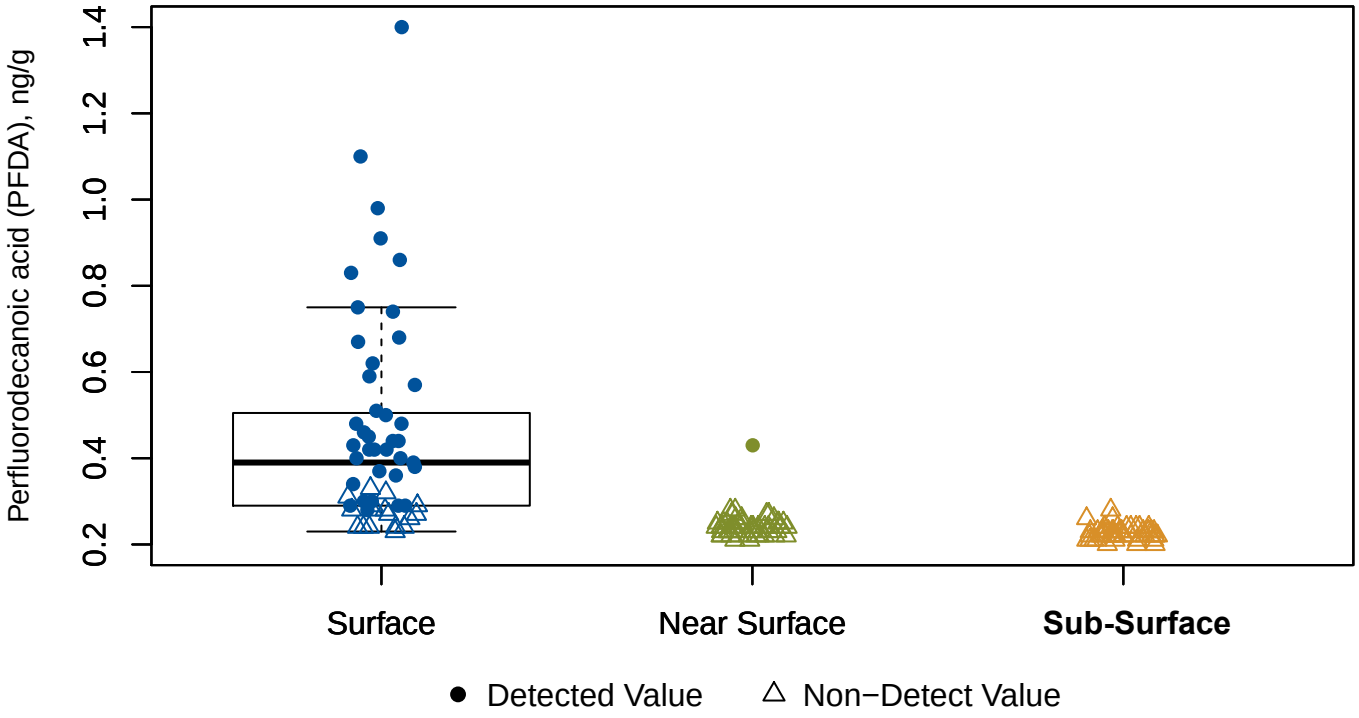
Perfluoroheptanoic acid (PFHpA)



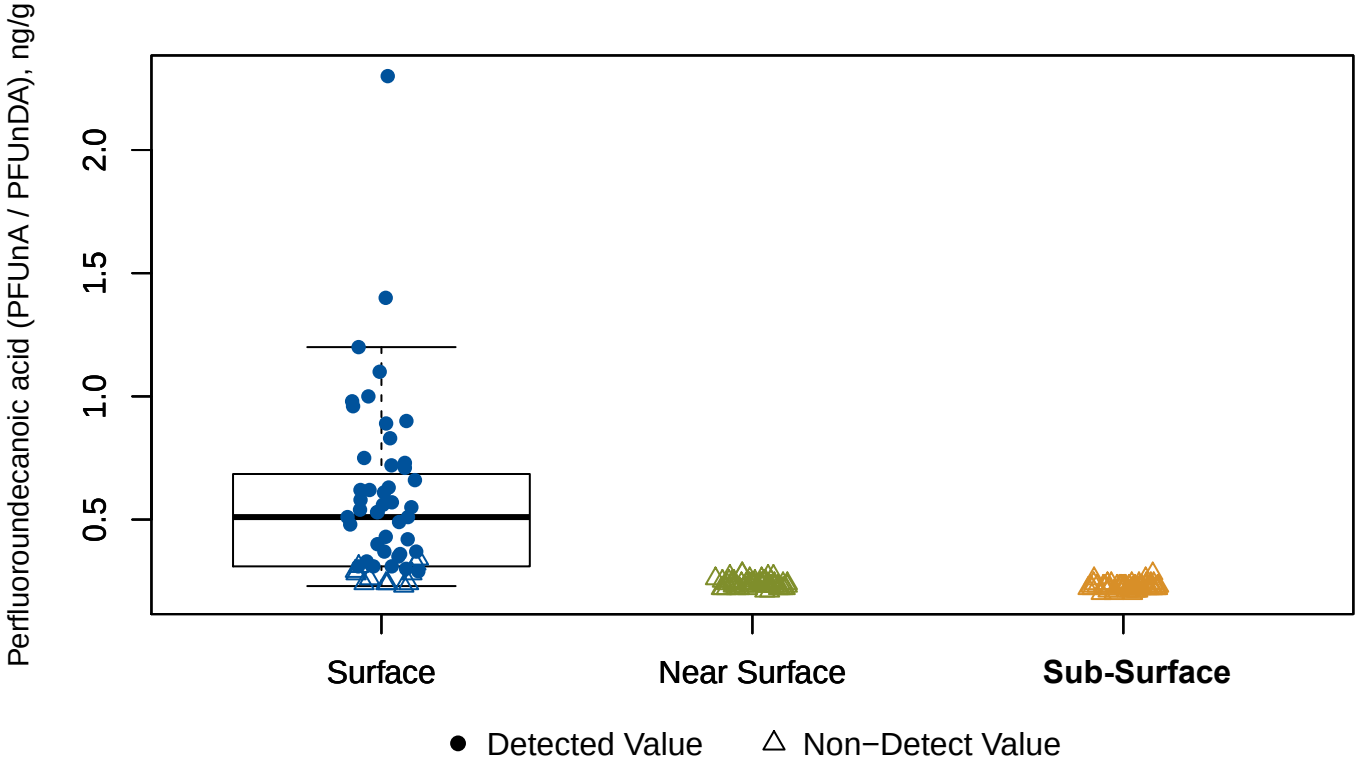
Perfluorononanoic acid (PFNA)



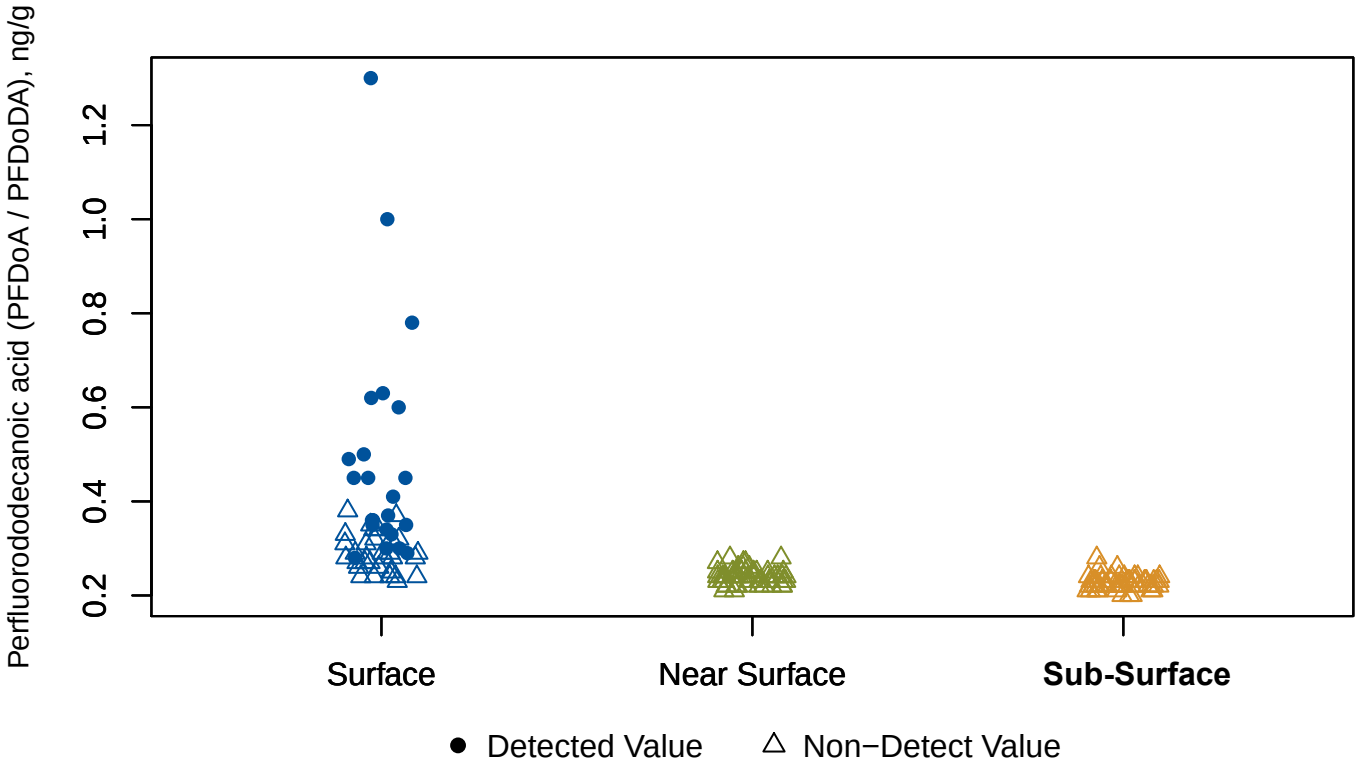
Perfluorodecanoic acid (PFDA)



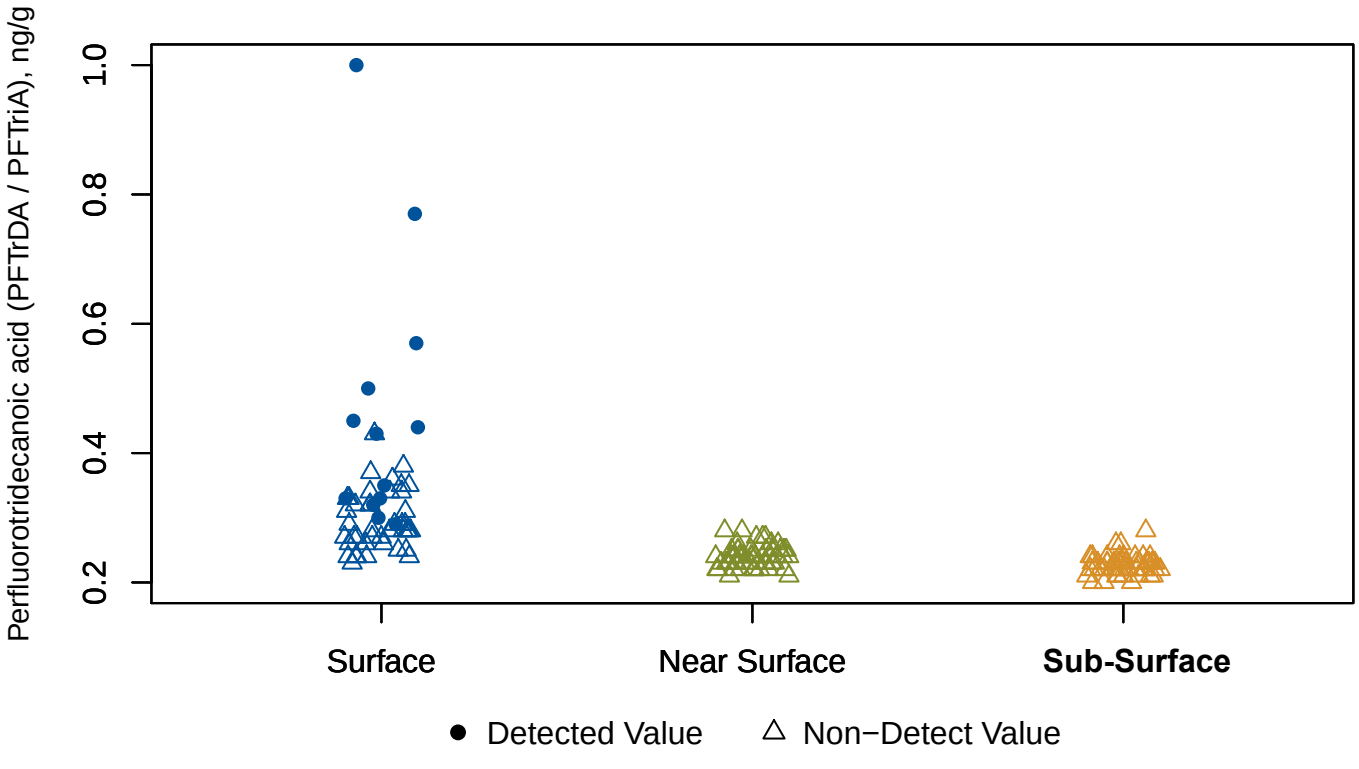
Perfluoroundecanoic acid (PFUnA / PFUnDA)



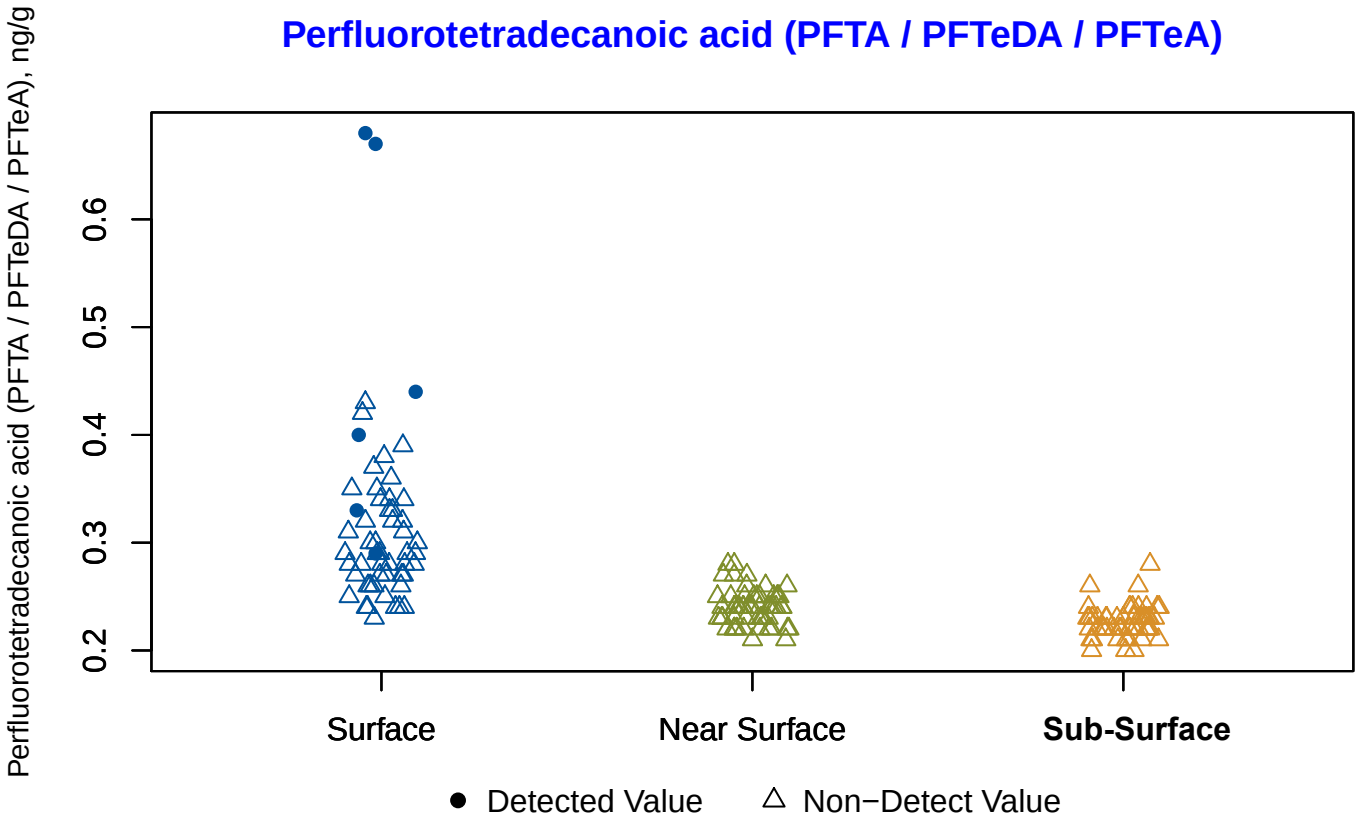
Perfluorododecanoic acid (PFDoA / PFDoDA)



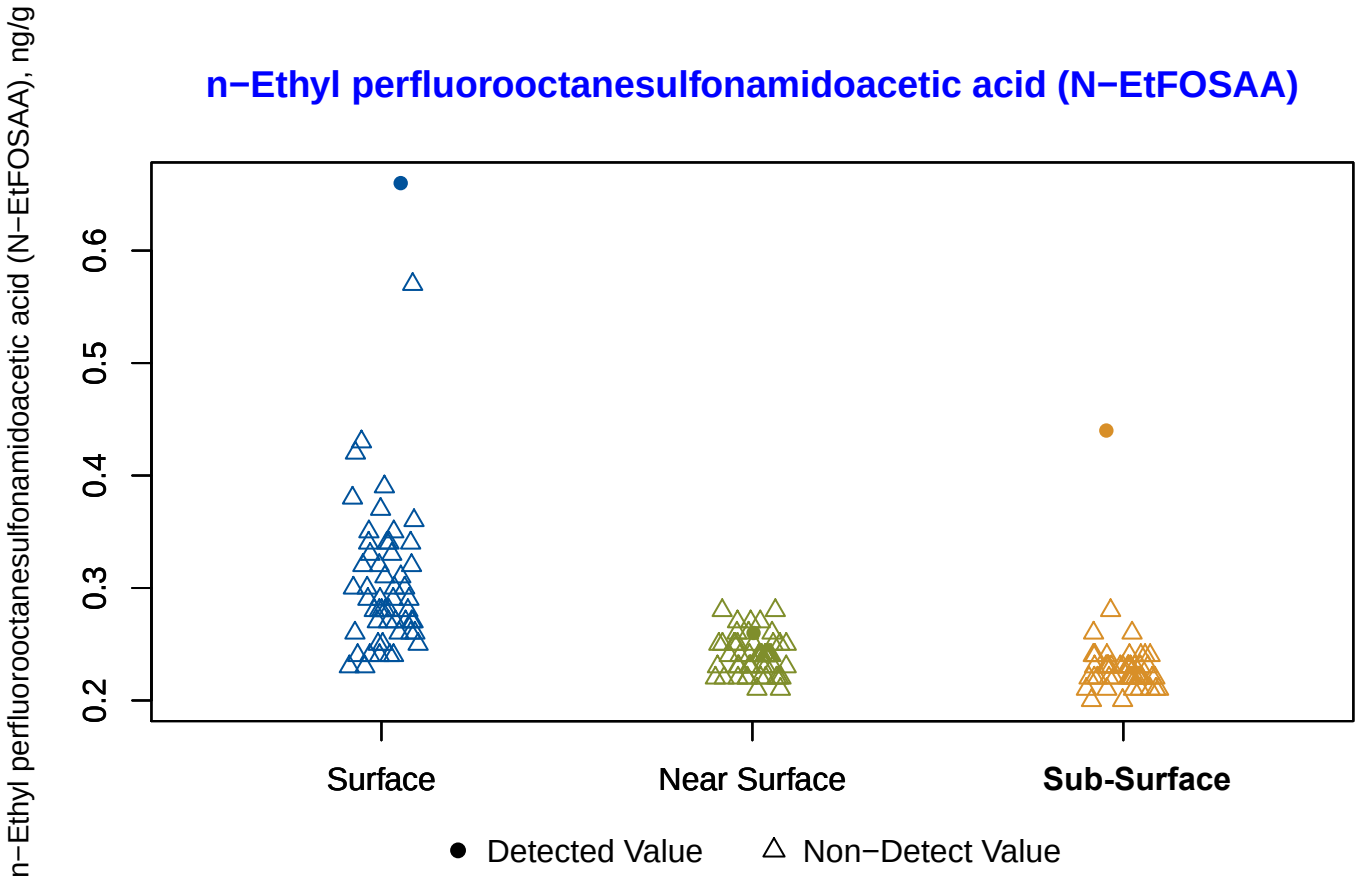
Perfluorotridecanoic acid (PFTrDA / PFTriA)



Perfluorotetradecanoic acid (PFTA / PFTeDA / PFTeA)



n−Ethyl perfluorooctanesulfonamidoacetic acid (N−EtFOSAA)

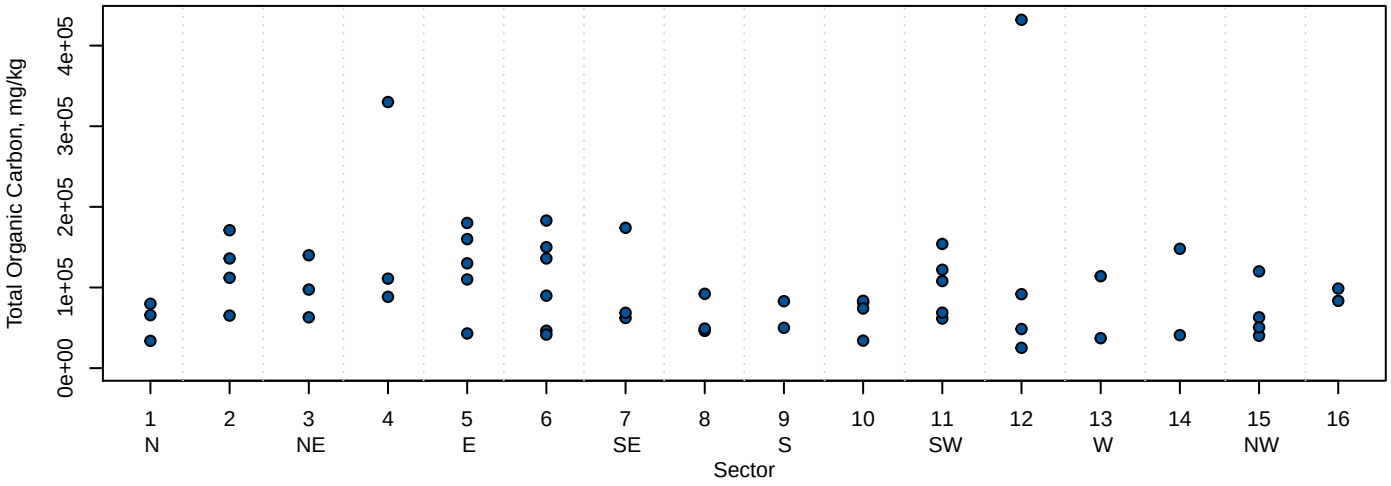


Appendix D

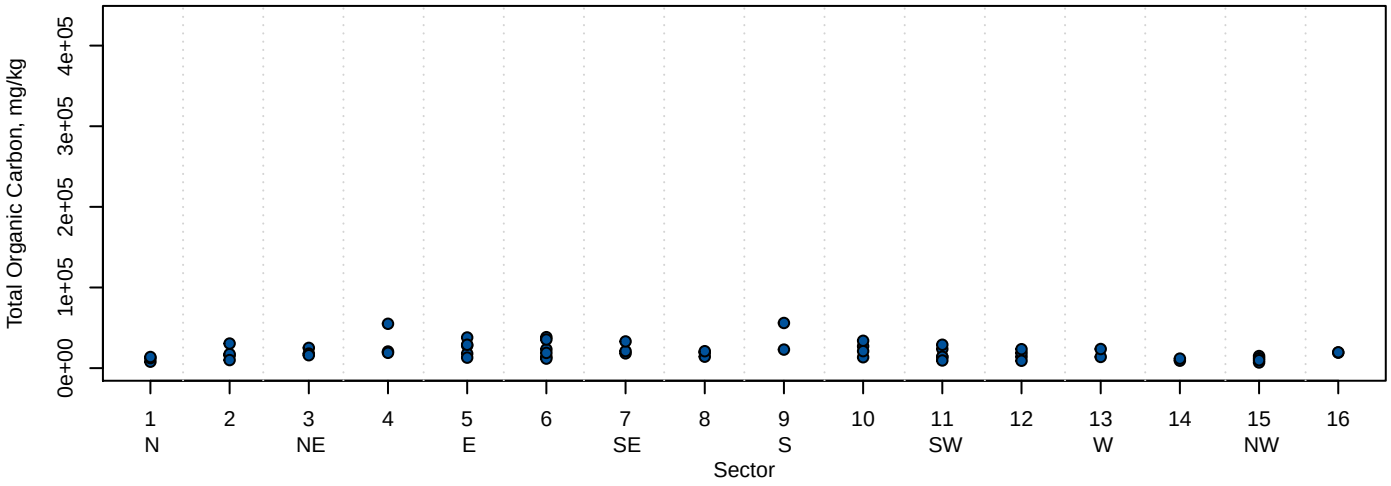
Parameter Strip Plots by Sector

Total Organic Carbon

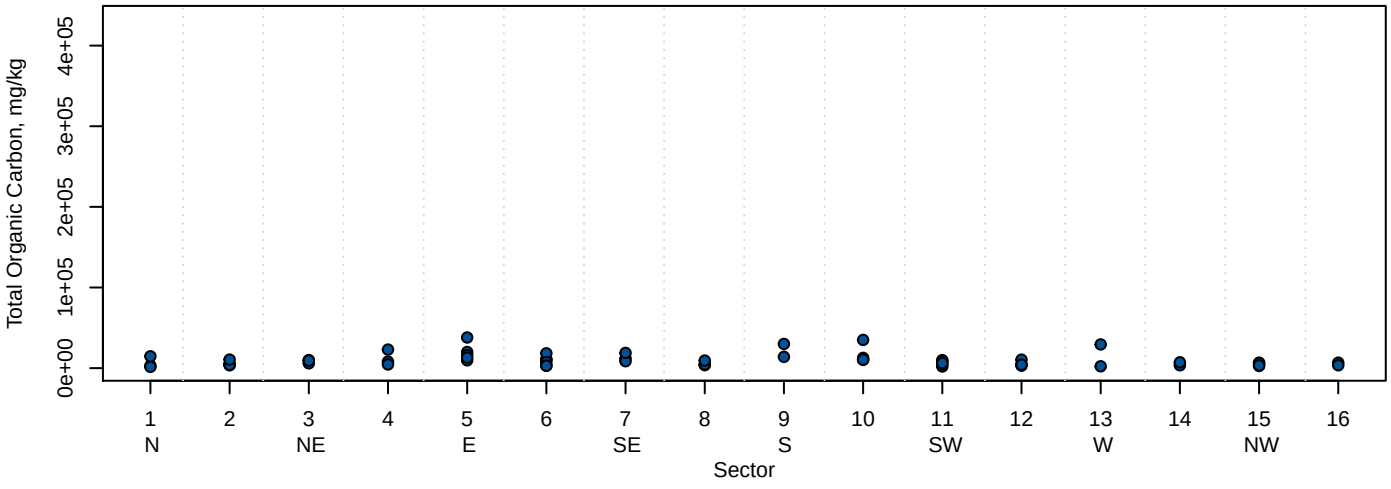
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

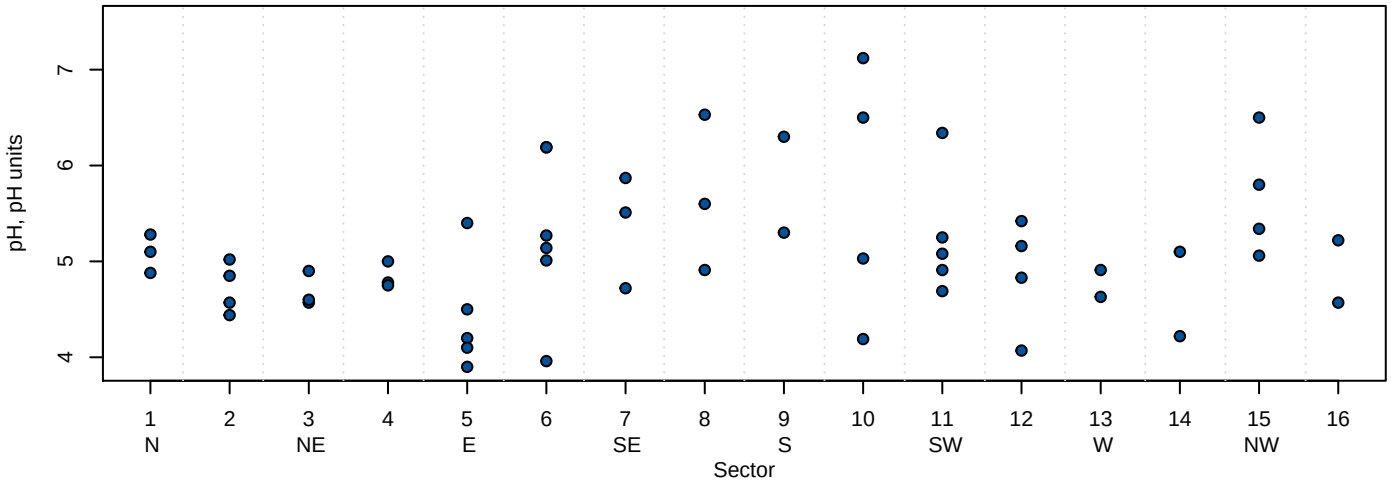


Sub−Surface Soil (1 − 2 feet)

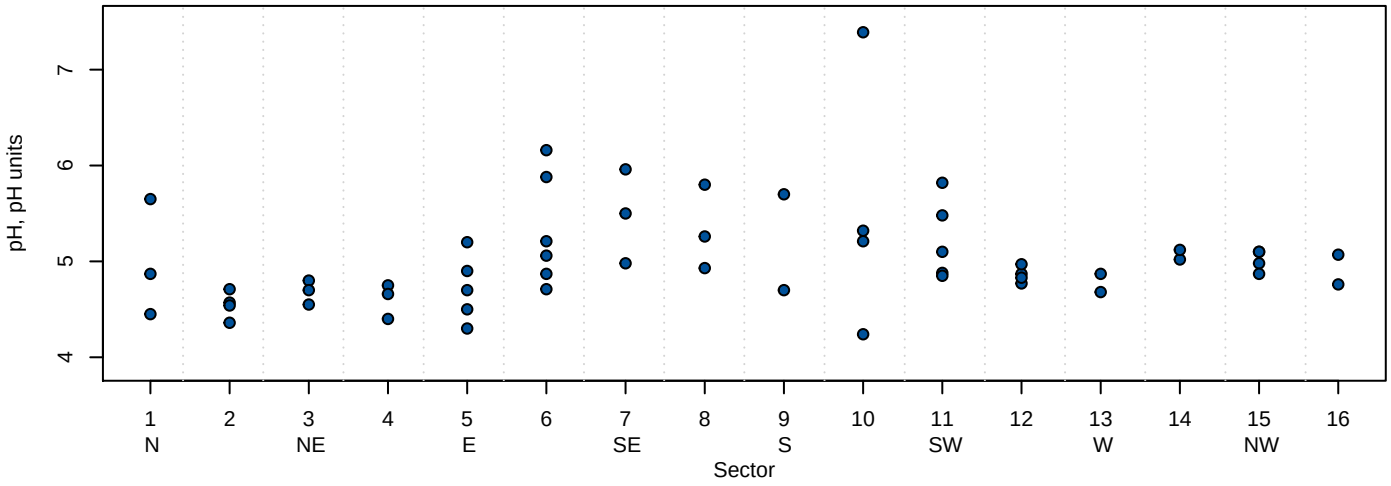


pH

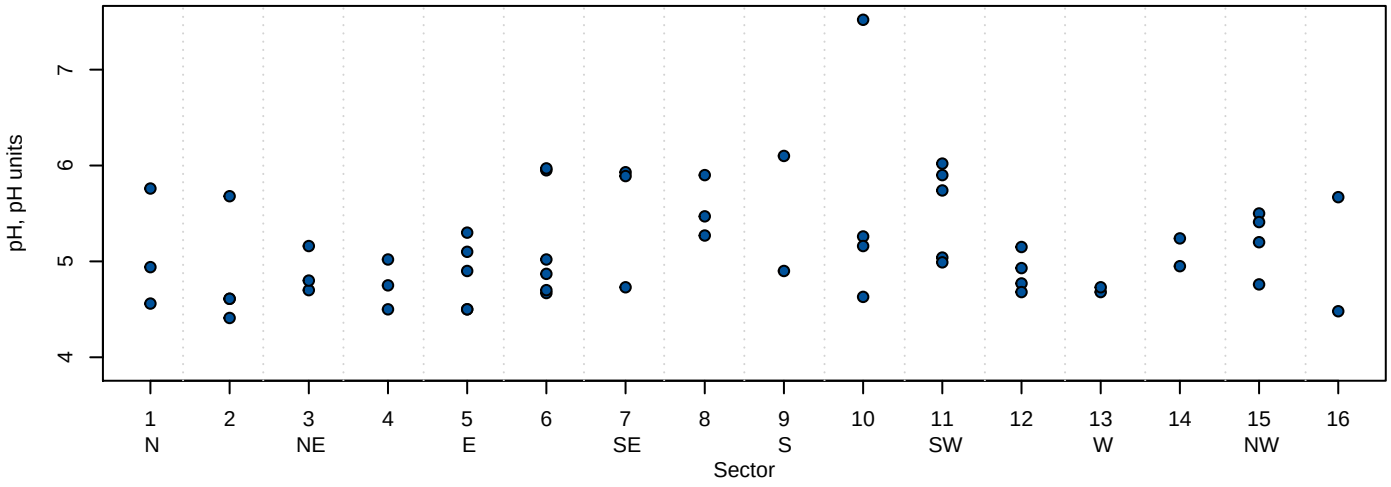
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

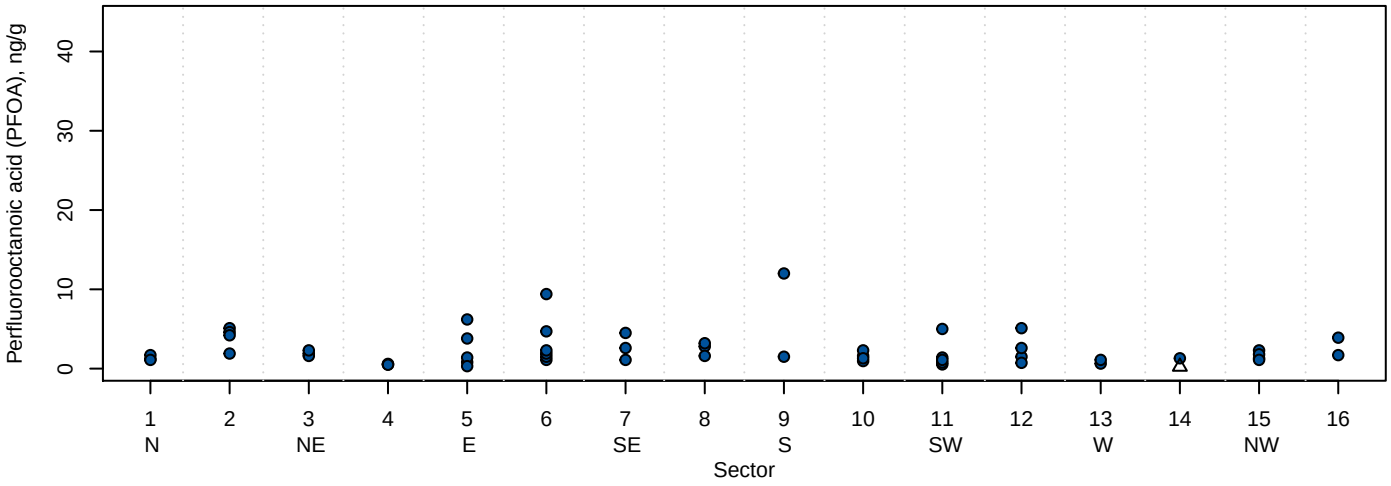


Sub−Surface Soil (1 − 2 feet)

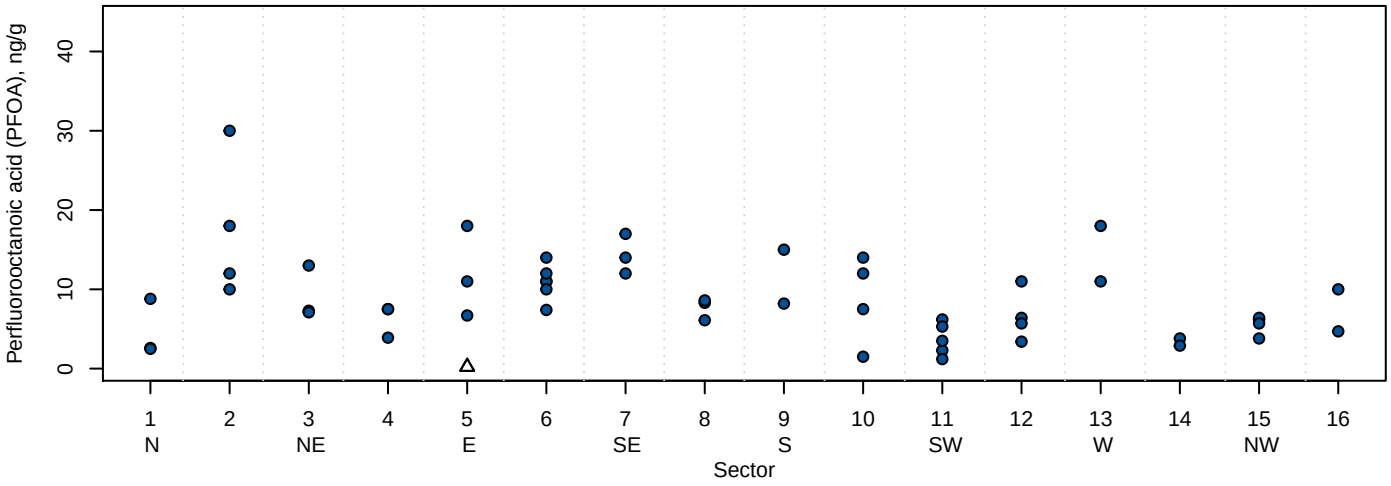


Perfluorooctanoic acid (PFOA)

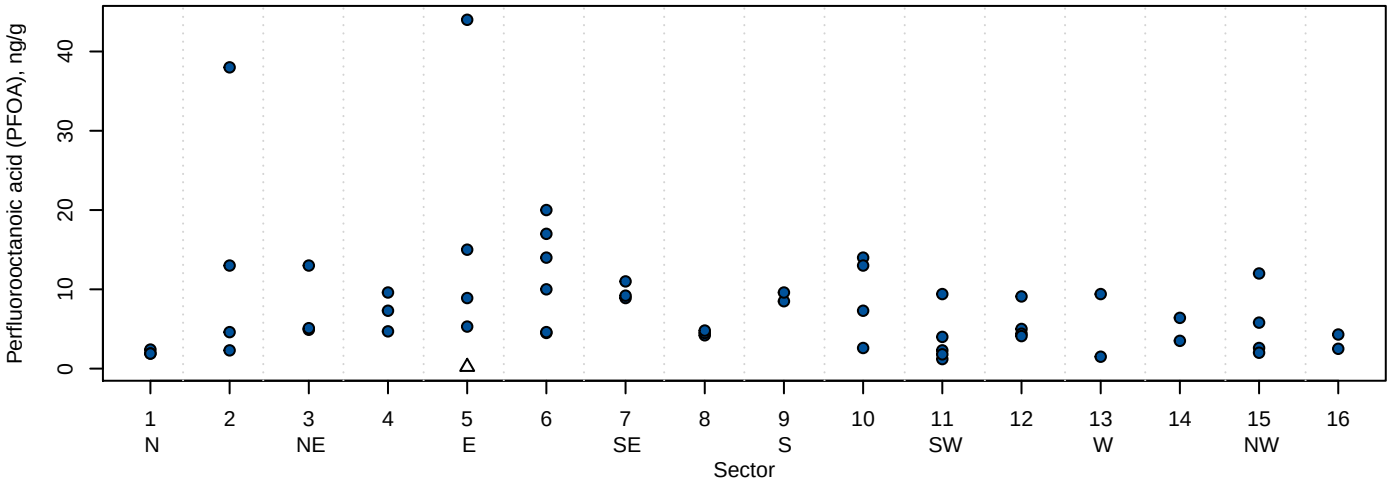
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

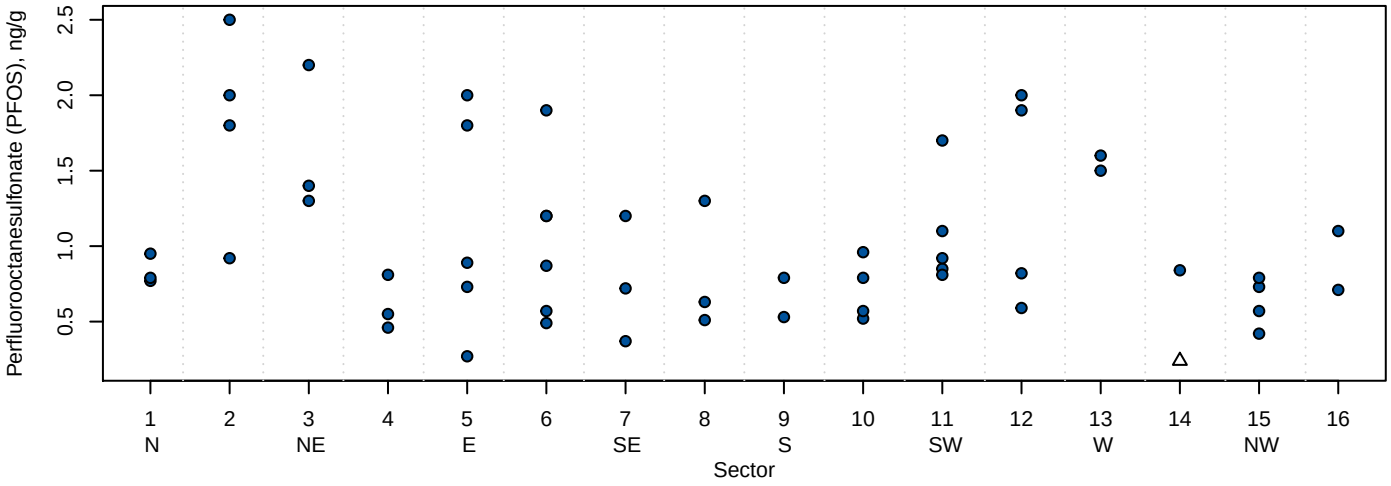


Sub−Surface Soil (1 − 2 feet)

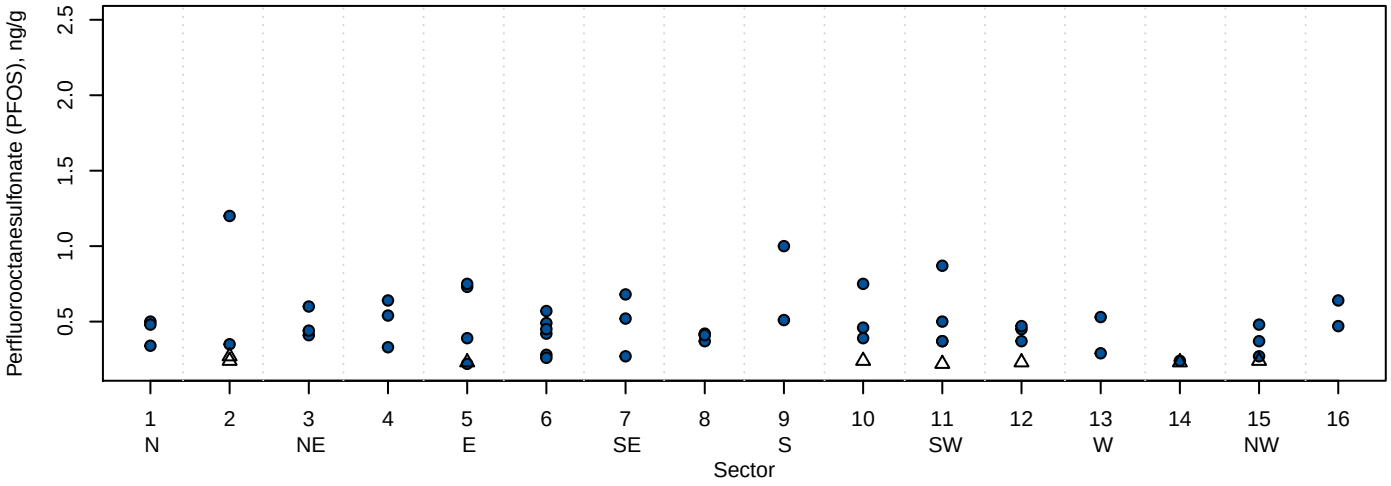


Perfluorooctanesulfonate (PFOS)

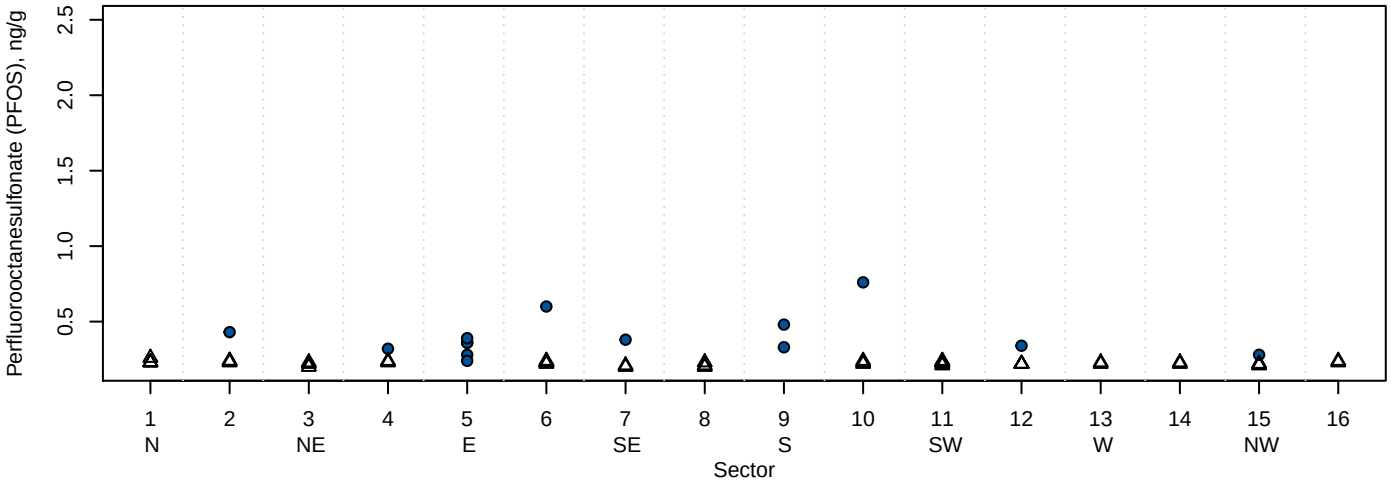
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

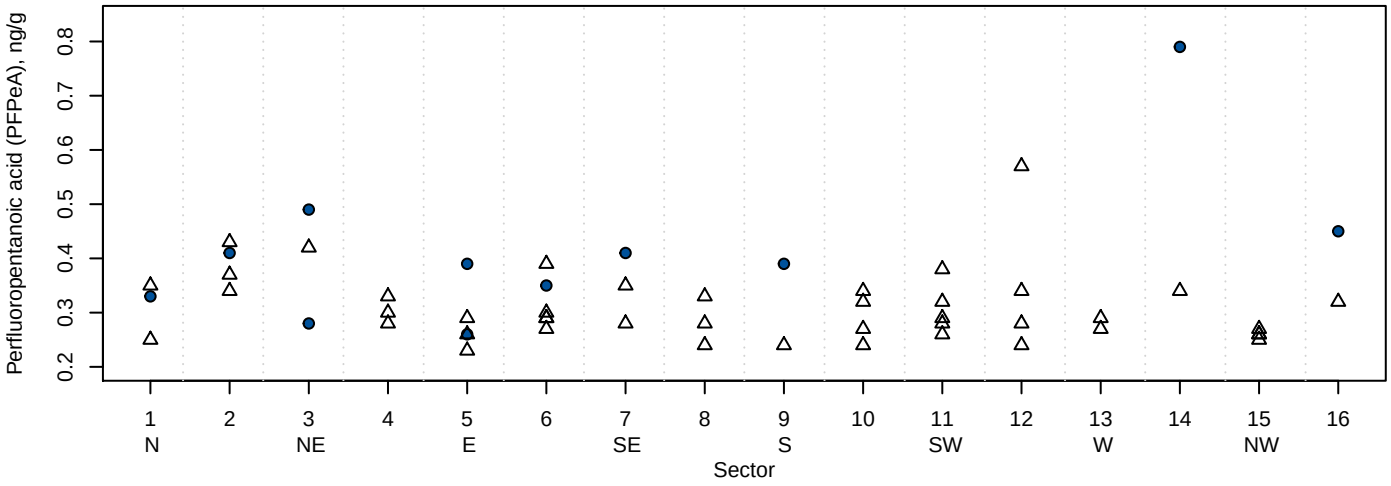


Sub−Surface Soil (1 − 2 feet)

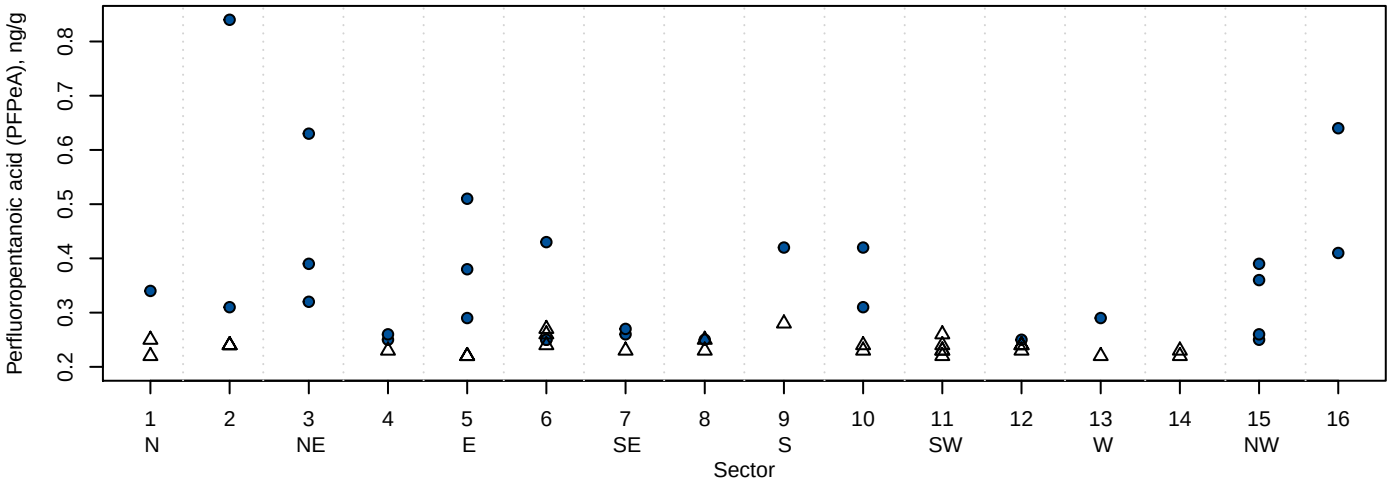


Perfluoropentanoic acid (PFPeA)

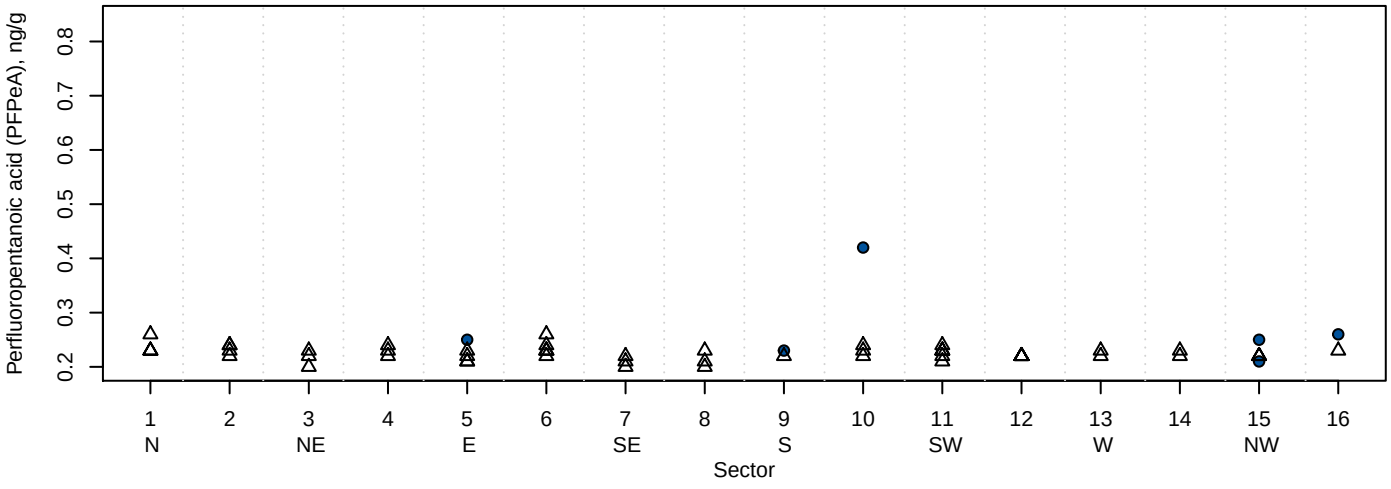
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

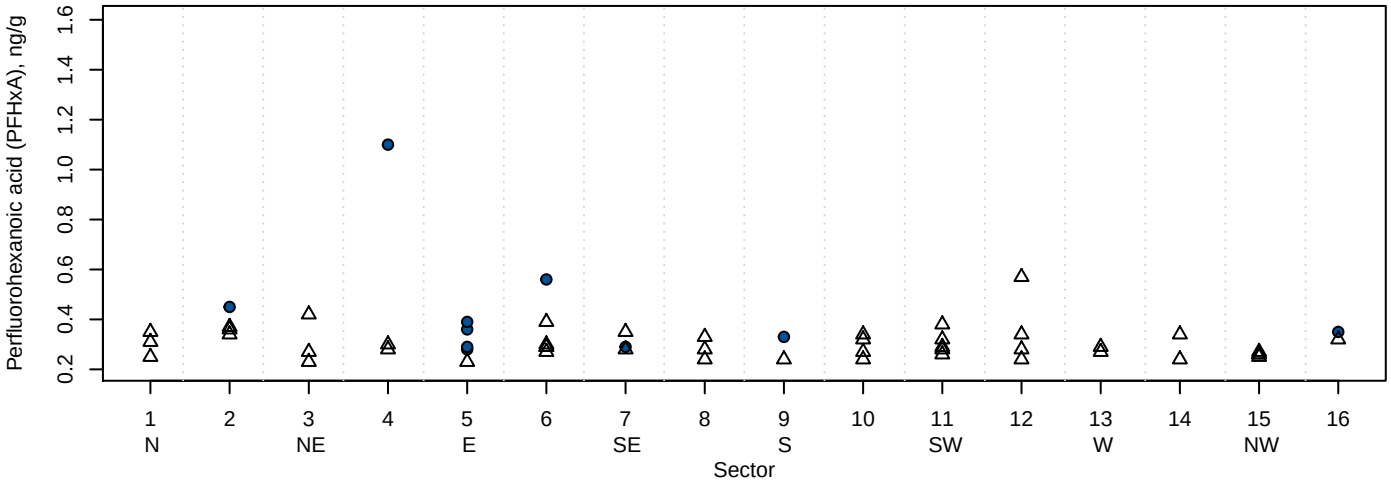


Sub−Surface Soil (1 − 2 feet)

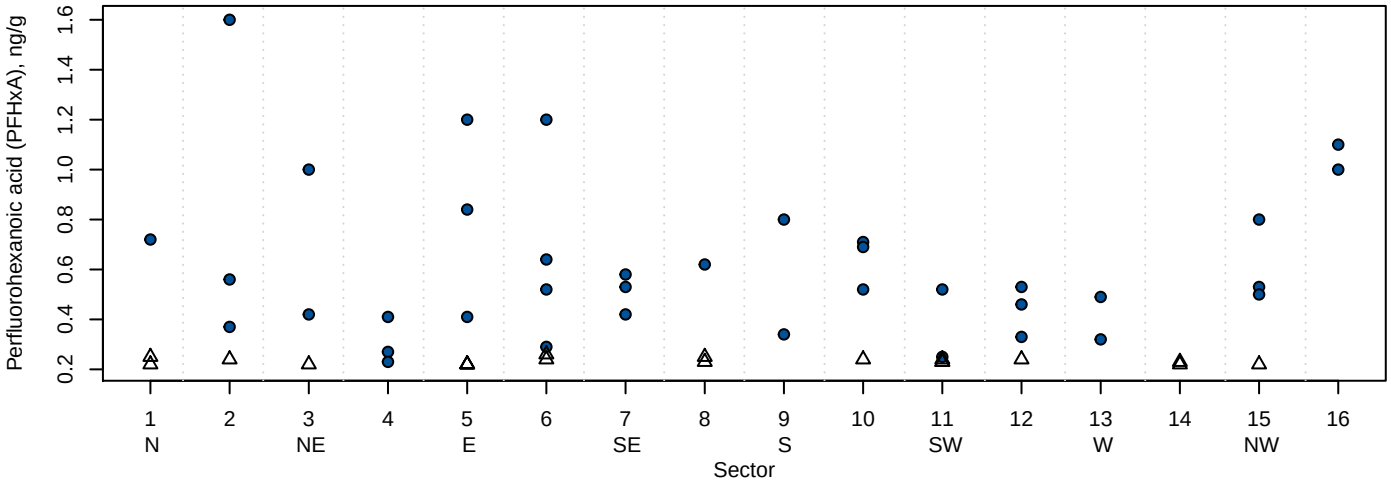


Perfluorohexanoic acid (PFHxA)

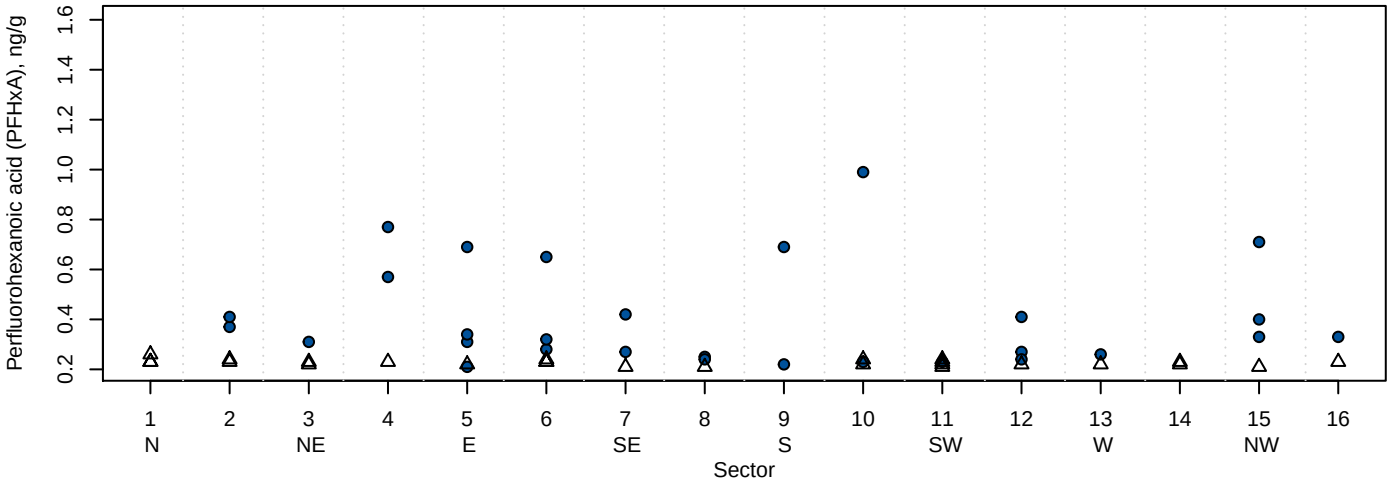
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

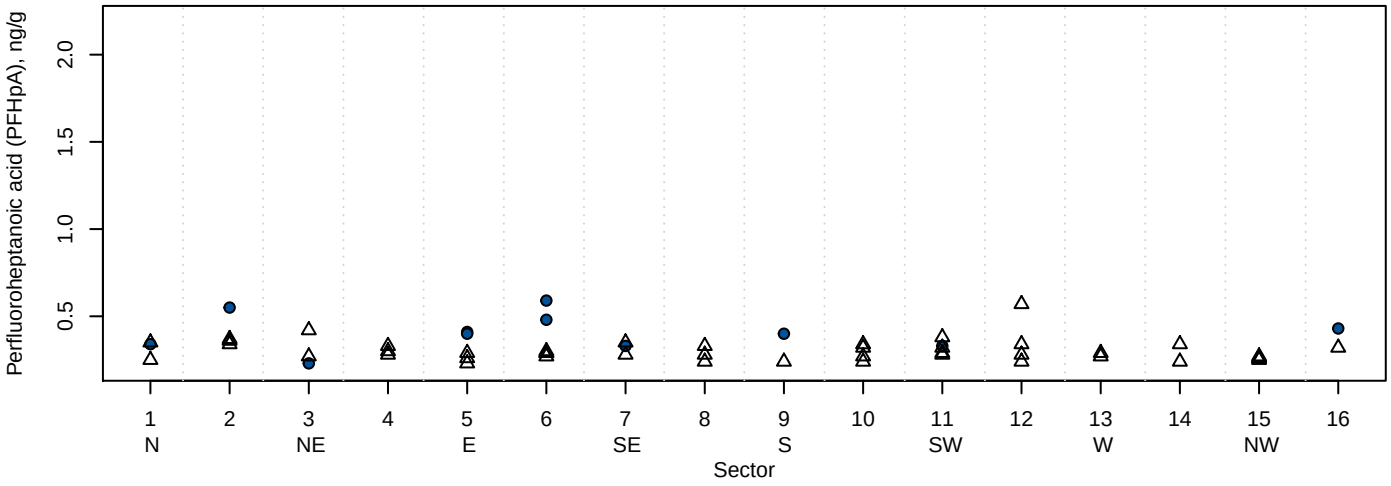


Sub−Surface Soil (1 − 2 feet)

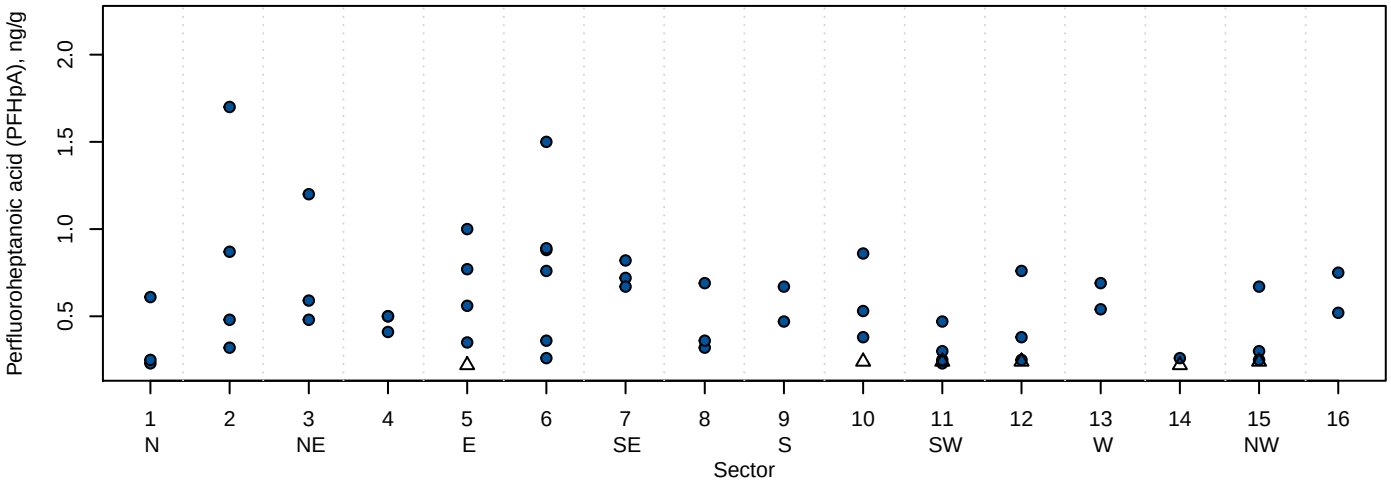


Perfluoroheptanoic acid (PFHpA)

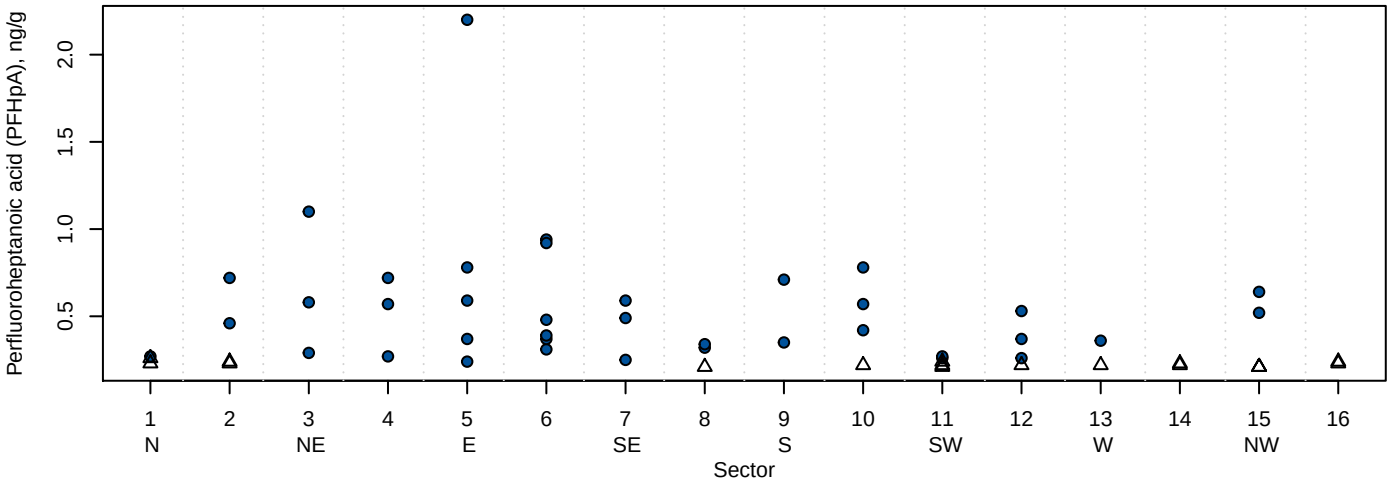
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

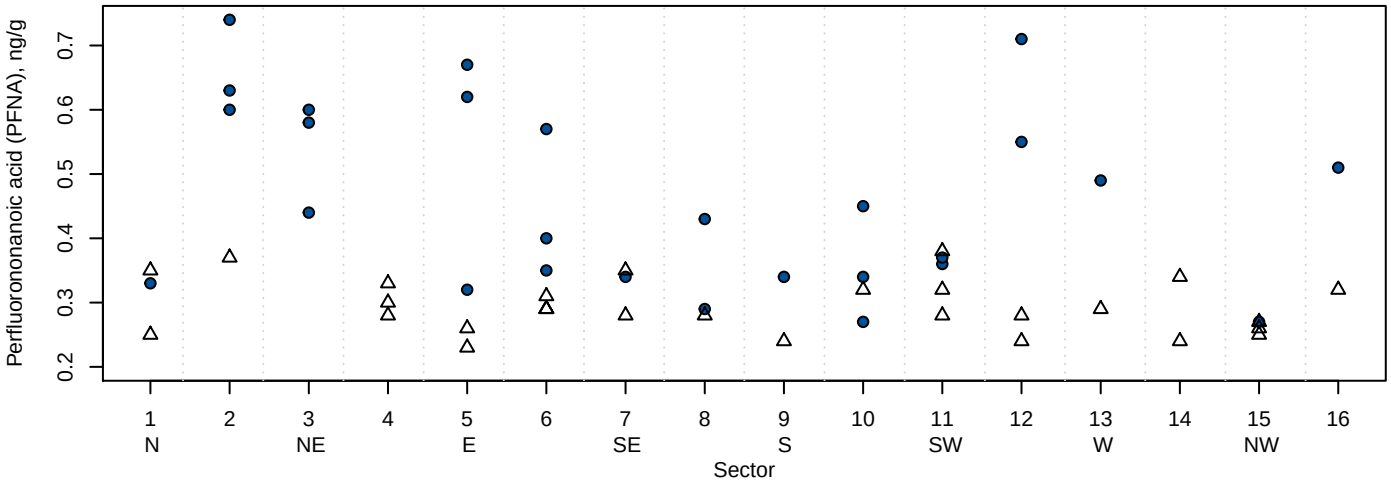


Sub−Surface Soil (1 − 2 feet)

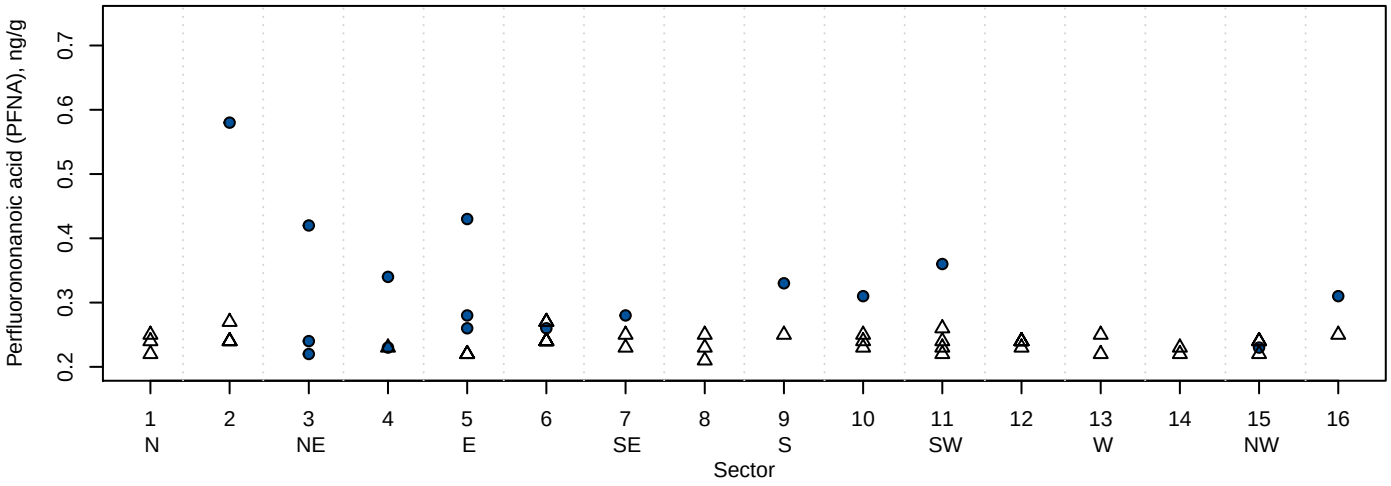


Perfluorononanoic acid (PFNA)

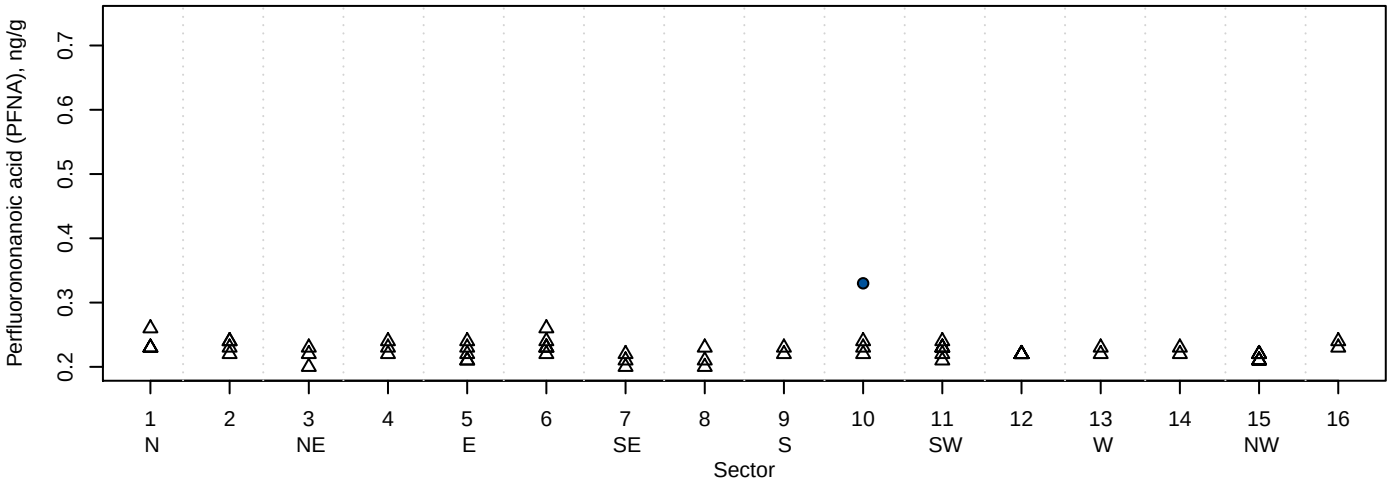
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

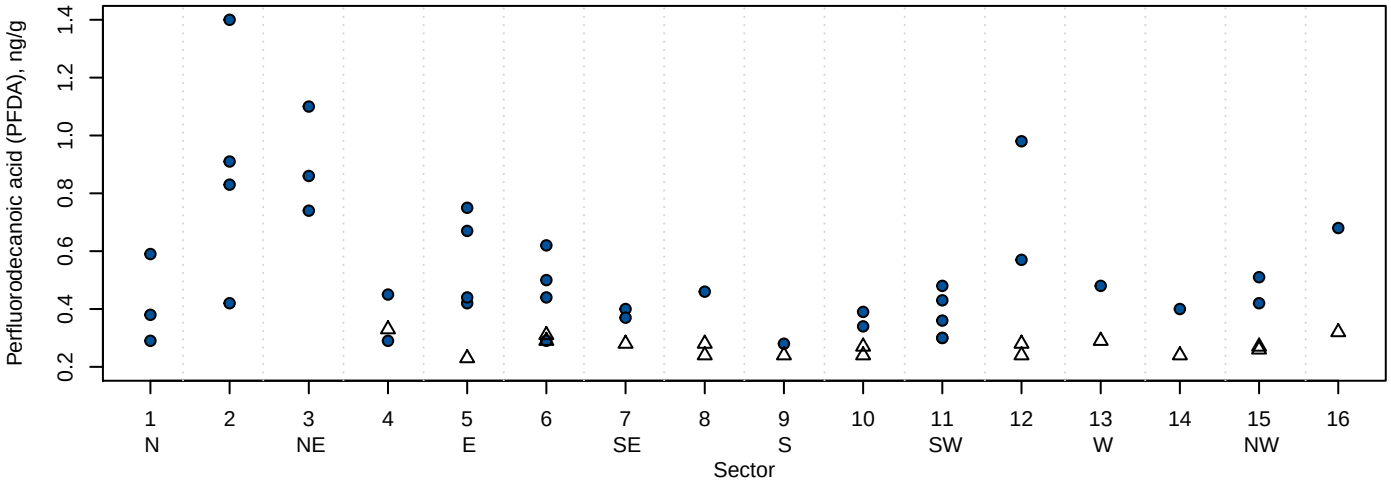


Sub−Surface Soil (1 − 2 feet)

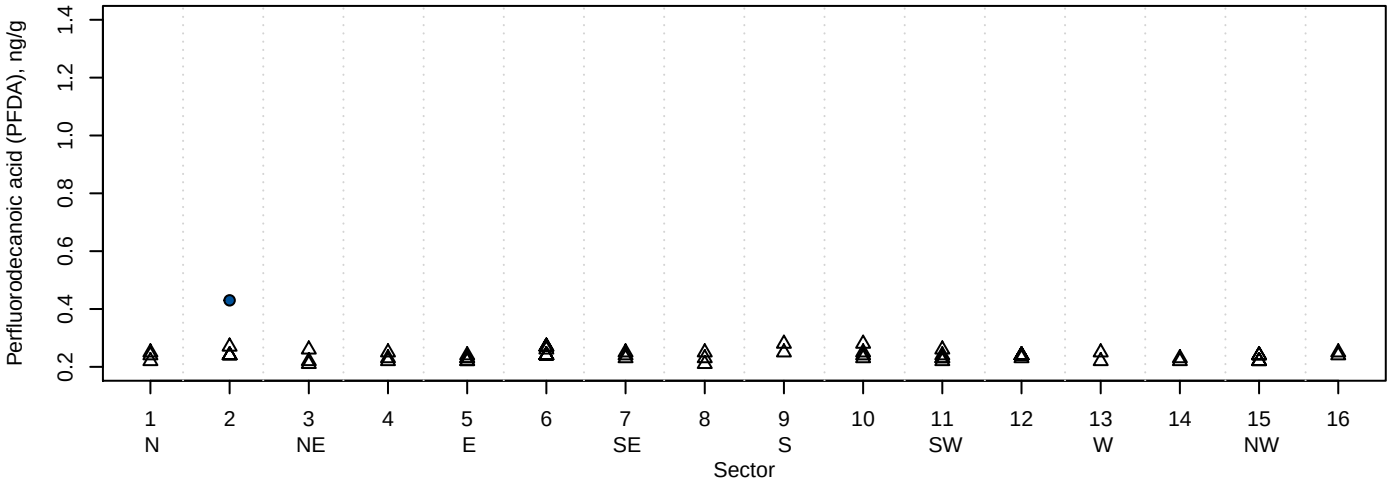


Perfluorodecanoic acid (PFDA)

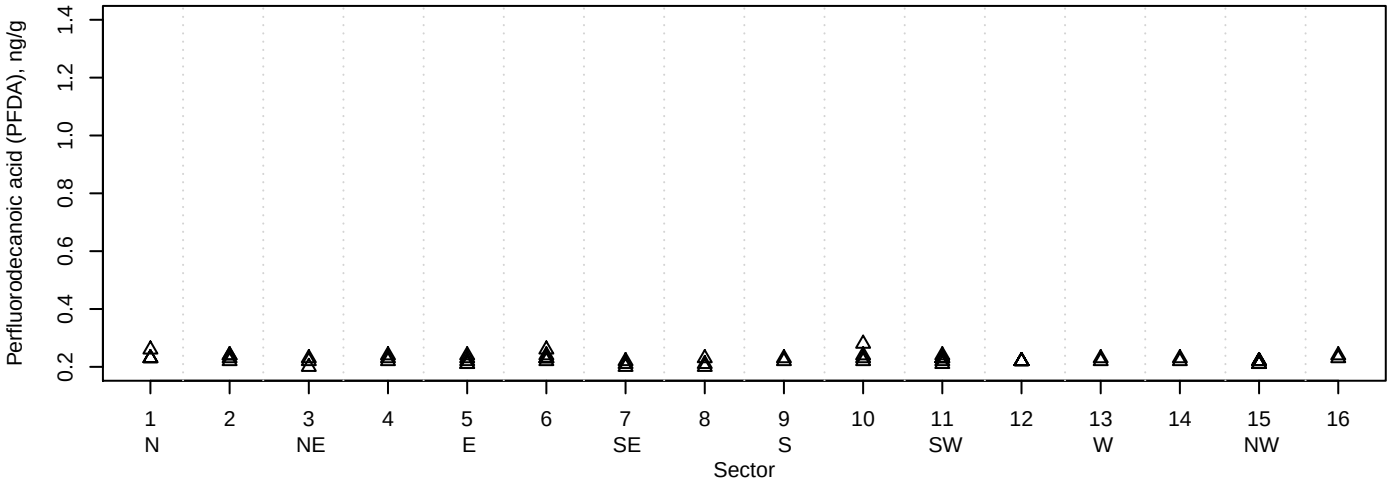
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

