
PACIFIC groundwater GROUP

November 13, 2018

Bill Teitzel
Lewis County Environmental Services
2025 N. E. Kresky Avenue
Chehalis, WA 98531

Re: Centralia Landfill First Quarter 2018 (2018 Q1) / Wet Season Compliance
Monitoring Quality Assurance/Quality Control Review

Bill:

This letter report presents our text contributions and attachments to the 2018 Q1 Centralia Landfill Compliance Monitoring Report that we understand you are preparing for submittal to Lewis County Environmental Services (Lewis County). Consistent with our scope of work, Pacific Groundwater Group (PGG) prepared the 2017 Q3 Monitoring Summary report with the intention that it would be used as a template for future reports to be generated by the City.

Below please find our quality assurance/quality control (QA/QC) review of the analytical data associated with the 2018 Q1 groundwater and surface water samples collected at the Centralia Landfill. We are providing this QA/QC review to be incorporated in the 2018 Q1 Centralia Landfill Compliance Monitoring Report. Attached to this letter report tables, figures, and an appendix also intended to be included in the report you are preparing. The attachments include analytical summary tables, figures presenting the landfill vicinity and 2018 Q1 groundwater elevations, and an appendix of water quality time-series plots.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control/quality assurance (QA/QC) reviews were conducted on the reported analyses. All requested analyses were performed and QA/QC assessments indicate that the data are considered usable for the intended purpose of the project. Notable results were not identified during the QA/QC review with the following exceptions.

Field duplicates are a type of QA/QC that may be included in a monitoring program to document the precision of the sampling process, the heterogeneity of the matrix, and reproducibility of sample preparation and analysis. A field duplicate is a second, separate sample taken from the same source, collected in separate containers, and analyzed independently by the same method and laboratory. During the 2018 Q1 sampling event, a field duplicate was collected at MW-CNE-1D and assigned the sample name labeled "Dup". The EPA National Functional Guidelines for Inorganic Superfund Methods Data Review

Environmental Protection Agency (EPA). 2016. National Functional Guidelines for Inorganic Superfund Methods Data Review. Office of Superfund Remediation and Technology Innovation (OSRTI). OLEM 9355.0-133. EPA-540-R-2016-001. September 2016.

ATTACHMENTS

Table 1. Shallow Upper/Upper Groundwater Quality Summary, 2018 Q1

Table 2. Lower Unit Groundwater Quality Summary, 2018 Q1

Figure 1. Centralia Landfill Vicinity

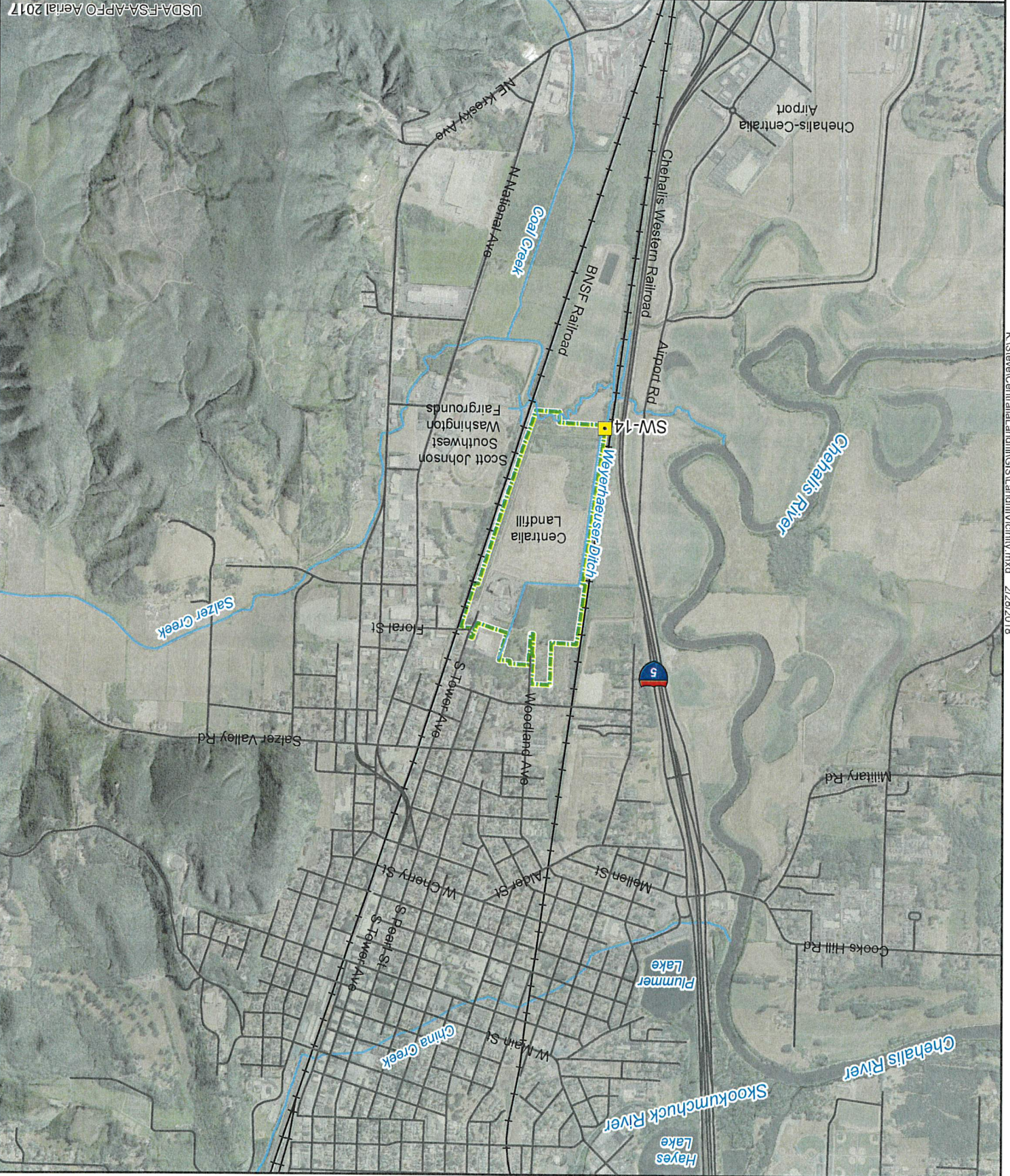
Figure 2. Shallow Upper Aquifer Groundwater Elevations 2018 Q1

Figure 3. Upper Aquifer Groundwater Elevations 2018 Q1

Figure 4. Lower Aquifer Groundwater Elevations 2018 Q1

Appendix A. Water Quality Time Series Plots

Units	CAP Cleanup Level	CAP Compliance Level	Groundwater Standards *										
				B-1S	B-1SU	B-2S	B-2SU	MW-1S	MW-2S	MW-2SU	MW-3S		
feet				3.8	4.4	4.3	5	2	2.55	3.75	4.4		
std. units				8.26	7.8	7.53	8.09	7.51	7.64	7.78	6.74		
ty (at 25 deg C) uS/cm	700			418	1420	258	564	280	2250	2190	293		
0 F				11.37	11.13	11.99	11.29	13.82	13.28	12.33	13.37		
CaCO3	mg/L			164	440	105	191	46	464	490	41.3		
	mg/L			0.4	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U		
nic	mg/L			4.37	26.8	3.68	6.8	3.39	32.5 j	25.7	7.94		
emand (COD)	mg/L	250		5 U	5	5 U	5 U	5 U	35.5	33.8	5 U		
	mg/L		250	4.5	89.3	4.8	2.3	1.6	187	185	7		
	mg/L			122	411	98.1	139	41.5	587	628	55.8		
	mg/L		10	0.1 U	0.4	0.85	0.1 U	1.4	0.45	0.41	0.38		
ed	mg/L		500	208	572	132	208	142	1030	1000	166		
	mg/L		250	0.2 U	0.2	2.7	2.7	17.7	0.64	1.2	32		
	mg/L	0.00027	0.0005	0.00005	0.0162	0.0044	0.0019	0.0016	0.0005 U	0.0229	0.0029	0.0005 U	0
	mg/L				25.9	70.5	22.2	25.6	13.3	123.5	155	16.5	
	mg/L	0.3			0.05 Uj	9.34 j	0.05 Uj	0.05 Uj	0.05 Uj	5.99 j	8.14 j	0.05 Uj	
ved	mg/L				9.99	52.7	8	17.3	4.31	66.8	68.5	4.38	
ved	mg/L	0.05			0.766	5.45	0.0375	0.0539	0.001	12	7.57	0.0035	
	mg/L			0.002	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0	
	mg/L				4.23	1.97	1.59	1.47	0.569	5.44	6.45	0.698	
ed	mg/L				11.1	54	8.57	15.9	11.3	21.5	22	13	
	mg/L		5	0.0047	0.0031	0.001 U	0.0043	0.001 U	0.0025	0.002	0.0027		



