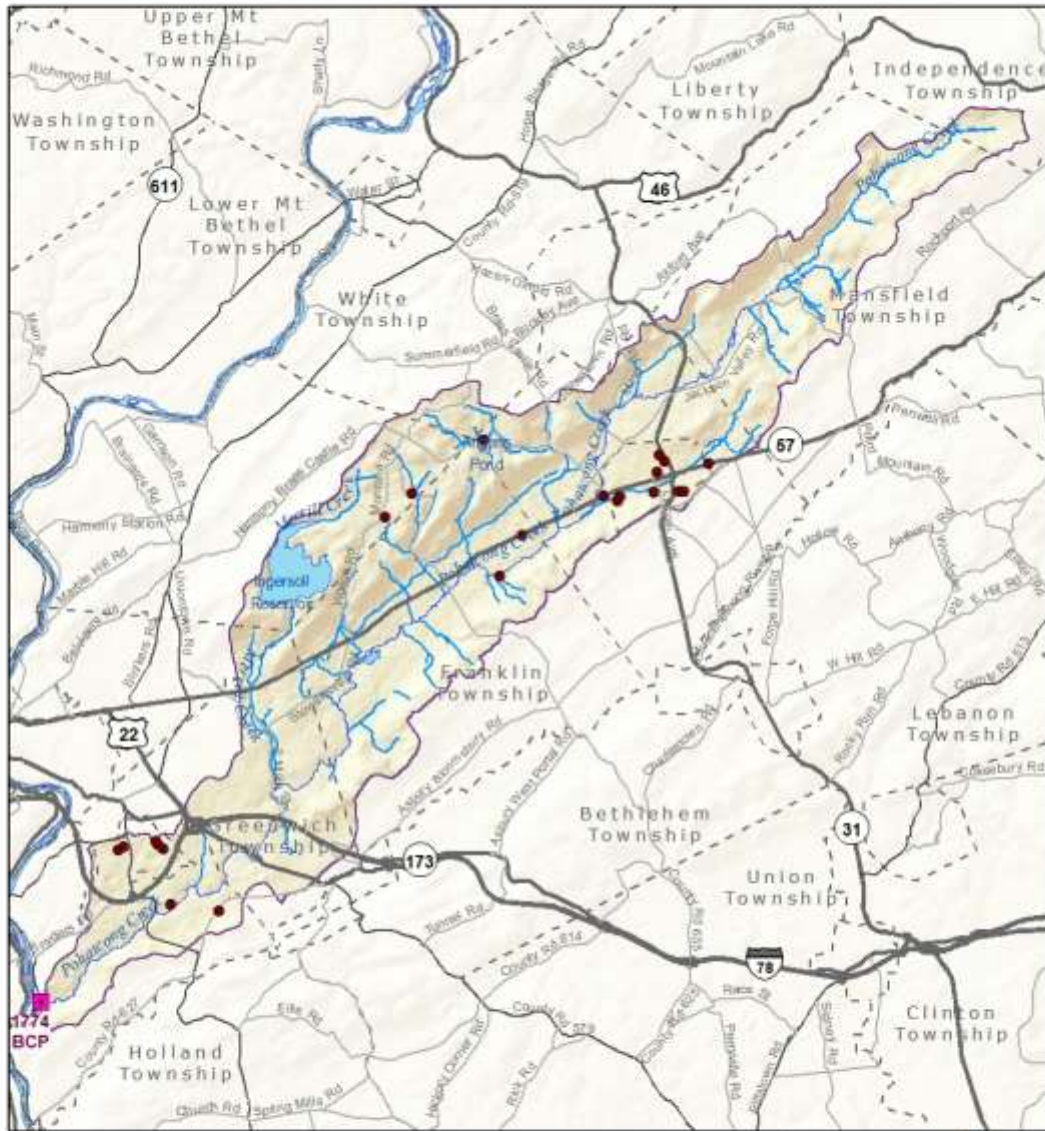


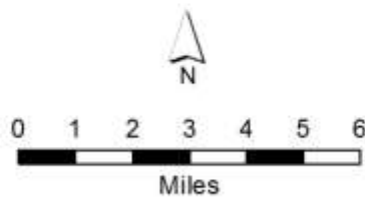
Chapter 16: 1774 BCP Pohatcong Creek, Warren County, NJ



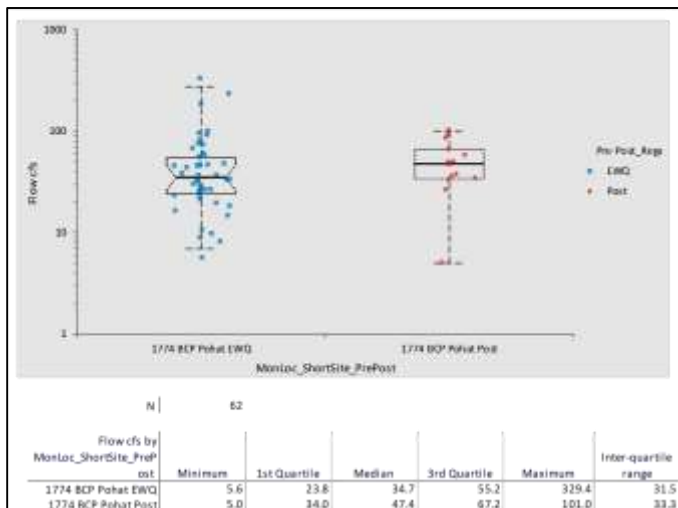
Pohatcong Creek

Drainage Area = 57.1 mi²

- Sampling Location
- NPDES
- ☞ Drainage Area



Analysis of flow differences between the EWQ and post-EWQ periods:



Flow was roughly the same between the EWQ and post-EWQ periods. Fewer samples were collected in the post-EWQ period. The range of flow conditions sampled was wider in the EWQ period, and the post-EWQ data contain fewer samples taken at high and low flow conditions. This is a deficiency that possibly affects the measurable change analyses for those parameters that are flow-related. There were too few samples taken in the post-EWQ period at Pohatcong Creek; sampling should have been biweekly instead of monthly.

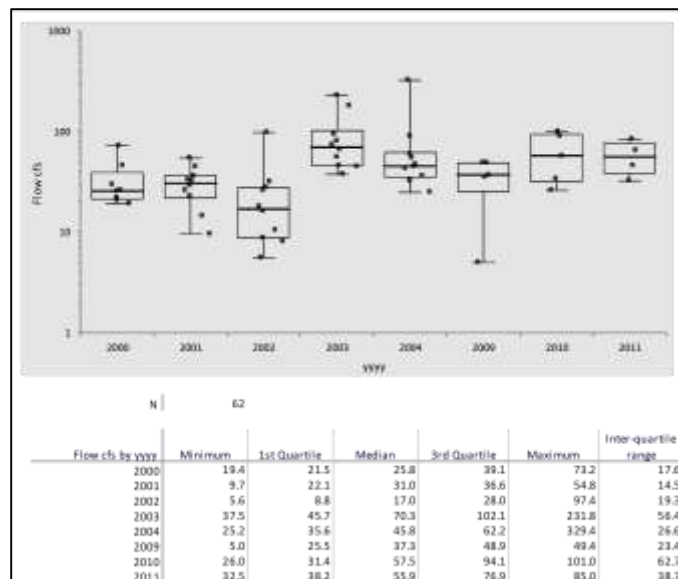
Kruskal-Wallis test

Flow cfs by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	48	130.0	2.71
1774 BCP Pohat Post	14	445.8	31.84

H statistic: 1.77
 X² approximation: 1.77
 DF: 1
 p-value: 0.1835¹

H0: $\theta_1 = \theta_2 = \dots$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.
¹ Do not reject the null hypothesis at the 5% significance level.

The 57.1 square mile Pohatcong Creek watershed is about 49% forested and about 8% urban land cover. Less than 1% of the watershed was affected by glacial activity. About 47% of the watershed is underlain by carbonate bedrock; limestone influence upon water quality is significant. Limestone streams possess high alkalinity, hardness and specific conductance. The watershed has urban and agricultural influences upon water quality as well. DRBC samples at the River Road Bridge near the Delaware River confluence.



Annual May to September flow statistics associated with water quality measurements are plotted above. These are measurements or estimates associated with the time of each water quality sample. Mean annual flow is about 97.3 cfs; and harmonic mean flow is about 73.6 cfs (USGS Stream Stats retrieval, Feb. 2014) which is more typical of summer flow conditions. Though a wide range of flows were sampled by DRBC, these data appear to be most representative of low to normal flow conditions. Flows corresponding to each water quality sample were estimated using a DRBC-constructed rating curve using a benchmark established on the bridge over River Road. In the 2009-2011 time periods many flow estimates were derived from the USGS BaSE* program. There was excellent correspondence between DRBC estimates and BaSE-derived estimates.

*Stuckey, M.H., Koerkle, E.H., and Ulrich, J.E., 2012, Estimation of baseline daily mean streamflows for ungaged locations on Pennsylvania streams, water years 1960–2008: U.S. Geological Survey Scientific Investigations Report 2012–5142, 61 p.)

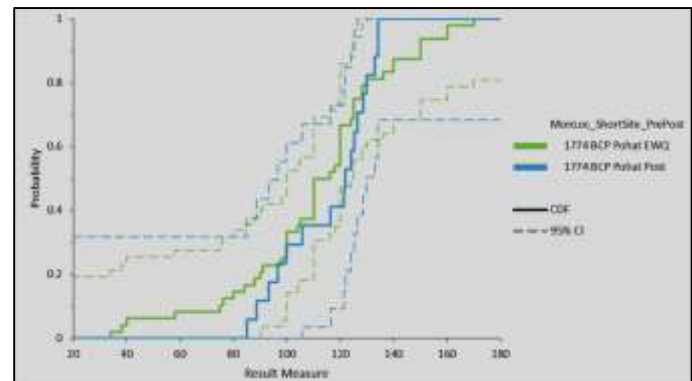
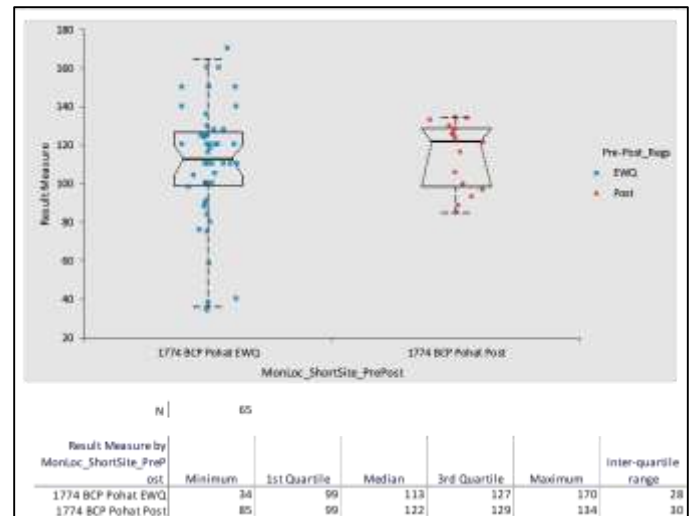
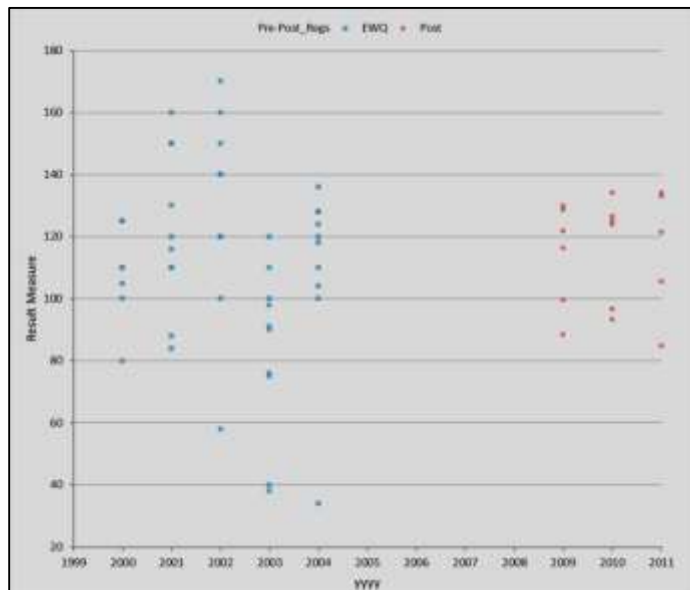
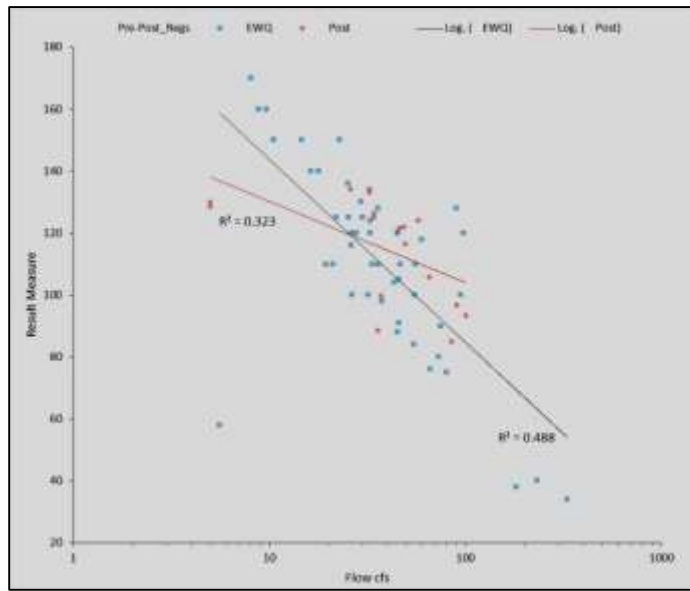
Upstream ICP: Delaware River at Easton 1838 ICP
 Downstream ICP: Del. River at Riegelsville 1748 ICP

Chapter 16: 1774 BCP Pohatcong Creek, NJ

Alkalinity as CaCO₃, Total mg/l

Existing Water Quality (Table 2K):

Median 113 mg/l (typo. error in rules 116 m/l)
 Lower 95% Confidence Interval 104 mg/l
 Upper 95% Confidence Interval 120 mg/l
 Defined in regulations as a flow-related parameter



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	48	46.0	0.96
1774 BCP Pohat Post	17	129.9	7.64

H statistic: 0.49
 X² approximation: 0.49
 DF: 1
 p-value: 0.4825¹

H₀: θ₁ = θ₂ = 0...
 The median of the populations are all equal.
 H₁: θ_i ≠ θ_j for at least one i, j
 The median of the populations are not all equal.
¹ Do not reject the null hypothesis at the 5% significance level.