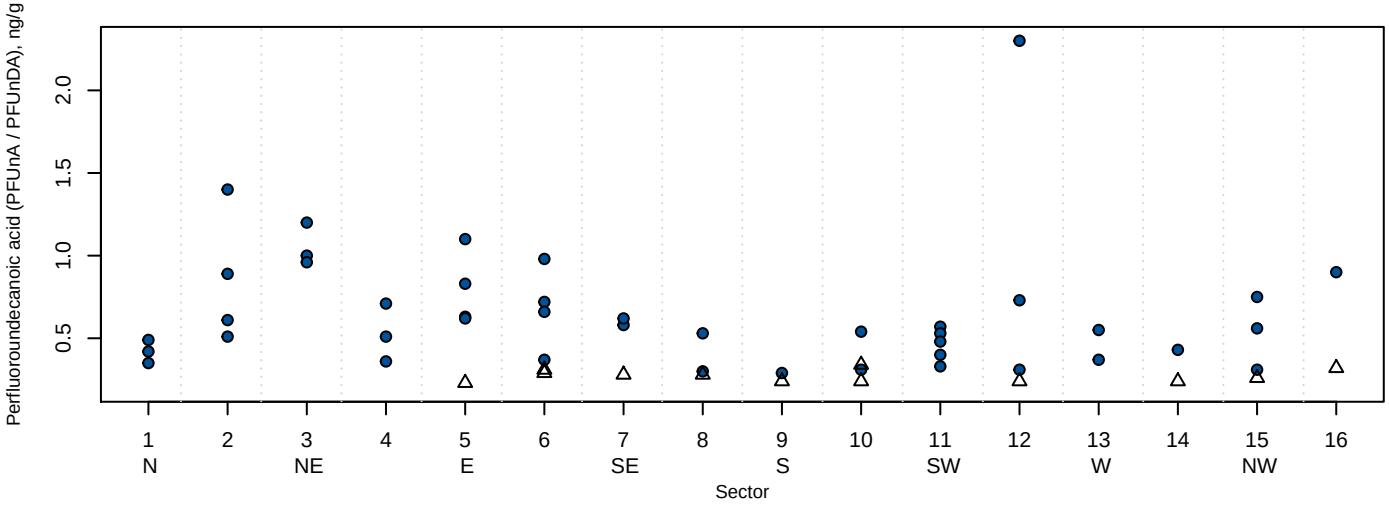


Sub−Surface Soil (1 − 2 feet)

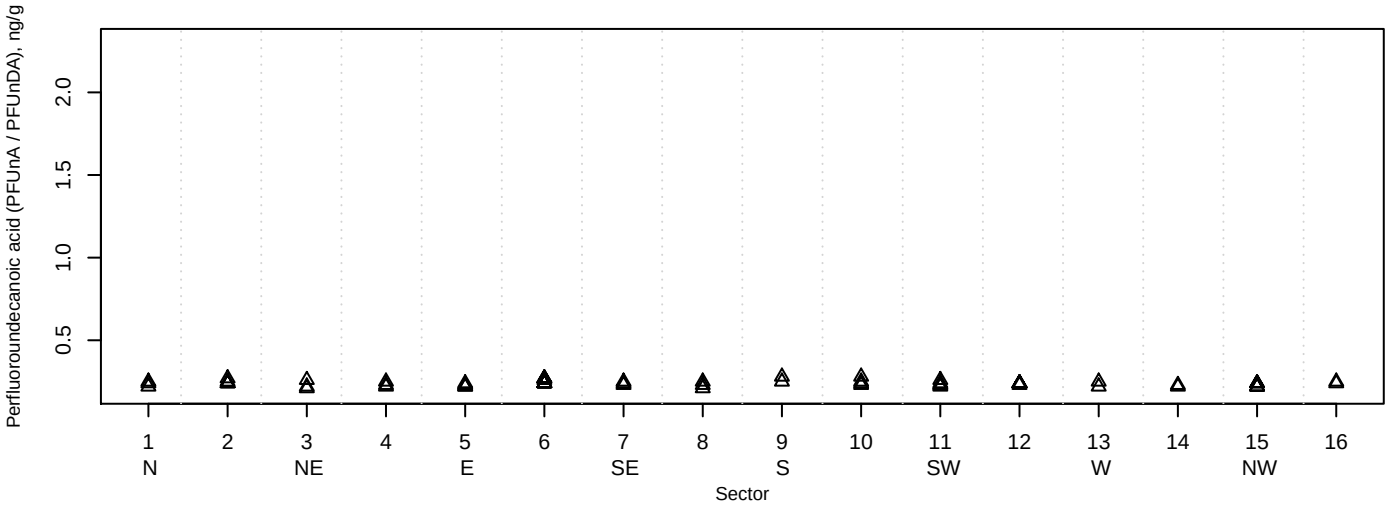


Perfluoroundecanoic acid (PFUnA / PFUnDA)

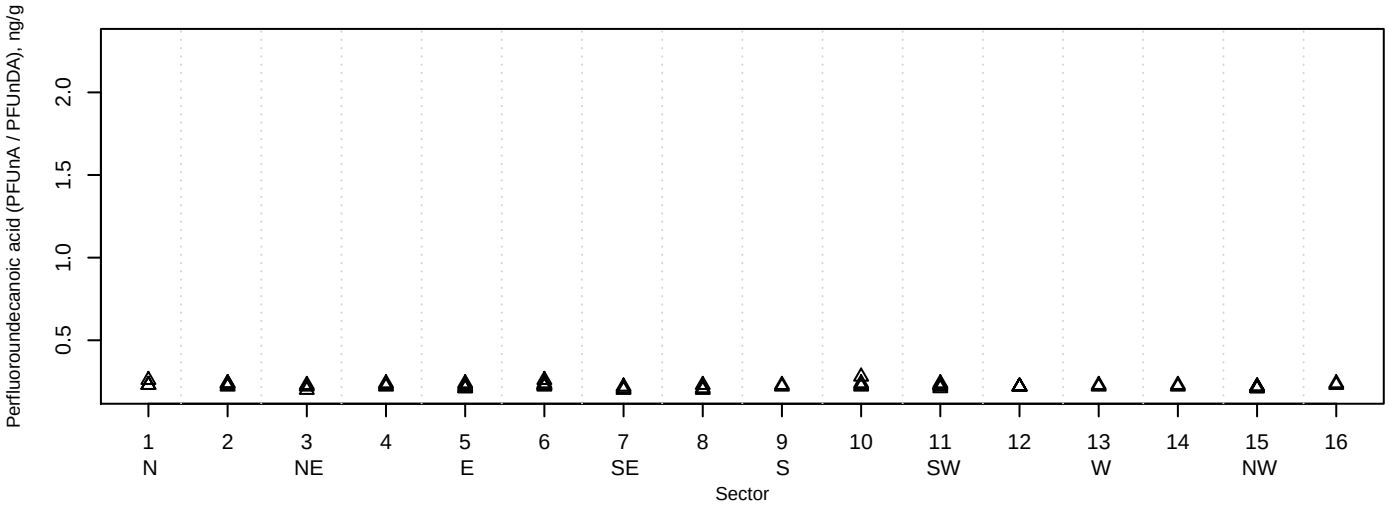
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)



Sub−Surface Soil (1 − 2 feet)



● Detected Value △ Non−Detect Value

Appendix E

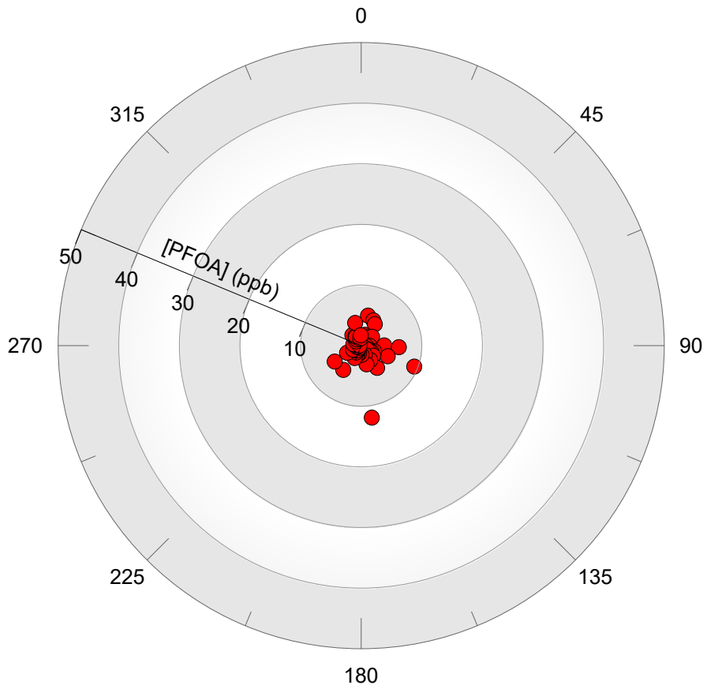
Evaluation Between Sectors

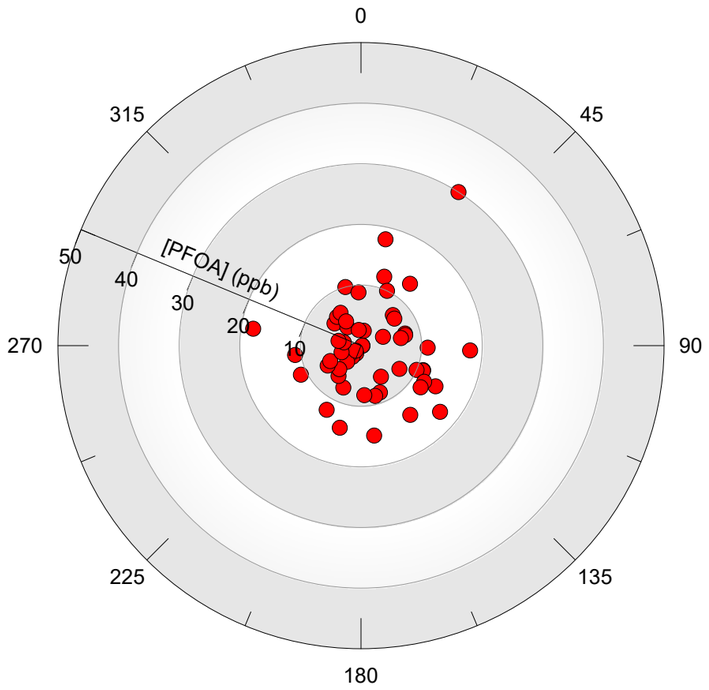
Appendix E1: Radial Plots
Appendix E2: Evaluation by Quadrant

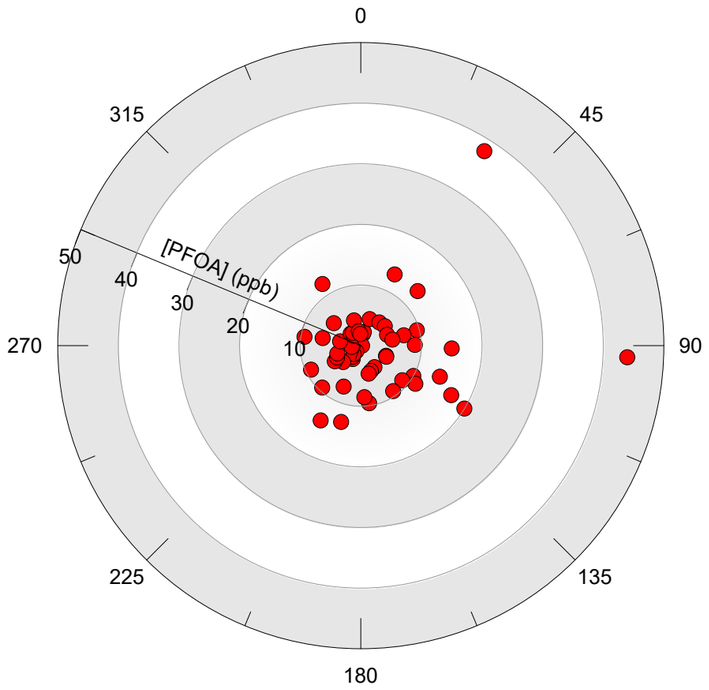
Appendix E

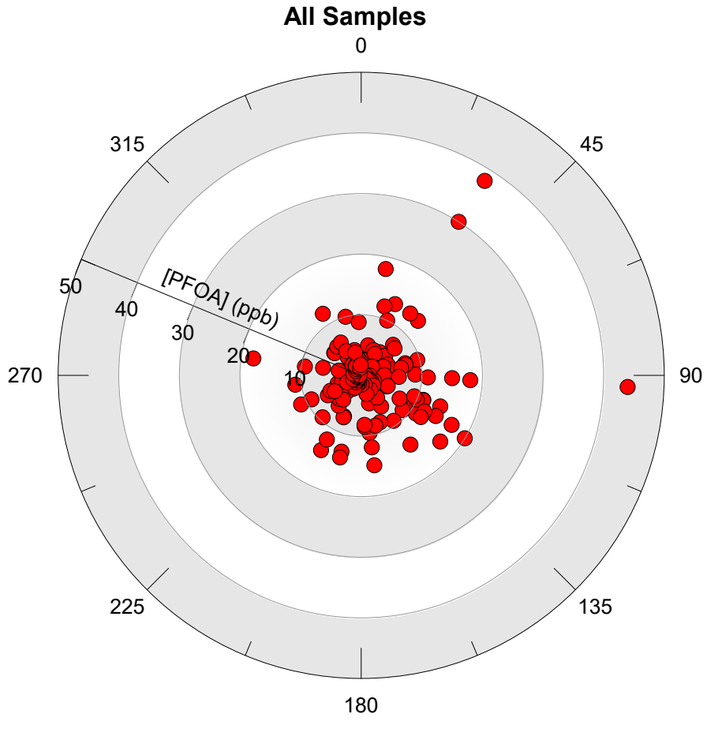
Evaluation Between Sectors

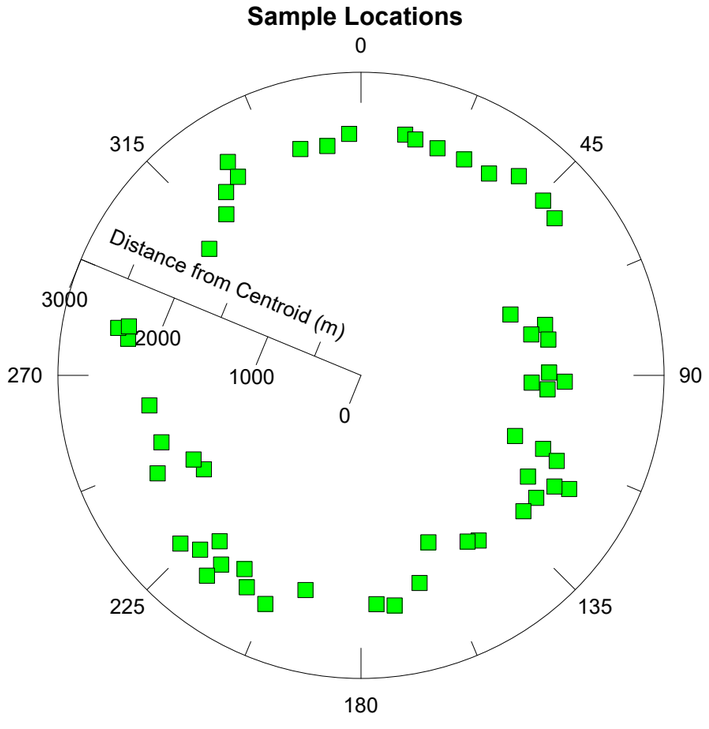
Appendix E1: Radial Plots











Centroid is center of sampling area

FIGURE E1

PFOA SOIL SAMPLE RESULTS
RADIAL PLOTS
Regional Air Deposition Study
Hoosick Falls

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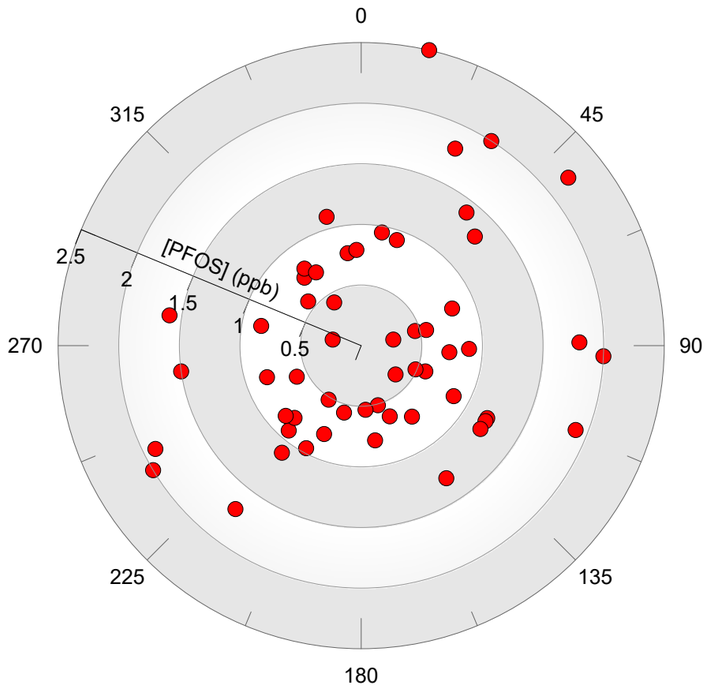

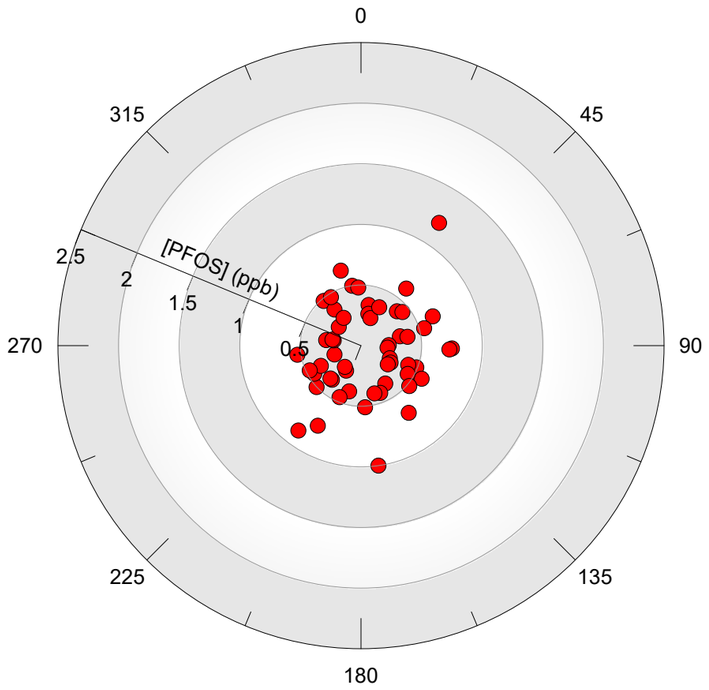

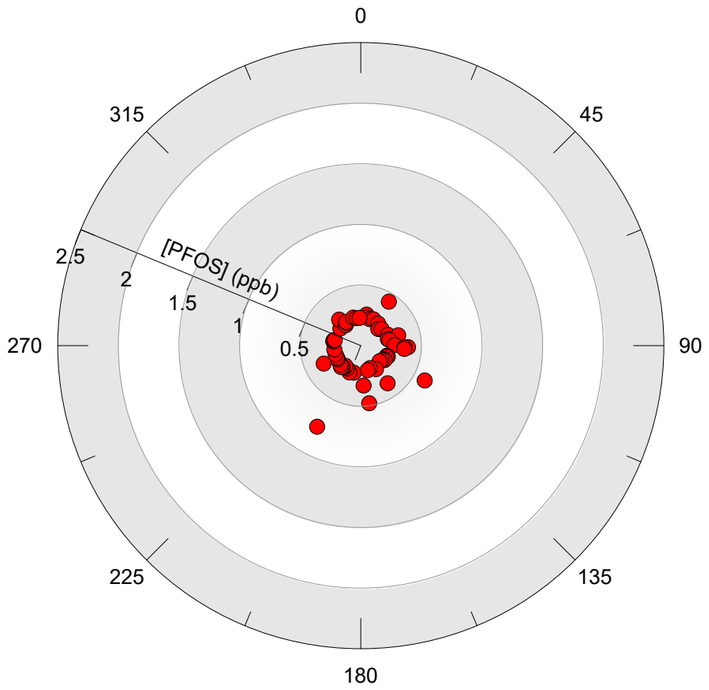

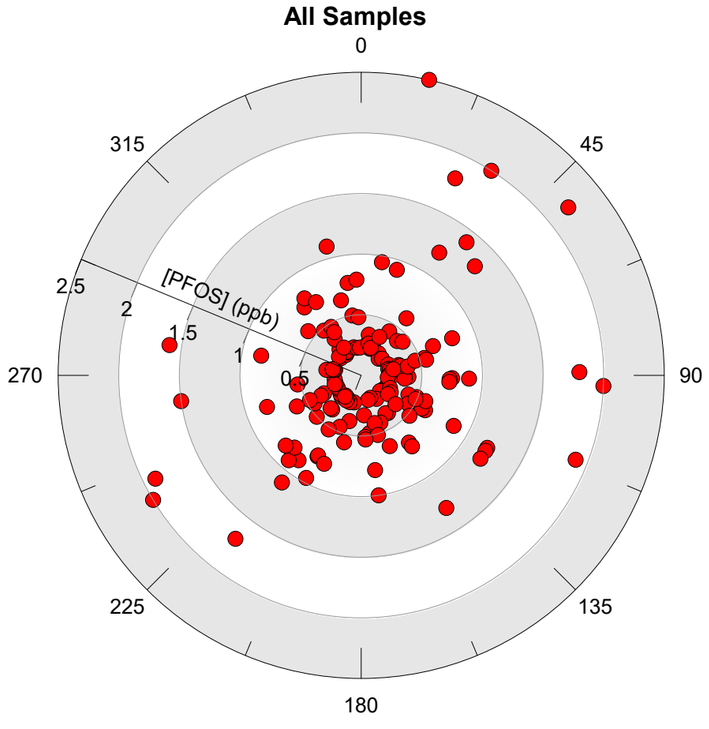

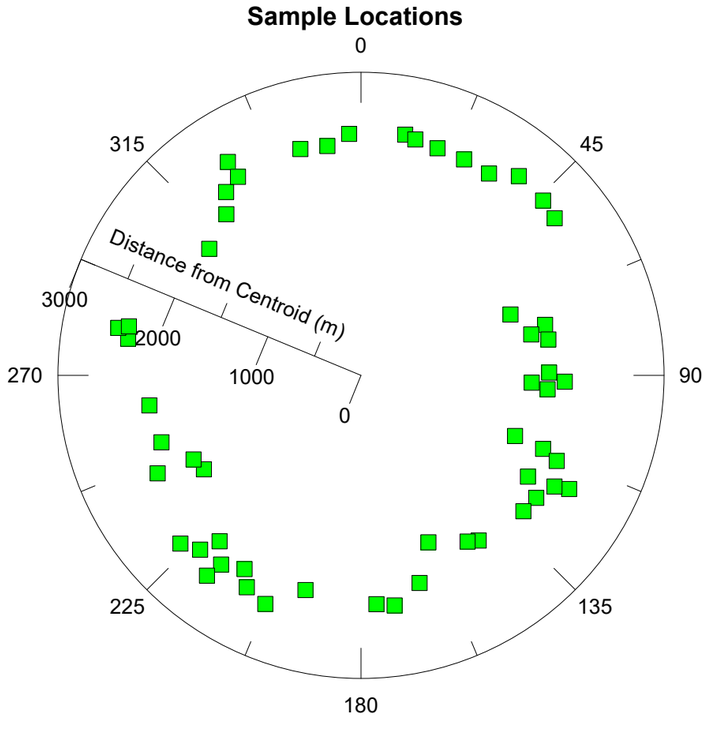

Centroid is center of sampling area

FIGURE E2

PFOS SOIL SAMPLE RESULTS
RADIAL PLOTS
Regional Air Deposition Study
Hoosick Falls

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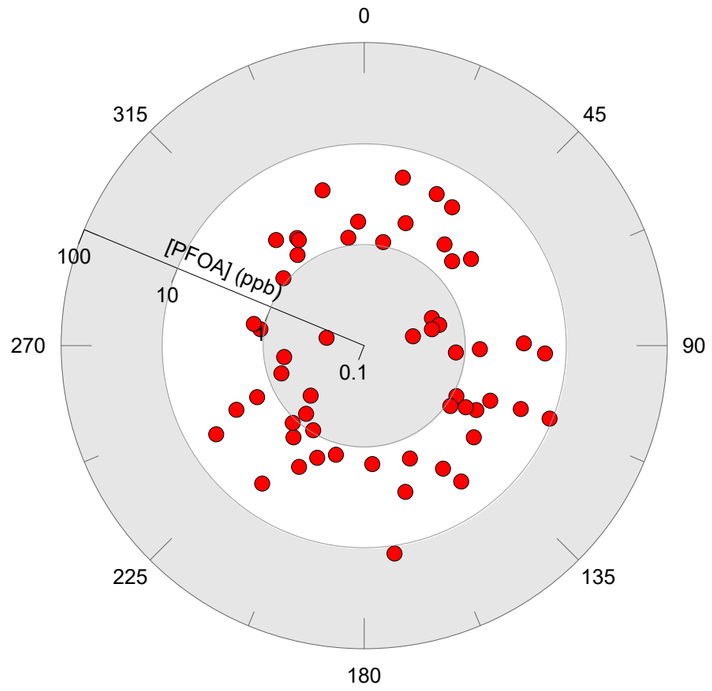
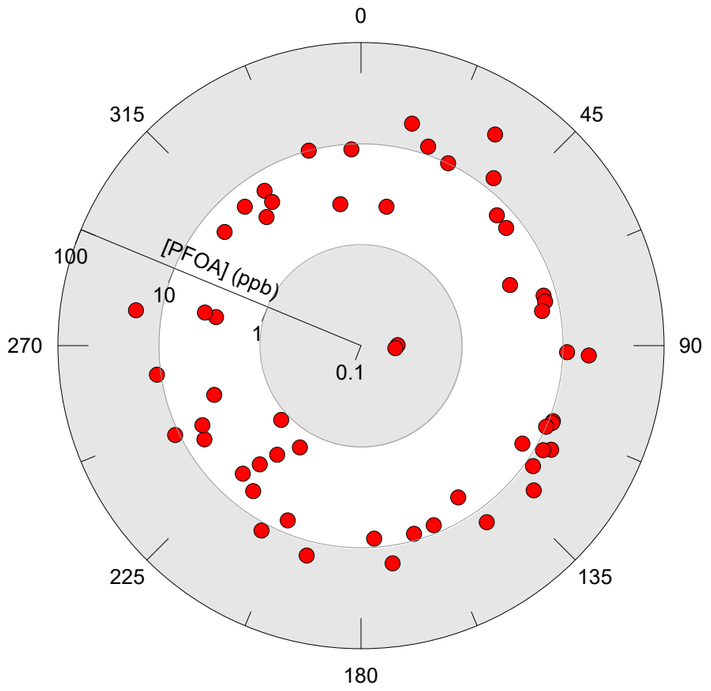
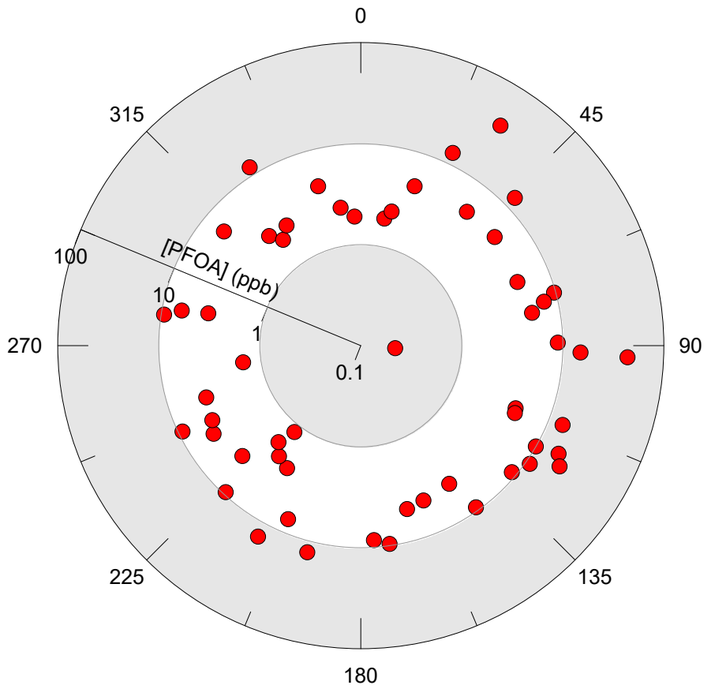
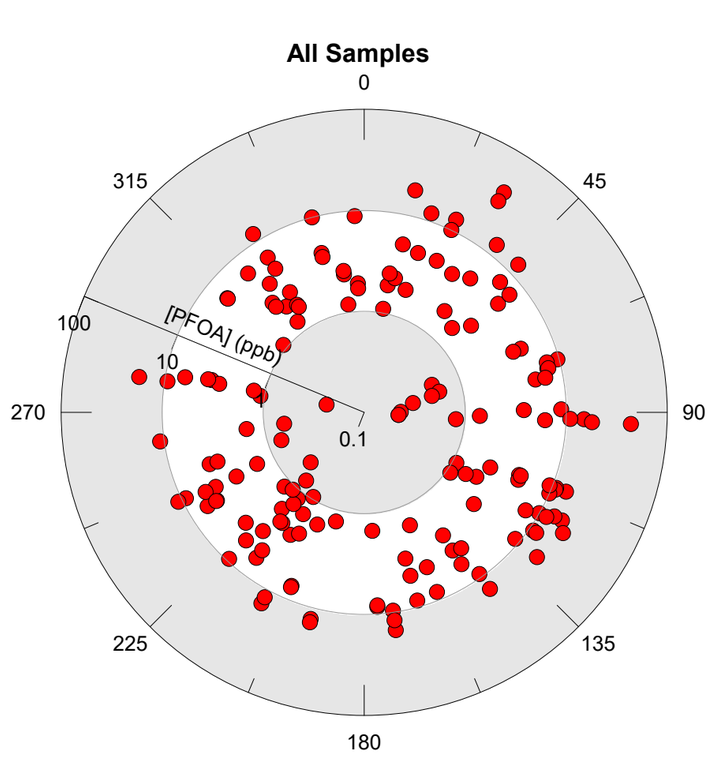
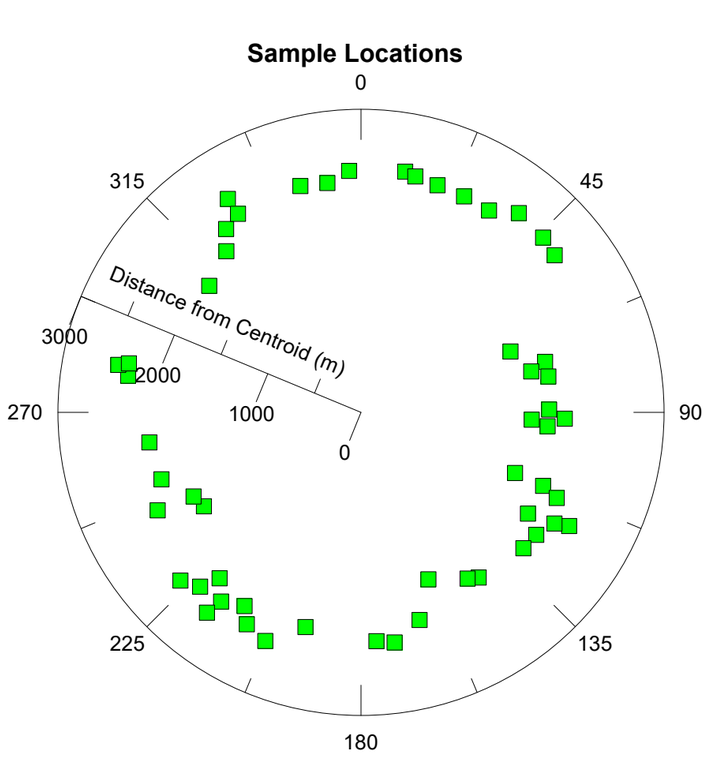
Engineering and Geology, P.C.











Centroid is center of sampling area

FIGURE E3

PFOA SOIL SAMPLE RESULTS
RADIAL PLOTS - LOG SCALE
Regional Air Deposition Study
Hoosick Falls

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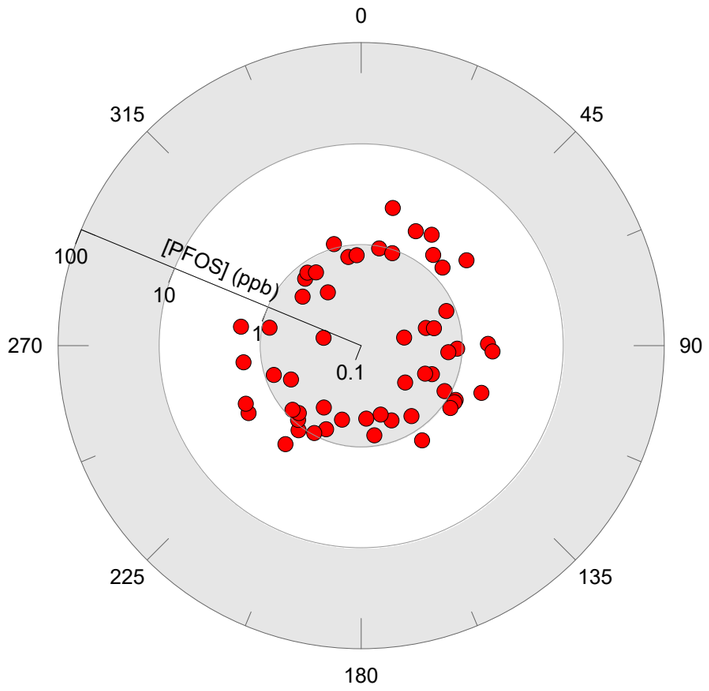
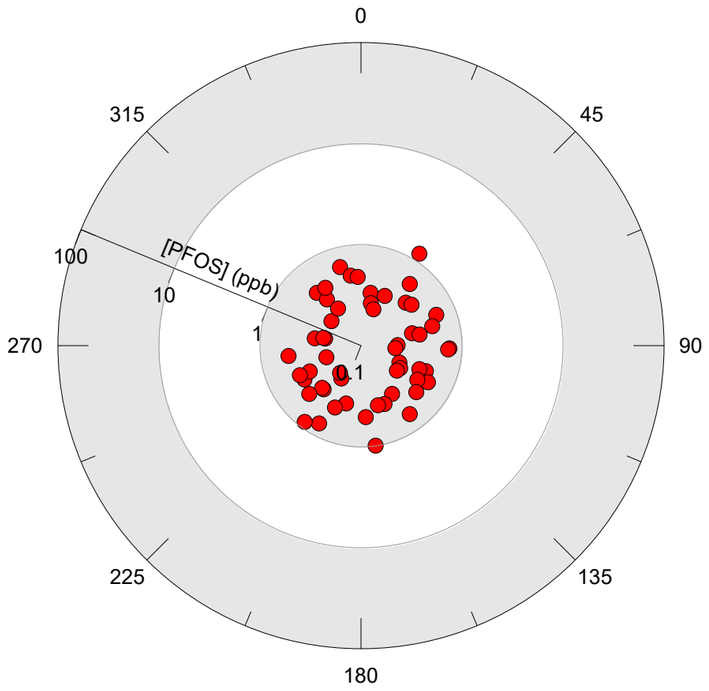
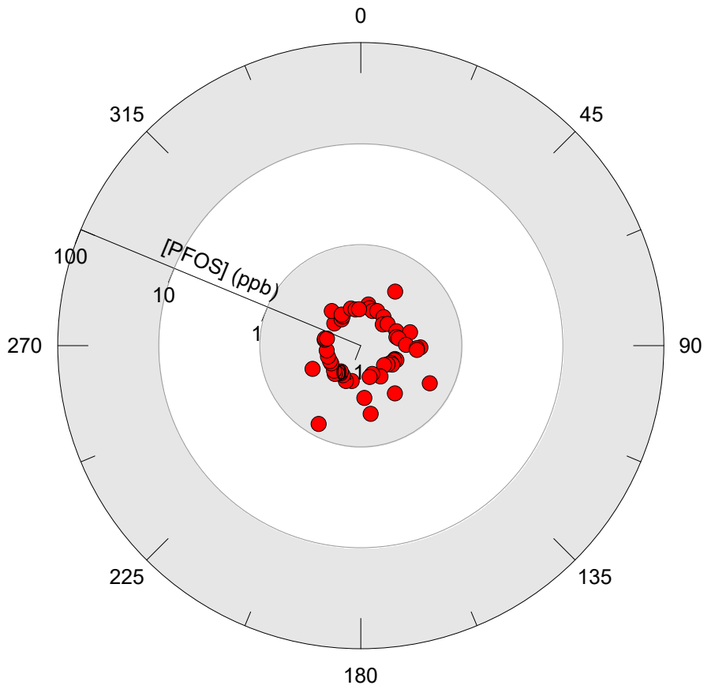
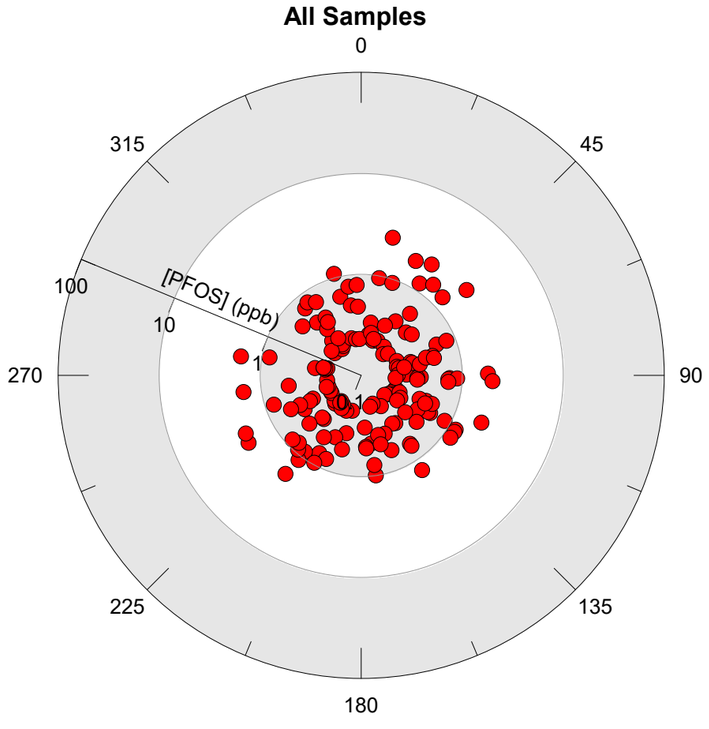
\\barr.com\projects\BEC\32 NY\42\32421003 SGPP Hoosick Falls\WorkFiles\0_AREA-WIDE\06_SOILS\Soil deposition\Report\AppendicesA

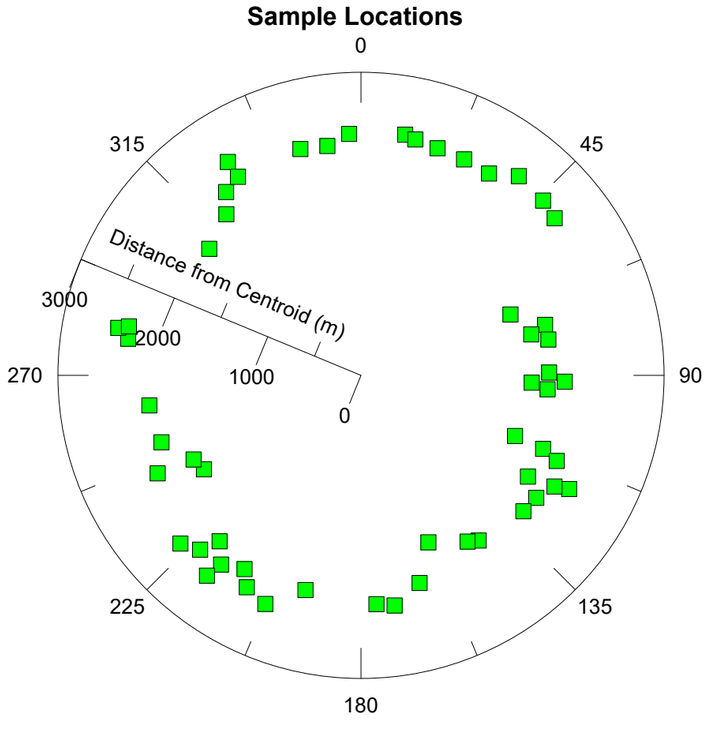
ppendicesAppendix_E_Geospatial (formerly G)\Work Area\radial_plots\graphics\Figure E3 - PFOA Log Radial Plot.grf









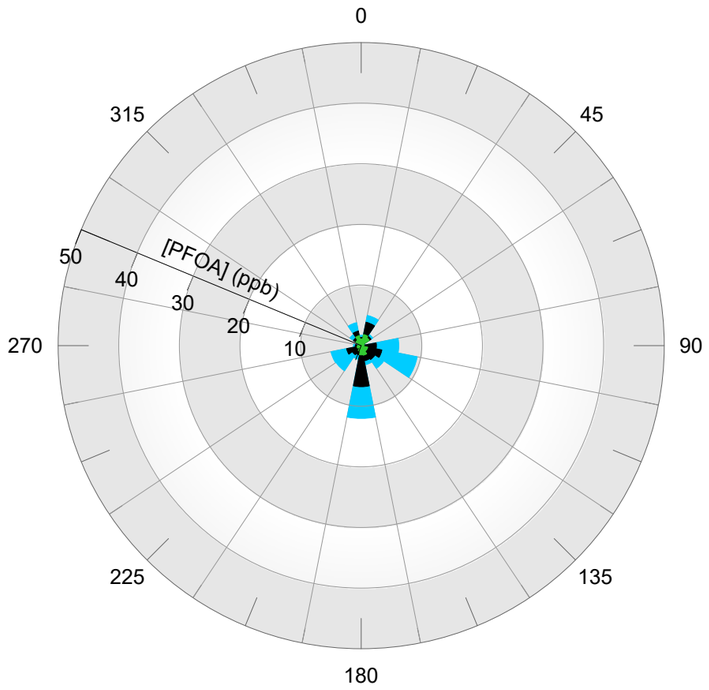


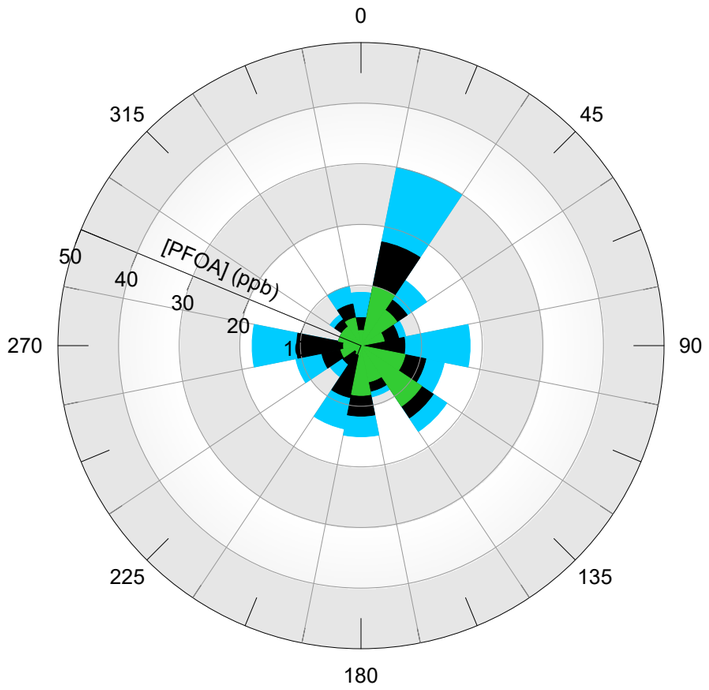
Centroid is center of sampling area

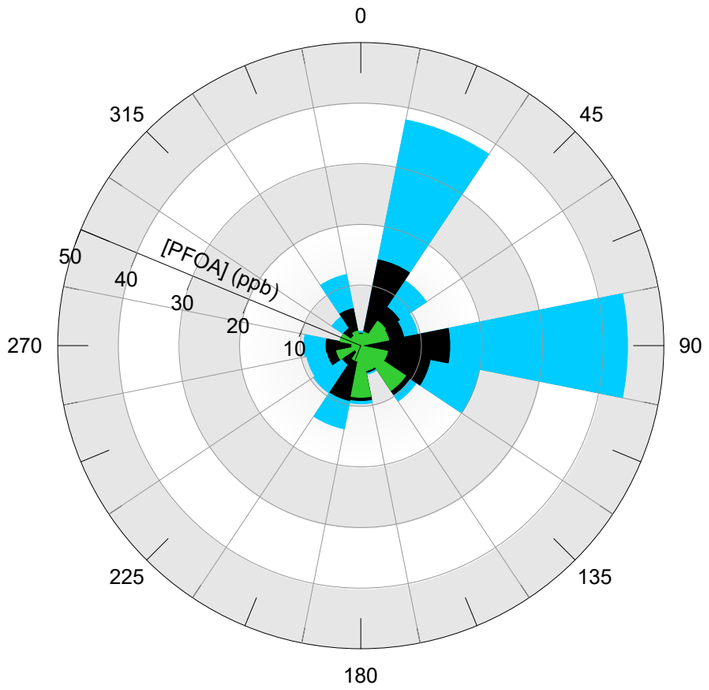
FIGURE E4

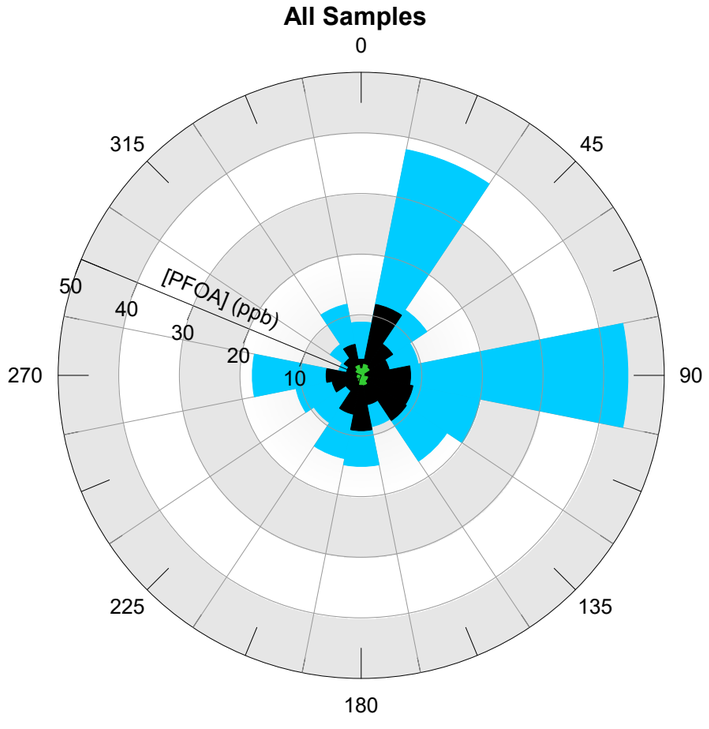
PFOS SOIL SAMPLE RESULTS
RADIAL PLOTS - LOG SCALE
Regional Air Deposition Study
Hoosick Falls

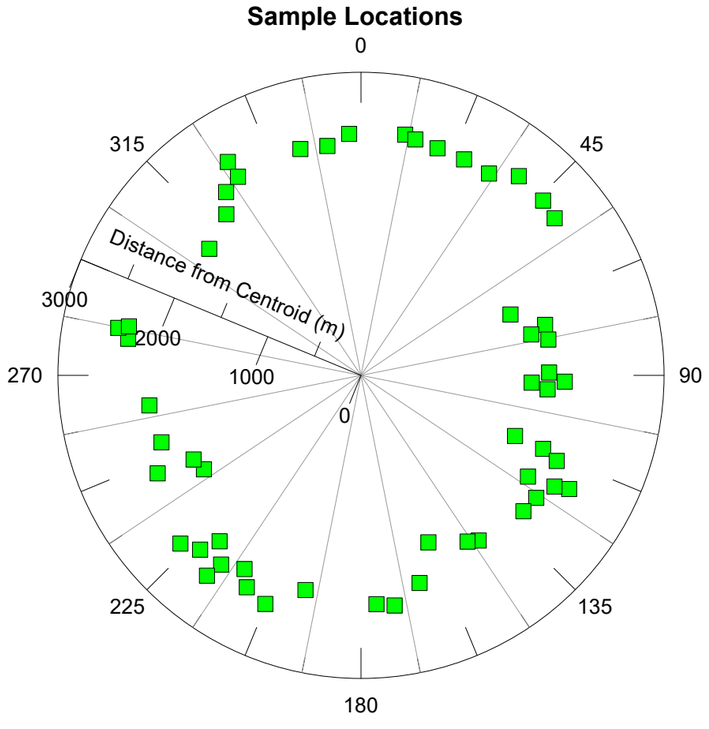
BEC
Engineering and Geology, P.C.











Centroid is center of sampling area

FIGURE E5

PFOA SOIL SAMPLE RESULTS
SECTOR BAR CHARTS
Regional Air Deposition Study
Hoosick Falls

BEC
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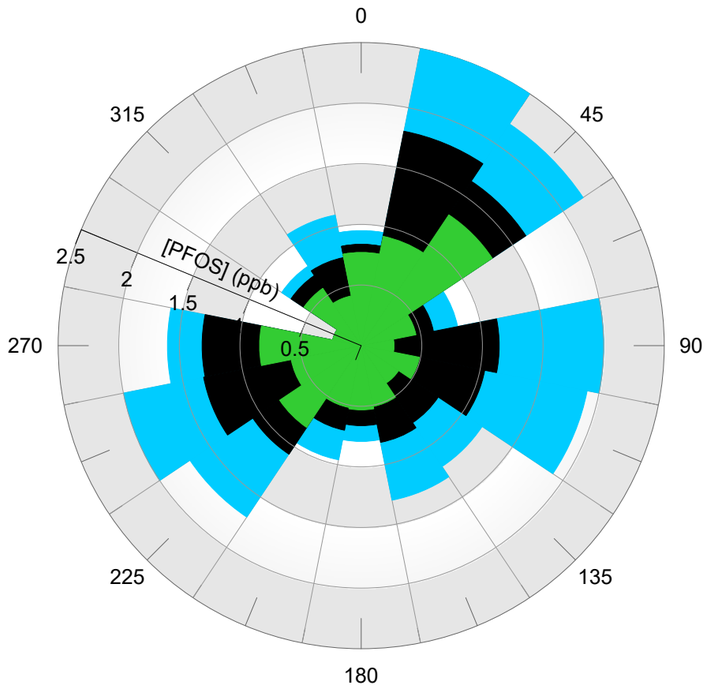

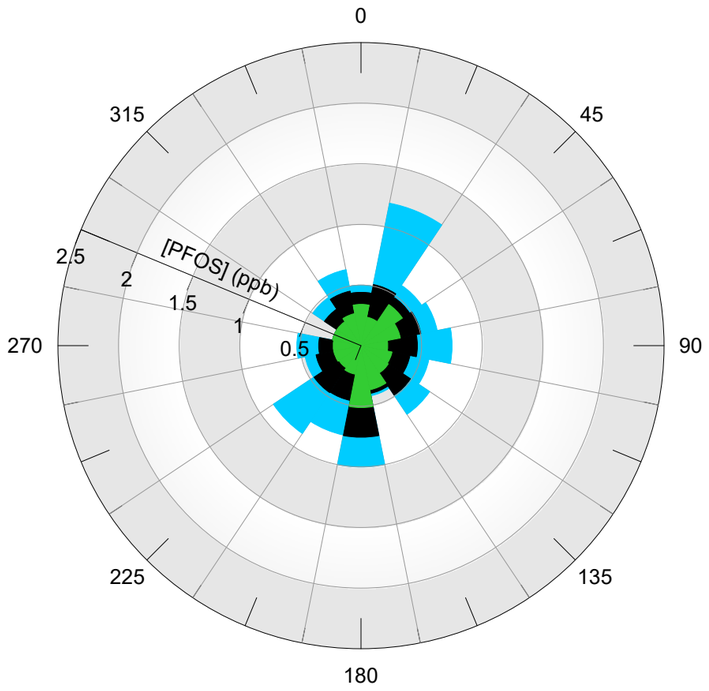

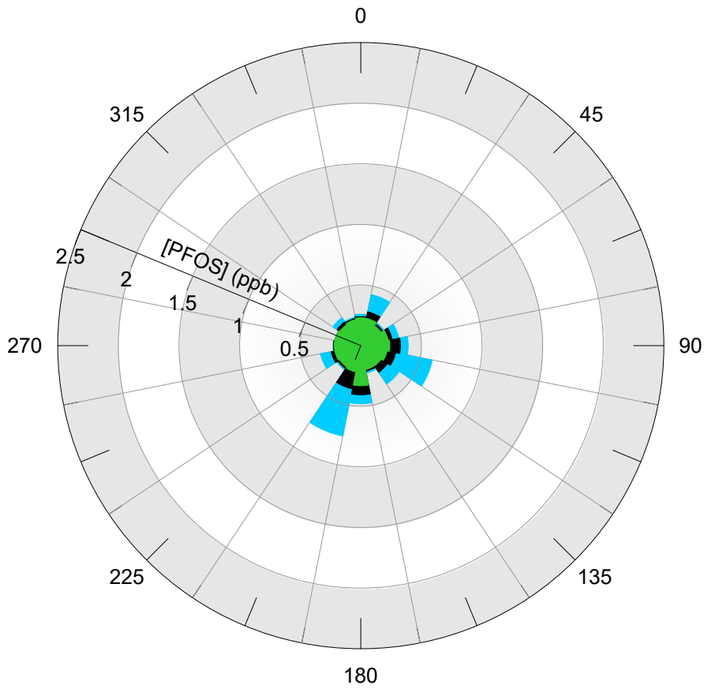

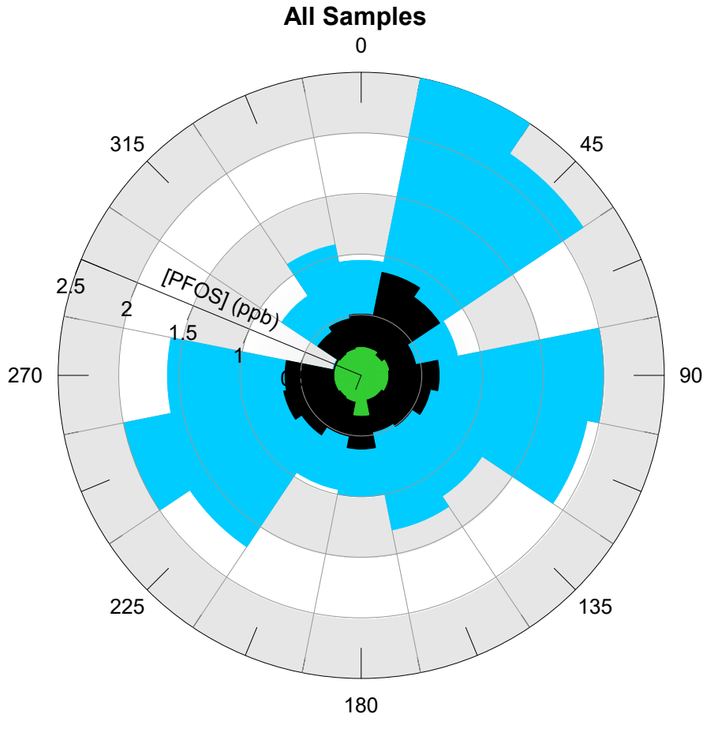

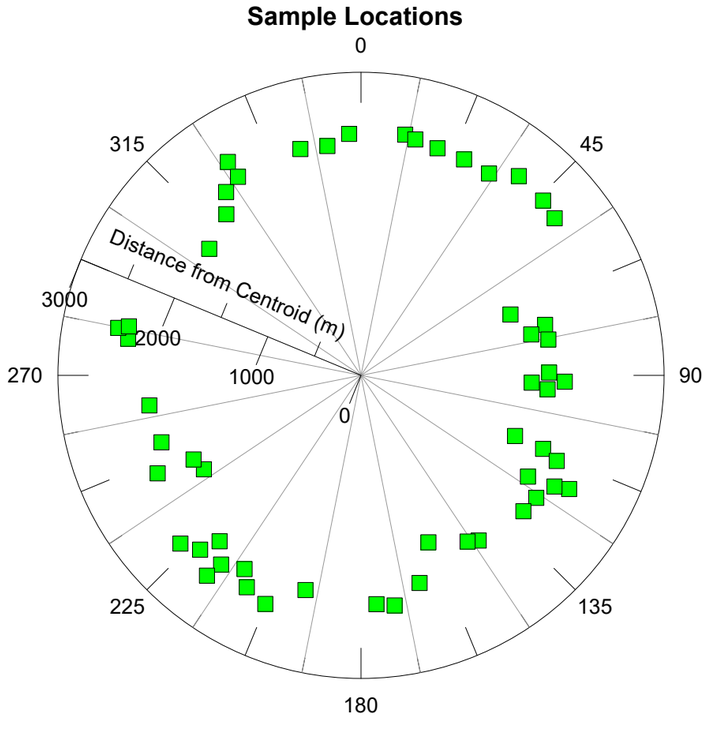

Centroid is center of sampling area

FIGURE E6

PFOS SOIL SAMPLE RESULTS
SECTOR BAR CHARTS
Regional Air Deposition Study
Hoosick Falls

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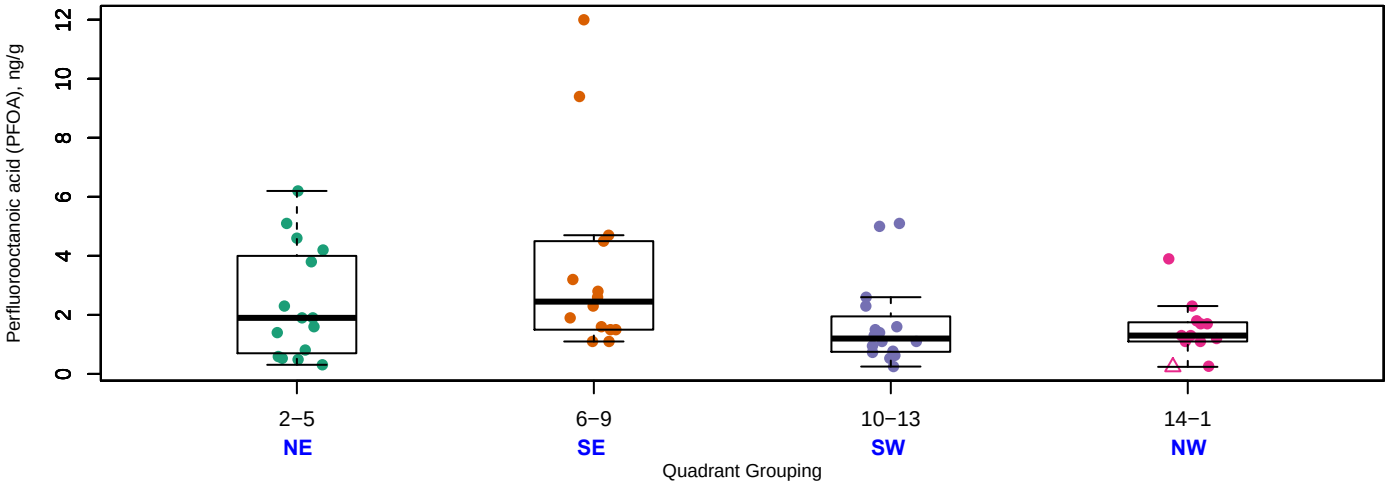
Appendix E

Evaluation Between Sectors

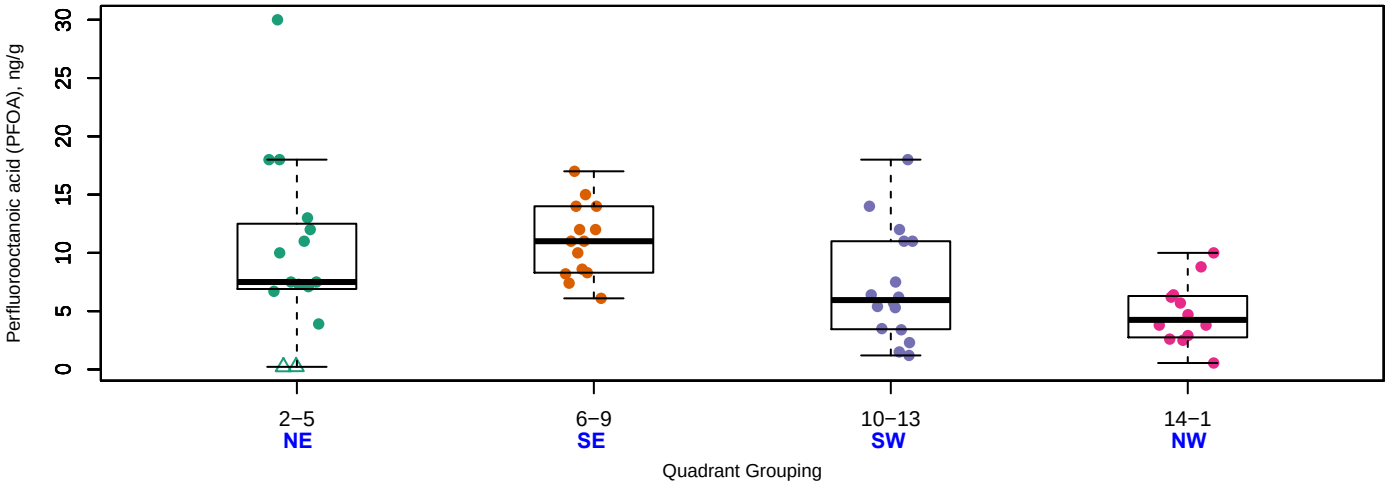
Appendix E2: Evaluation by Quadrant

Perfluorooctanoic acid (PFOA)

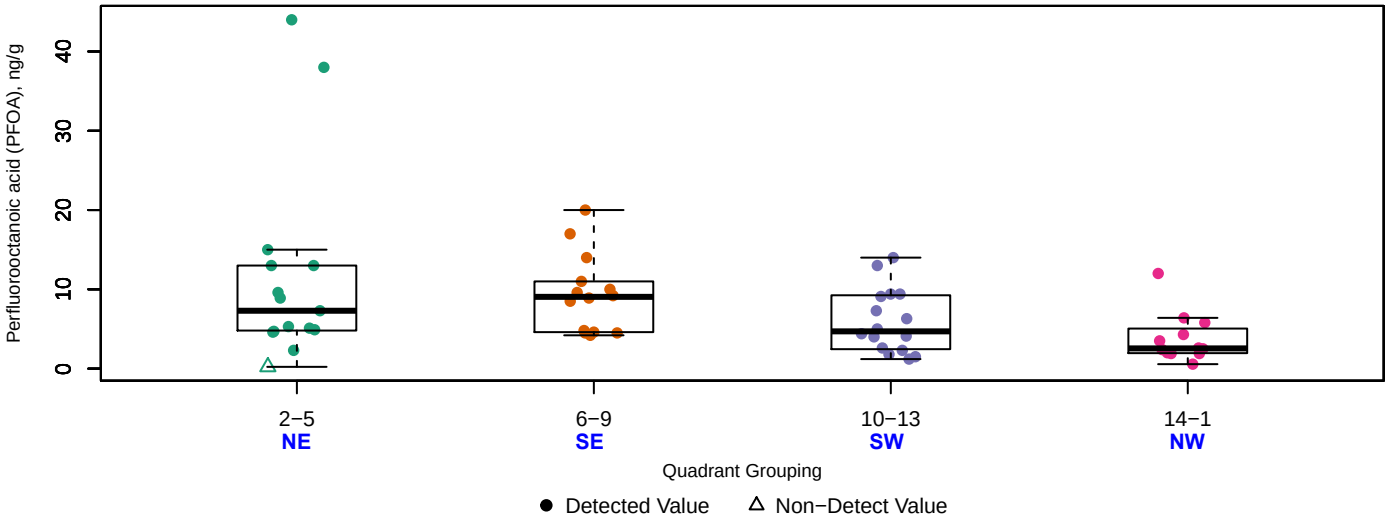
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

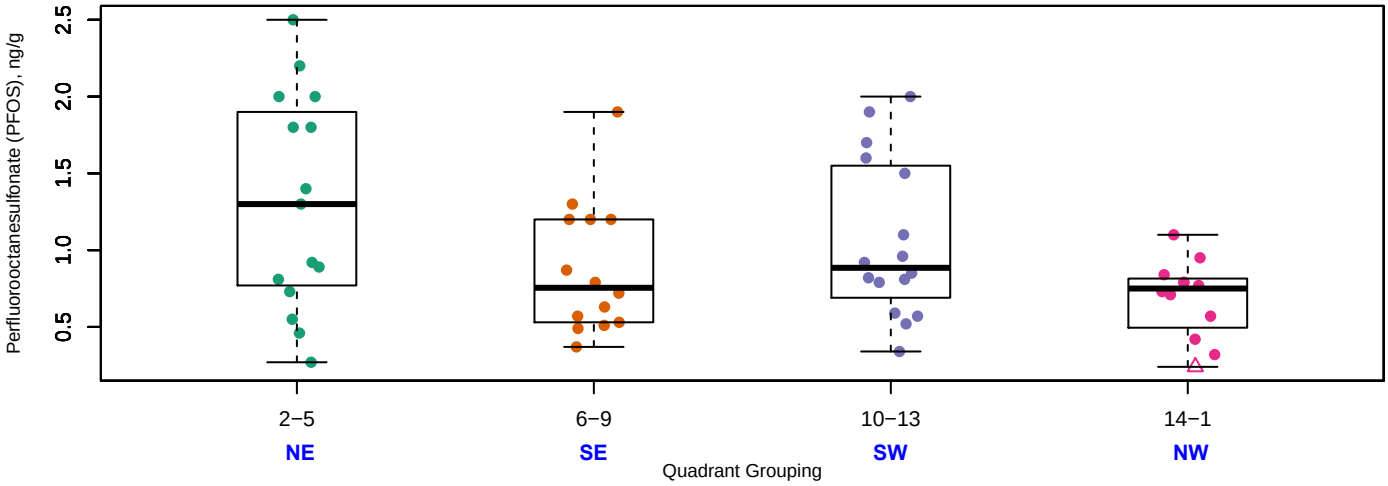


Sub−Surface Soil (1− 2 feet)

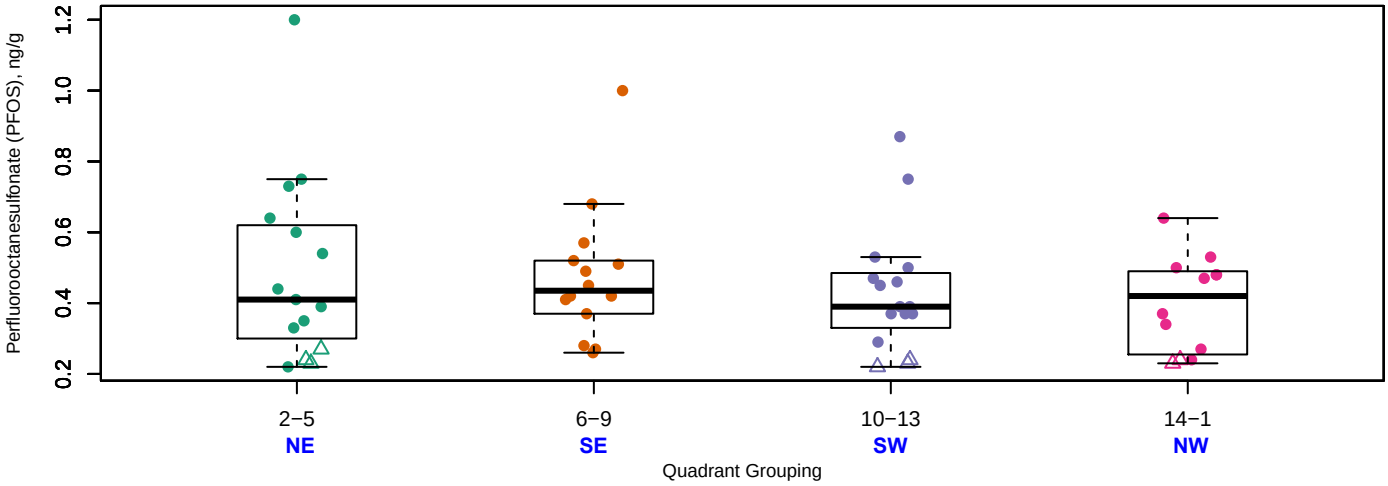


Perfluorooctanesulfonate (PFOS)

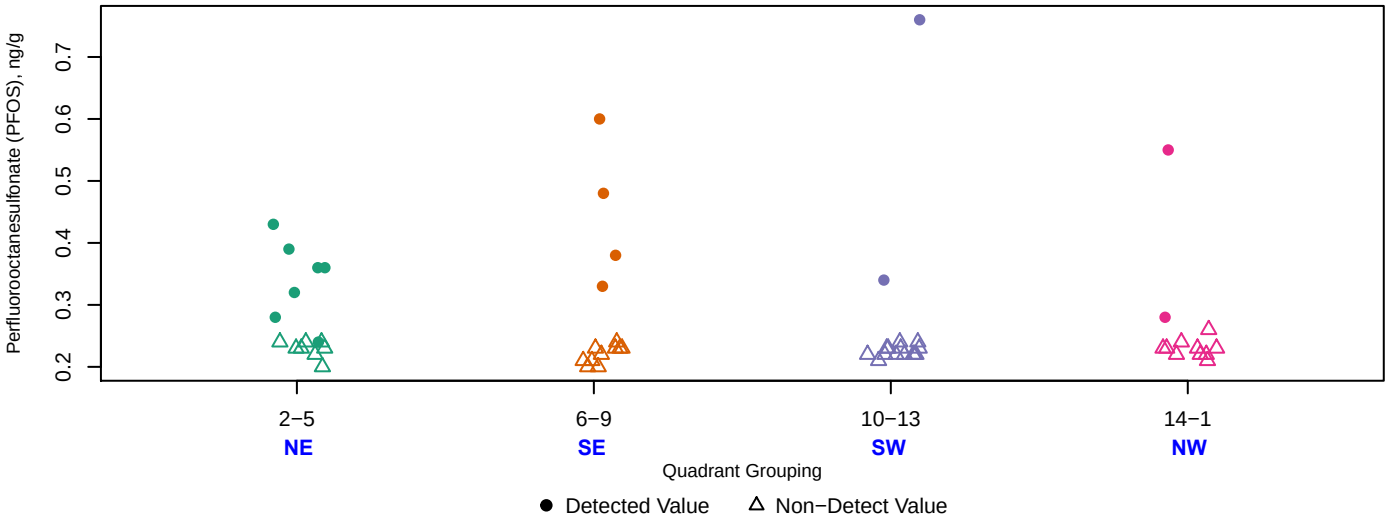
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

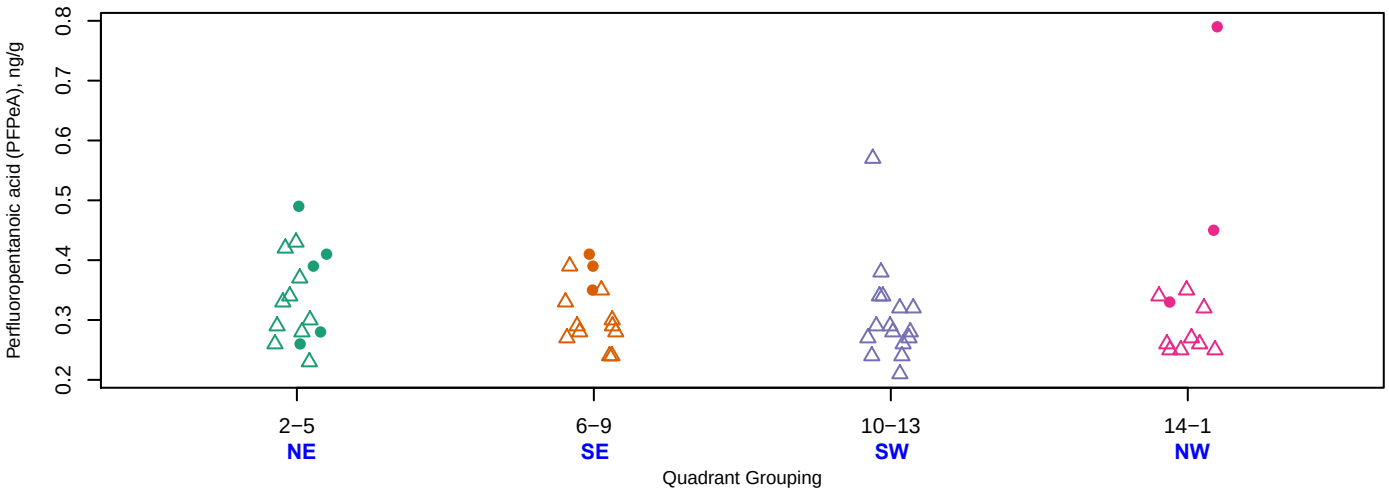


Sub−Surface Soil (1− 2 feet)

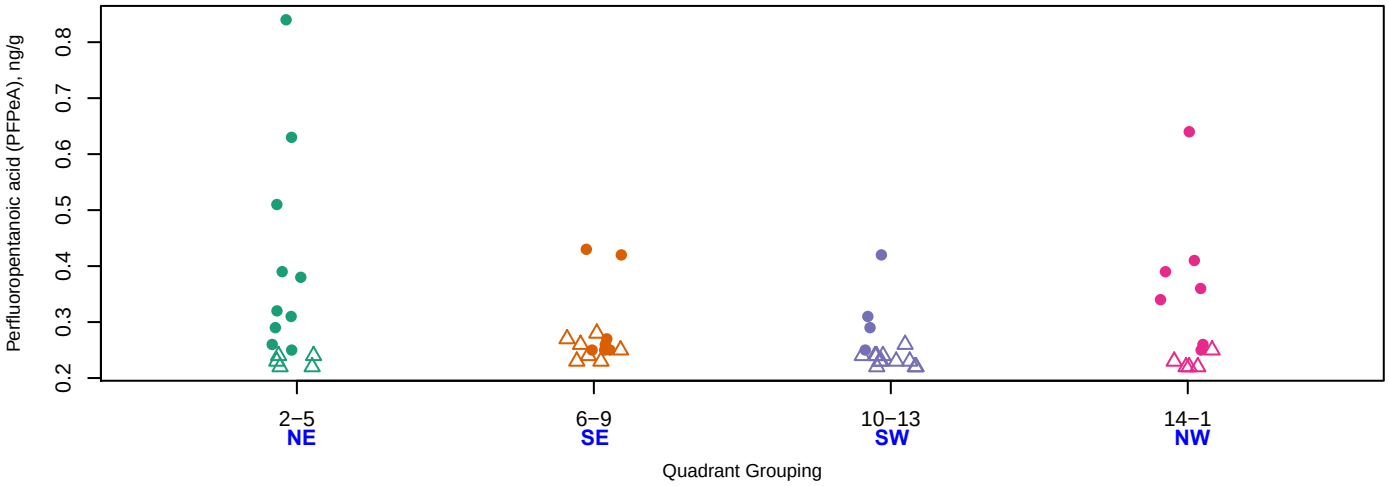


Perfluoropentanoic acid (PFPeA)

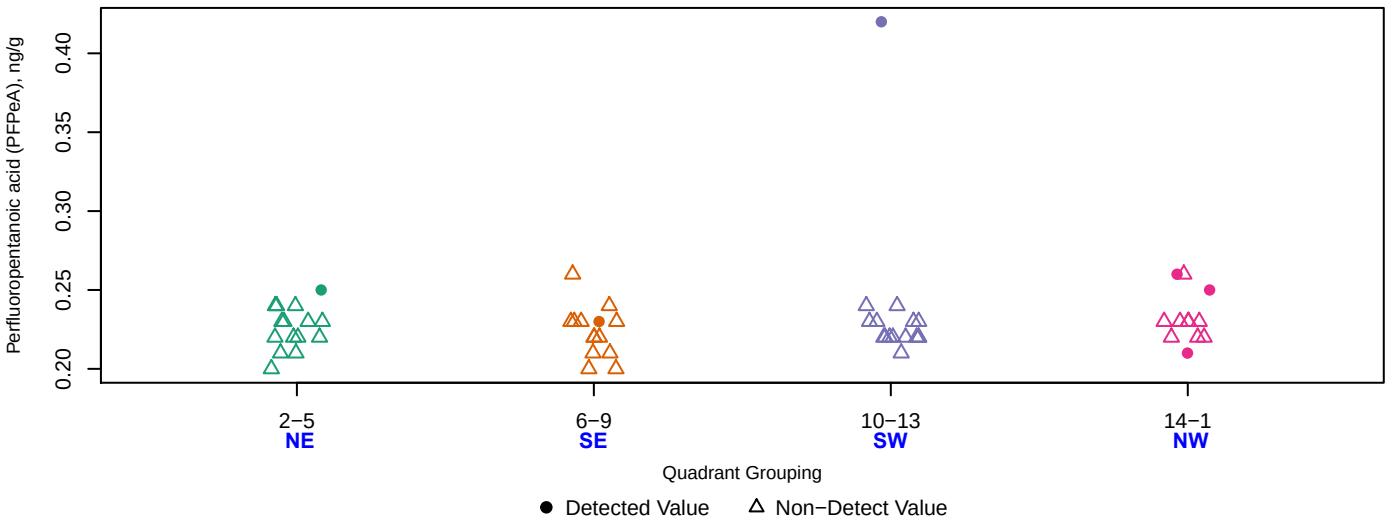
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

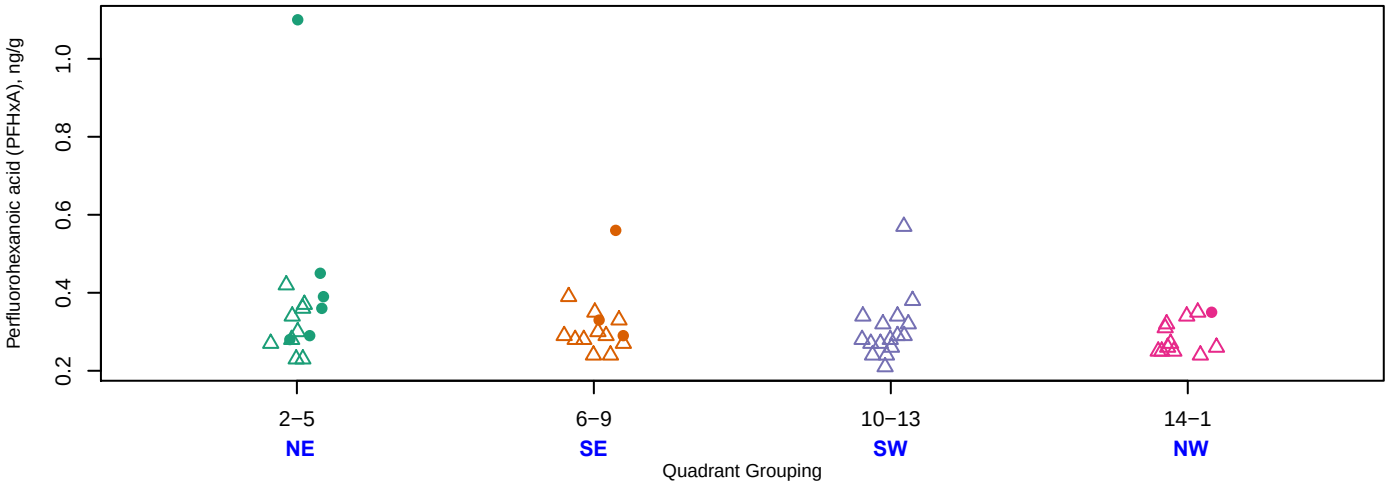


Sub−Surface Soil (1− 2 feet)