Monitoring Wells (with Measured Groundwater Elevation)





Monitoring Wells (with Measured Groundwater Elevation)

Groundwater Elevation Contours

Estimated Flow Path

City Property

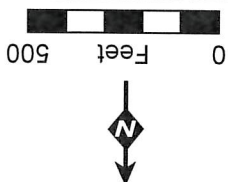
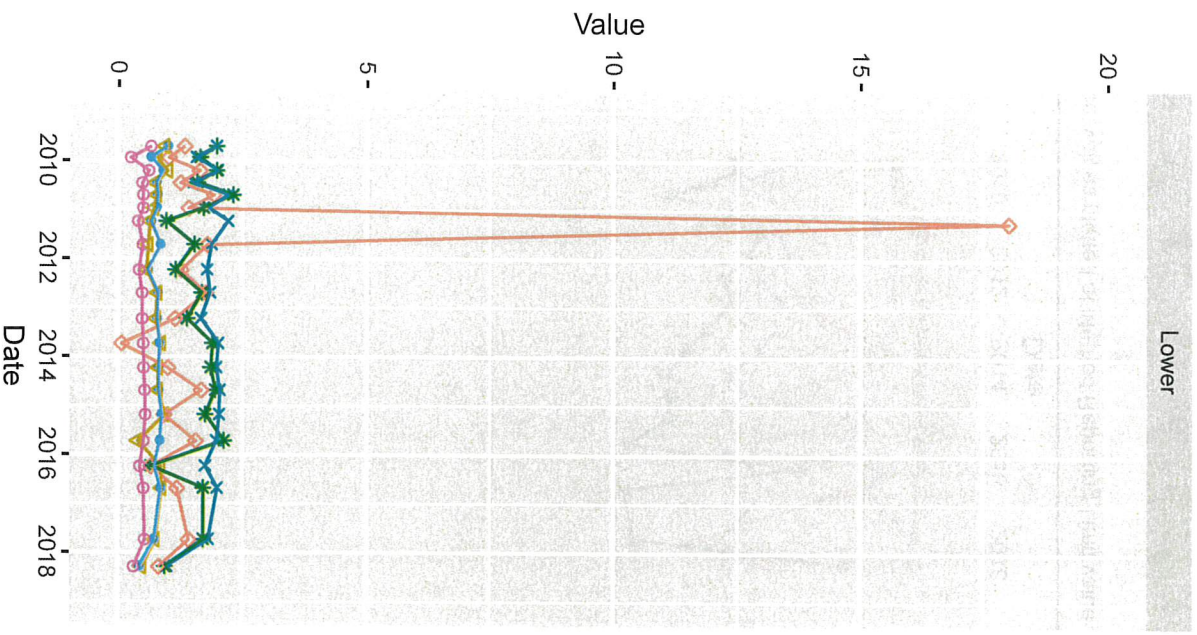
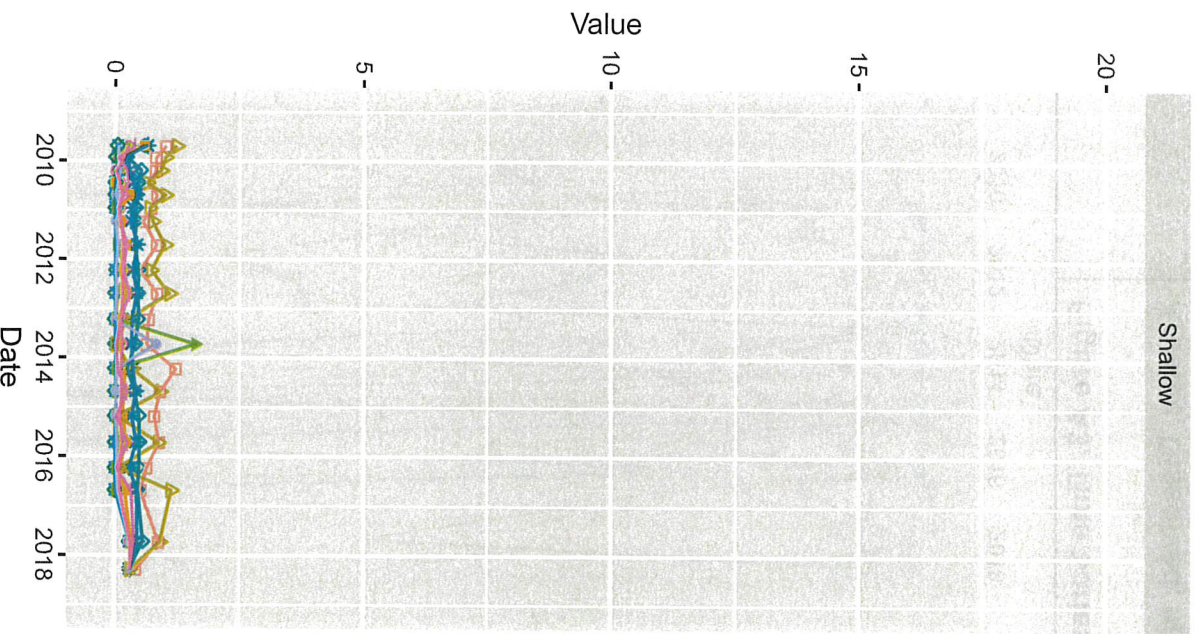


Figure 4
Lower Aquifer
Groundwater Elevations
2018 Q1

Centralia Landfill
Compliance Monitoring



- txtStationID
- B-6DR
 - B-8DR
 - MW-1D
 - MW-2D
 - MW-3D
 - MW-CNE-1D

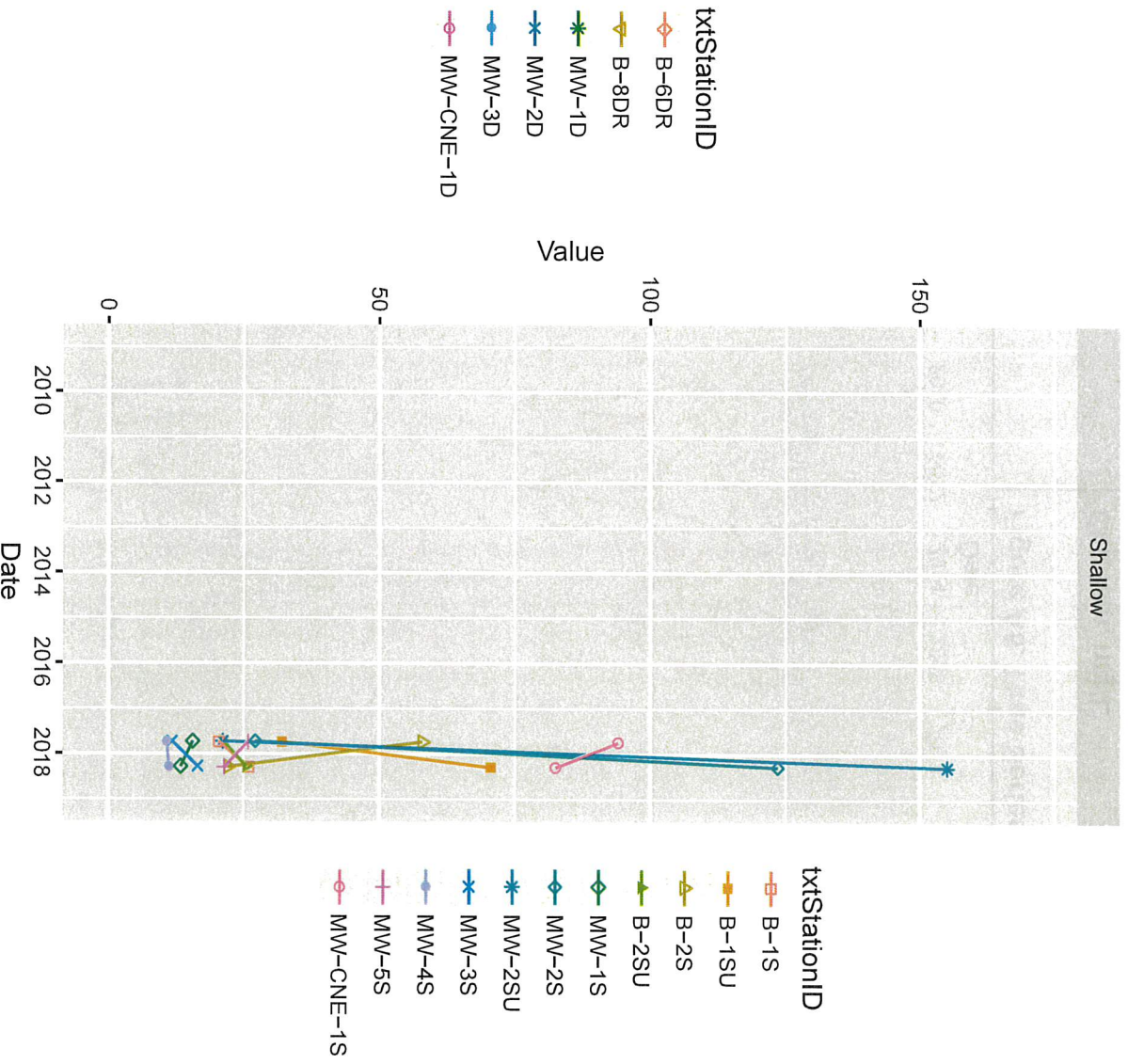
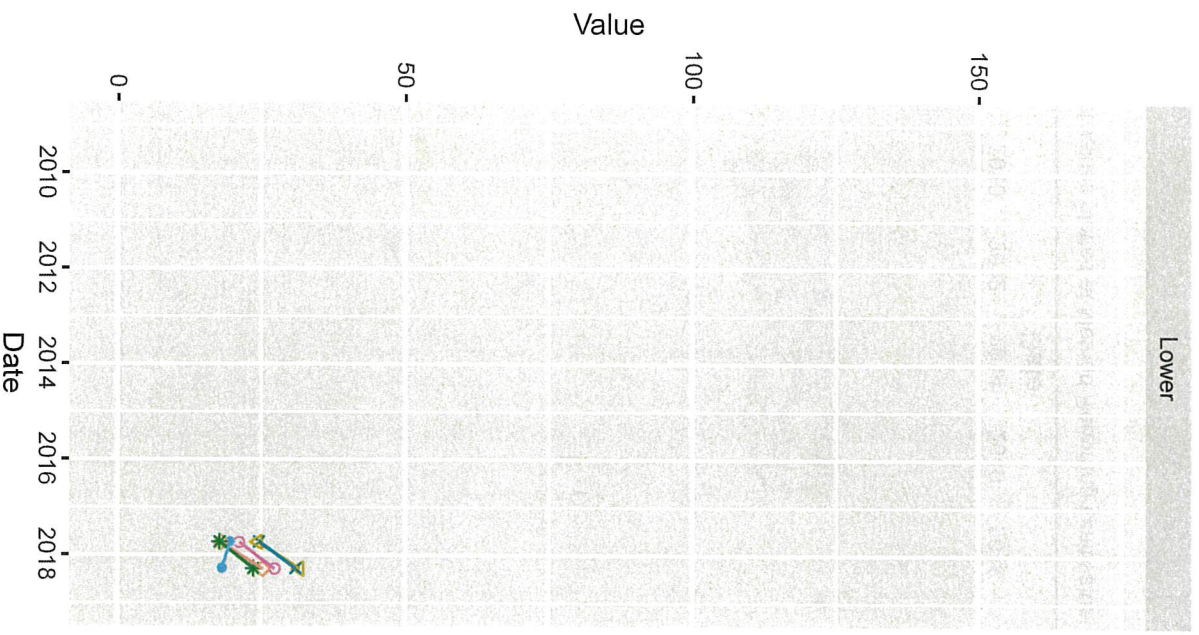