No water quality degradation is evident here. Alkalinity apparently did not measurably change between the EWQ and post-EWQ periods. However, uncertainty is introduced into this conclusion because of potential laboratory artifacts, insufficient post-EWQ sampling frequency, and flow differences. Alkalinity is inversely related to flow in both data sets. Post-EWQ median alkalinity rose above the upper EWQ 95% confidence interval, but there were insufficient data for statistical significance. There were too few data in the post-EWQ data set to fully represent the flow regime of Pohatcong Creek – there were too few samples taken under high-flow conditions.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

Ammonia Nitrogen as N, Total mg/l

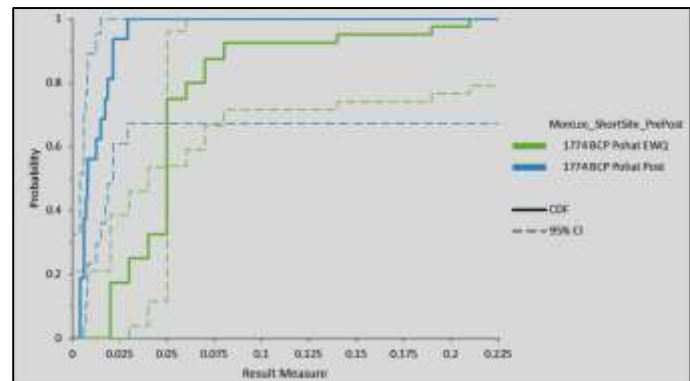
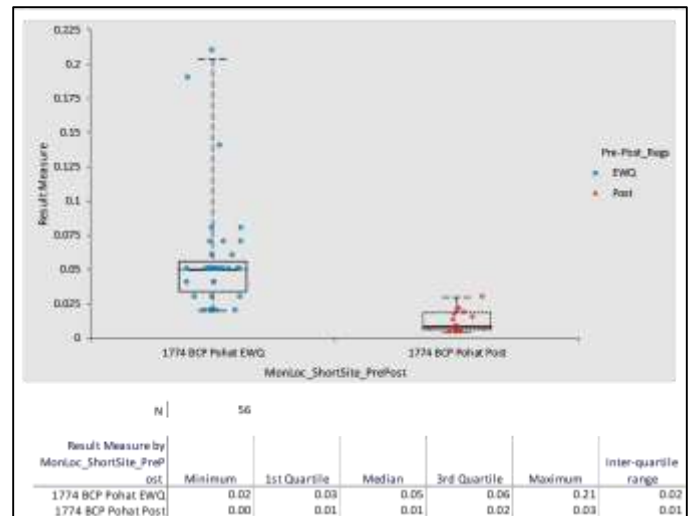
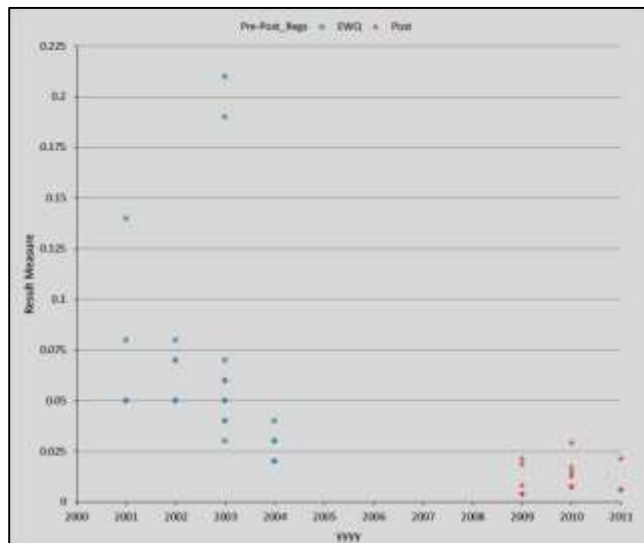
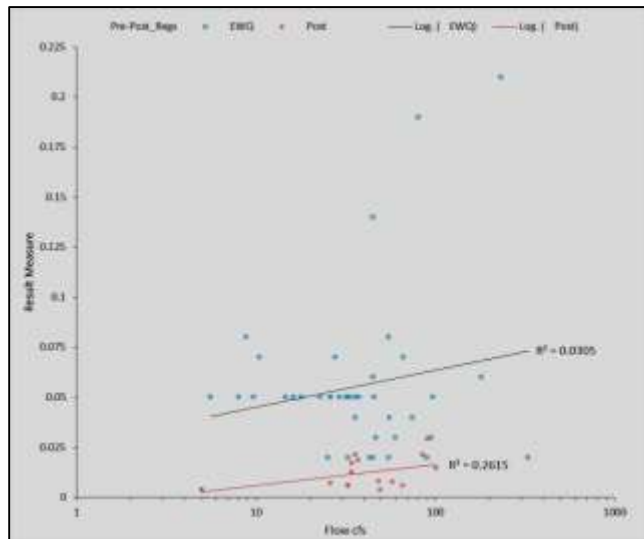
Existing Water Quality (Table 2K):

Median <0.05 mg/l

Lower 95% Confidence Interval <0.05 mg/l

Upper 95% Confidence Interval <0.05 mg/l

Designated in DRBC rules as flow-related



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	40	2235.0	55.88
1774 BCP Pohat Post	16	5587.6	349.22

H statistic | 30.34
 X² approximation | 30.34
 DF | 1
 p-value | <0.0001¹

H0: $\theta_1 = \theta_2 = 0...$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.

¹ Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.

No independent data were available to validate results. DRBC’s post-EWQ detection limit (0.004-0.006 mg/l) was much lower than during the EWQ period (0.02-0.05 mg/l). EWQ data possessed many undetected results (27 of 40 samples), which interfered with calculation of the median. Under 2009-2011 lower detection levels there were still 6/16 undetected results, but the median calculation was unaffected. So rather than a real change in ambient concentrations we are better able to measure actual concentrations. Some water quality improvement may be indicated as the post-EWQ data contained no concentrations greater than 0.03 mg/l.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

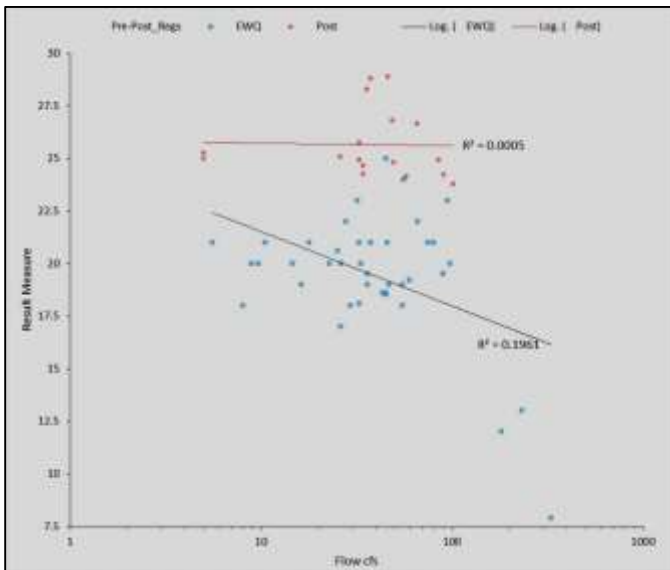
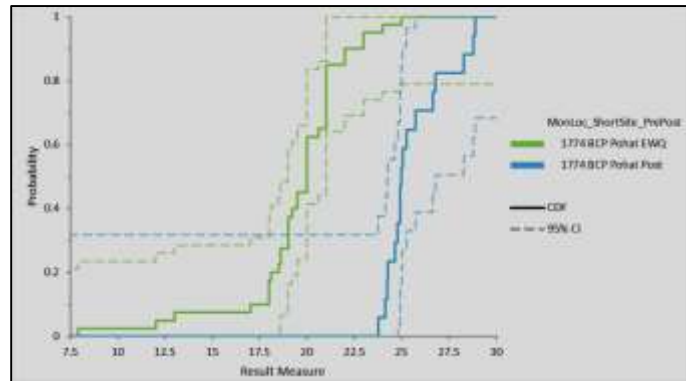
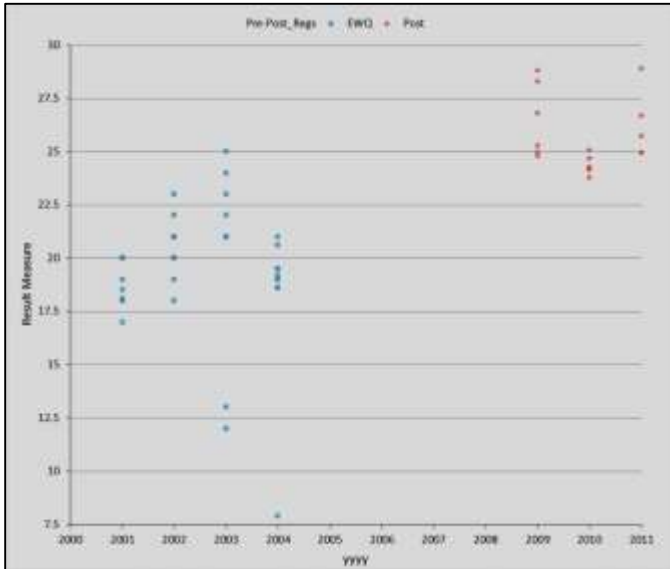
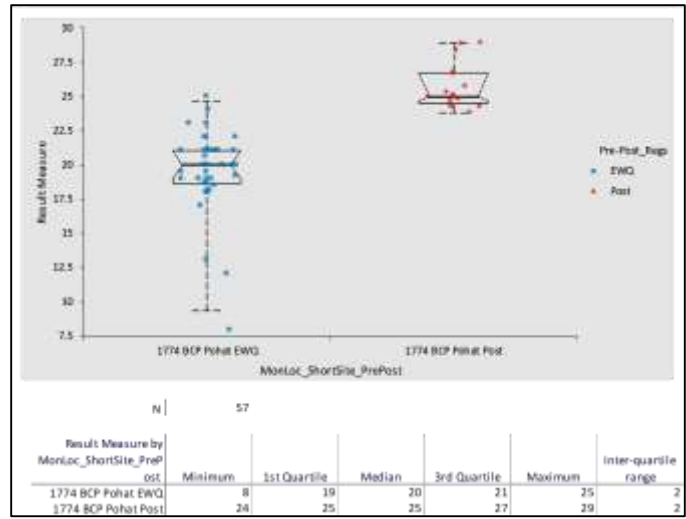
Chloride, Total mg/l

Existing Water Quality (Table 2K):

Median 20 mg/l

Lower 95% Confidence Interval 19 mg/l

Upper 95% Confidence Interval 21 mg/l



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	40	2722.5	68.06
1774 BCP Pohat Post	17	6405.9	376.82

H statistic | 33.31
 X² approximation | 33.31
 DF | 1
 p-value | <0.0001¹

H0: $\theta_1 = \theta_2 = 0...$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.
¹ Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.

Water quality degradation is evident here. Chloride concentrations apparently rose by about 5 mg/l. However, uncertainty is introduced into this conclusion by potential laboratory artifacts, insufficient post-EWQ sampling frequency, and flow differences. Post-EWQ median concentration rose above the EWQ upper 95% confidence interval. Chloride concentration is unrelated to flow in this data set. No independent data were available to validate these results.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

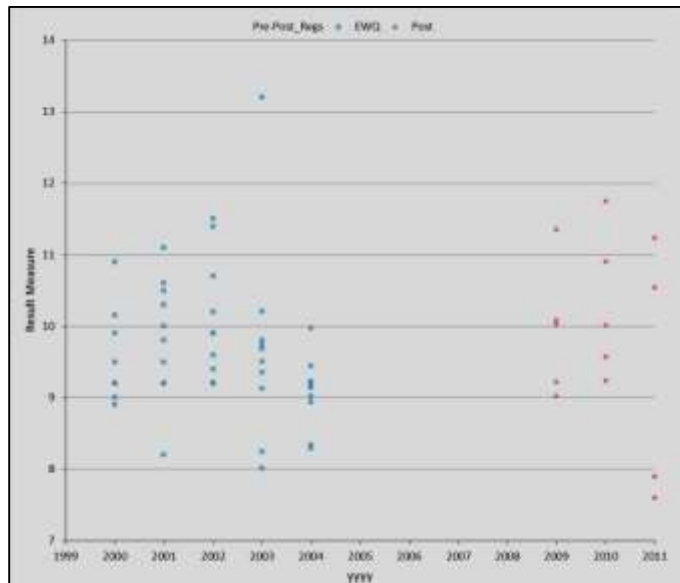
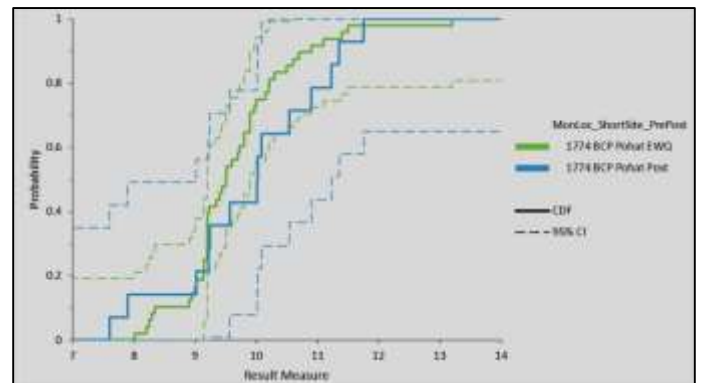
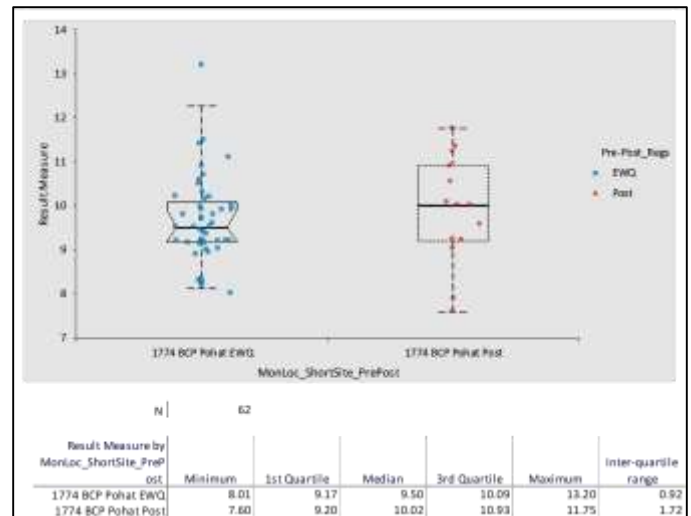
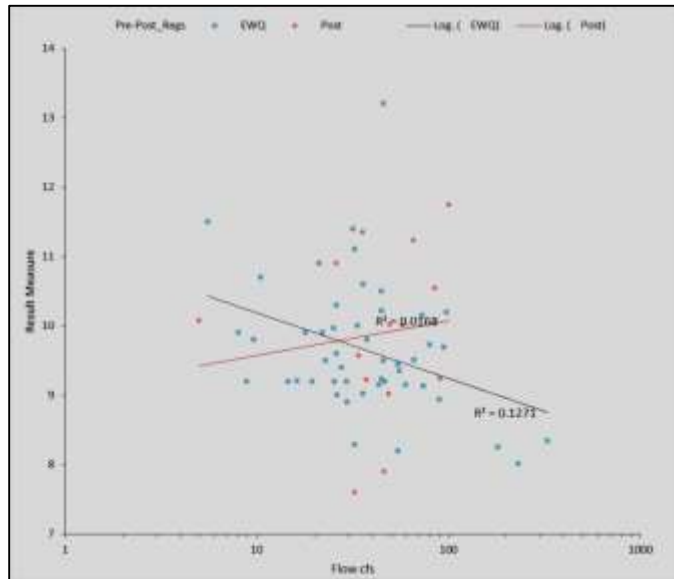
Dissolved Oxygen (DO) mg/l

Existing Water Quality (Table 2K):

Median 9.50 mg/l

Lower 95% Confidence Interval 9.20 mg/l

Upper 95% Confidence Interval 9.90 mg/l



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	48	93.5	1.95
1774 BCP Pohat Post	14	320.6	22.90

H statistic 1.27
 X² approximation 1.27
 DF 1
 p-value 0.2591¹

H0: $\theta_1 = \theta_2 = 0...$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.
¹ Do not reject the null hypothesis at the 5% significance level.