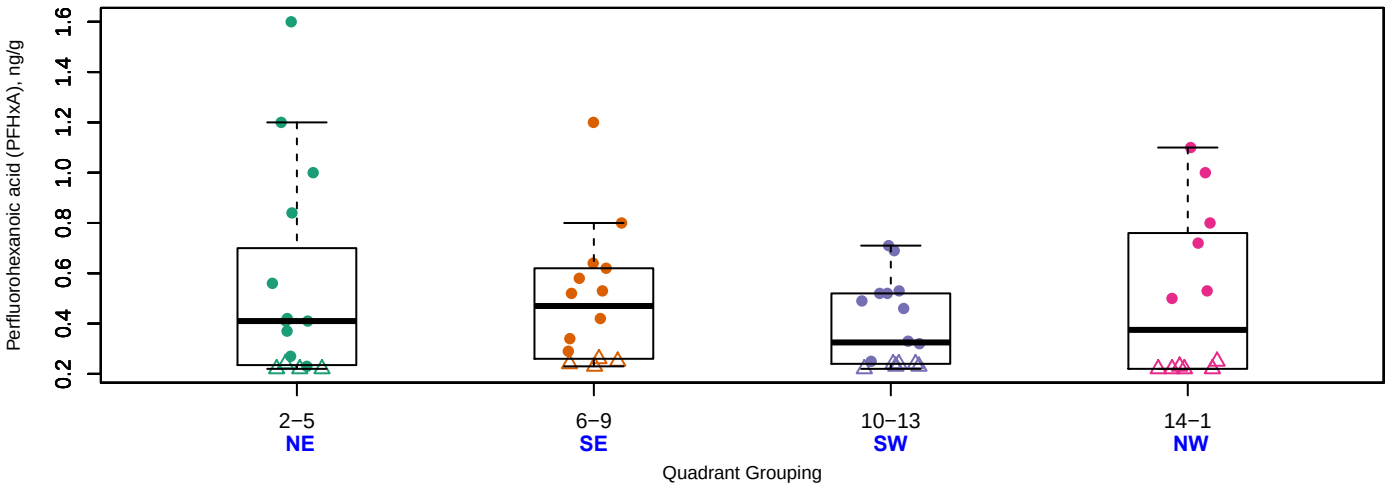


Perfluorohexanoic acid (PFHxA)

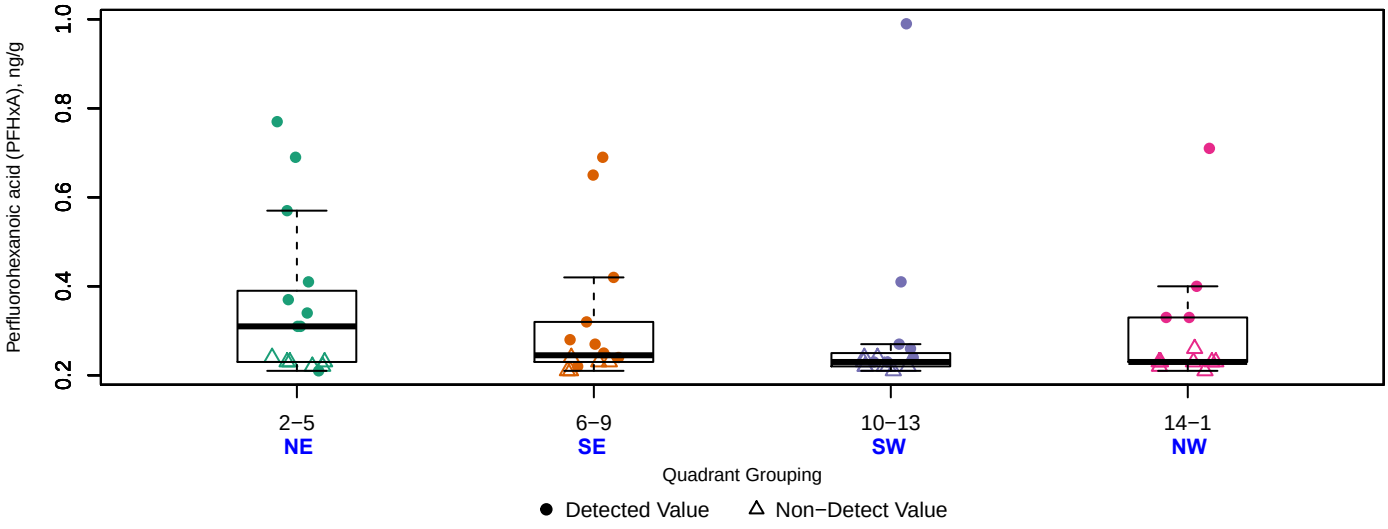
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

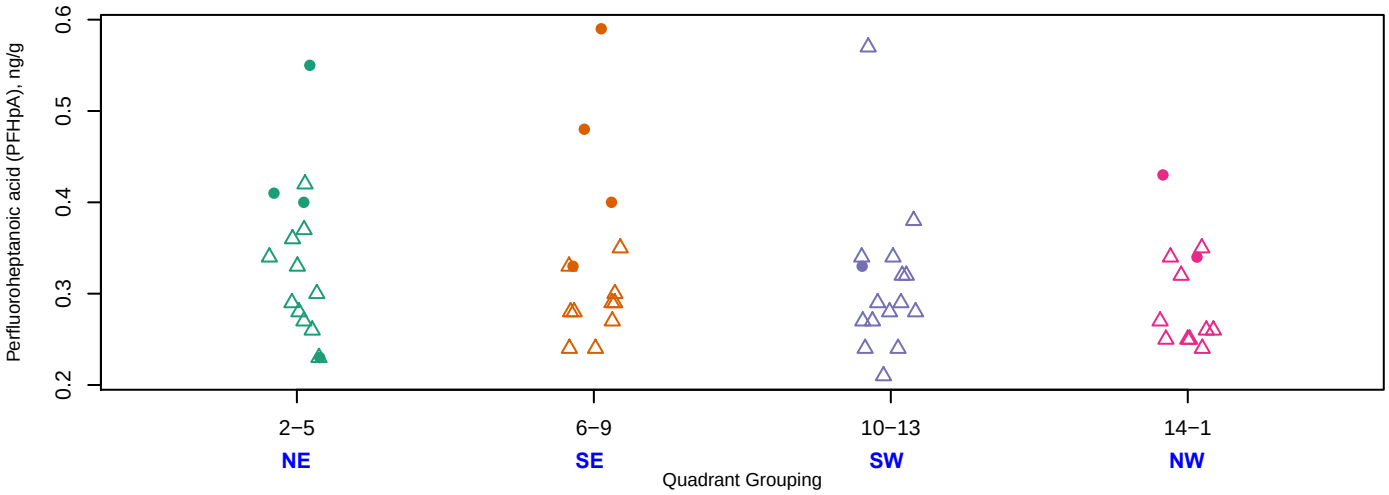


Sub−Surface Soil (1− 2 feet)

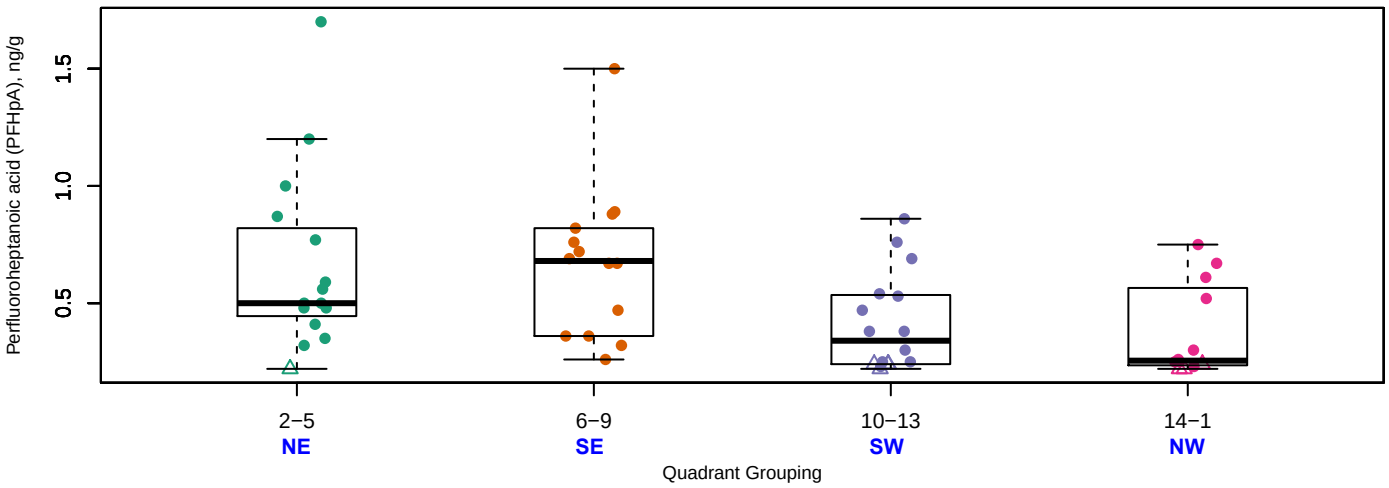


Perfluoroheptanoic acid (PFHpA)

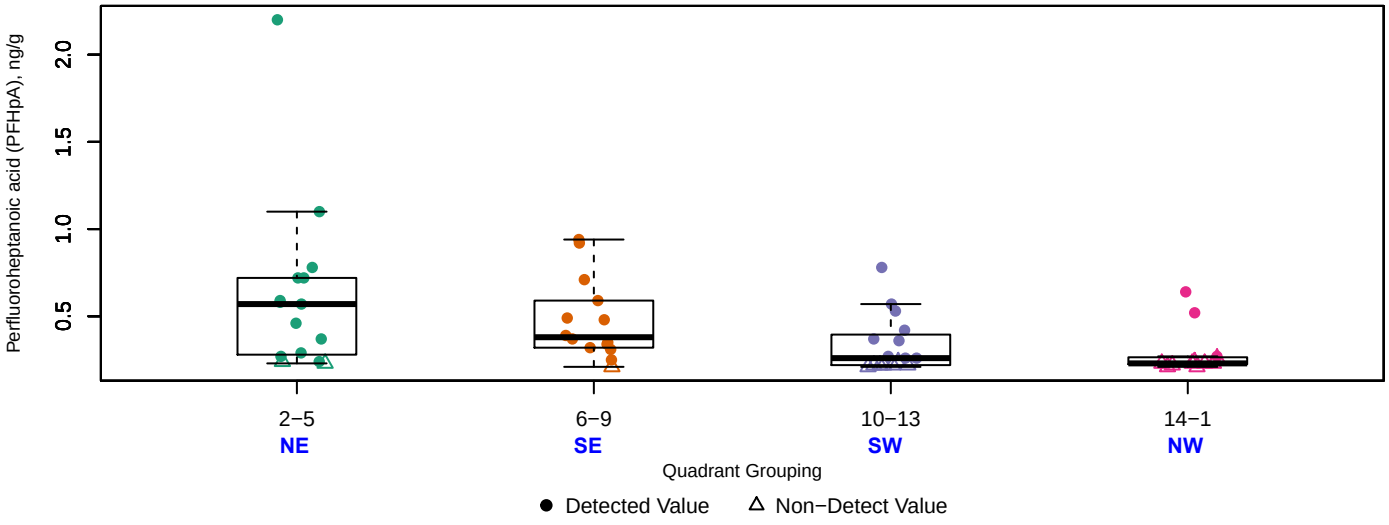
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

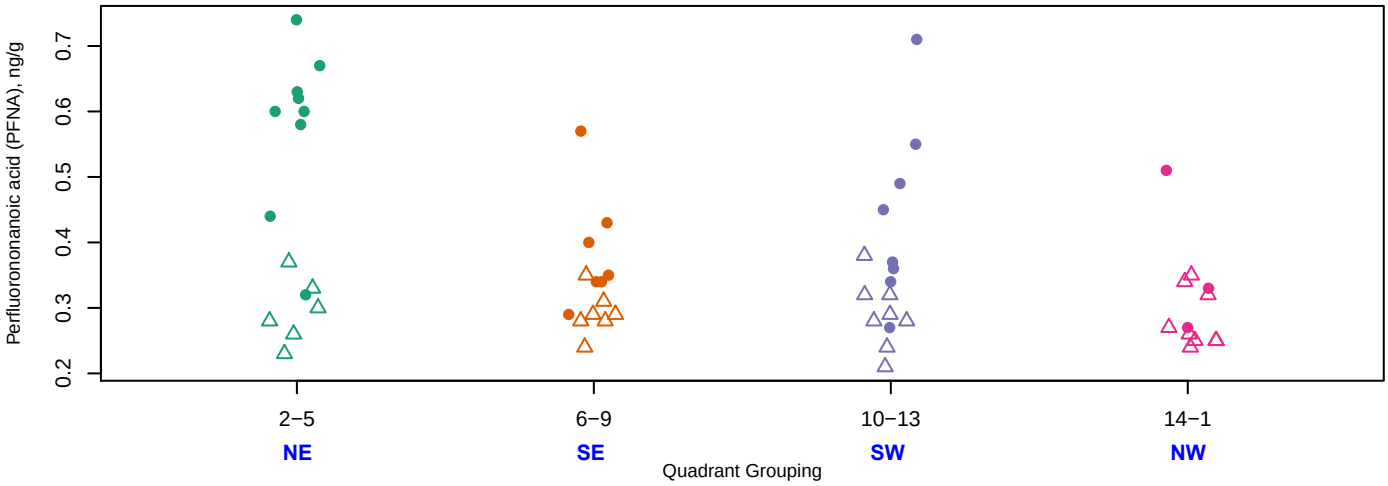


Sub−Surface Soil (1− 2 feet)

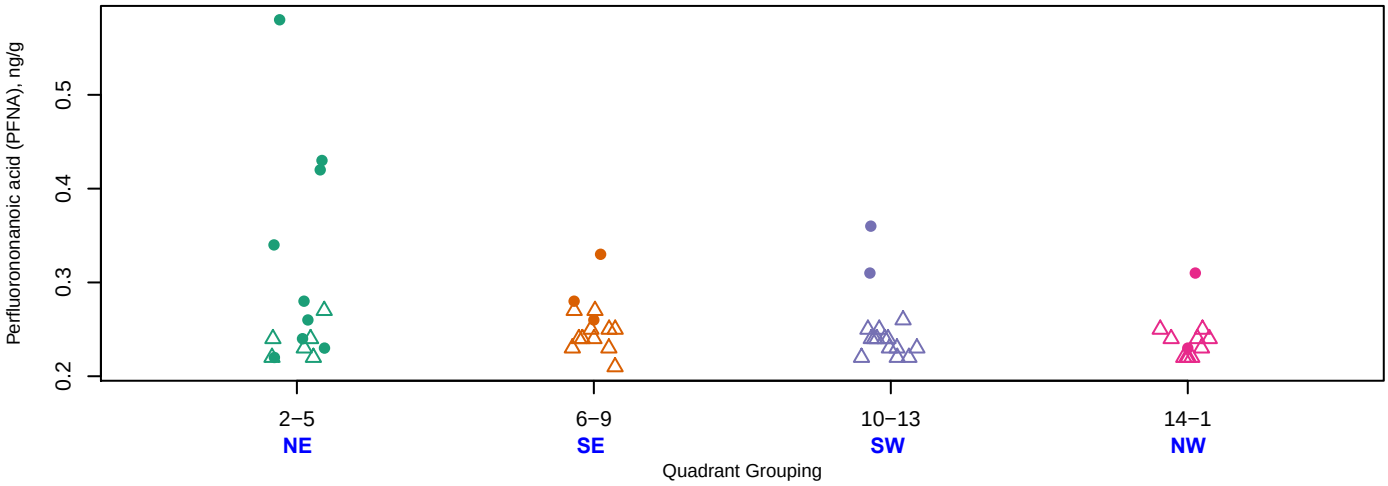


Perfluorononanoic acid (PFNA)

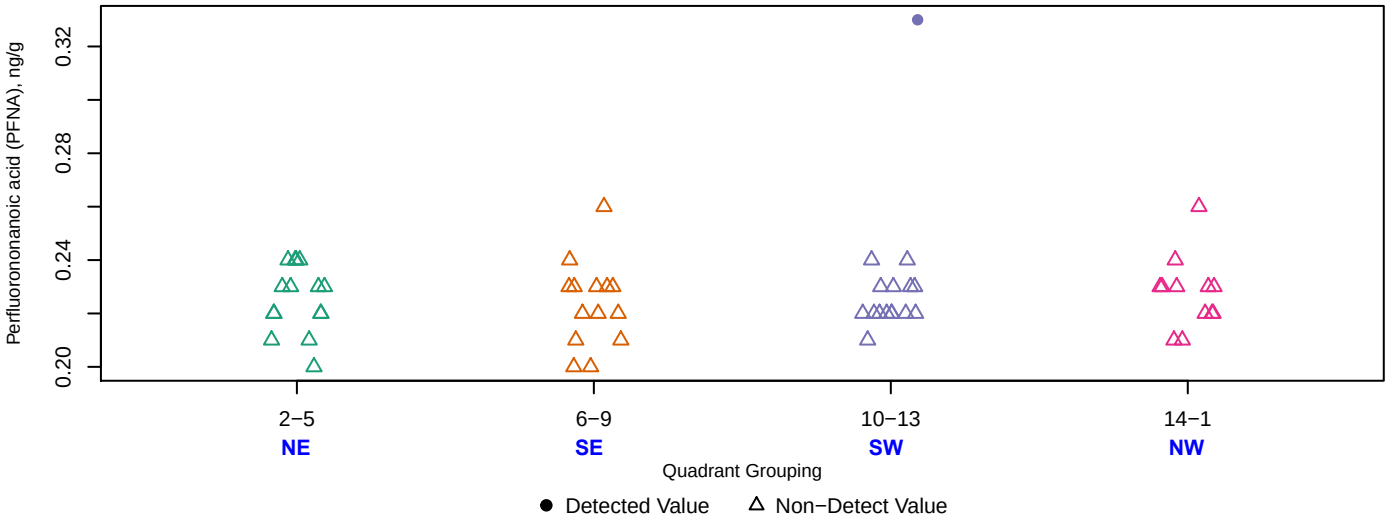
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

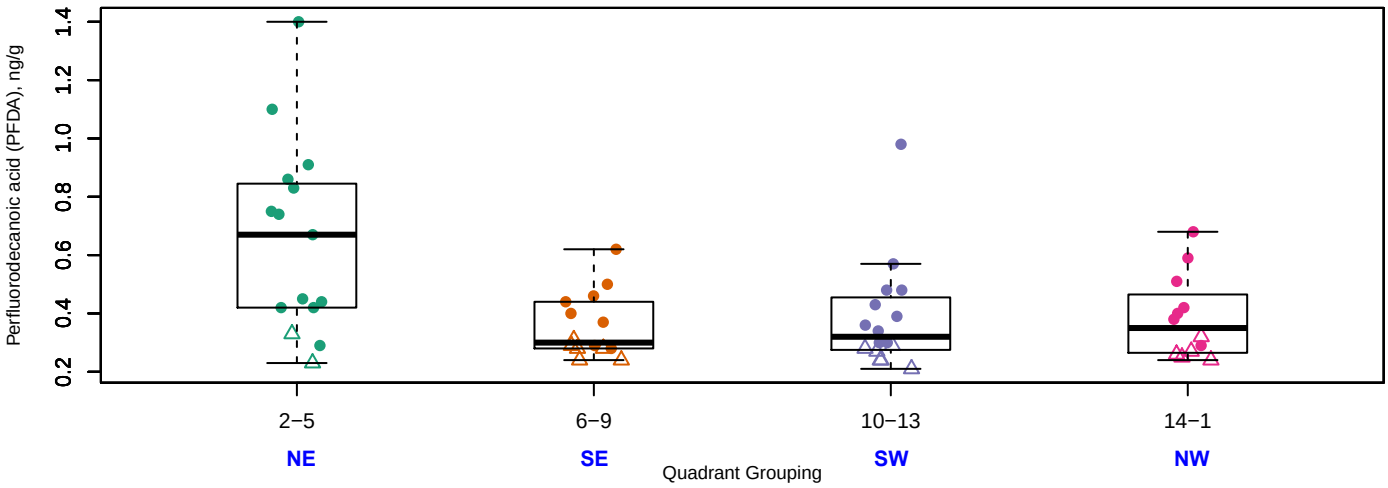


Sub−Surface Soil (1− 2 feet)

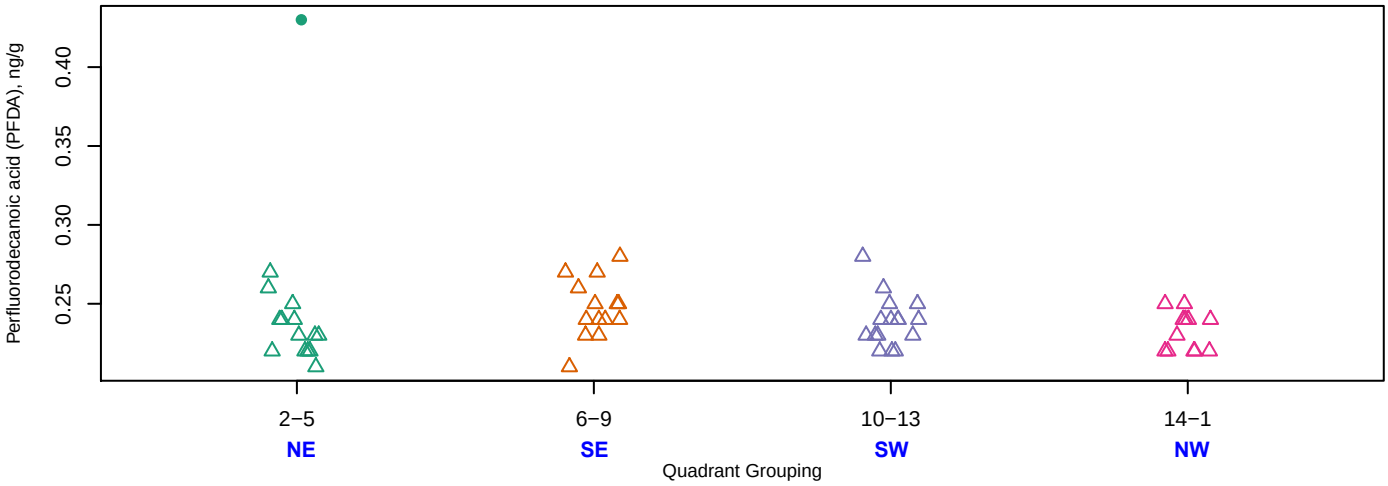


Perfluorodecanoic acid (PFDA)

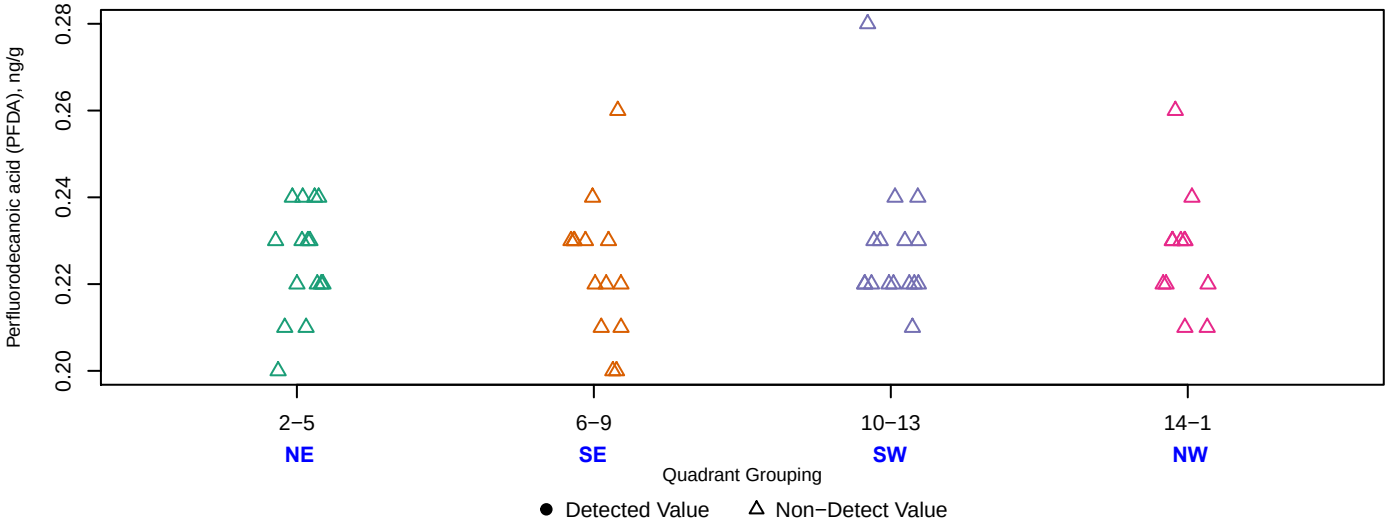
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

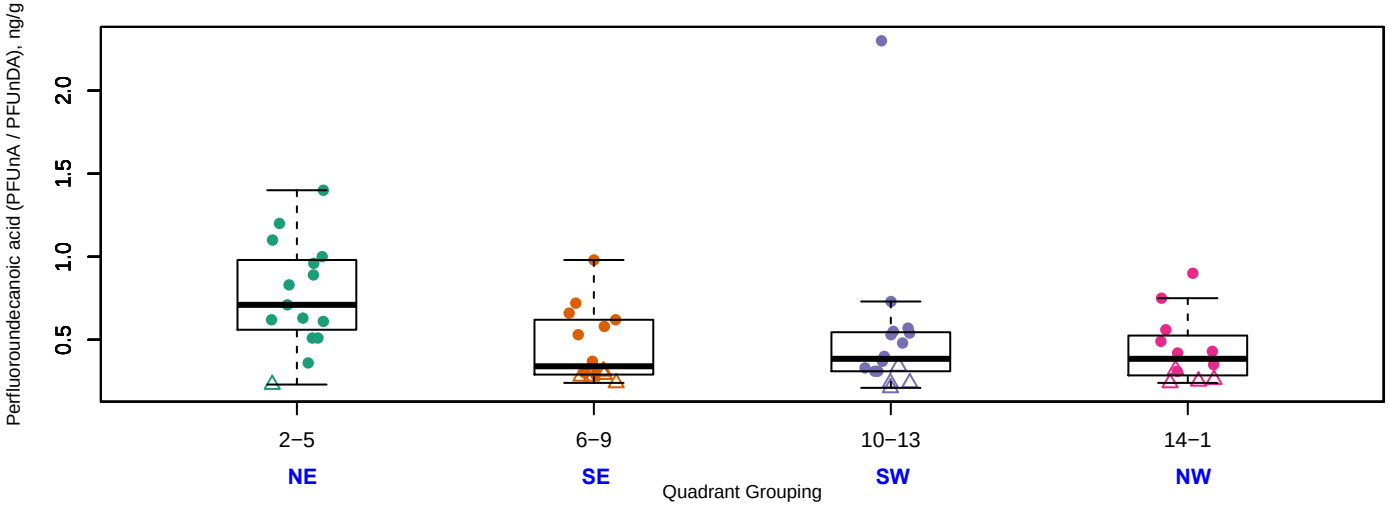


Sub−Surface Soil (1− 2 feet)

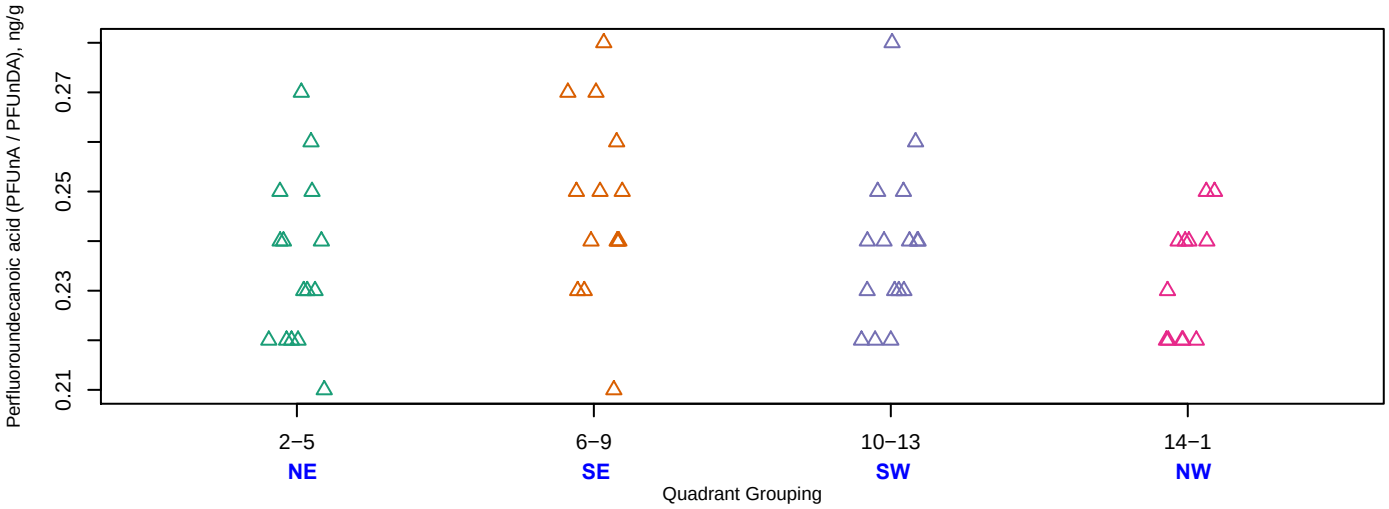


Perfluoroundecanoic acid (PFUnA / PFUnDA)

Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)



Sub−Surface Soil (1− 2 feet)

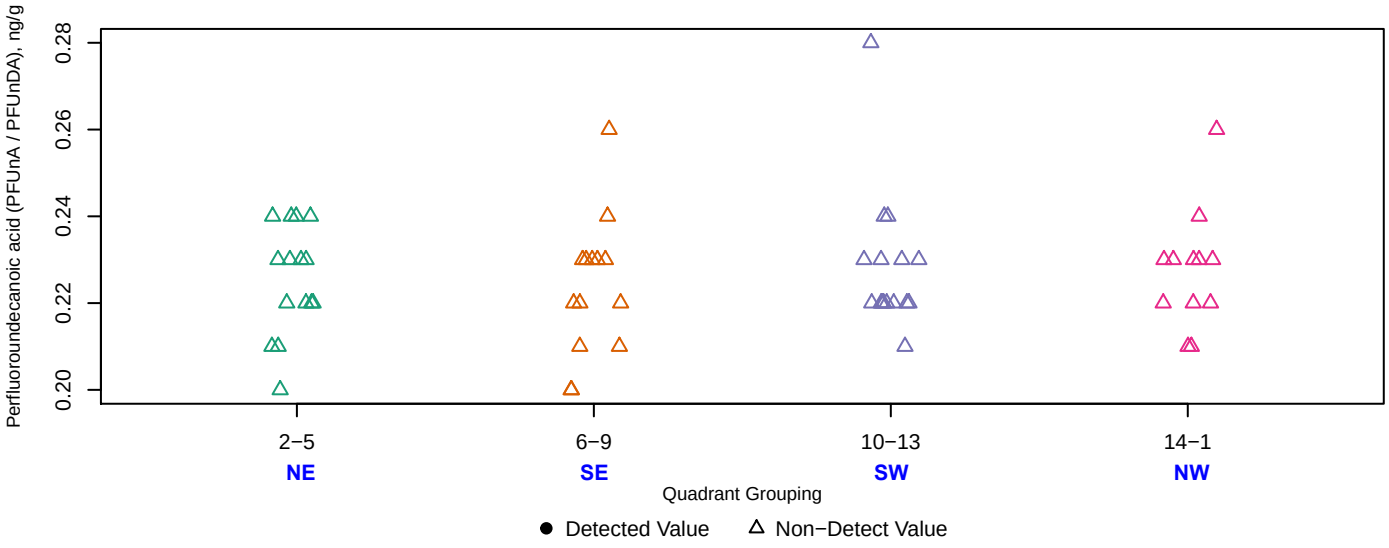


Table E2: PFAS Summary Statistics by Quadrant
Interim Report: Regional Air Deposition Study
Village of Hoosick Falls, New York

Investigation Location Subgroup	PFOA Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	15	100%	6.2	0.31	1.9	2.4	0.49	1.3	3.3
Sectors 6-9	14	14	100%	12	1.1	2.5	3.6	0.87	1.8	1.2
Sectors 10-13	16	15	94%	5.1	--	1.3	1.8	0.4	1.9	1.2
Sectors 14-1	12	10	83%	3.9	--	1.3	1.7	0.3	1.2	1.1

Investigation Location Subgroup	PFOS Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	15	100%	2.5	0.27	1.3	1.3	0.18	1.2	2.9
Sectors 6-9	14	14	100%	1.9	0.37	0.76	0.88	0.11	1.7	1.1
Sectors 10-13	16	15	94%	2.0	--	0.92	1.1	0.13	1.6	1.1
Sectors 14-1	12	10	83%	1.1	--	0.77	0.74	0.06	1.4	1.1

Investigation Location Subgroup	Perfluorobutanoic acid (PFBA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	3	20%	1.7	--	--	--	--	--	--
Sectors 6-9	14	0	0%	1.6	--	--	--	--	--	--
Sectors 10-13	16	5	31%	3.3	--	--	--	--	--	--
Sectors 14-1	12	4	33%	1.5	--	--	--	--	--	--

Investigation Location Subgroup	Perfluoropentanoic acid (PFPeA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	5	33%	0.49	--	0.33	0.30	0.02	1.1	1.0
Sectors 6-9	14	3	21%	0.41	--	--	--	--	--	--
Sectors 10-13	16	0	0%	0.57	--	--	--	--	--	--
Sectors 14-1	12	3	25%	0.79	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorohexanoic acid (PFHxA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	6	40%	1.1	--	0.34	0.36	0.06	1.1	0.98
Sectors 6-9	14	3	21%	0.56	--	--	--	--	--	--
Sectors 10-13	16	0	0%	0.57	--	--	--	--	--	--
Sectors 14-1	12	1	8%	0.35	--	--	--	--	--	--

Investigation Location Subgroup	Perfluoroheptanoic acid (PFHpA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	4	27%	0.55	--	--	--	--	--	--
Sectors 6-9	14	4	29%	0.59	--	--	--	--	--	--
Sectors 10-13	16	1	6%	0.57	--	--	--	--	--	--
Sectors 14-1	12	2	17%	0.43	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorononanoic acid (PFNA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	9	60%	0.74	--	0.44	0.47	0.04	1.1	1.2
Sectors 6-9	14	7	50%	0.57	--	0.33	0.34	0.02	1.0	1.1
Sectors 10-13	16	8	50%	0.71	--	0.34	0.36	0.04	1.1	1.1
Sectors 14-1	12	3	25%	0.51	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorodecanoic acid (PFDA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	13	87%	1.4	--	0.67	0.66	0.09	1.1	1.6
Sectors 6-9	14	8	57%	0.62	--	0.30	0.36	0.03	1.1	1.1
Sectors 10-13	16	10	63%	0.98	--	0.34	0.41	0.05	1.1	1.1
Sectors 14-1	12	7	58%	0.68	--	0.38	0.40	0.04	1.1	1.1

Table E2: PFAS Summary Statistics by Quadrant
Interim Report: Regional Air Deposition Study
Village of Hoosick Falls, New York

Investigation Location Subgroup	Perfluoroundecanoic acid (PFUnA / PFUnDA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	14	93%	1.4	--	0.71	0.78	0.08	1.1	1.6
Sectors 6-9	14	9	64%	0.98	--	0.34	0.46	0.06	1.2	1.1
Sectors 10-13	16	12	75%	2.3	--	0.40	0.56	0.13	1.1	1.1
Sectors 14-1	12	8	67%	0.9	--	0.42	0.47	0.06	1.1	1.1

Investigation Location Subgroup	Perfluorododecanoic acid (PFDoA / PFDoDA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	12	80%	1	--	0.45	0.49	0.05	1.1	1.2
Sectors 6-9	14	3	21%	0.49	--	--	--	--	--	--
Sectors 10-13	16	4	25%	1.3	--	--	--	--	--	--
Sectors 14-1	12	4	33%	0.45	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorotridecanoic acid (PFTrDA / PFTriA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	9	60%	0.77	--	0.36	0.38	0.04	1.1	1.1
Sectors 6-9	14	2	14%	0.5	--	--	--	--	--	--
Sectors 10-13	16	1	6%	1	--	--	--	--	--	--
Sectors 14-1	12	1	8%	0.35	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorotetradecanoic acid (PFTA / PFTeDA / PFTeA) Surface Soil[1]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	5	33%	0.68	--	--	--	--	--	--
Sectors 6-9	14	0	0%	0.39	--	--	--	--	--	--
Sectors 10-13	16	1	6%	0.67	--	--	--	--	--	--
Sectors 14-1	12	0	0%	0.35	--	--	--	--	--	--

Table E2: PFAS Summary Statistics by Quadrant
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Investigation Location Subgroup	PFOA Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	13	87%	30	0.22	7.5	11	1.8	6.6	1.2
Sectors 6-9	14	14	100%	17	6.1	11	11	0.8	9.1	1.1
Sectors 10-13	16	15	94%	18	1.2	6.2	7.3	1.3	3.7	1.2
Sectors 14-1	12	11	92%	10	2.5	4.7	5.2	0.8	3.6	1.2

Investigation Location Subgroup	PFOS Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	12	80%	1.2	0.22	0.41	0.48	0.07	1.5	1.1
Sectors 6-9	14	14	100%	1.0	0.26	0.44	0.48	0.05	1.4	1.1
Sectors 10-13	16	12	75%	0.87	0.22	0.39	0.45	0.04	1.2	1.1
Sectors 14-1	12	9	75%	0.64	0.23	0.37	0.39	0.04	1.2	1.1

Investigation Location Subgroup	Perfluorobutanoic acid (PFBA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	3	20%	2	--	--	--	--	--	--
Sectors 6-9	14	1	7%	1.2	--	--	--	--	--	--
Sectors 10-13	16	8	50%	1.5	0.89	1.2	1.3	0.028	1.2	1.0
Sectors 14-1	12	2	17%	1.2	--	--	--	--	--	--

Investigation Location Subgroup	Perfluoropentanoic acid (PFPeA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	10	67%	0.84	0.22	0.29	0.36	0.05	1.1	1.1
Sectors 6-9	14	7	50%	0.43	0.23	0.26	0.28	0.02	0.98	1.1
Sectors 10-13	16	4	25%	0.42	--	--	--	--	--	--
Sectors 14-1	12	7	58%	0.64	0.22	0.26	0.33	0.04	1.0	1.1

Investigation Location Subgroup	Perfluorohexanoic acid (PFHxA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	11	73%	1.6	0.22	0.41	0.55	0.11	1.4	1.2
Sectors 6-9	14	14	100%	1.2	0.23	0.47	0.51	0.07	1.2	1.1
Sectors 10-13	16	10	63%	0.71	0.23	0.33	0.40	0.04	1.2	1.1
Sectors 14-1	12	6	50%	1.1	0.22	0.50	0.65	0.07	1.0	1.1

Investigation Location Subgroup	Perfluoroheptanoic acid (PFHpA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	14	93%	1.7	0.22	0.5	0.67	0.10	1.4	1.1
Sectors 6-9	14	3	21%	1.5	--	--	--	--	--	--
Sectors 10-13	16	12	75%	0.86	0.23	0.38	0.42	0.06	1.3	1.1
Sectors 14-1	12	9	75%	0.75	0.22	0.26	0.39	0.06	1.1	1.2

Investigation Location Subgroup	Perfluorononanoic acid (PFNA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	9	60%	0.58	0.22	0.24	0.29	0.03	1.1	1.1
Sectors 6-9	14	0	0%	0.33	--	--	--	--	--	--
Sectors 10-13	16	2	13%	0.36	--	--	--	--	--	--
Sectors 14-1	12	2	17%	0.31	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorodecanoic acid (PFDA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	1	7%	0.43	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Table E2: PFAS Summary Statistics by Quadrant
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Investigation Location Subgroup	Perfluoroundecanoic acid (PFUnA / PFUnDA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorododecanoic acid (PFDoA / PFDoDA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorotridecanoic acid (PFTrDA / PFTriA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorotetradecanoic acid (PFTA / PFTeDA / PFTeA) Near-Surface Soil[2]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Table E2: PFAS Summary Statistics by Quadrant
Interim Report: Regional Air Deposition Study
Village of Hoosick Falls, New York

Investigation Location Subgroup	PFOA Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	14	93%	44	0.22	7.3	12	3.2	5.2	1.3
Sectors 6-9	14	14	100%	20	4.2	9.1	9.3	1.3	6.3	1.2
Sectors 10-13	16	15	94%	14	1.2	4.4	5.9	1.1	3.0	1.2
Sectors 14-1	12	11	92%	12	1.9	2.6	4.1	0.92	2.4	1.2

Investigation Location Subgroup	PFOS Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	7	47%	0.43	--	--	--	--	--	--
Sectors 6-9	14	4	29%	0.6	--	--	--	--	--	--
Sectors 10-13	16	2	13%	0.76	--	--	--	--	--	--
Sectors 14-1	12	1	8%	0.28	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorobutanoic acid (PFBA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	2	13%	1.6	--	--	--	--	--	--
Sectors 6-9	14	0	0%	1	--	--	--	--	--	--
Sectors 10-13	16	4	25%	1.7	--	--	--	--	--	--
Sectors 14-1	12	2	17%	1.1	--	--	--	--	--	--

Investigation Location Subgroup	Perfluoropentanoic acid (PFPeA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	1	7%	0.25	--	--	--	--	--	--
Sectors 6-9	14	1	7%	0.26	--	--	--	--	--	--
Sectors 10-13	16	1	6%	0.42	--	--	--	--	--	--
Sectors 14-1	12	3	25%	0.26	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorohexanoic acid (PFHxA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	9	60%	0.77	0.21	0.31	0.35	0.05	1.2	1.1
Sectors 6-9	14	9	64%	0.69	0.21	0.245	0.32	0.04	1.1	1.1
Sectors 10-13	16	7	44%	0.99	--	--	--	--	--	--
Sectors 14-1	12	4	33%	0.71	--	--	--	--	--	--

Investigation Location Subgroup	Perfluoroheptanoic acid (PFHpA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	13	87%	2.2	0.23	0.57	0.62	0.13	1.5	1.2
Sectors 6-9	14	13	93%	0.94	0.21	0.38	0.48	0.06	1.4	1.1
Sectors 10-13	16	9	56%	0.78	0.21	0.26	0.36	0.04	1.1	1.1
Sectors 14-1	12	3	25%	0.64	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorononanoic acid (PFNA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	1	6%	0.33	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorodecanoic acid (PFDA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Table E2: PFAS Summary Statistics by Quadrant
Interim Report: Regional Air Deposition Study
Village of Hoosick Falls, New York

Investigation Location Subgroup	Perfluoroundecanoic acid (PFUnA / PFUnDA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorododecanoic acid (PFDoA / PFDoDA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorotridecanoic acid (PFTrDA / PFTriA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Investigation Location Subgroup	Perfluorotetradecanoic acid (PFTA / PFTeDA / PFTeA) Sub-Surface Soil[3]									
	# of Samples	# of Detections	Detection Frequency	Maximum	Minimum	Median	Arithmetic Mean	Geometric Mean	75th Percentile	25th Percentile
Sectors 2-5	15	0	0%	--	--	--	--	--	--	--
Sectors 6-9	14	0	0%	--	--	--	--	--	--	--
Sectors 10-13	16	0	0%	--	--	--	--	--	--	--
Sectors 14-1	12	0	0%	--	--	--	--	--	--	--

Appendix F

Parameter vs Parameter Plots – Soil Data

Appendix F1: Scatter Plots: Parameter vs Parameter
Appendix F2: Box Plots: Parameter vs Parameter

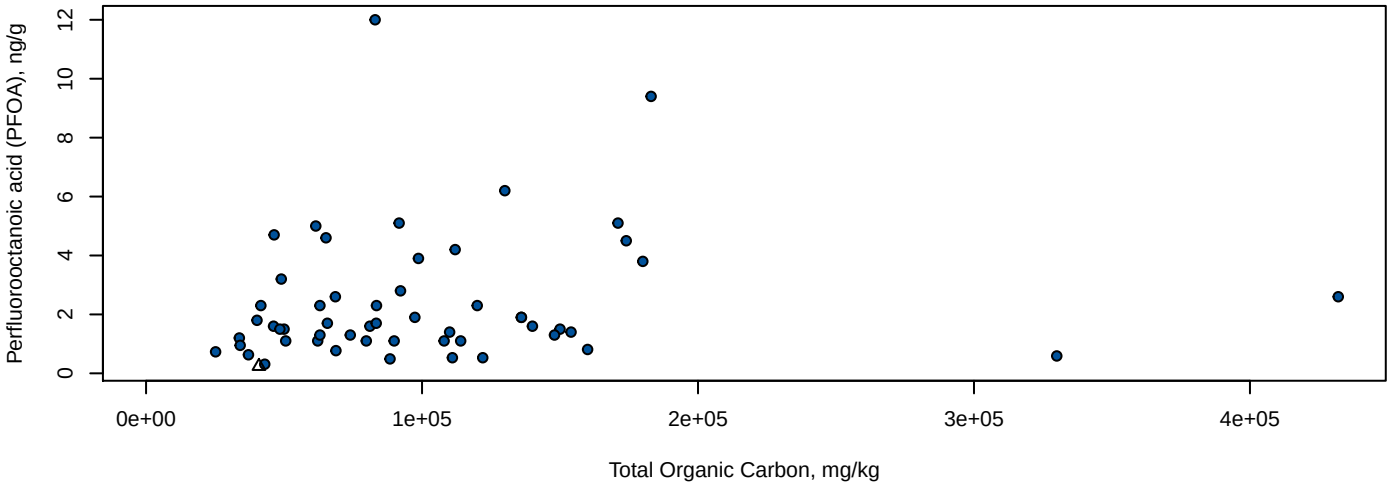
Appendix F

Parameter vs Parameter Plots – Soil Data

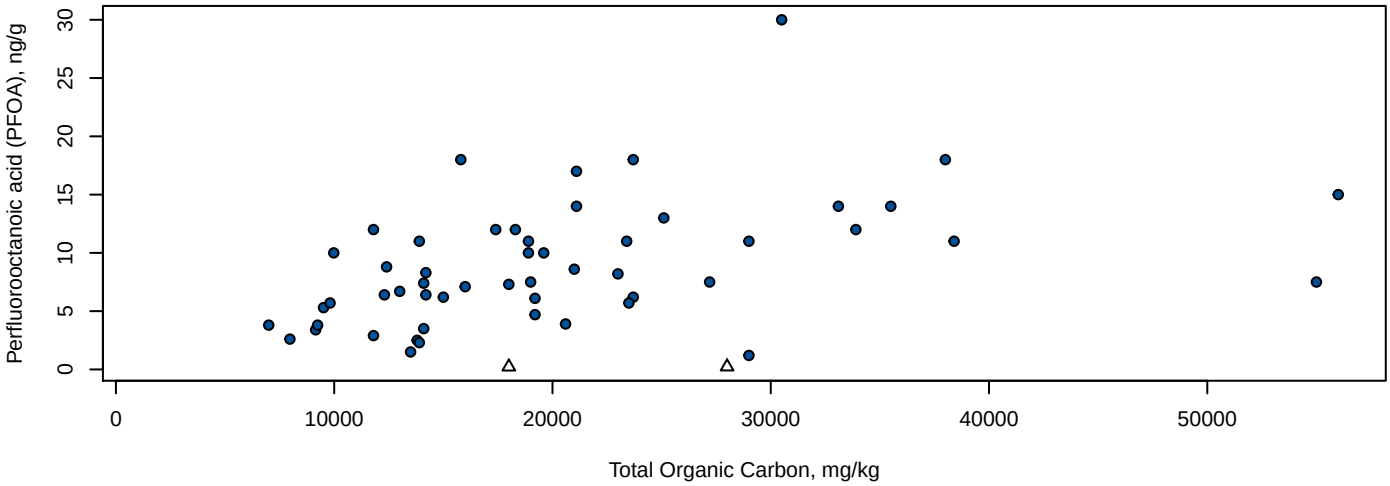
Appendix F1: Scatter Plots: Parameter vs Parameter

TOC vs. Perfluorooctanoic acid (PFOA)

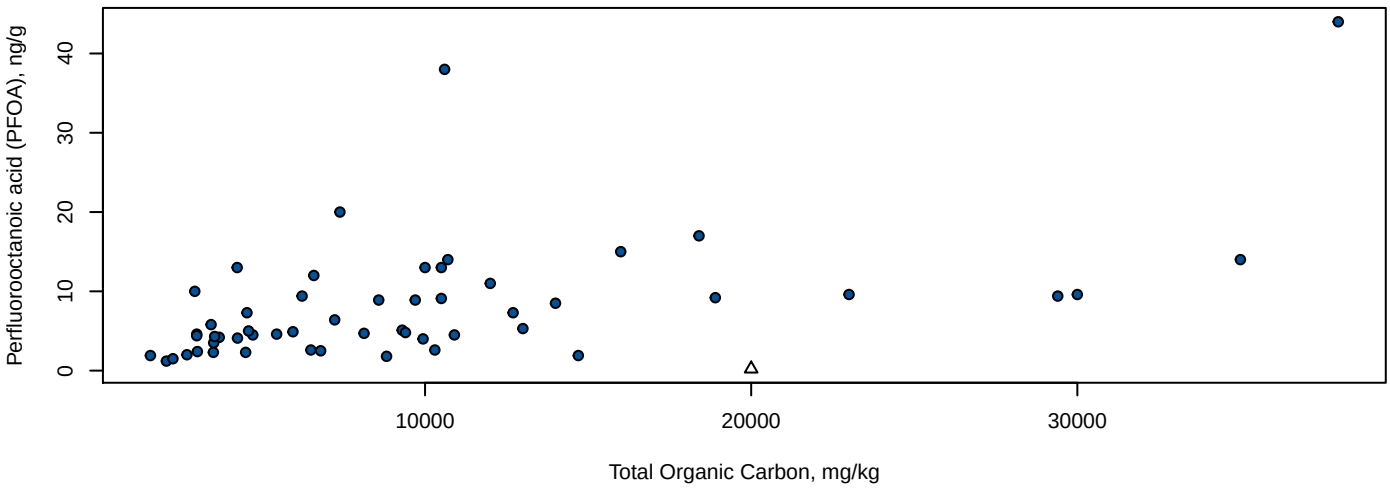
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

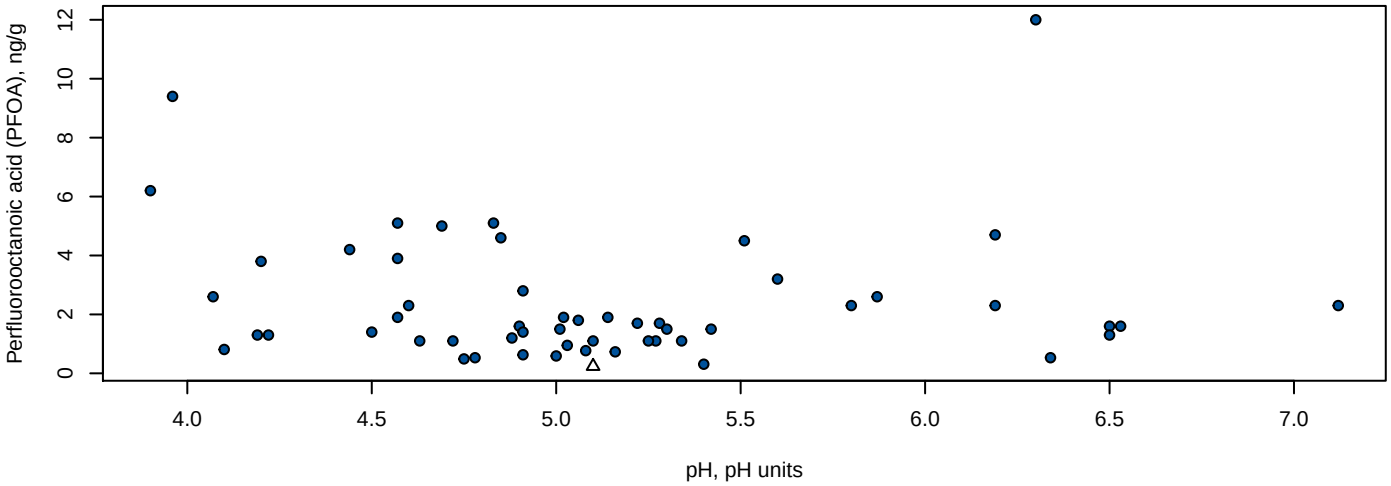


Sub−Surface Soil (1 − 2 feet)

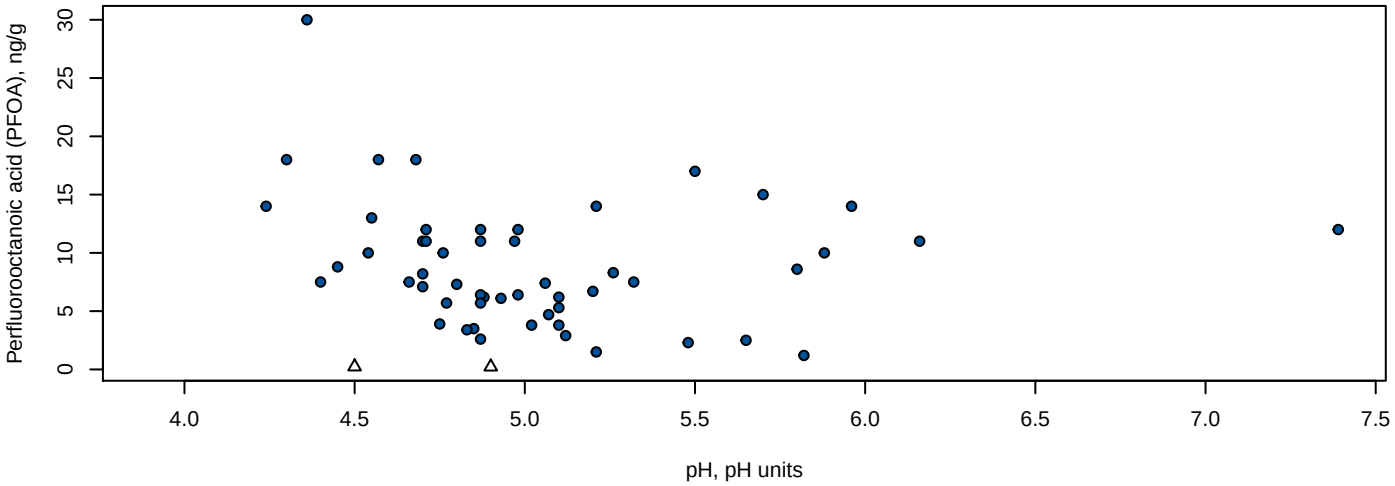


pH vs. Perfluorooctanoic acid (PFOA)

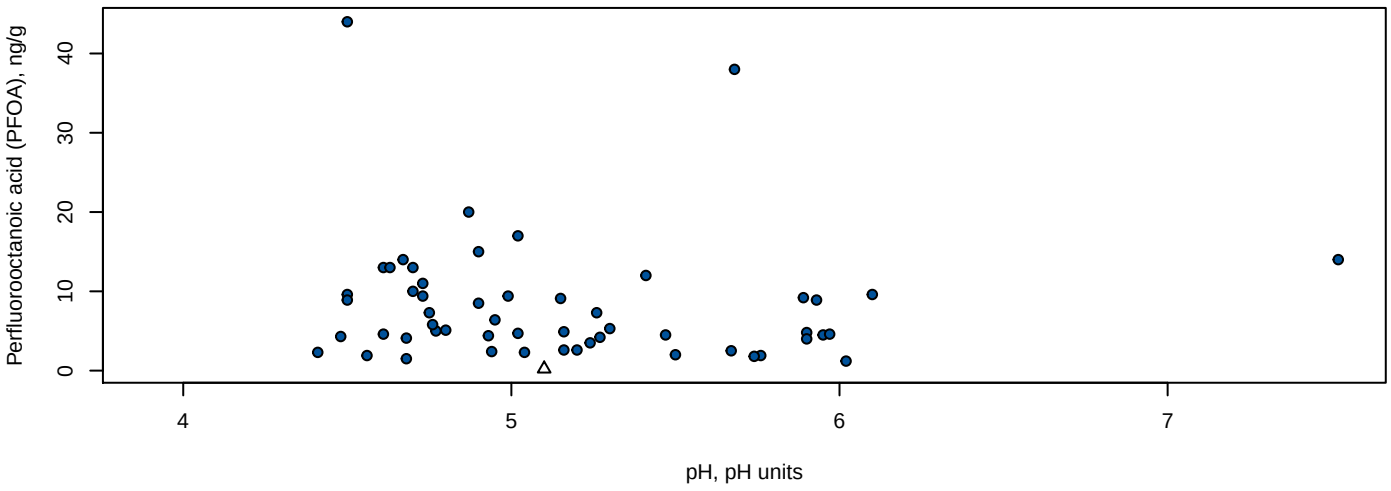
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

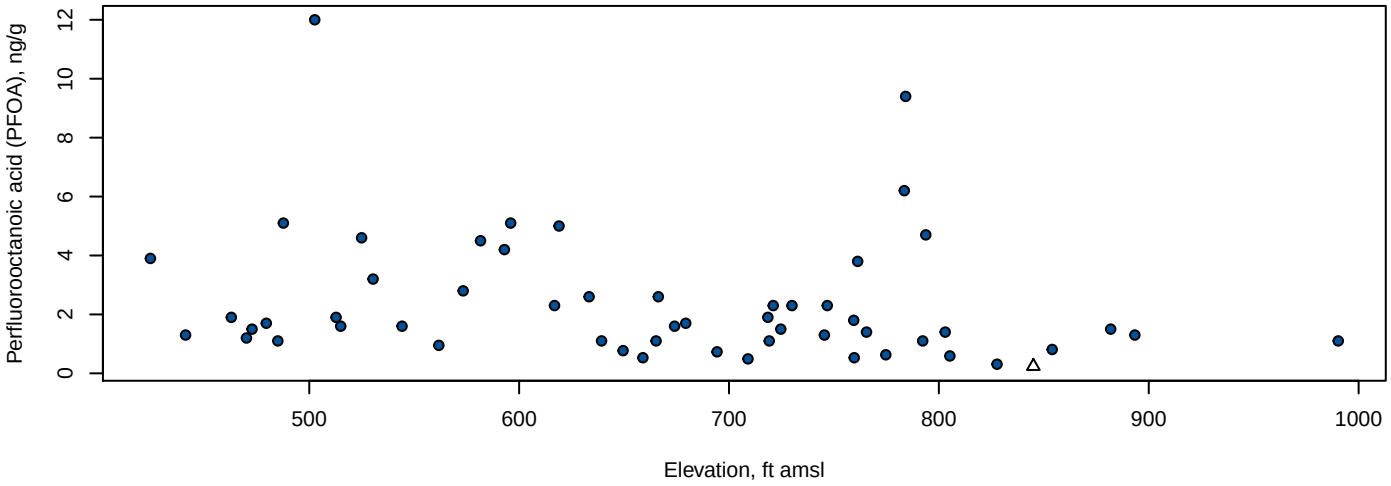


Sub−Surface Soil (1 − 2 feet)

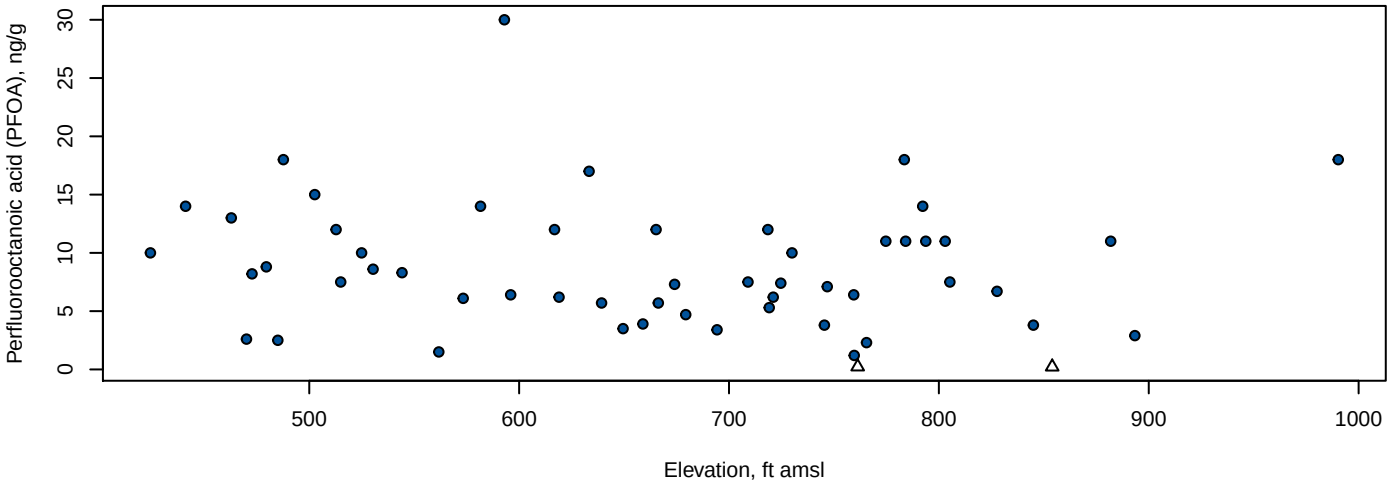


Elevation vs. Perfluorooctanoic acid (PFOA)

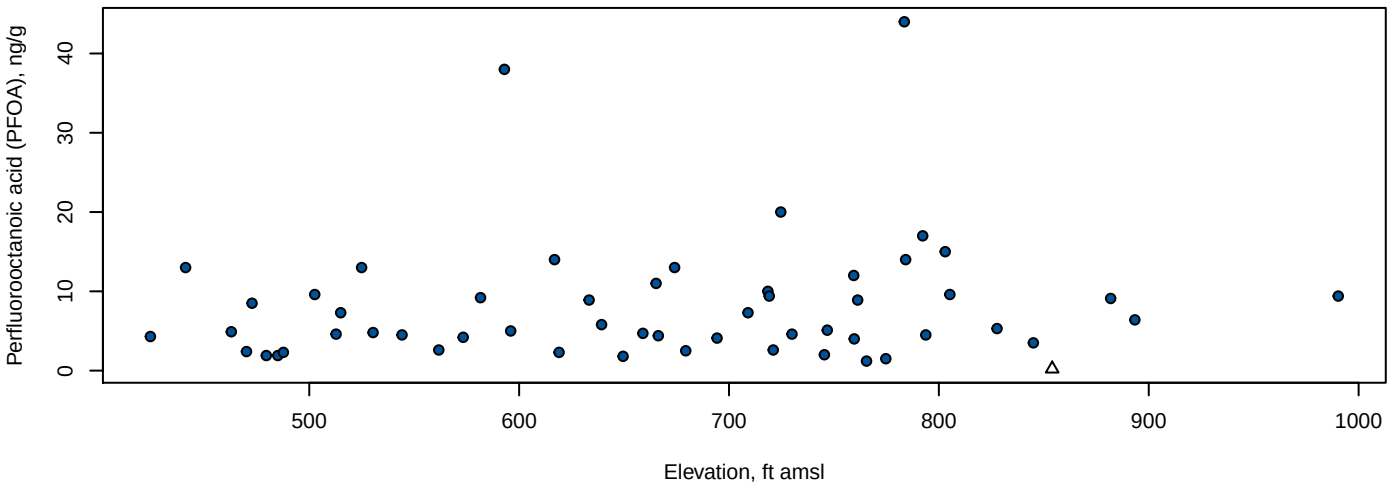
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

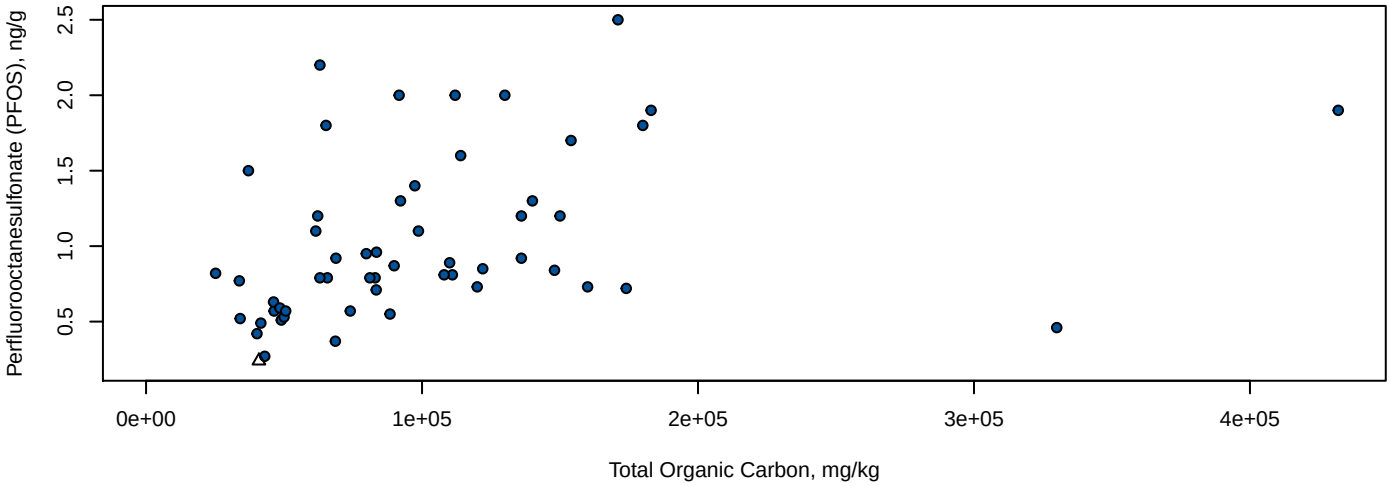


Sub−Surface Soil (1 − 2 feet)

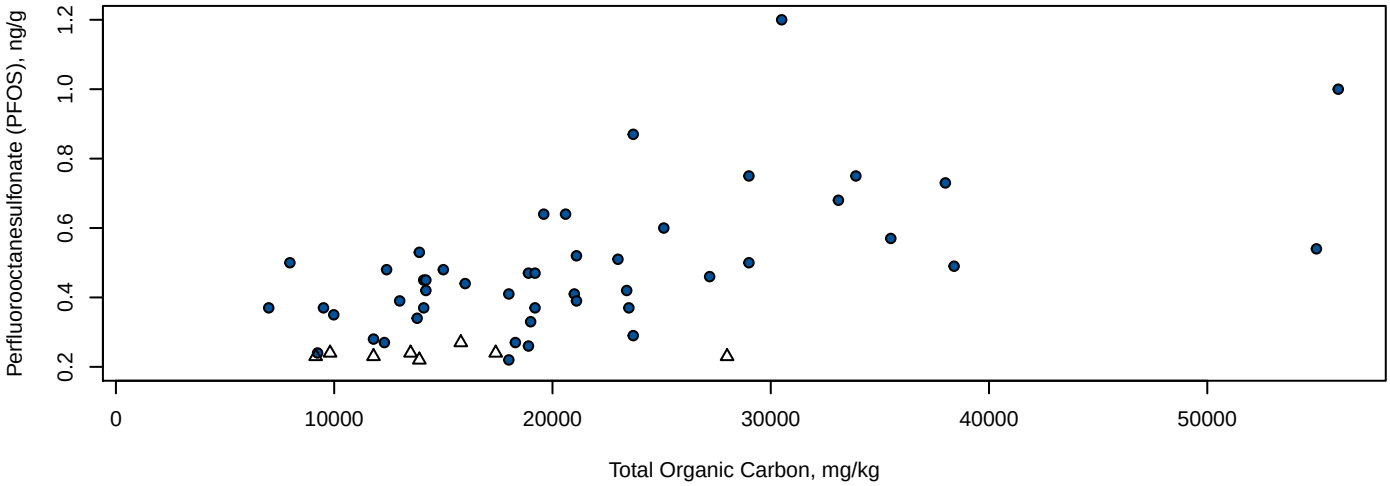


TOC vs. Perfluorooctanesulfonate (PFOS)

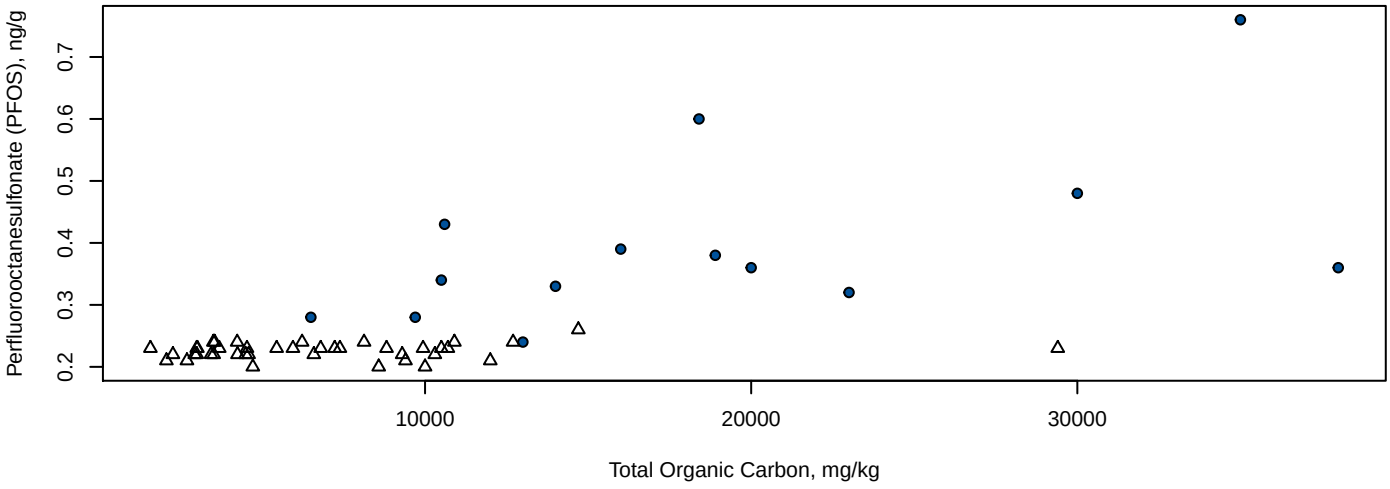
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

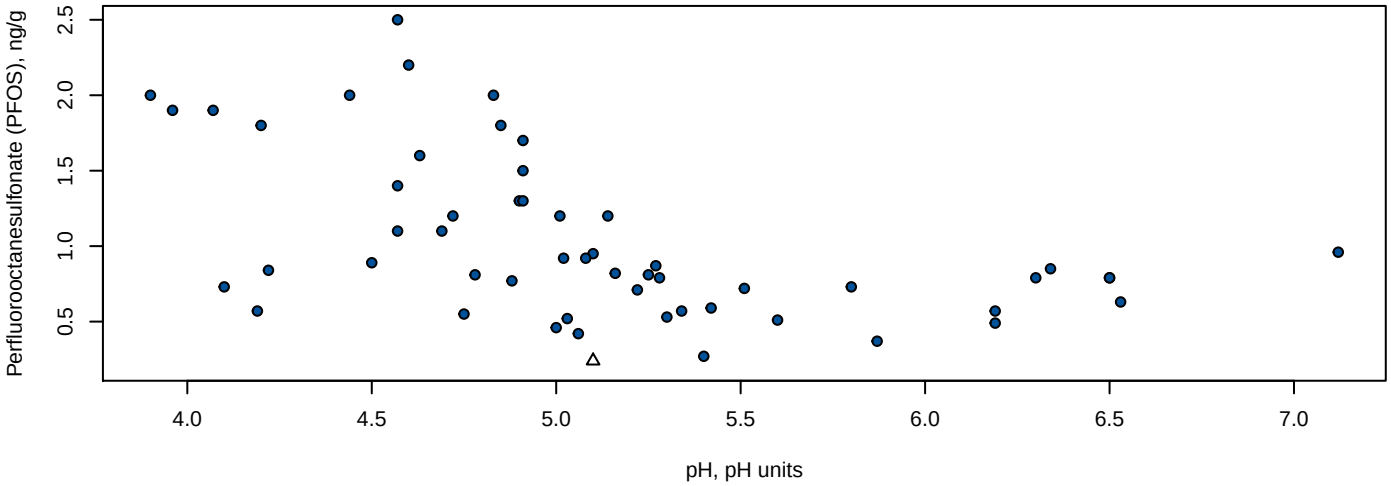


Sub−Surface Soil (1 − 2 feet)

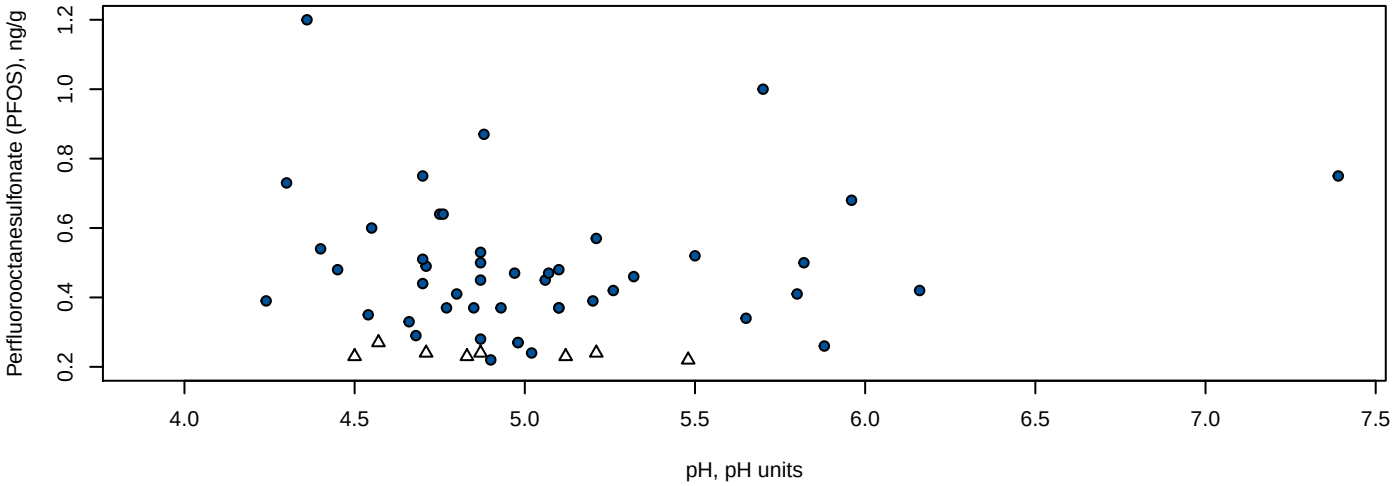


pH vs. Perfluorooctanesulfonate (PFOS)

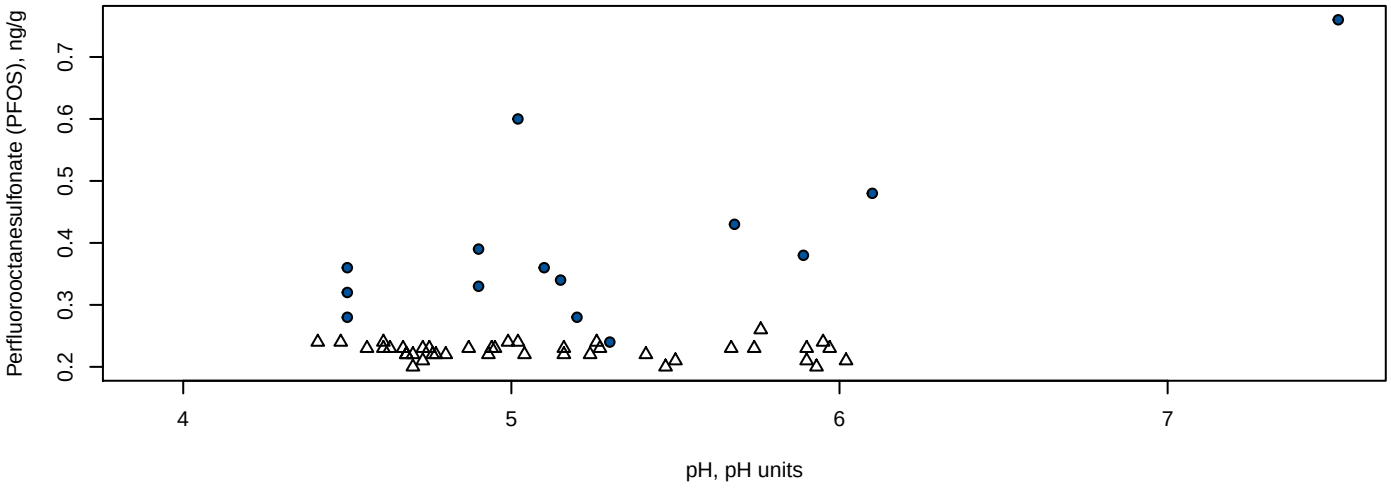
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

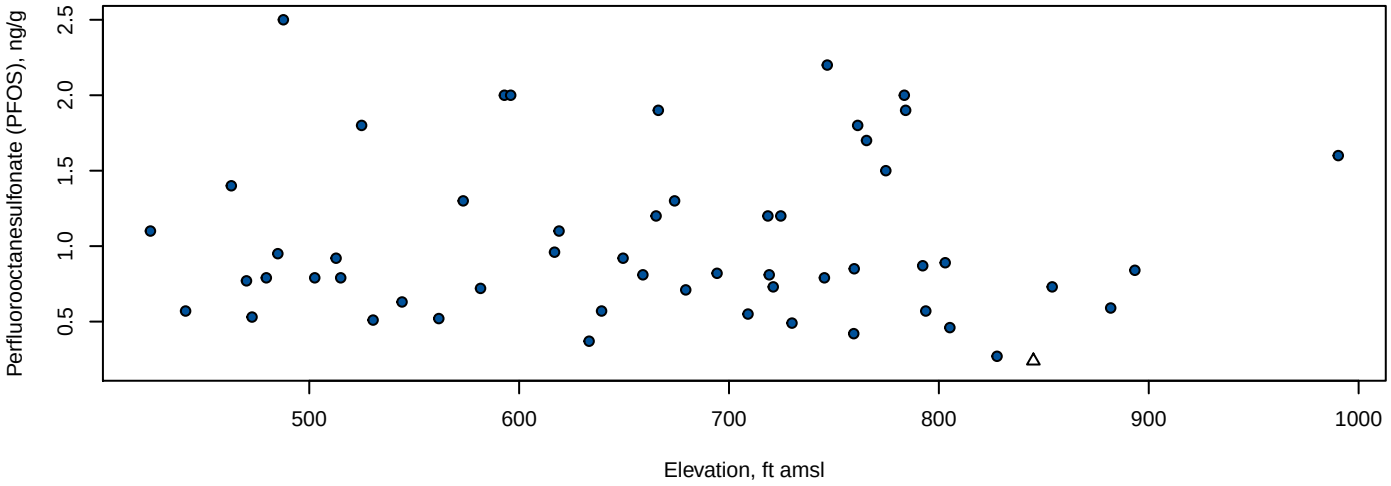


Sub−Surface Soil (1 − 2 feet)

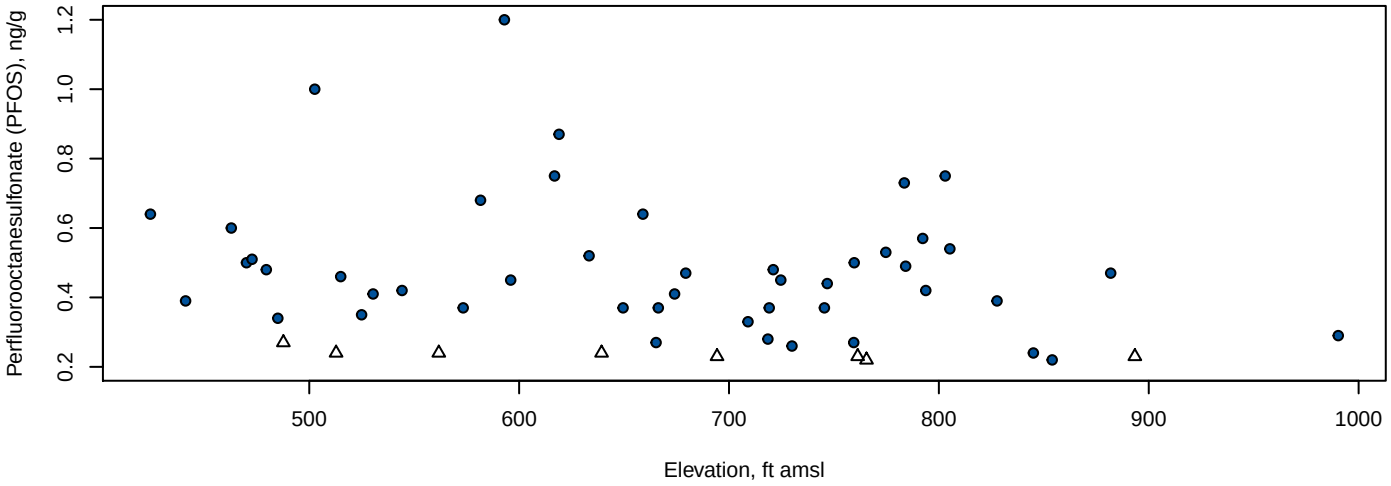


Elevation vs. Perfluorooctanesulfonate (PFOS)