- txtStationID
- B-1S
 - B-1SU
 - B-2S
 - B-2SU
 - MW-1S
 - MW-2S
 - MW-2SU
 - MW-3S
 - MW-4S
 - MW-5S
 - MW-CNE-1S

Non-detect values plotted at Method Reporting Limit value

Figure A2. Time Series

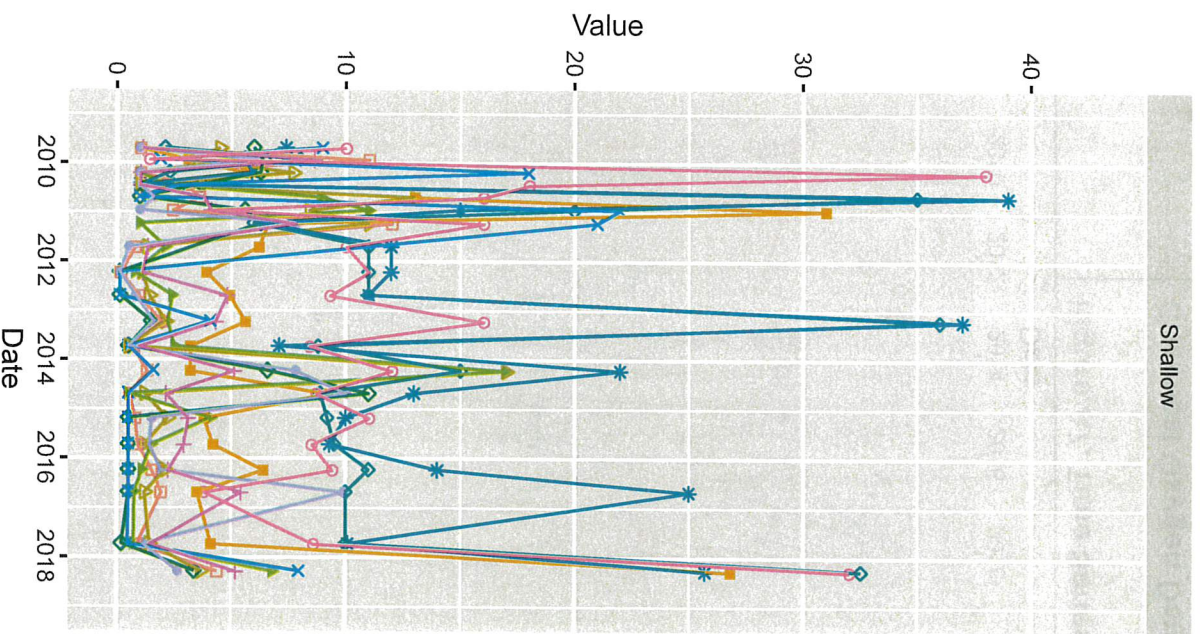
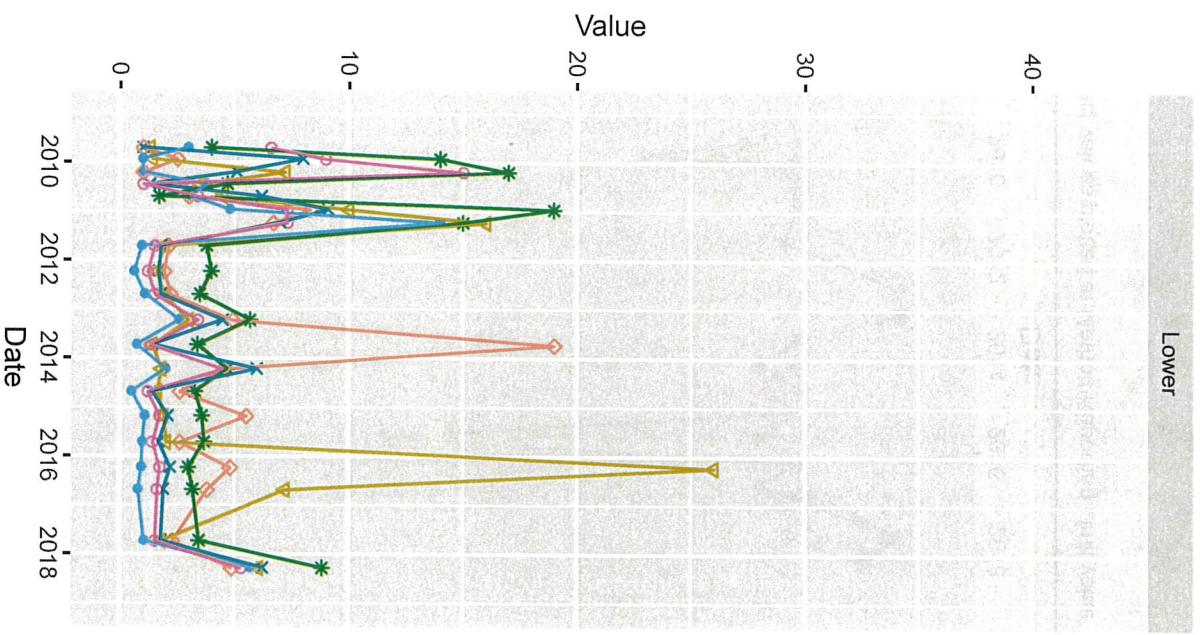
Ammonia as N, Total, mg/L



