

Statistical Analysis of River Network



December 8, 2018

Outline

- 1 Data
- 2 Analysis
 - Overall results
 - Local Maps
 - Interactive Shiny App
- 3 Discussion

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1 Data

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3 Discussion

Datasets summary

- PA River Network Analysis:
 - **2660** sulphate observation sites.
 - **245** coal mining sites.
 - **3098** unconventional well sites.
- South West PA River Network Analysis
 - **959** sulphate observation sites.
 - **93** coal mining sites.
 - **1059** unconventional well sites.

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Data plot

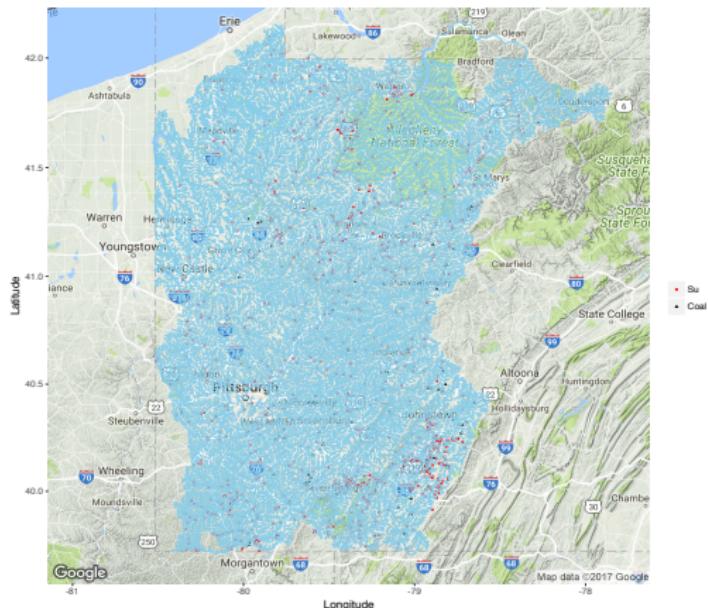


Figure: Plot of Su observation sites and all coal mine sites over the river network

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Coal mines plot

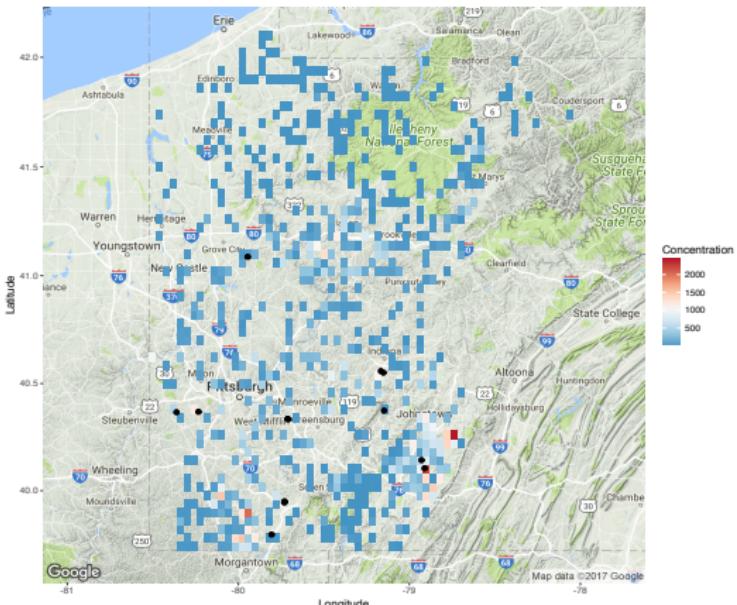


Figure: Significant coal sites on heatmap of Sulphate concentrations

Summary statistics

Table: Summary statistics for 10 significant coal sites

Site ID	Creek Name	Upstream Mean	Downstream Mean	Upstream Median	Downstream Median	t test p-value	Wilcoxon test p-value
1	Robinson Run	1190.00	126.87	1250.00	100.00	0.00	0.00
2	Georges Creek	51.50	168.41	51.50	118.00	0.00	0.02
3	Redstone Creek	24.29	188.84	25.00	125.50	0.00	0.00
4	Yellow Creek	60.63	162.32	45.80	120.00	0.00	0.00
5	Brush Creek	60.73	122.85	60.70	105.00	0.00	0.00
6	Raccoon Creek	58.75	343.63	59.00	281.50	0.00	0.00
7	Slippery Rock Creek	170.05	73.75	146.00	69.05	0.00	0.00
8	Tubmill Creek	32.00	160.57	25.50	114.00	0.00	0.00
9	Stonycreek River	1101.24	414.74	604.00	201.00	0.00	0.00
10	Oven Run	2728.15	641.04	2730.00	217.50	0.00	0.00

