

## **Appendix B: Nutrients Trending Graphs**

## Time Series

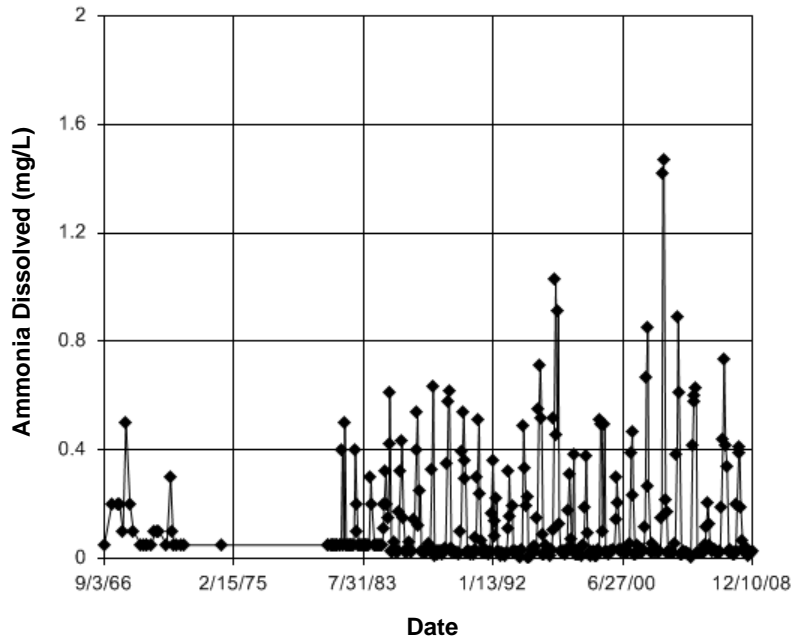


Figure B1 Battle River: Ammonia Dissolved

## Seasonality

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For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 59.38  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 6 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 59.38  
Adjusted Kruskal-Wallis statistic (H') = 59.38