Non-detect values plotted at Method Reporting Limit value

Figure A4. Time Series

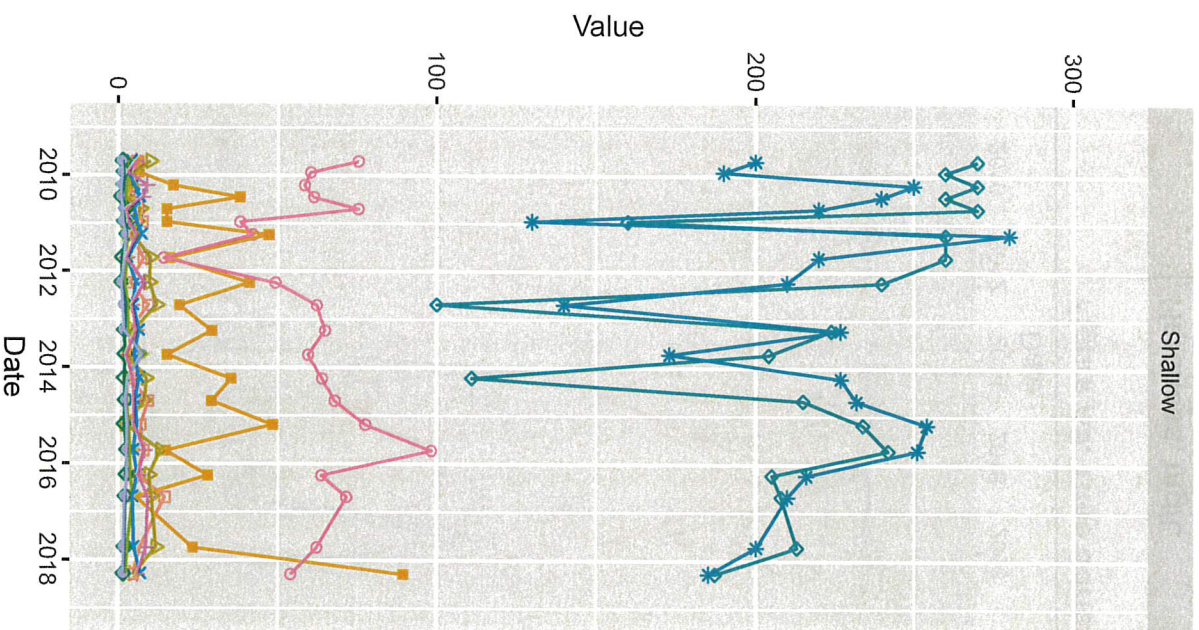
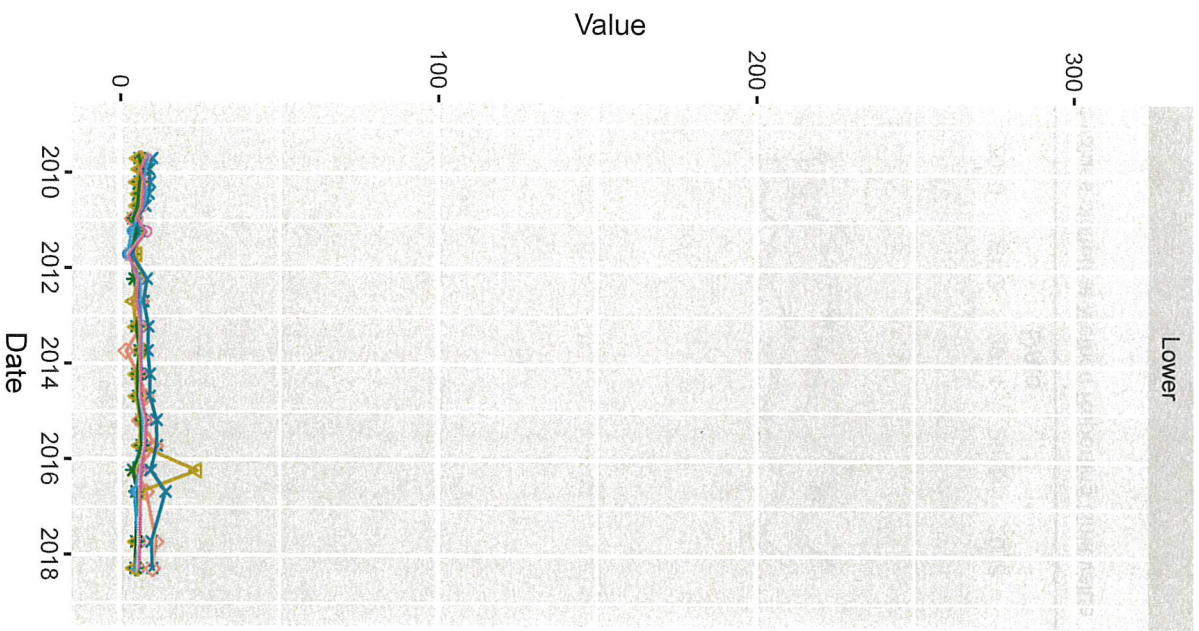
Calcium, Dissolved, mg/L



Non-detect values plotted at Method Reporting Limit value

Figure A6. Time Series

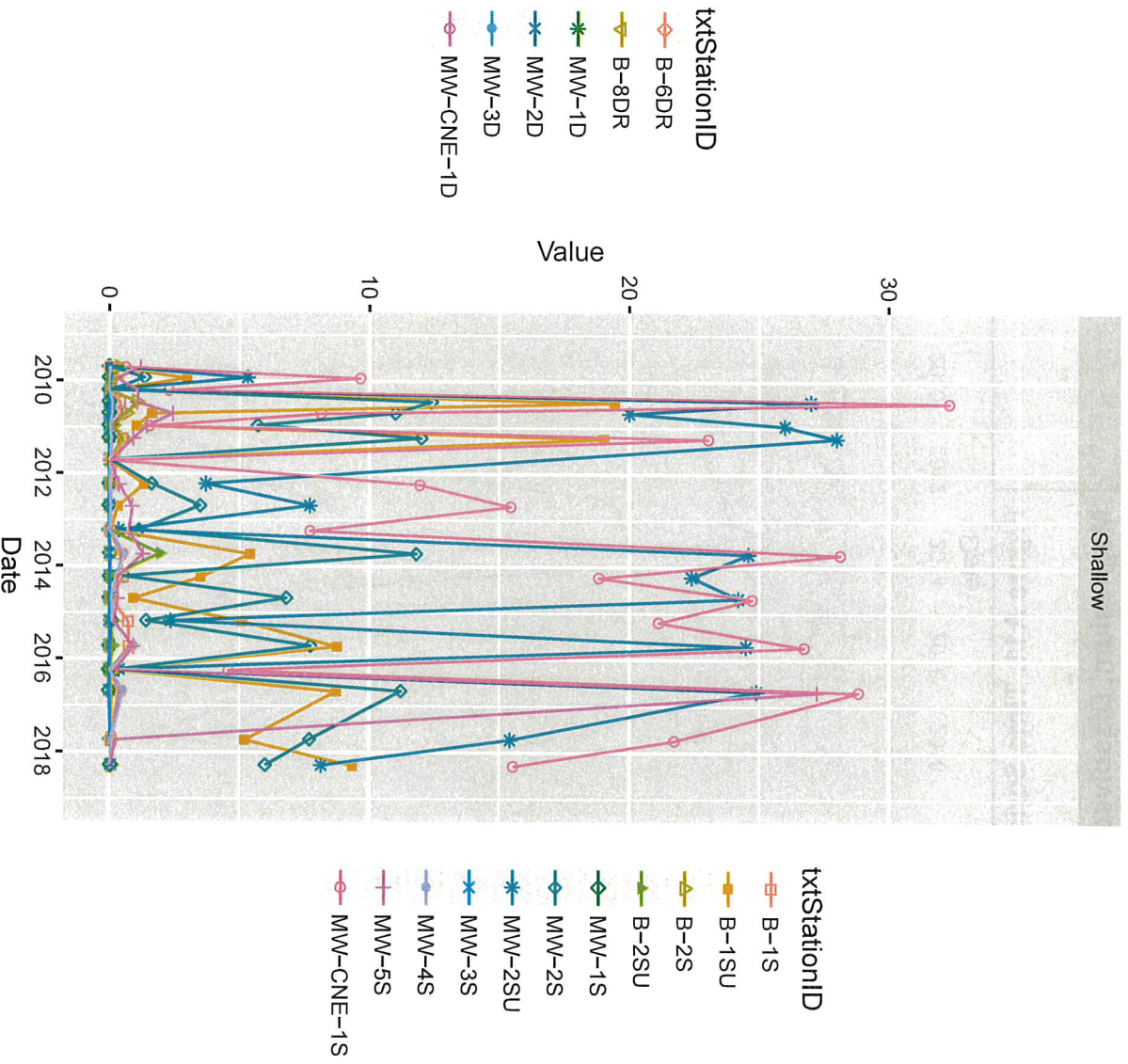
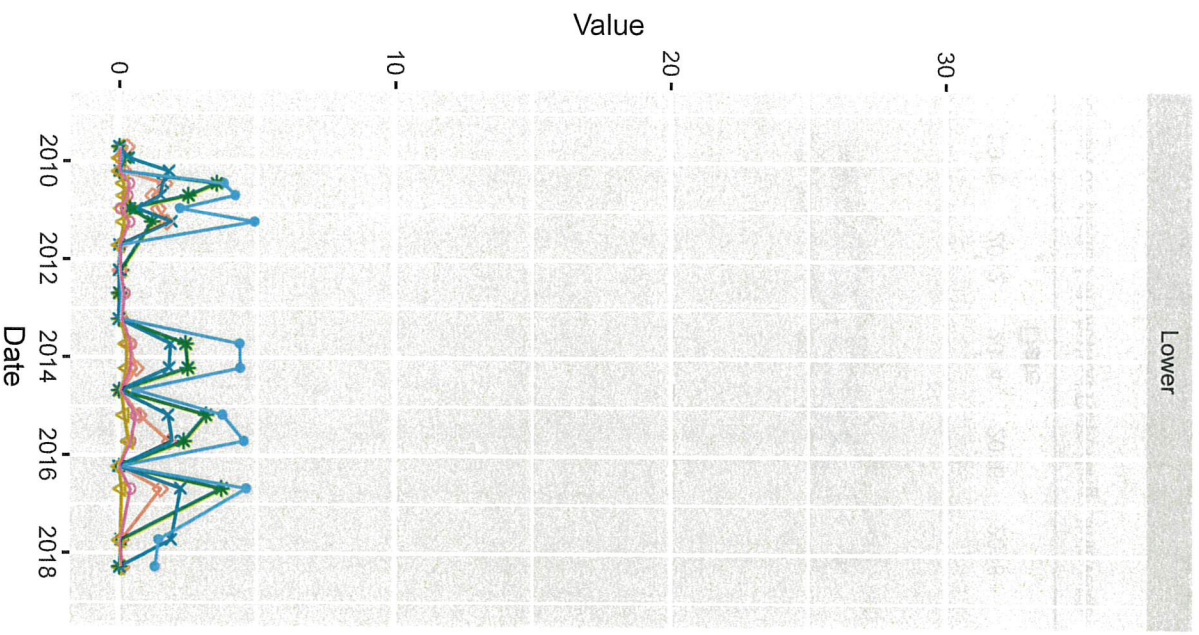
Carbon, Total Organic, mg/L