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Site 1: Robinson Run

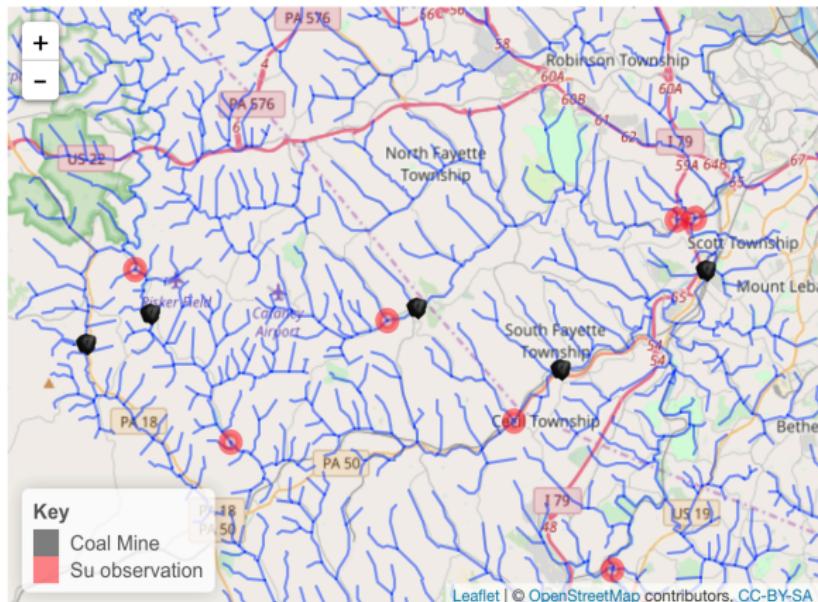


Figure: Site 1: River network visualization

Site 1: Robinson Run (Local)

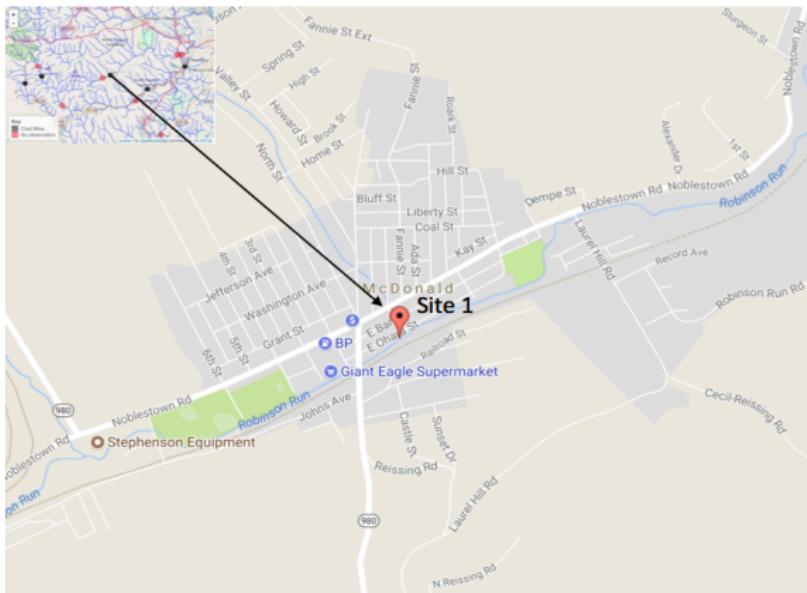


Figure: Site 1: Local Map

Site 2: Georges Creek

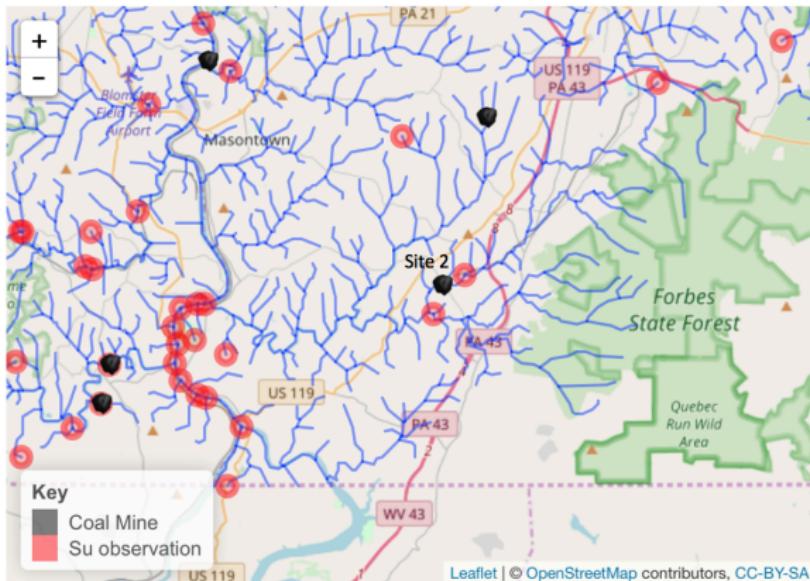


Figure: Site 2: River network visualization

Site 2: Georges Creek (Local)