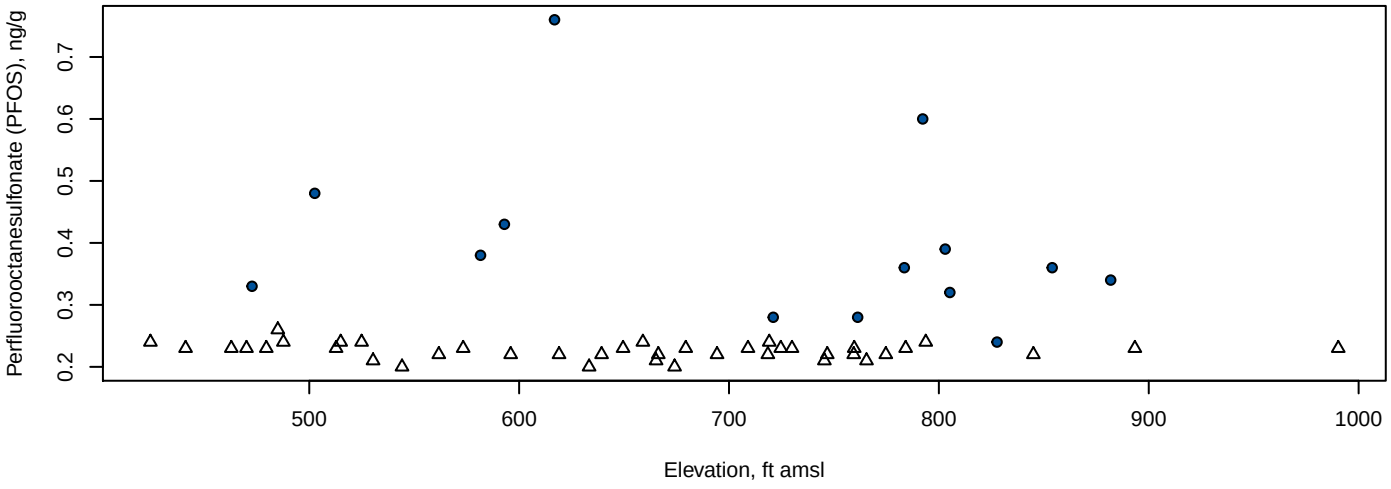
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

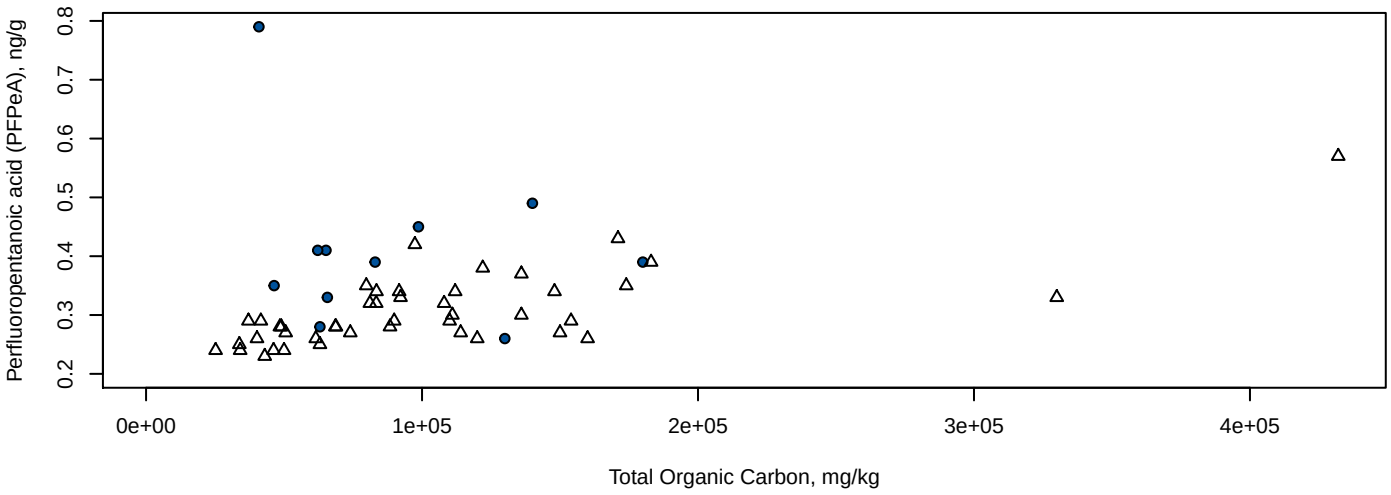


Sub−Surface Soil (1 − 2 feet)

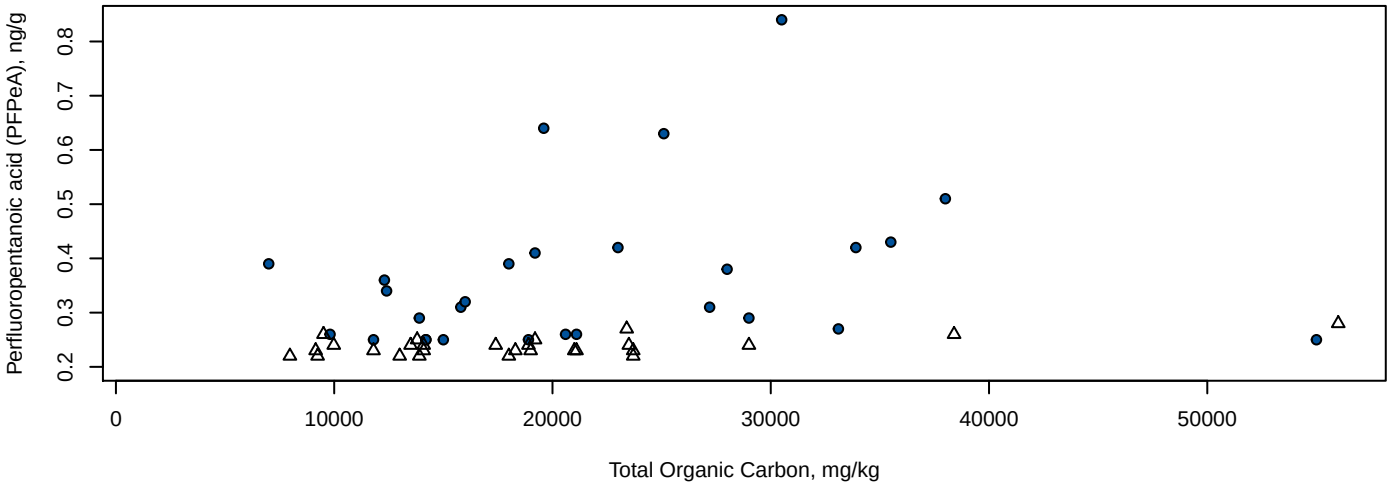


TOC vs. Perfluoropentanoic acid (PFPeA)

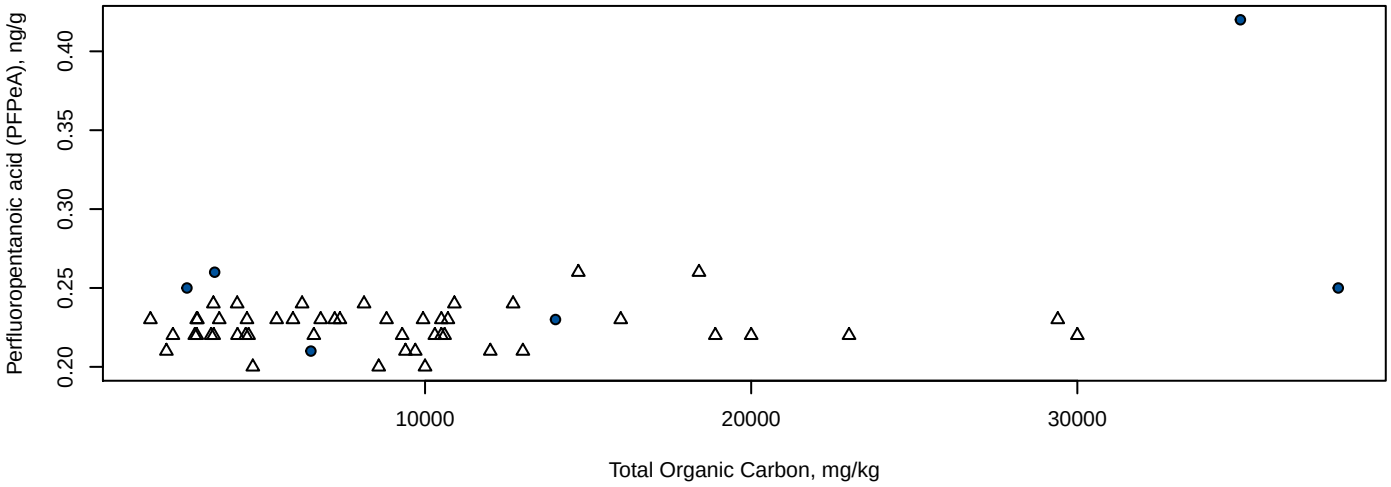
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

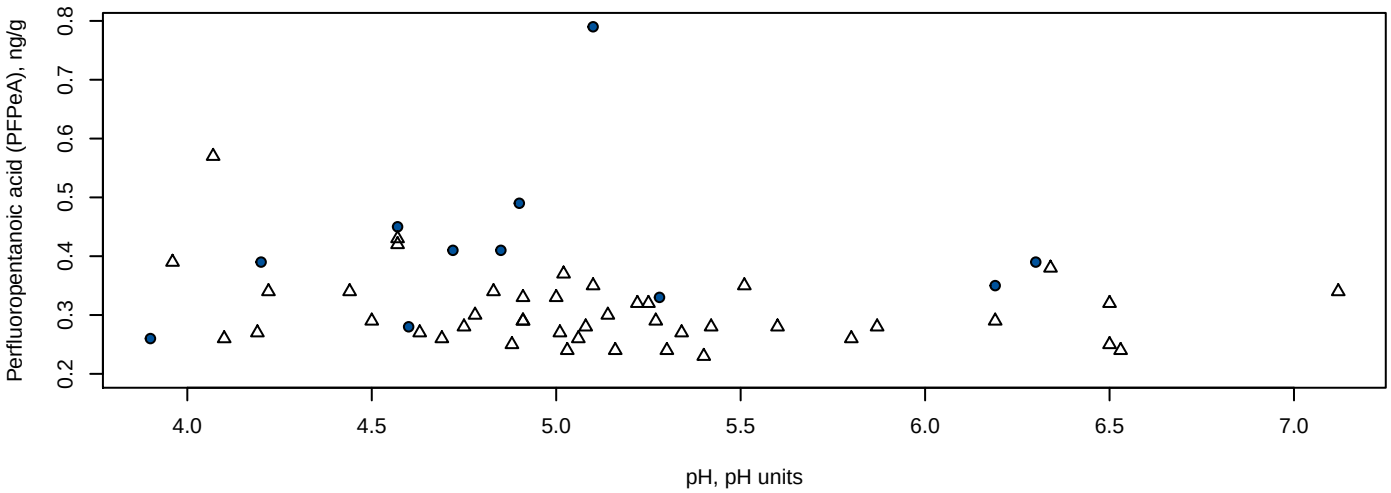


Sub−Surface Soil (1 − 2 feet)

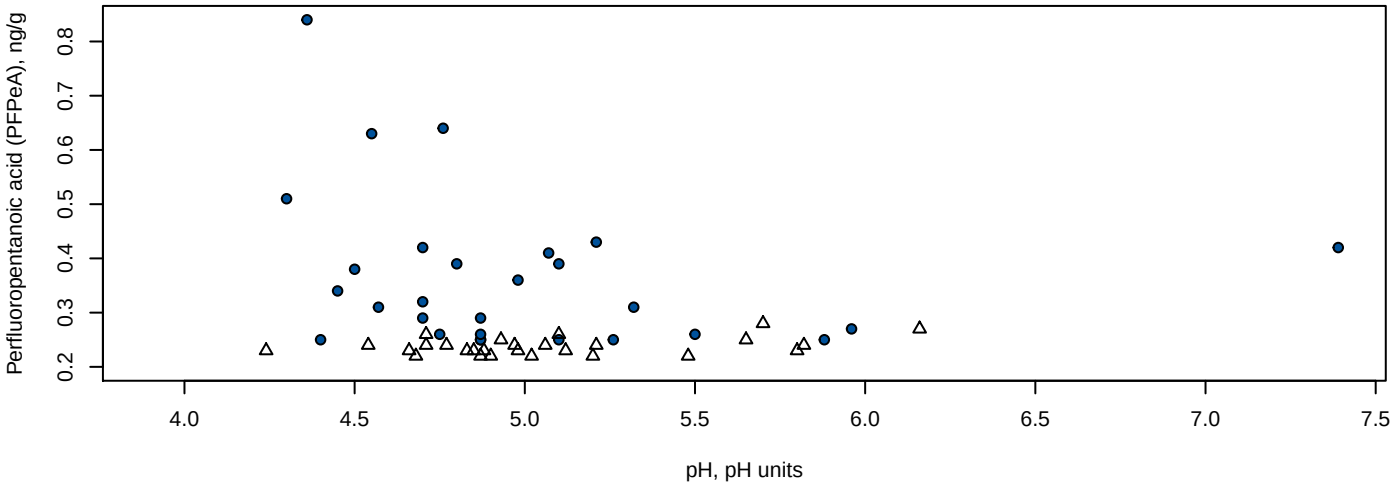


pH vs. Perfluoropentanoic acid (PFPeA)

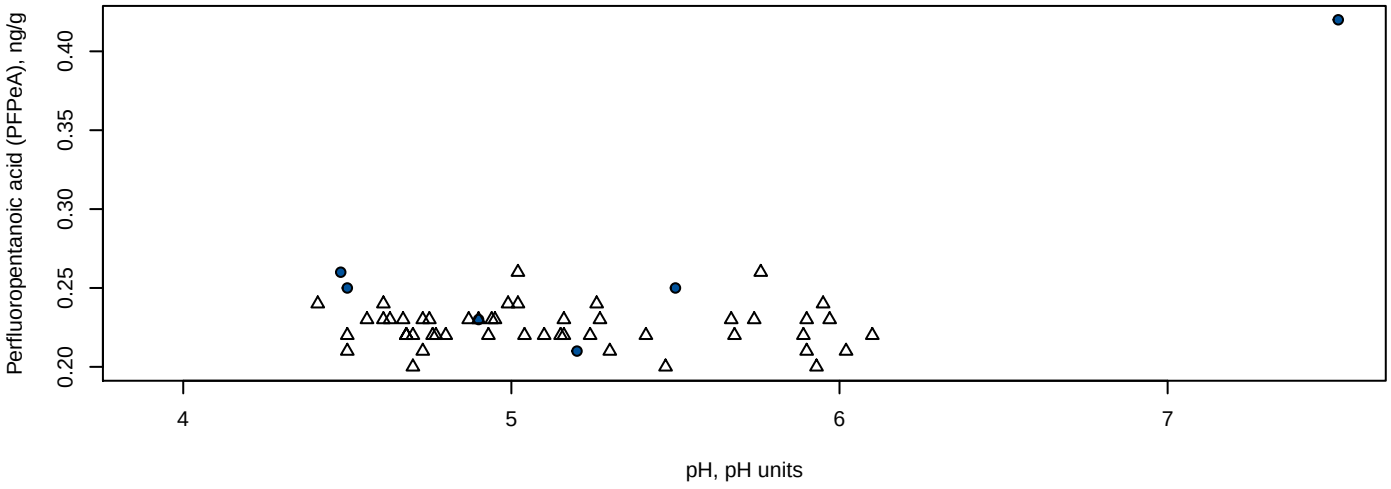
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

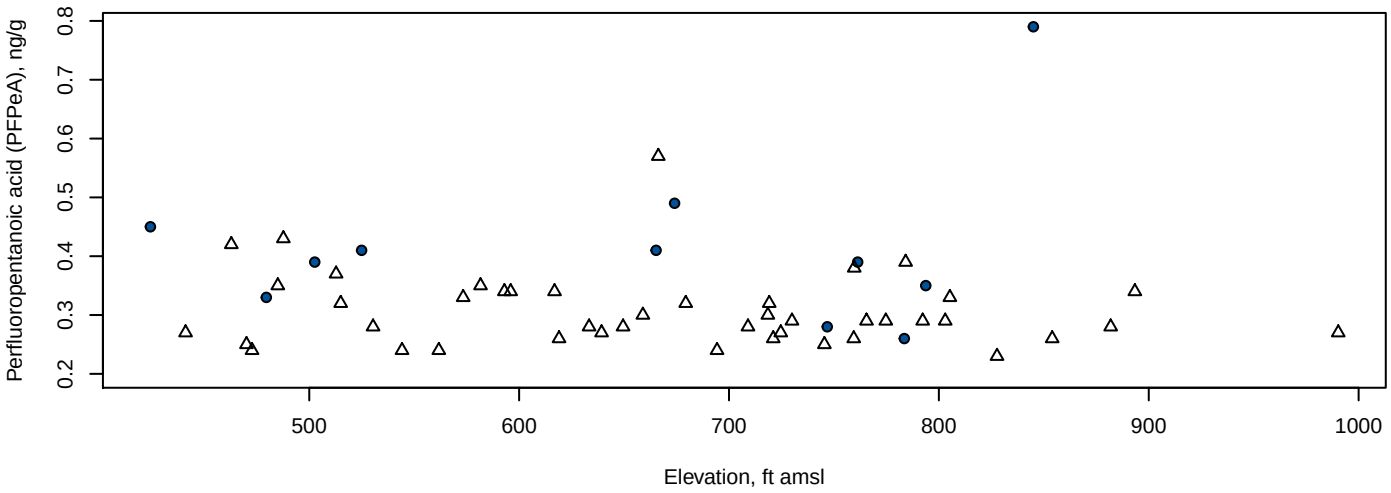


Sub−Surface Soil (1 − 2 feet)

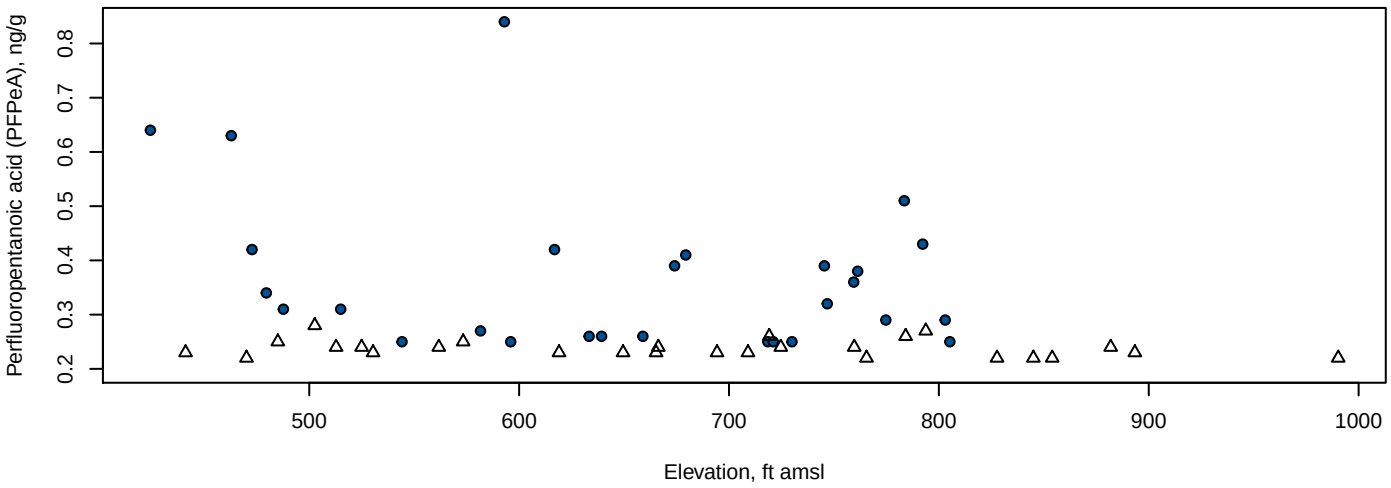


Elevation vs. Perfluoropentanoic acid (PFPeA)

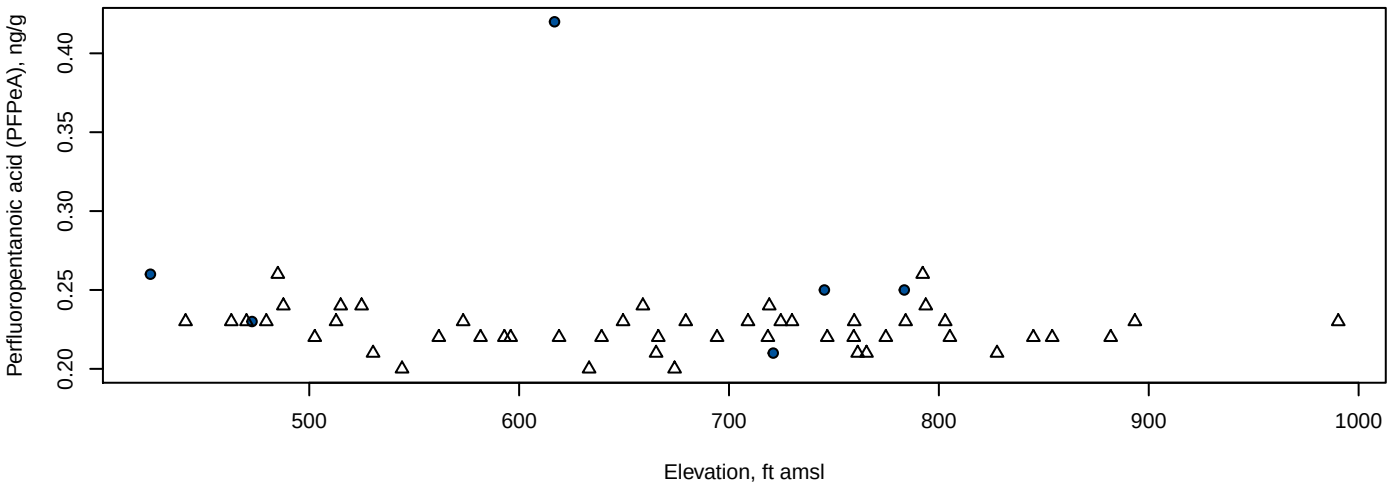
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

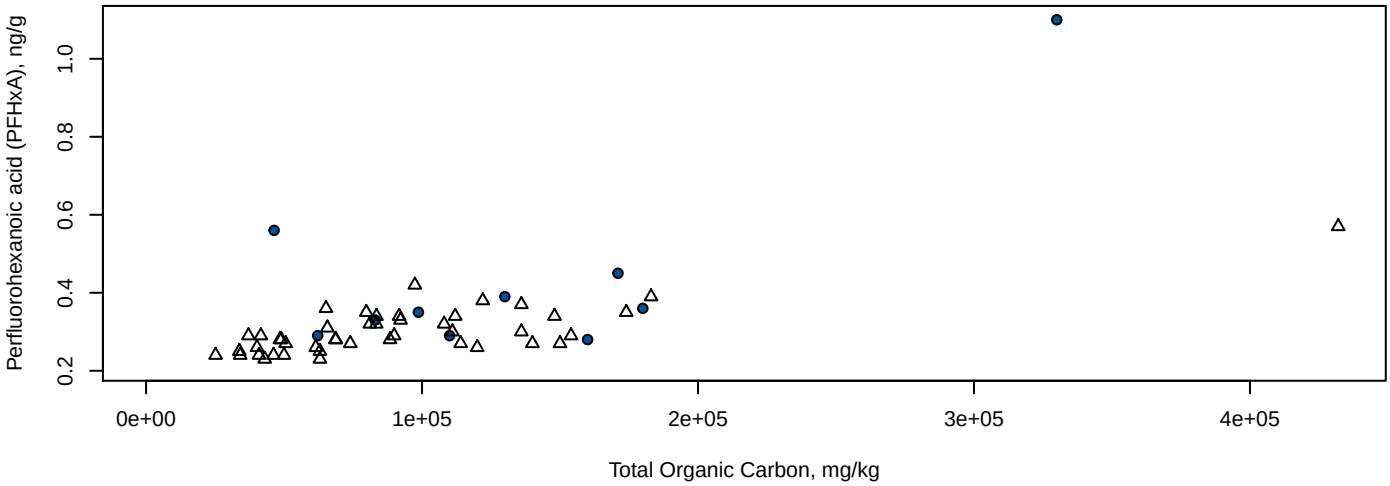


Sub−Surface Soil (1 − 2 feet)

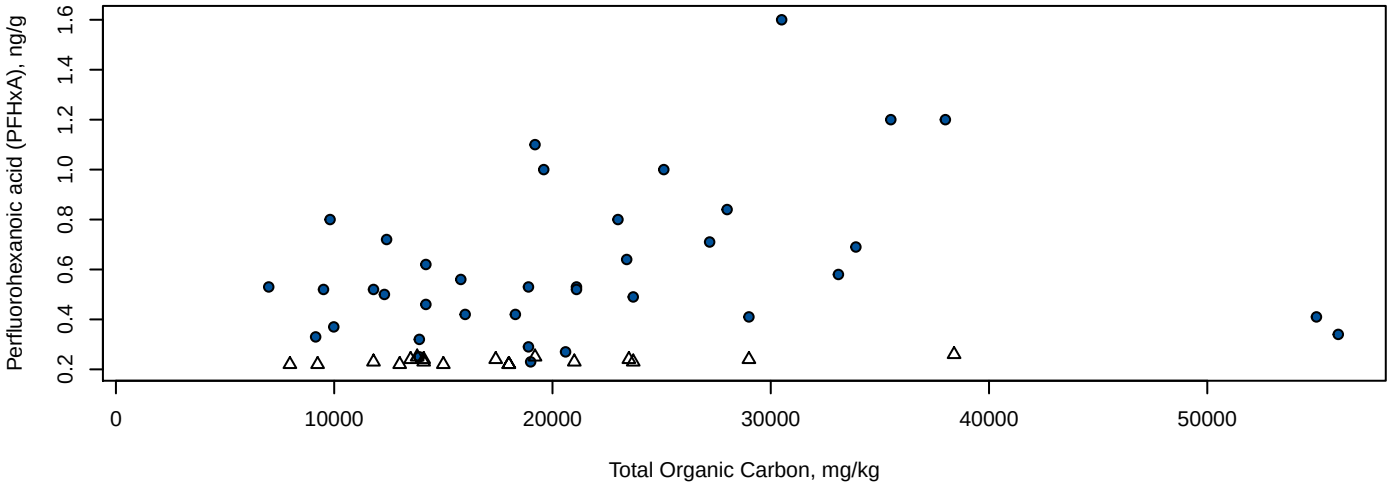


TOC vs. Perfluorohexanoic acid (PFHxA)

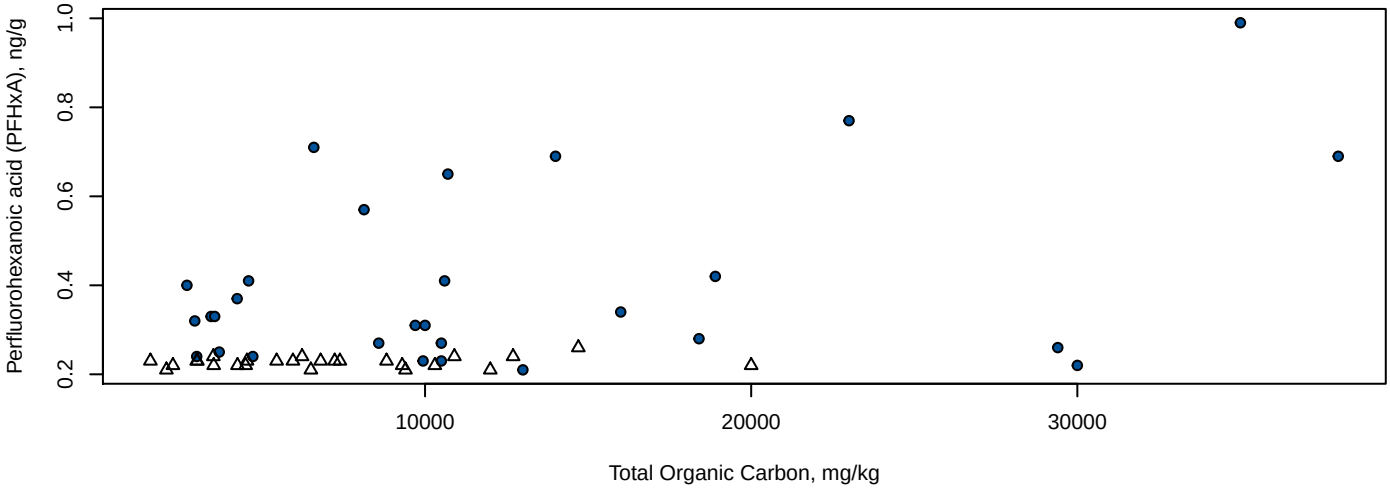
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

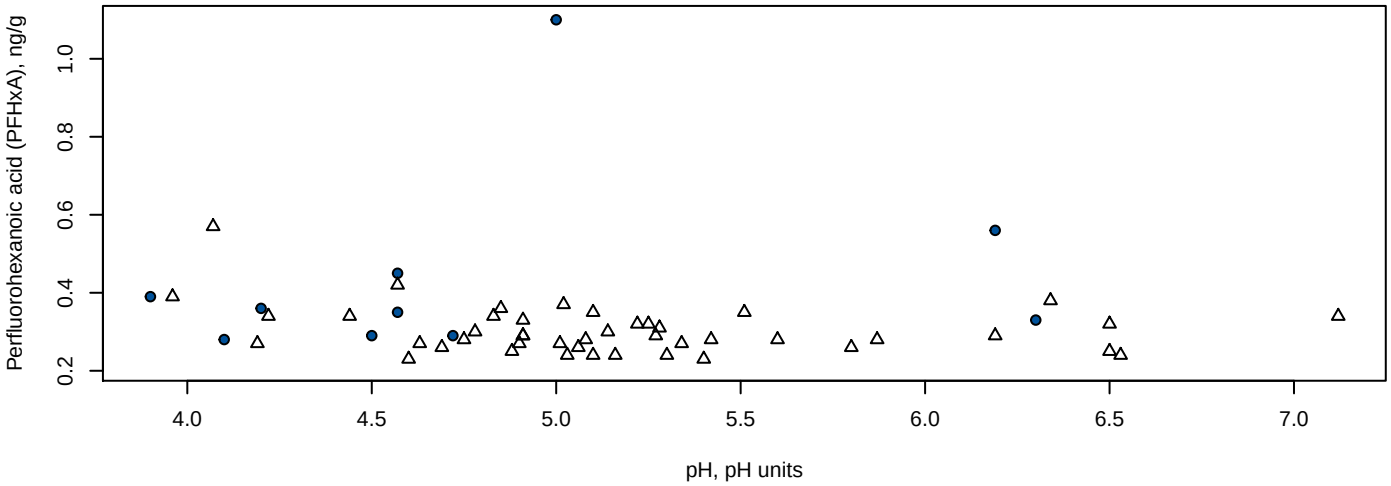


Sub−Surface Soil (1 − 2 feet)

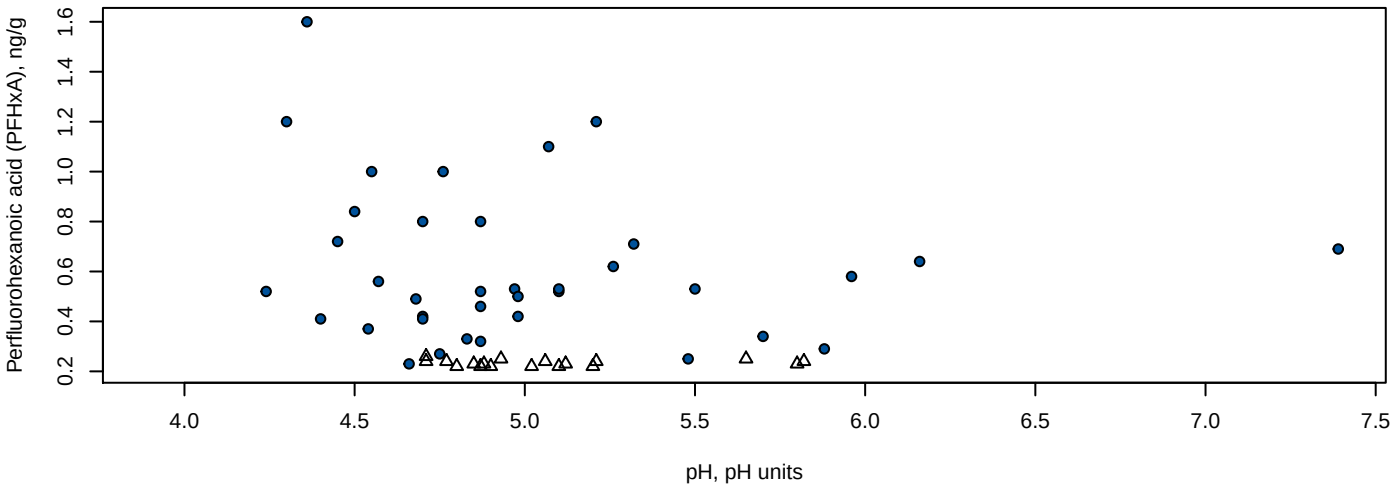


pH vs. Perfluorohexanoic acid (PFHxA)

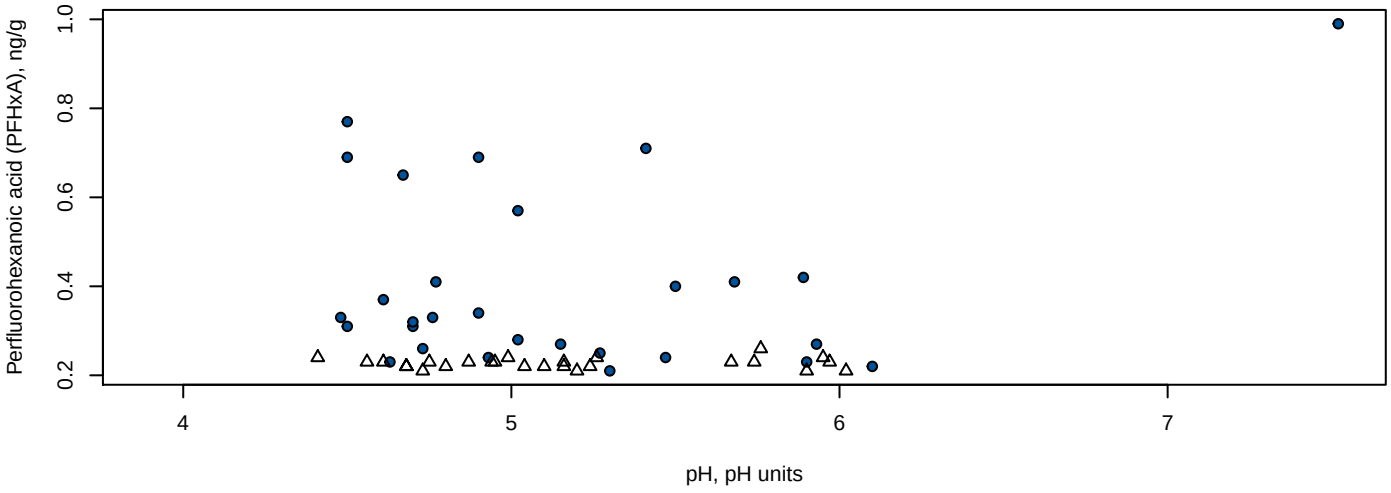
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

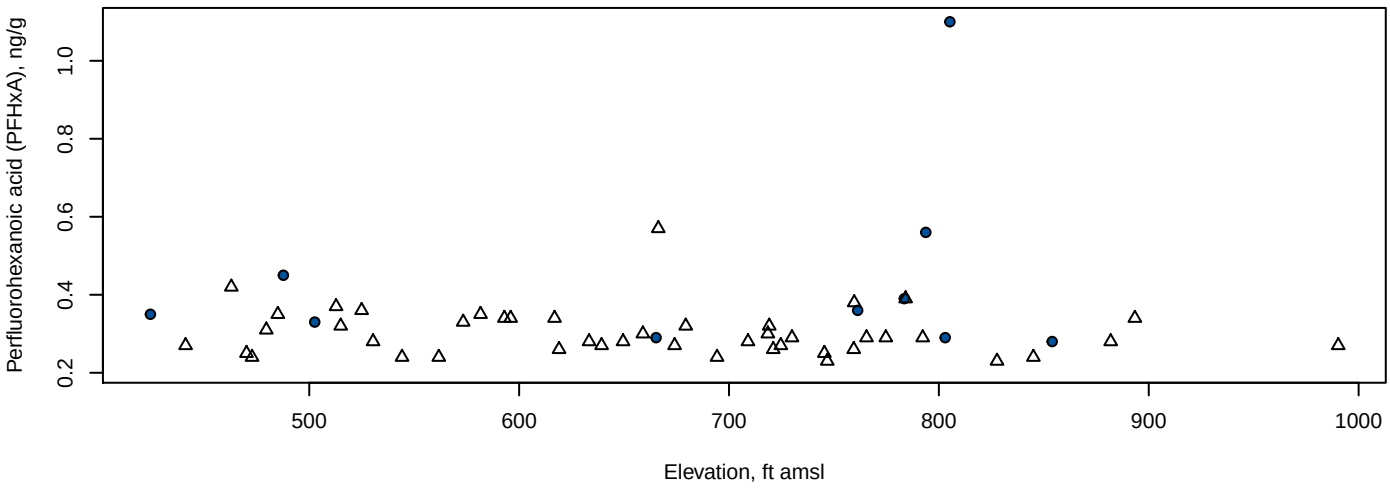


Sub−Surface Soil (1 − 2 feet)

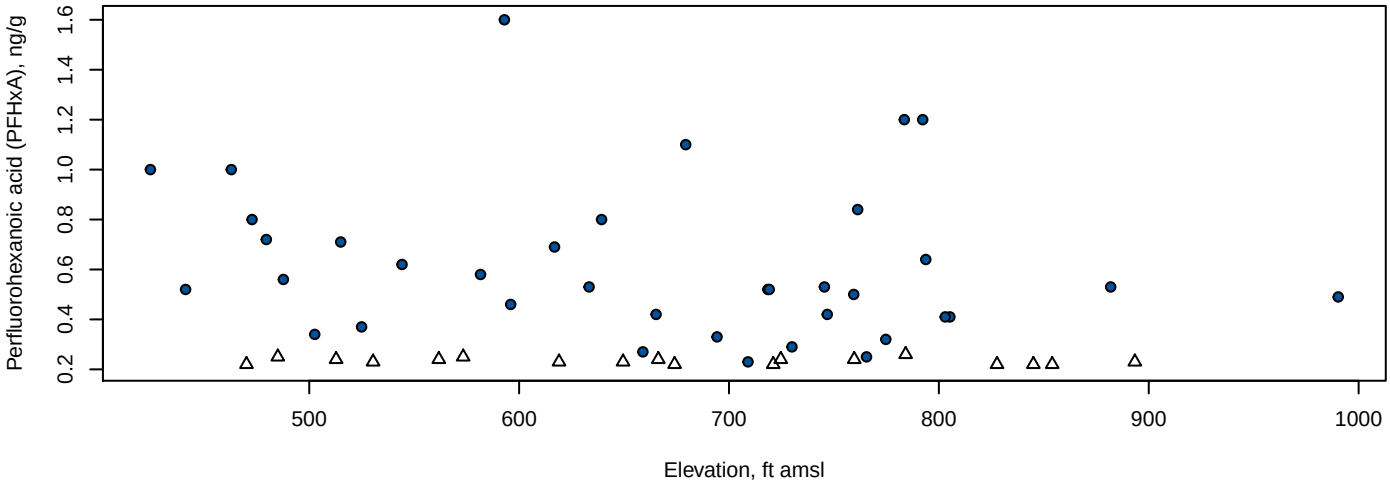


Elevation vs. Perfluorohexanoic acid (PFHxA)

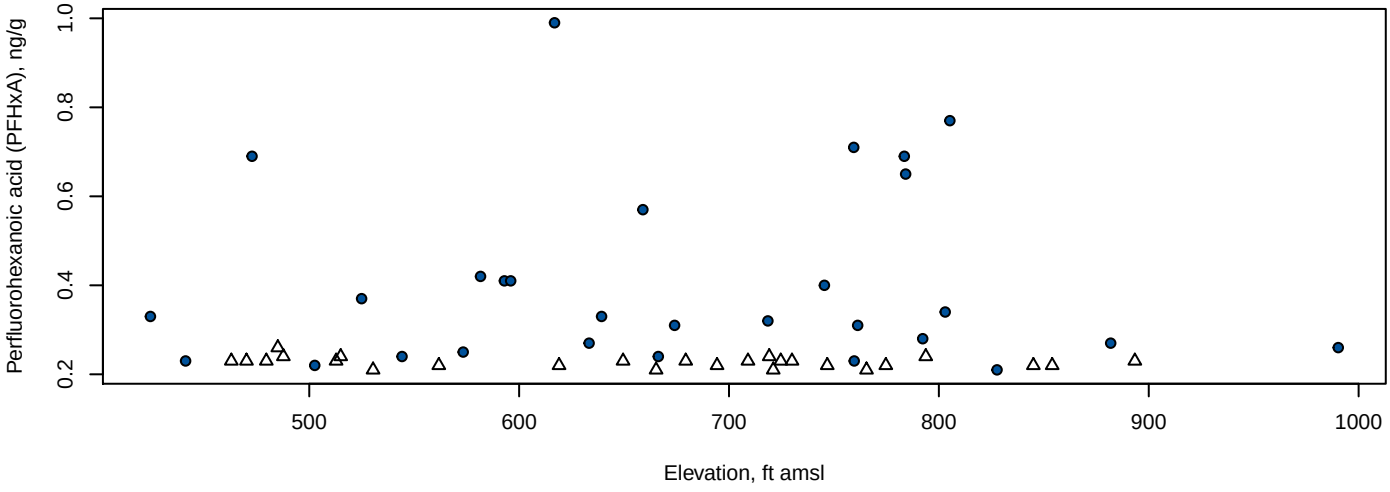
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

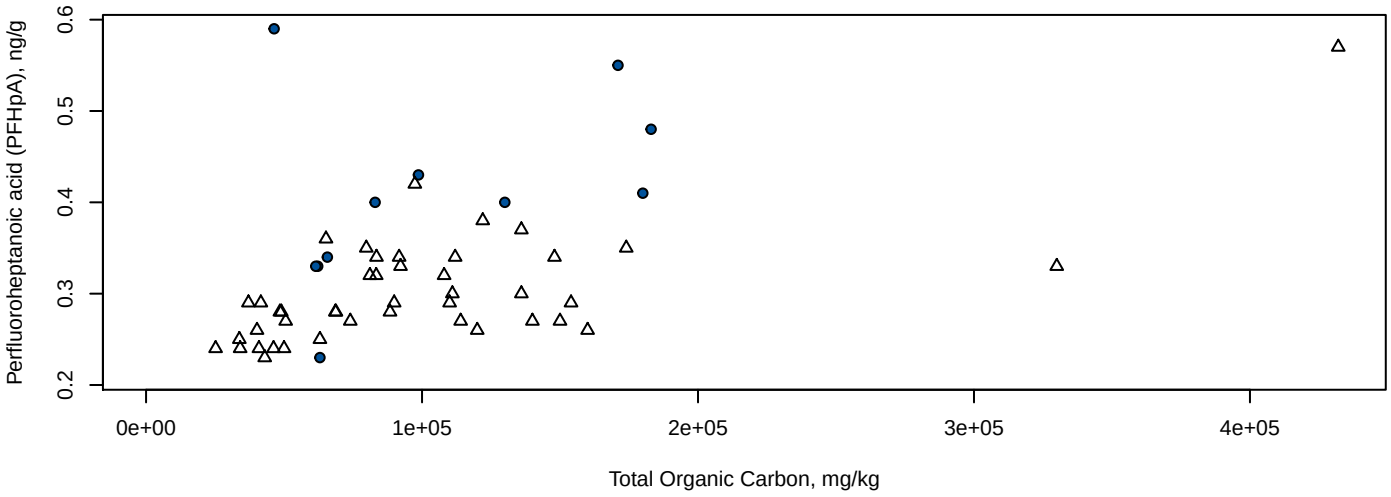


Sub−Surface Soil (1 − 2 feet)

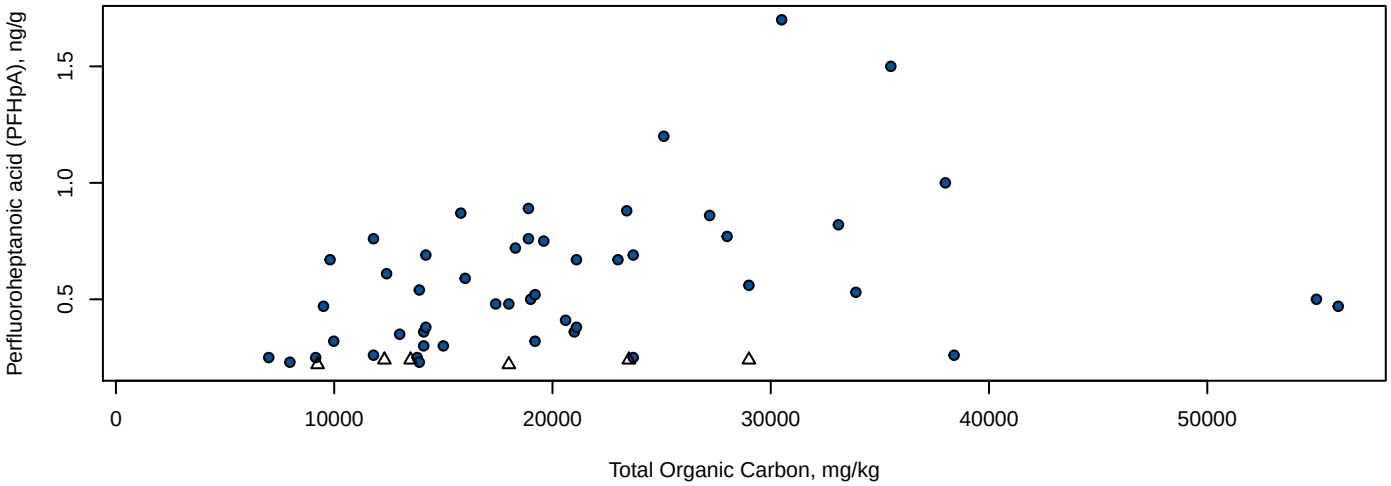


TOC vs. Perfluoroheptanoic acid (PFHpA)

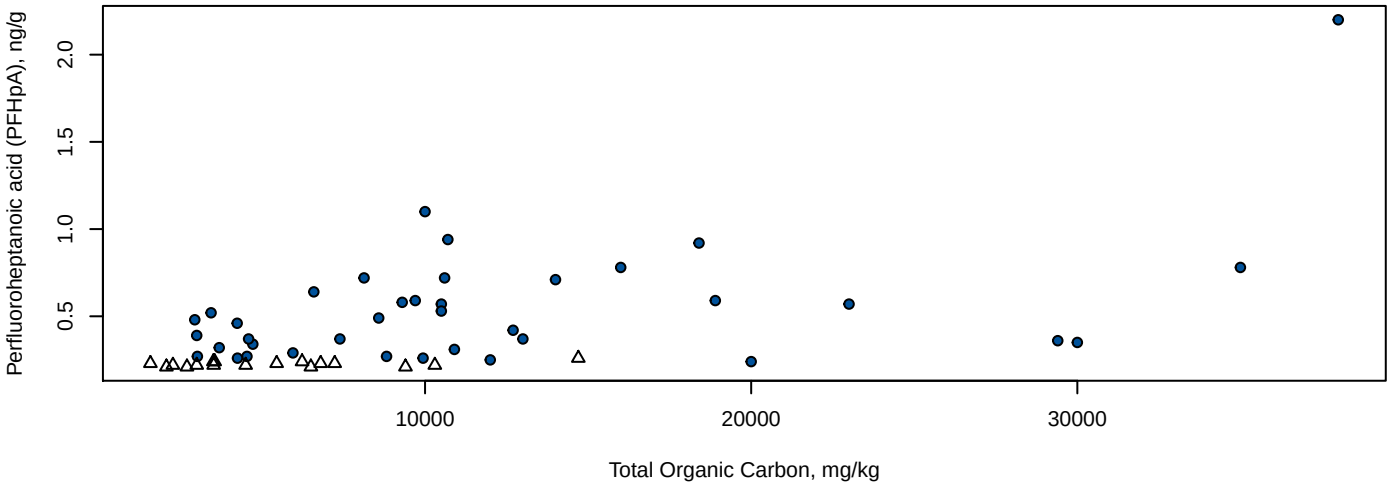
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)



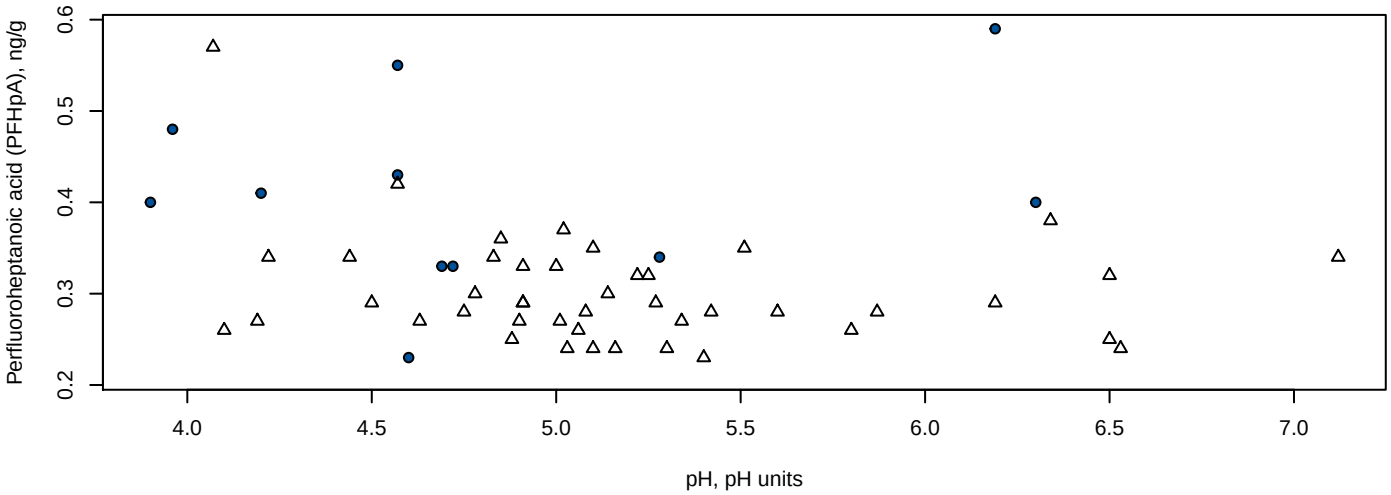
Sub−Surface Soil (1 − 2 feet)



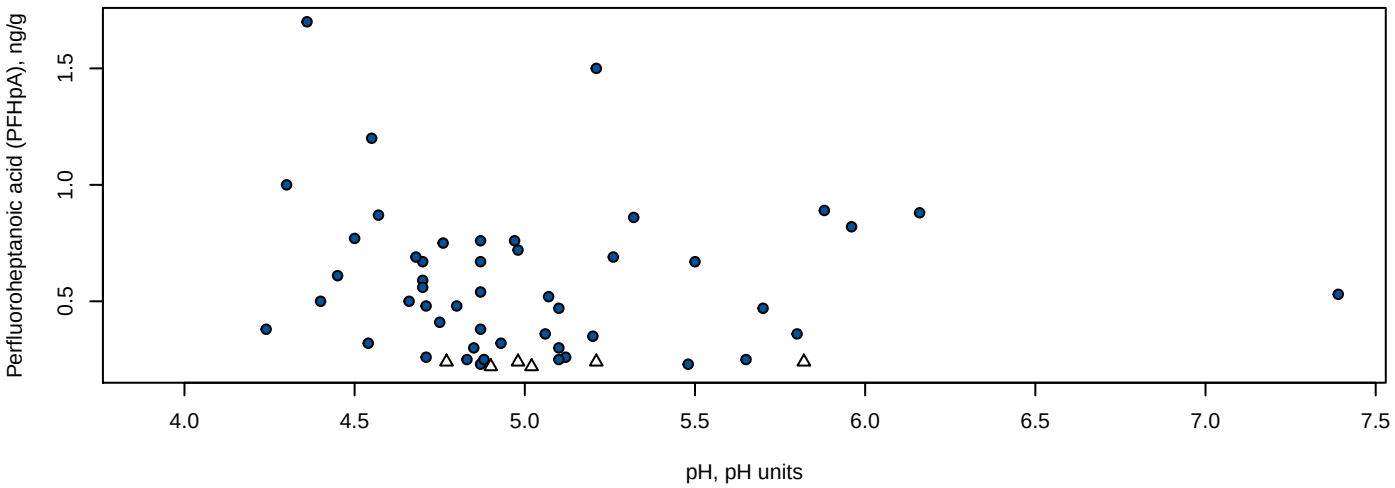
Detected Value Non−Detect Value

pH vs. Perfluoroheptanoic acid (PFHpA)

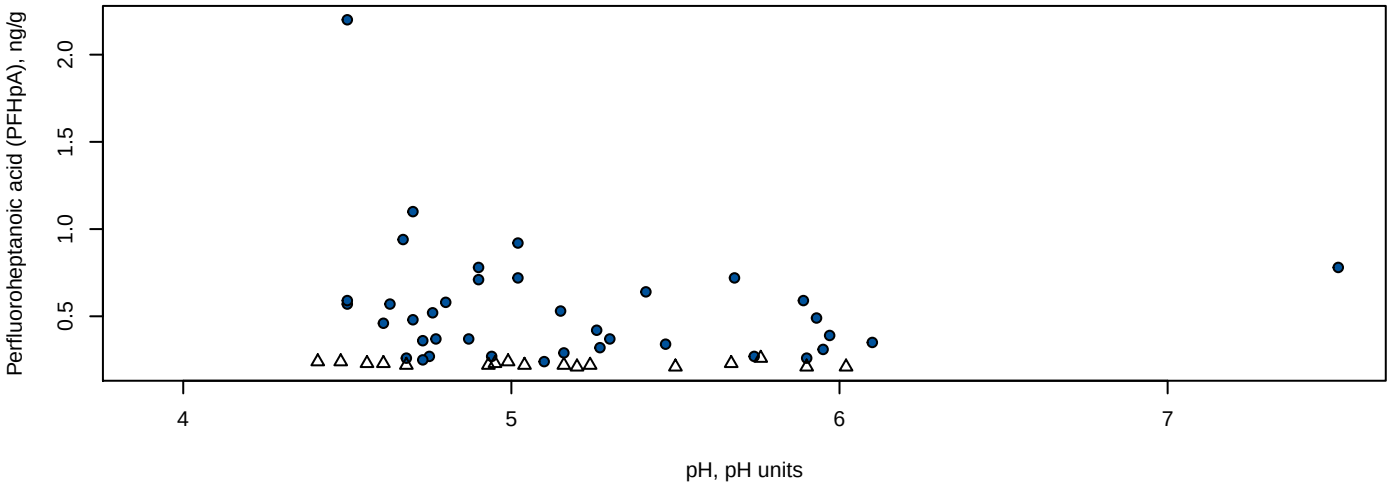
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

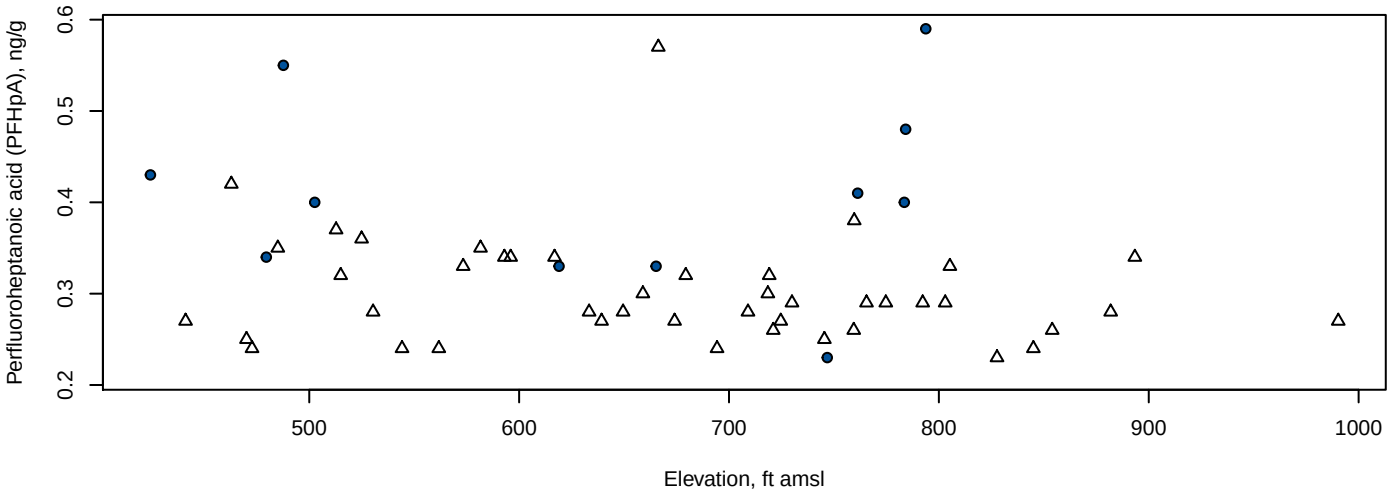


Sub−Surface Soil (1 − 2 feet)

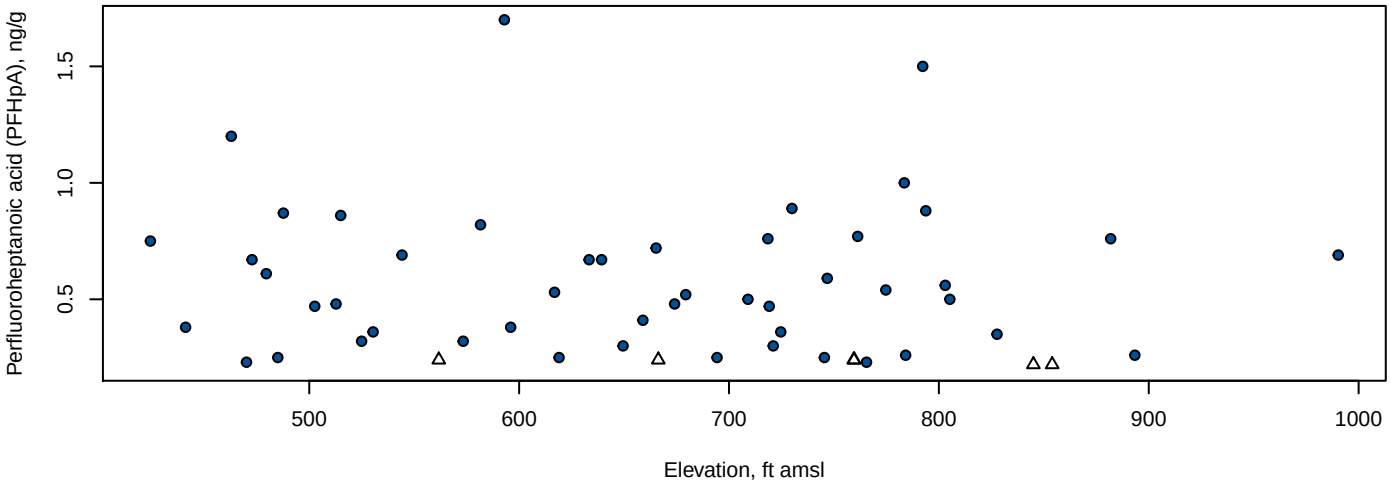


Elevation vs. Perfluoroheptanoic acid (PFHpA)

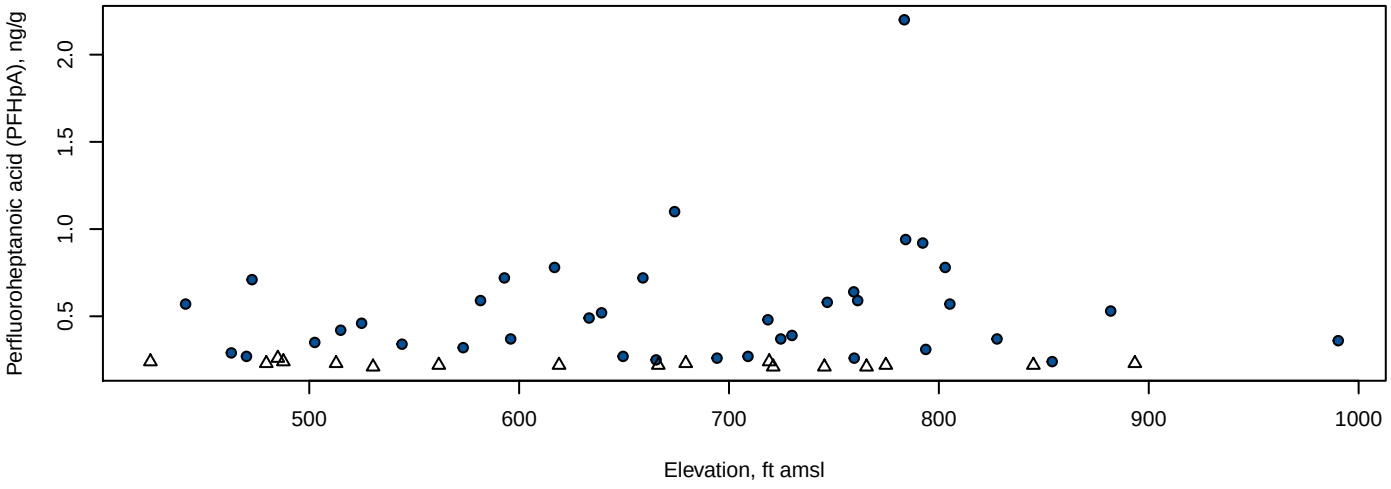
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

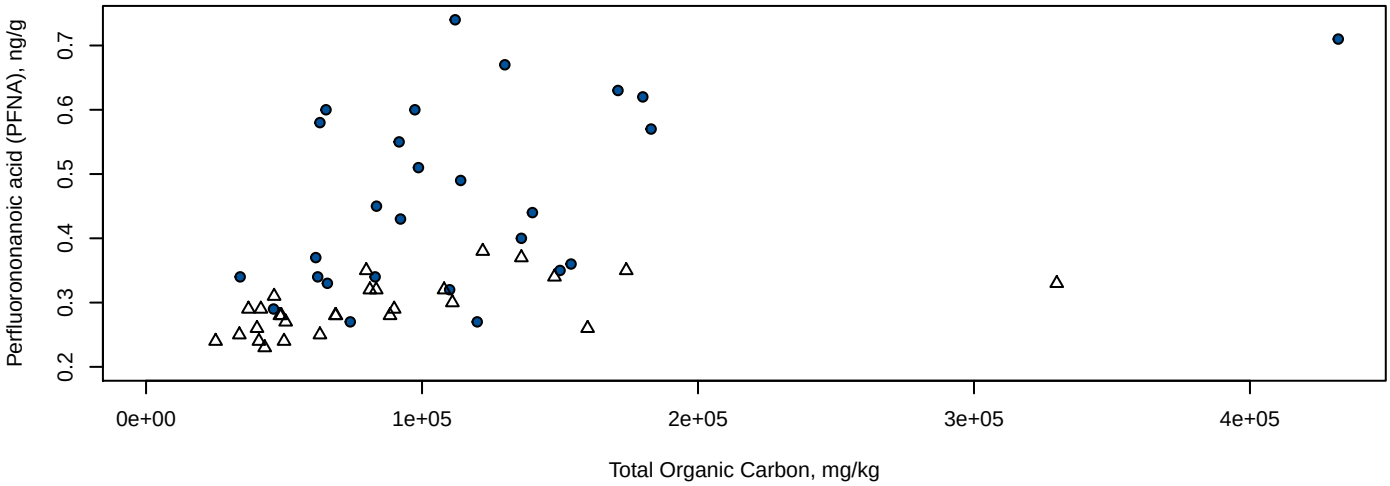


Sub−Surface Soil (1 − 2 feet)

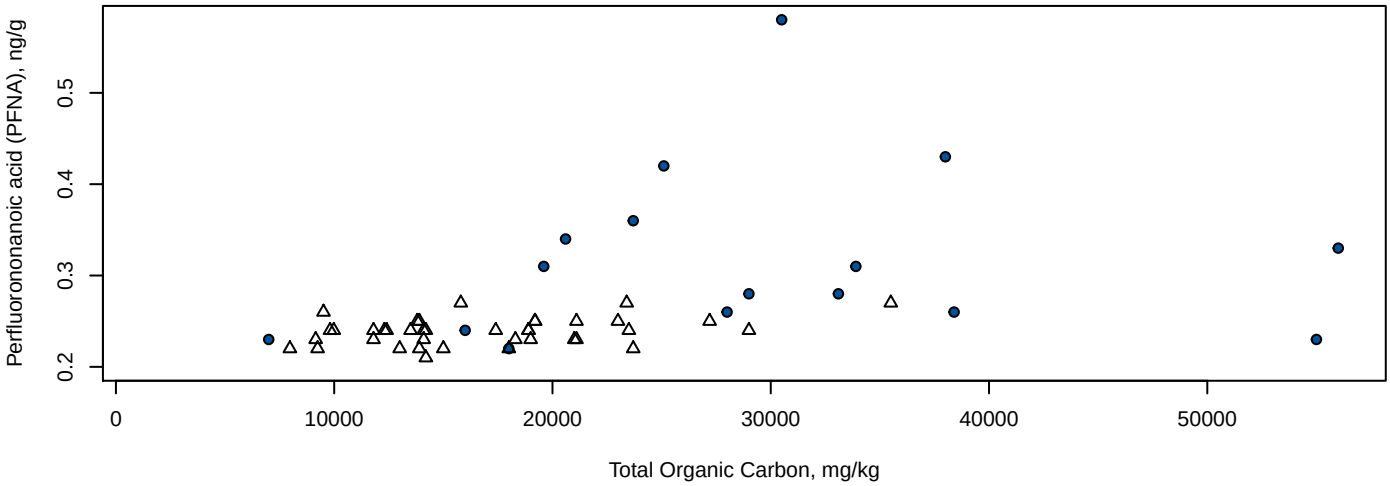


TOC vs. Perfluorononanoic acid (PFNA)

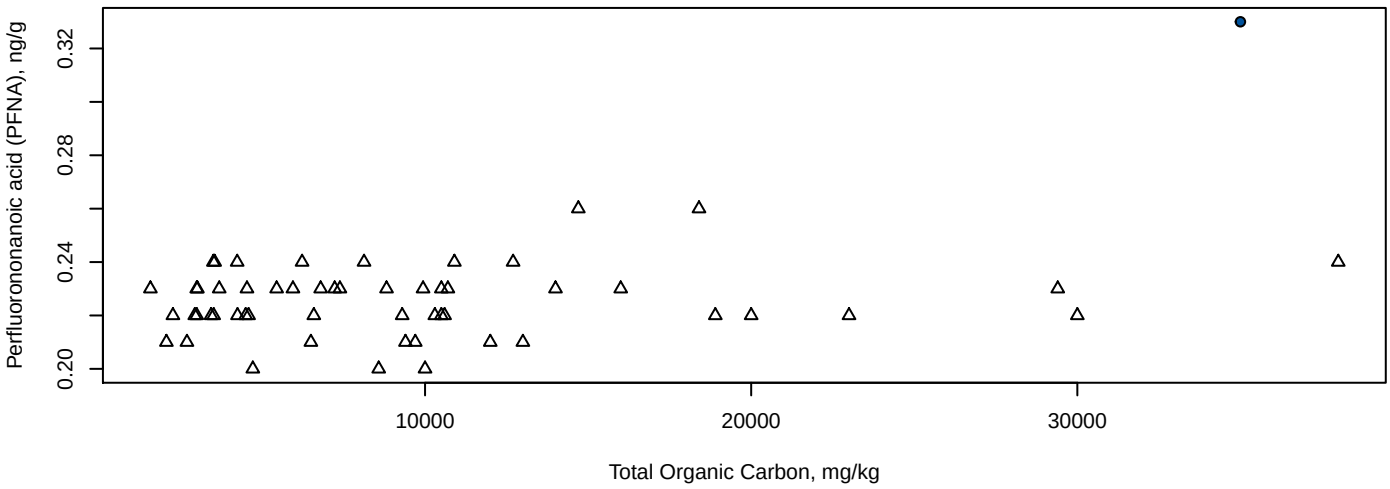
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

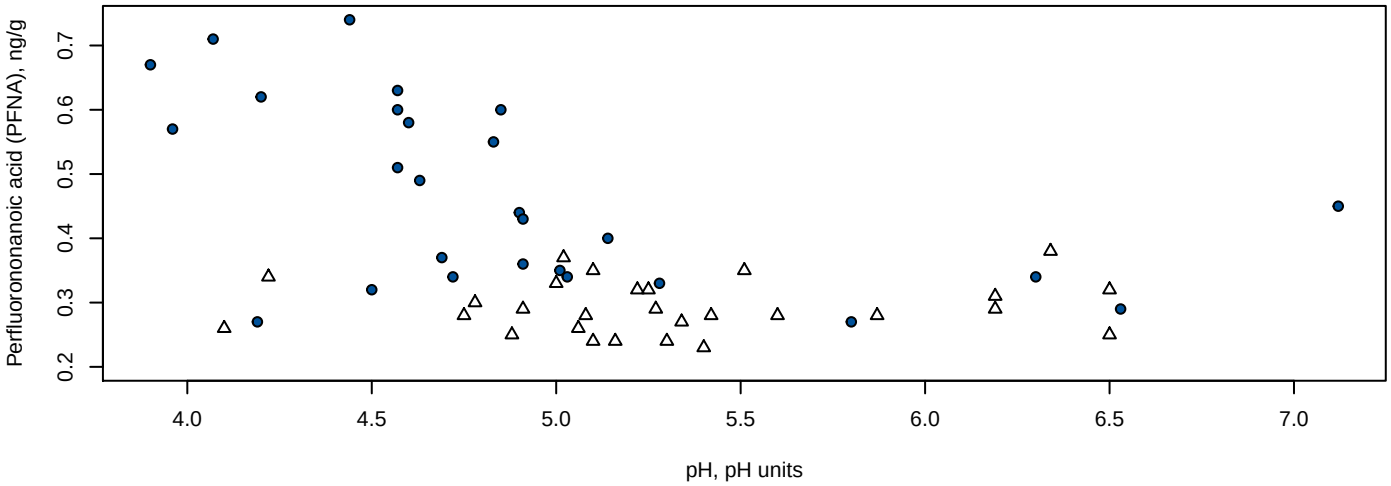


Sub−Surface Soil (1 − 2 feet)

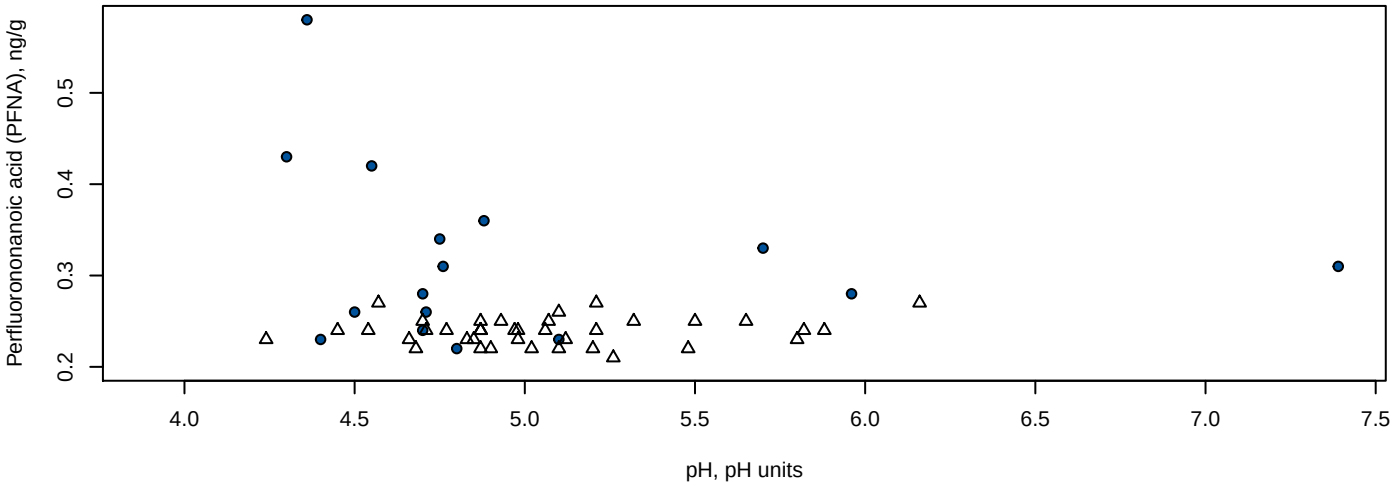


pH vs. Perfluorononanoic acid (PFNA)

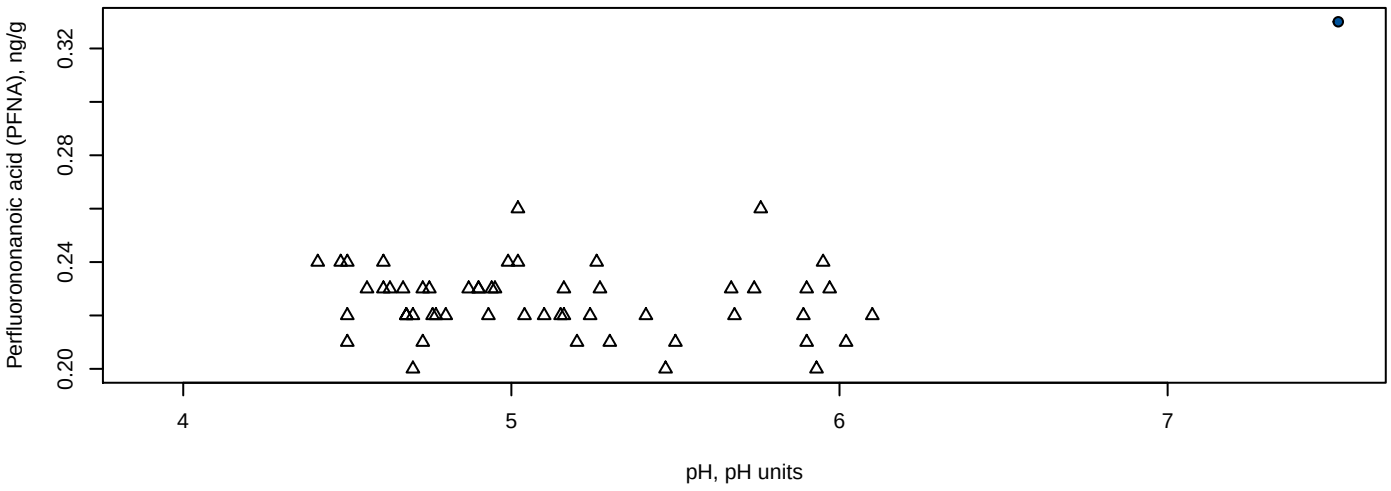
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

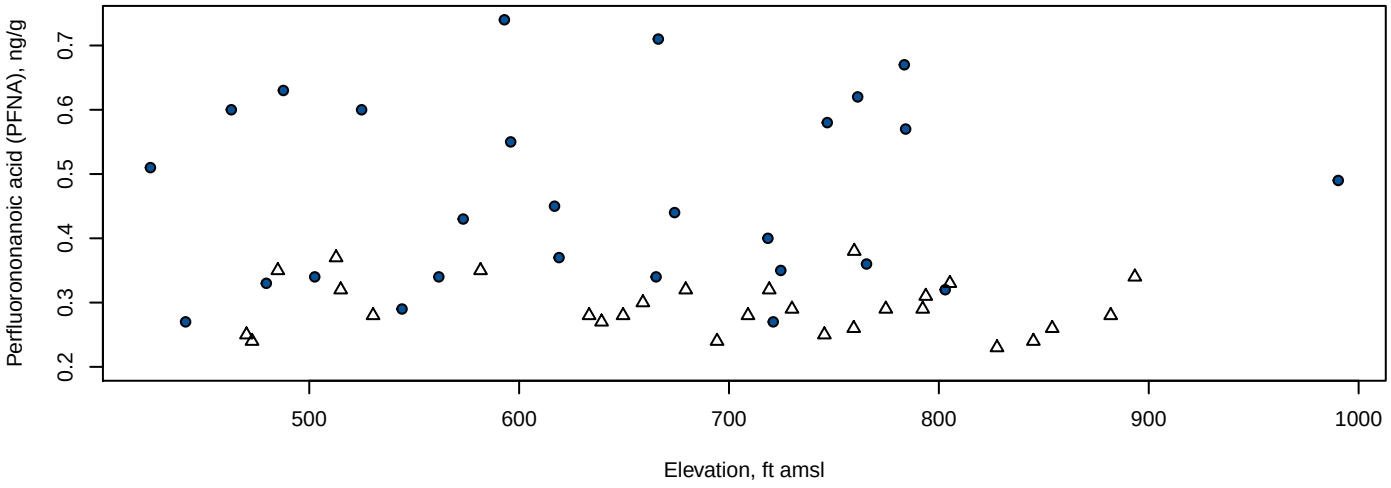


Sub−Surface Soil (1 − 2 feet)

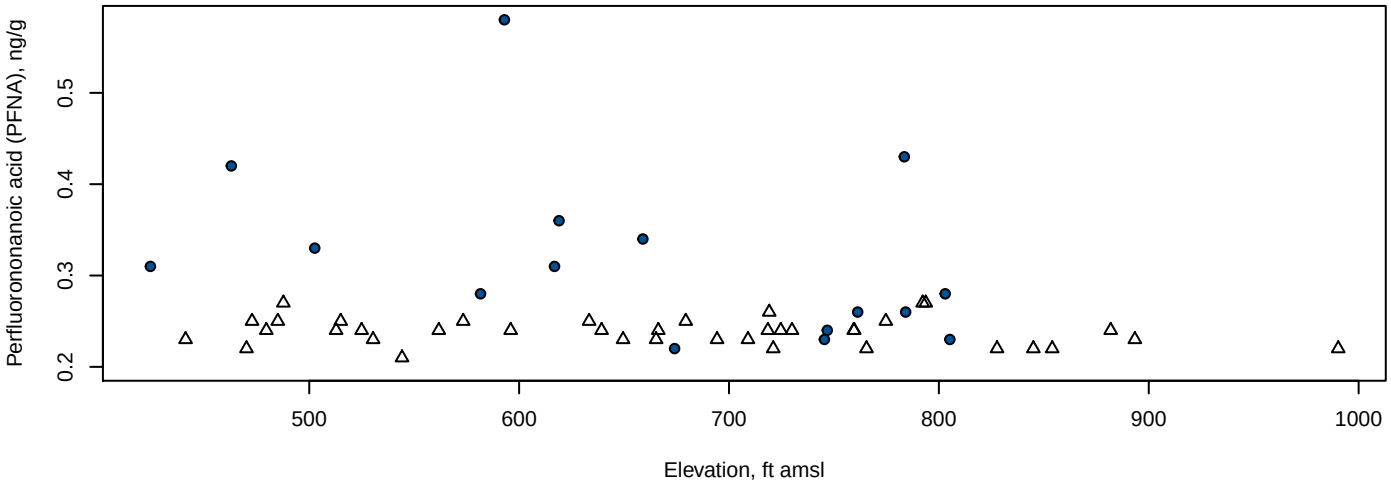


Elevation vs. Perfluorononanoic acid (PFNA)