Non-detect values plotted at Method Reporting Limit value

Figure A8. Time Series

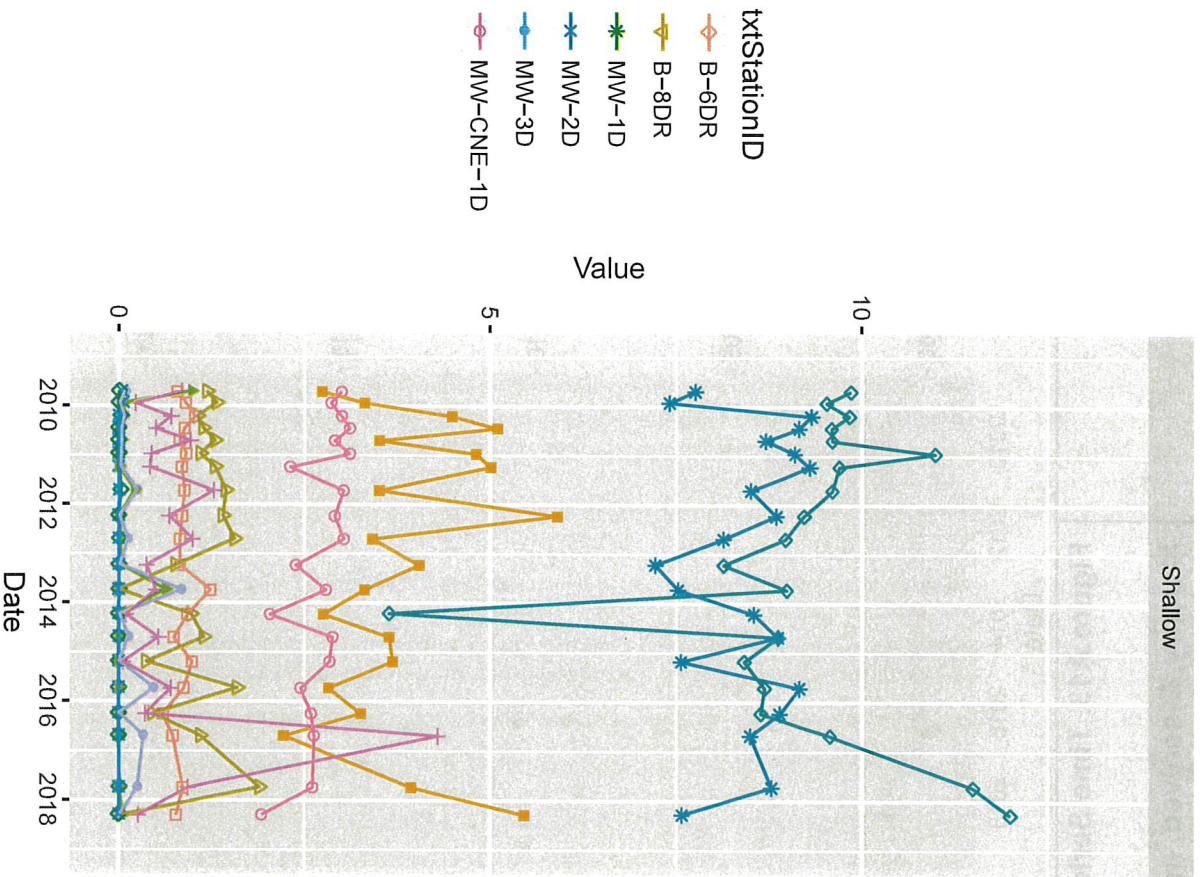
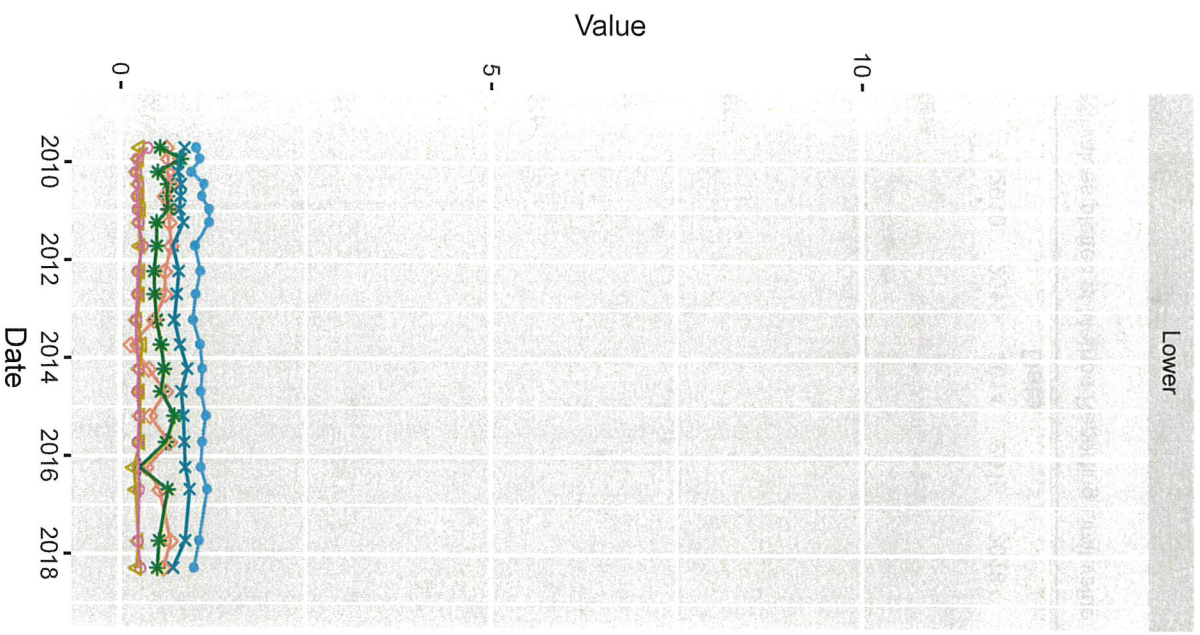
Chloride, mg/L