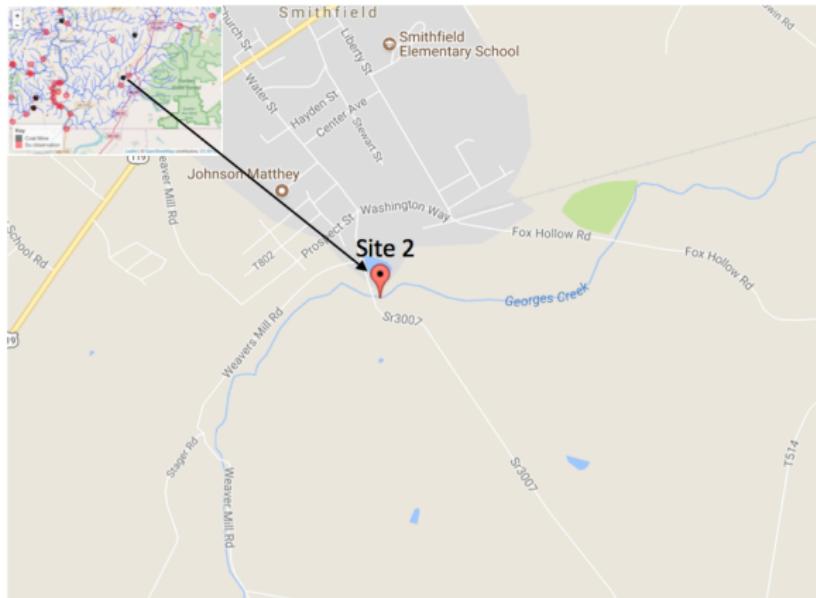


Figure: Site 2: Local Map

Site 3: Redstone Creek



Figure: Site 3: River network visualization

Site 3: Redstone Creek (Local)