No water quality degradation is evident here. No measurable change took place between the EWQ and Post-EWQ periods. Uncertainty is introduced into this conclusion by insufficient post-EWQ sampling frequency and flow differences. Post-EWQ median DO concentration was above the EWQ upper 95% confidence interval but the increase was not statistically significant due to too few post-EWQ samples. Such an increase would represent an improvement to water quality anyway. DO concentration is unrelated to flow in both data sets.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

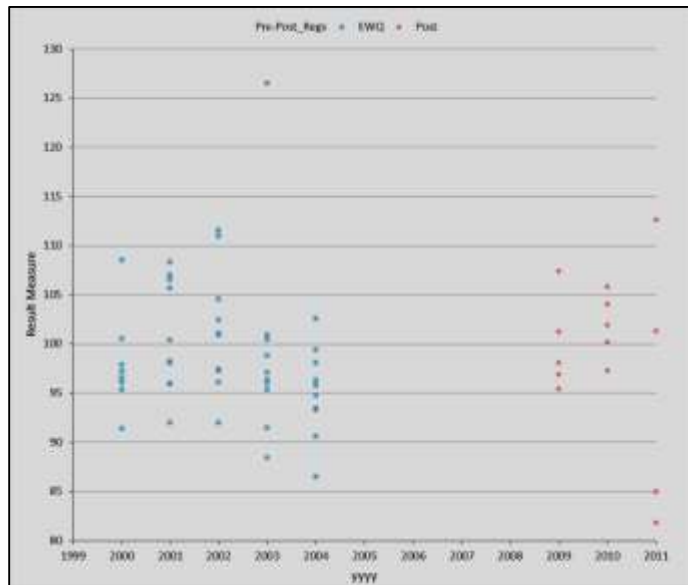
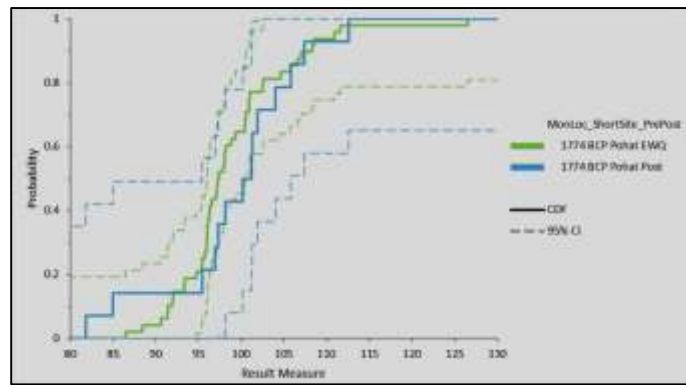
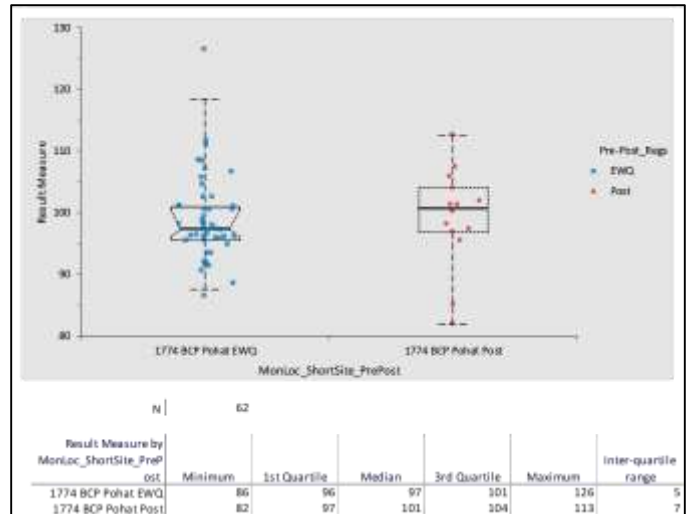
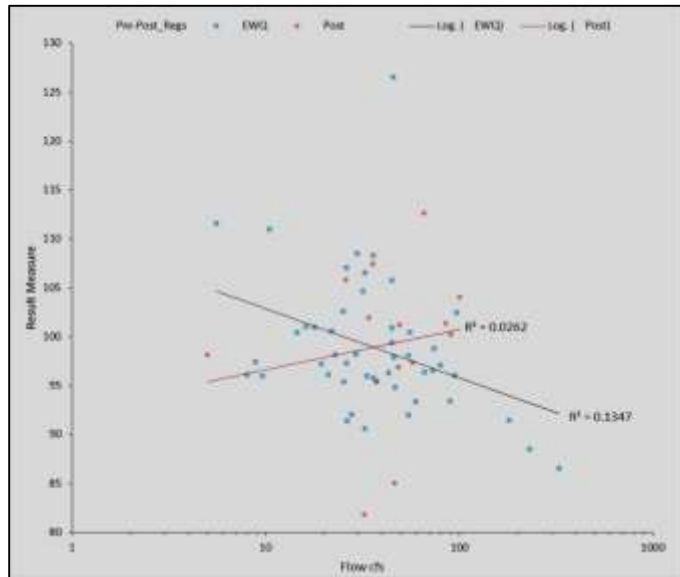
Dissolved Oxygen Saturation %

Existing Water Quality (Table 2K):

Median 97%

Lower 95% Confidence Interval 96%

Upper 95% Confidence Interval 100%



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	48	77.5	1.62
1774 BCP Pohat Post	14	265.8	18.98

H statistic | 1.05
 X² approximation | 1.05
 DF | 1
 p-value | 0.3044¹

H0: $\theta_1 = \theta_2 = 0...$

The median of the populations are all equal.

H1: $\theta_i \neq \theta_j$ for at least one i,j

The median of the populations are not all equal.

¹ Do not reject the null hypothesis at the 5% significance level.

No water quality degradation is evident here. Dissolved Oxygen Saturation is unrelated to flow, and did not measurably change between the EWQ and post-EWQ periods. Uncertainty is introduced into this conclusion by insufficient post-EWQ sampling frequency and flow differences. Post-EWQ median DO saturation increased above the upper EWQ 95% confidence interval but the increase was not statistically significant due to too few post-EWQ samples. An increase in DO saturation would represent a water quality improvement anyway.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

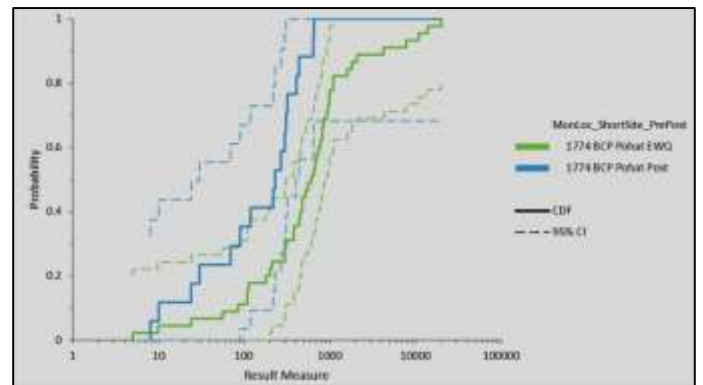
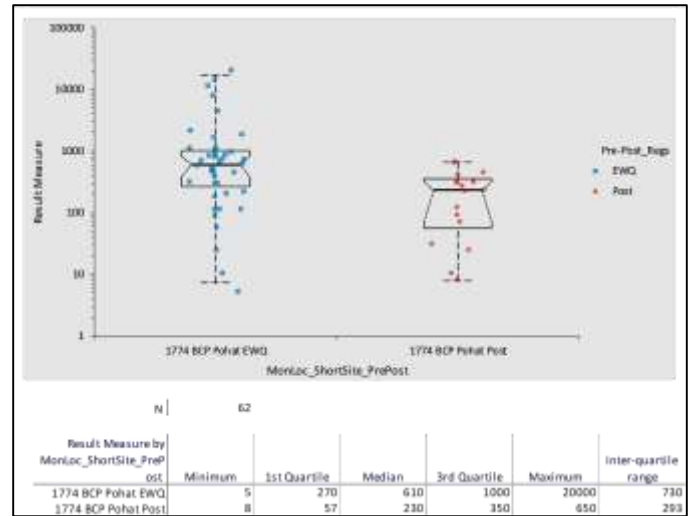
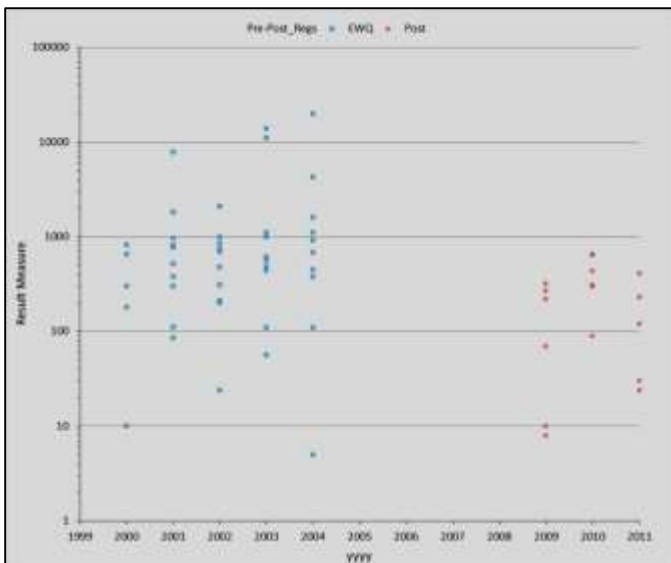
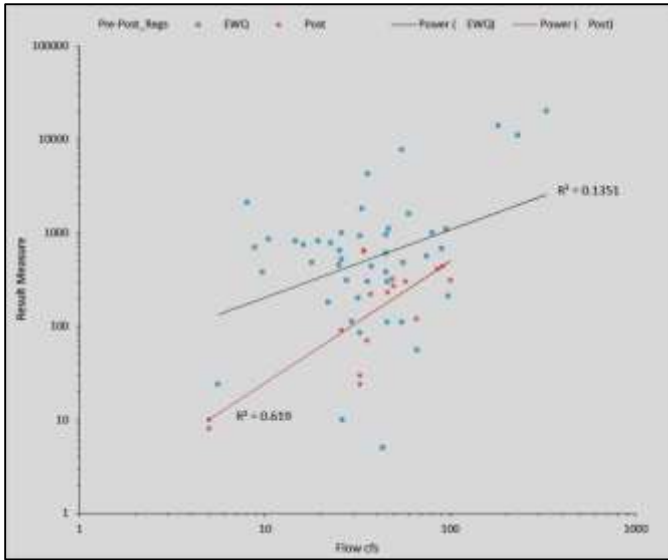
Enterococcus colonies/100 ml

Existing Water Quality (Table 2K):

Median 610/100 ml

Lower 95% Confidence Interval 380/100 ml

Upper 95% Confidence Interval 820/100 ml



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	45	947.6	21.06
1774 BCP Pohat Post	17	2508.4	147.55

H statistic | 10.62
 X² approximation | 10.62
 DF | 1
 p-value | 0.0011¹

H0: $\theta_1 = \theta_2 = 0...$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.

¹ Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.

Uncertainty is introduced into this conclusion by potential laboratory artifacts, insufficient post-EWQ sampling frequency and flow differences. Enterococcus concentrations are weakly related to flow in the EWQ data set, but positively related to flow in the post-EWQ data – but only because of a pair of influential low values. Concentrations and flows are plotted on a logarithmic scale, and the regression is a power relationship. Post-EWQ median enterococcus concentrations fell below the lower EWQ 95% confidence interval.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

Escherichia coli colonies/100 ml

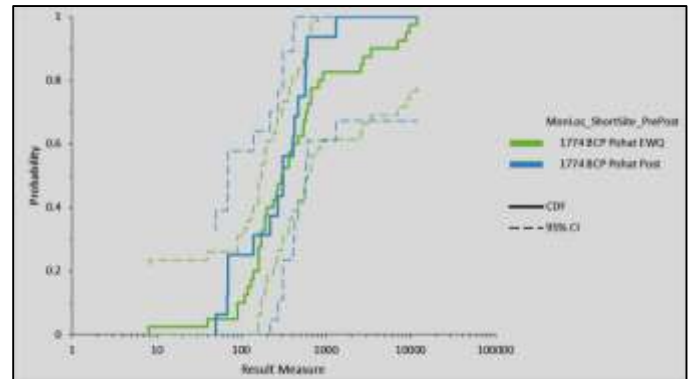
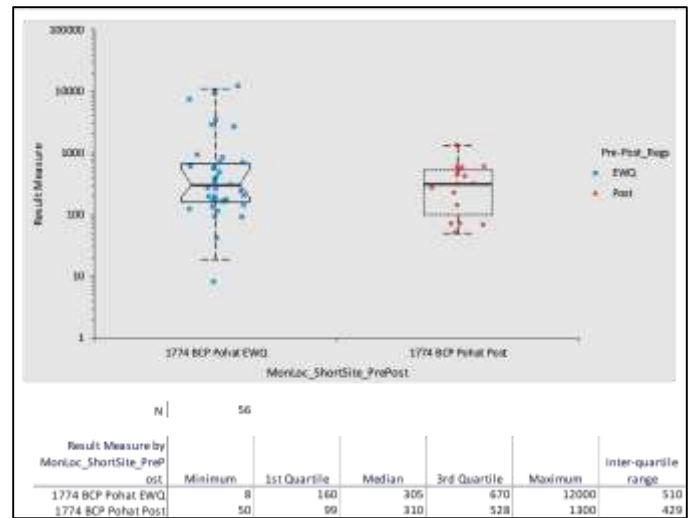
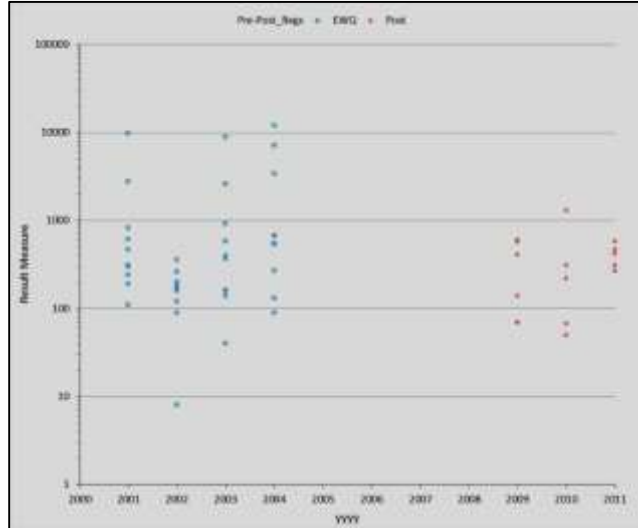
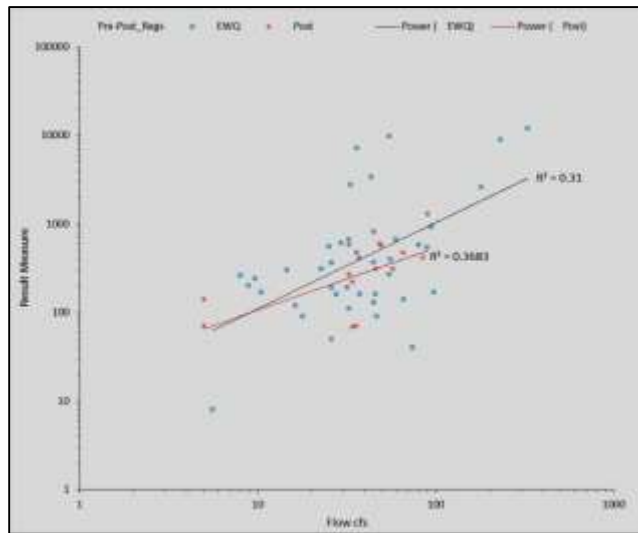
Existing Water Quality (Table 2K):

Median 305/100 ml

Lower 95% Confidence Interval 190/100 ml

Upper 95% Confidence Interval 550/100 ml

Designated in DRBC rules as flow-related



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EwQ	40	42.0	1.05
1774 BCP Pohat Post	16	105.1	6.57

H statistic: 0.55
 X² approximation: 0.55
 DF: 1
 p-value: 0.4570¹

H0: $\theta_1 = \theta_2 = \theta_3$...
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.