Non-detect values plotted at Method Reporting Limit value

Figure A10. Time Series

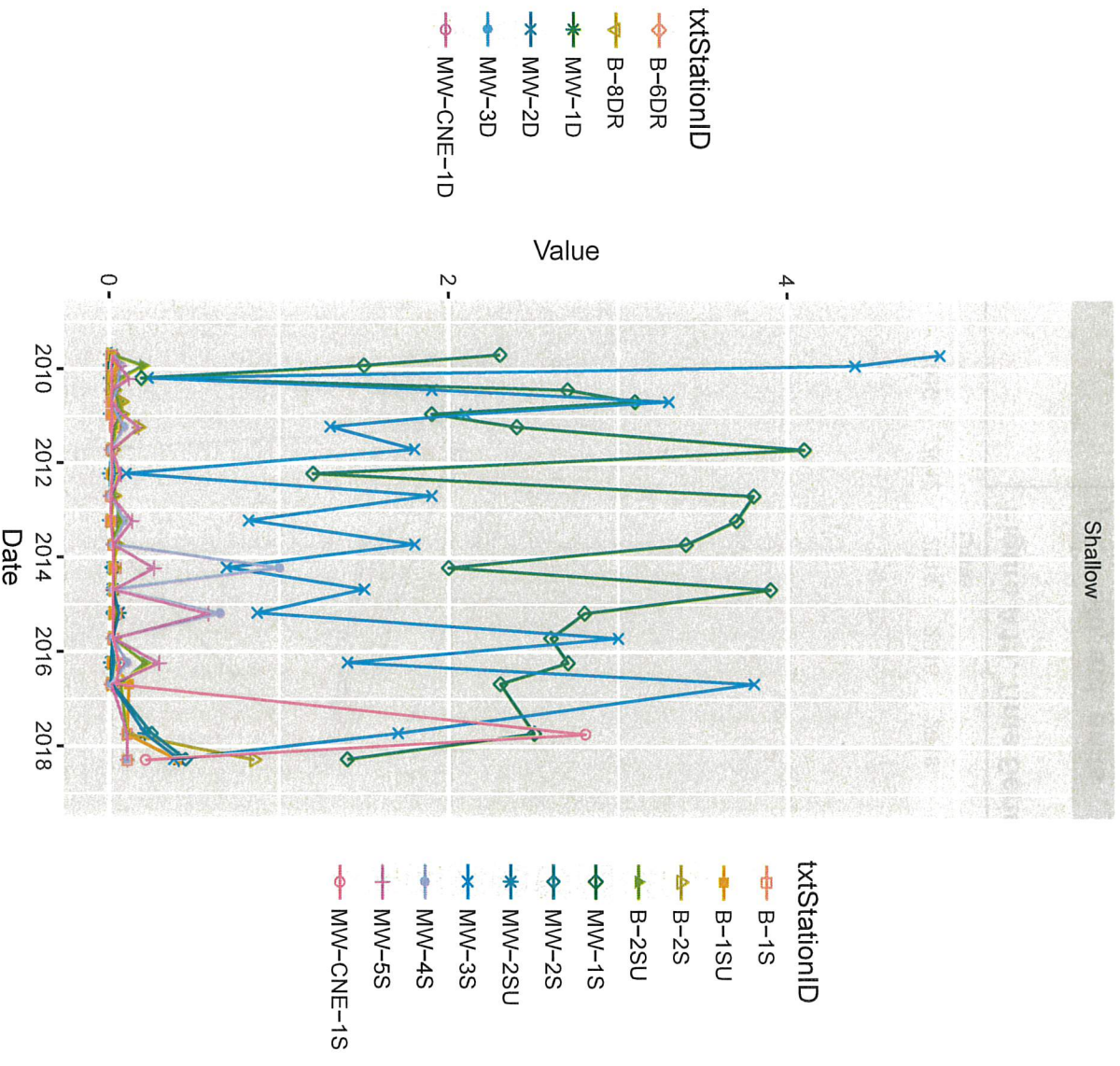
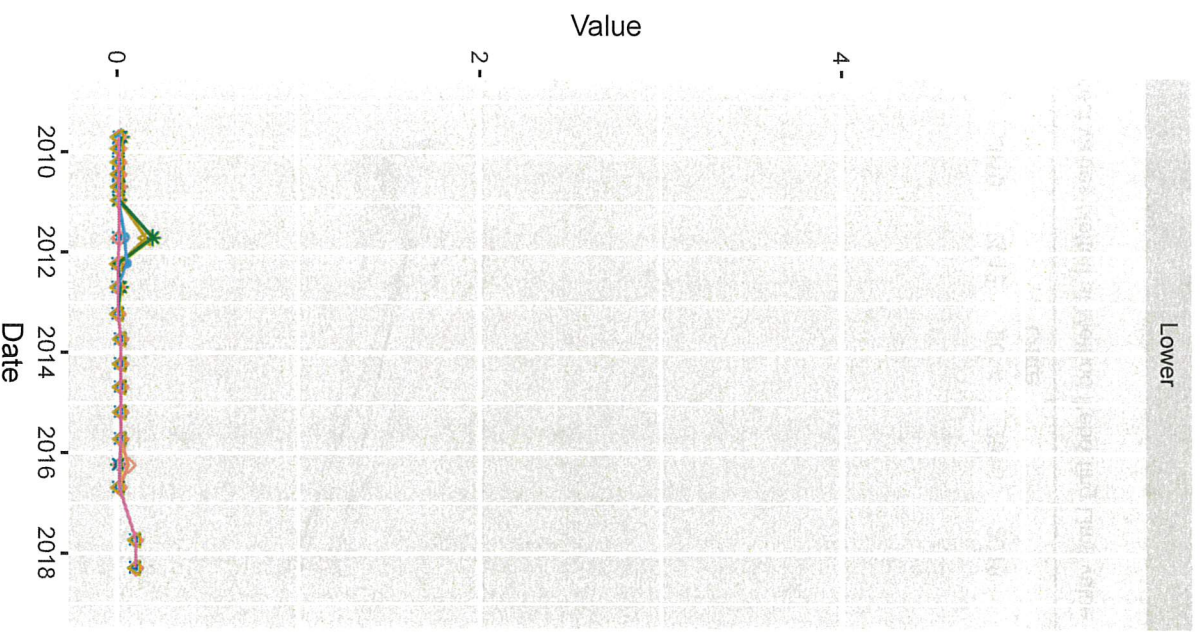
Iron, Dissolved, mg/L