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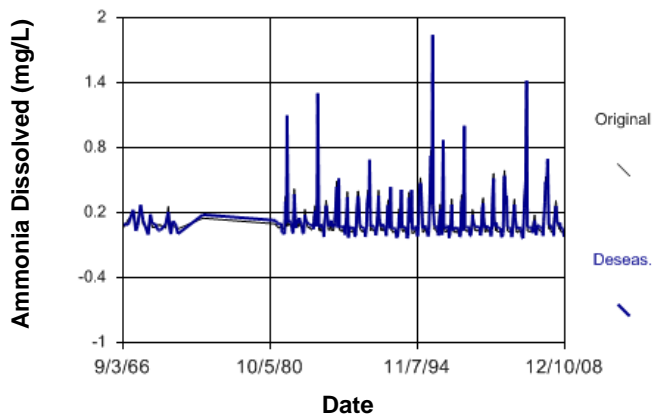
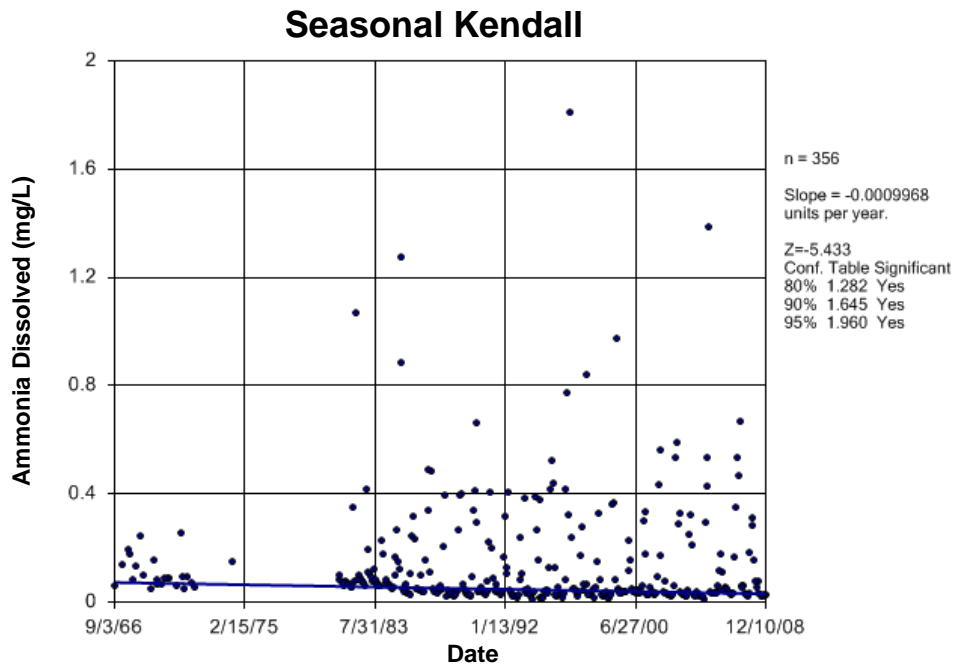
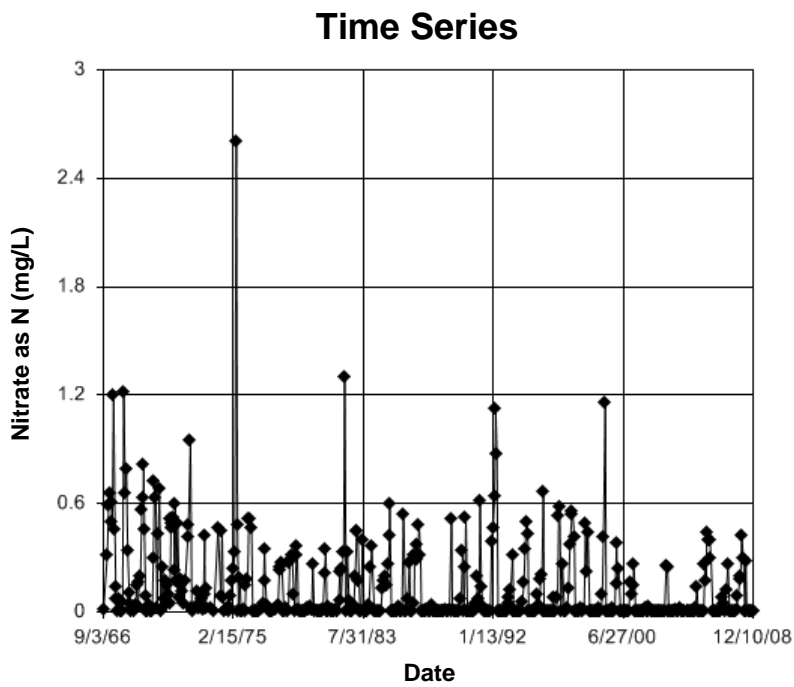


Figure B2 Battle River: Ammonia Dissolved



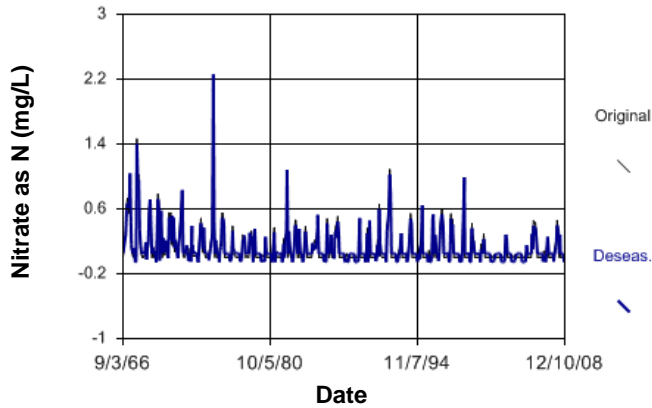
**Figure B3 Battle River: Ammonia Dissolved**