¹ Do not reject the null hypothesis at the 5% significance level.

No water quality degradation is evident here. E. coli concentrations apparently did not measurably change between the EWQ and Post-EWQ periods. Uncertainty is introduced into this conclusion by potential laboratory artifacts, insufficient post-EWQ sampling frequency and flow differences.

Post-EWQ median E. coli fell within the EWQ 95% confidence intervals. Concentrations and flows are plotted on a logarithmic scale. E. coli concentrations are weakly related to flow in both data sets. No independent data were available to validate these results.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

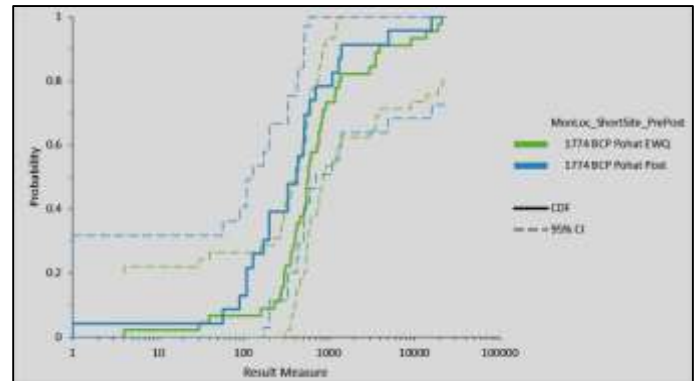
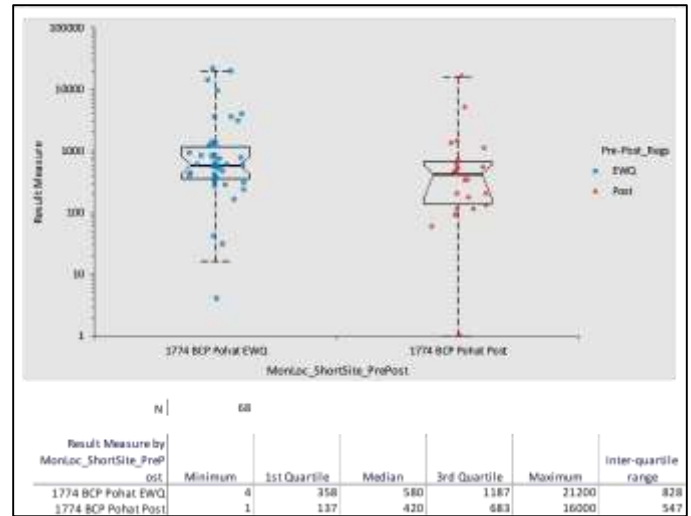
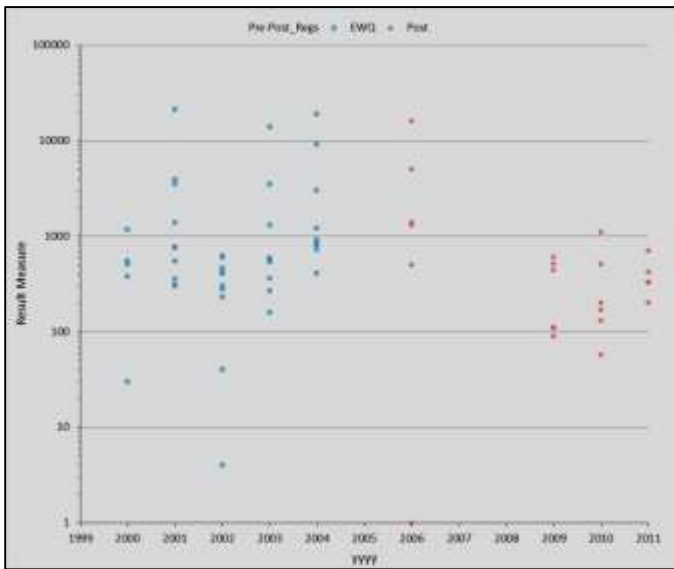
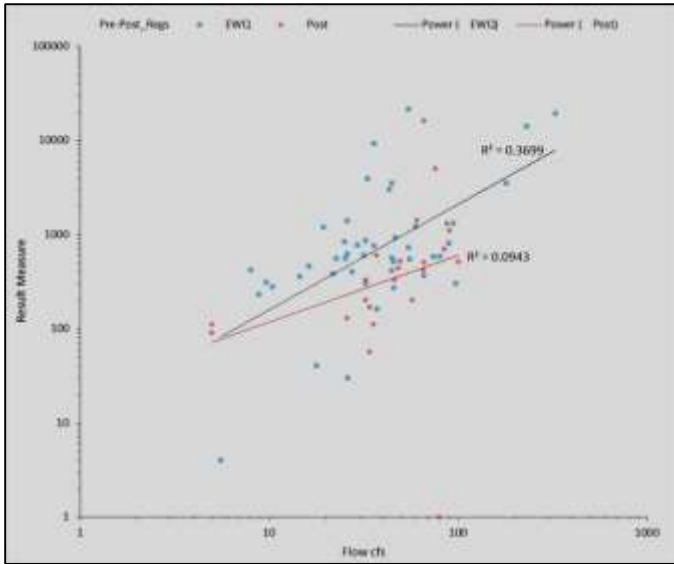
Fecal coliform colonies/100 ml

Existing Water Quality (Table 2K):

Median 580/100 ml

Lower 95% Confidence Interval 420/100 ml

Upper 95% Confidence Interval 810/100 ml



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	45	476.9	10.60
1774 BCP Pohat Post	23	933.1	40.57

H statistic 3.61
 X² approximation 3.61
 DF 1
 p-value 0.0575¹

H0: $\theta_1 = \theta_2 = 0...$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.
¹ Do not reject the null hypothesis at the 5% significance level.

Fecal coliform concentrations are weakly related to flow in the EWQ data set, but unrelated to flow in the post-EWQ data. Post-EWQ median concentrations were within the EWQ 95% confidence intervals.

Concentrations and flows are plotted on a logarithmic scale.

NJDEP 2006 data were comparable with DRBC data and included in the post-EWQ data set in order to increase the number of post-EWQ results.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

Hardness as CaCO₃, Total mg/l

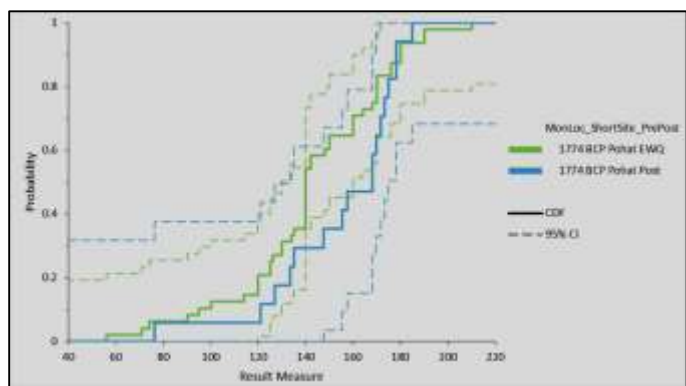
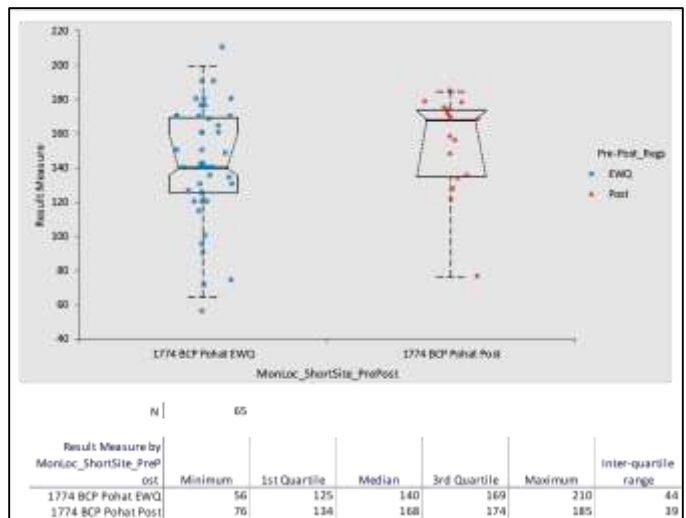
Existing Water Quality (Table 2K):

Median 140 mg/l

Lower 95% Confidence Interval 135 mg/l

Upper 95% Confidence Interval 160 mg/l

Defined in regulations as a flow-related parameter



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	48	192.0	4.00
1774 BCP Pohat Post	17	542.1	31.89

H statistic	2.06
χ^2 approximation	2.06
DF	1
p-value	0.1512 ¹

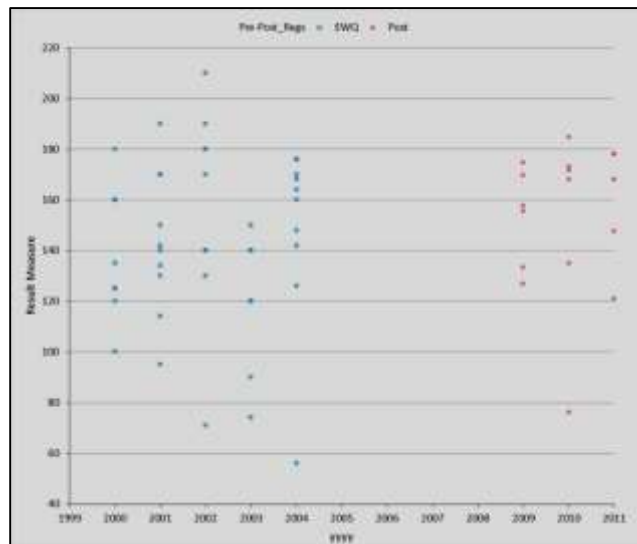
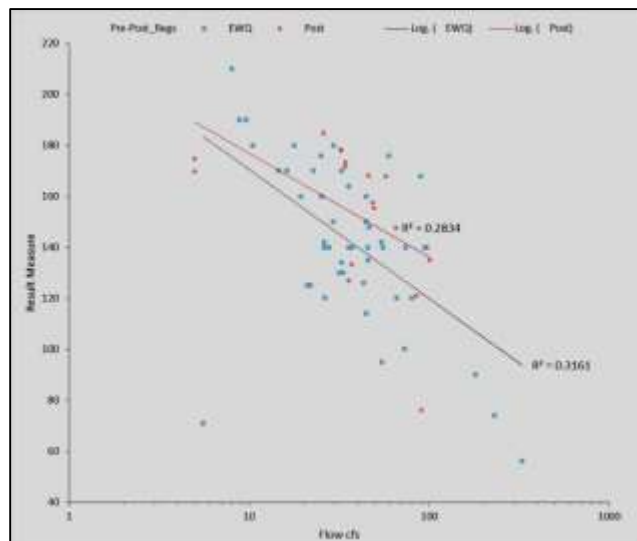
H0: $\theta_1 = \theta_2 = 0...$

The median of the populations are all equal.

H1: $\theta_i \neq \theta_j$ for at least one i, j

The median of the populations are not all equal.

¹ Do not reject the null hypothesis at the 5% significance level.



No water quality degradation is evident here. Hardness apparently did not measurably change between the EWQ and post-EWQ periods. Uncertainty is introduced into this conclusion by potential laboratory artifacts, insufficient post-EWQ sampling frequency and flow differences. Hardness is inversely but weakly related to flow in both data sets. Post-EWQ median hardness was above the EWQ upper 95% confidence interval, but the rise was not statistically significant due to insufficient post EWQ samples (n=17). Flow is plotted on a logarithmic scale. No data were available to validate DRBC conclusions. These high concentrations reflect natural limestone influence upon water quality.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

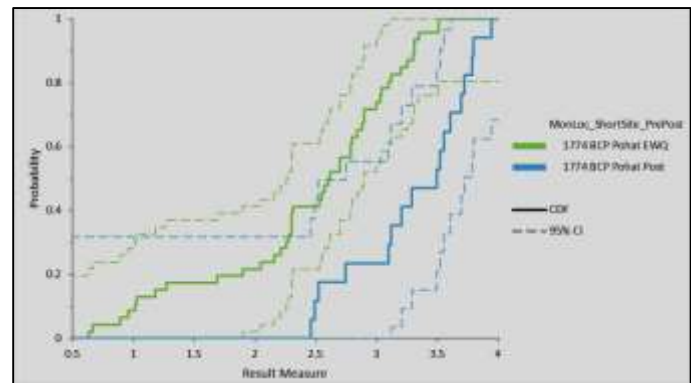
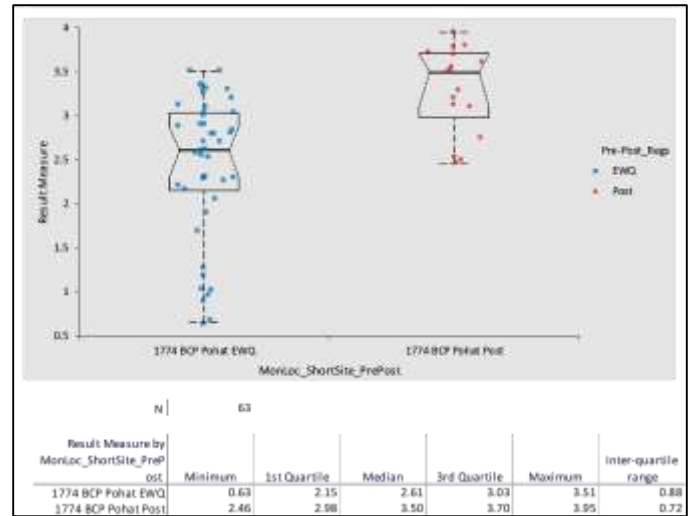
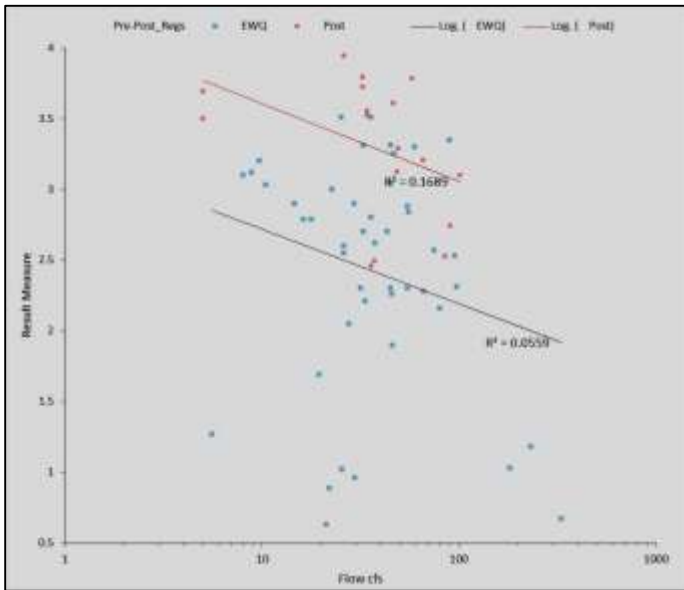
Nitrate + Nitrite as N, Total mg/l