Non-detect values plotted at Method Reporting Limit value

Figure A12. Time Series

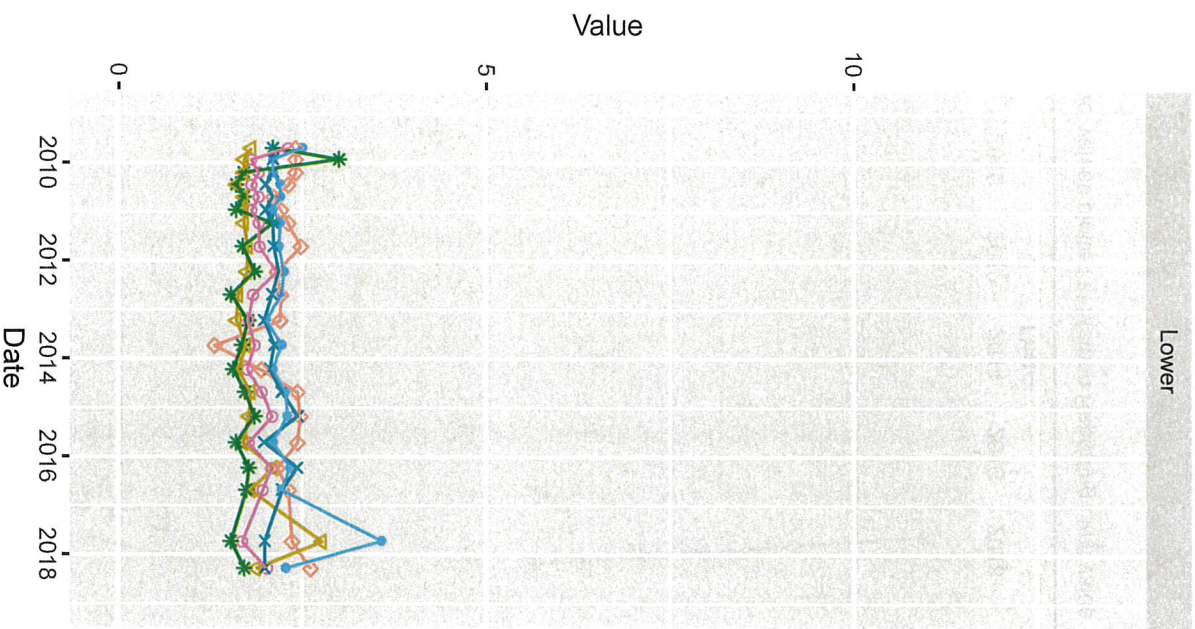
Manganese, Dissolved, mg/L



Non-detect values plotted at Method Reporting Limit value

Figure A14. Time Series

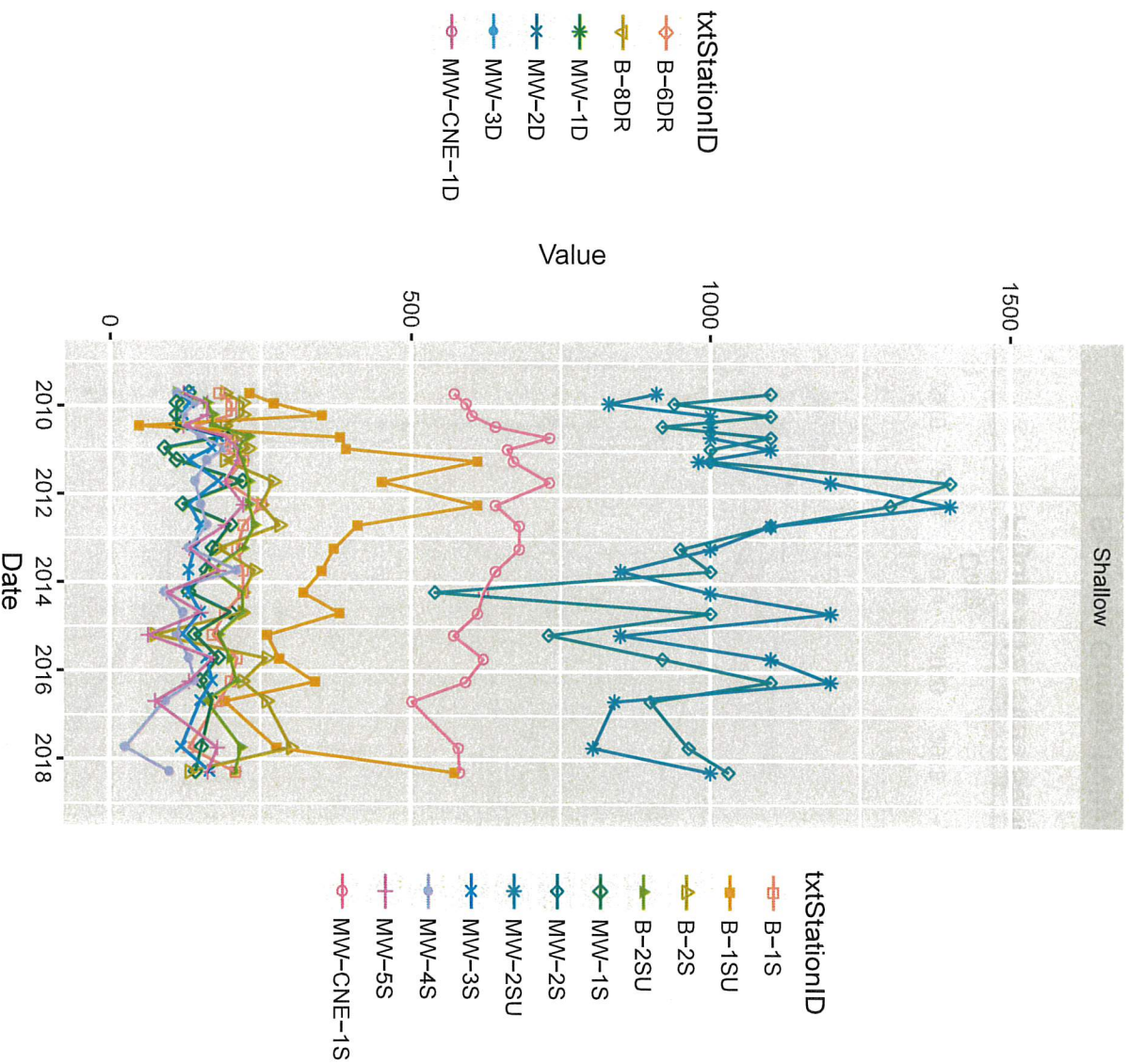
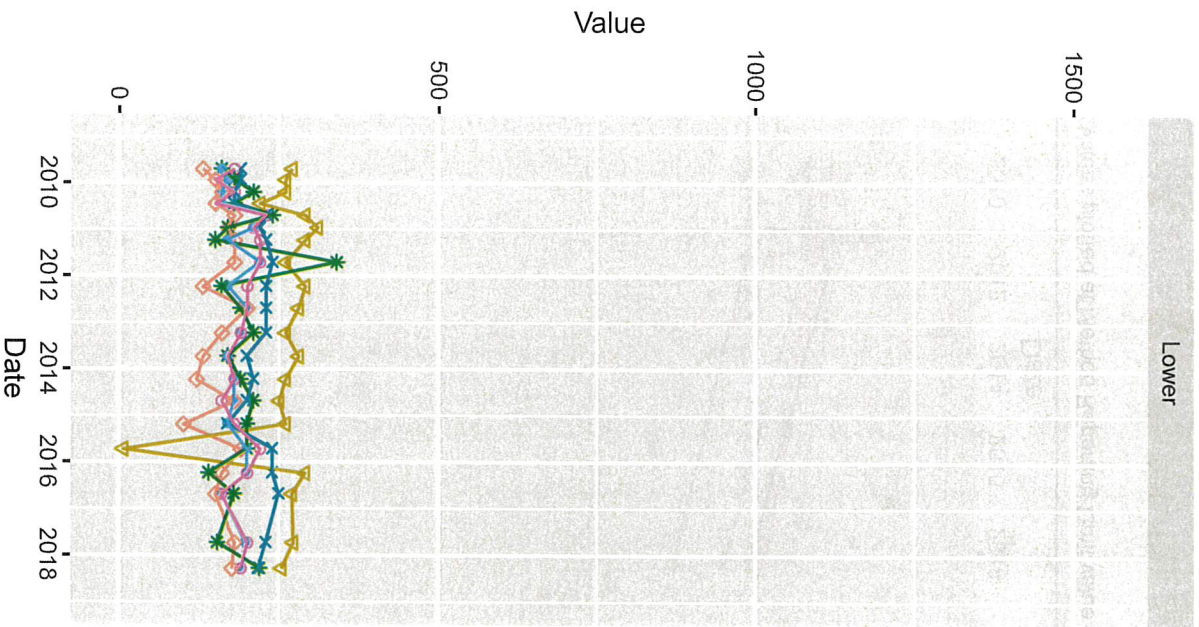
Nitrate+Nitrite as N, mg/L