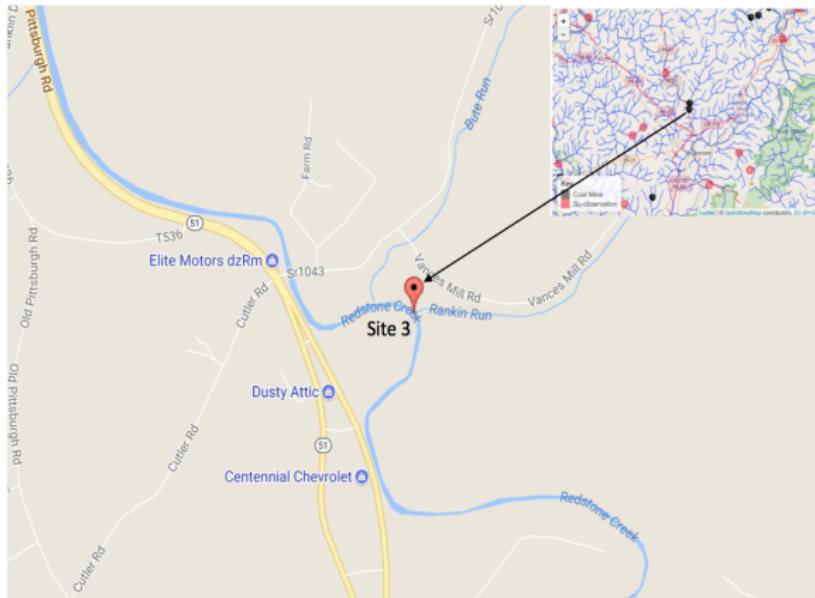


Figure: Site 3: Local Map

Site 4: Yellow Creek

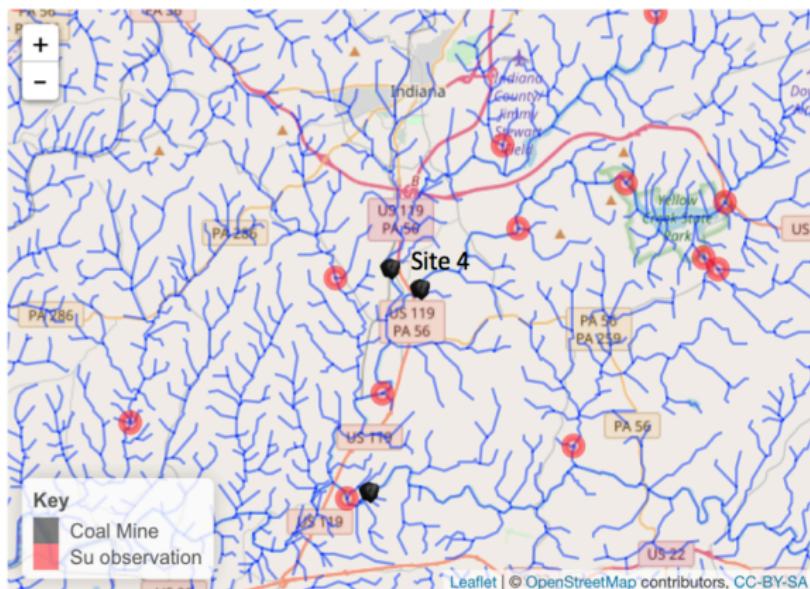


Figure: Site 4: River network visualization

Site 4: Yellow Creek (Local)

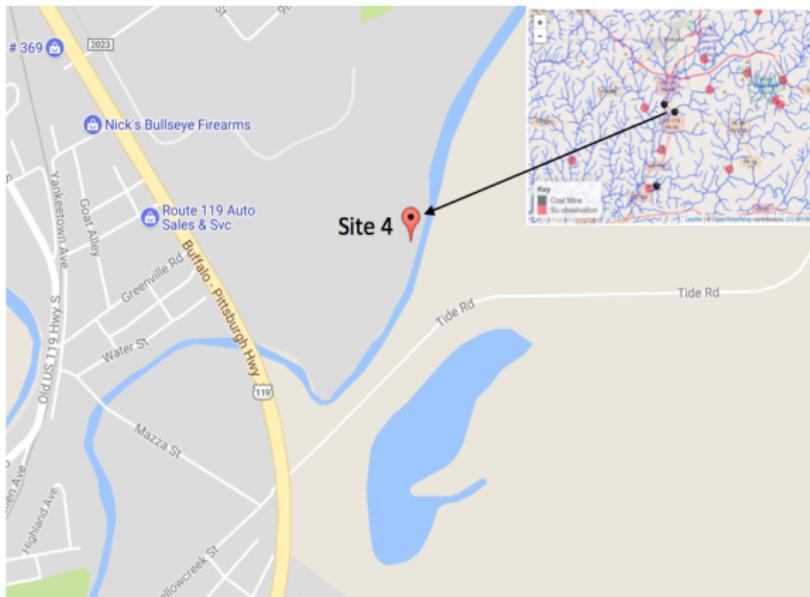


Figure: Site 4: Local Map

Site 5: Brush Creek

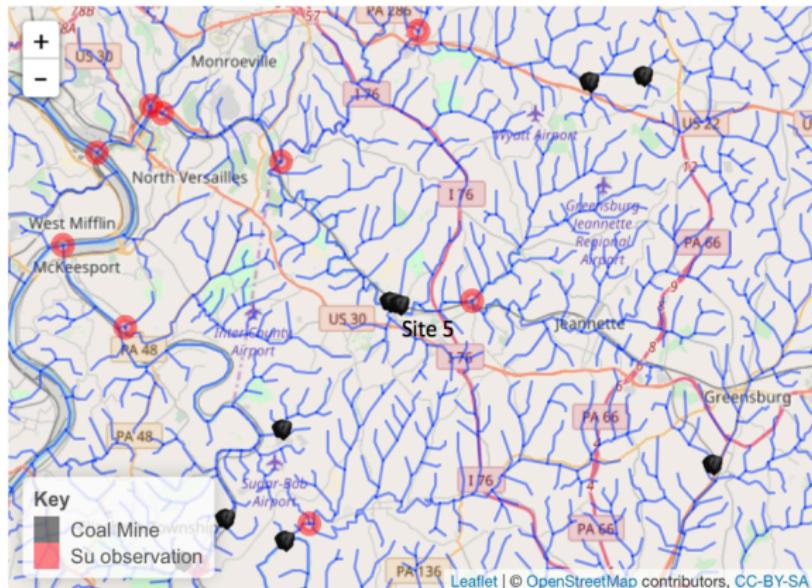


Figure: Site 5: River network visualization

Site 5: Brush Creek (Local)