**Figure B4 Battle River: Nitrate as N**

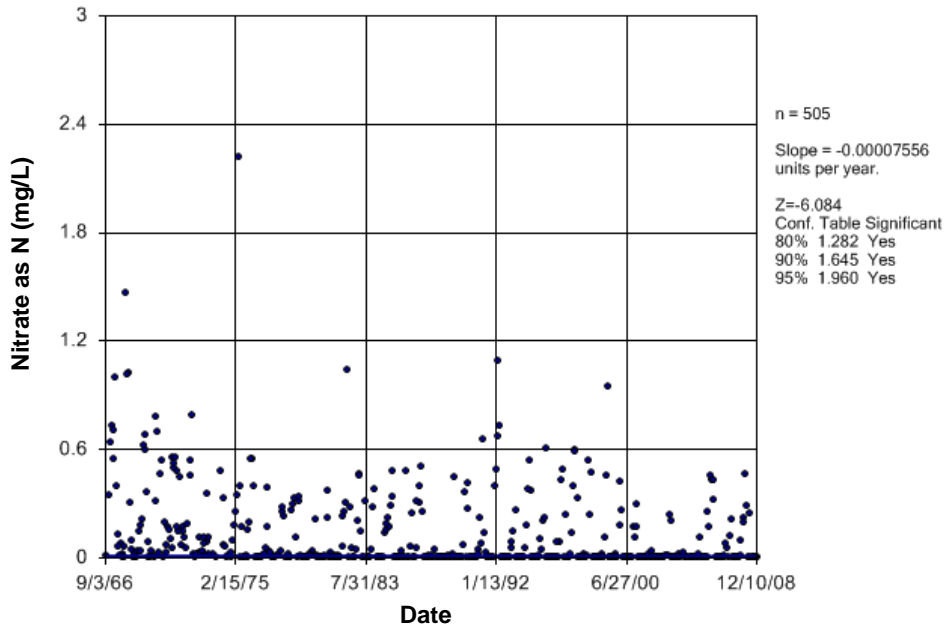
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 99.43  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 31 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 99.43  
 Adjusted Kruskal-Wallis statistic (H') = 99.43

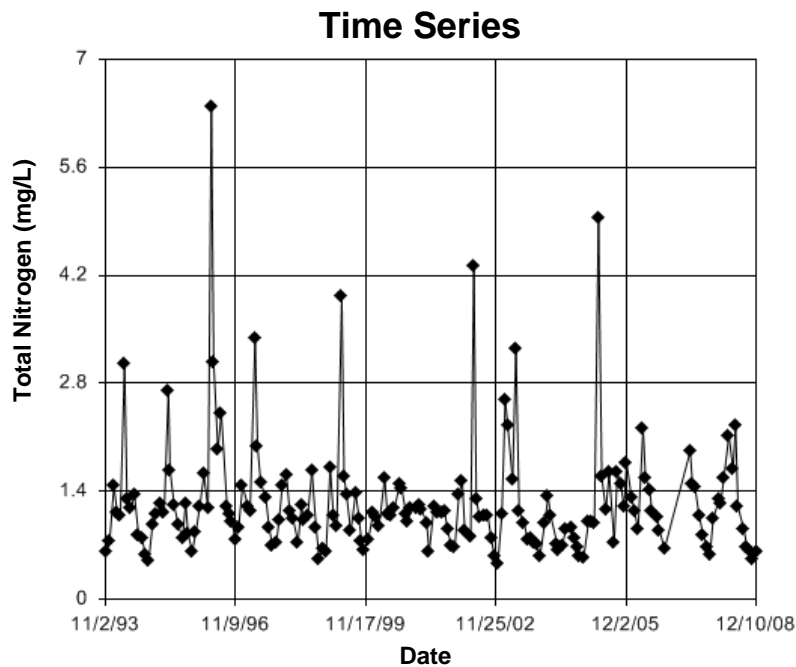


**Figure B5 Battle River: Nitrate as N**

## Seasonal Kendall



**Figure B6 Battle River: Nitrate as N**



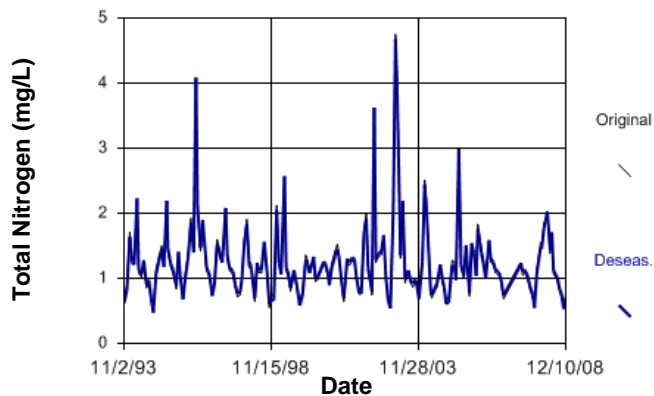
**Figure B7 Battle River: Total Nitrogen**