Existing Water Quality (Table 2K, as Nitrate only):

Median 2.61 mg/l

Lower 95% Confidence Interval 2.30 mg/l

Upper 95% Confidence Interval 2.88 mg/l



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	46	1435.8	31.21
1774 BCP Pohat Post	17	3885.2	228.54

H statistic | 15.84
 X² approximation | 15.84
 DF | 1
 p-value | <0.0001¹

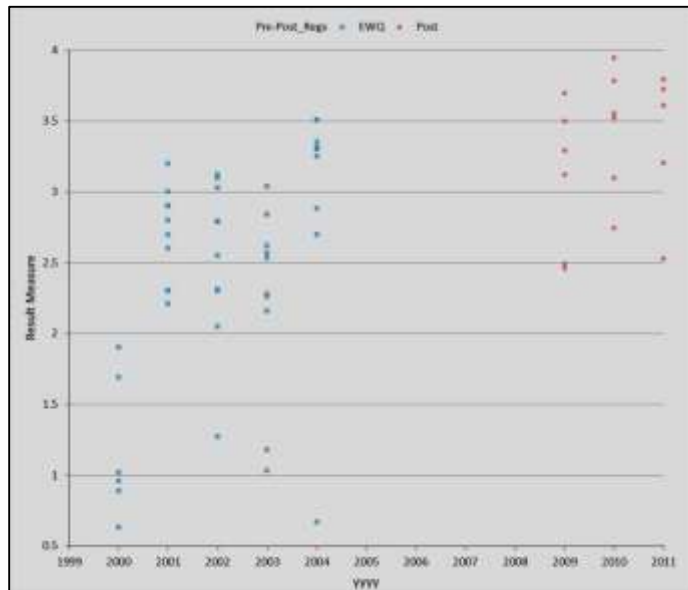
H0: $\theta_1 = \theta_2 = 0 \dots$

The median of the populations are all equal.

H1: $\theta_i \neq \theta_j$ for at least one i,j

The median of the populations are not all equal.

¹ Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.



Water quality degradation is evident here. Nitrate concentrations, already high in the Pohatcong, apparently increased. Uncertainty is introduced into conclusions by potential laboratory artifacts, insufficient post-EWQ sampling frequency and flow differences.

Nitrate is unrelated to flow in both data sets. Post-EWQ median concentration exceeded the EWQ upper 95% confidence interval. Post-EWQ nitrate + nitrite concentrations were assumed equivalent for comparison with EWQ nitrate concentrations since EWQ nitrite concentrations were never detected. Independent data were not available for validation of results. At other sites where concentrations are lower, there was a problem interpreting the data due to changing detection limits. Concentrations are sufficiently high in Pohatcong Creek that no uncertainty was introduced by detection limit differences.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

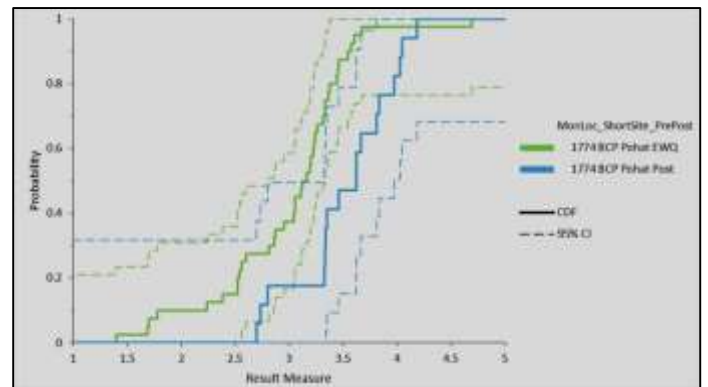
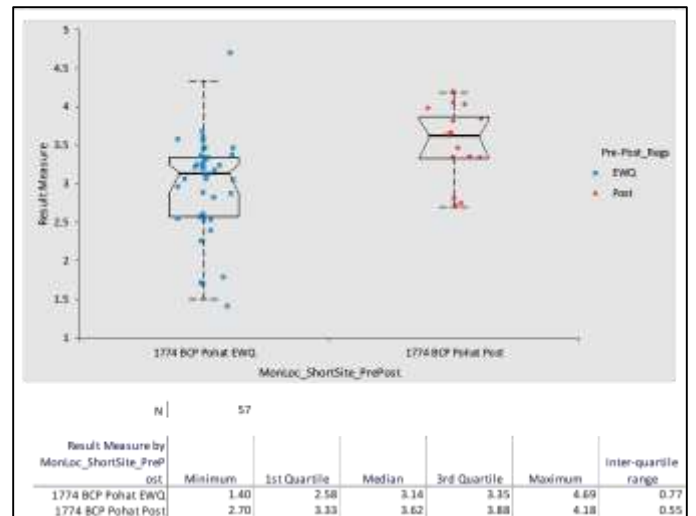
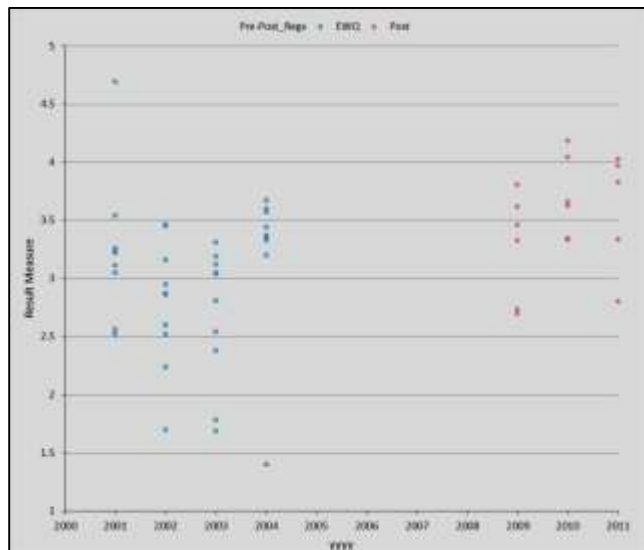
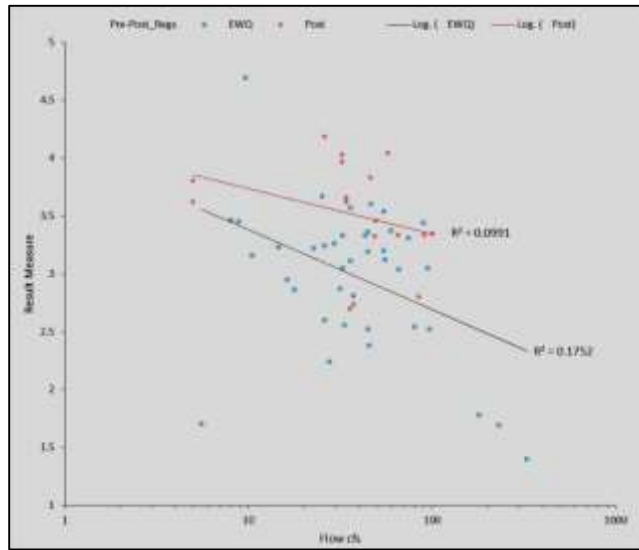
Nitrogen as N, Total (TN) mg/l

Existing Water Quality (Table 2K):

Median 3.14 mg/l

Lower 95% Confidence Interval 2.87 mg/l

Upper 95% Confidence Interval 3.26 mg/l



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat E-WQ	40	936.1	23.40
1774 BCP Pohat Post	17	2202.5	129.56

H statistic 11.39
 X² approximation 11.39
 DF 1
 p-value 0.0007¹
 H0: $\theta_1 = \theta_2 = \theta_3 \dots$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i, j.
 The median of the populations are not all equal.

¹ Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.

Water quality degradation is evident here. Total Nitrogen concentrations apparently increased. Uncertainty is introduced into conclusions by potential laboratory artifacts, insufficient post-EWQ sampling frequency and flow differences. TN is unrelated to flow in both data sets. No independent data were available to validate results. Post-EWQ median TN concentration exceeded the EWQ upper 95% confidence interval. Pohatcong Creek Total Nitrogen concentrations remain among the highest in comparison with other Delaware River tributaries.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

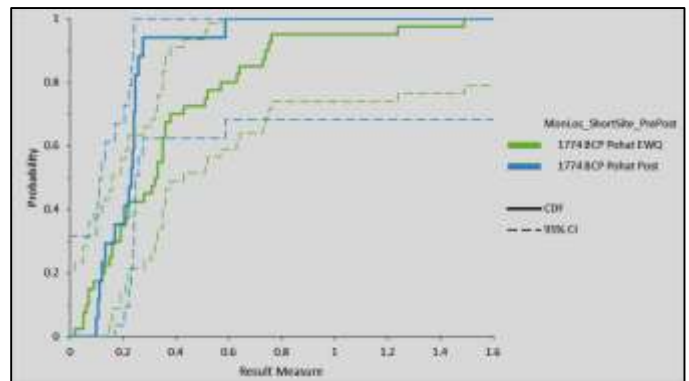
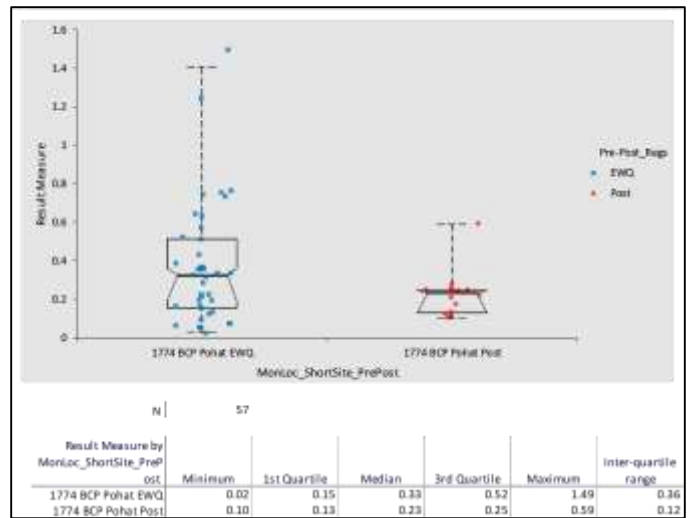
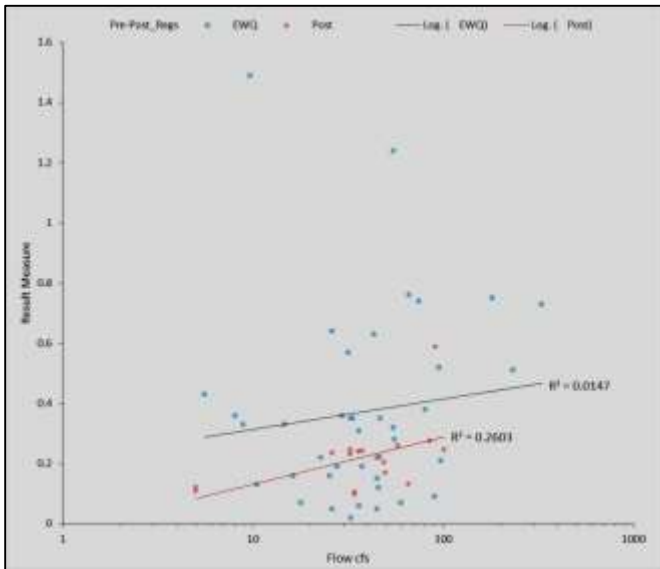
Nitrogen, Kjeldahl as N, Total (TKN) mg/l

Existing Water Quality (Table 2K):

Median 0.33 mg/l

Lower 95% Confidence Interval 0.19 mg/l

Upper 95% Confidence Interval 0.36 mg/l



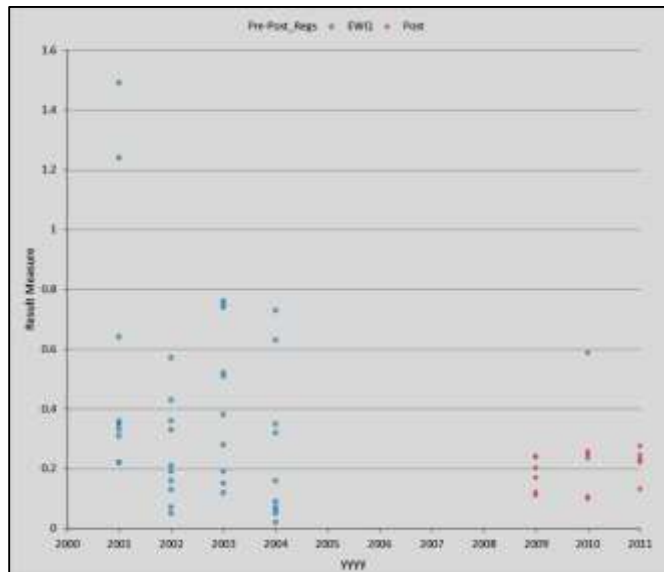
Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	40	207.0	5.18
1774 BCP Pohat Post	17	487.1	28.65

H statistic: 2.52
 X² approximation: 2.52
 DF: 1
 p-value: 0.1124¹

H0: $\theta_1 = \theta_2 = \theta_3 = \dots$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i, j
 The median of the populations are not all equal.

¹ Do not reject the null hypothesis at the 5% significance level.