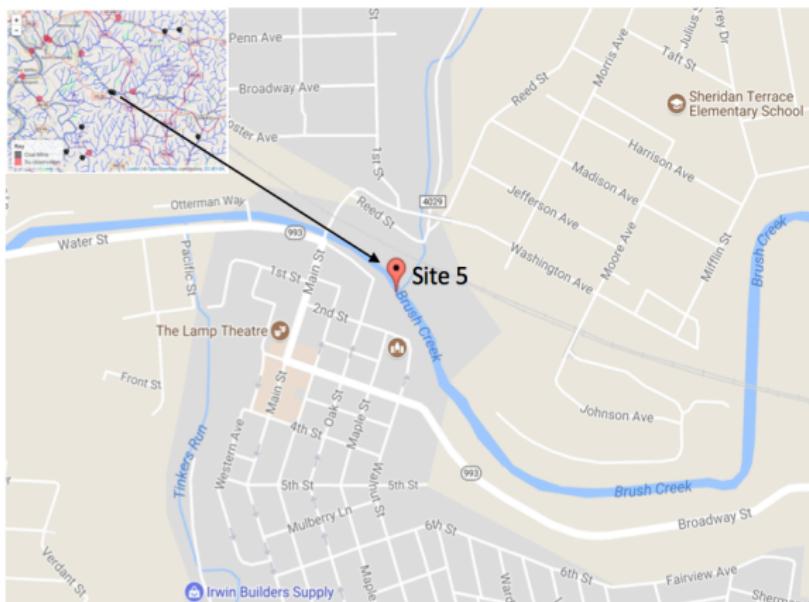


Figure: Site 5: Local Map

Site 6: Raccoon Creek

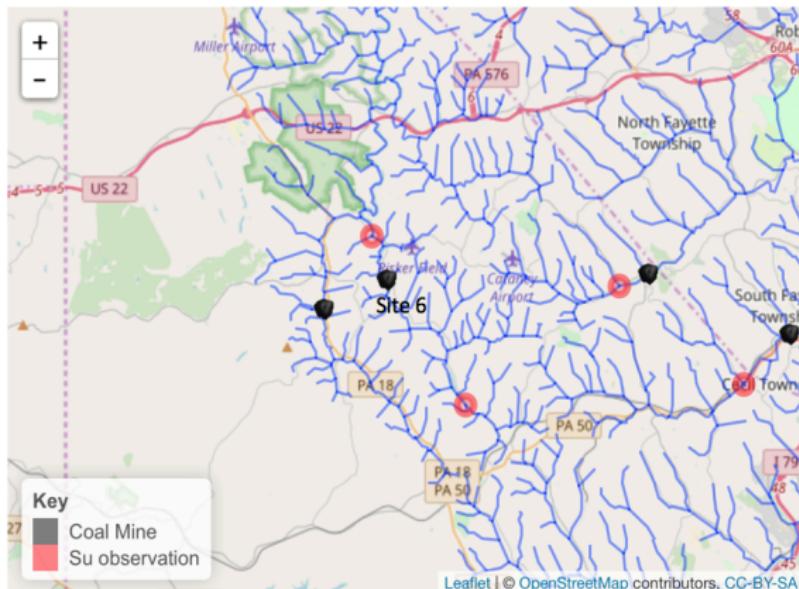


Figure: Site 6: River network visualization

Site 6: Raccoon Creek (Local)