### Seasonality

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For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 3.014  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 6 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 3.014  
 Adjusted Kruskal-Wallis statistic (H') = 3.014

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**Figure B8 Battle River: Total Nitrogen**

### Sen's Slope Estimator

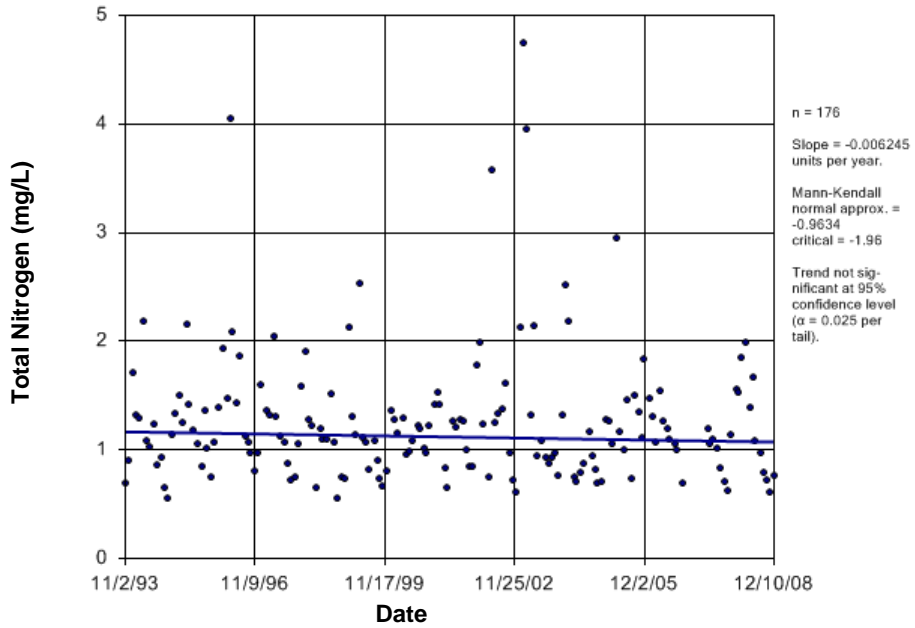


Figure B9 Battle River: Total Nitrogen

### Time Series

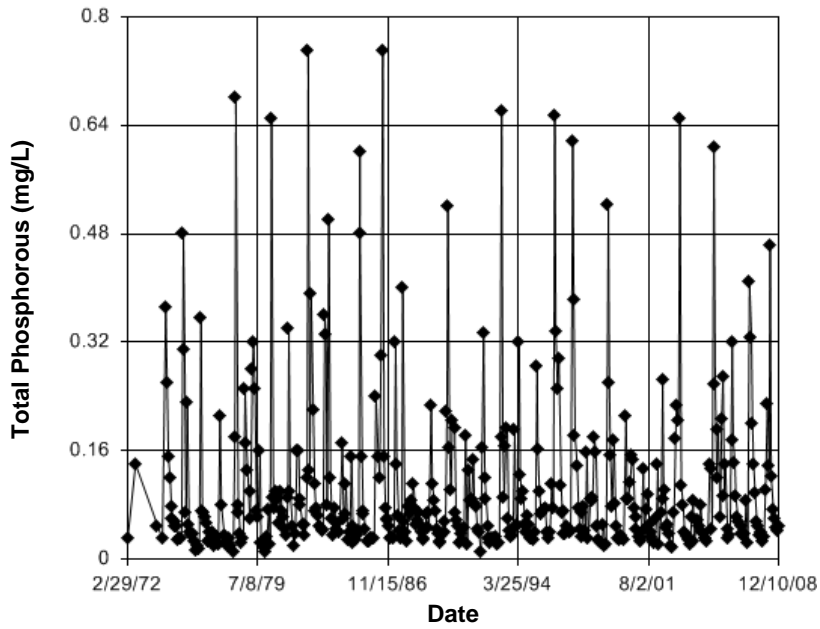
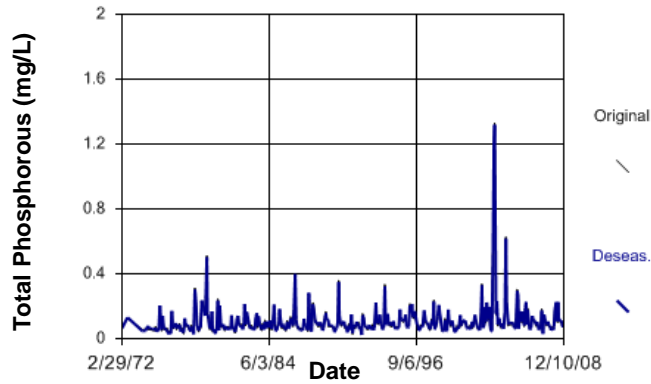