Non-detect values plotted at Method Reporting Limit value

Figure A16. Time Series

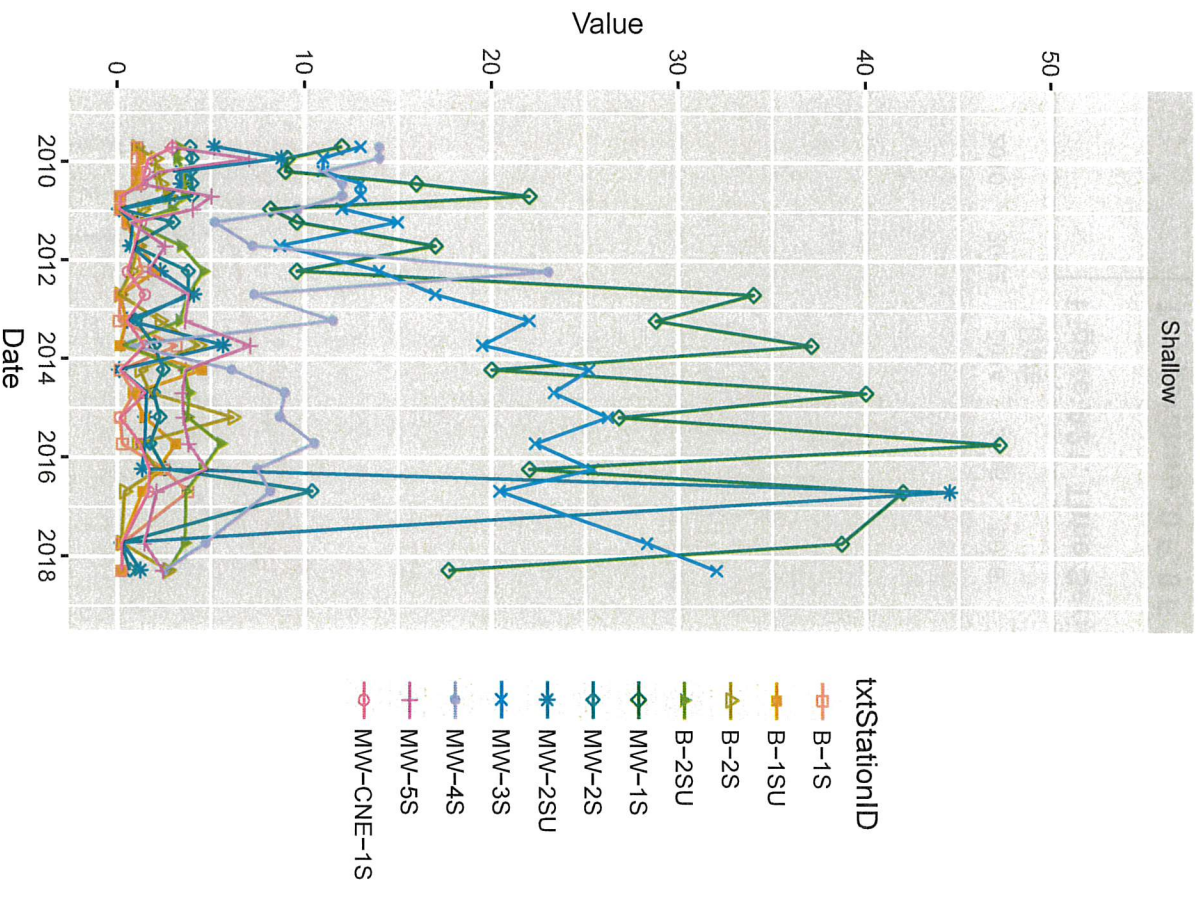
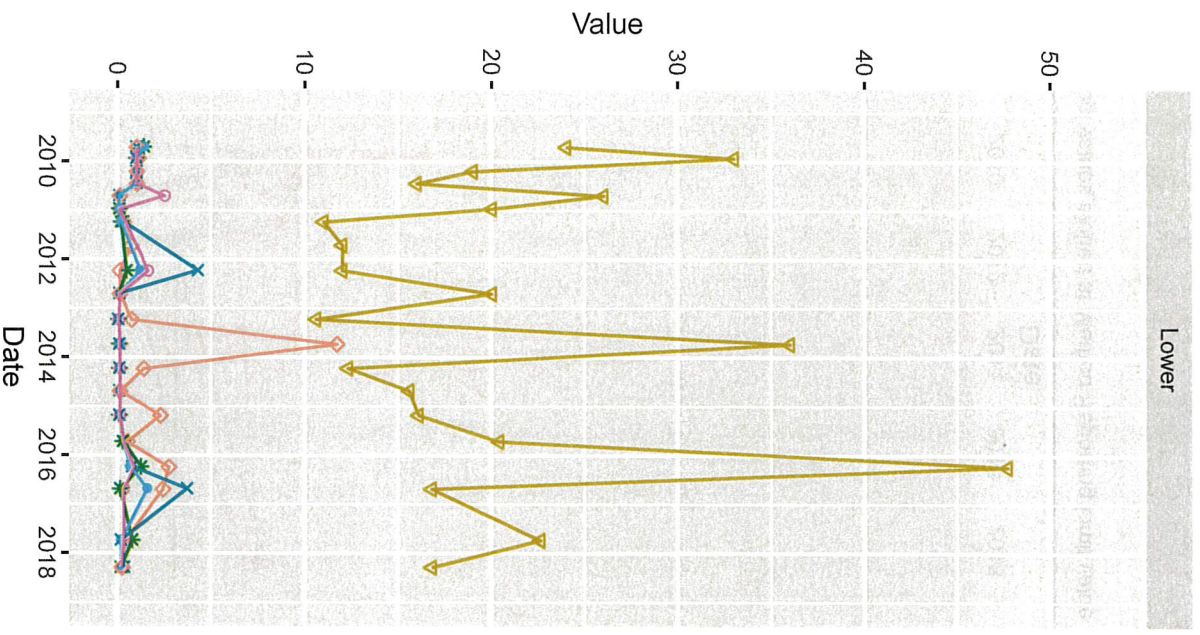
Potassium, Dissolved, mg/L



Non-detect values plotted at Method Reporting Limit value

Figure A18. Time Series

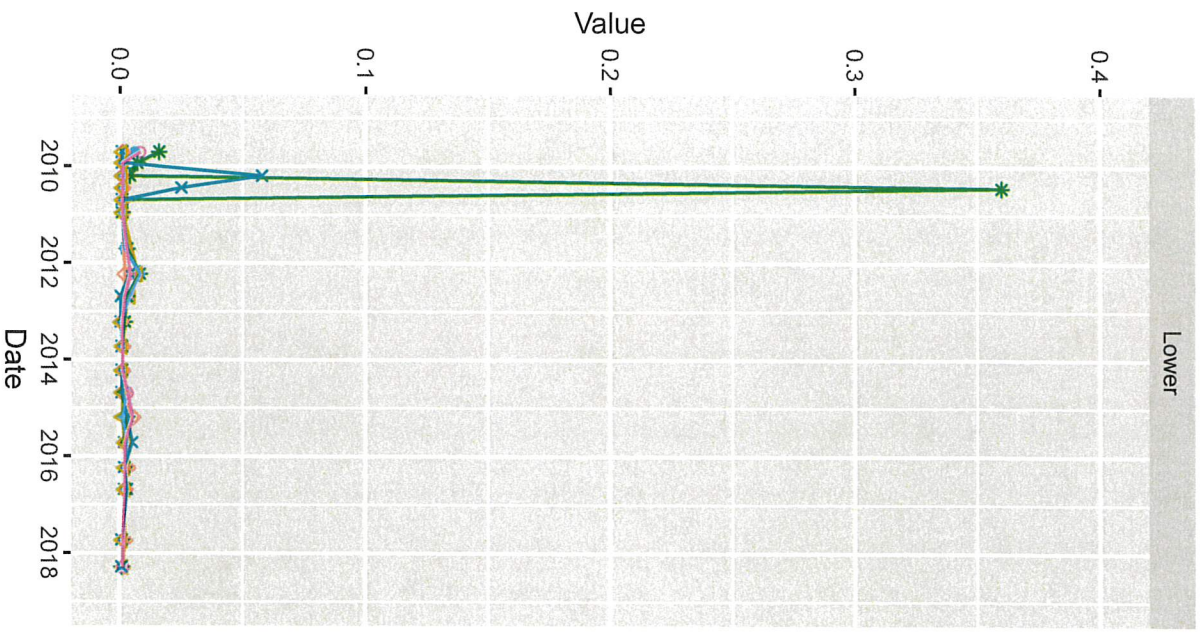
Solids, Total Dissolved, mg/L



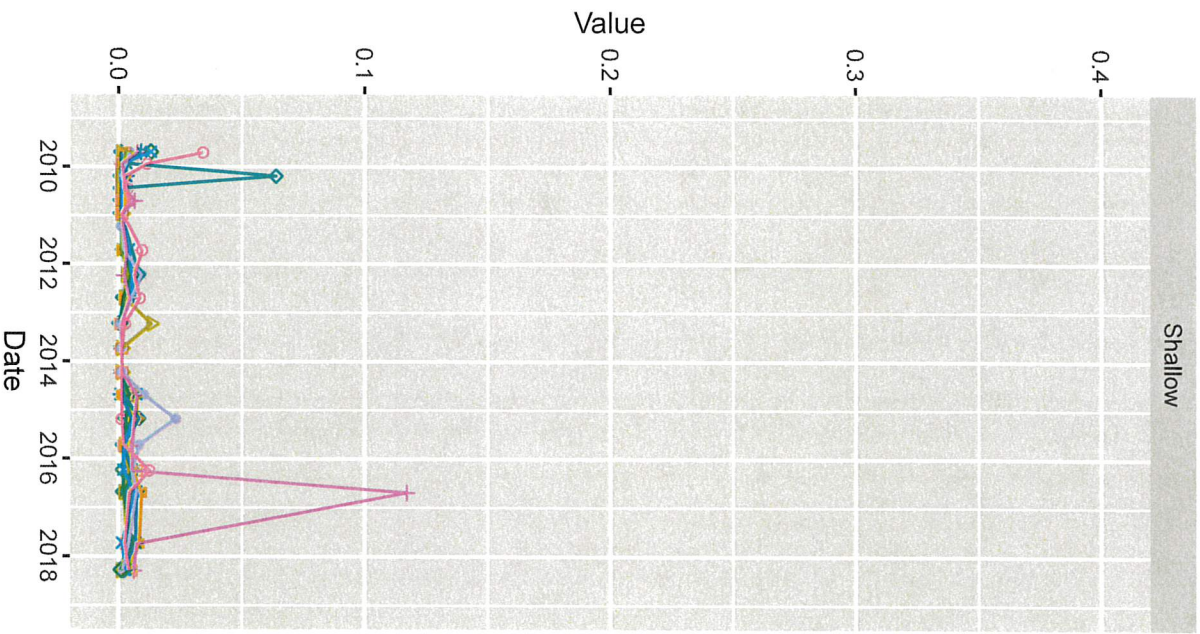
Non-detect values plotted at Method Reporting Limit value

Figure A20. Time Series

Sulfate, mg/L



- txtStationID
- B-6DR
 - B-8DR
 - MW-1D
 - MW-2D
 - MW-3D
 - MW-CNE-1D



- txtStationID
- B-1S
 - B-1SU
 - B-2S
 - B-2SU
 - MW-1S
 - MW-2S
 - MW-2SU
 - MW-3S
 - MW-4S
 - MW-5S
 - MW-CNE-1S

Non-detect values plotted at Method Reporting Limit value

Figure A22. Time Series

Zinc, Dissolved, mg/L