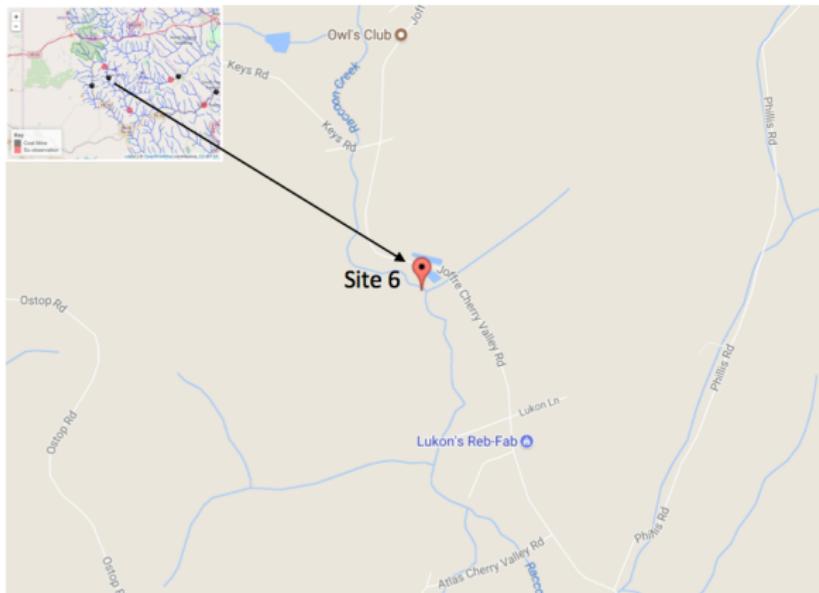


Figure: Site 6: Local Map

Site 7: Slippery Rock Creek

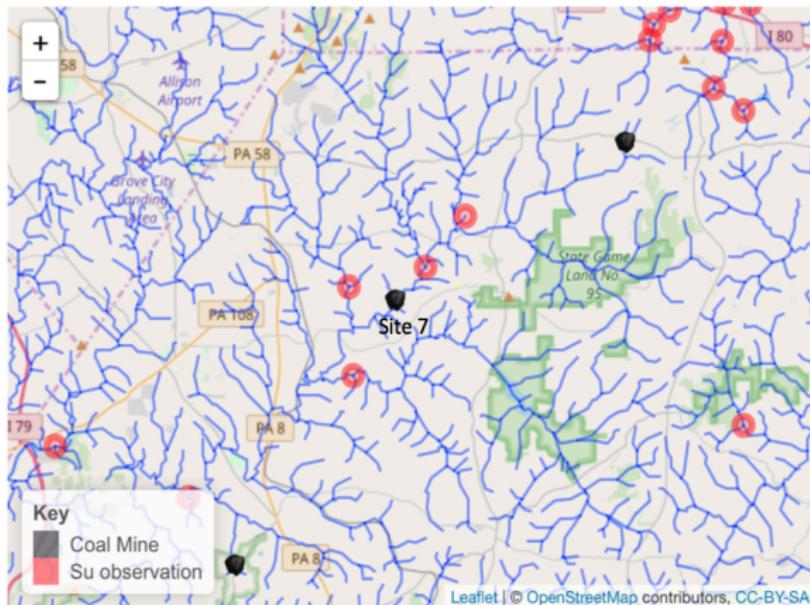


Figure: Site 7: River network visualization

Site 7: Slippery Rock Creek (Local)