Figure B10 Battle River: Total Phosphorous

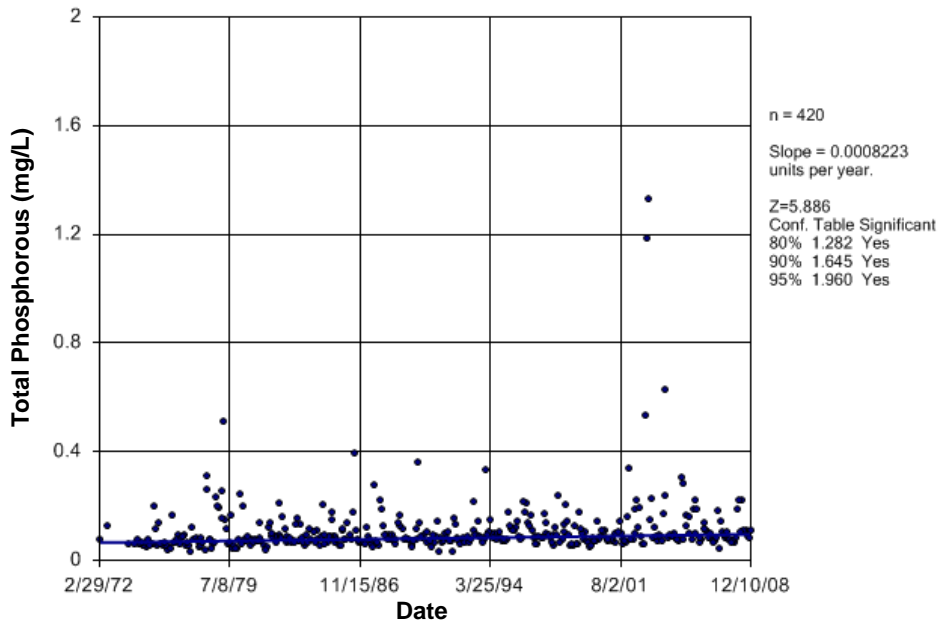
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 9.694  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 15 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 9.694  
 Adjusted Kruskal-Wallis statistic (H') = 9.694