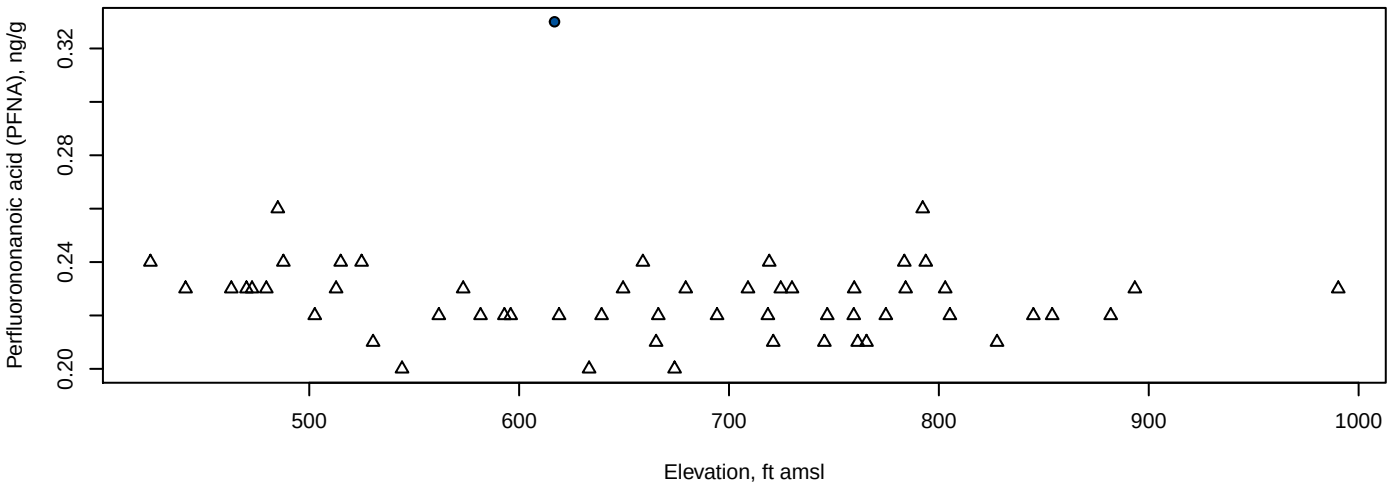
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

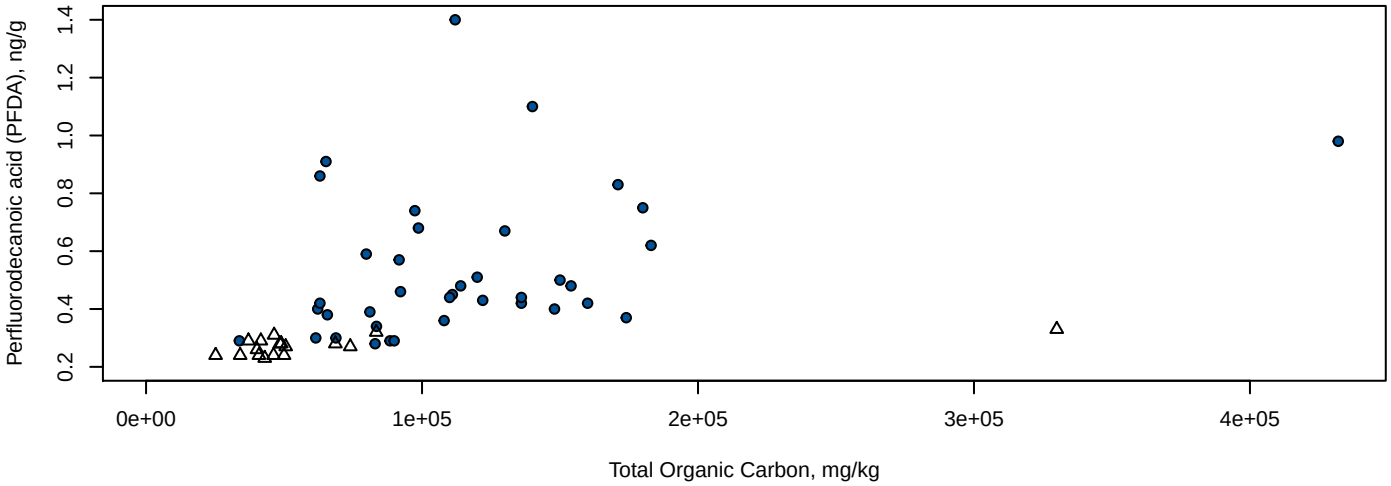


Sub−Surface Soil (1 − 2 feet)

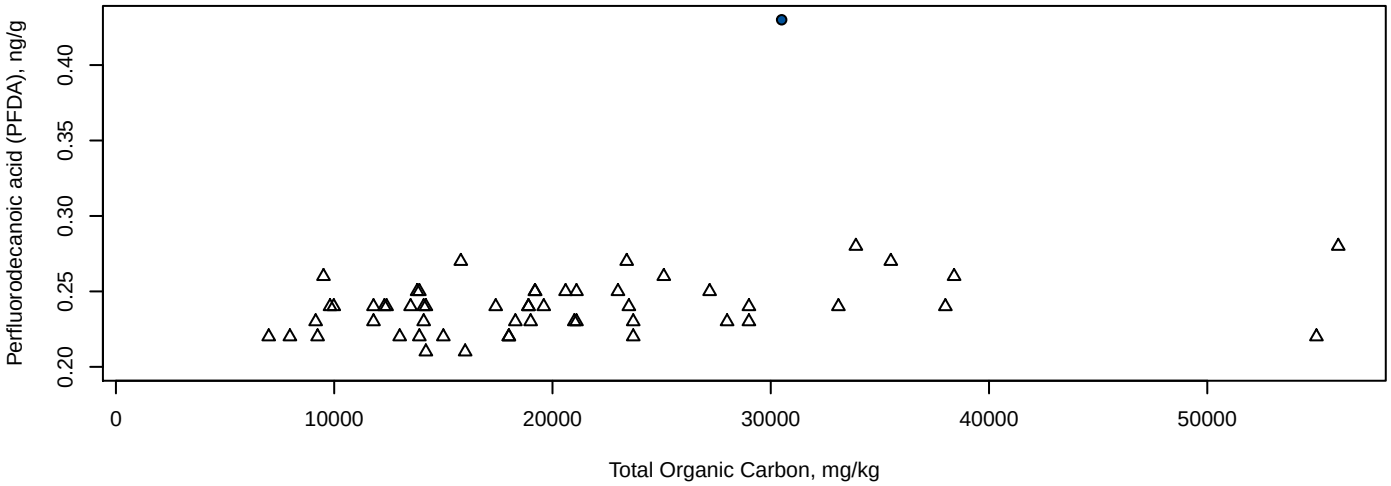


TOC vs. Perfluorodecanoic acid (PFDA)

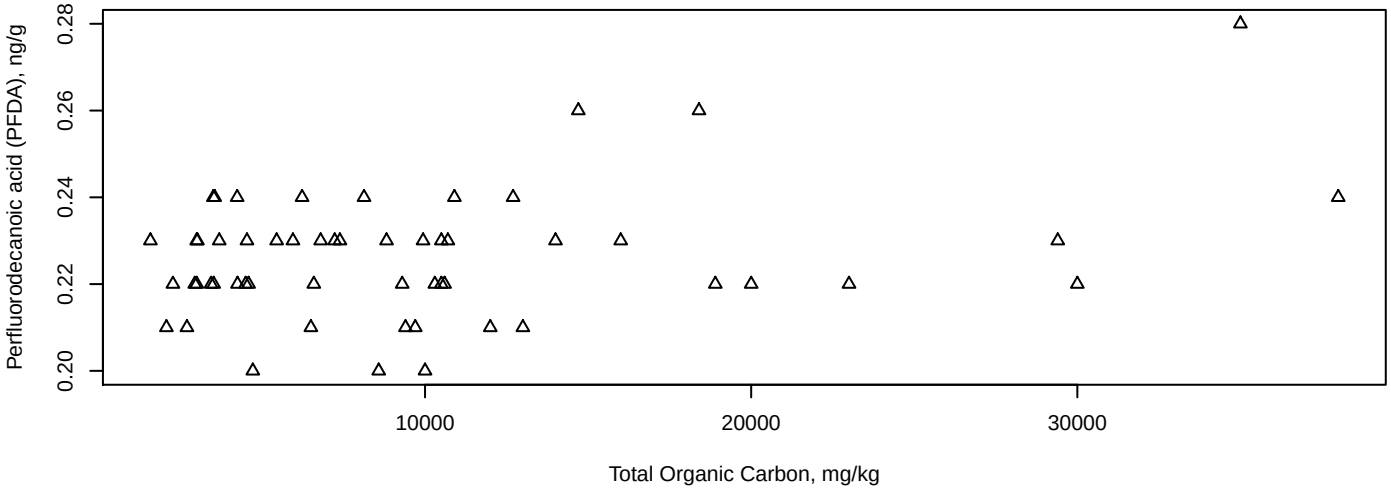
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

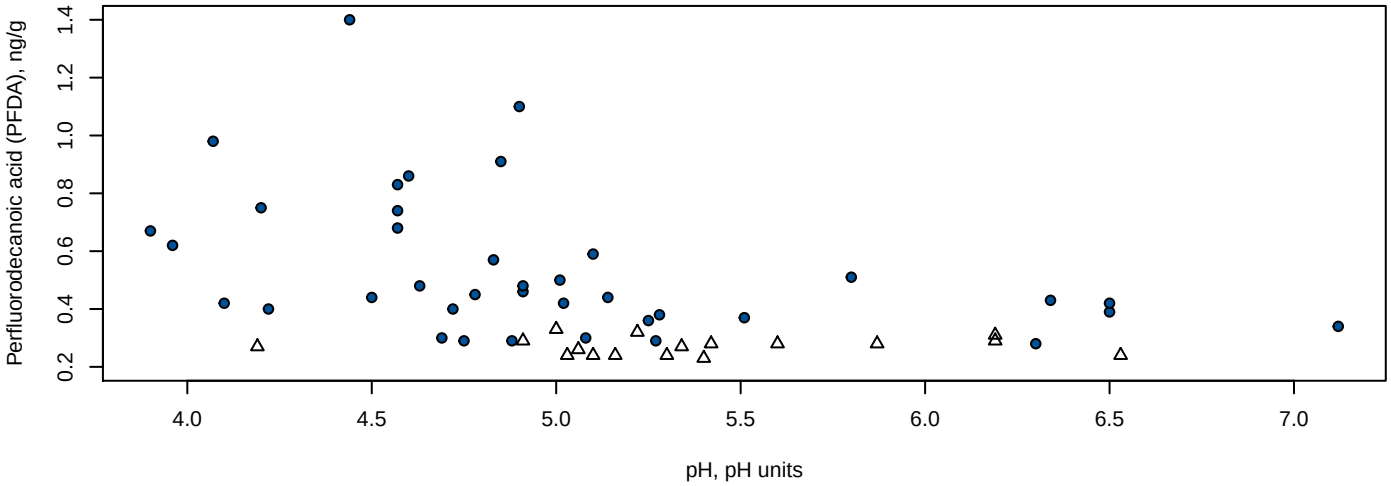


Sub−Surface Soil (1 − 2 feet)

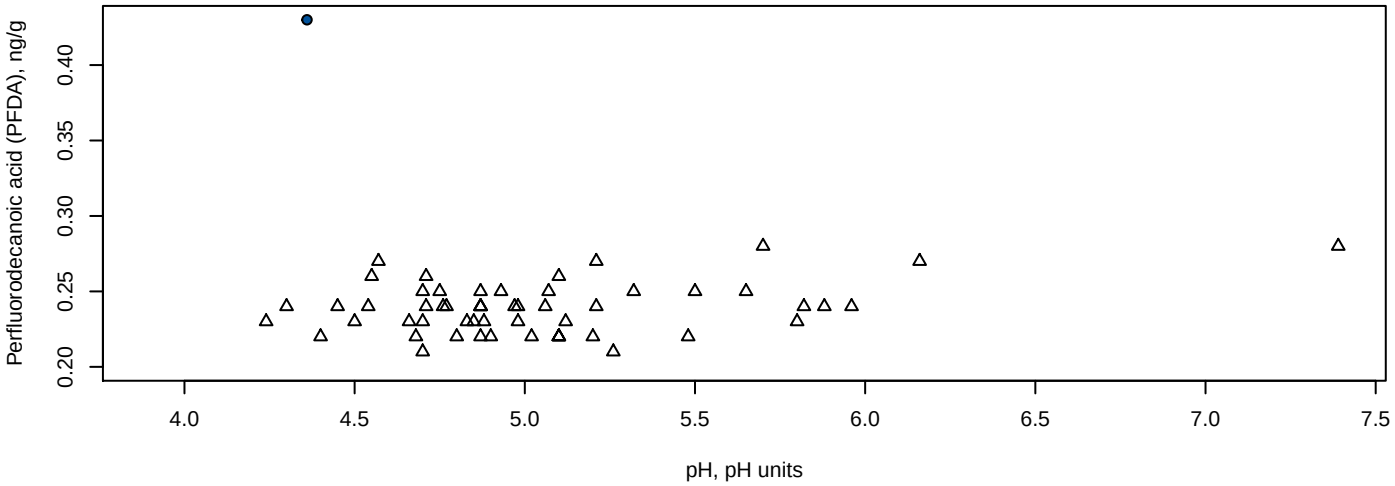


pH vs. Perfluorodecanoic acid (PFDA)

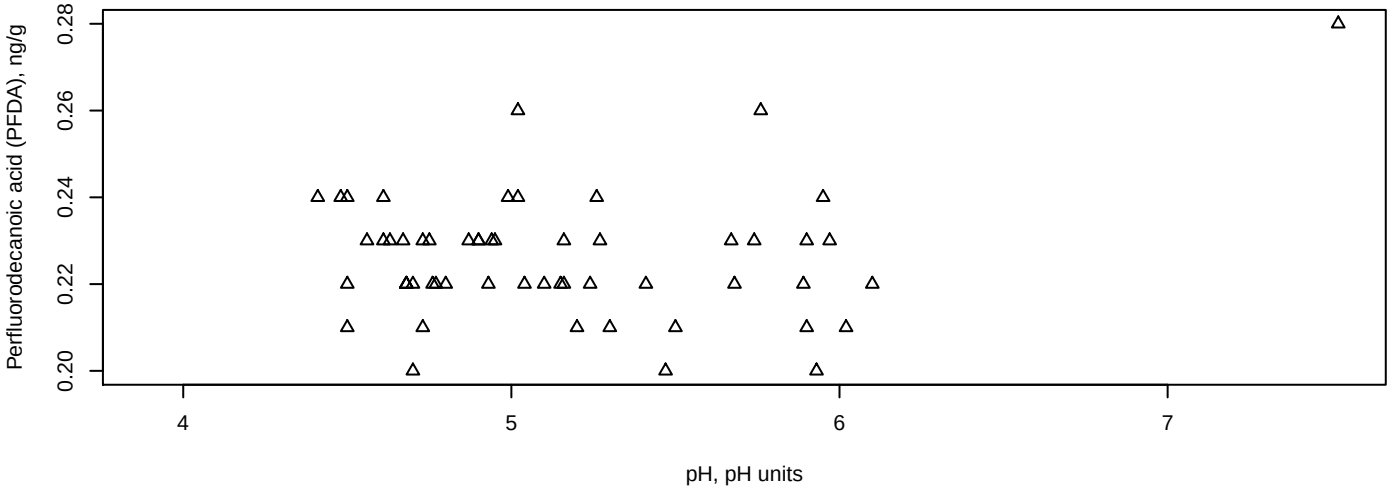
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

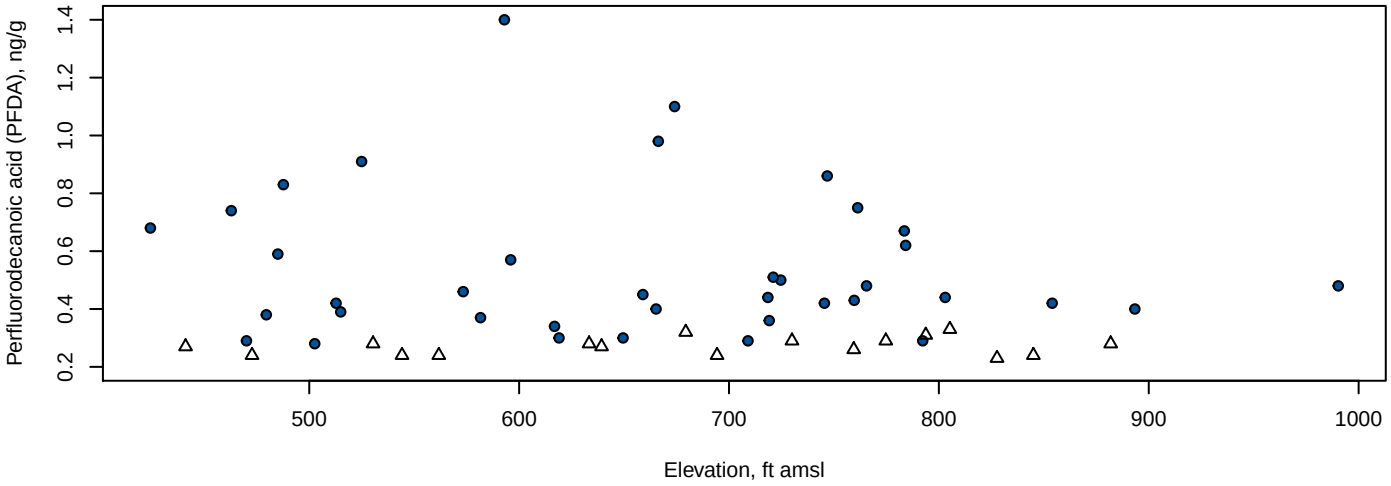


Sub−Surface Soil (1 − 2 feet)

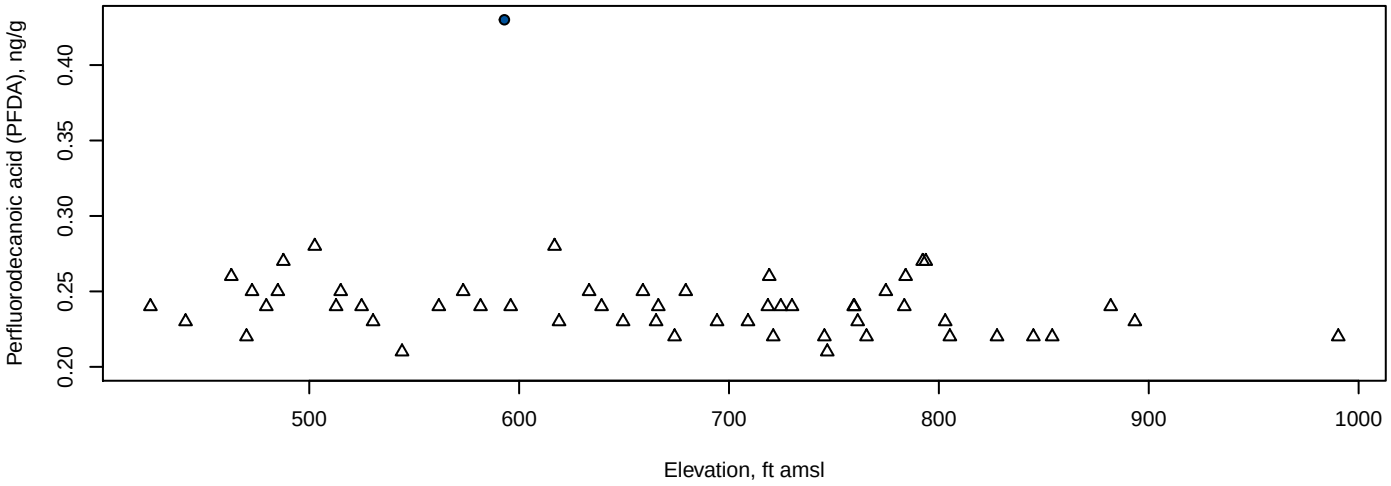


Elevation vs. Perfluorodecanoic acid (PFDA)

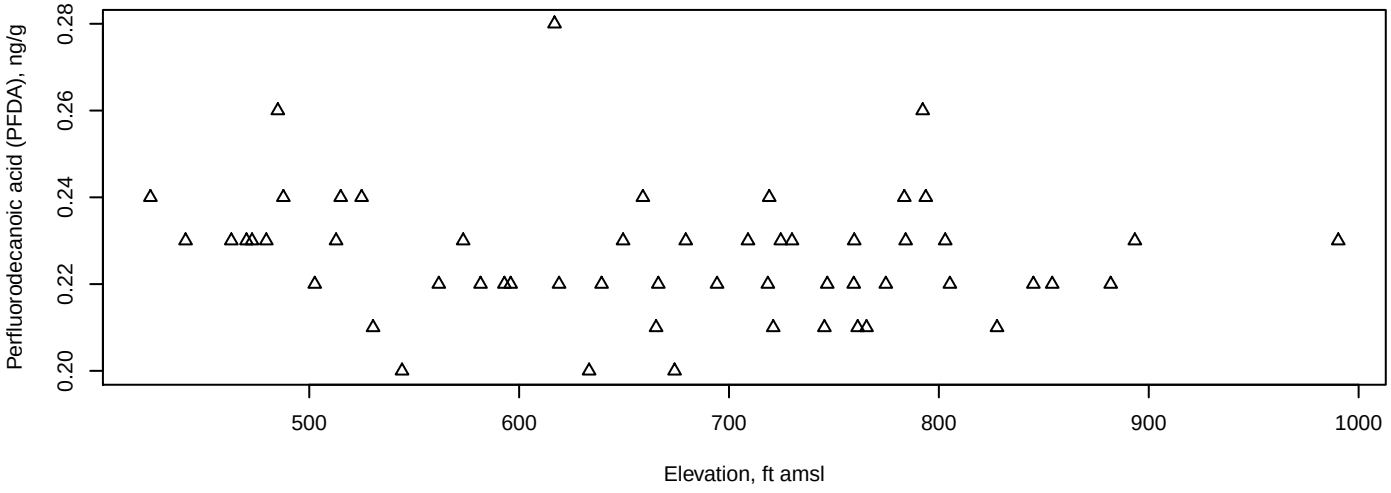
Surface Soil (0 − 0.17 feet)



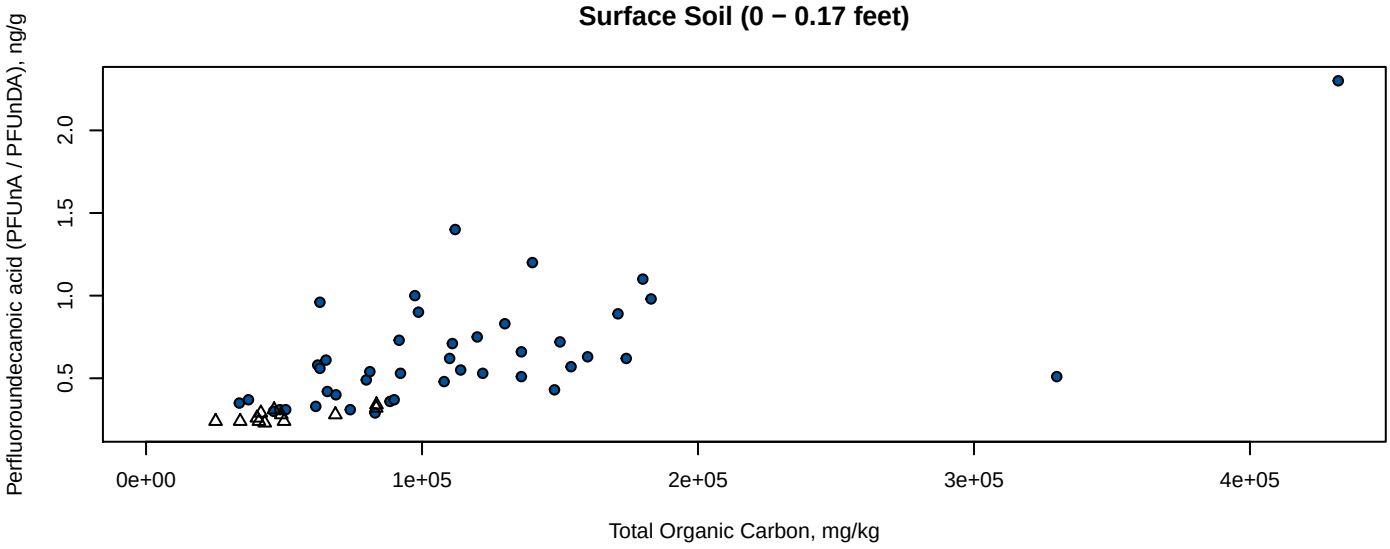
Near Surface Soil (0.17 − 1 foot)

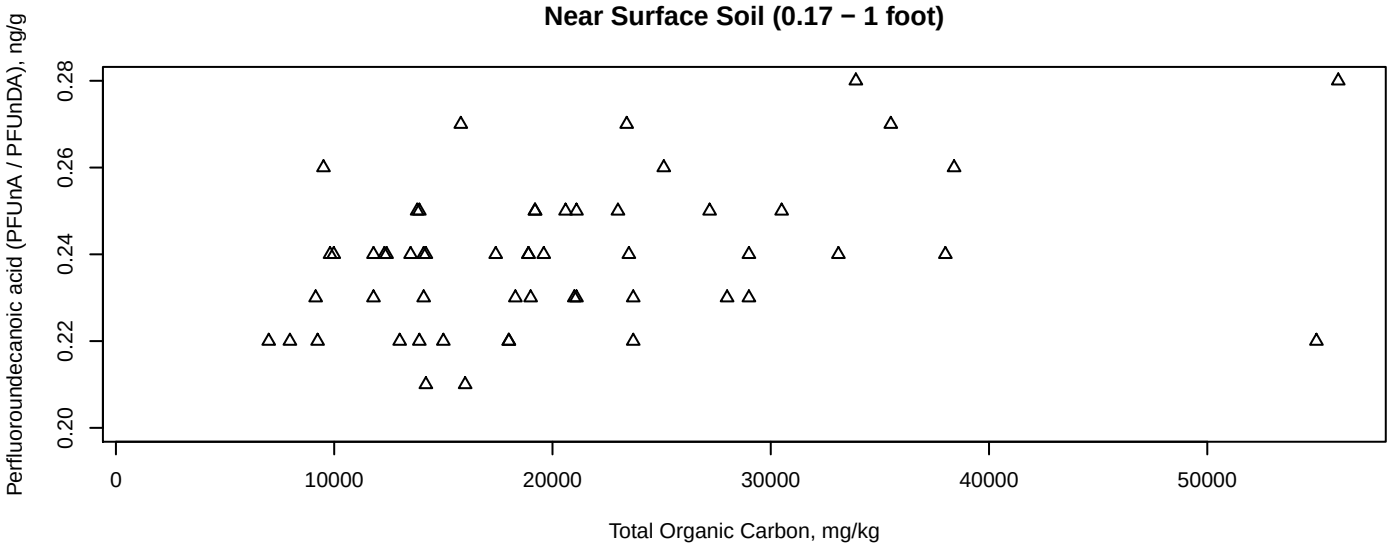


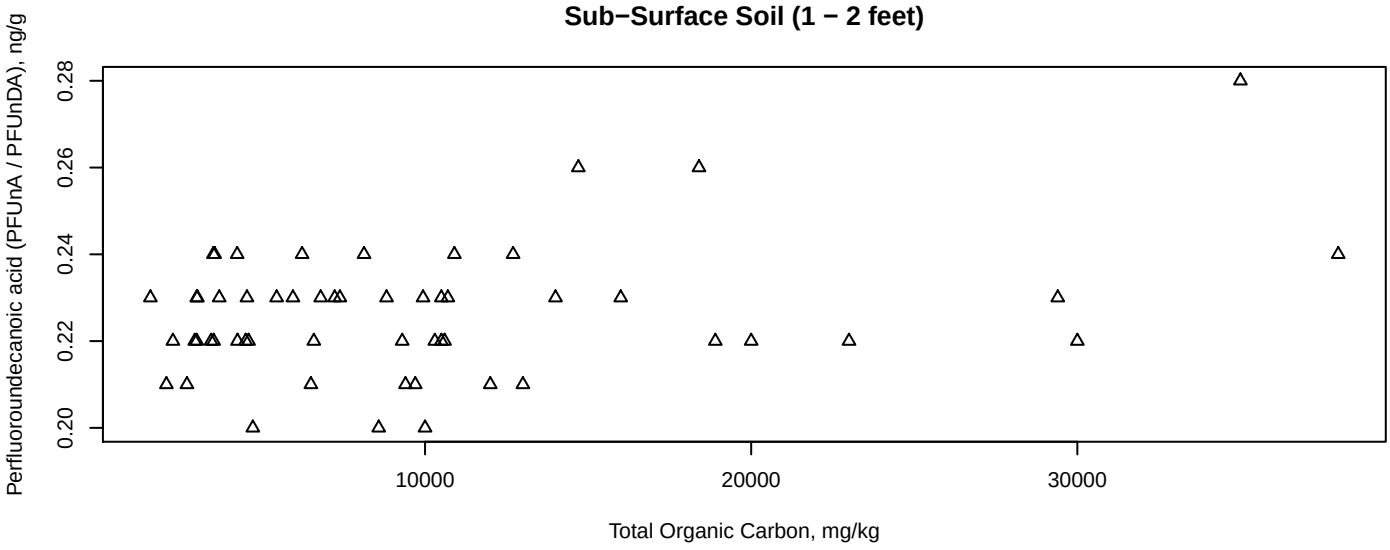
Sub−Surface Soil (1 − 2 feet)



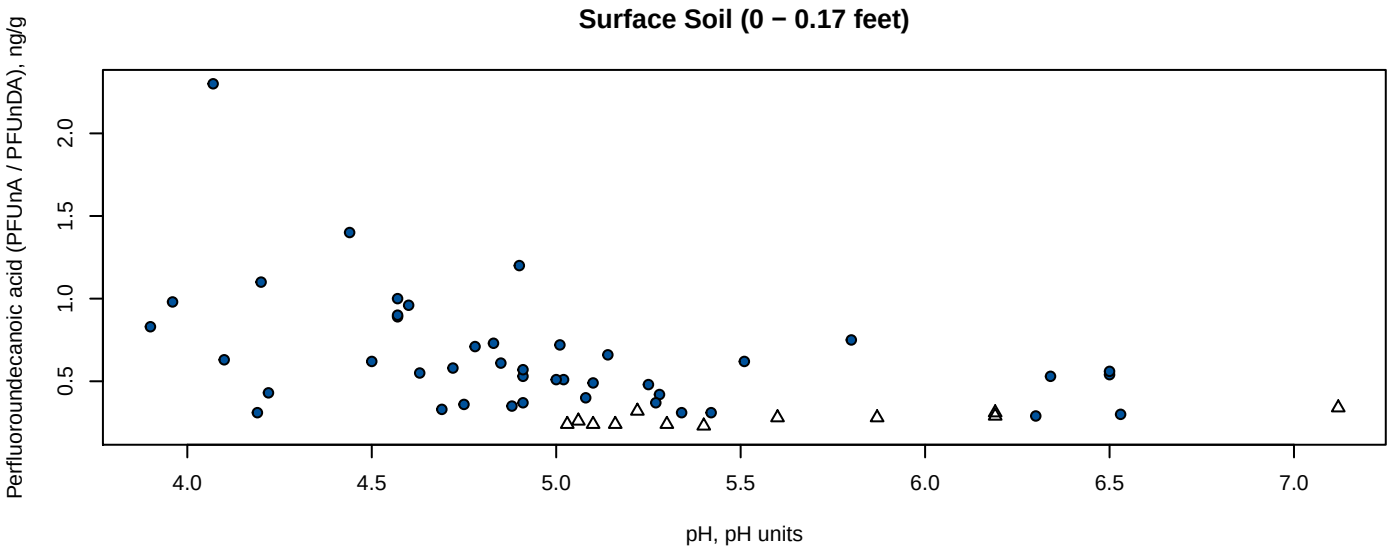
TOC vs. Perfluoroundecanoic acid (PFUnA / PFUnDA)

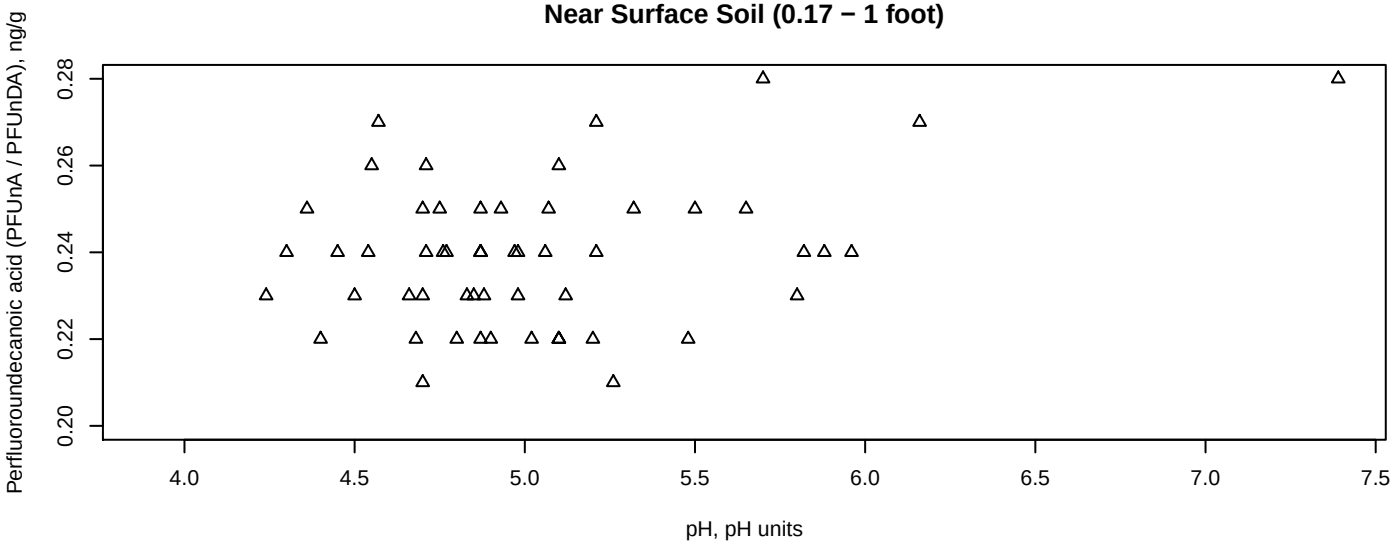


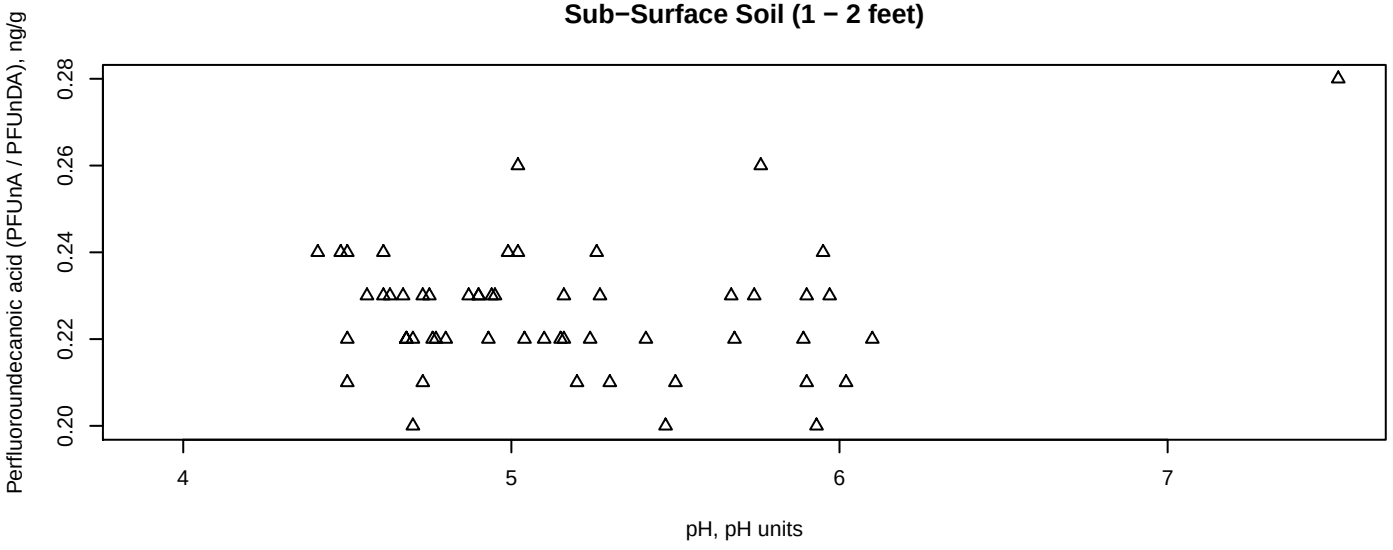




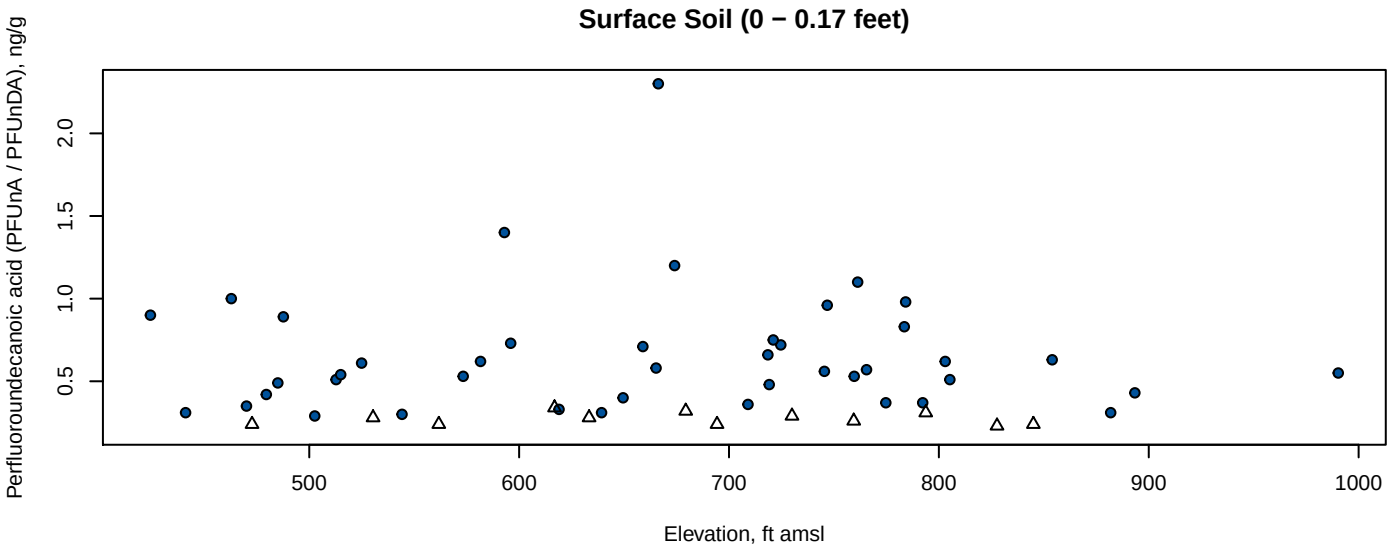
pH vs. Perfluoroundecanoic acid (PFUnA / PFUnDA)

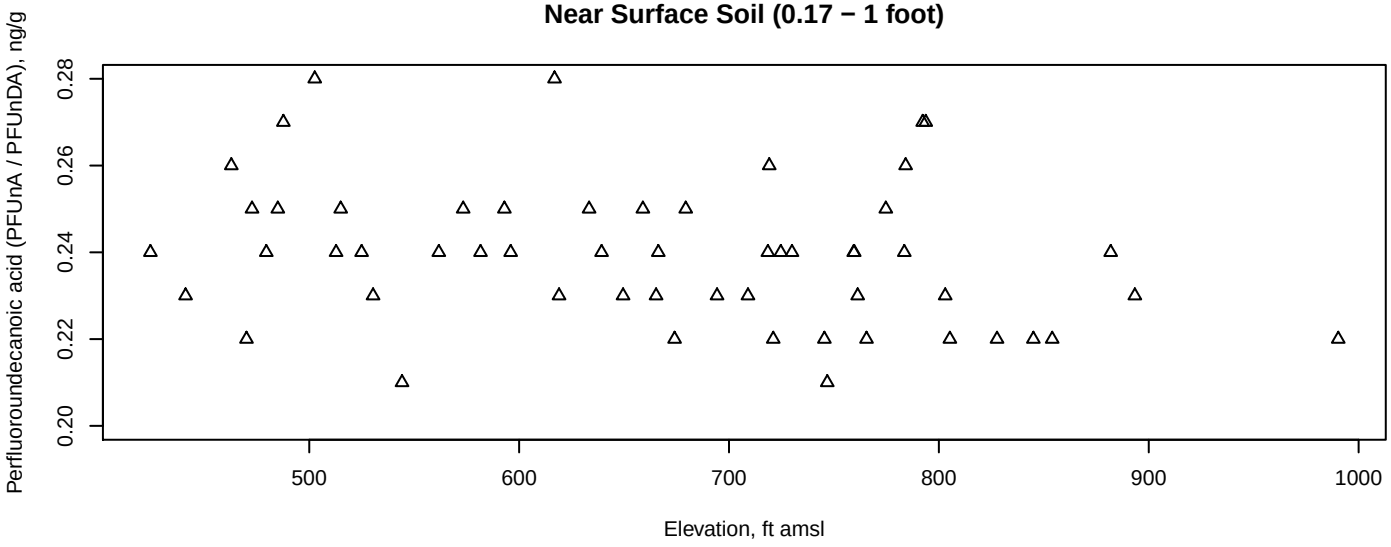


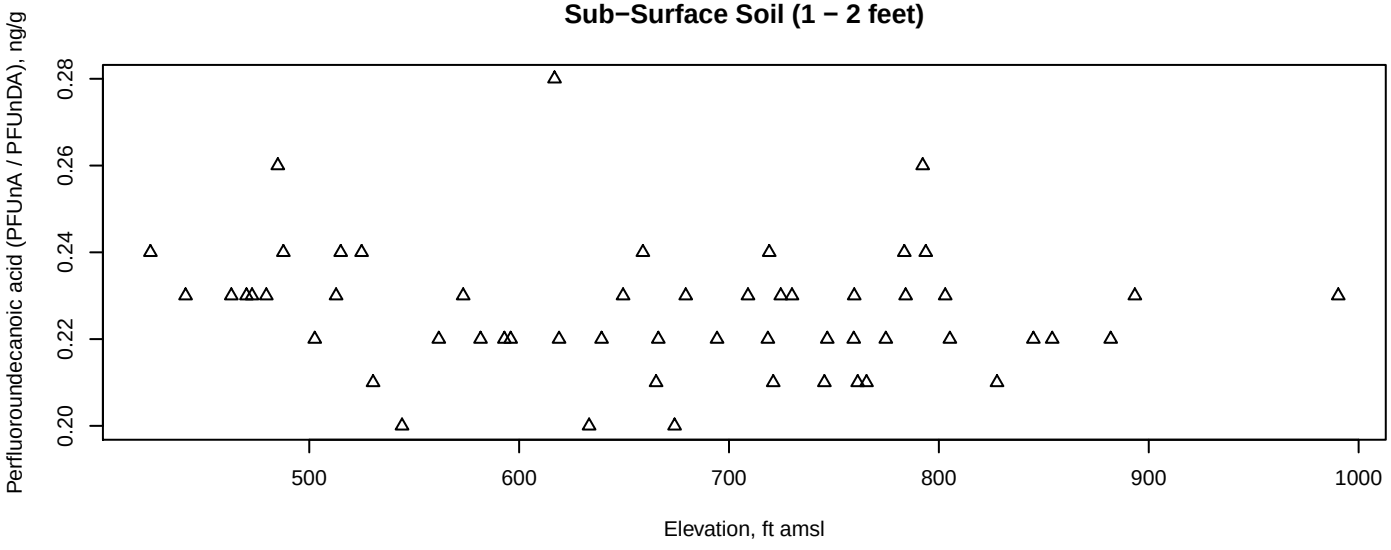




Elevation vs. Perfluoroundecanoic acid (PFUnA / PFUnDA)







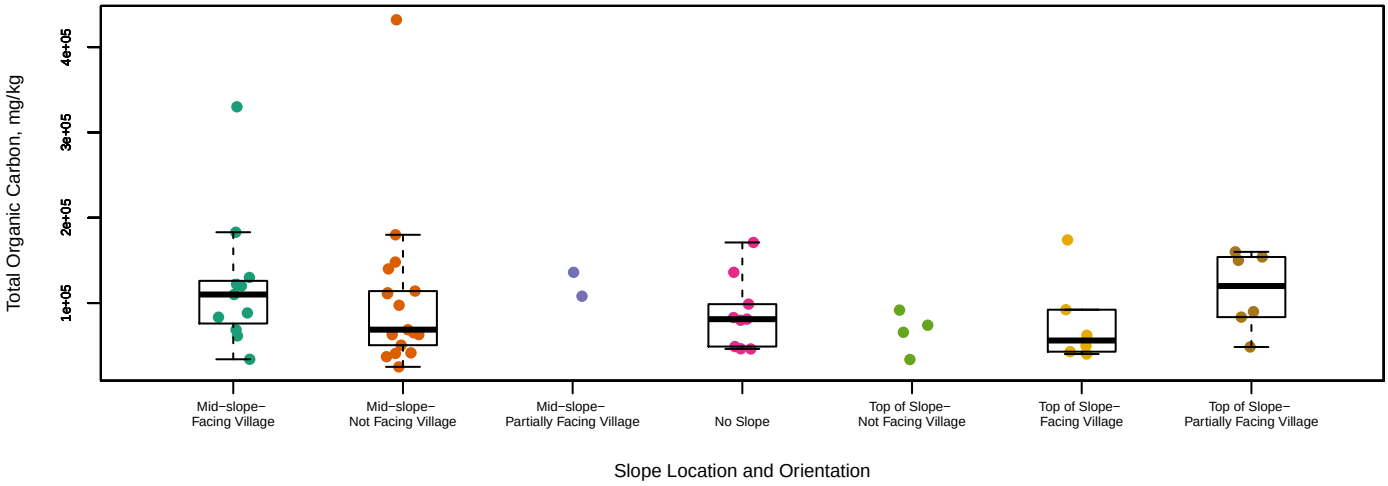
Appendix F

Parameter vs Parameter Plots – Soil Data

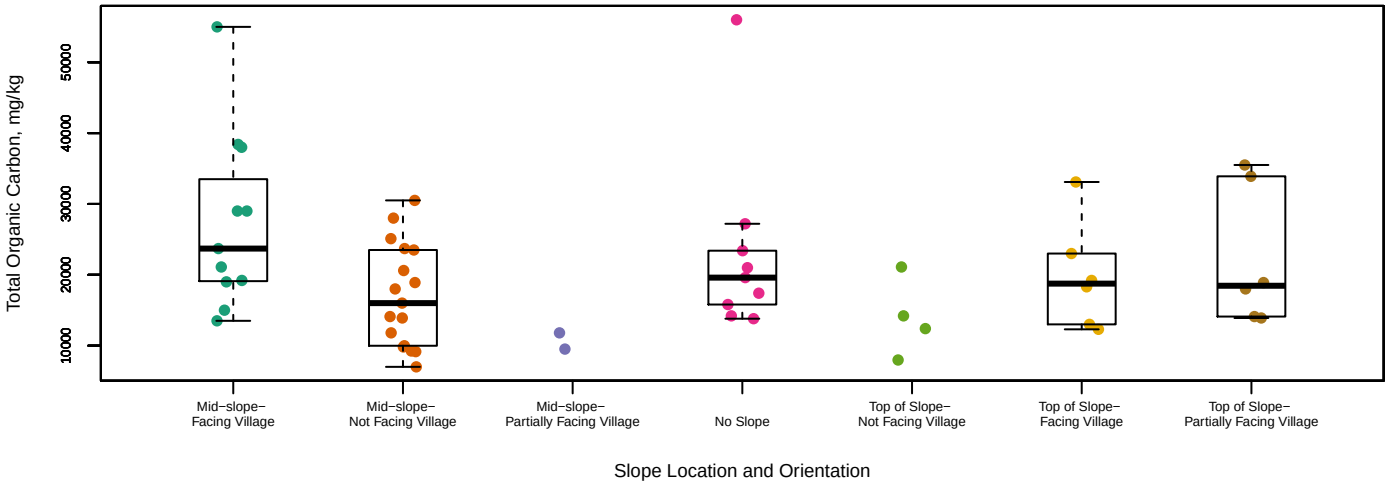
Appendix F2: Box Plots: Parameter vs Parameter

Total Organic Carbon

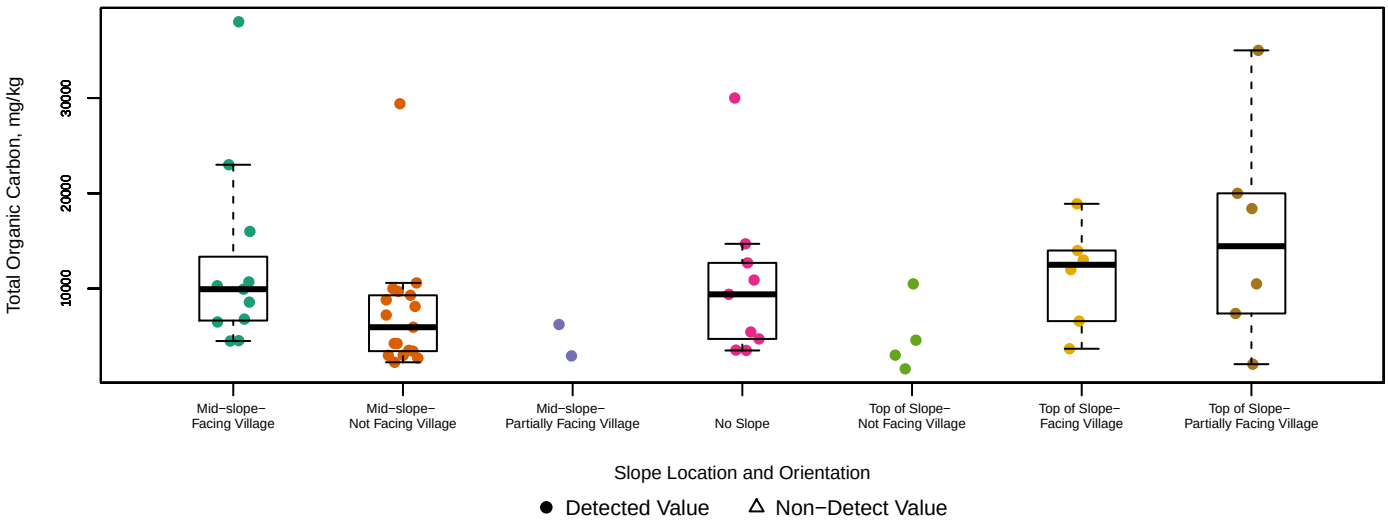
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

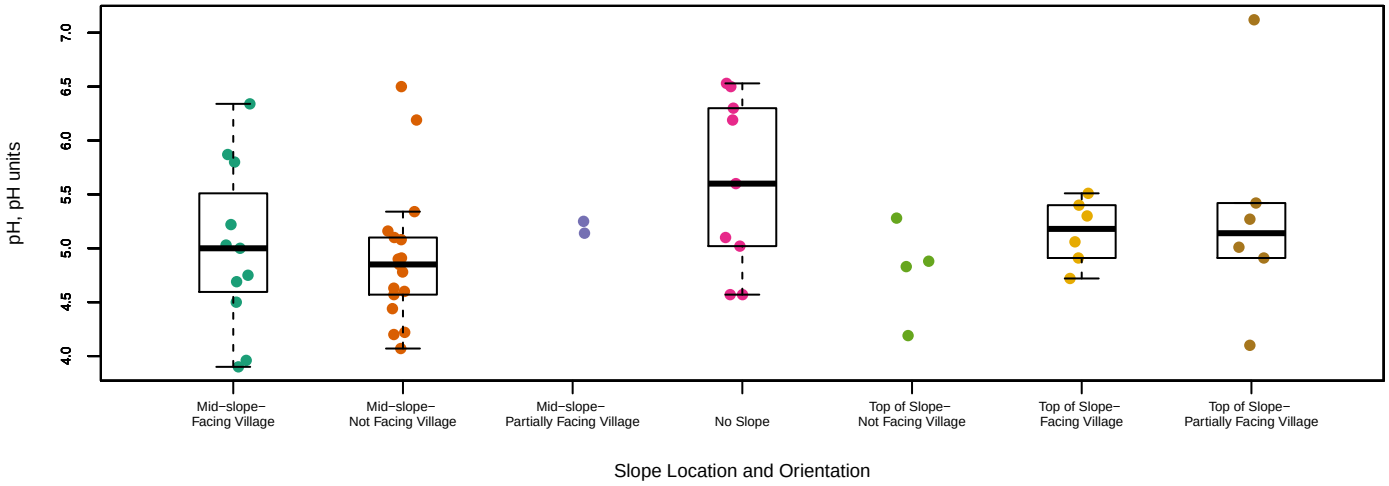


Sub−Surface Soil (1 − 2 feet)

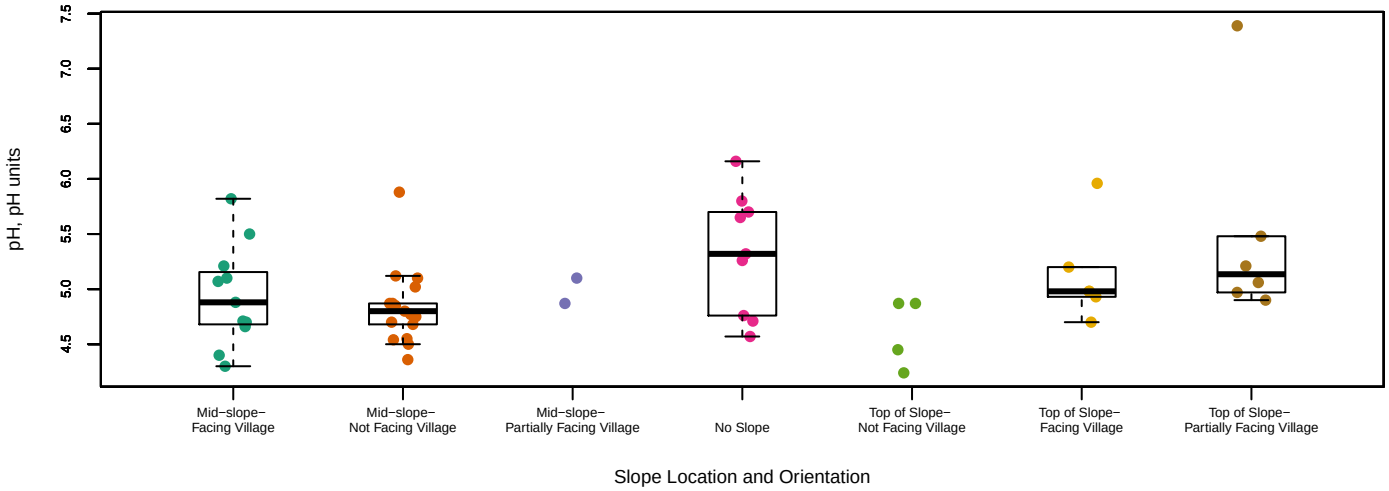


pH

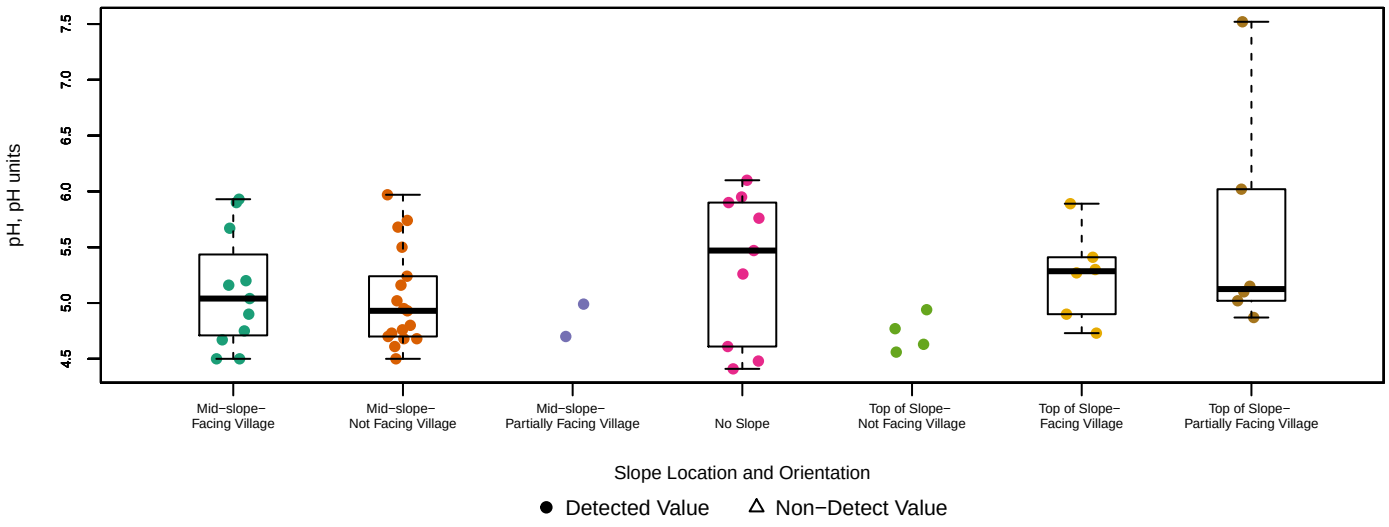
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

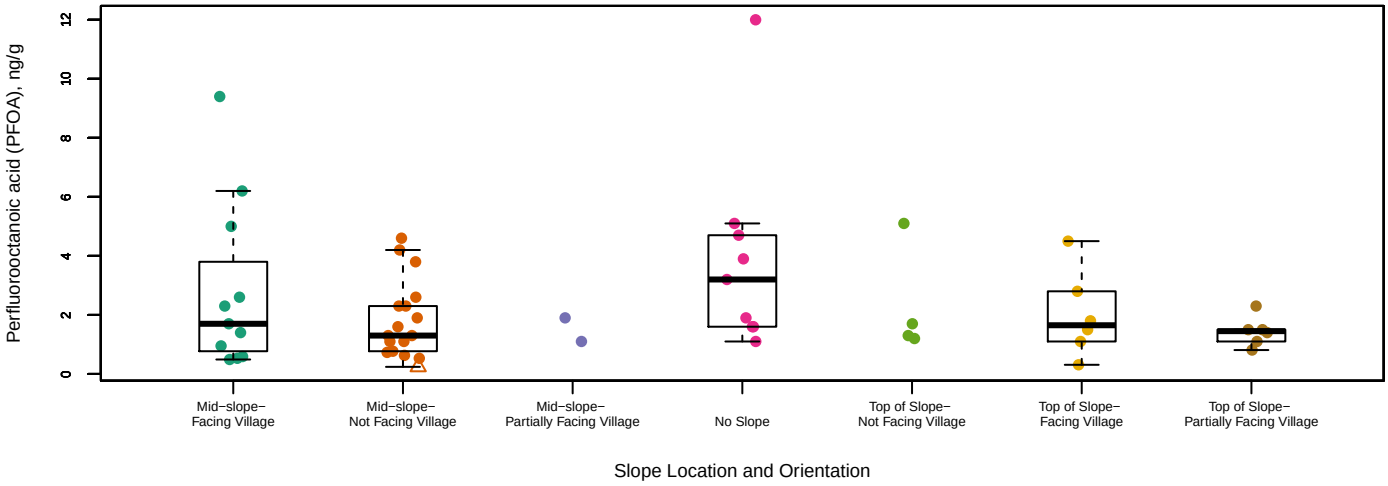


Sub−Surface Soil (1 − 2 feet)

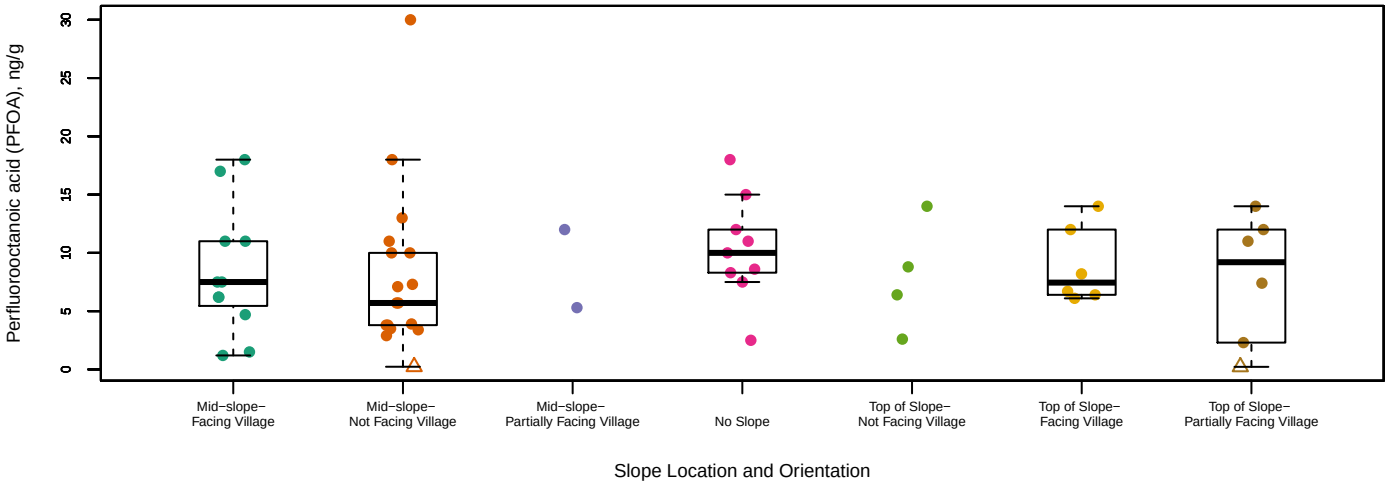


Perfluorooctanoic acid (PFOA)

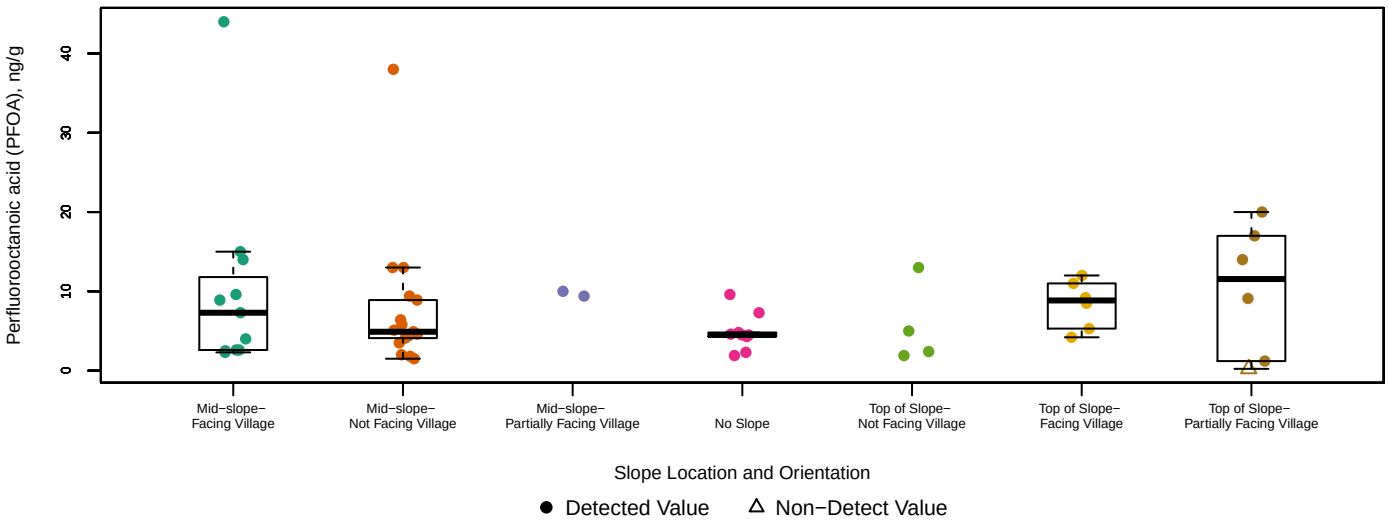
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

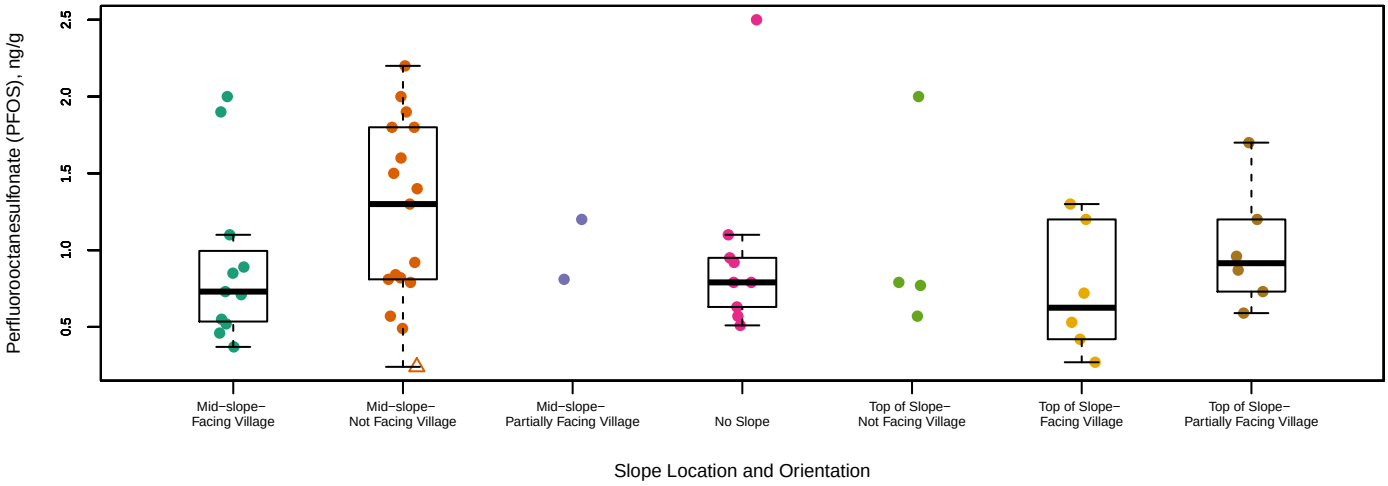


Sub−Surface Soil (1 − 2 feet)

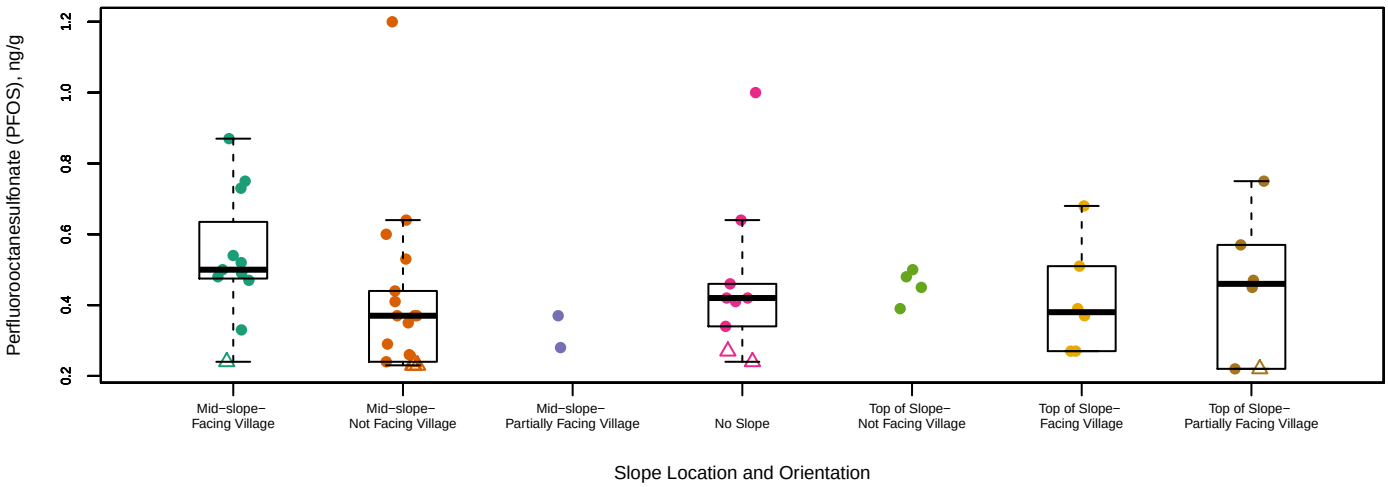


Perfluorooctanesulfonate (PFOS)

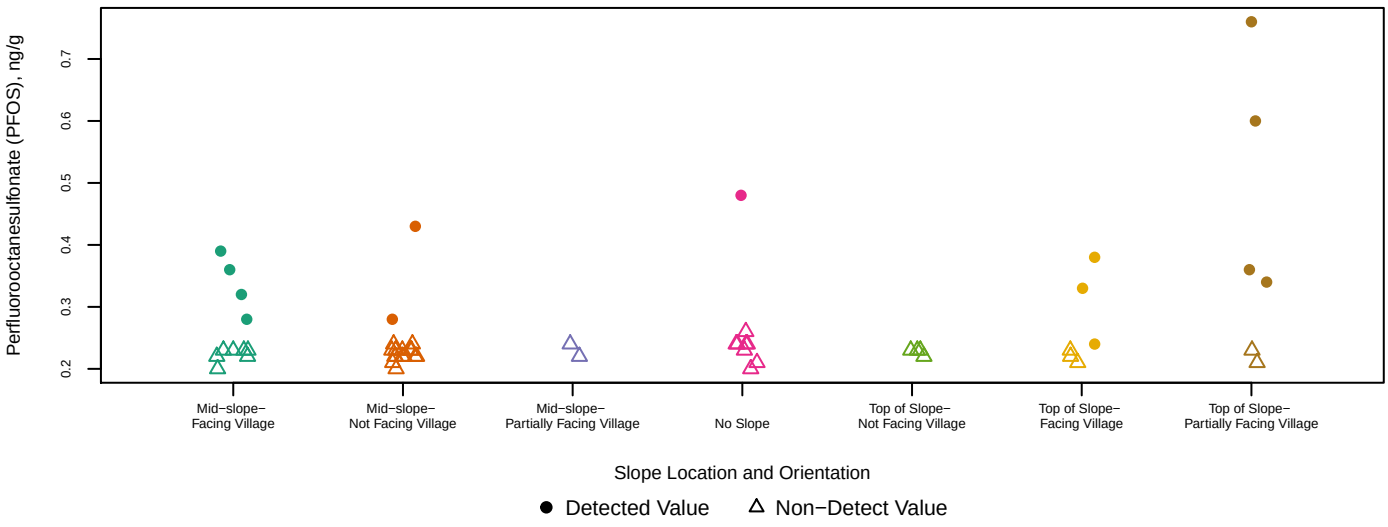
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

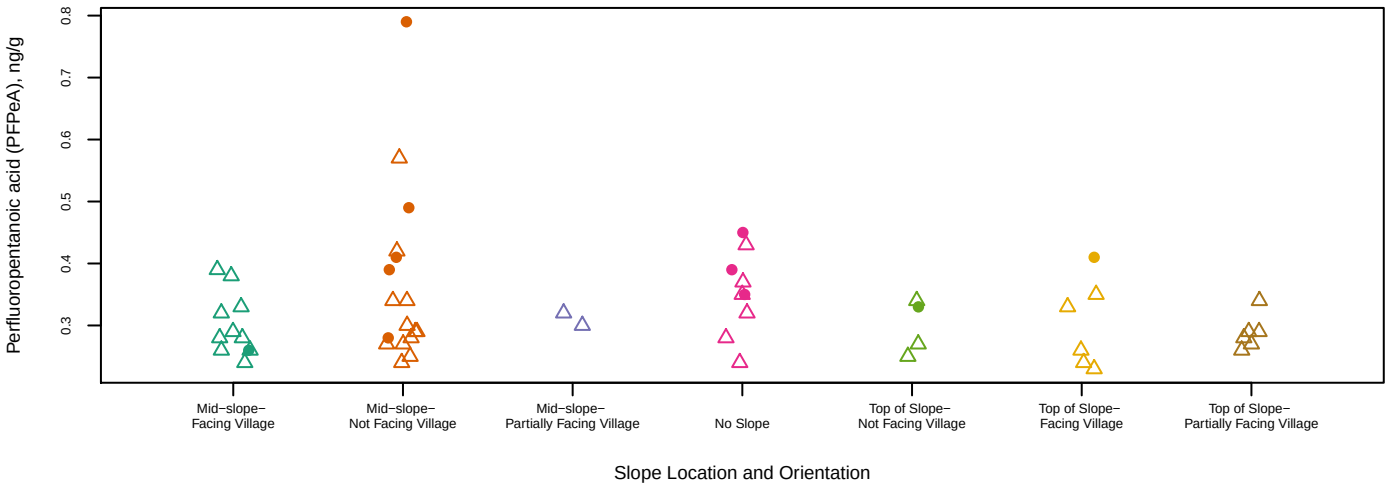


Sub−Surface Soil (1 − 2 feet)

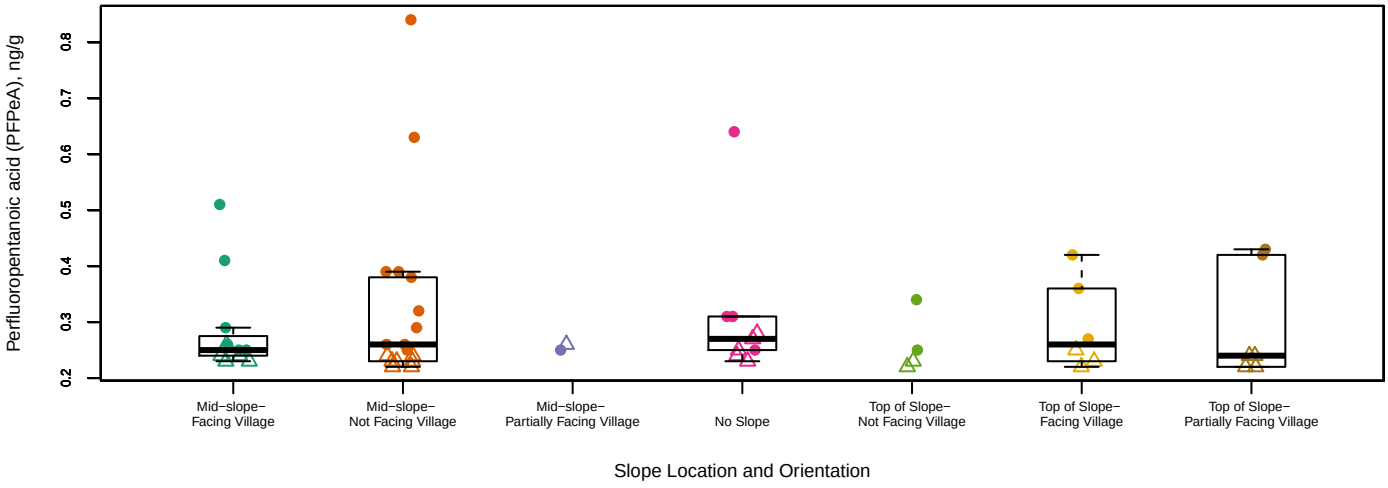


Perfluoropentanoic acid (PFPeA)

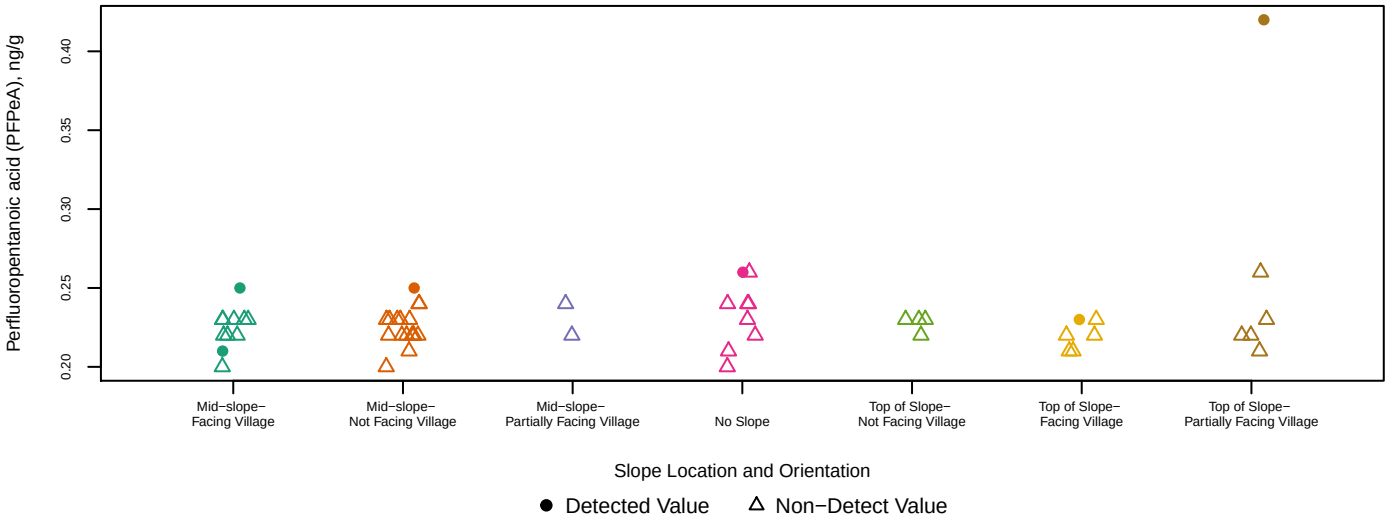
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

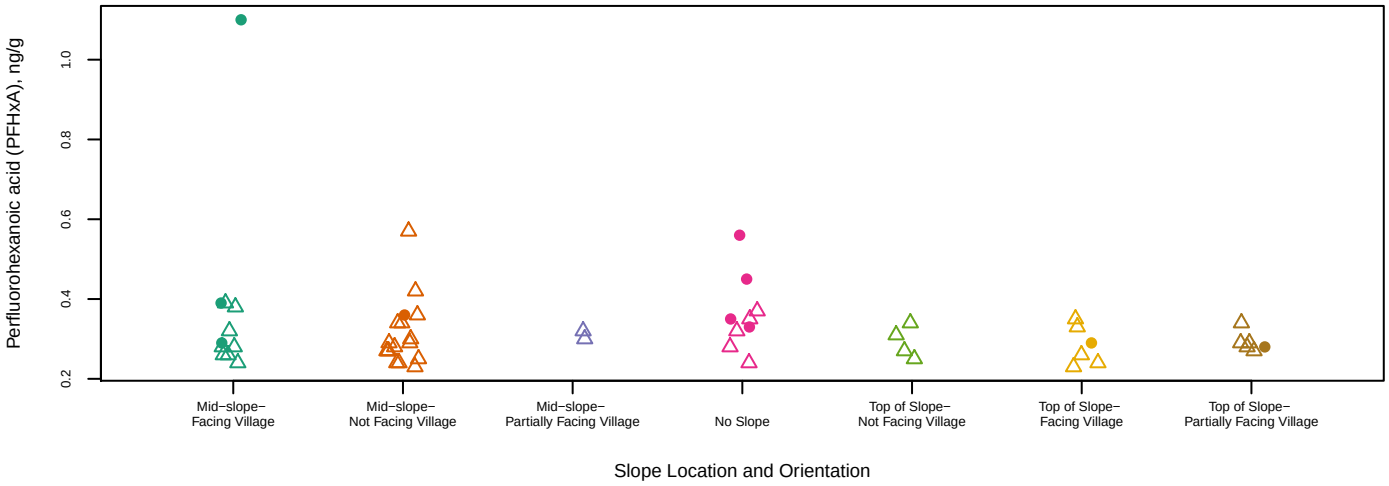


Sub−Surface Soil (1 − 2 feet)