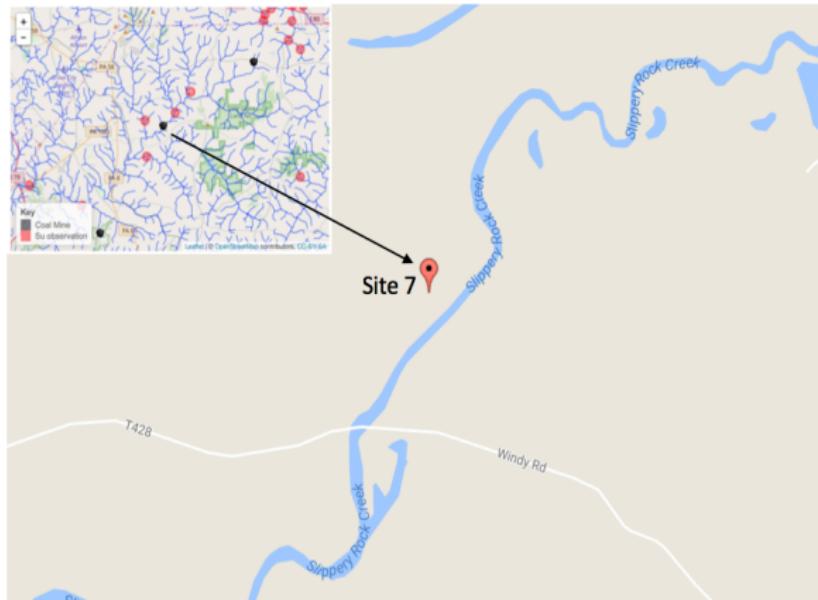


Figure: Site 7: Local Map

Site 8: Tubmill Creek

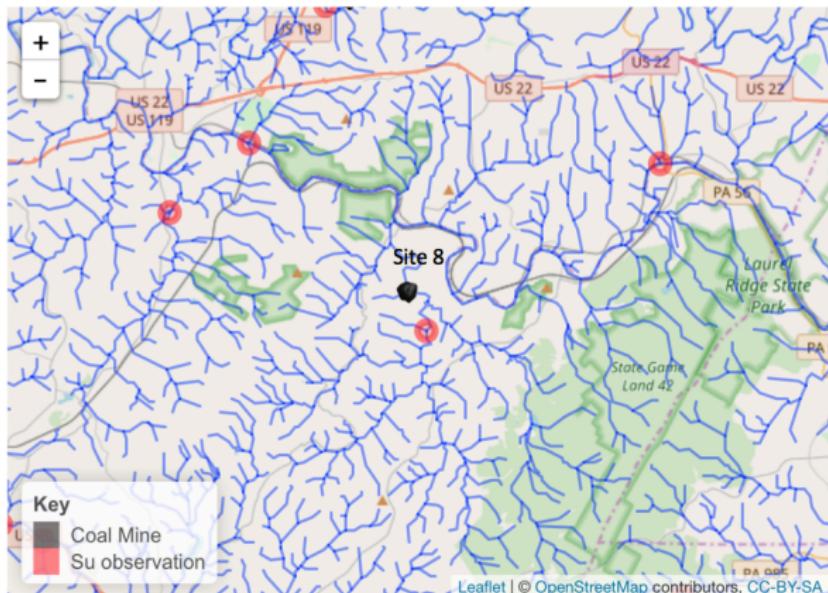


Figure: Site 8: River network visualization

Site 8: Tubmill Creek (Local)

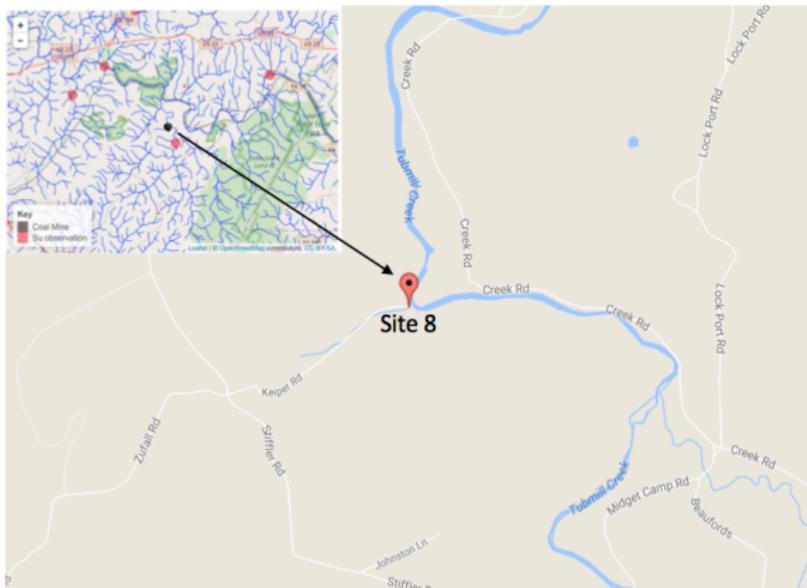


Figure: Site 8: Local Map

Site 9: Stonycreek River

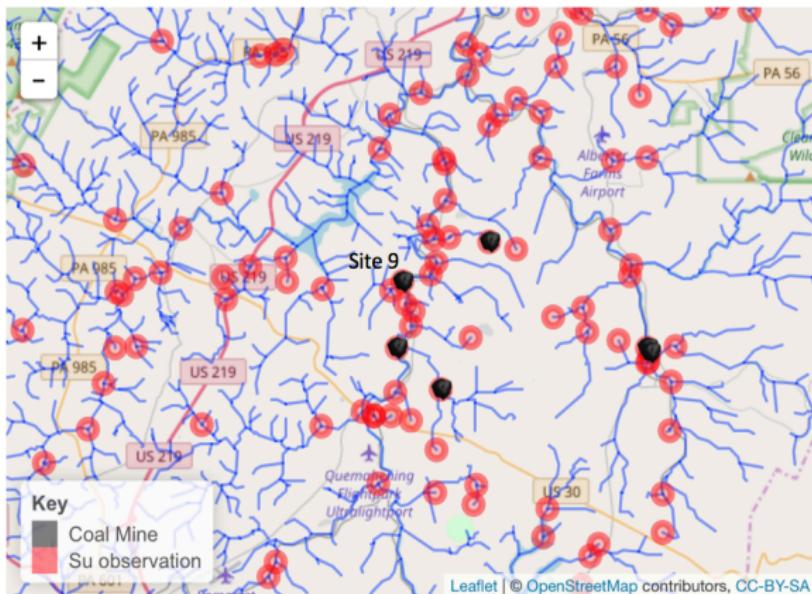


Figure: Site 9: River network visualization

Site 9: Stonycreek River (Local)