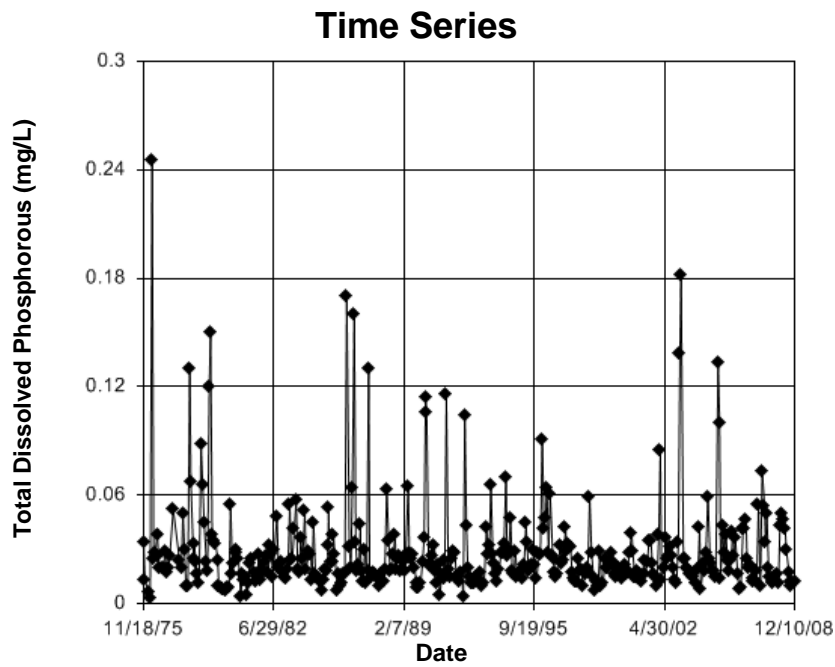


**Figure B11 Battle River: Total Phosphorous**

## Seasonal Kendall



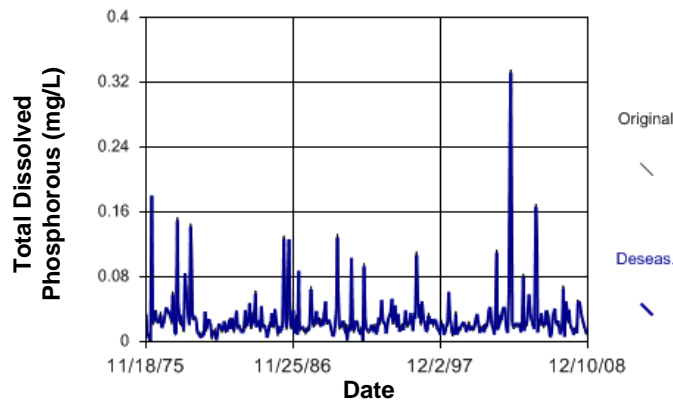
**Figure B12 Battle River: Total Phosphorous**



**Figure B13 Battle River: Total Dissolved Phosphorous**

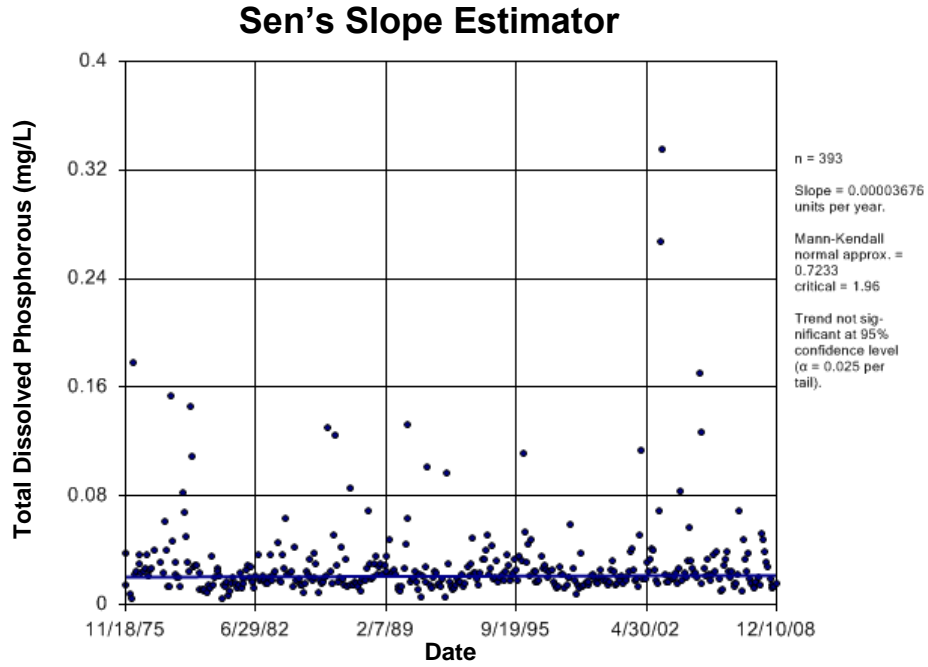
### Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 3.123  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 22 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 3.123  
 Adjusted Kruskal-Wallis statistic (H') = 3.123