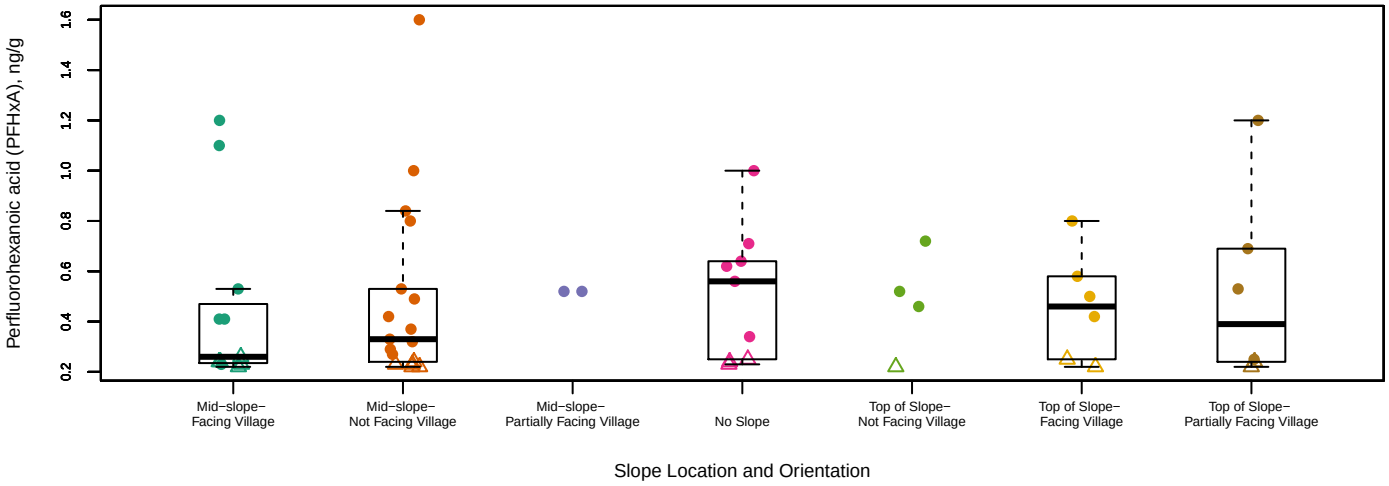


Perfluorohexanoic acid (PFHxA)

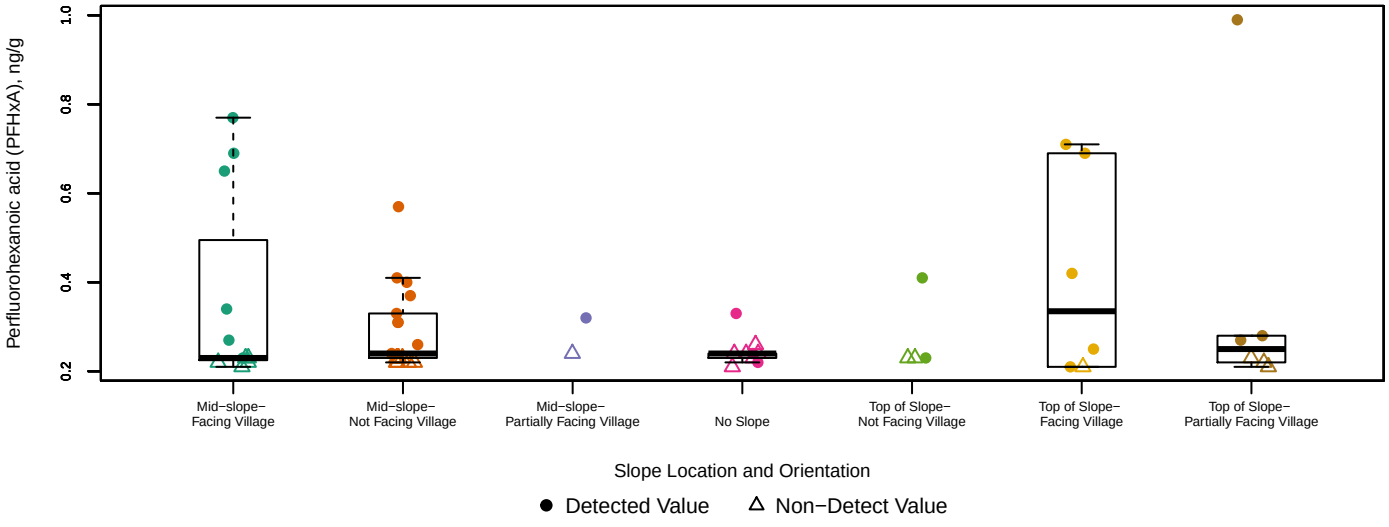
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

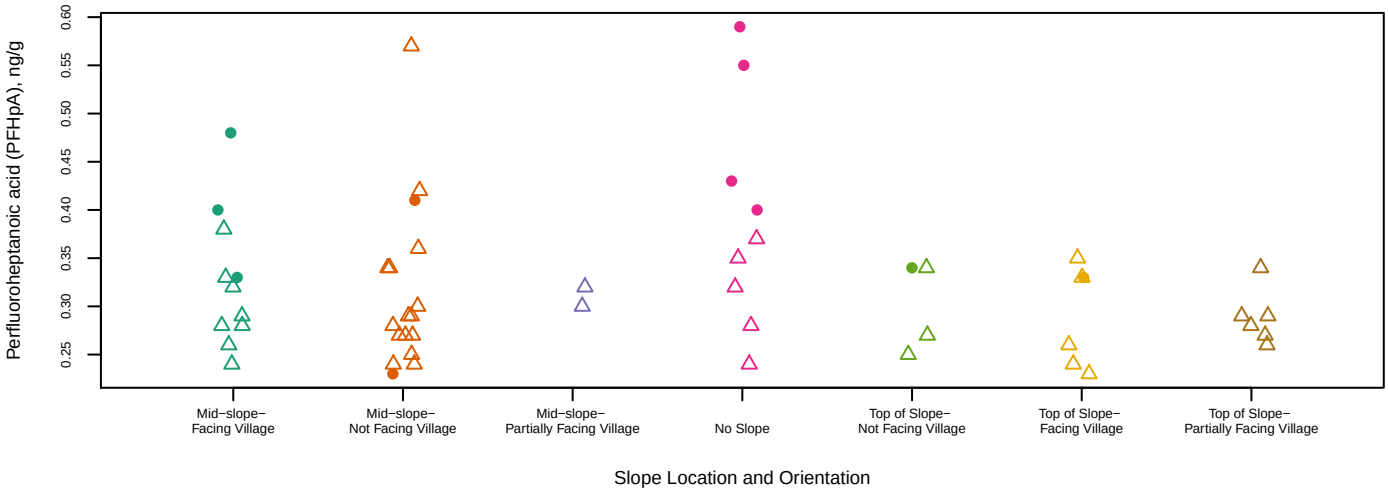


Sub−Surface Soil (1 − 2 feet)

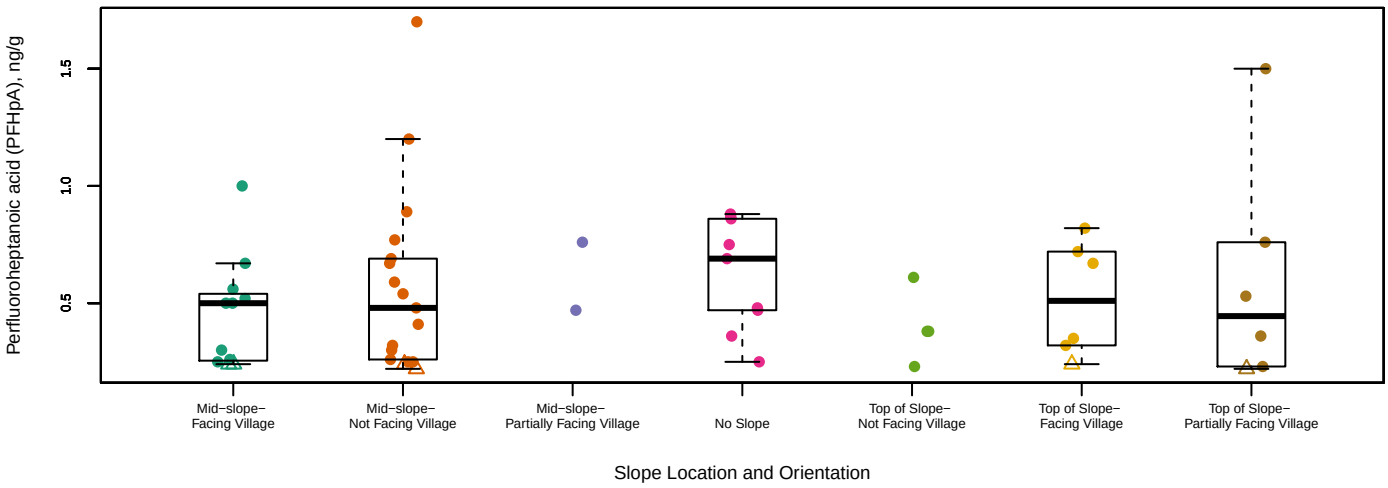


Perfluoroheptanoic acid (PFHpA)

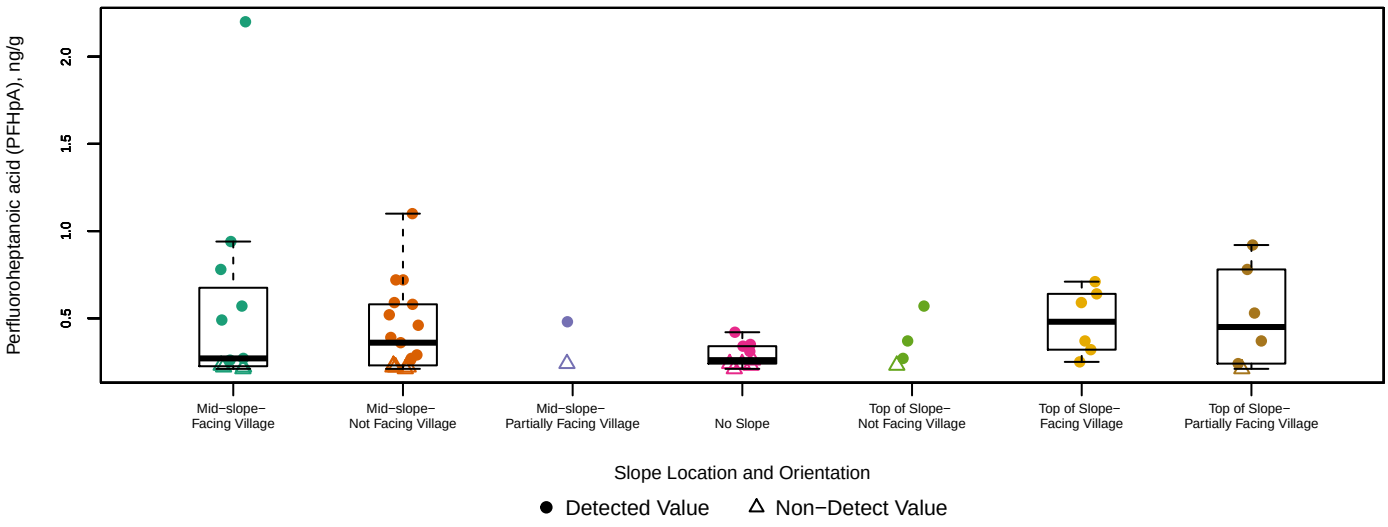
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

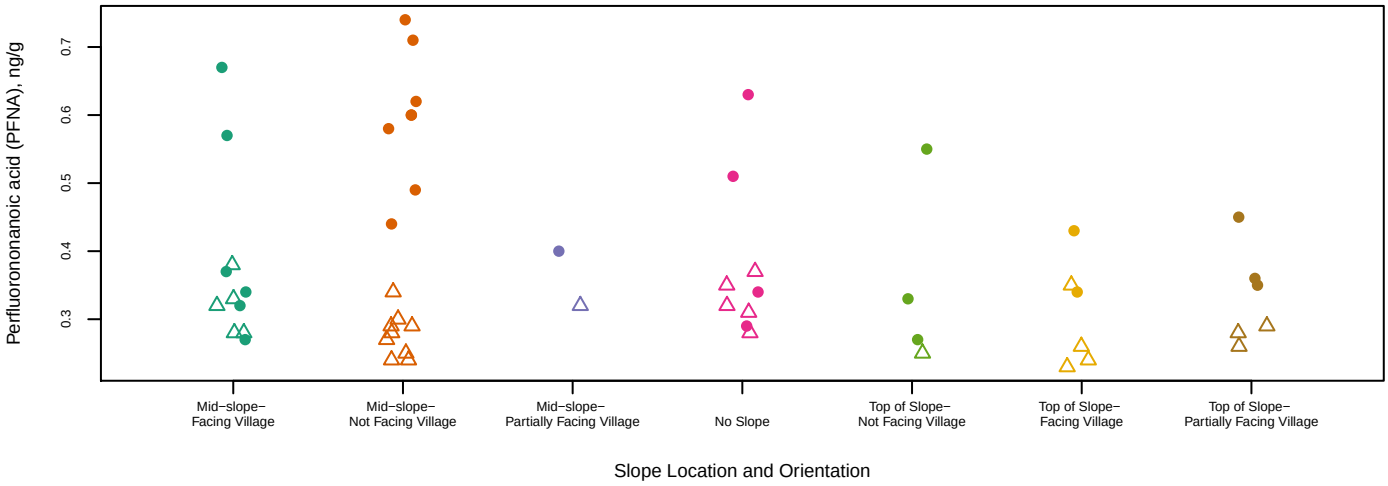


Sub−Surface Soil (1 − 2 feet)

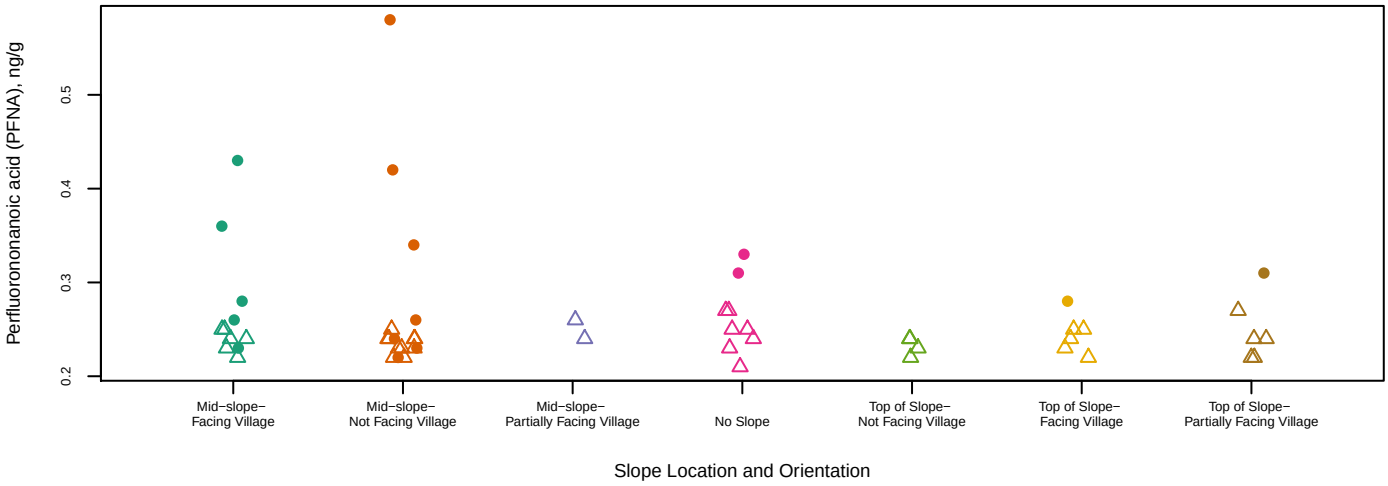


Perfluorononanoic acid (PFNA)

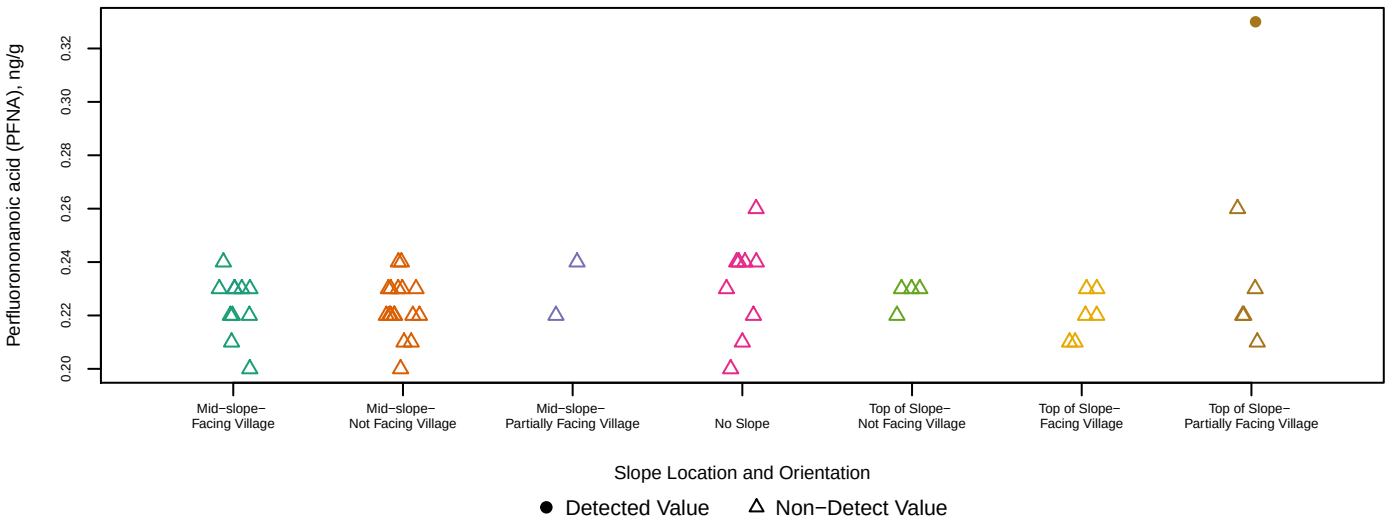
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

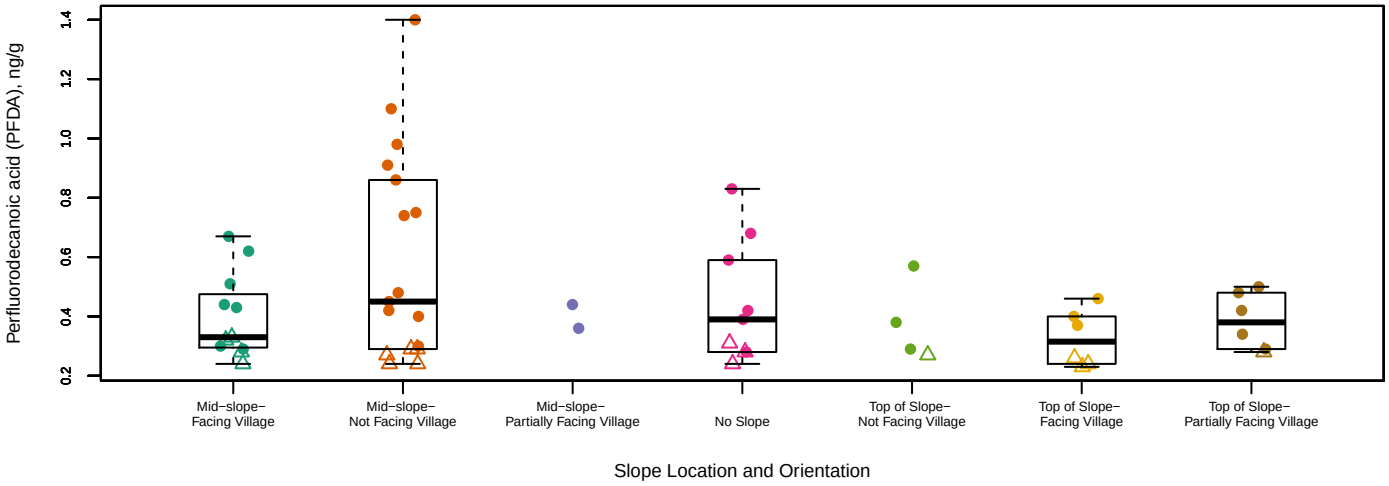


Sub−Surface Soil (1 − 2 feet)

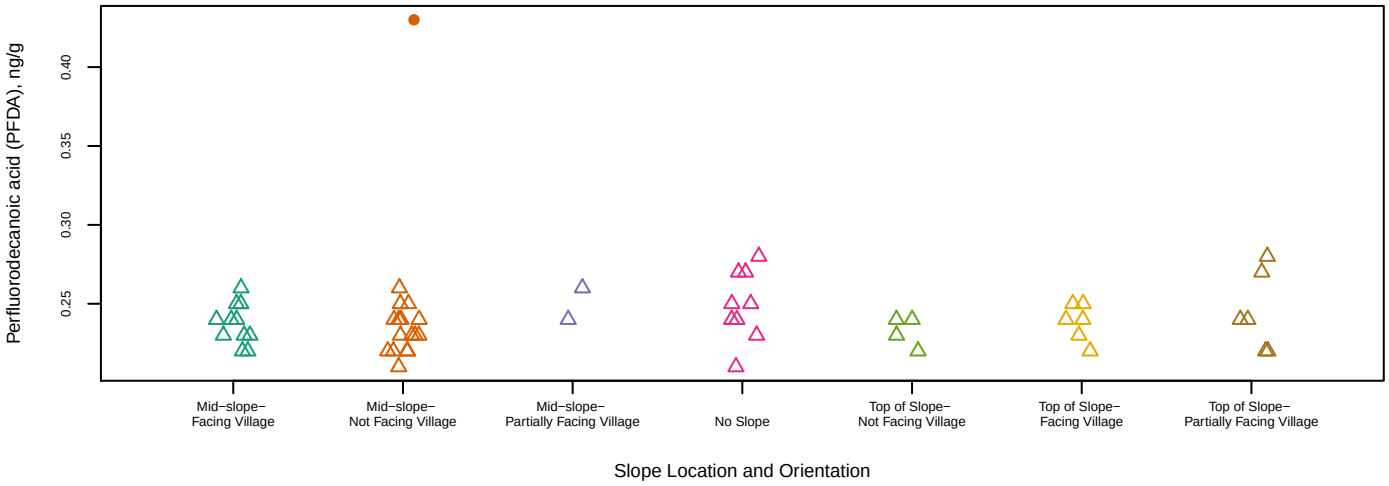


Perfluorodecanoic acid (PFDA)

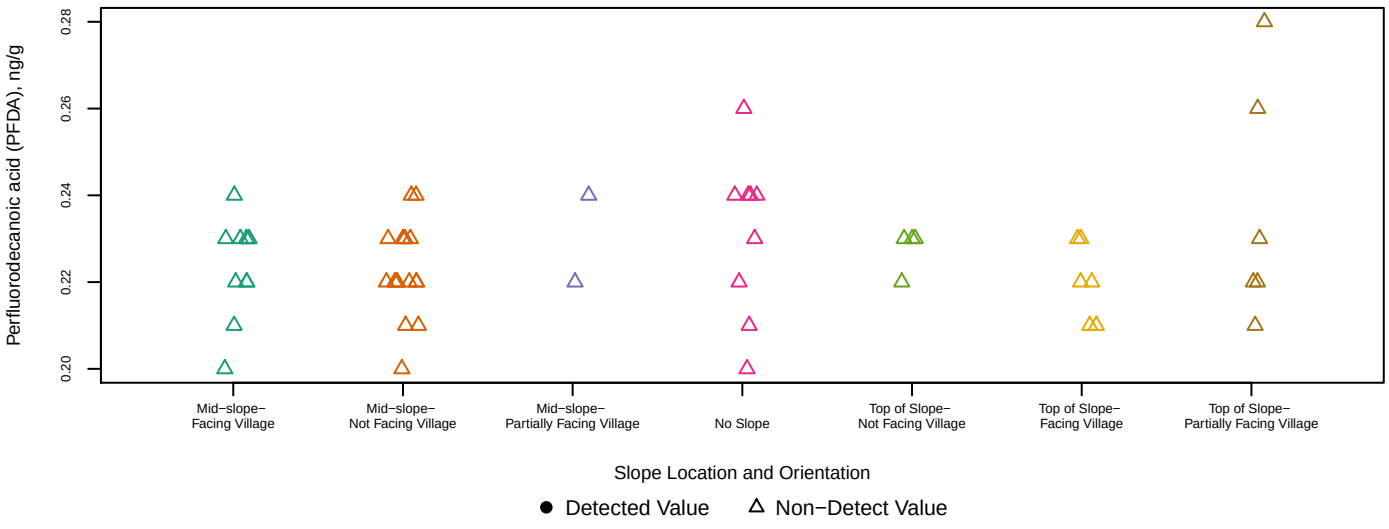
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

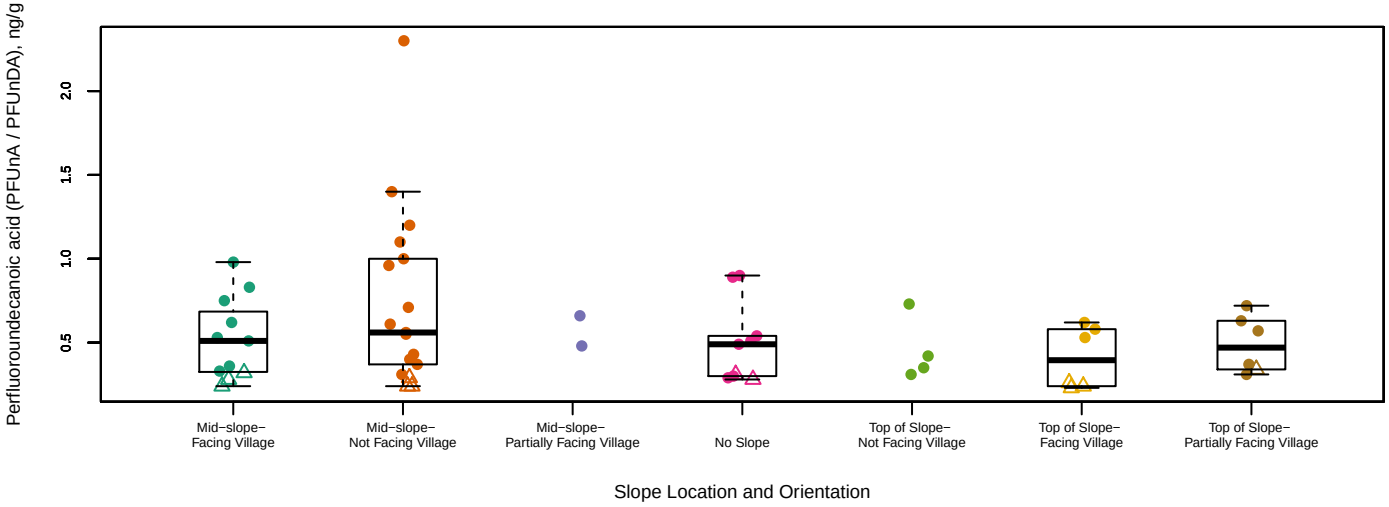


Sub−Surface Soil (1 − 2 feet)

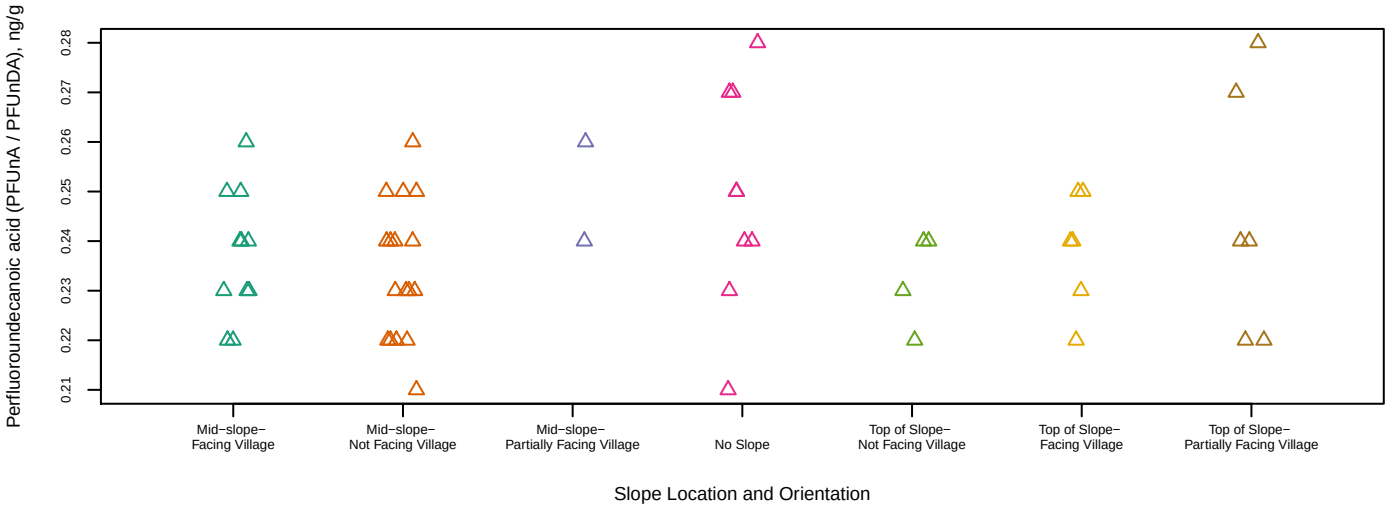


Perfluoroundecanoic acid (PFUnA / PFUnDA)

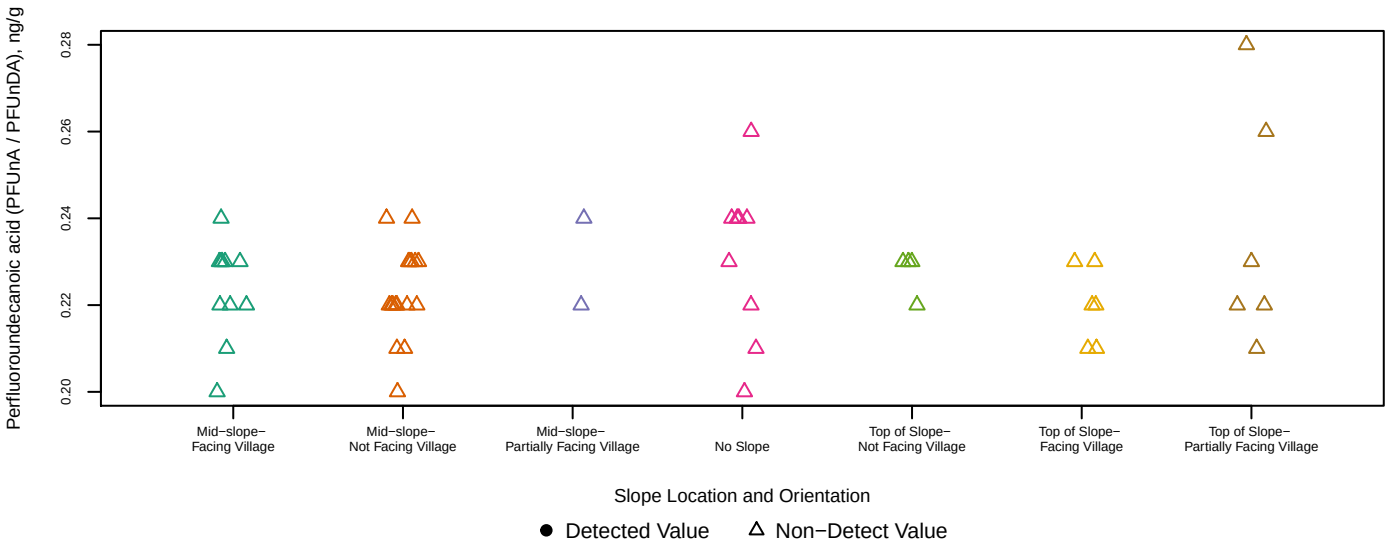
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

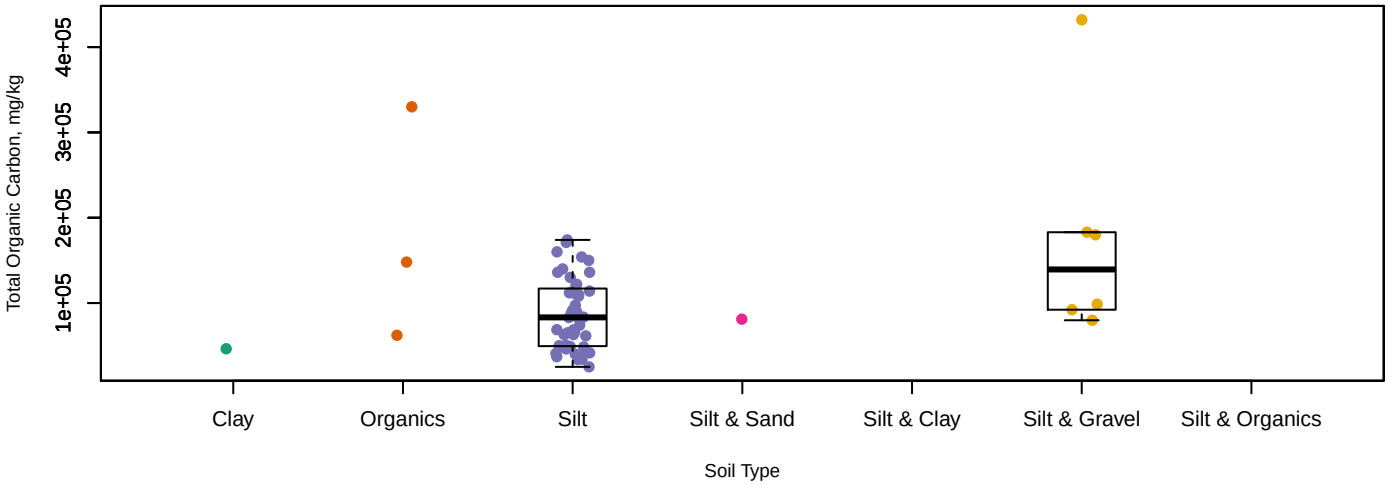


Sub−Surface Soil (1 − 2 feet)

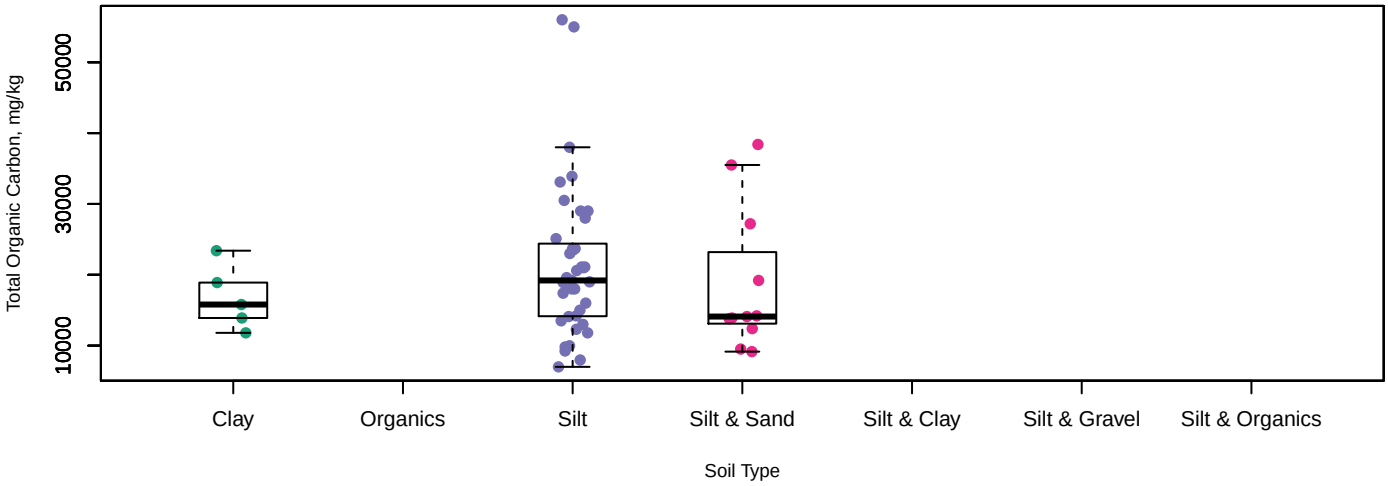


Total Organic Carbon

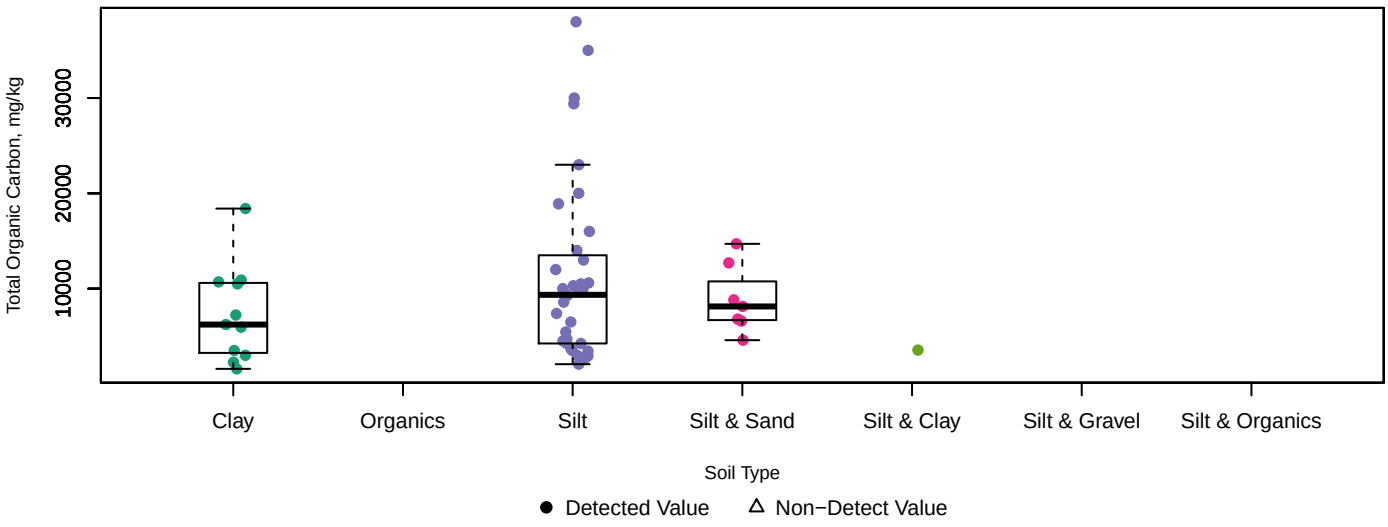
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

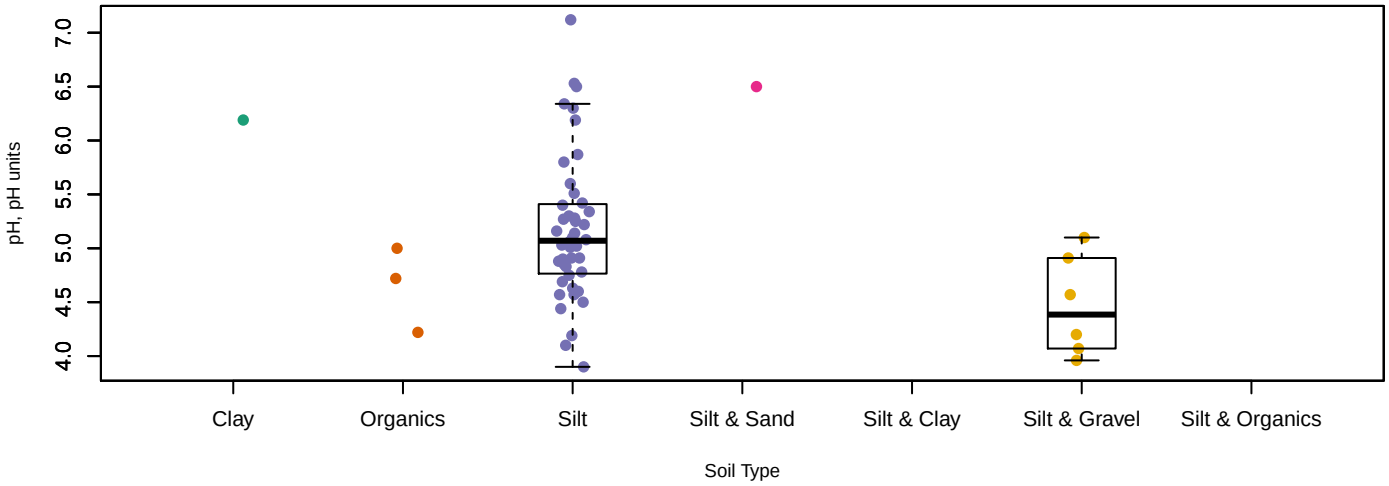


Sub−Surface Soil (1 − 2 feet)

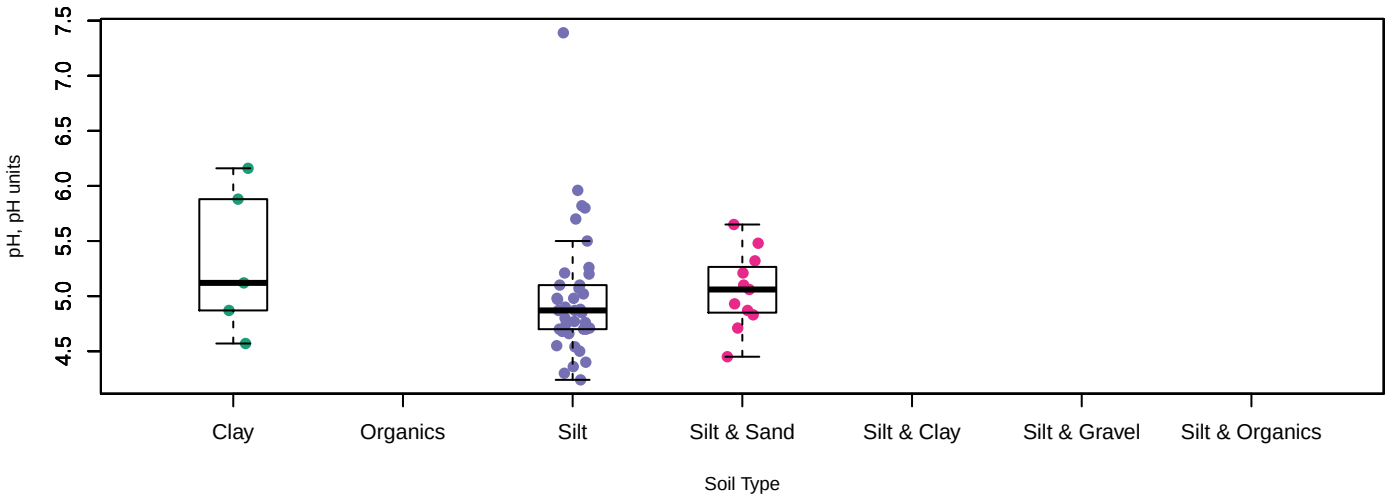


pH

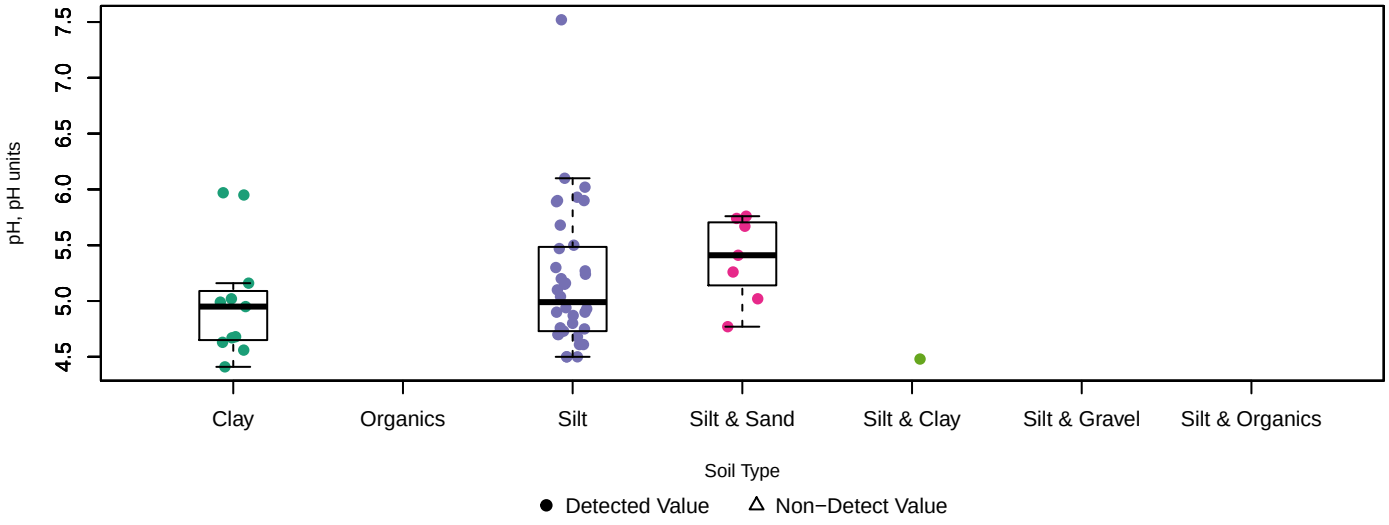
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

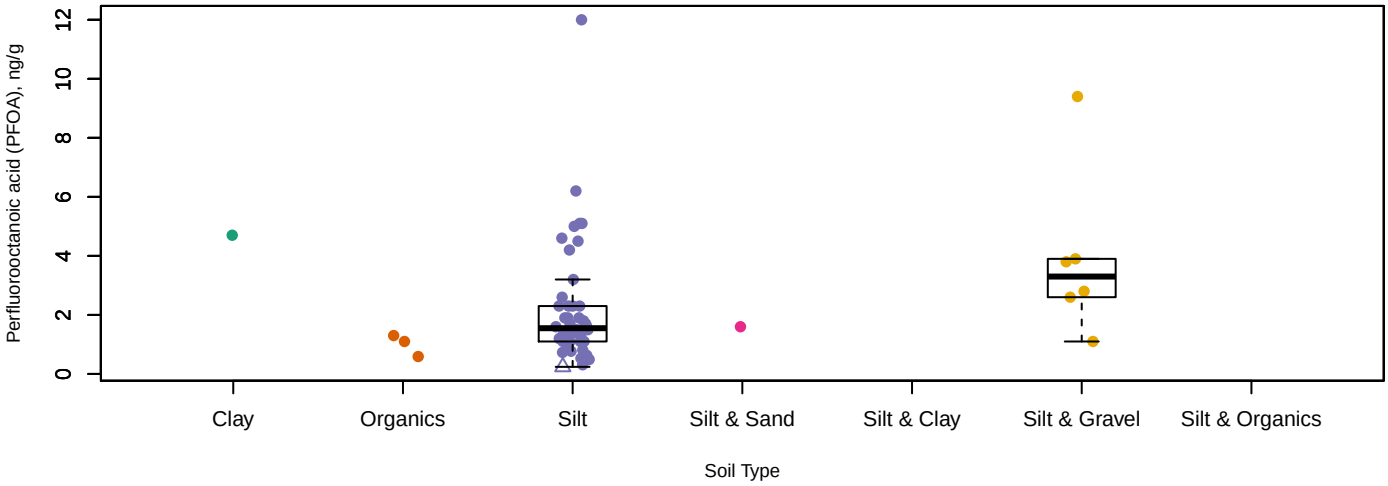


Sub−Surface Soil (1 − 2 feet)

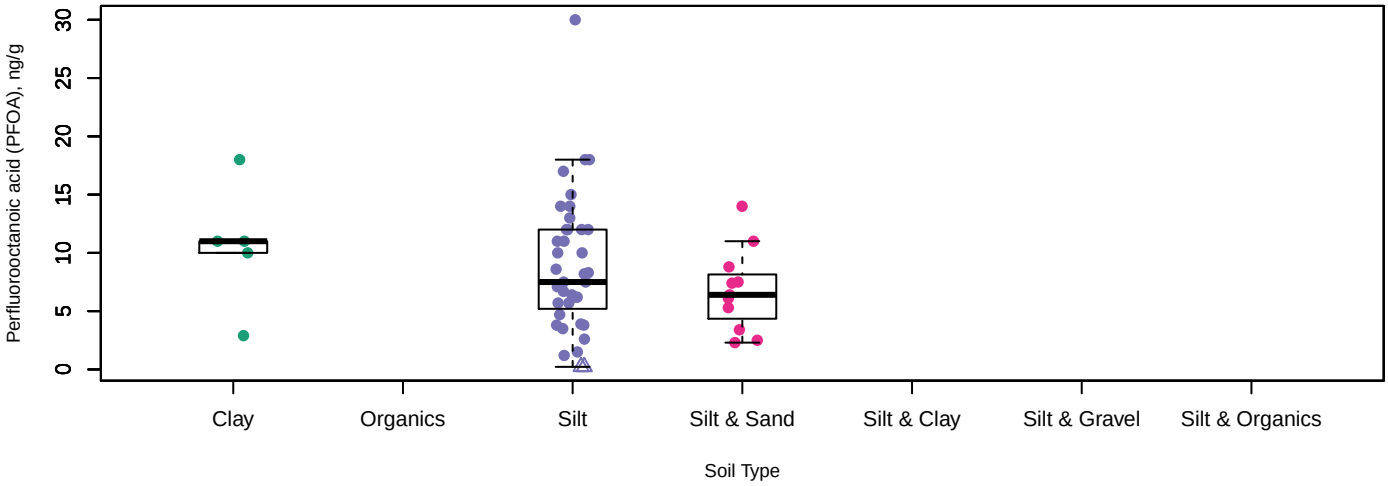


Perfluorooctanoic acid (PFOA)

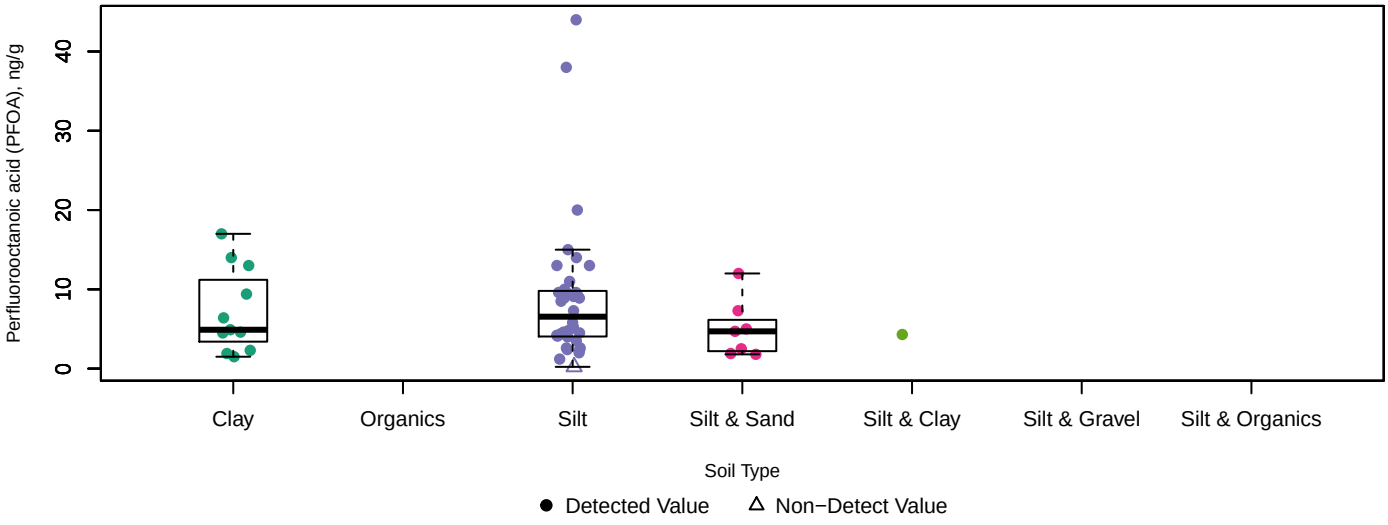
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

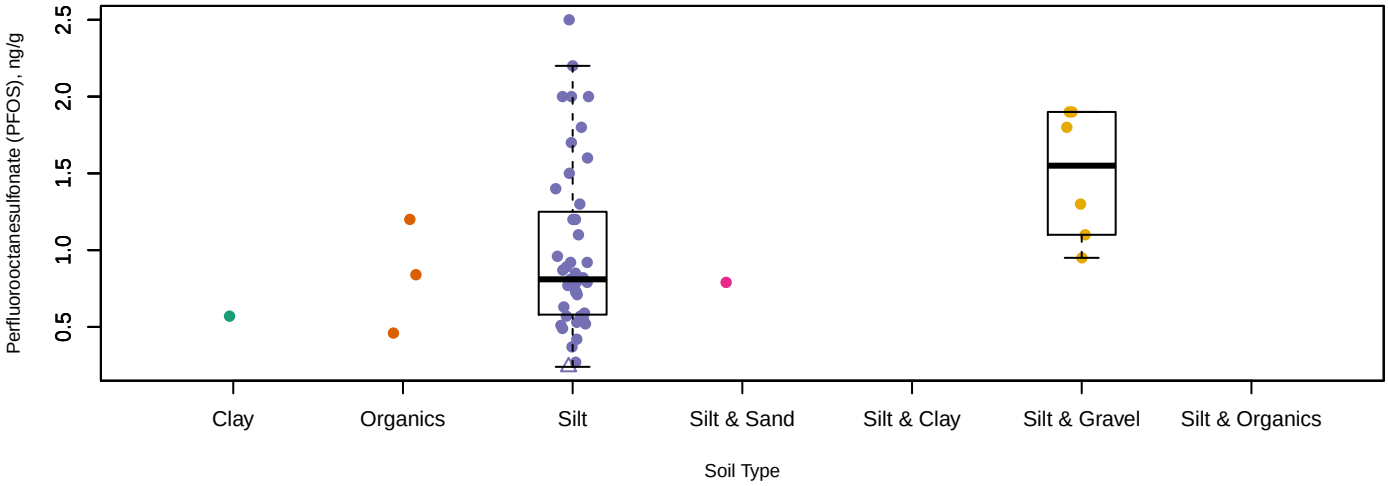


Sub−Surface Soil (1 − 2 feet)

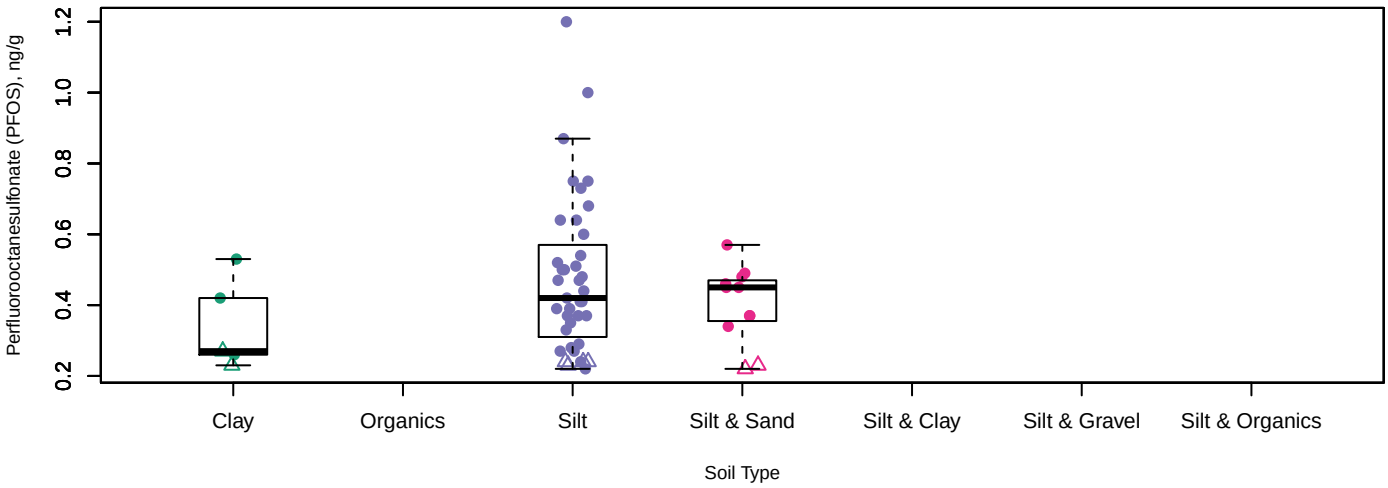


Perfluorooctanesulfonate (PFOS)

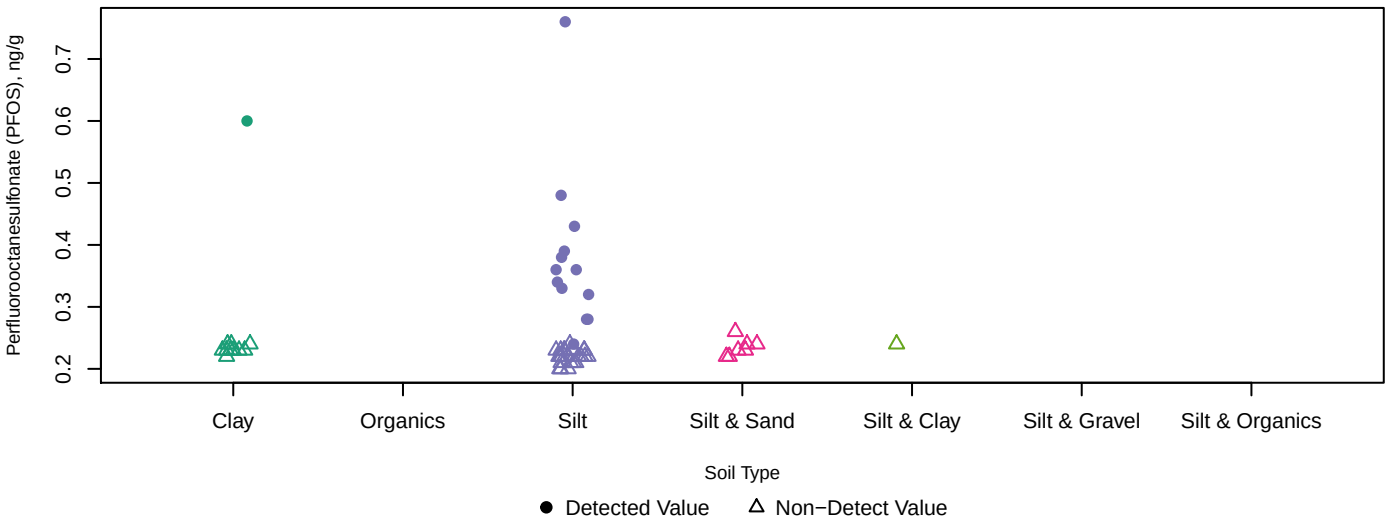
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

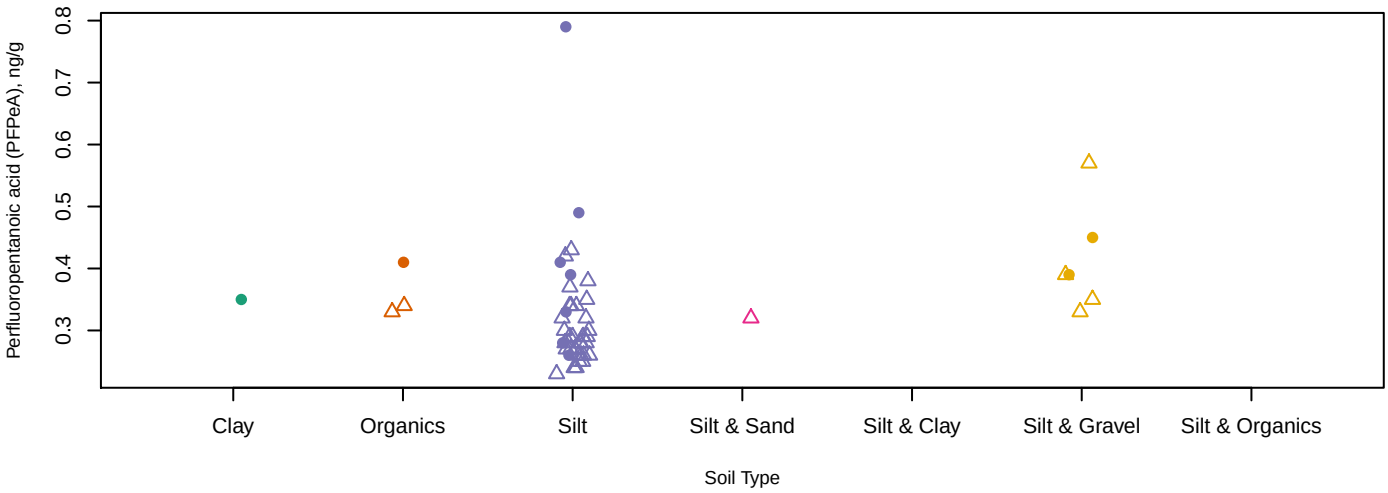


Sub−Surface Soil (1 − 2 feet)

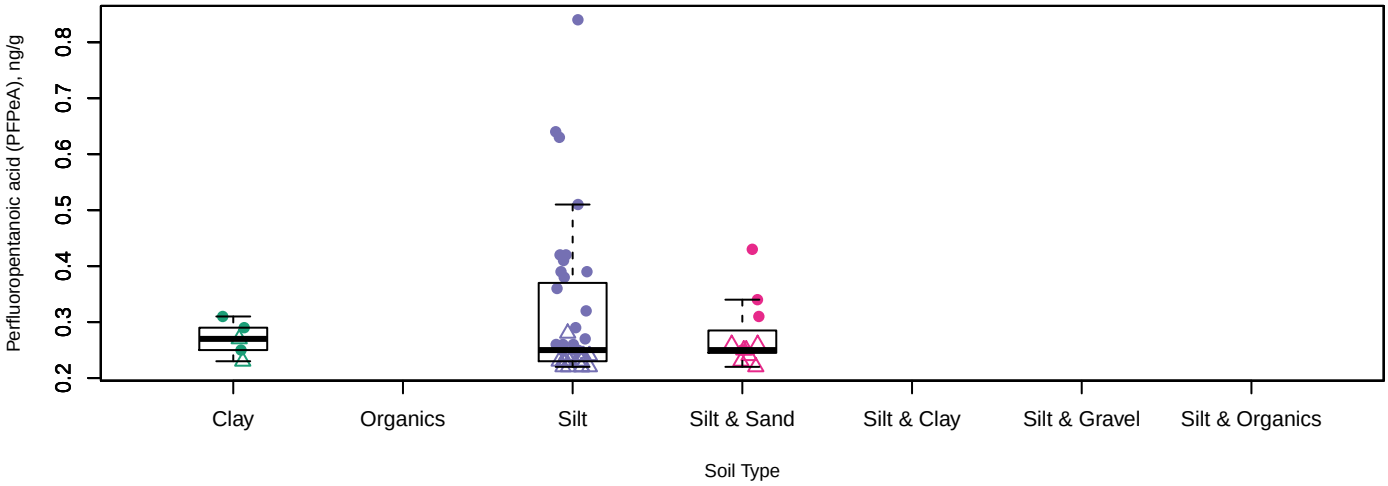


Perfluoropentanoic acid (PFPeA)

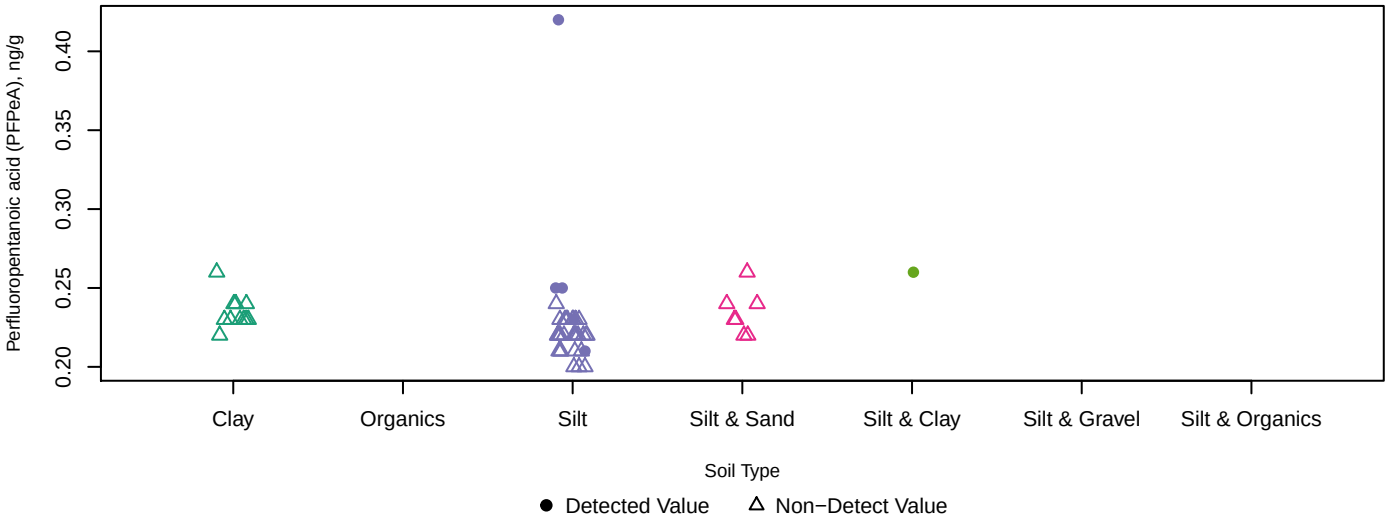
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

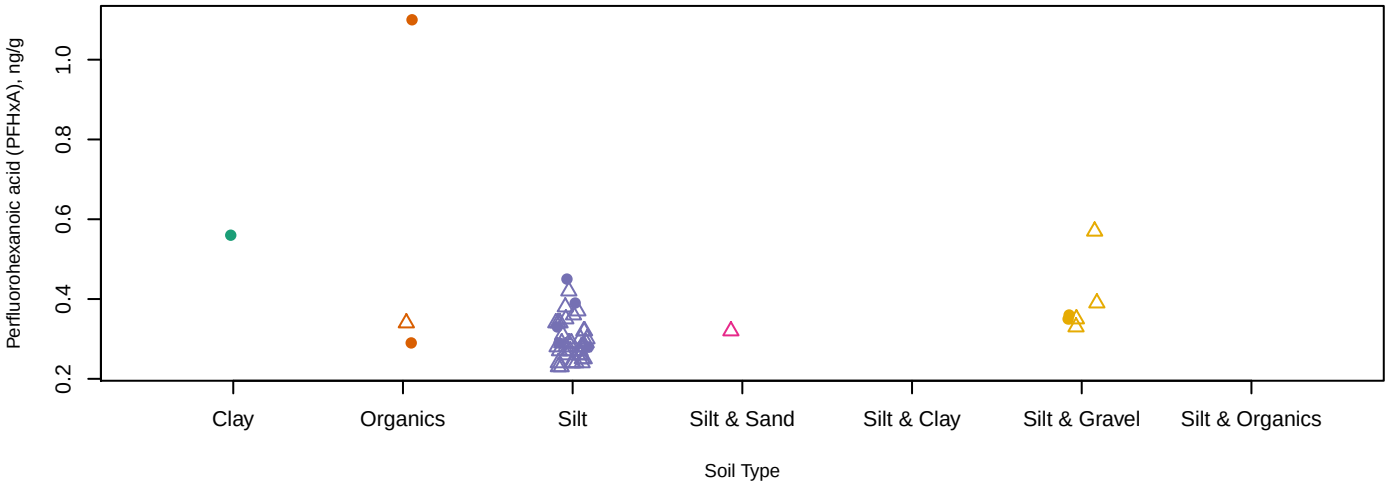


Sub−Surface Soil (1 − 2 feet)

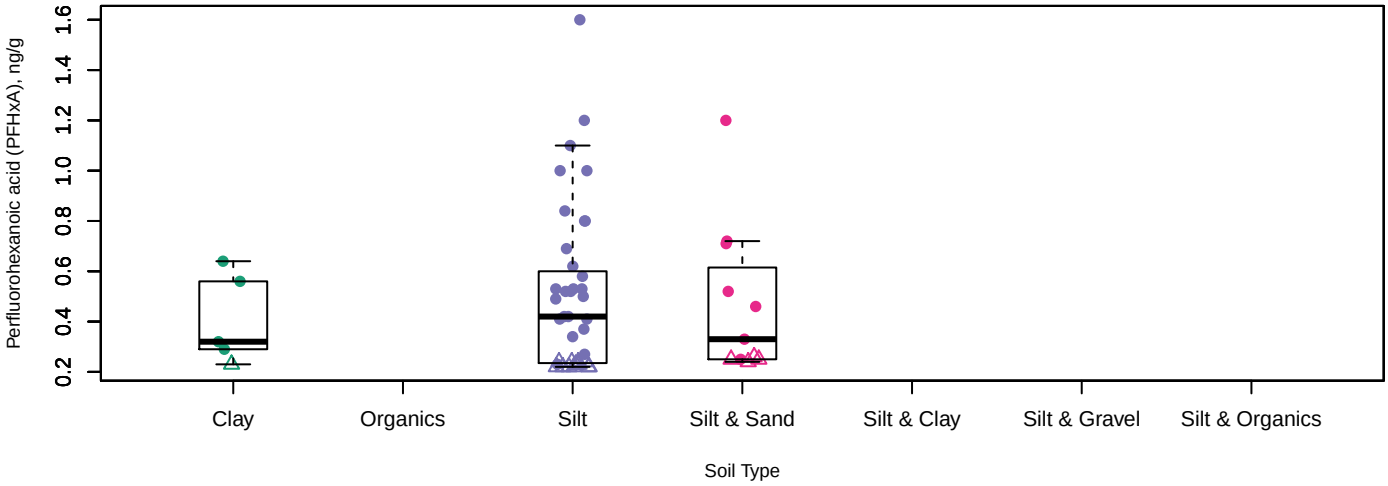


Perfluorohexanoic acid (PFHxA)

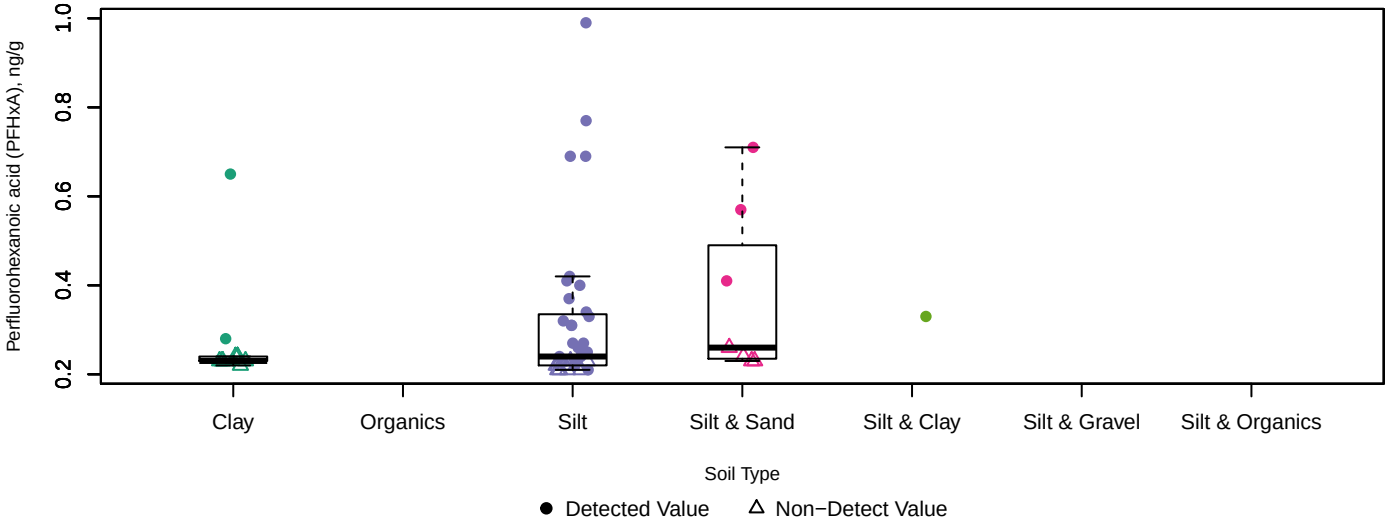
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

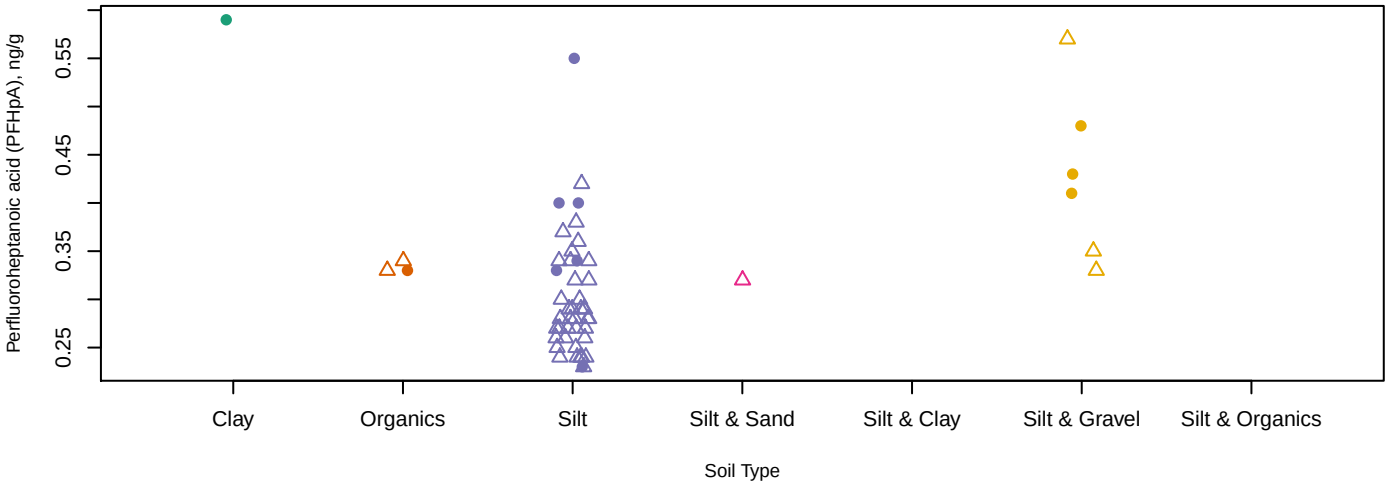


Sub−Surface Soil (1 − 2 feet)

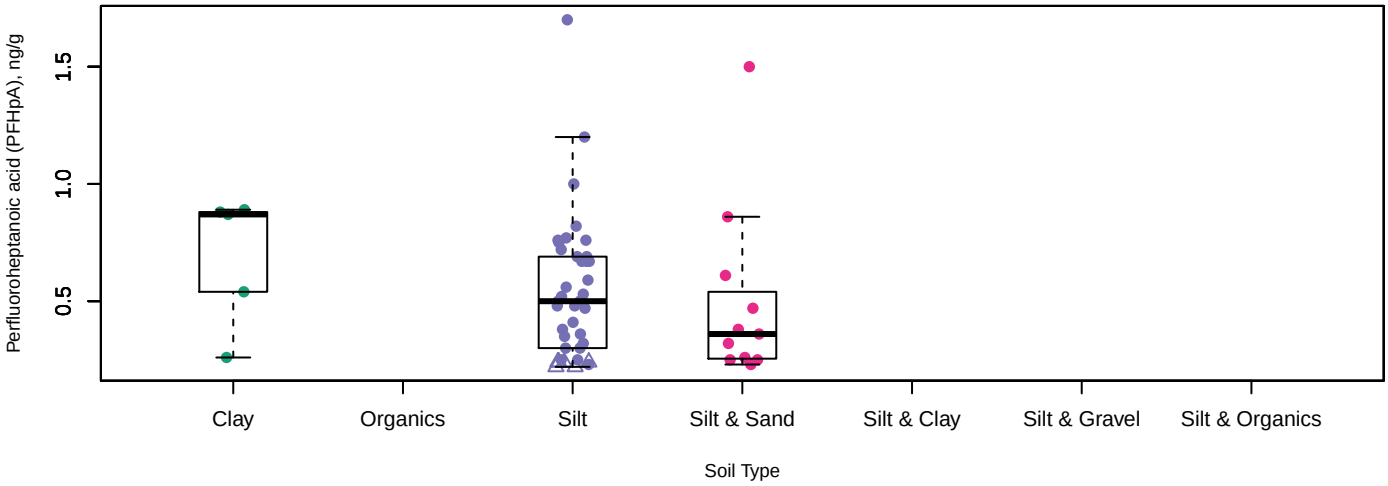


Perfluoroheptanoic acid (PFHpA)

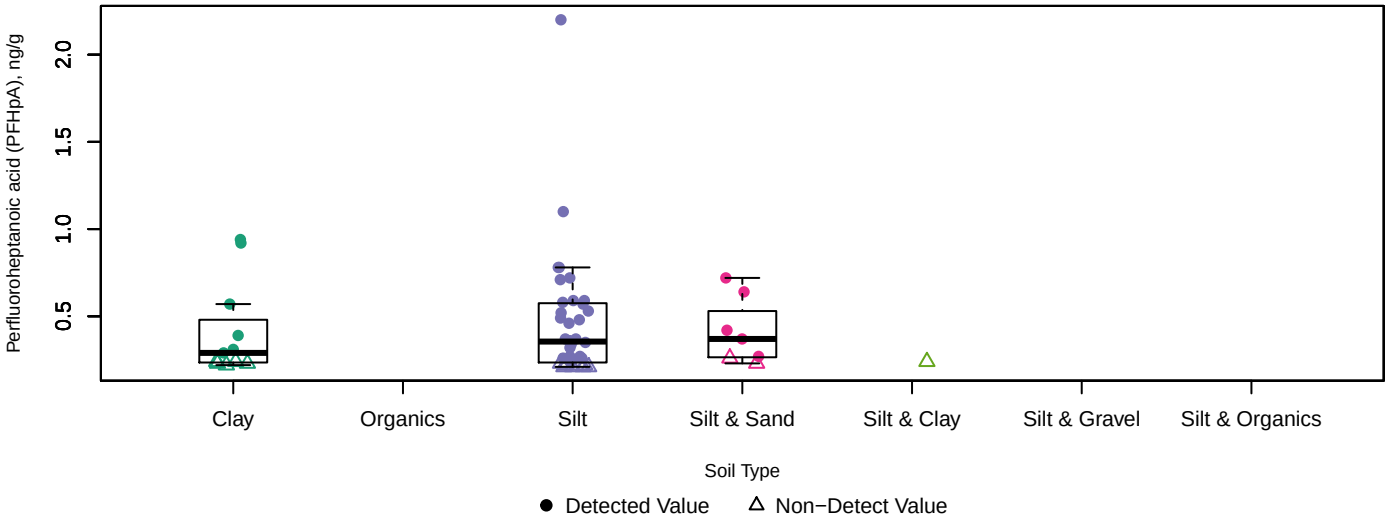
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

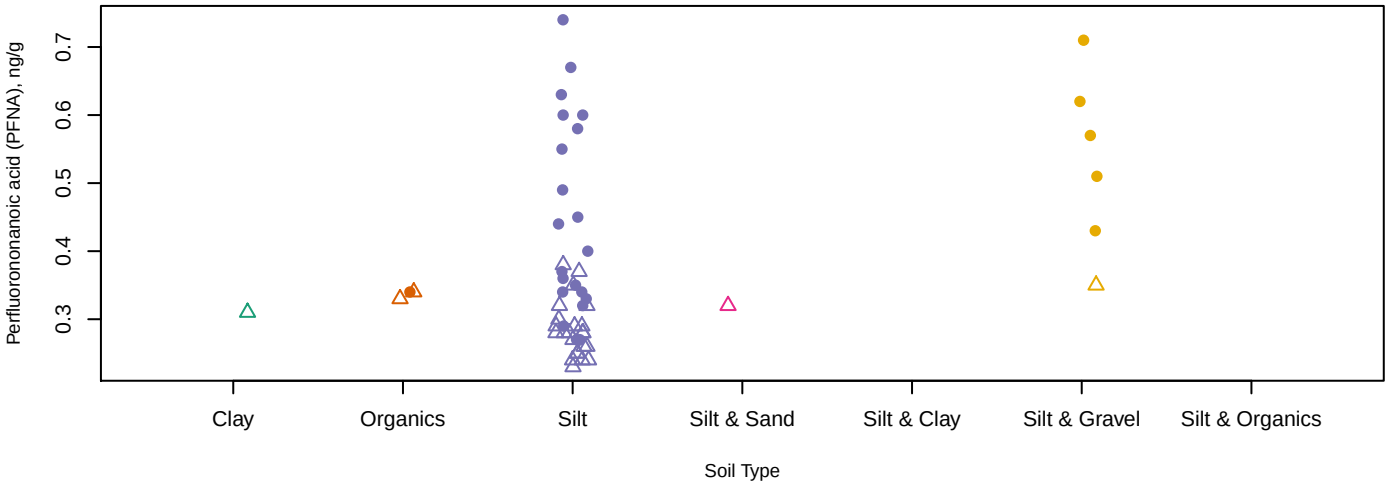


Sub−Surface Soil (1 − 2 feet)