No water quality degradation is evident here. TKN concentrations apparently did not measurably change. Uncertainty is introduced into conclusions by potential laboratory artifacts, insufficient post-EWQ sampling frequency and flow differences. The post-EWQ range was far narrower and all concentrations were less than 0.6 mg/l – reflecting either a water quality improvement or laboratory artifacts. TKN concentration is unrelated to flow in both data sets. Post-EWQ median TKN fell within the EWQ 95% confidence intervals. There were no independent data to confirm DRBC results.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

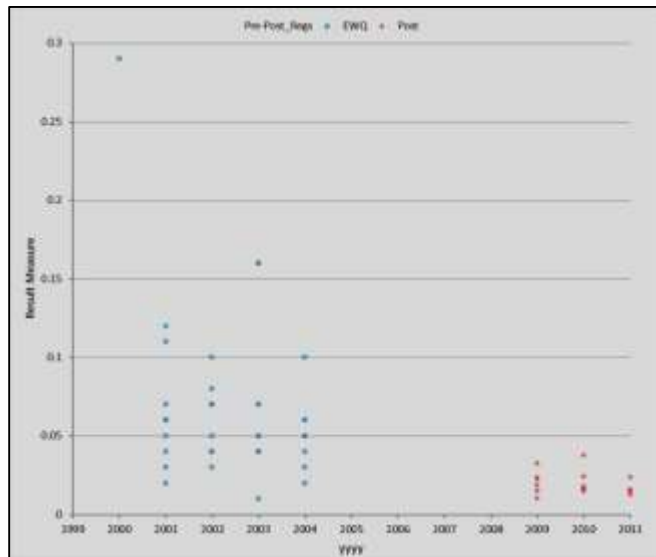
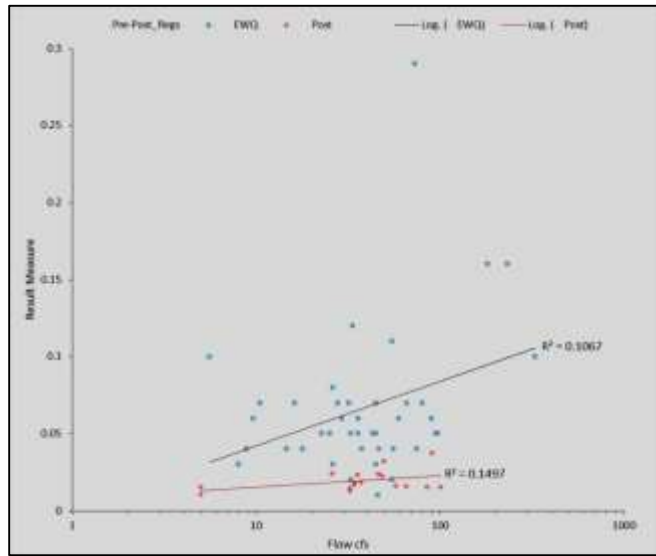
Orthophosphate as P, Total mg/l (OP)

Existing Water Quality (Table 2K):

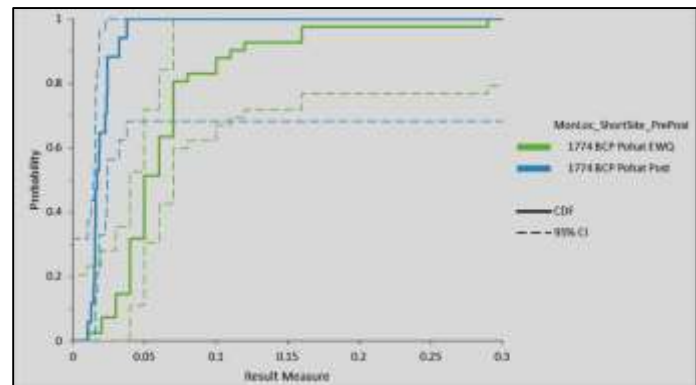
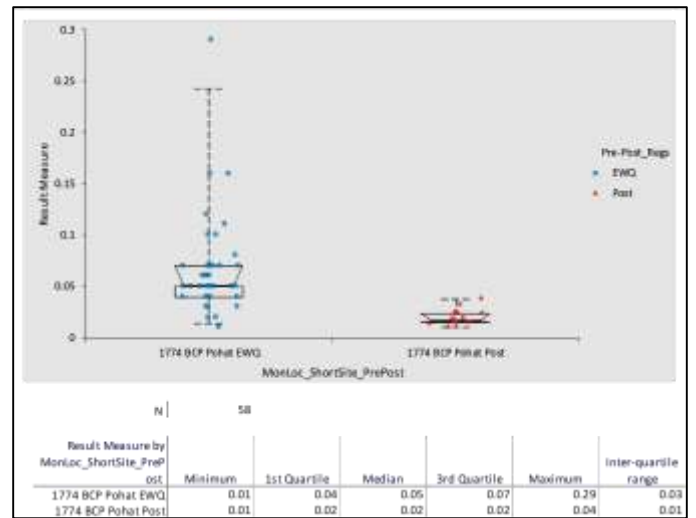
Median 0.05 mg/l

Lower 95% Confidence Interval 0.05 mg/l

Upper 95% Confidence Interval 0.07 mg/l



No water quality degradation is evident here. OP concentrations apparently declined between the EWQ and post-EWQ periods. Uncertainty is introduced into conclusions by potential laboratory artifacts, insufficient post-EWQ sampling frequency, and flow differences.



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	41	2397.1	58.47
1774 BCP Pohat Post	17	5781.3	340.08

H statistic | 28.88
 X² approximation | 28.88
 DF | 1
 p-value | <0.0001¹
 H0: $\theta_1 = \theta_2 = 0...$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.

¹ Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.

OP is unrelated to flow in both data sets. Post-EWQ median OP fell below the EWQ lower 95% confidence interval. Unlike in other watersheds, there were no undetected results in the EWQ or post-EWQ data, so this analysis contained no interference by differences between detection limits. Post-EWQ orthophosphate ranged less widely than EWQ data and no concentrations were higher than 0.04 mg/l, possibly indicating water quality improvement or laboratory artifacts. There were no independent data to confirm DRBC results.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

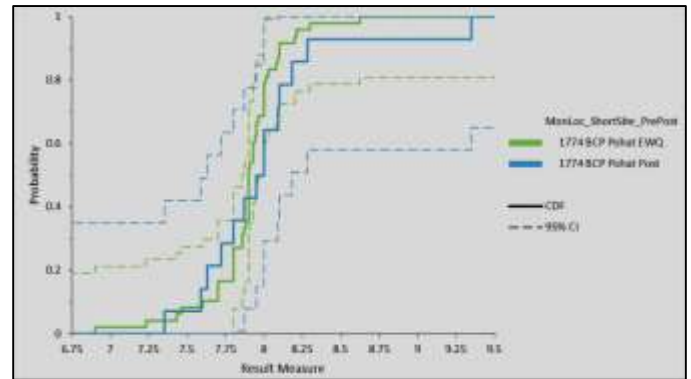
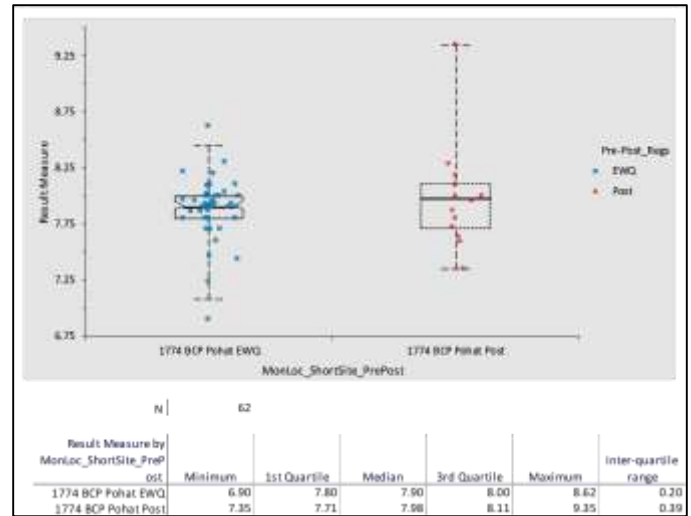
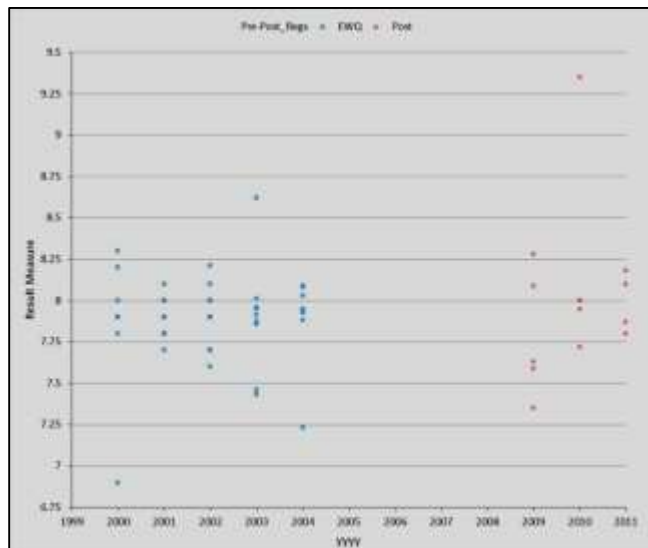
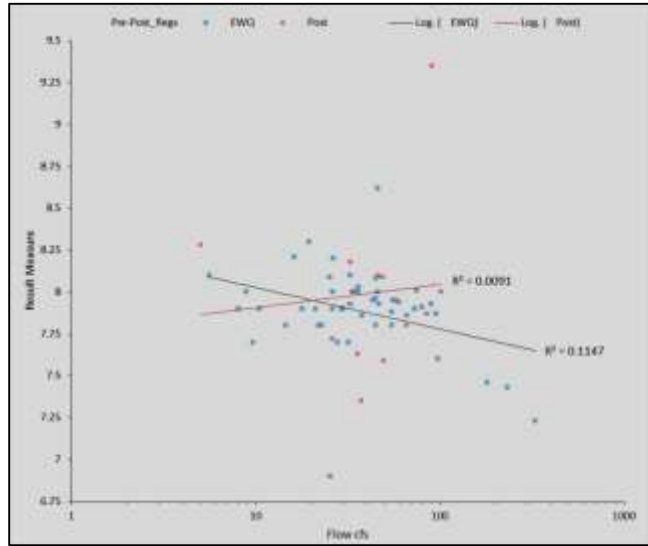
pH

Existing Water Quality (Table 2K):

Median 7.90 standard units

Lower 95% Confidence Interval 7.88 standard units

Upper 95% Confidence Interval 7.95 standard units



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	48	23.4	0.49
1774 BCP Pohat Post	14	80.2	5.73

H statistic: 0.32
 X² approximation: 0.32
 DF: 1
 p-value: 0.5718¹

H0: $\theta_1 = \theta_2 = \theta_3 \dots$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i, j
 The median of the populations are not all equal.
¹ Do not reject the null hypothesis at the 5% significance level.

No water quality degradation is evident here. pH did not measurably change between the EWQ and post-EWQ periods. Uncertainty is introduced into conclusions by insufficient post-EWQ sampling frequency and flow differences. pH is unrelated to flow in both data sets. Post-EWQ median pH was above the upper EWQ 95% confidence interval, but the result was not statistically significant due to insufficient post-EWQ data (n=14). In 2010 there was one spike above pH 9, indicating high algal productivity during that dry sampling period. No additional data were available to confirm DRBC results.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

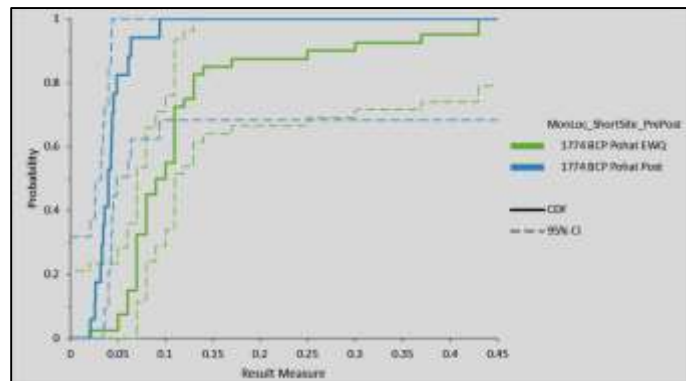
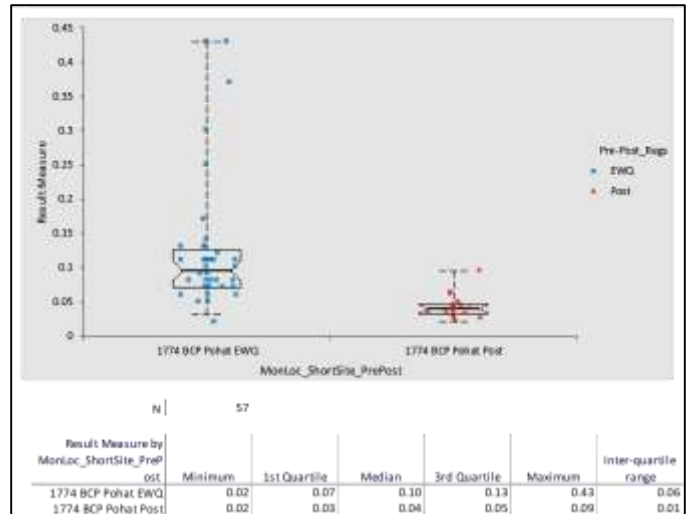
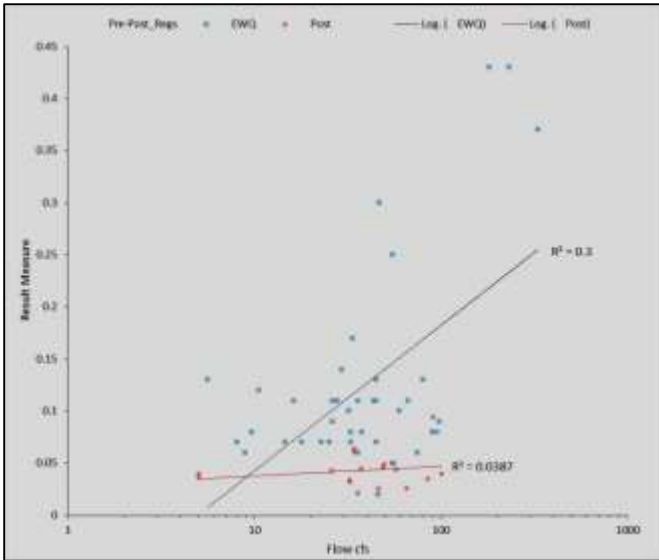
Phosphorus as P, Total (TP) mg/l

Existing Water Quality (Table 2K):

Median 0.10 mg/l

Lower 95% Confidence Interval 0.08 mg/l

Upper 95% Confidence Interval 0.11 mg/l



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	40	2160.9	54.02
1774 BCP Pohat Post	17	5084.5	299.09

H statistic | 26.42
 X² approximation | 26.42
 DF | 1
 p-value | <0.0001¹

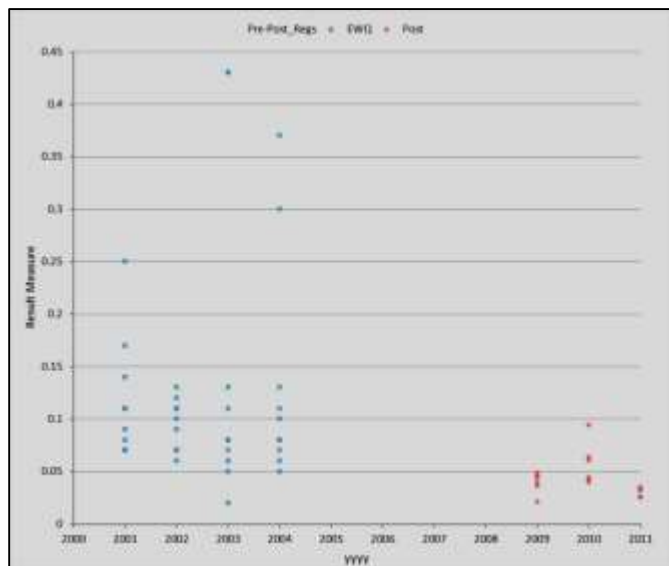
H0: $\theta_1 = \theta_2 = 0...$

The median of the populations are all equal.