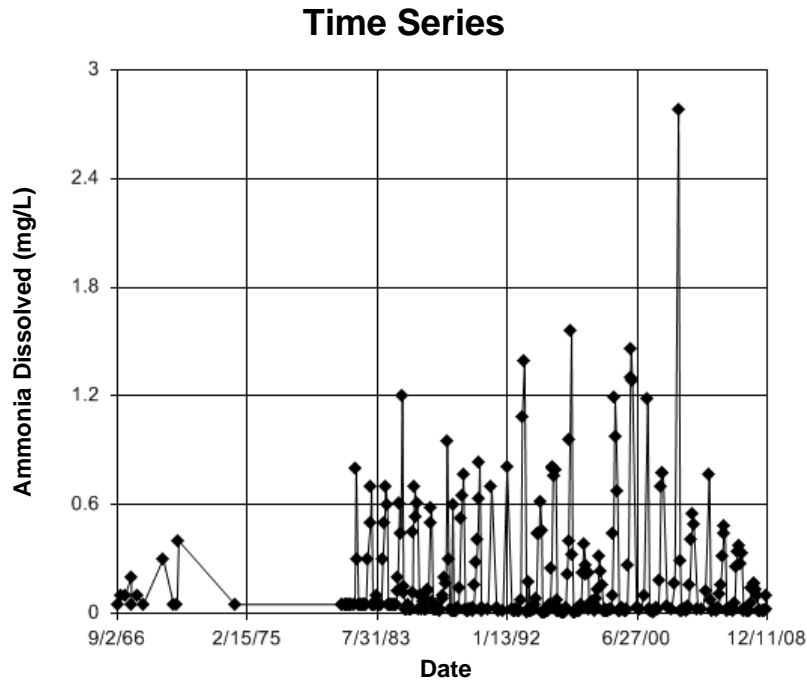


**Figure B14 Battle River: Total Dissolved Phosphorous**





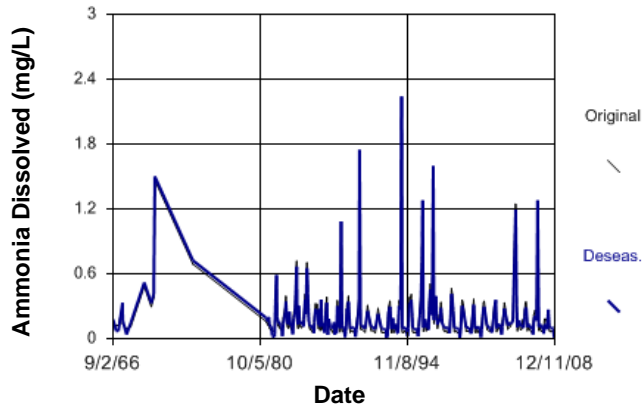
**Figure B15 Battle River: Total Dissolved Phosphorous**