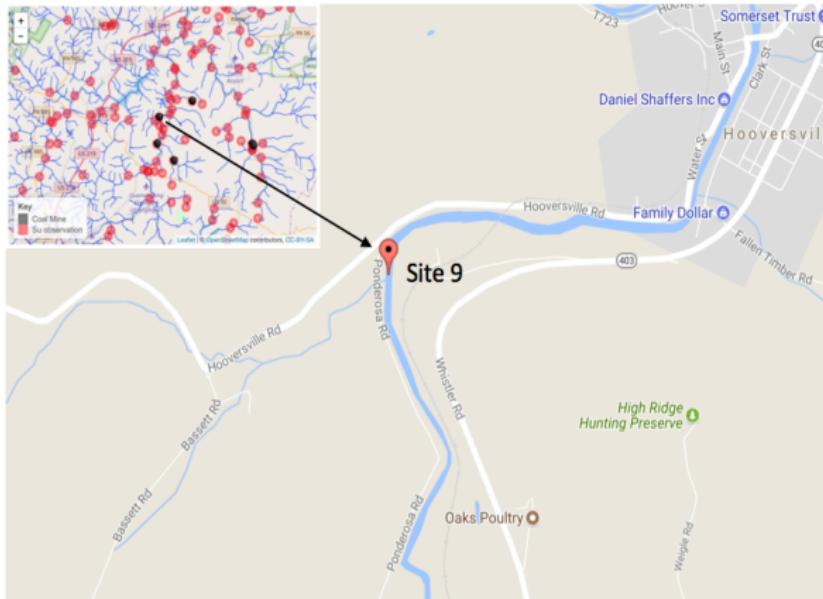


Figure: Site 9: Local Map

Site 10: Oven Run

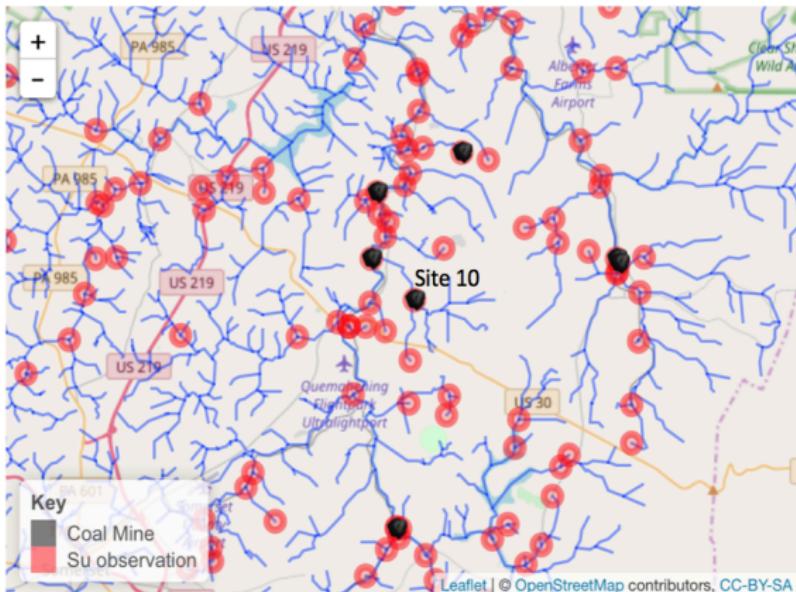


Figure: Site 10: River network visualization

Site 10: Oven Run (Local)

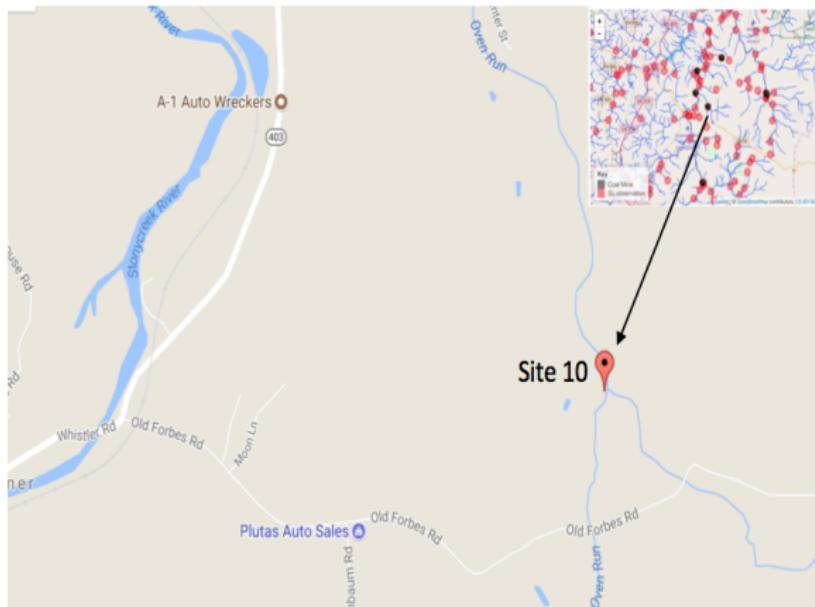


Figure: Site 10: Local Map

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- Generalized methodology to analyze pollutor-analyte data in river networks
- Interactive Shiny App

Future work:

- Unconventional Wells
- Different subgraphs

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