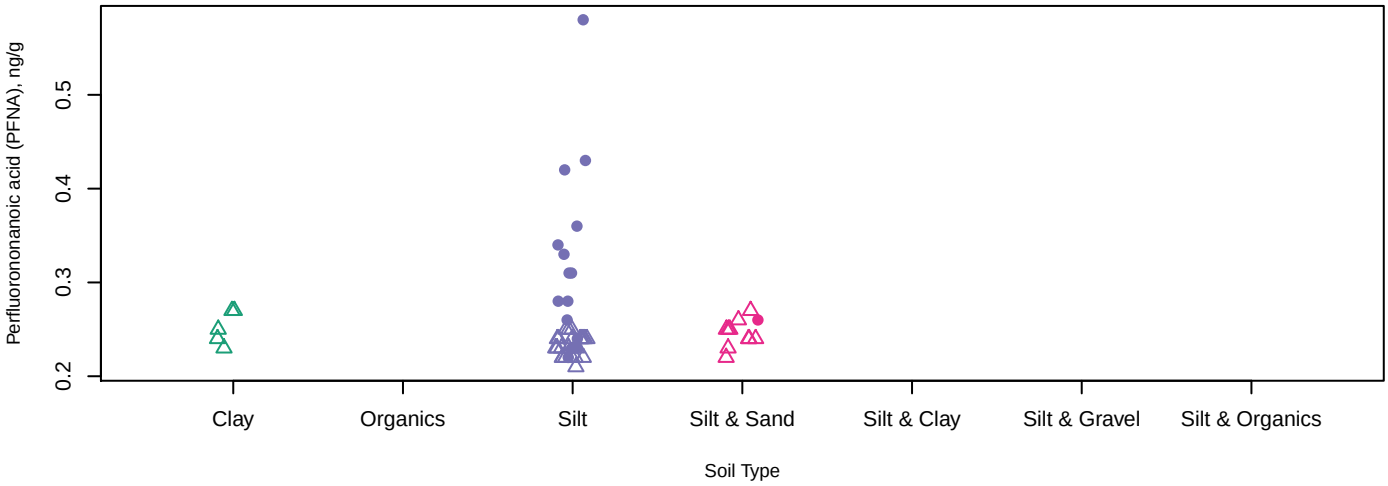


Perfluorononanoic acid (PFNA)

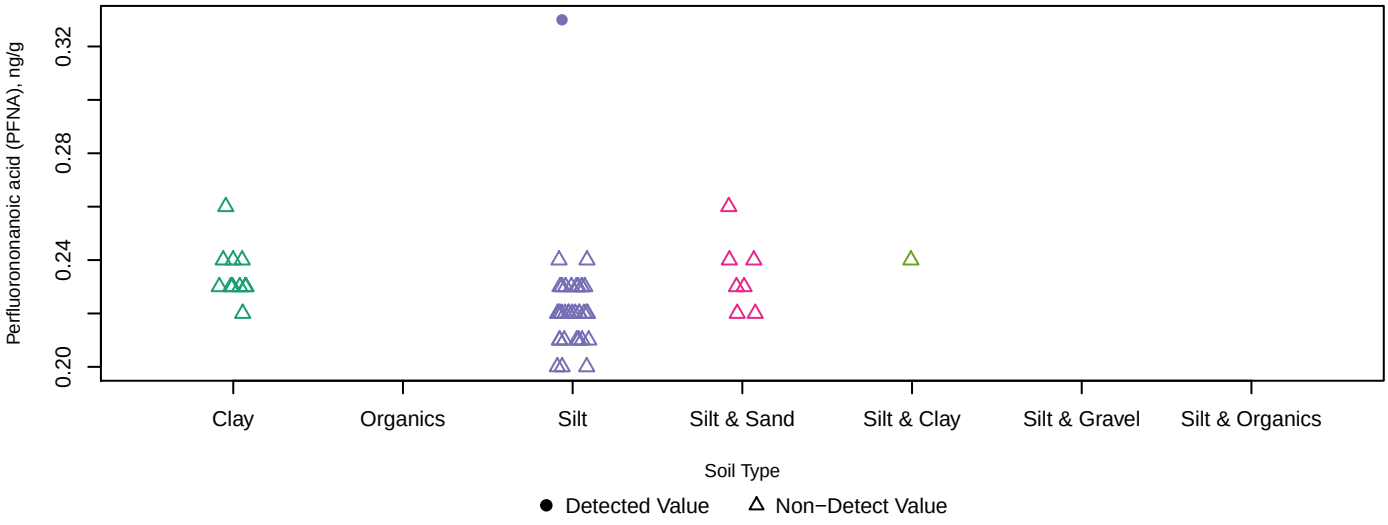
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

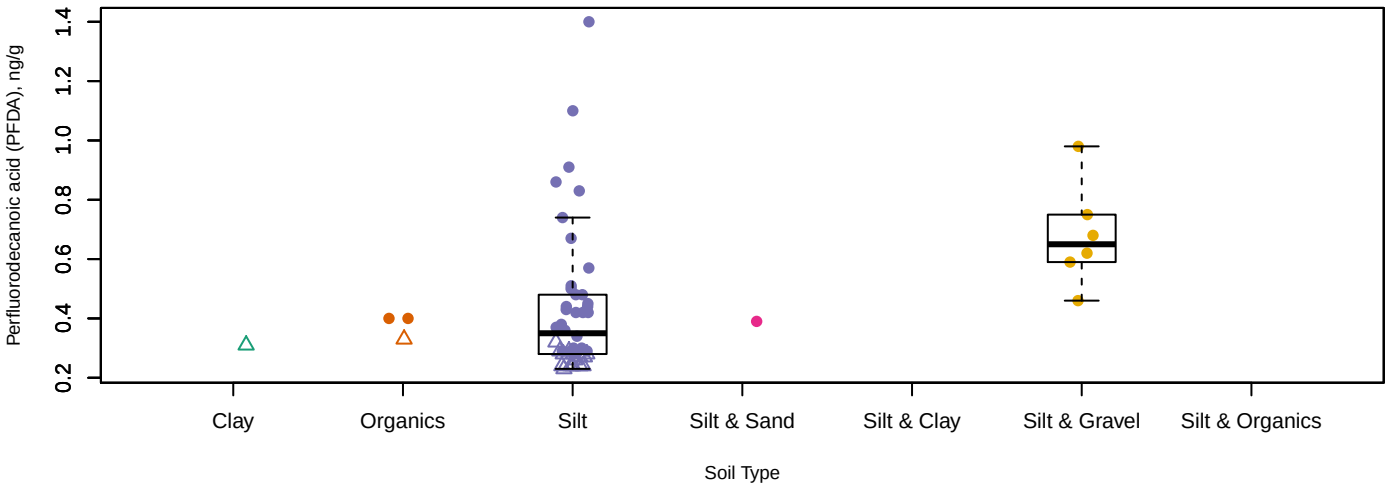


Sub−Surface Soil (1 − 2 feet)

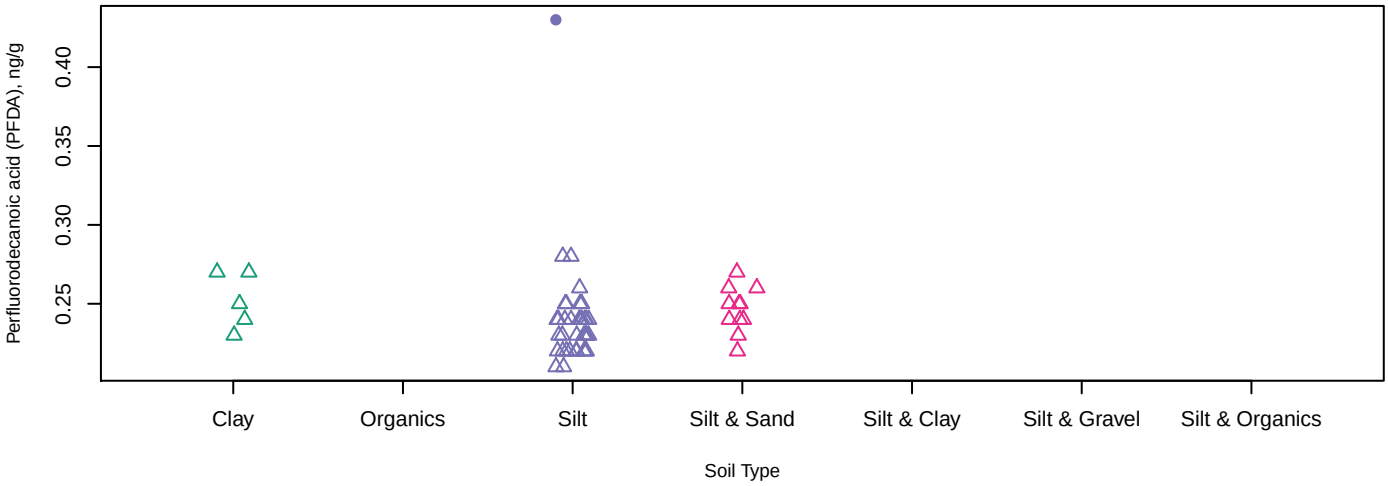


Perfluorodecanoic acid (PFDA)

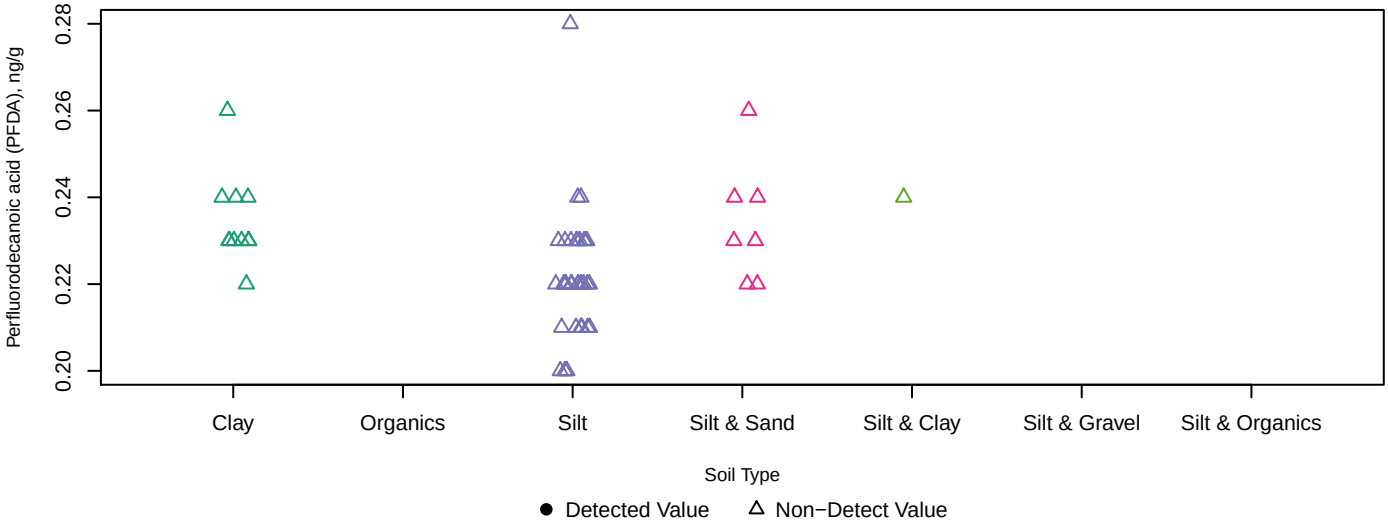
Surface Soil (0 − 0.17 feet)



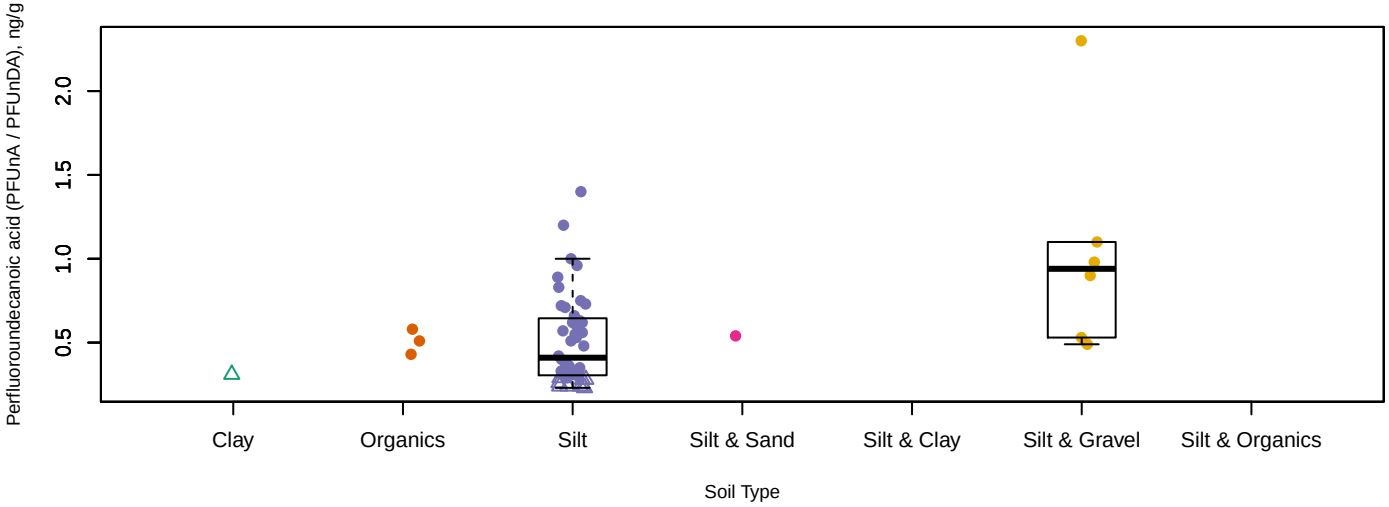
Near Surface Soil (0.17 − 1 foot)

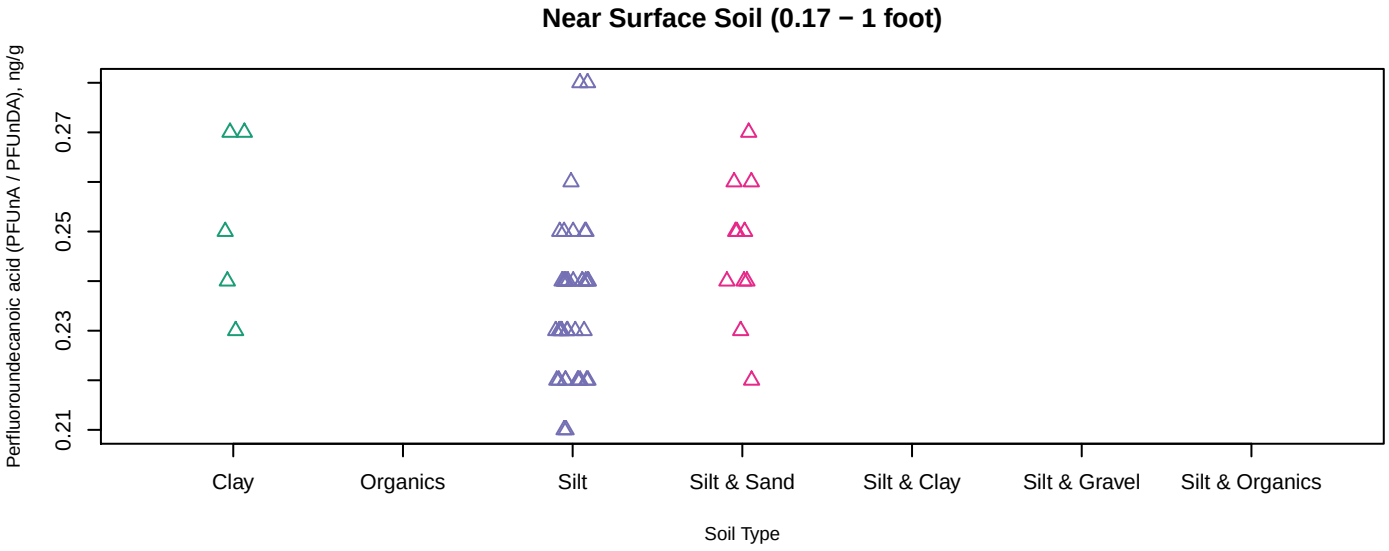


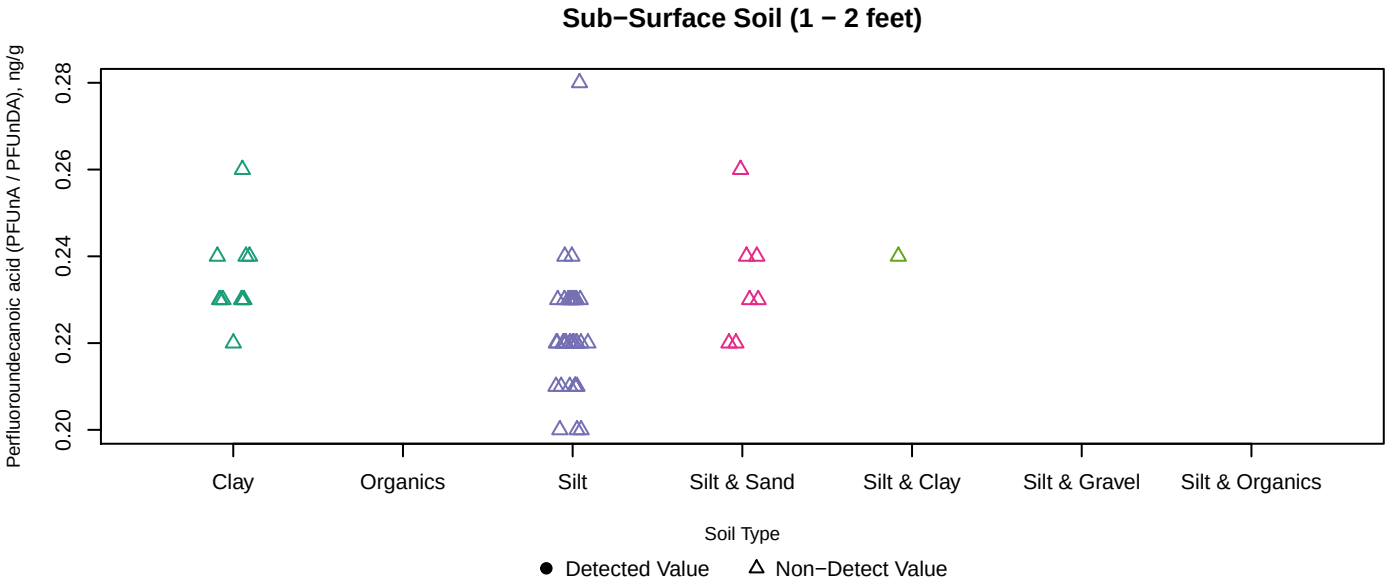
Sub−Surface Soil (1 − 2 feet)



Perfluoroundecanoic acid (PFUnA / PFUnDA)

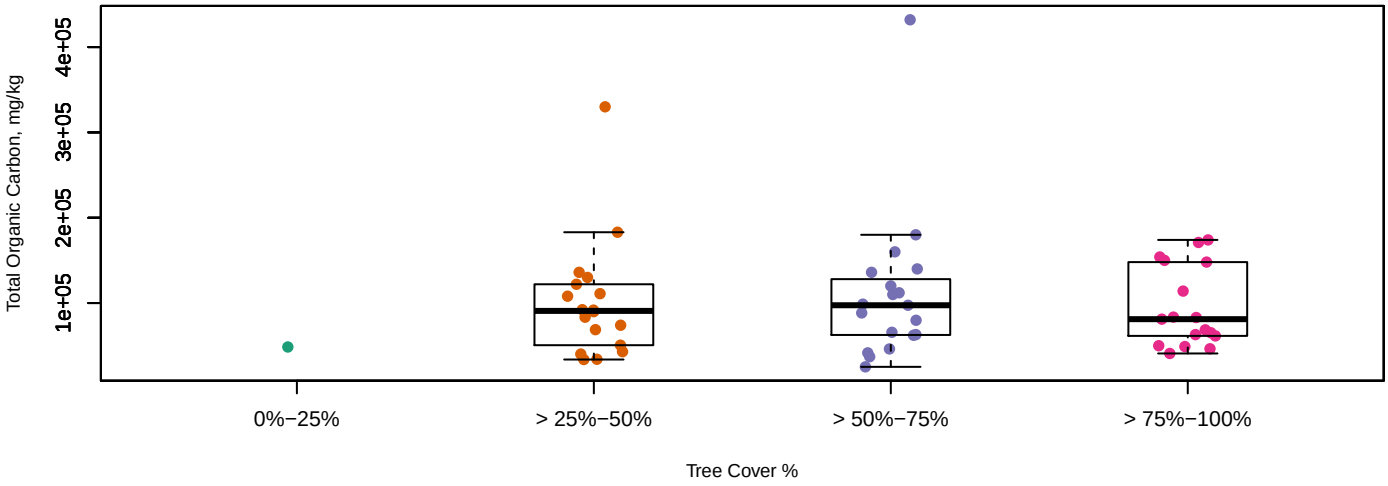




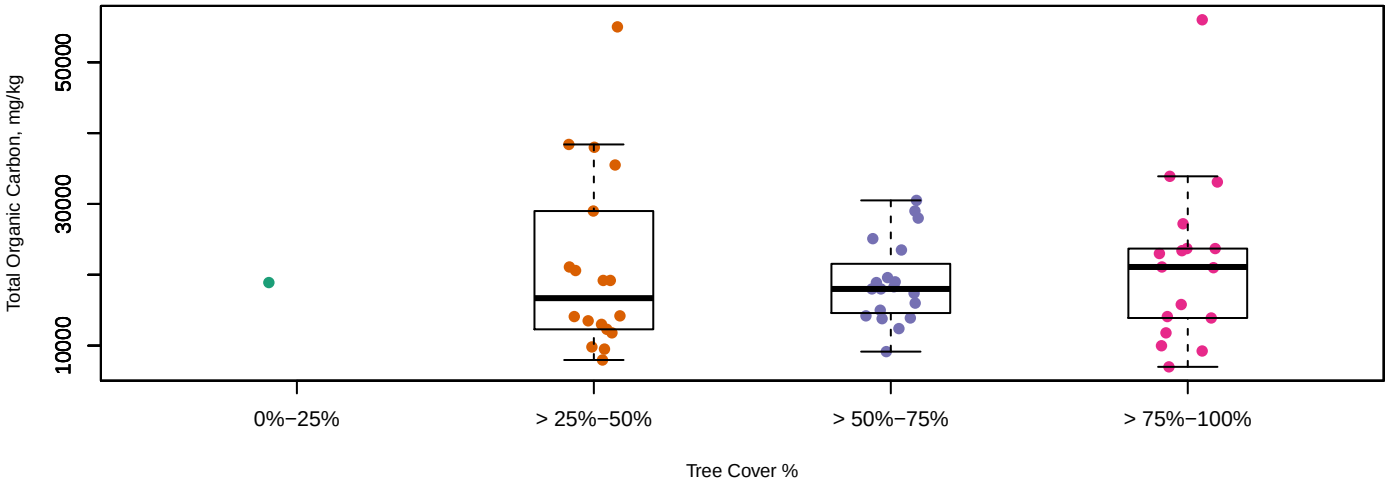


Total Organic Carbon

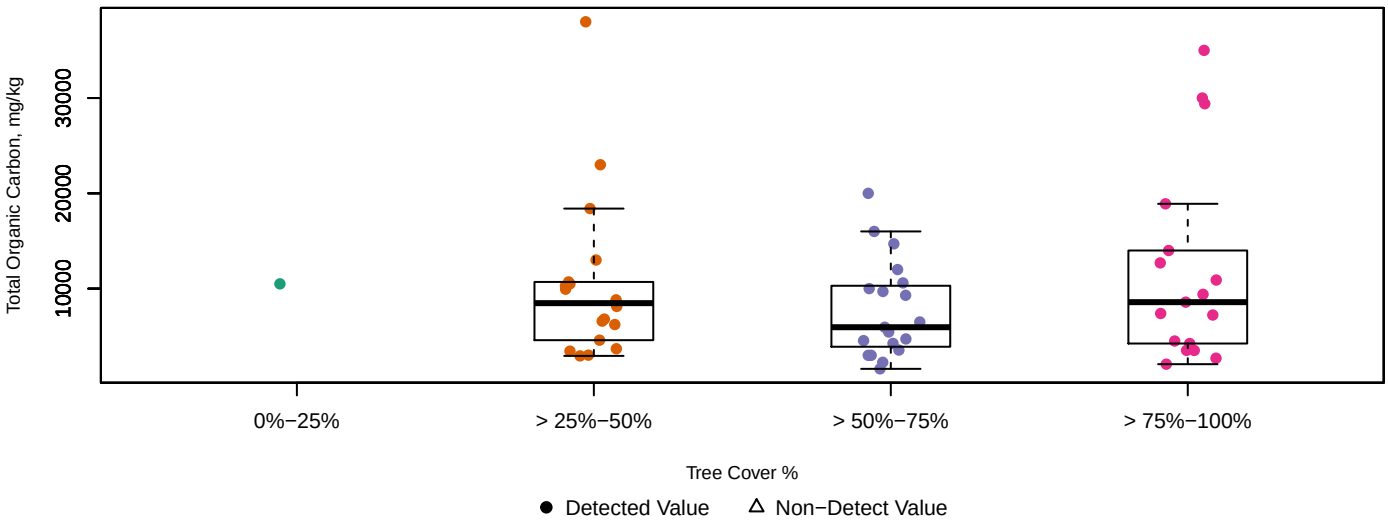
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

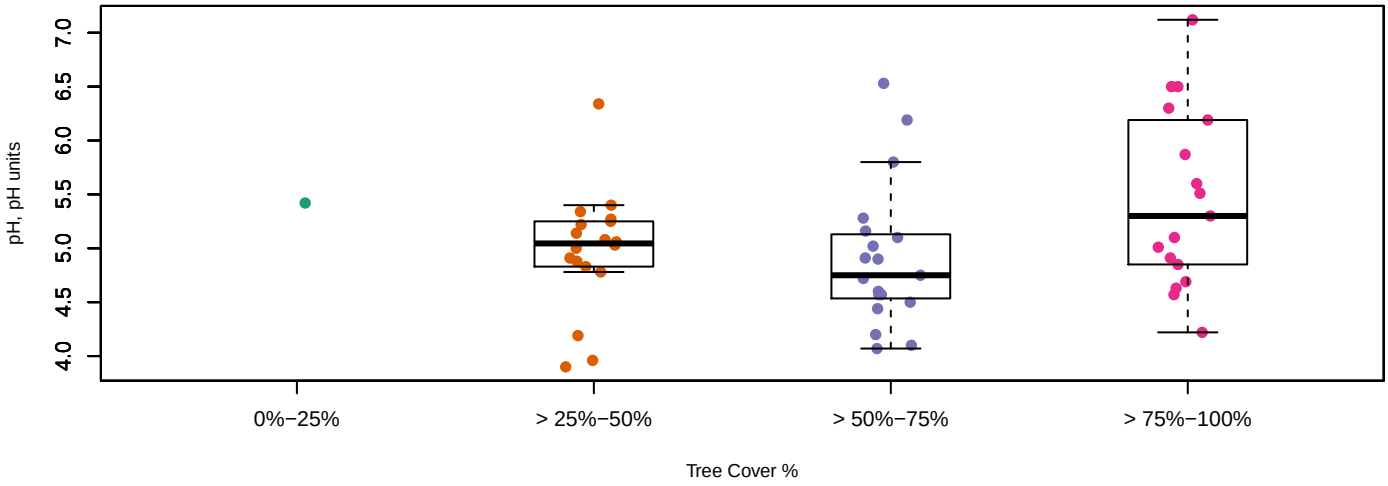


Sub−Surface Soil (1 − 2 feet)

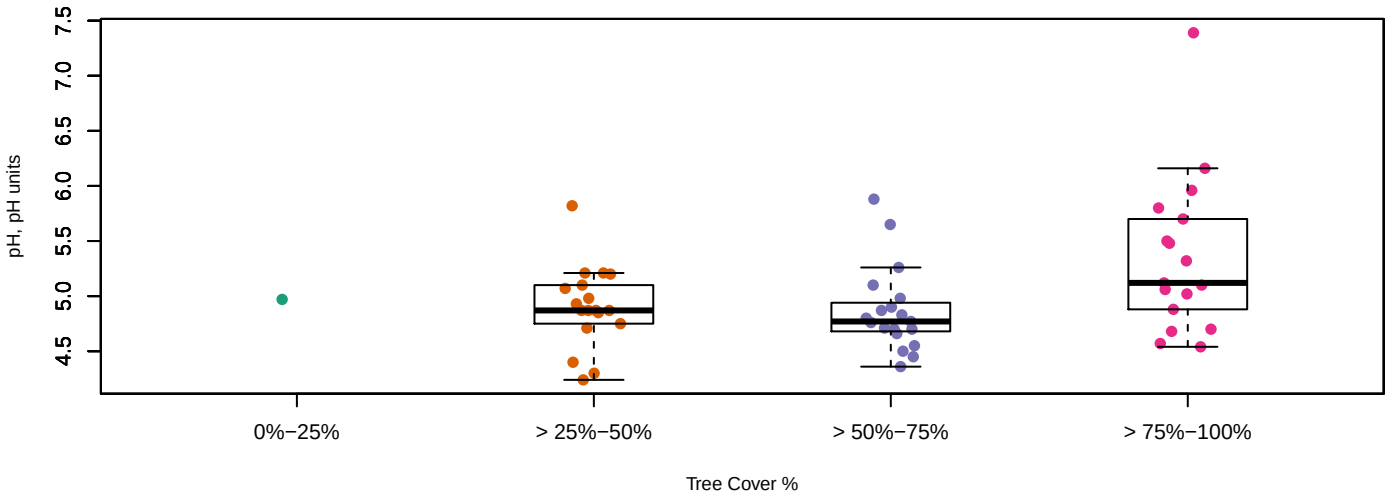


pH

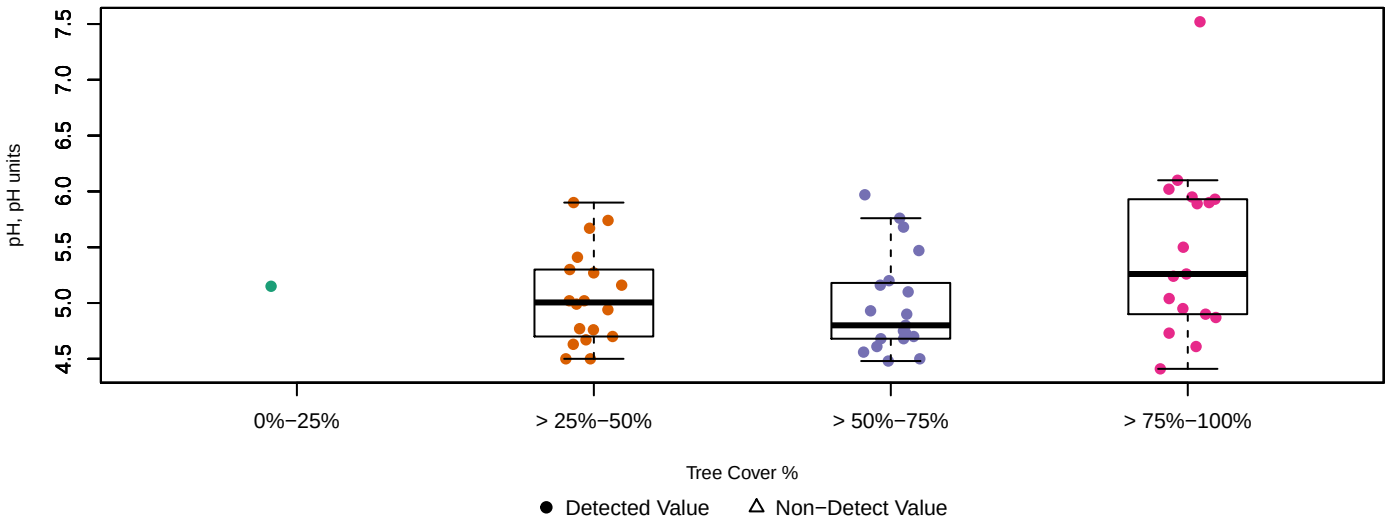
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

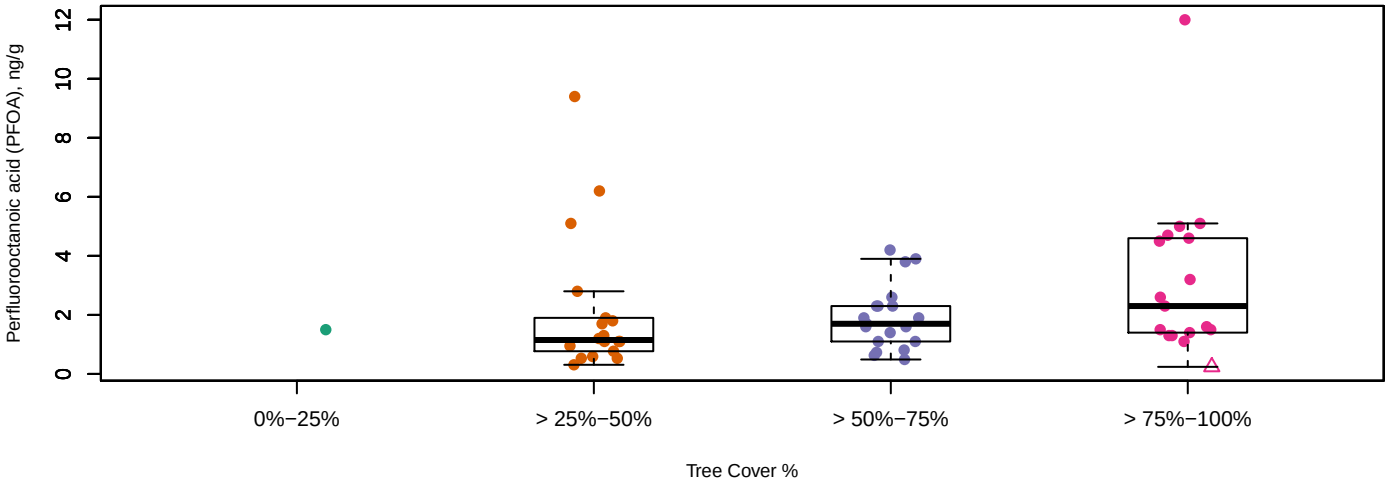


Sub−Surface Soil (1 − 2 feet)

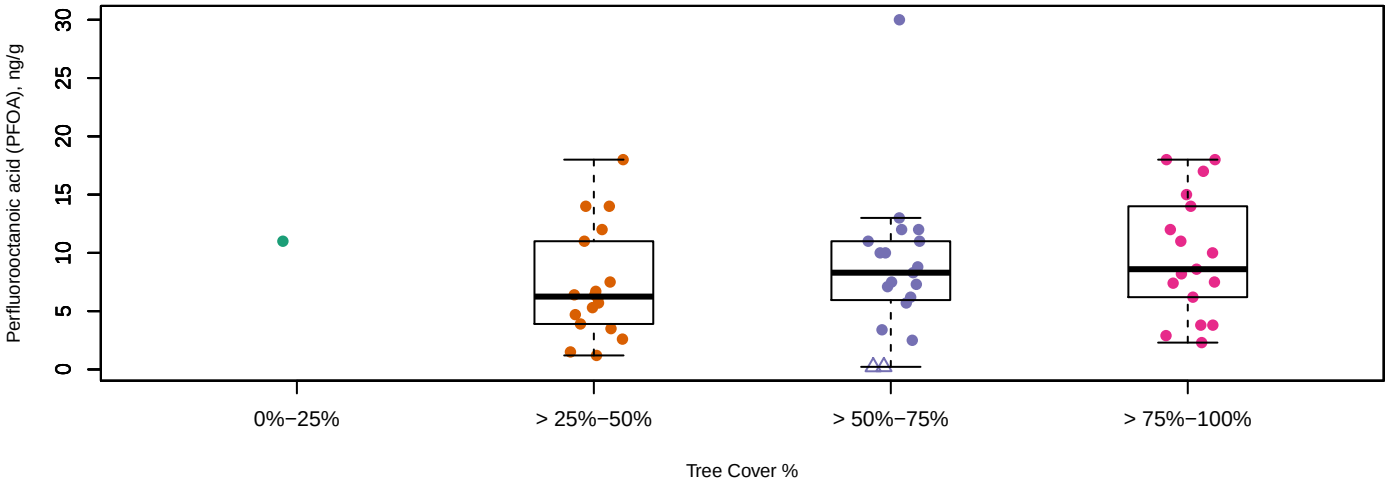


Perfluorooctanoic acid (PFOA)

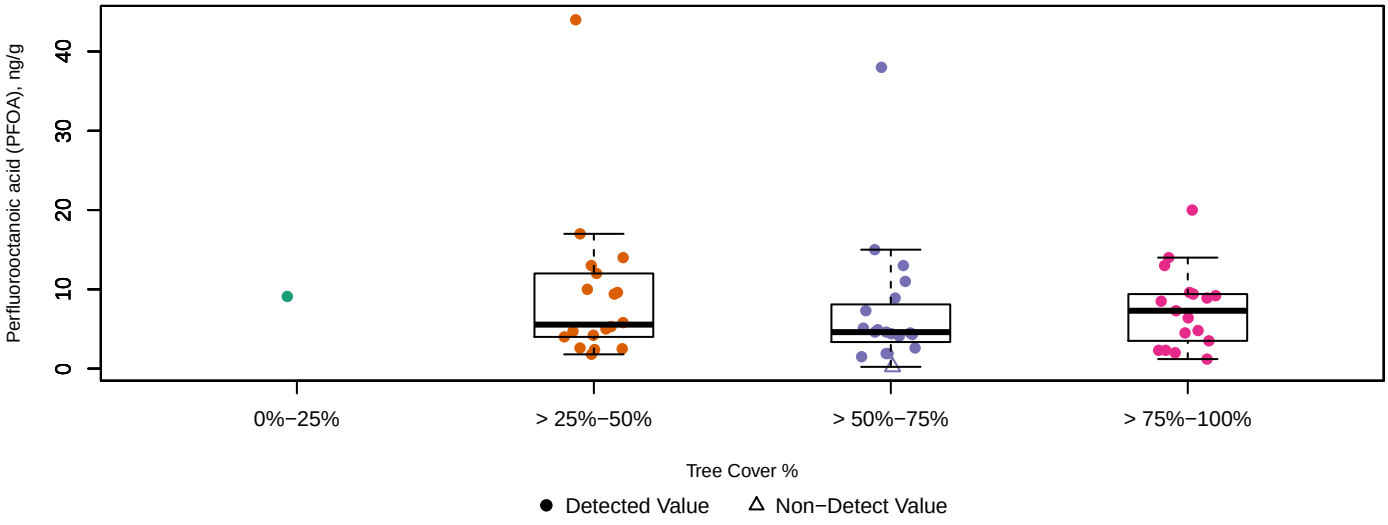
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

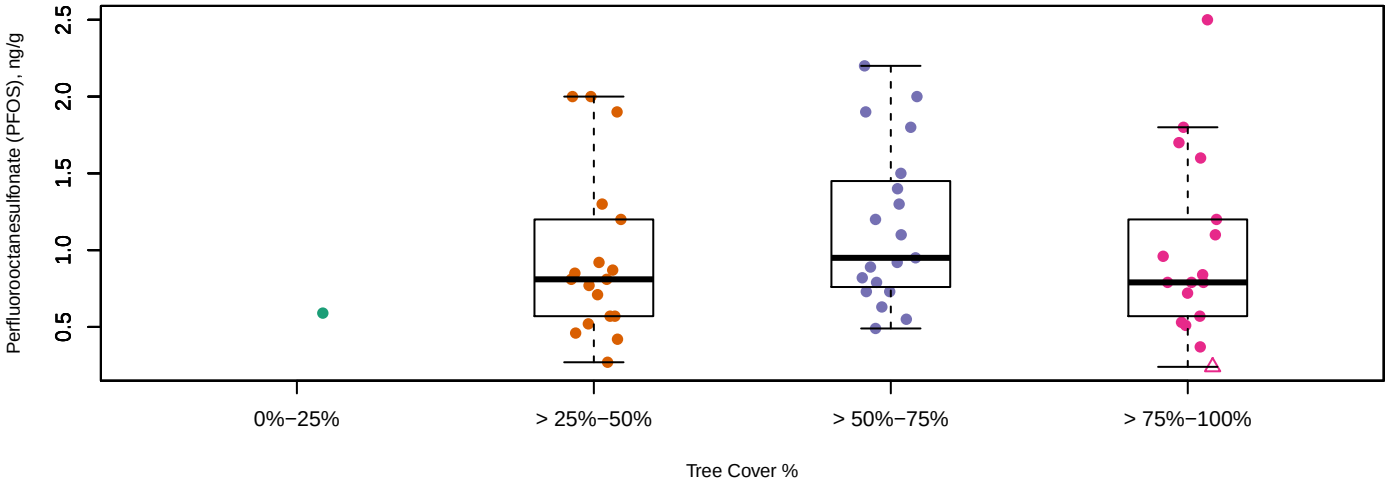


Sub−Surface Soil (1 − 2 feet)

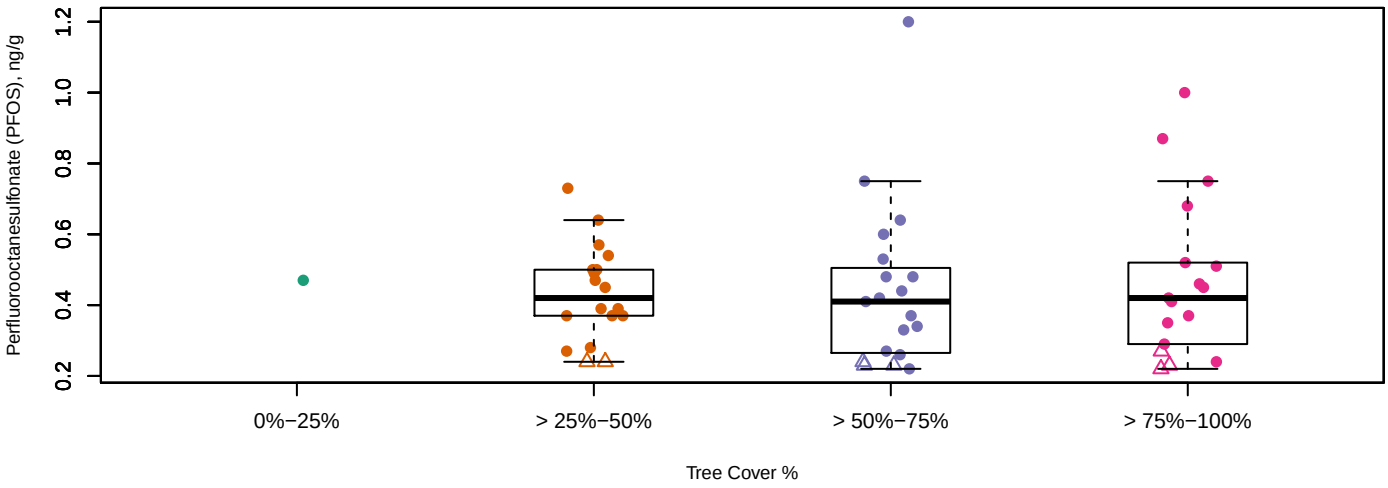


Perfluorooctanesulfonate (PFOS)

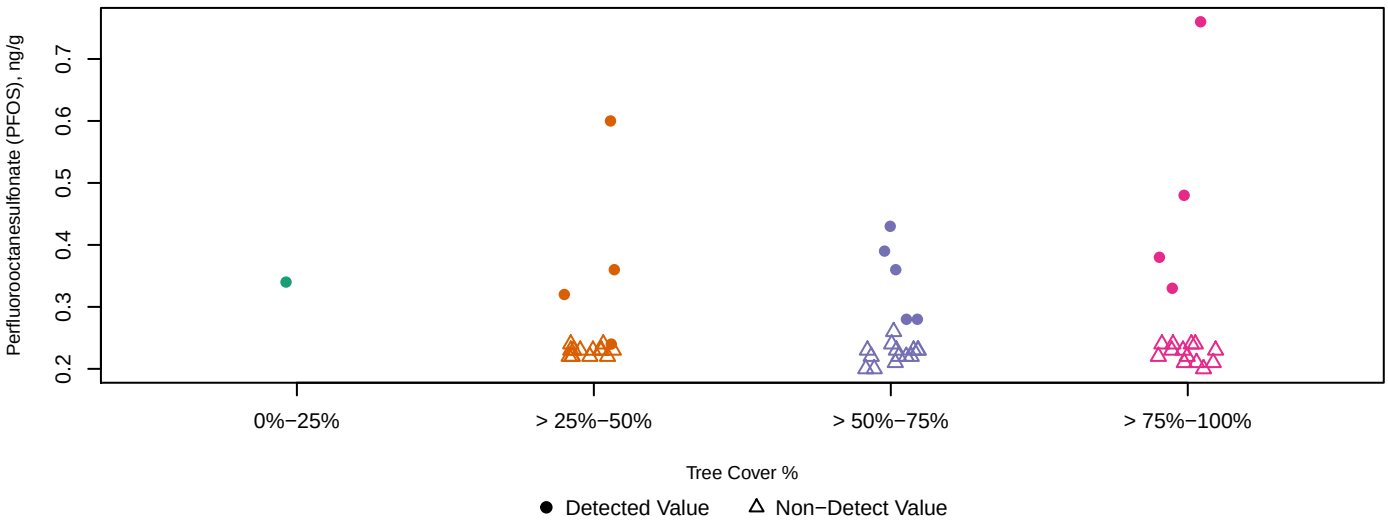
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

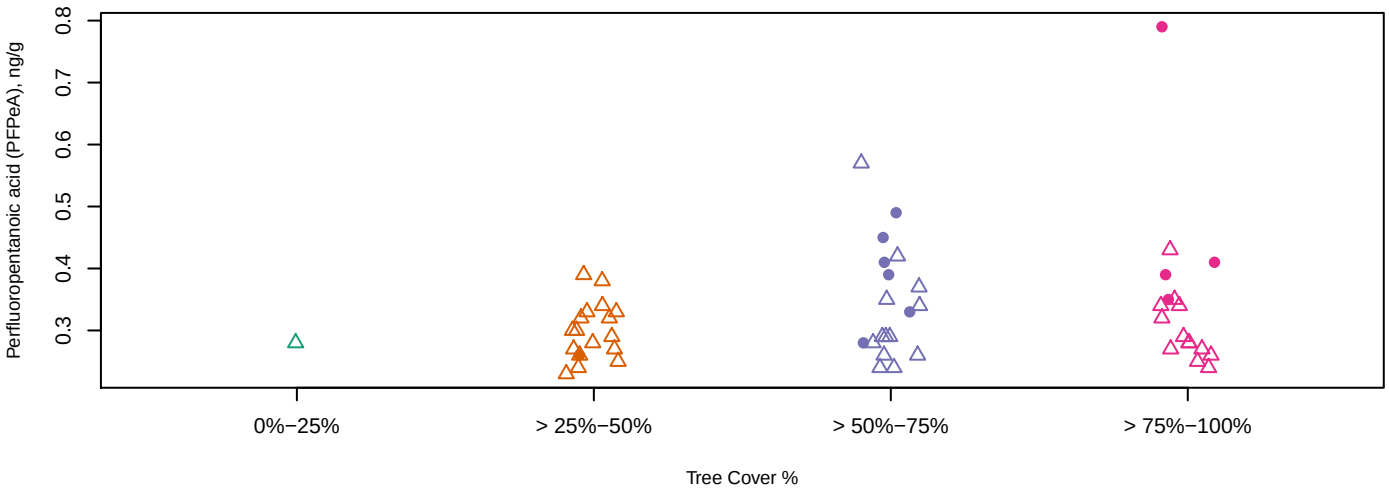


Sub−Surface Soil (1 − 2 feet)

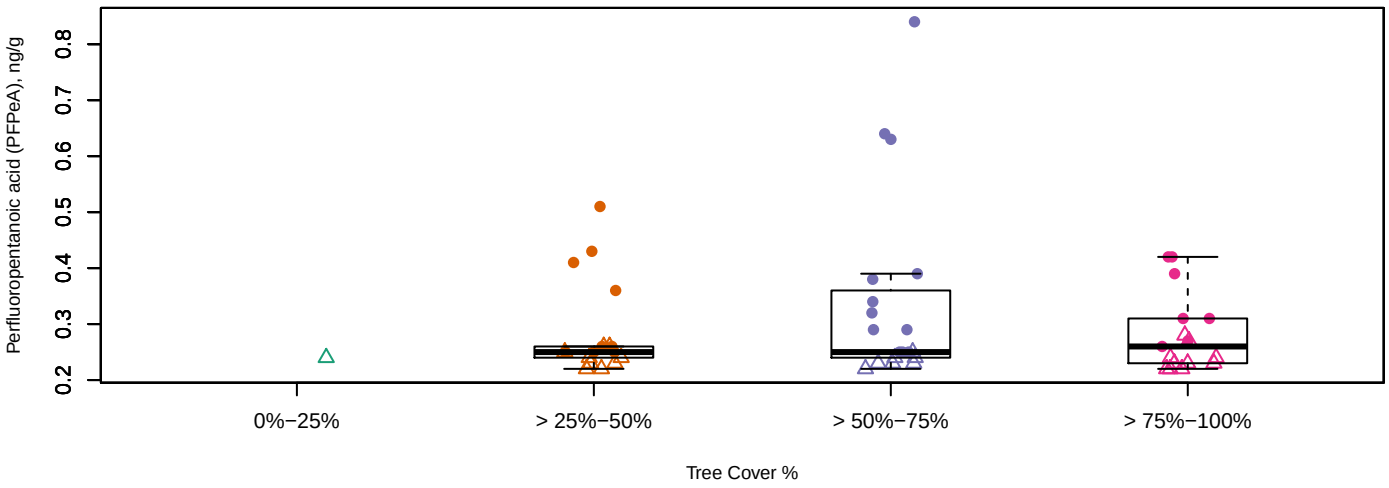


Perfluoropentanoic acid (PFPeA)

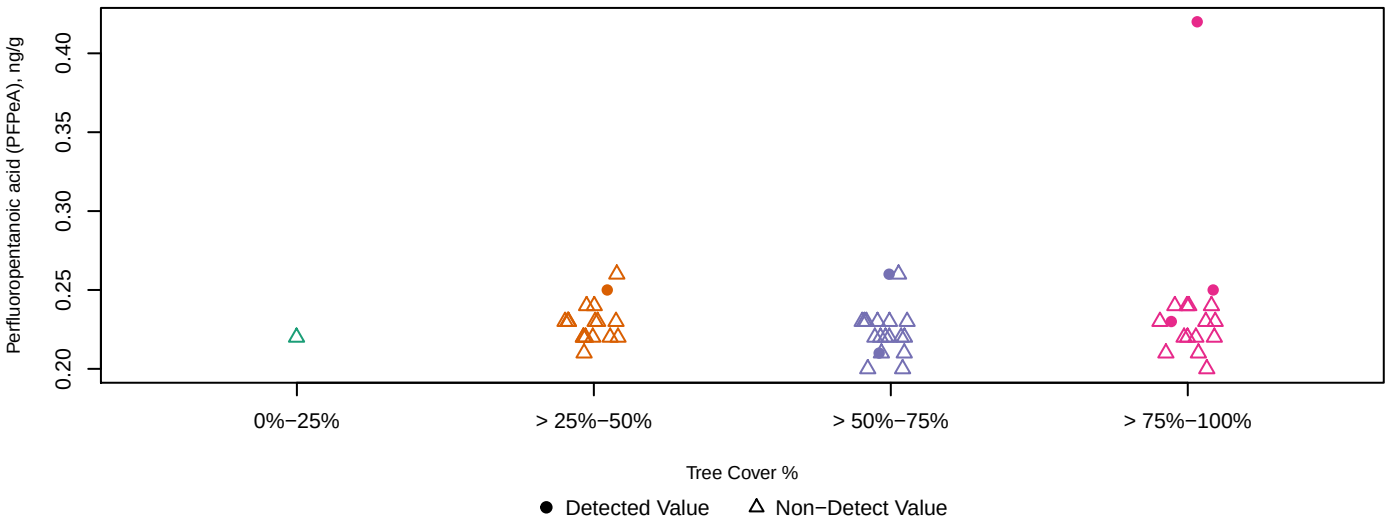
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

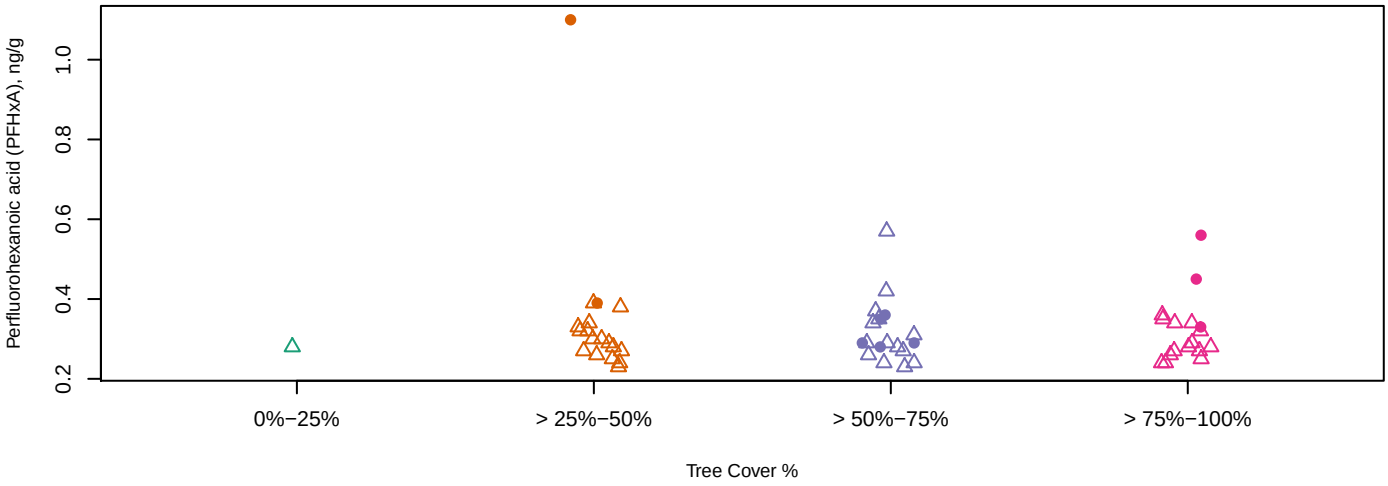


Sub−Surface Soil (1 − 2 feet)

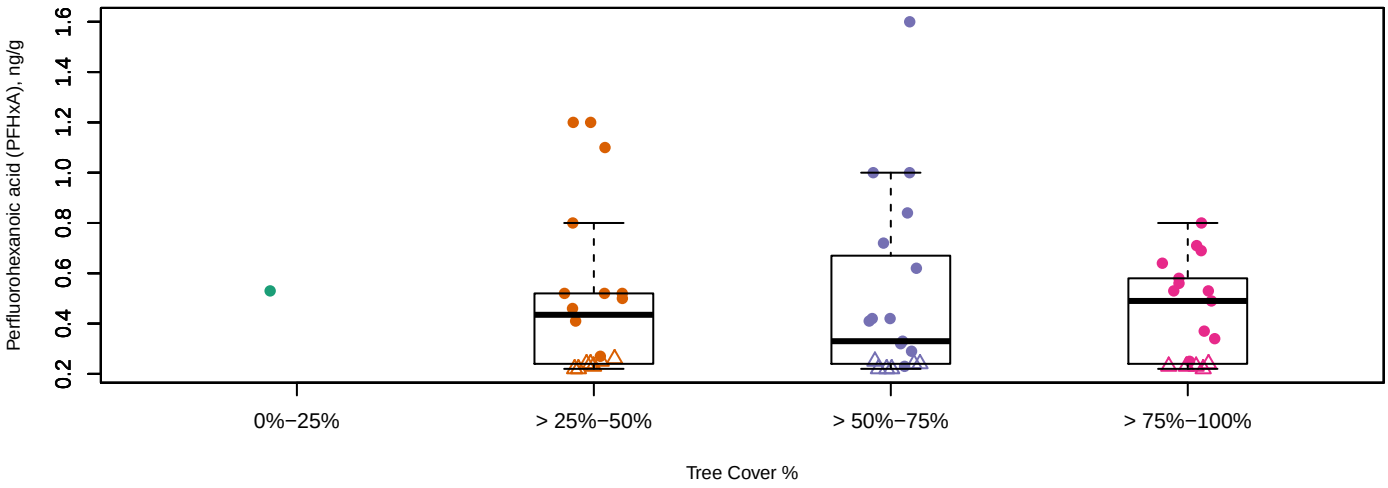


Perfluorohexanoic acid (PFHxA)

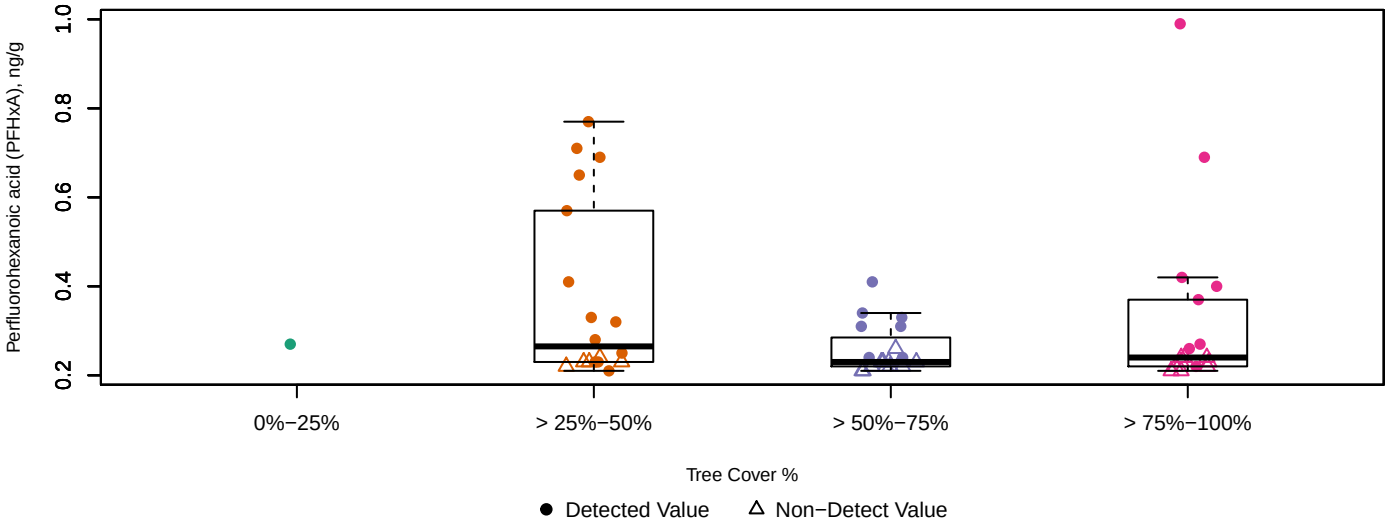
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

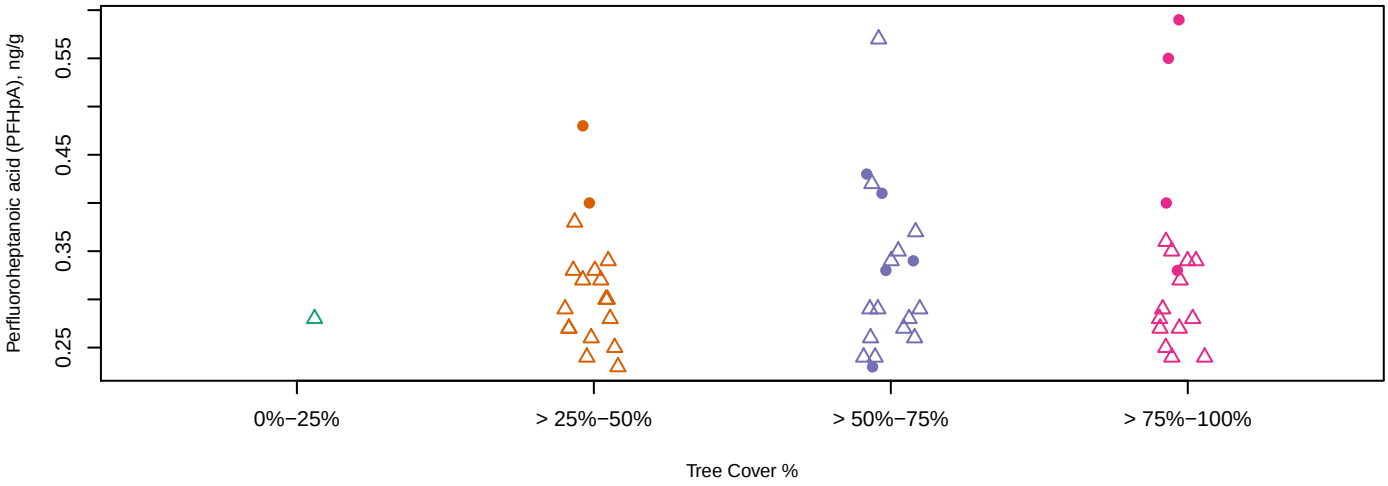


Sub−Surface Soil (1 − 2 feet)

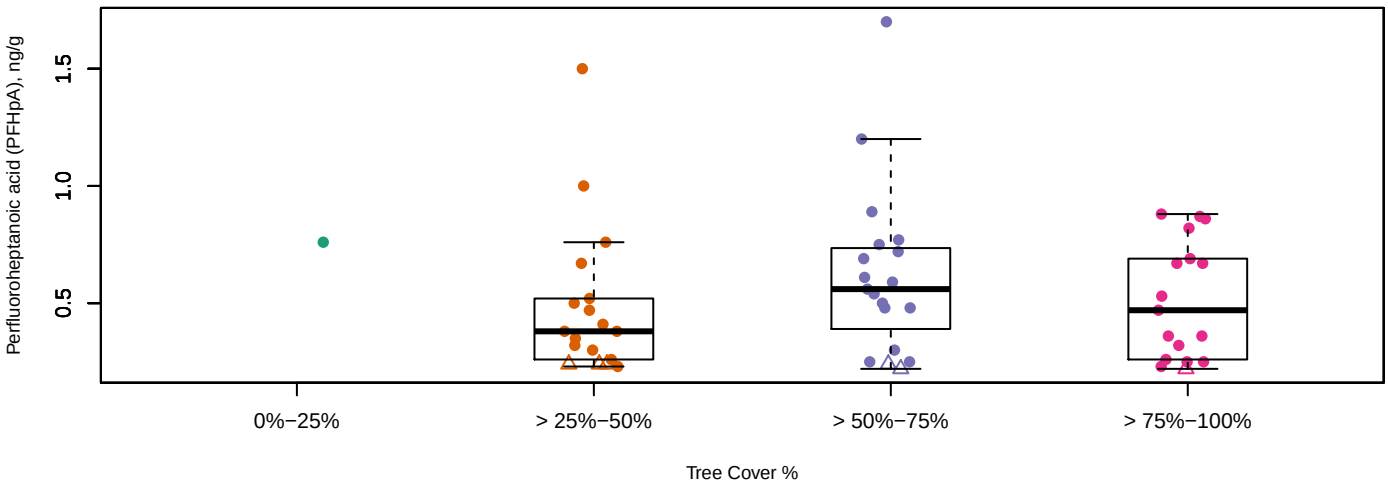


Perfluoroheptanoic acid (PFHpA)

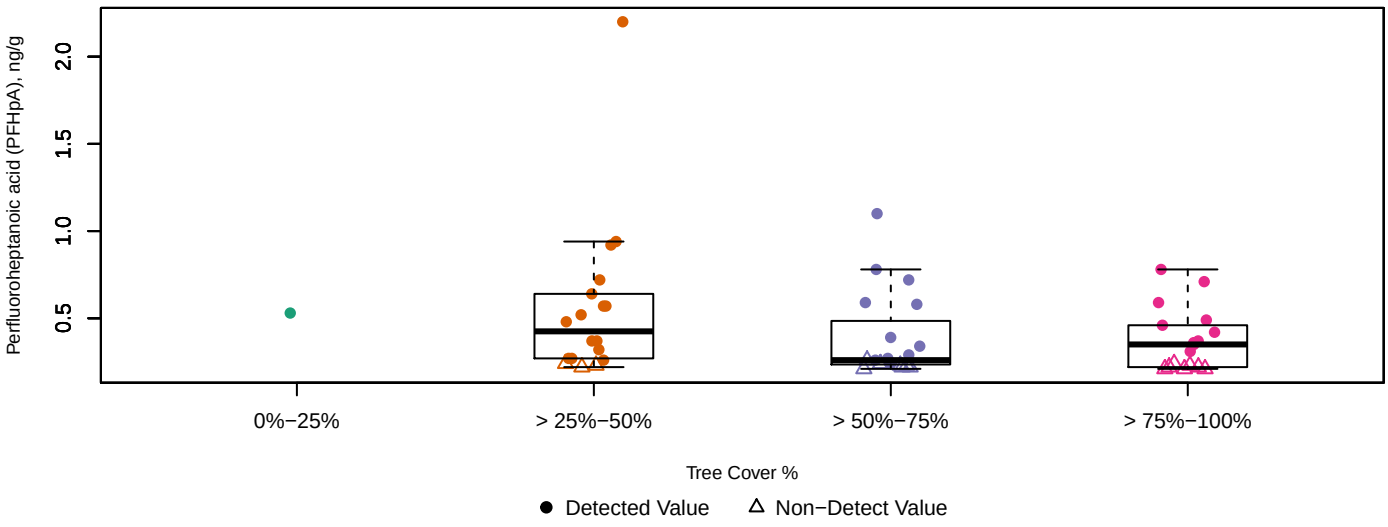
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

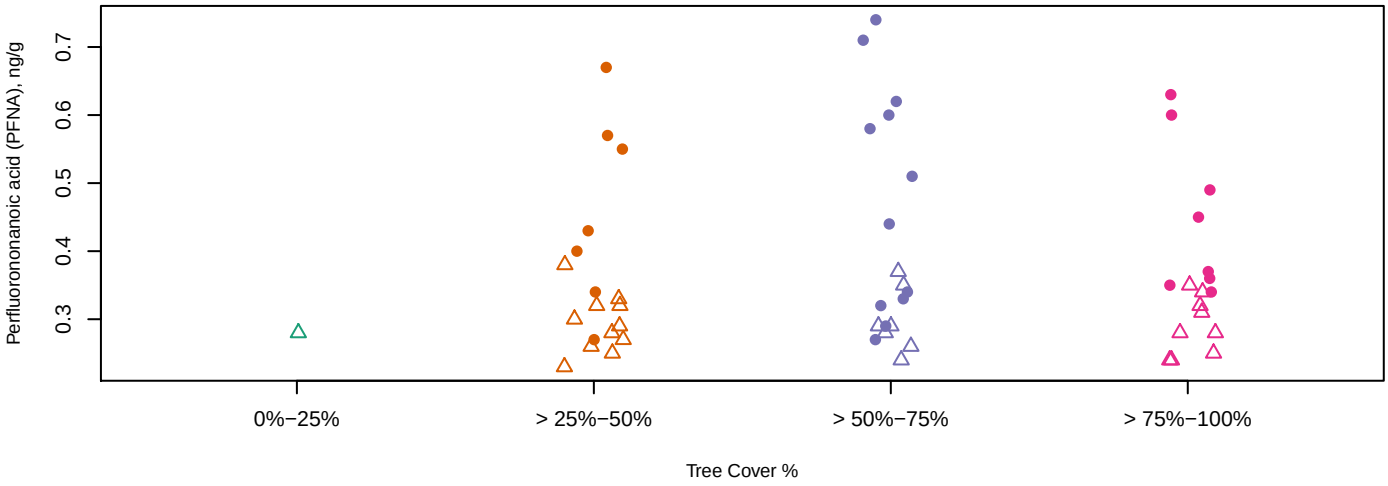


Sub−Surface Soil (1 − 2 feet)

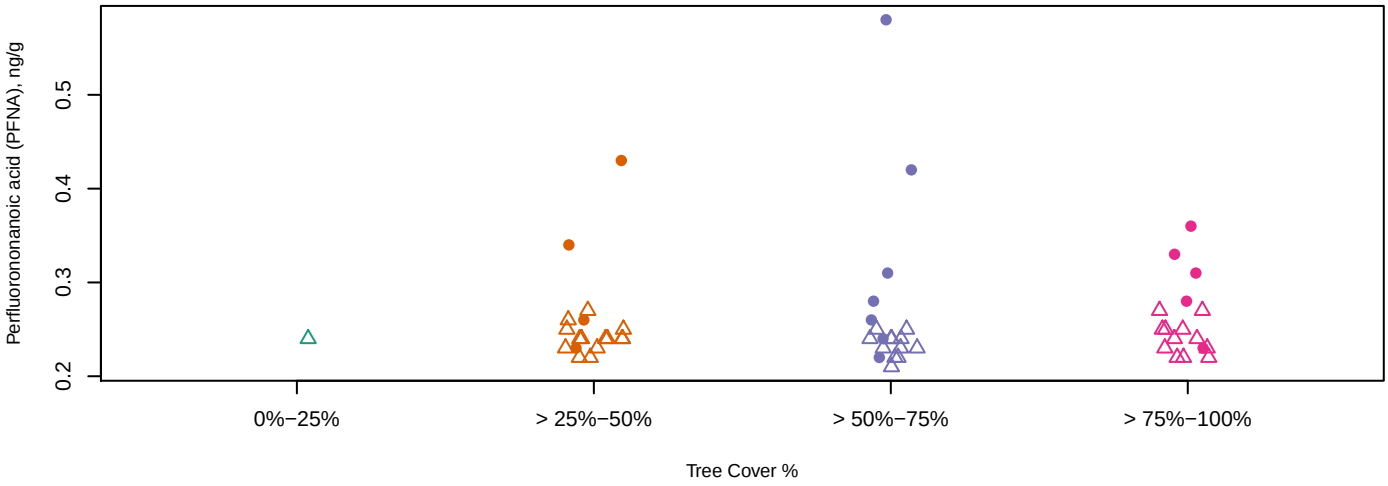


Perfluorononanoic acid (PFNA)

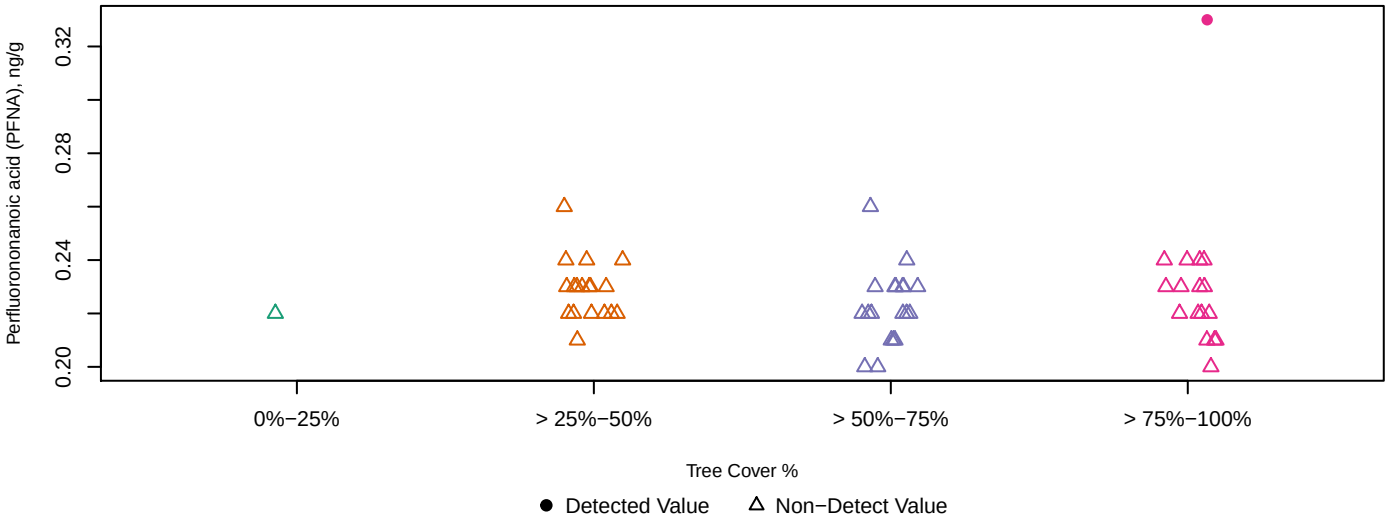
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

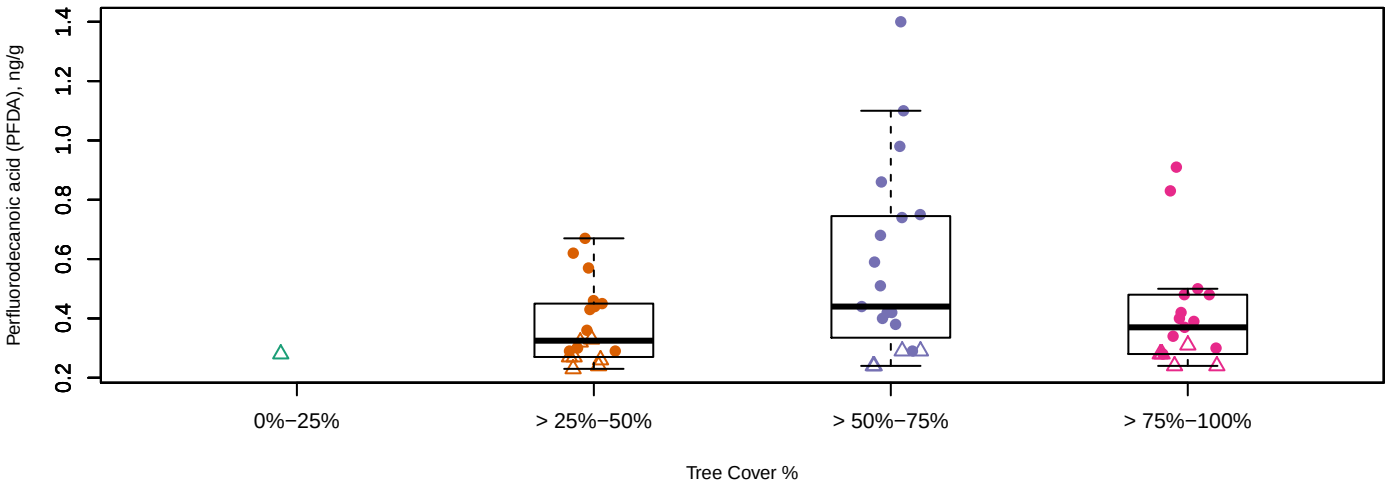


Sub−Surface Soil (1 − 2 feet)

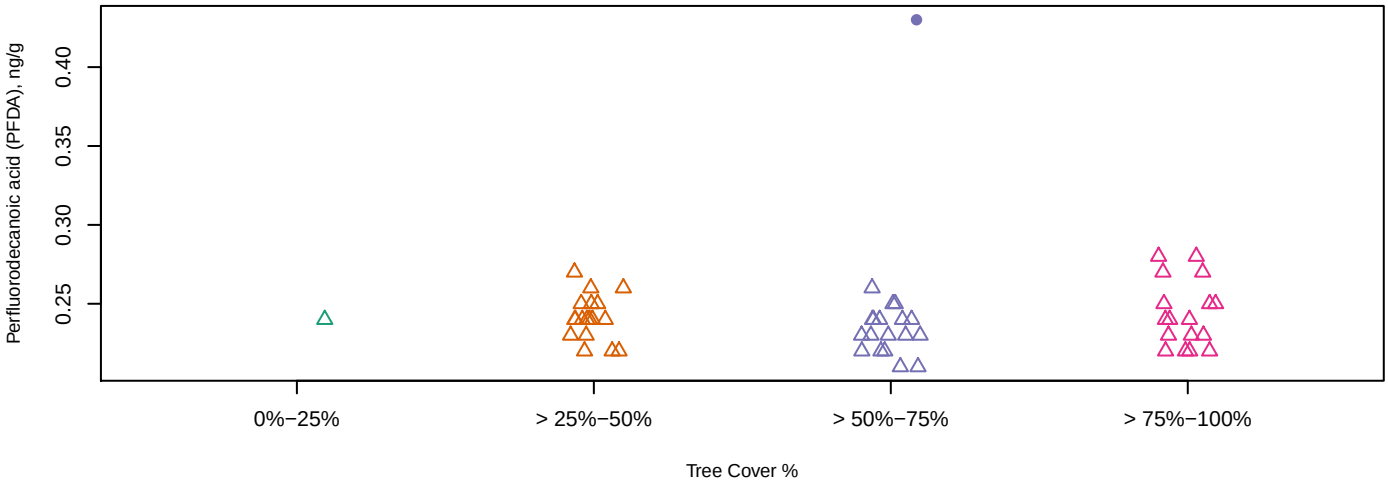


Perfluorodecanoic acid (PFDA)

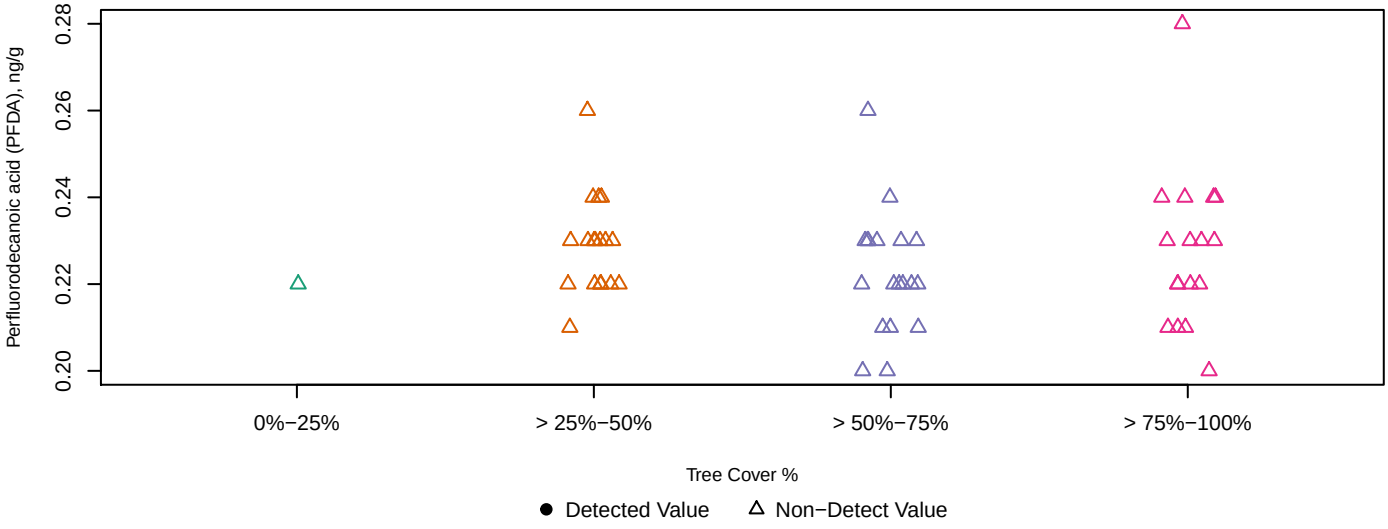
Surface Soil (0 − 0.17 feet)