H1: $\theta_i \neq \theta_j$ for at least one i, j

The median of the populations are not all equal.

¹ Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.



No water quality degradation is evident here. Total Phosphorus (TP) concentrations apparently declined between the EWQ and post-EWQ periods. Uncertainty is introduced into conclusions by potential laboratory artifacts, detection limit differences, insufficient post-EWQ sampling frequency, and flow differences.

Post-EWQ median total phosphorus fell below the EWQ lower 95% confidence interval. TP is unrelated to flow in both data sets. The weak relationship to flow indicated in the EWQ data were driven by a few high outlier values. No additional data were available to confirm DRBC results. EWQ results were more variable than post-EWQ data, which contained no concentrations higher than 0.1 mg/l. This may constitute a water quality improvement unless it reflects only laboratory artifacts.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

Specific Conductance $\mu\text{mho/cm}$

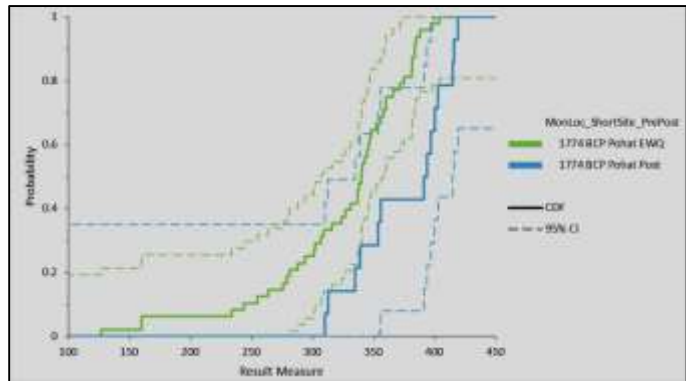
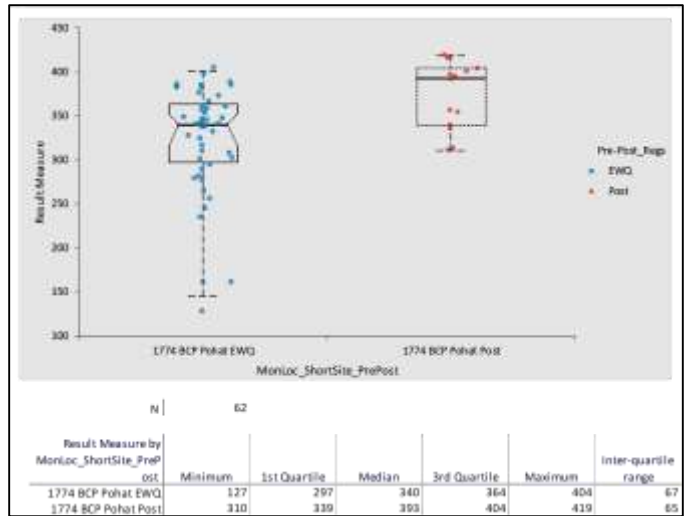
Existing Water Quality (Table 2K):

Median 340 $\mu\text{mho/cm}$

Lower 95% Confidence Interval 316 $\mu\text{mho/cm}$

Upper 95% Confidence Interval 352 $\mu\text{mho/cm}$

Defined in regulations as a flow-related parameter



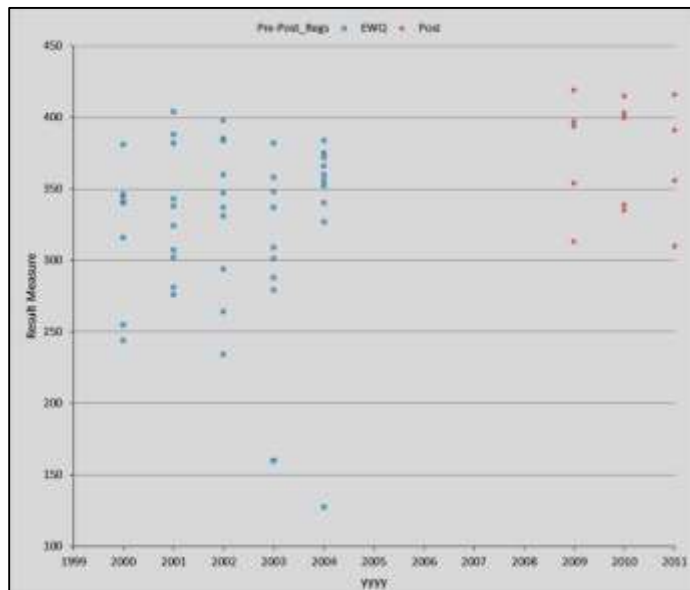
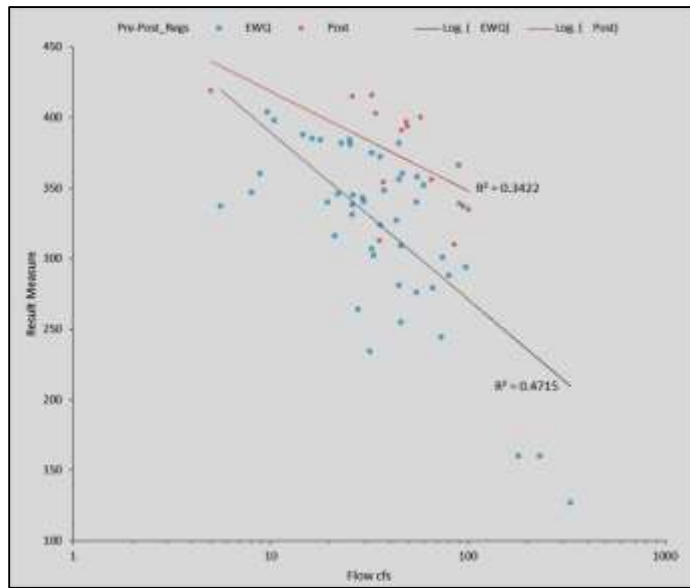
Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWO	48	671.3	13.98
1774 BCP Pohat Post	14	2301.4	164.39

H statistic | 9.13
 X² approximation | 9.13
 DF | 1
 p-value | 0.0025¹

H0: $\theta_1 = \theta_2 = 0...$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.

¹ Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.



Water quality degradation is evident here. Specific conductance apparently increased above the EWO upper 95% confidence interval. Uncertainty is introduced into conclusions by insufficient post-EWO sampling frequency and flow differences.

Specific conductance is inversely related to flow in both data sets. Higher flow conditions were not well represented in the post-EWO data, and the significant increase may be partially attributable to this. The rise in specific conductance may be partially attributable to the concurrent rise in chloride concentrations. Median specific conductance has risen from 340 to 393 $\mu\text{mhos/cm}$; a 16% increase in a few years' time. Further investigation is recommended. No additional data were available to confirm DRBC results.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

Total Dissolved Solids (TDS) mg/l

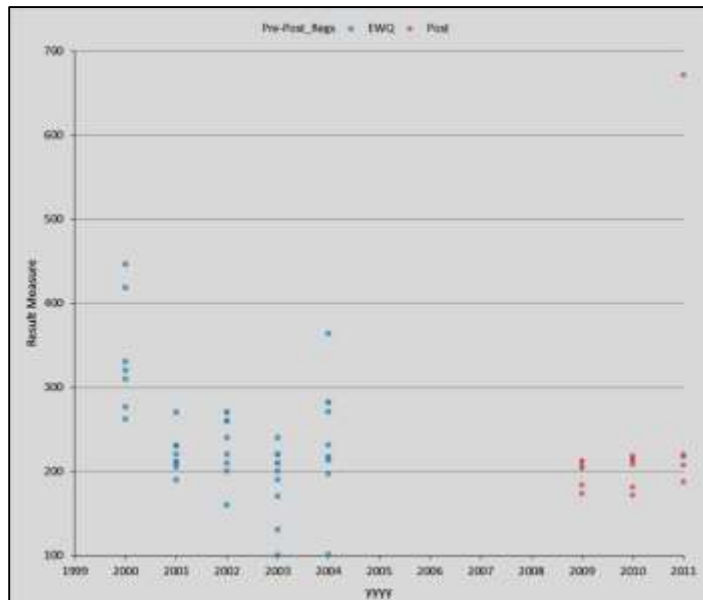
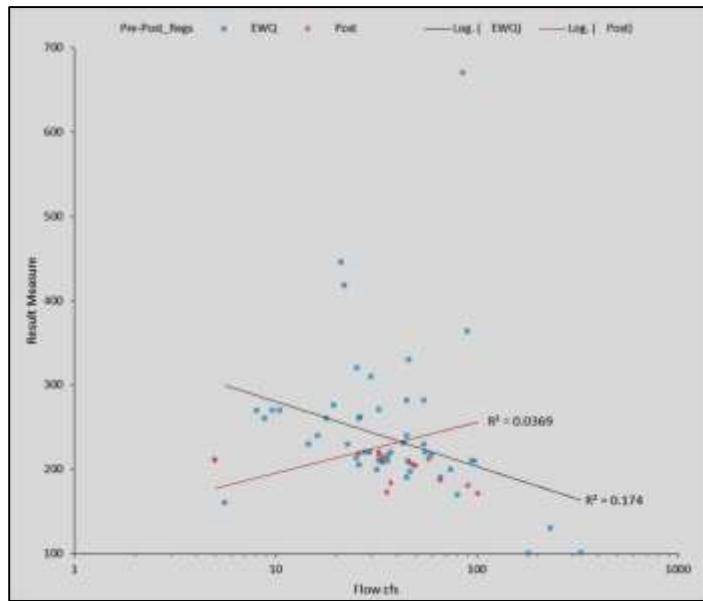
Existing Water Quality (Table 2K):

Median 220 mg/l

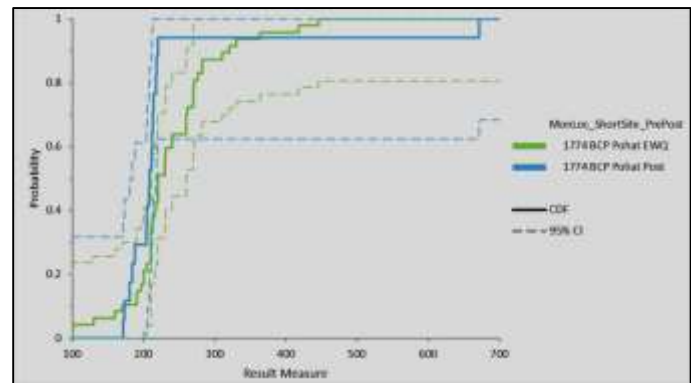
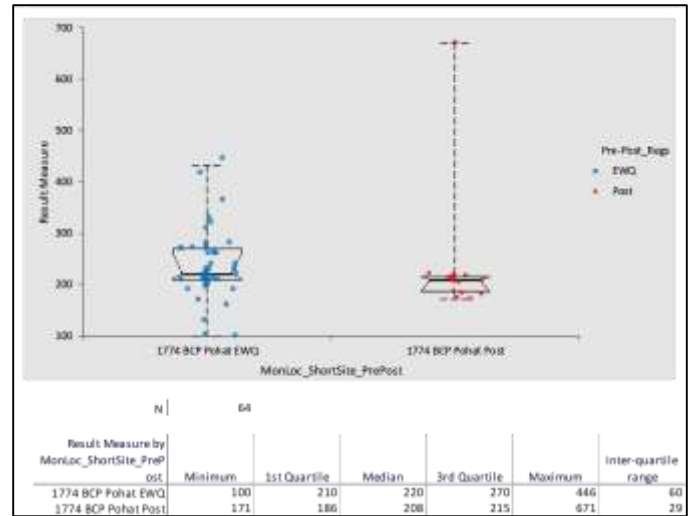
Lower 95% Confidence Interval 211 mg/l

Upper 95% Confidence Interval 260 mg/l

Defined in regulations as a flow-related parameter



No water quality degradation is evident here. TDS apparently declined. Uncertainty is introduced into conclusions by potential laboratory artifacts, insufficient post-EWQ sampling frequency, and flow differences.



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	47	494.8	10.53
1774 BCP Pohat Post	17	1368.0	80.47

H statistic 5.38
 X² approximation 5.38
 DF 1
 p-value 0.0204¹

H0: $\theta_1 = \theta_2 = 0...$

The median of the populations are all equal.

H1: $\theta_i \neq \theta_j$ for at least one i,j

The median of the populations are not all equal.

¹ Reject the null hypothesis in favour of the alternative hypothesis at the 5% significance level.

TDS is unrelated to flow in both data sets, though TDS was designated in the rules as flow related. Post-EWQ median TDS fell below the EWQ lower 95% lower confidence interval. Post-EWQ TDS was much less variable than the baseline samples as well except for a single unexplained high outlier measurement (5/17/11, normal flow conditions). Post-EWQ detection limits were lower than EWQ detection limits, though there were no non-detect results at any time. No additional data were available to confirm DRBC results.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

Total Suspended Solids (TSS) mg/l

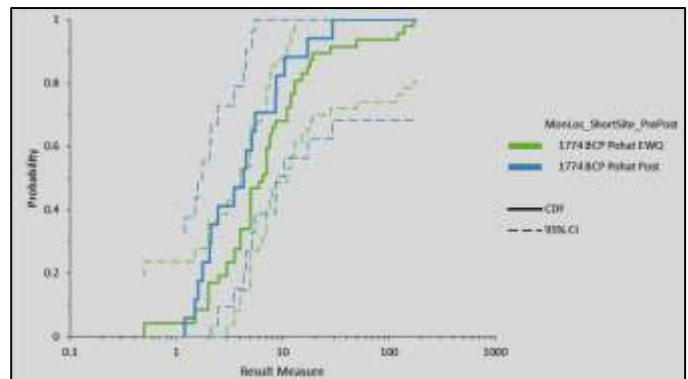
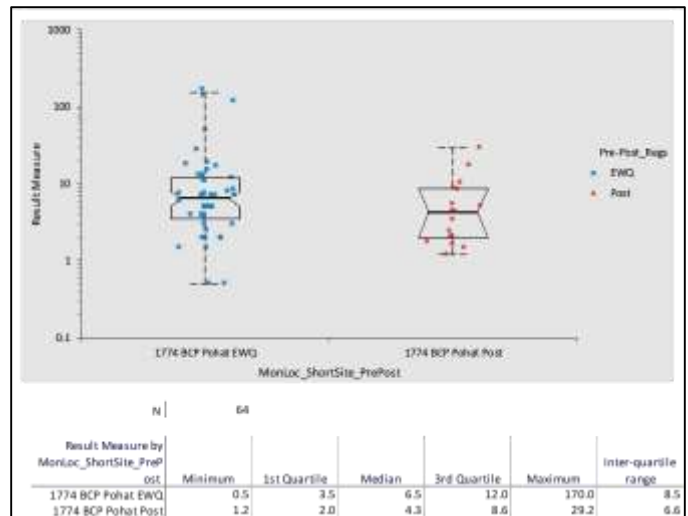
Existing Water Quality (Table 2K):

Median 6.5 mg/l

Lower 95% Confidence Interval 5.0 mg/l

Upper 95% Confidence Interval 8.0 mg/l

Should have been designated in rules as flow-related



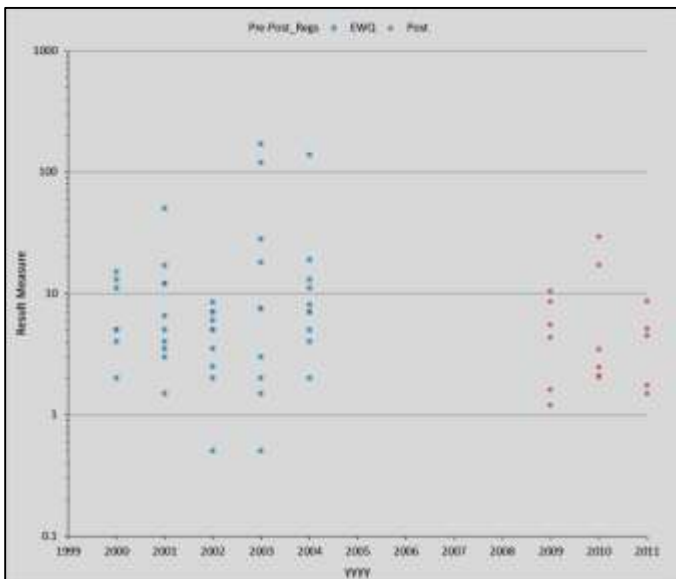
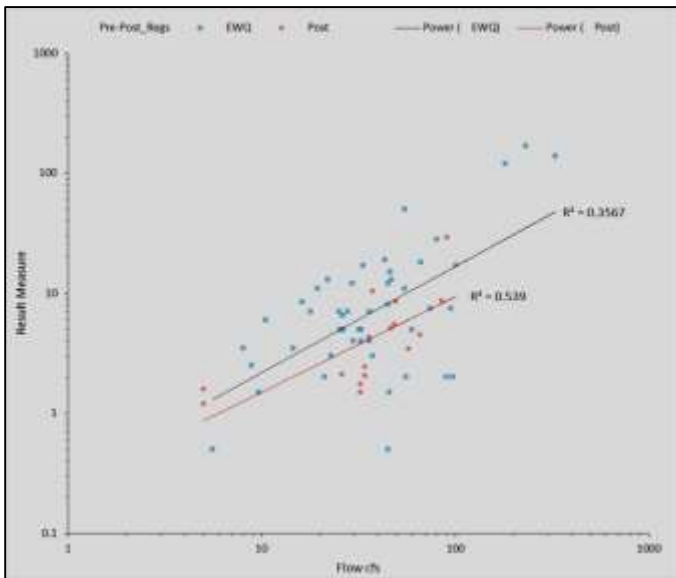
Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	47	194.0	4.13
1774 BCP Pohat Post	17	536.5	31.56

H statistic | 2.11
 X² approximation | 2.11
 DF | 1
 p-value | 0.1463¹

H0: $\theta_1 = \theta_2 = \theta_{..}$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i, j
 The median of the populations are not all equal.
¹ Do not reject the null hypothesis at the 5% significance level.

No water quality degradation is evident here. TSS apparently did not measurably change between the EWQ and post-EWQ periods. Uncertainty is introduced into conclusions by potential laboratory artifacts, insufficient post-EWQ sampling frequency, and flow differences. TSS is positively related to flow in both data sets. Post-EWQ median TSS fell below the EWQ lower 95% confidence interval, but the decline was not statistically significant due to too few post-EWQ samples taken under higher flow conditions. Flow and concentration are plotted on a logarithmic scale, and the regression is a power relationship. No additional data were available to confirm DRBC results.



Chapter 16: 1774 BCP Pohatcong Creek, NJ

Turbidity NTU

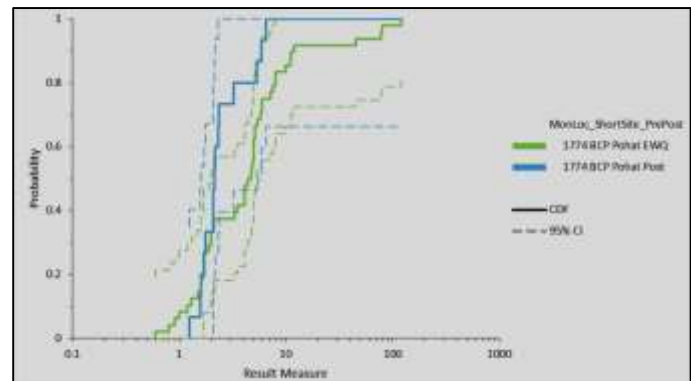
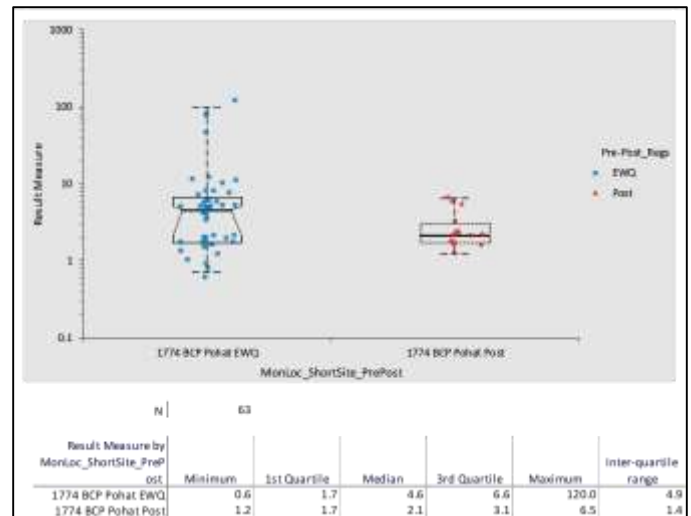
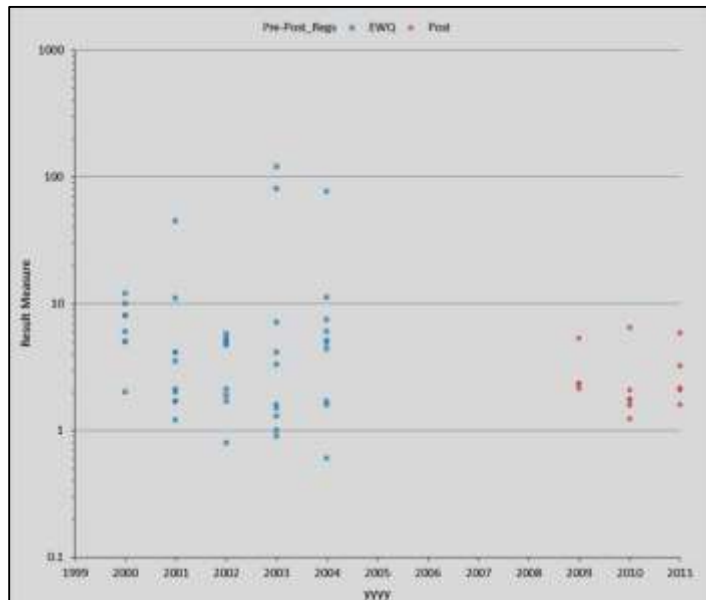
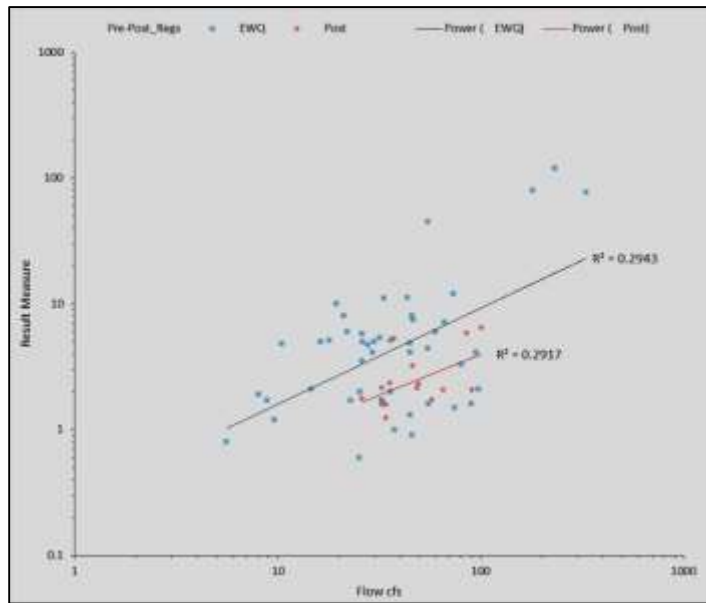
Existing Water Quality (Table 2K):

Median 4.6 NTU

Lower 95% Confidence Interval 2.1 NTU

Upper 95% Confidence Interval 5.1 NTU

Defined in regulations as a flow-related parameter



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWO	48	172.5	3.59
1774 BCP Pohat Post	15	552.1	36.80

H statistic	2.16
X ² approximation	2.16
DF	1
p-value	0.1418 ¹

H0: $\theta_1 = \theta_2 = 0...$

The median of the populations are all equal.

H1: $\theta_i \neq \theta_j$ for at least one i,j

The median of the populations are not all equal.

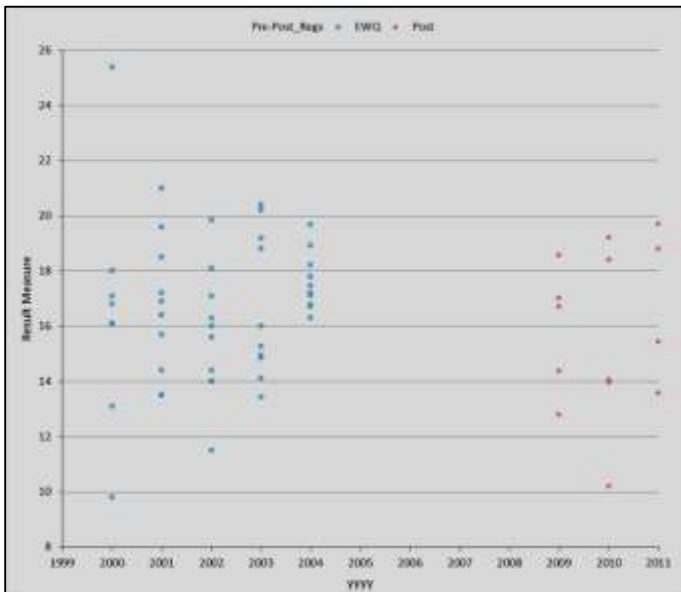
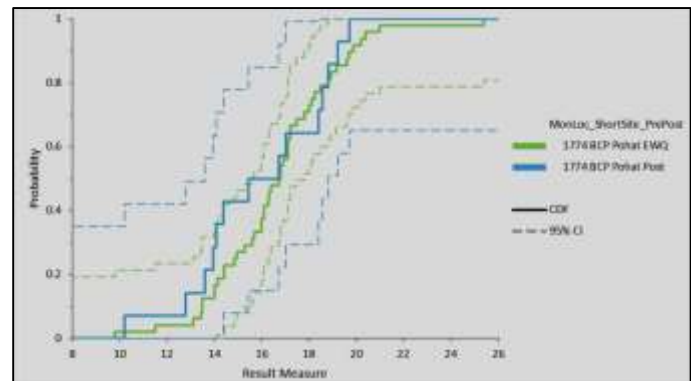
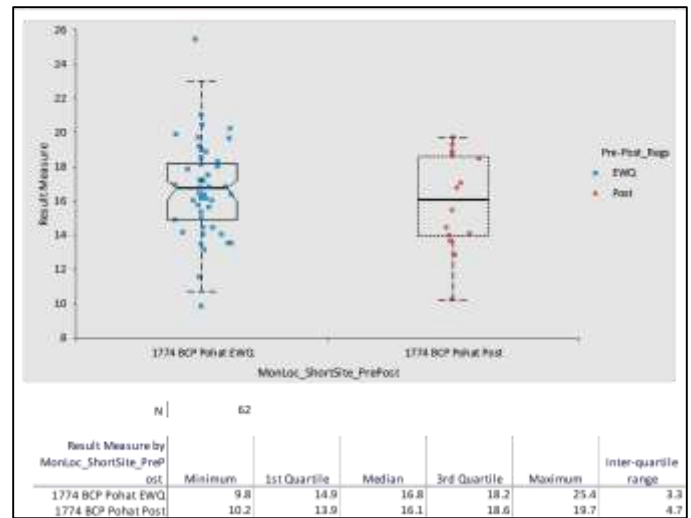
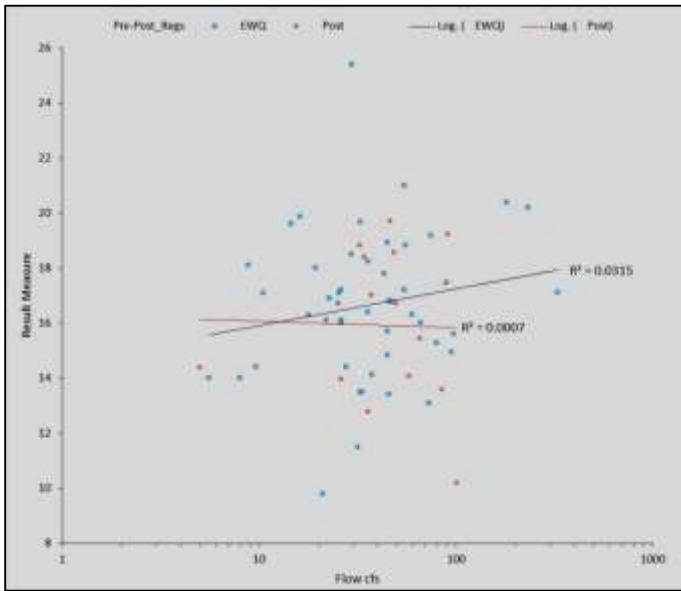
¹ Do not reject the null hypothesis at the 5% significance level.

No water quality degradation is evident here. Turbidity apparently did not measurably change between the EWQ and post-EWQ periods. Uncertainty is introduced into conclusions by insufficient post-EWQ sampling frequency and flow differences. Post-EWQ median turbidity fell within the EWQ 95% confidence intervals. Turbidity is positively but weakly related to flow in both data sets. Concentration and flow are represented on logarithmic scale. There were no additional data available for comparison with DRBC results. As with other flow-related parameters at this site, high-flow conditions were under-represented in the sample set, probably causing the apparent decline in turbidity.

Chapter 16: 1774 BCP Pohatcong Creek, NJ

Water Temperature, degrees C

Not included in DRBC Existing Water Quality rules



Kruskal-Wallis test

Result Measure by MonLoc_ShortSite_PrePost	n	Rank sum	Mean rank
1774 BCP Pohat EWQ	48	37.6	0.78
1774 BCP Pohat Post	14	129.0	9.22

H statistic	0.51
X ² approximation	0.51
DF	1
p-value	0.4742 ¹

H0: $\theta_1 = \theta_2 = 0...$
 The median of the populations are all equal.
 H1: $\theta_i \neq \theta_j$ for at least one i,j
 The median of the populations are not all equal.
¹ Do not reject the null hypothesis at the 5% significance level.

No water quality degradation is evident here. Water temperature apparently did not measurably change between the EWQ and post-EWQ periods. Uncertainty is introduced into conclusions by insufficient post-EWQ sampling frequency and flow differences. Water temperature is unrelated to flow in both data sets. Flow is plotted on a logarithmic scale. No additional data were available to confirm DRBC data.