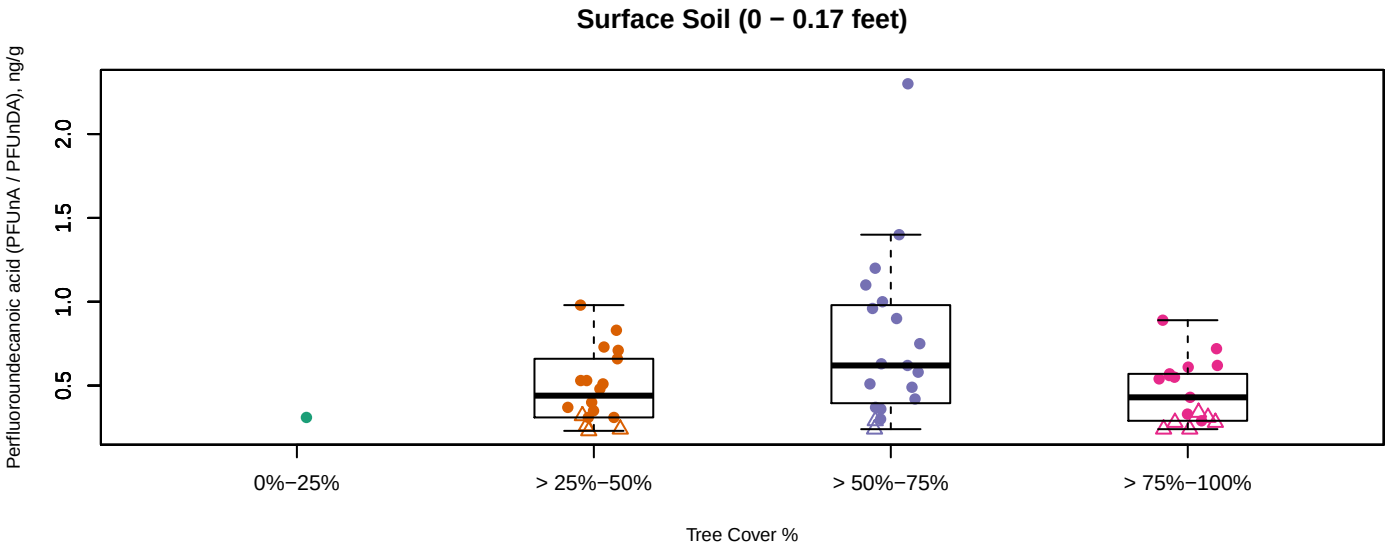
Near Surface Soil (0.17 − 1 foot)

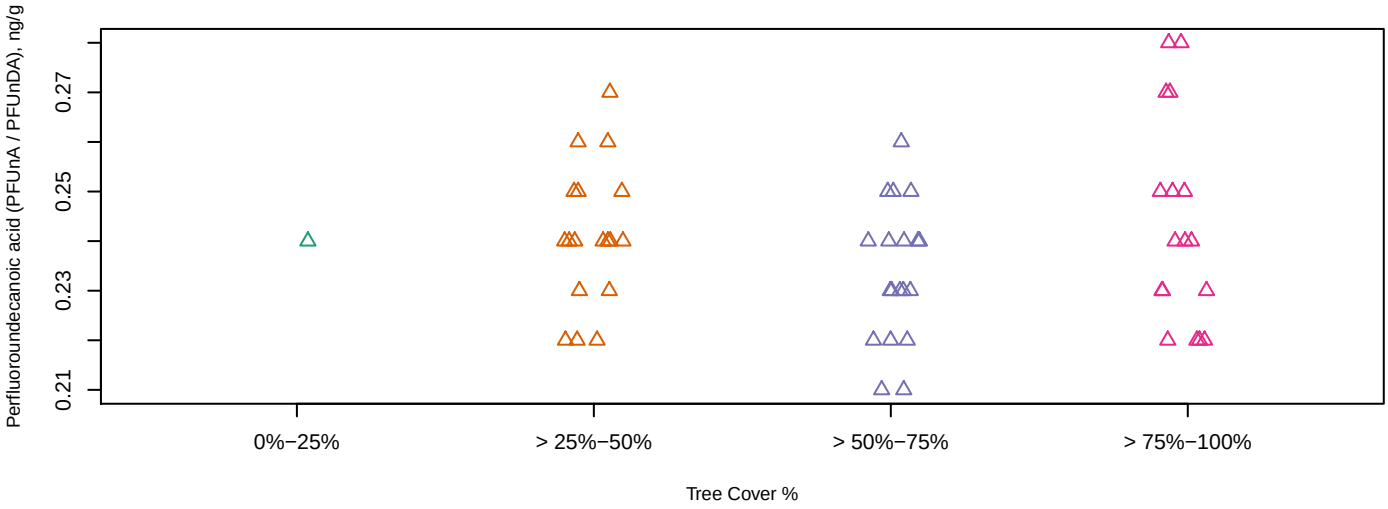


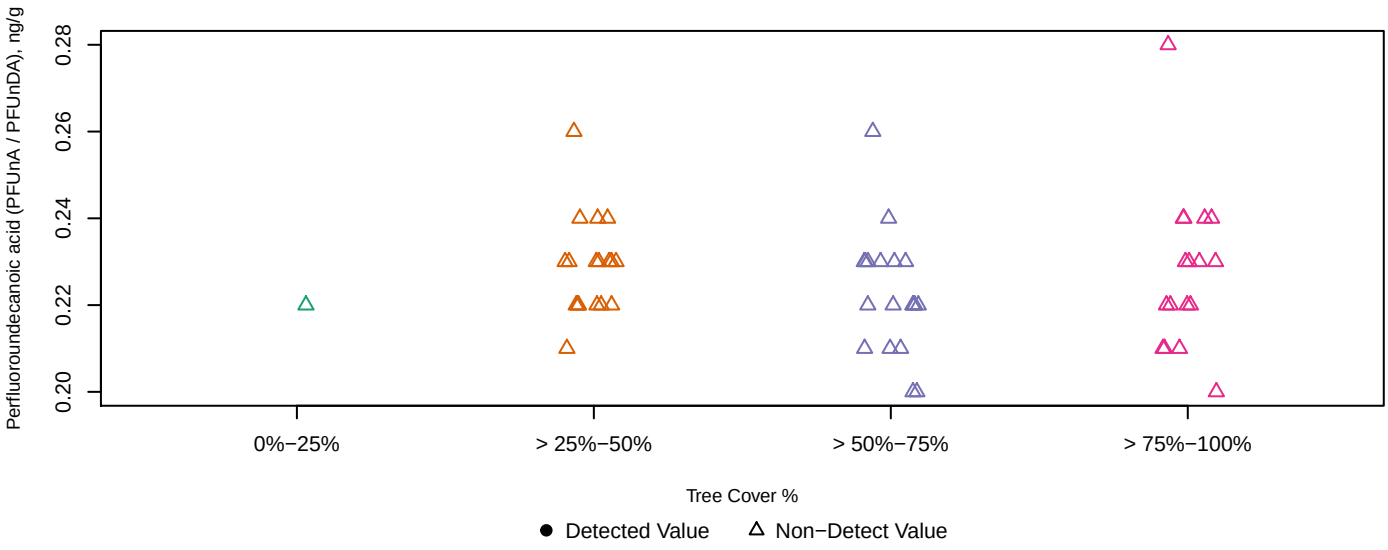
Sub−Surface Soil (1 − 2 feet)



Perfluoroundecanoic acid (PFUnA / PFUnDA)

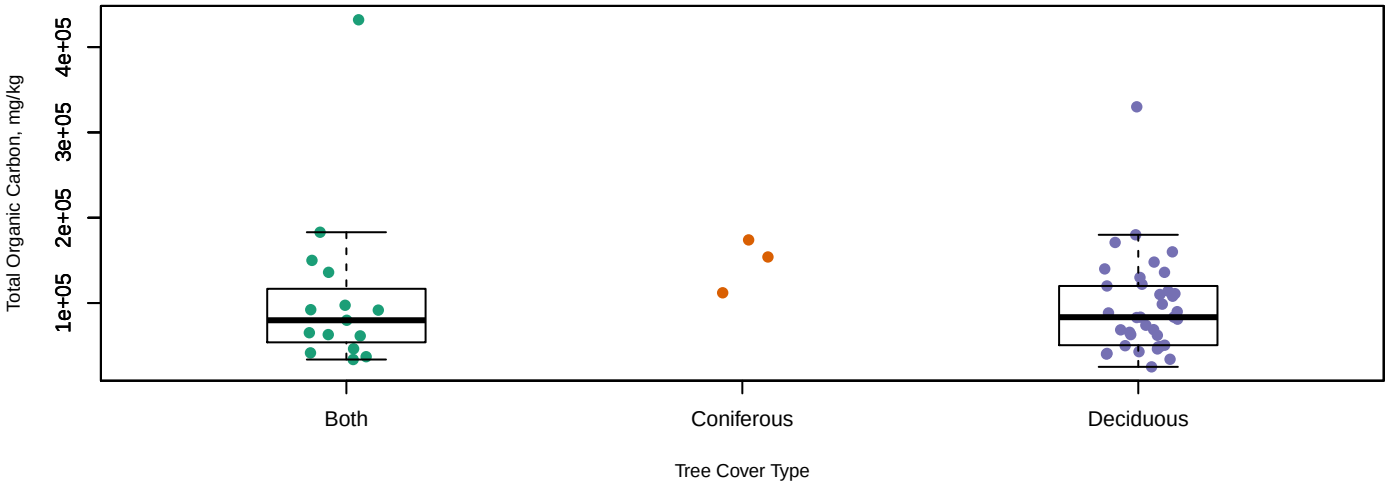




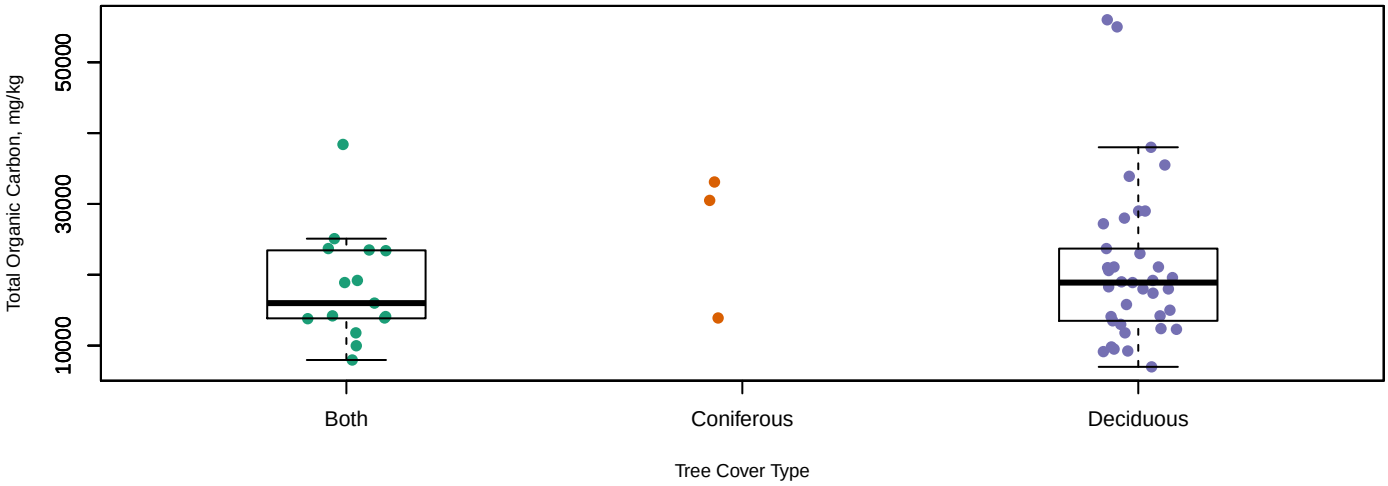


Total Organic Carbon

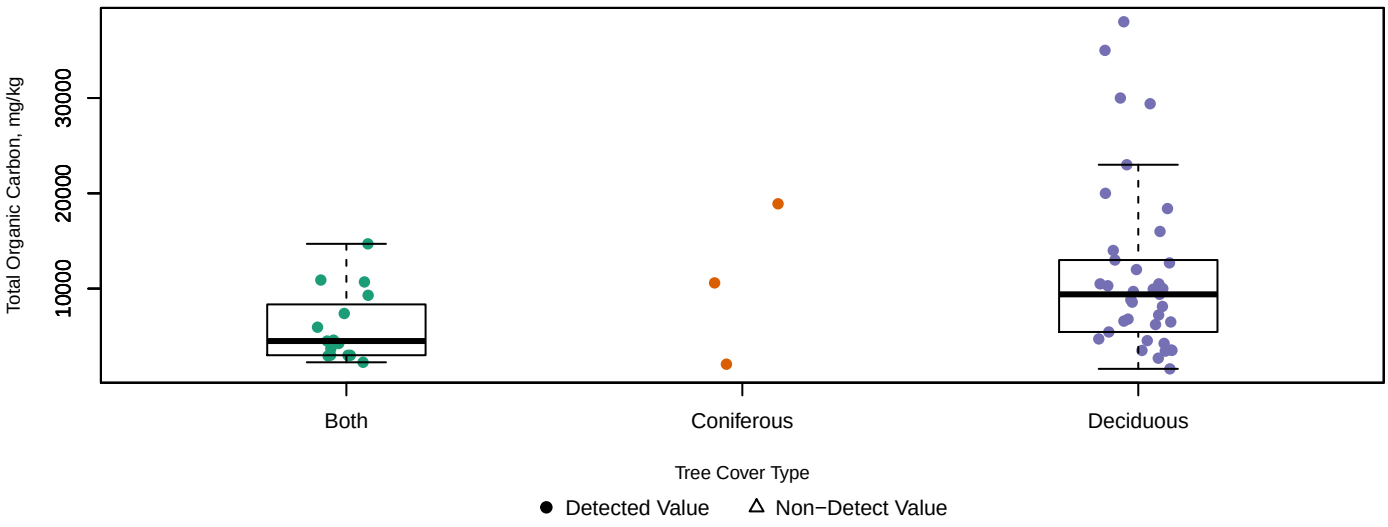
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

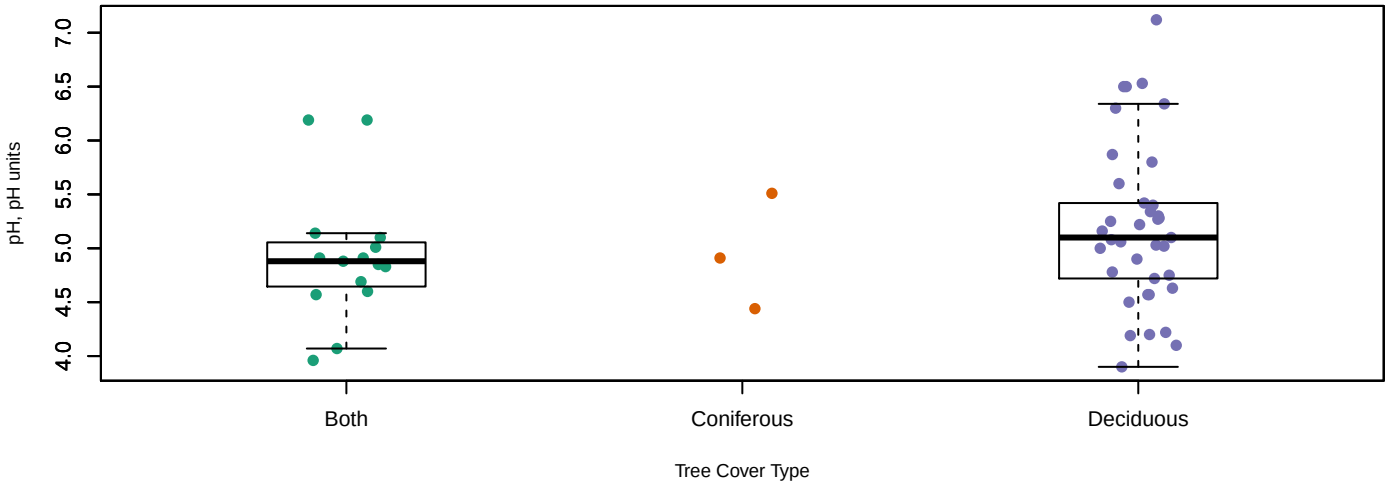


Sub−Surface Soil (1− 2 feet)

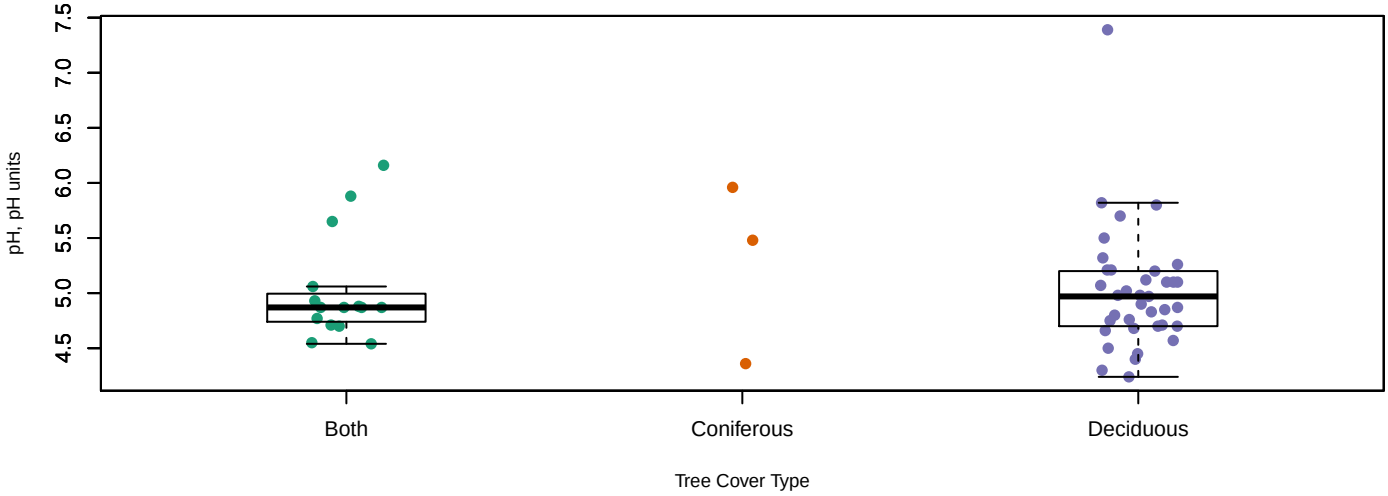


pH

Surface Soil (0 − 0.17 feet)



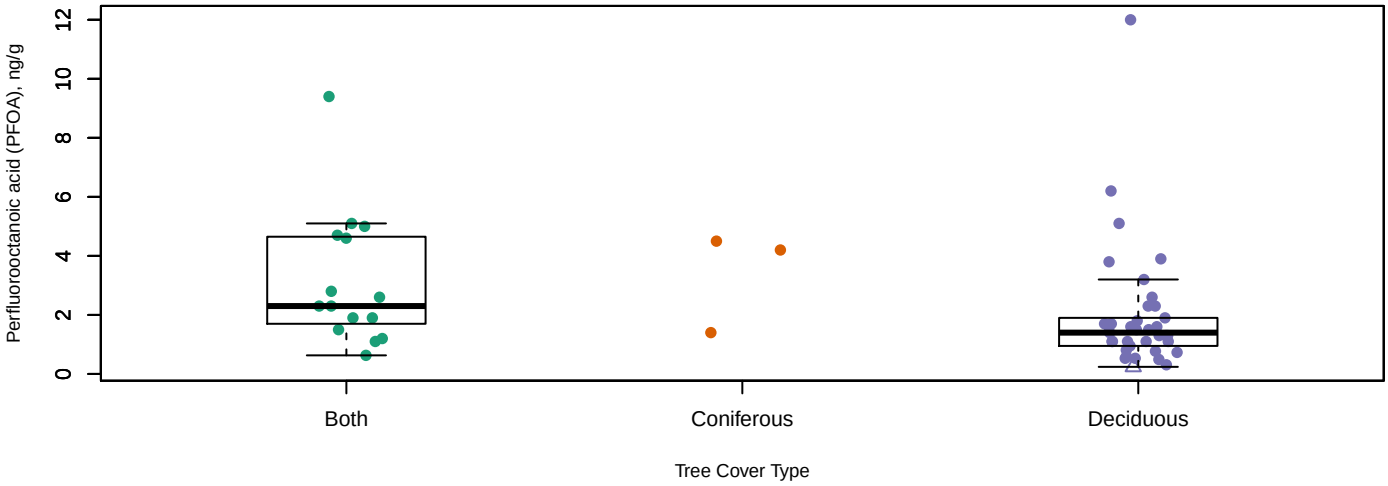
Near Surface Soil (0.17 − 1 foot)



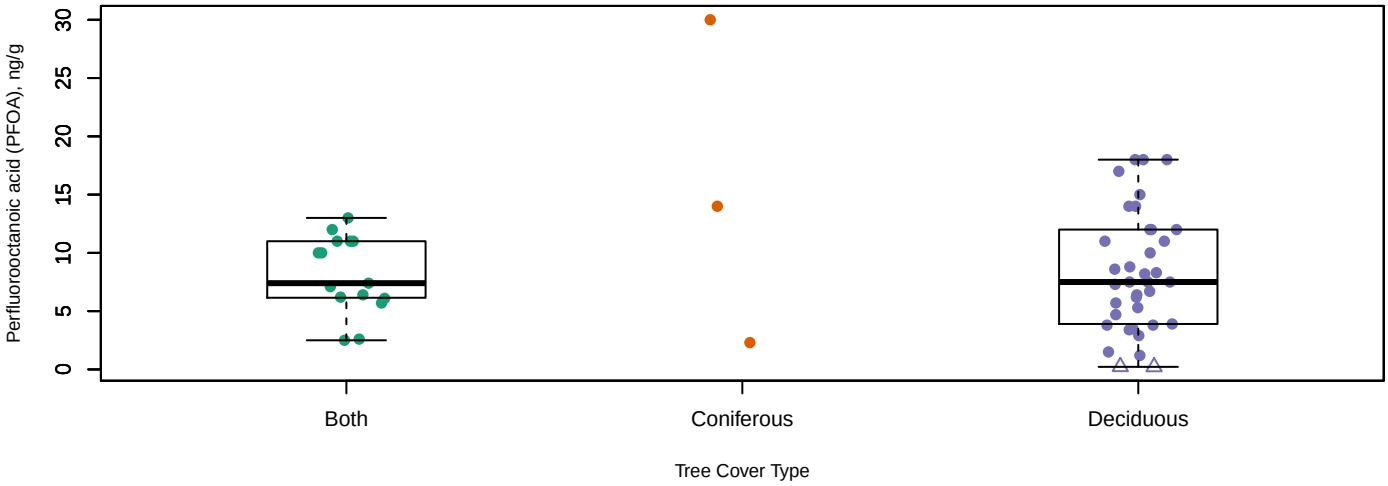
Sub−Surface Soil (1− 2 feet)

Perfluorooctanoic acid (PFOA)

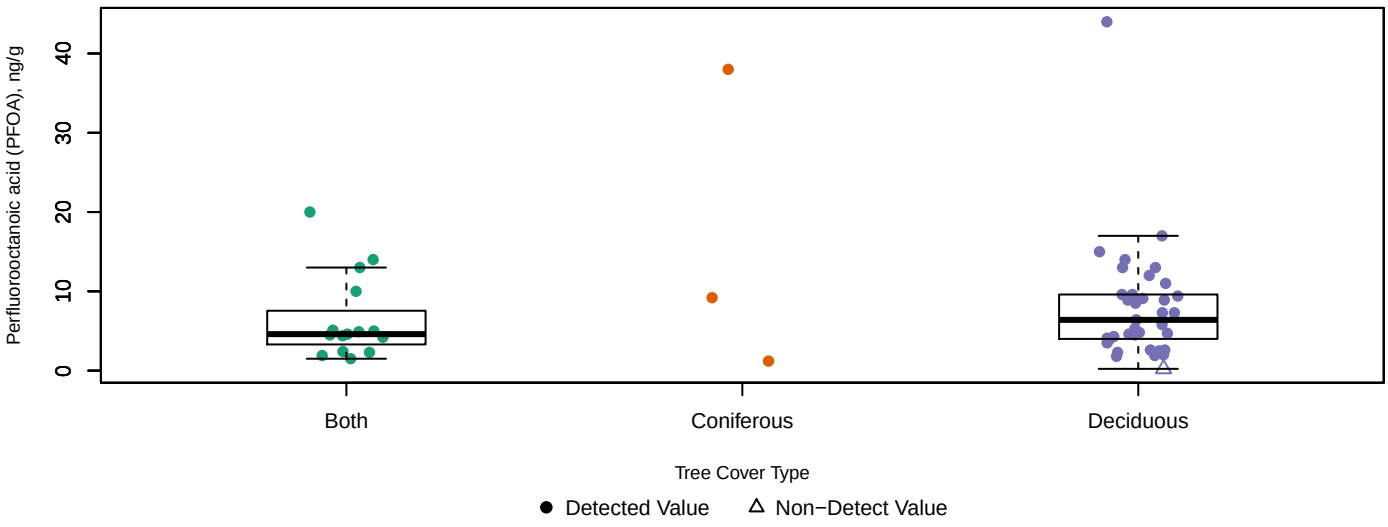
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

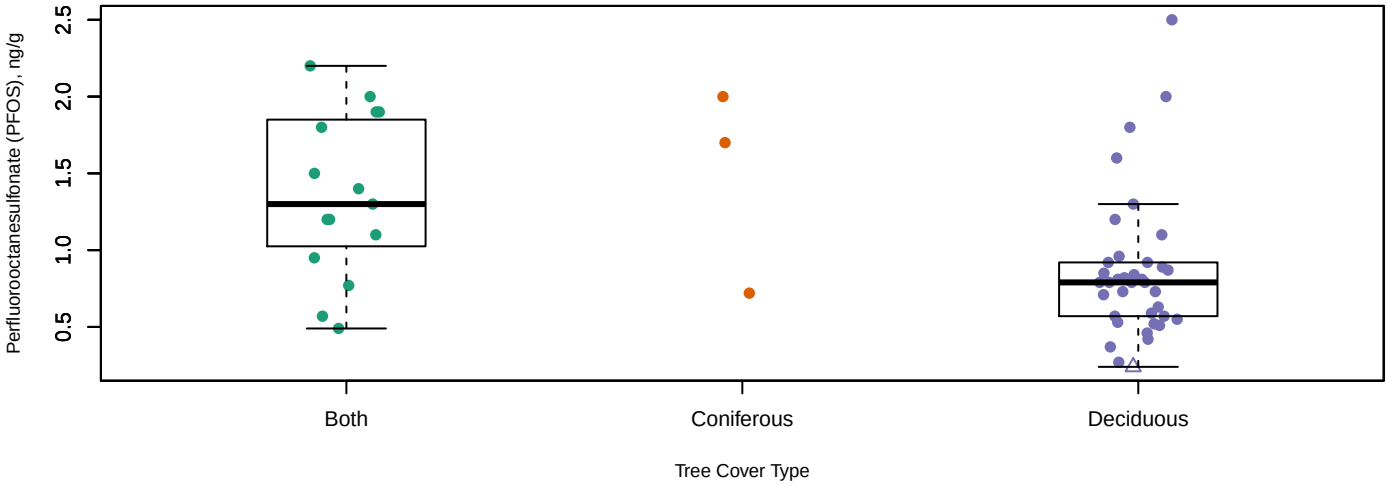


Sub−Surface Soil (1− 2 feet)



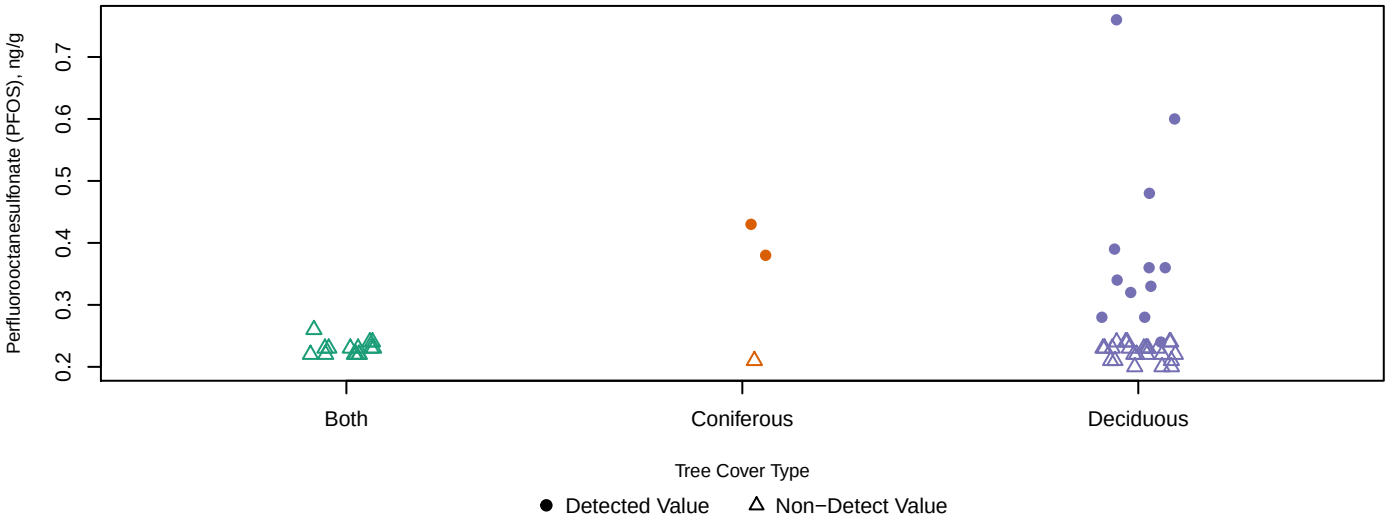
Perfluorooctanesulfonate (PFOS)

Surface Soil (0 − 0.17 feet)



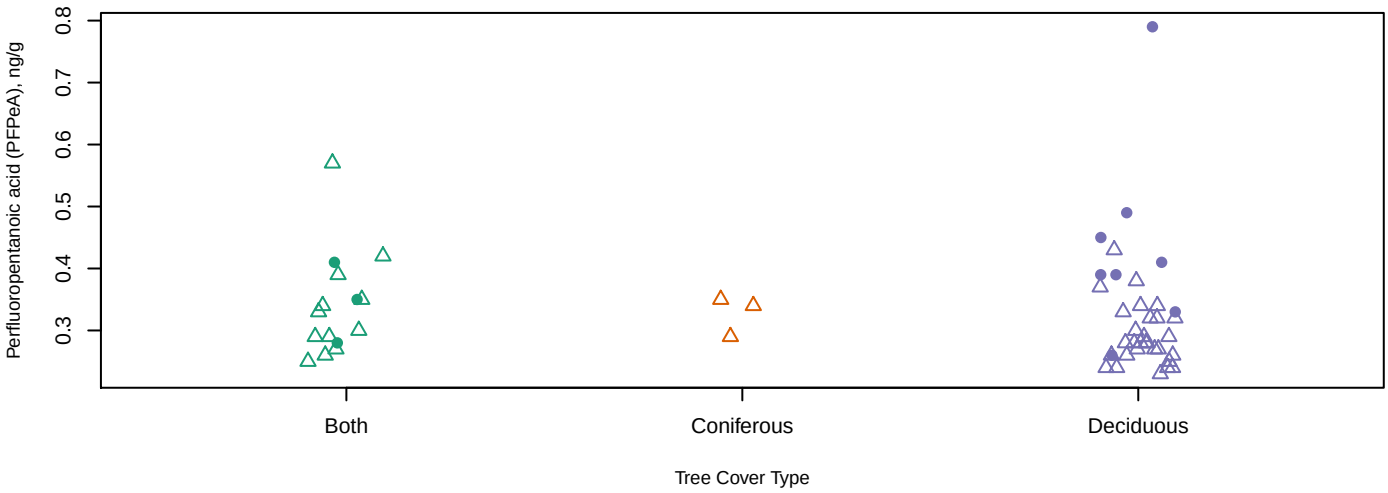
Near Surface Soil (0.17 − 1 foot)

Sub−Surface Soil (1− 2 feet)

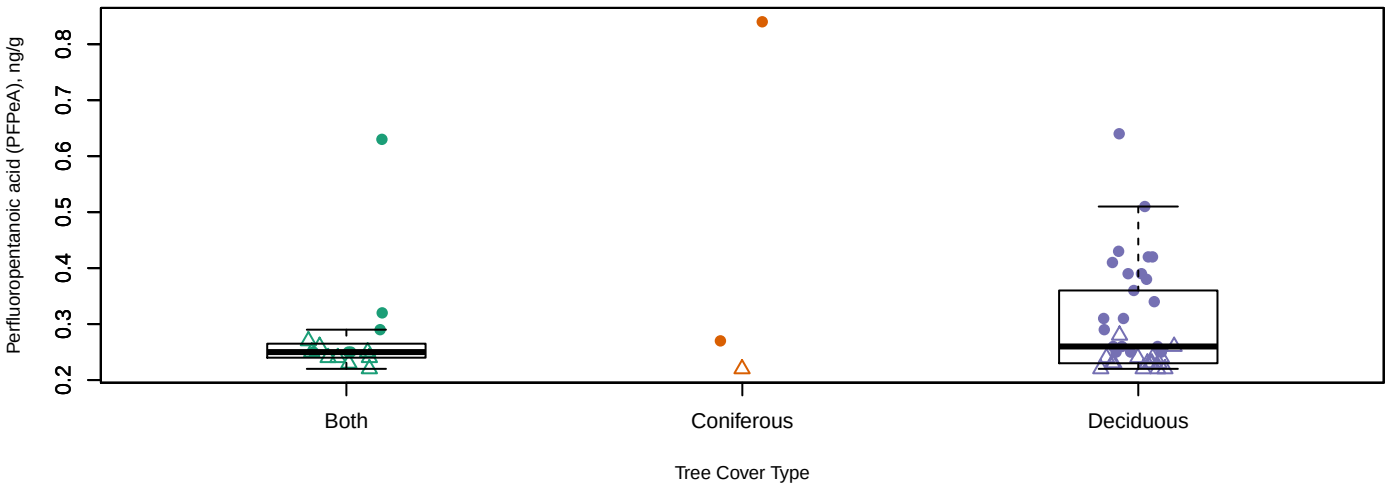


Perfluoropentanoic acid (PFPeA)

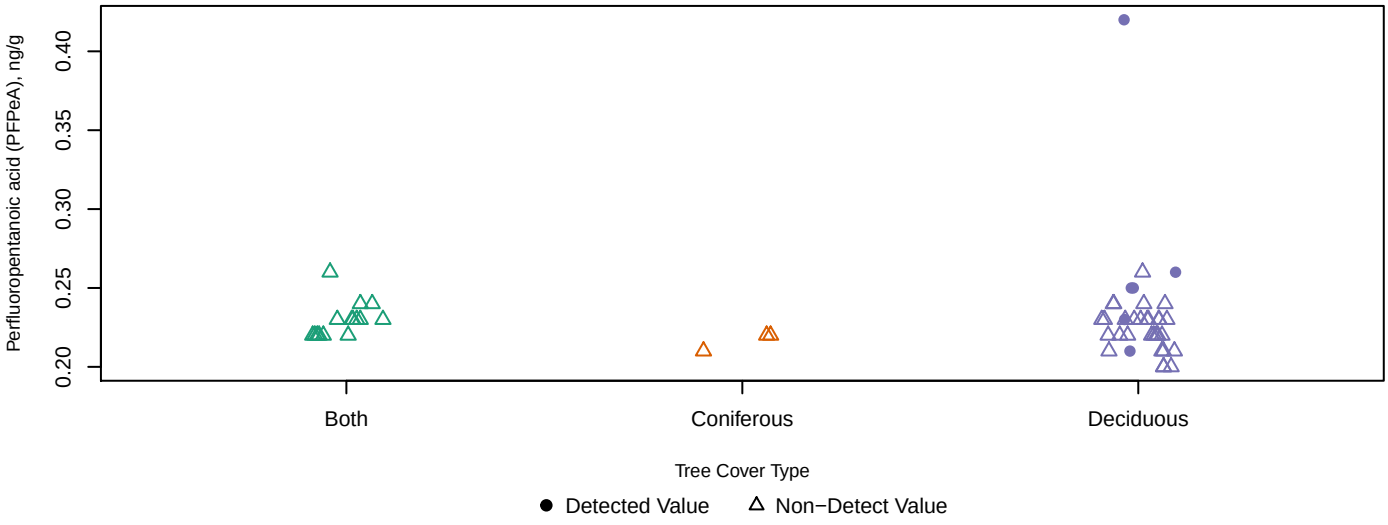
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

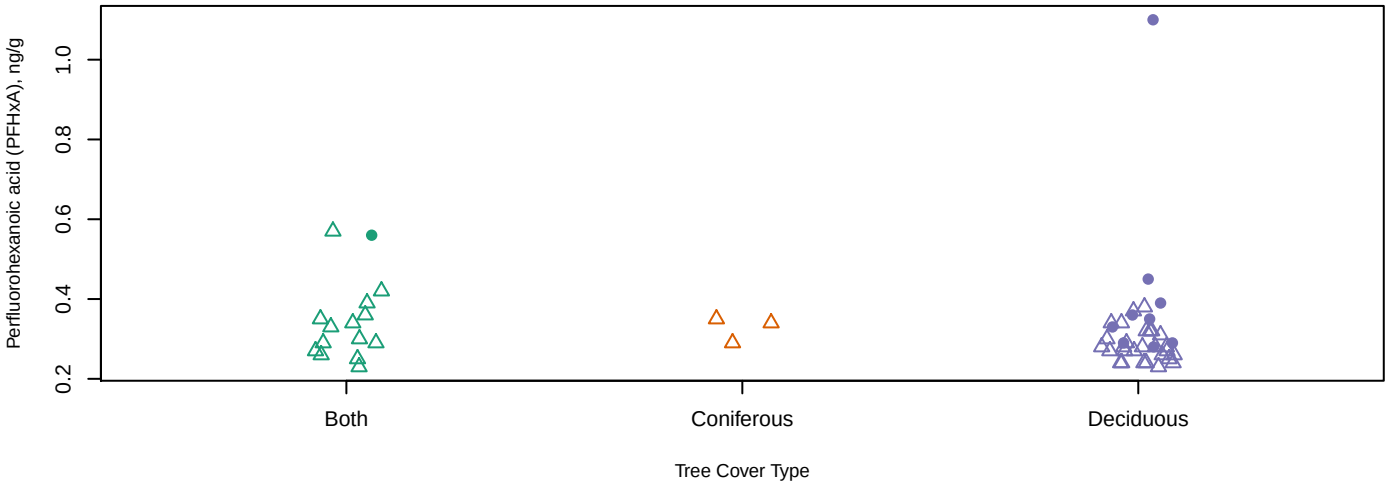


Sub−Surface Soil (1− 2 feet)

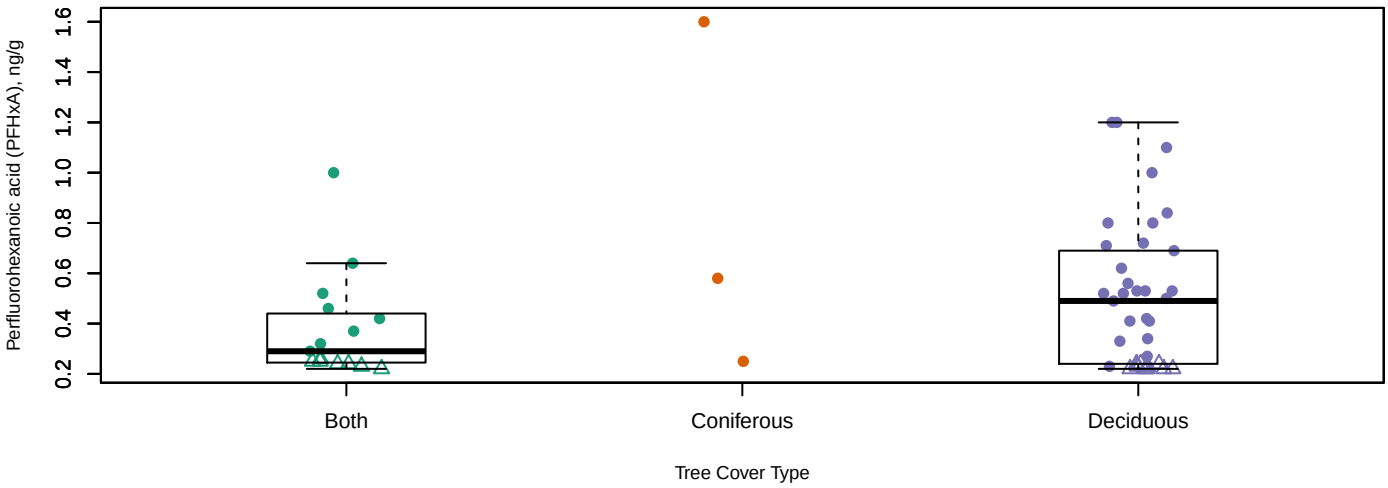


Perfluorohexanoic acid (PFHxA)

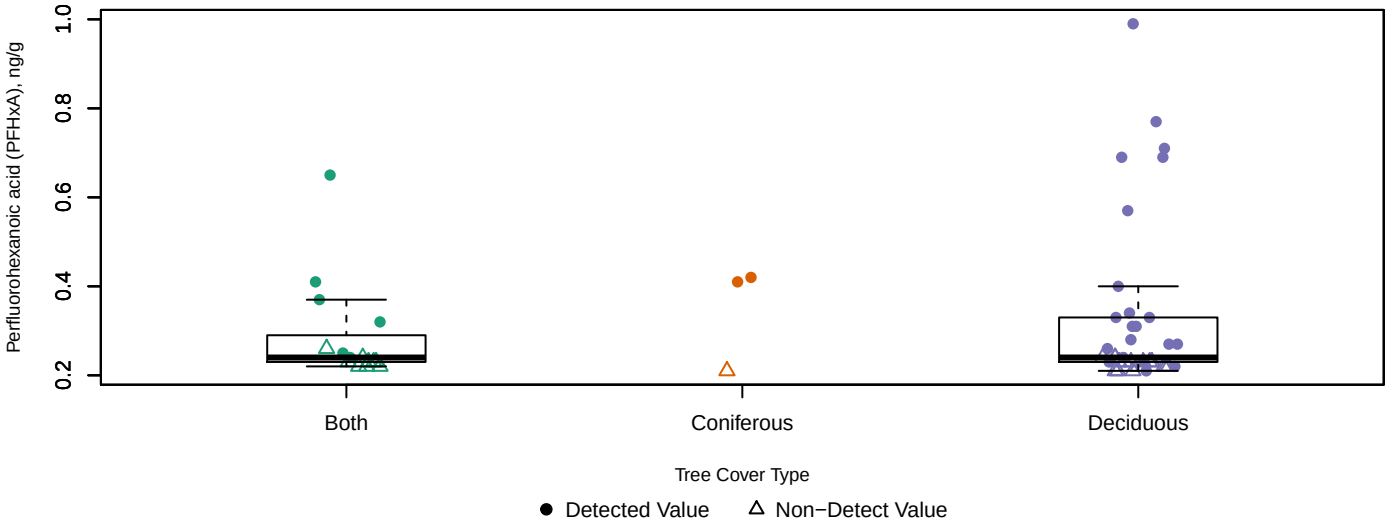
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

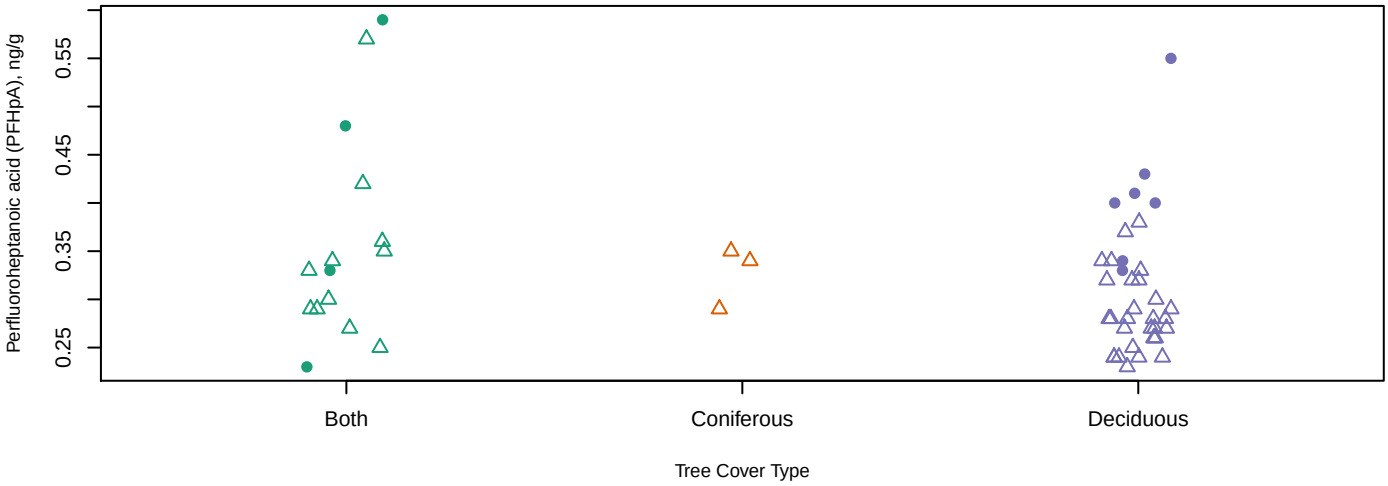


Sub−Surface Soil (1− 2 feet)

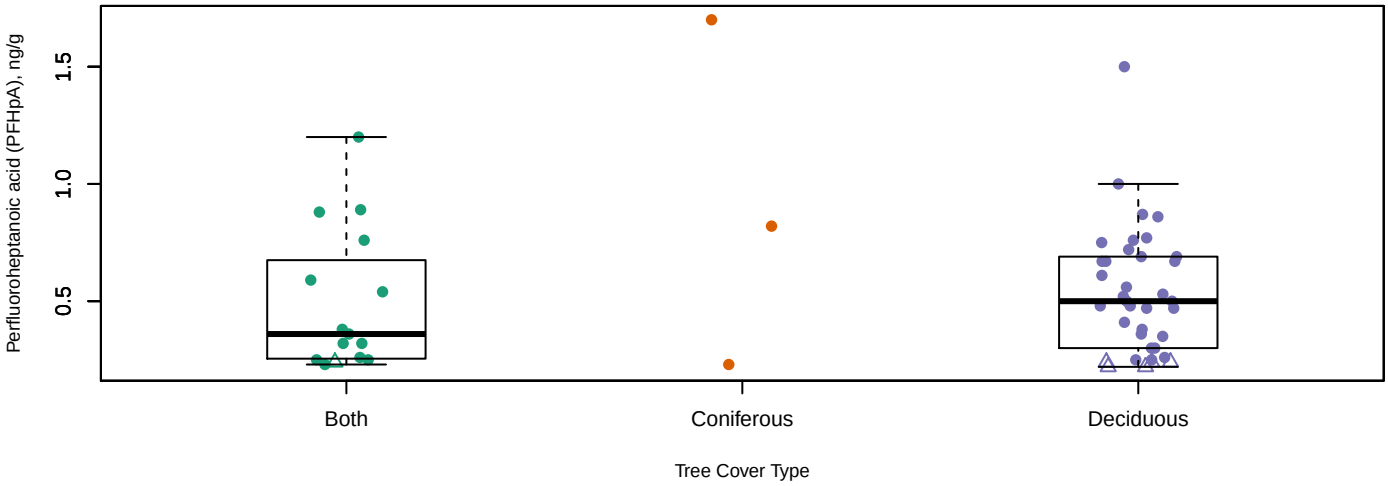


Perfluoroheptanoic acid (PFHpA)

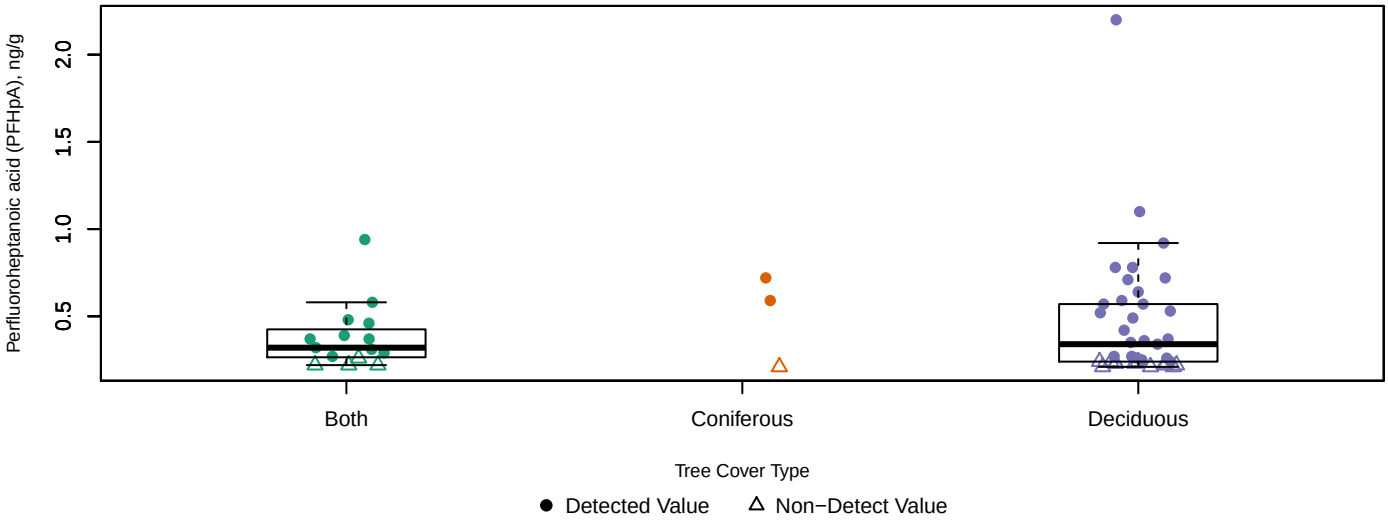
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

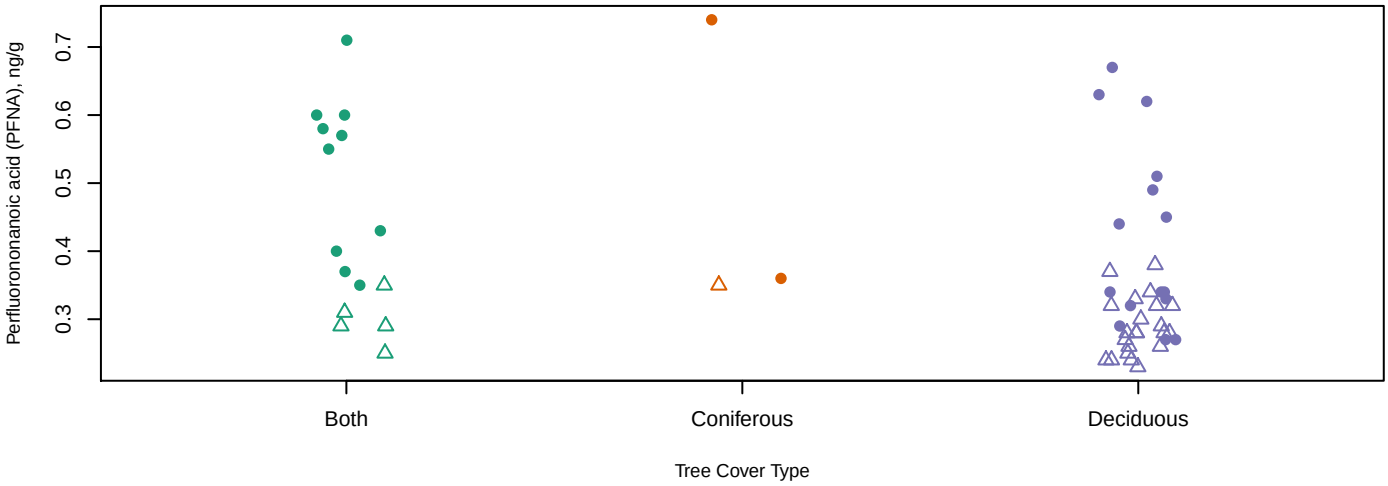


Sub−Surface Soil (1− 2 feet)

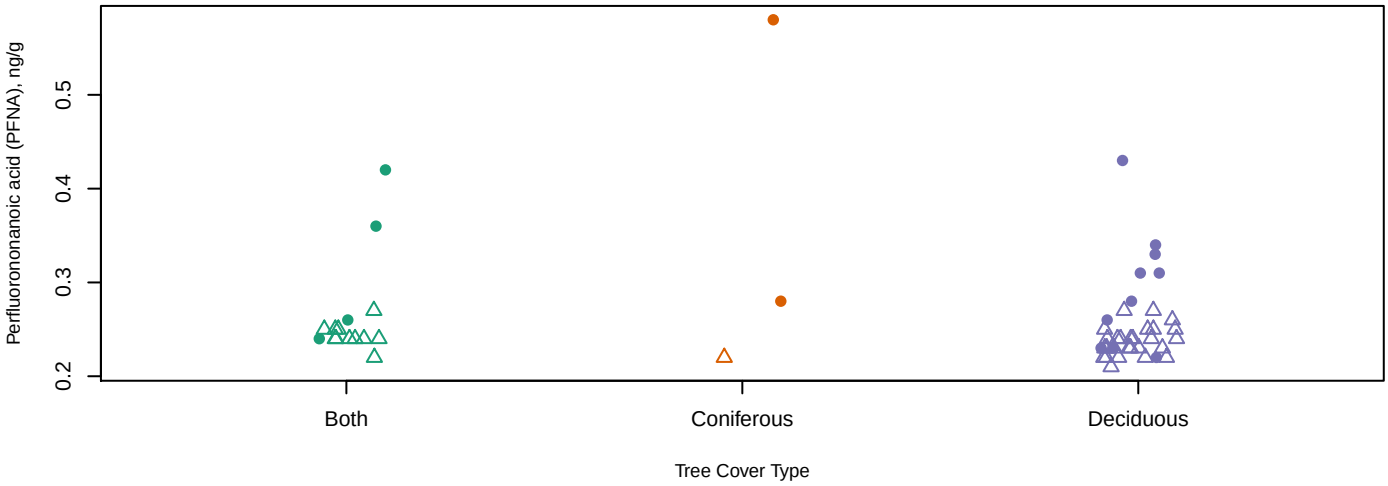


Perfluorononanoic acid (PFNA)

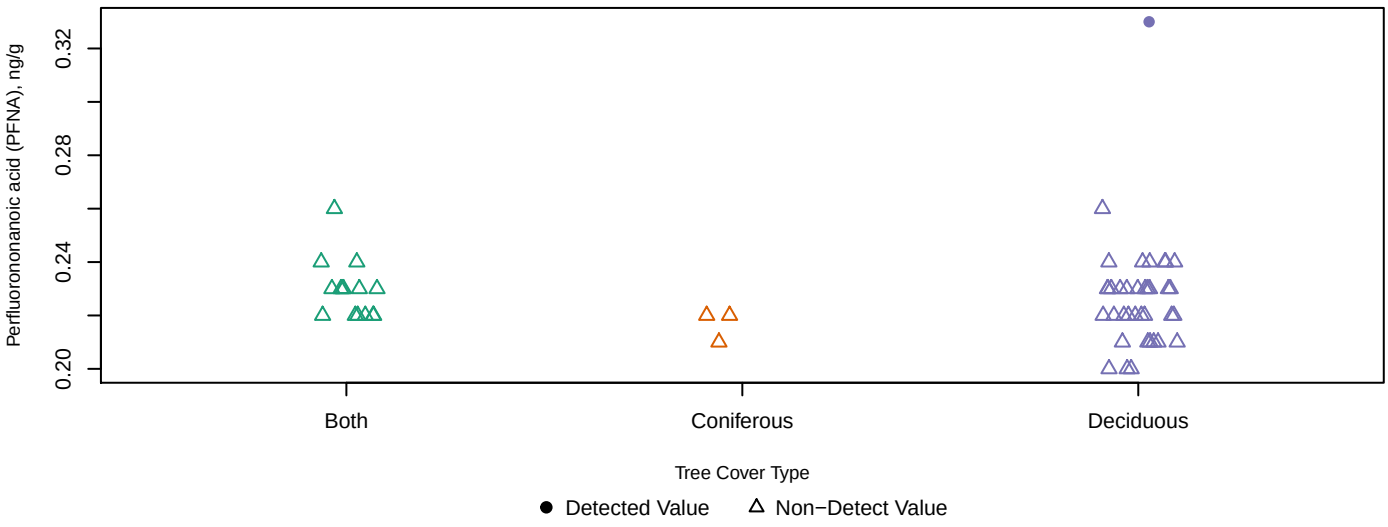
Surface Soil (0 − 0.17 feet)



Near Surface Soil (0.17 − 1 foot)

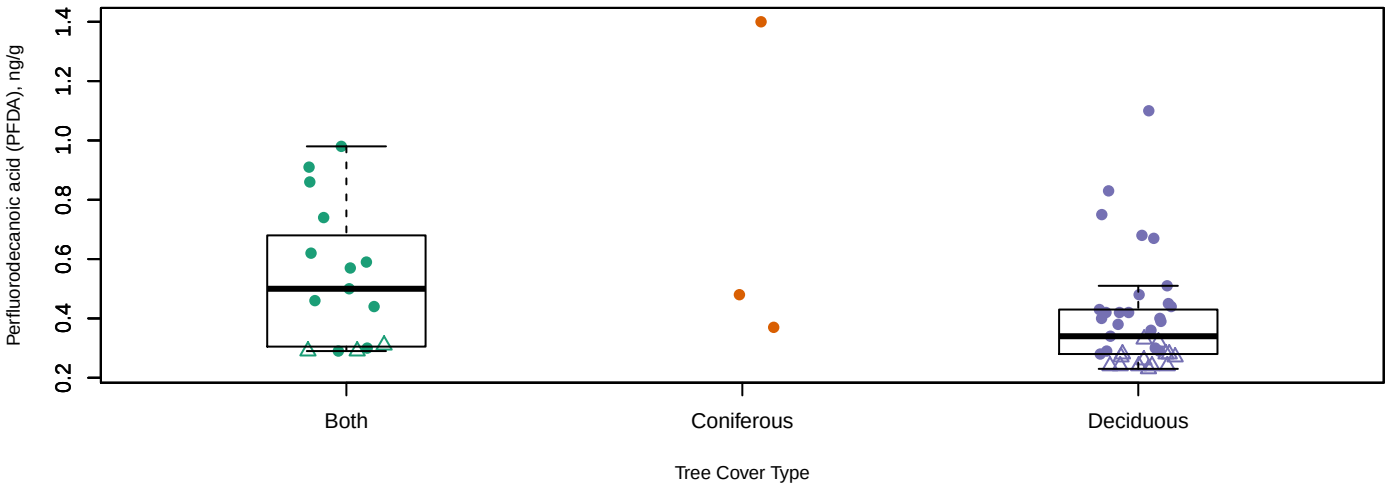


Sub−Surface Soil (1− 2 feet)

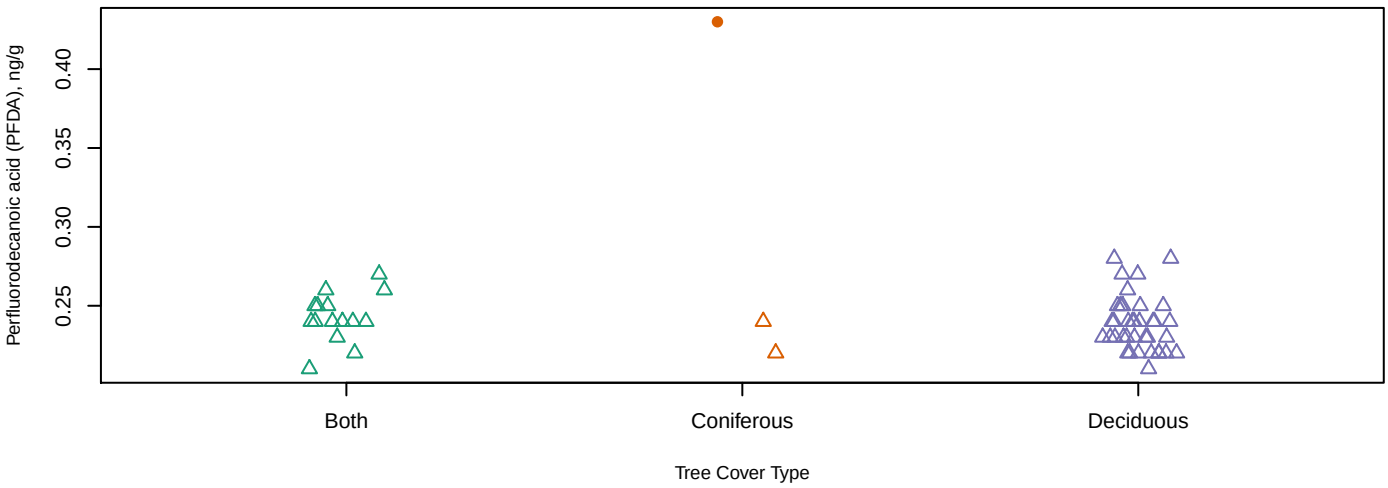


Perfluorodecanoic acid (PFDA)

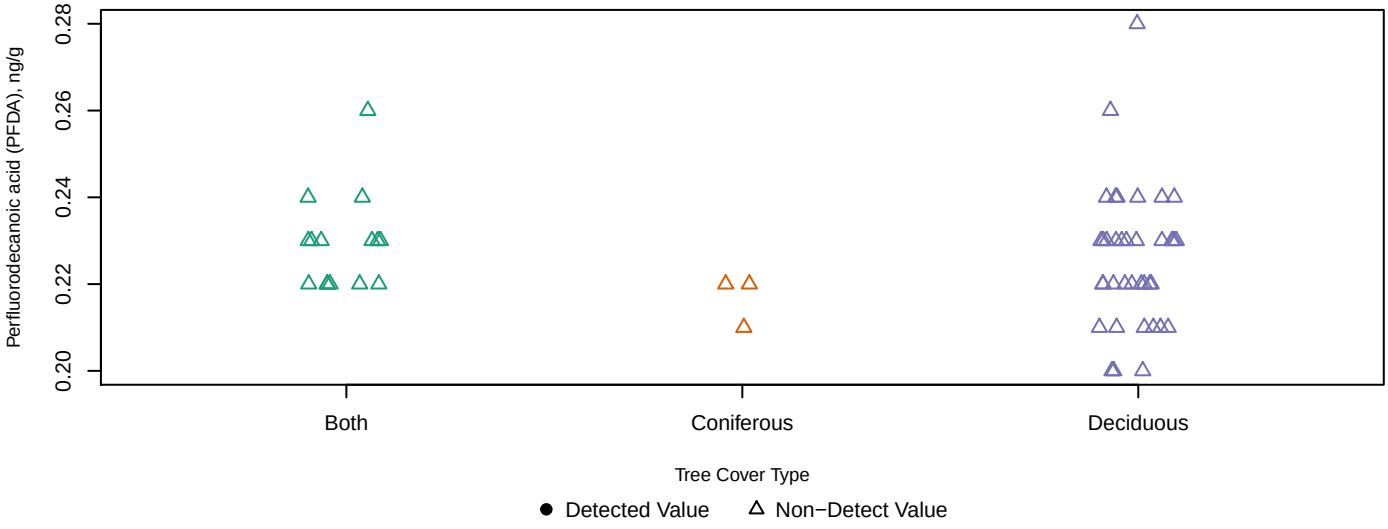
Surface Soil (0 − 0.17 feet)



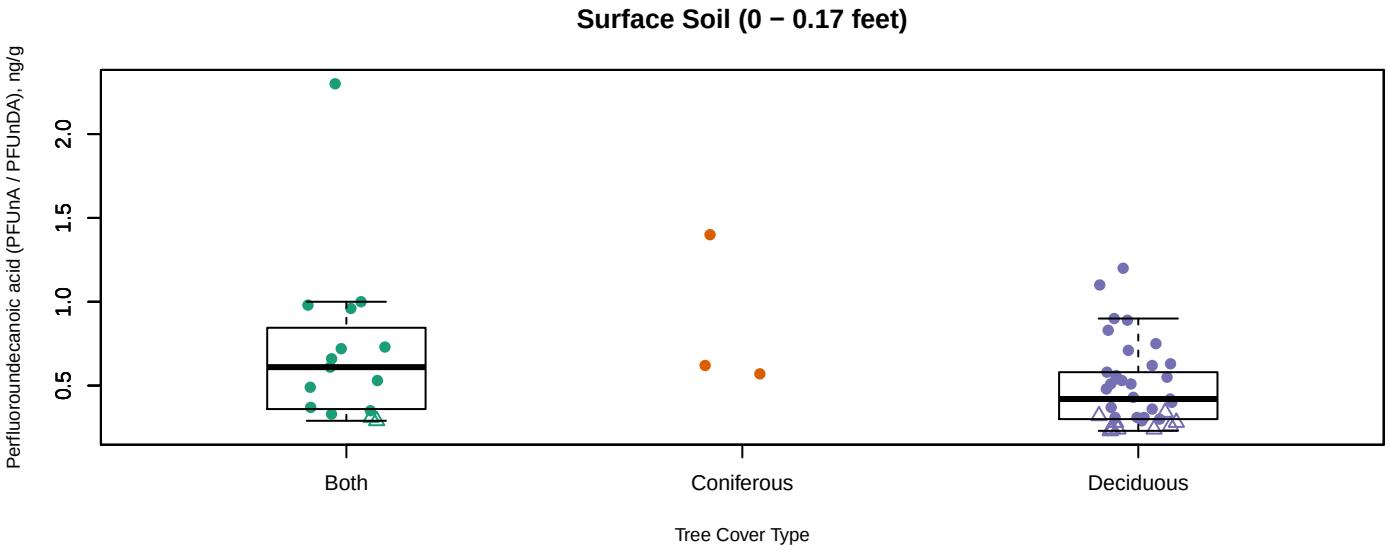
Near Surface Soil (0.17 − 1 foot)

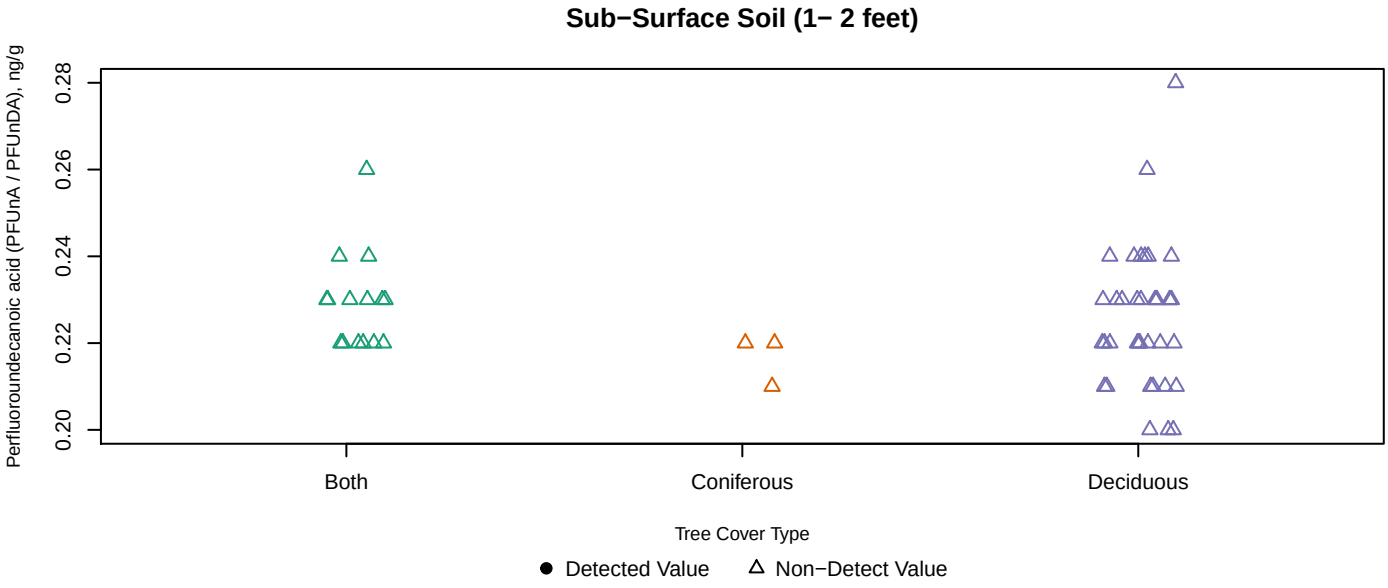


Sub−Surface Soil (1− 2 feet)



Perfluoroundecanoic acid (PFUnA / PFUnDA)





Appendix G

SPLP Evaluation

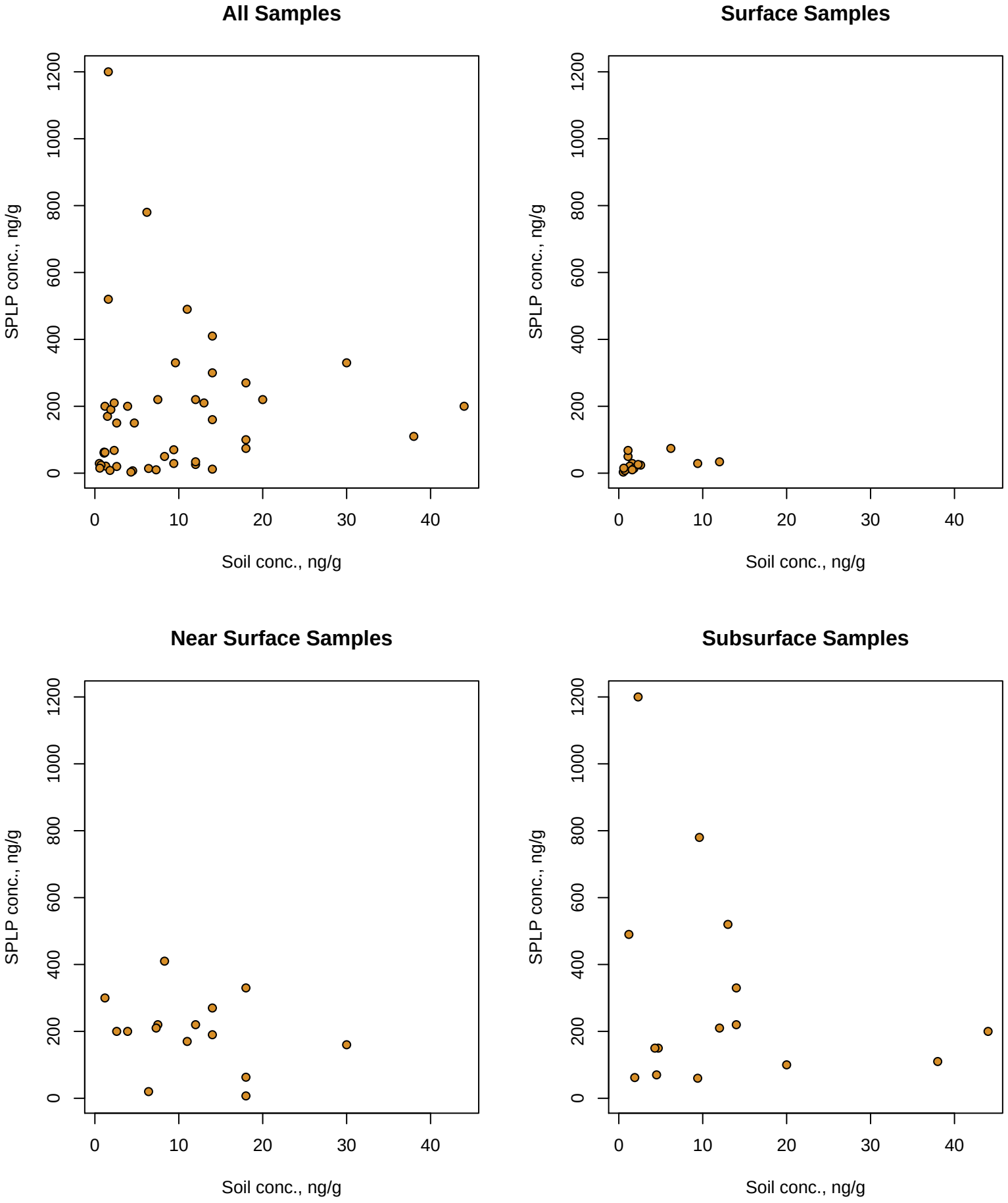
Appendix G1: Scatter Plots: SPLP vs Soil
Appendix G2: Scatter Plots: SPLP vs TOC-Normalized Soil

Appendix G

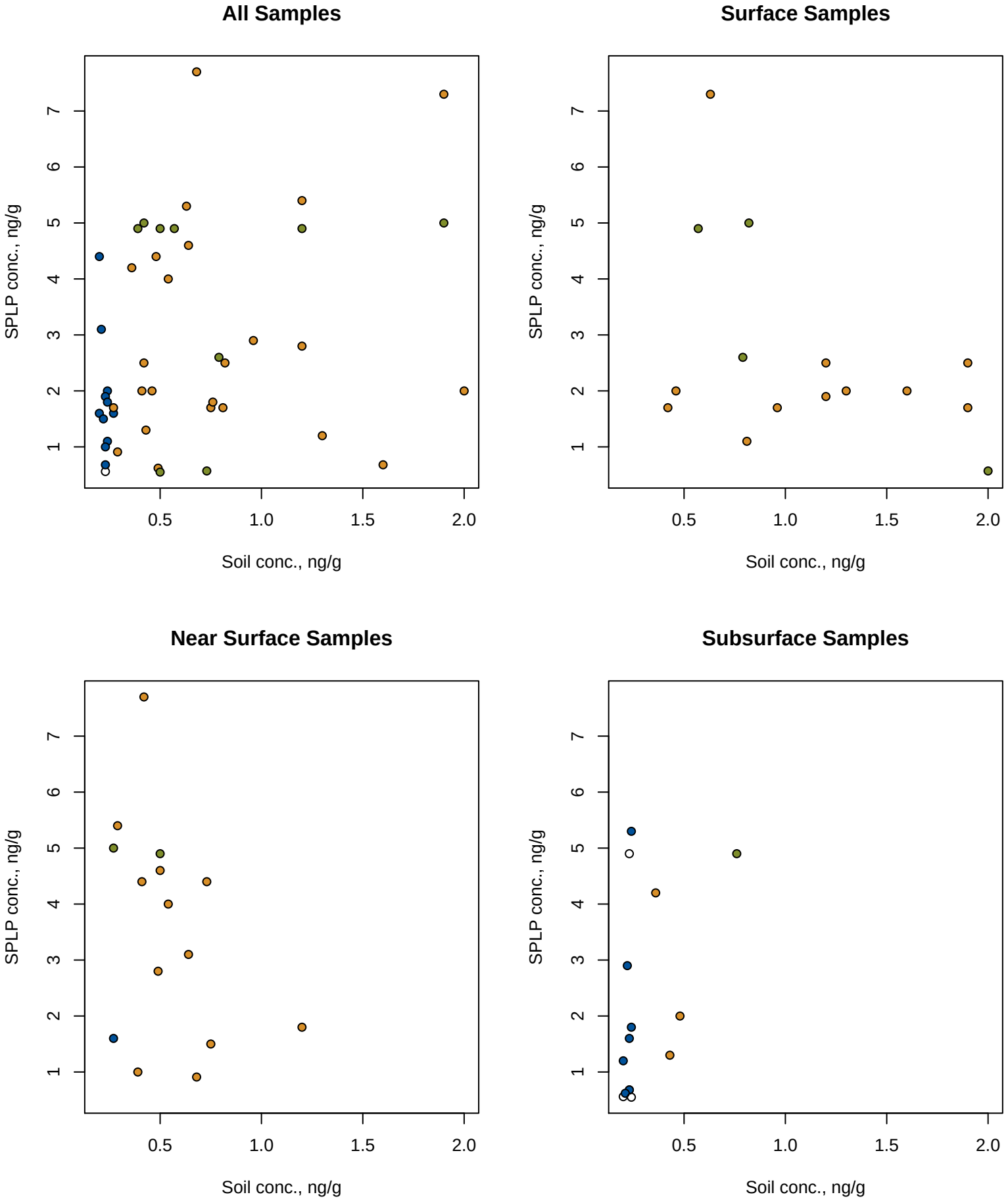
SPLP Evaluation

Appendix G1: Scatter Plots: SPLP vs Soil

Perfluorooctanoic acid (PFOA)



Perfluorooctanesulfonic acid (PFOS)

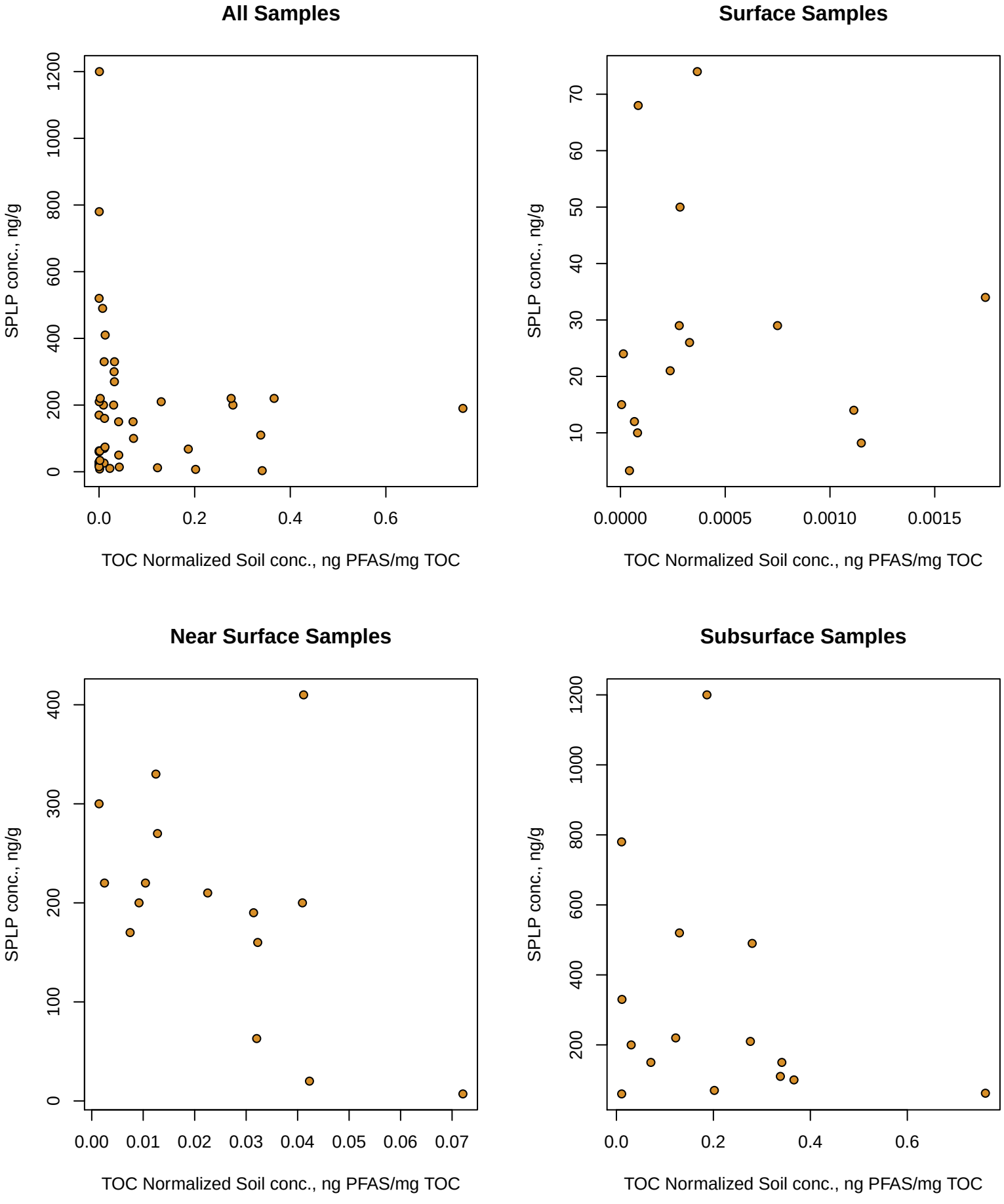


Appendix G

SPLP Evaluation

Appendix G2: Scatter Plots: SPLP vs TOC-Normalized Soil

Perfluorooctanoic acid (PFOA)



Perfluorooctanesulfonic acid (PFOS)