**Figure B16 Beaver River: Ammonia Dissolved**

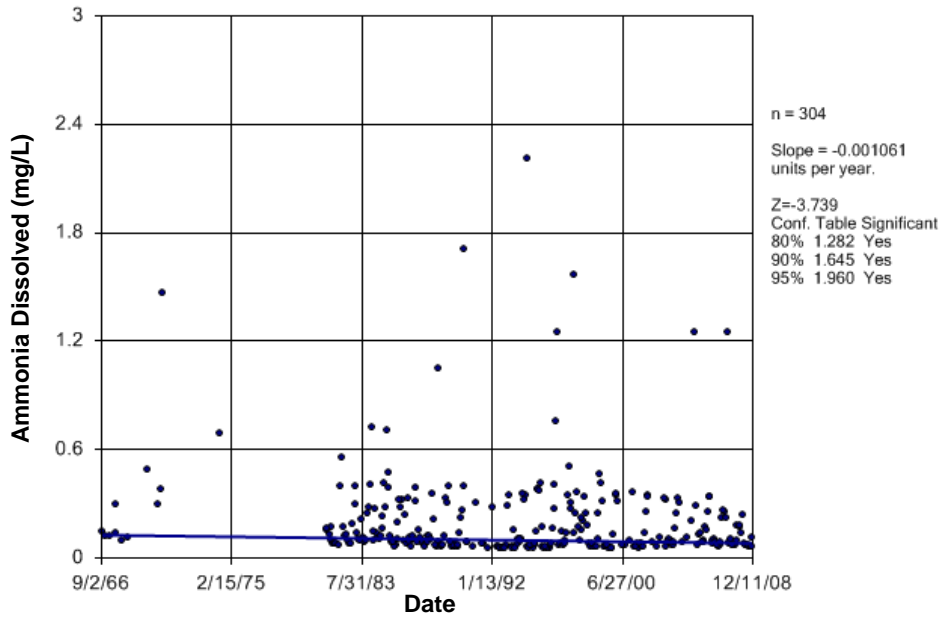
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 76.01  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 6 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 76.01  
 Adjusted Kruskal-Wallis statistic (H') = 76.01



**Figure B17 Beaver River: Ammonia Dissolved**

## Seasonal Kendall



**Figure B18 Beaver River: Ammonia Dissolved**

## Time Series

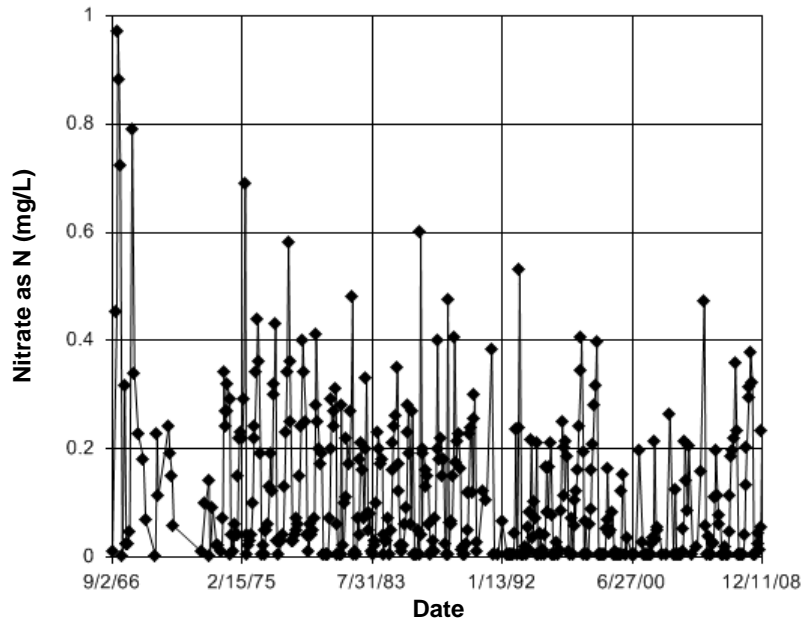


Figure B19 Beaver River: Nitrate as N

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 112.3  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 13 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 112.3  
Adjusted Kruskal-Wallis statistic (H') = 112.3

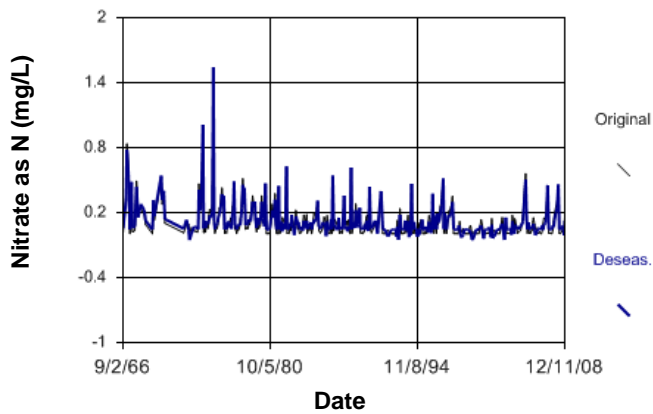


Figure B20 Beaver River: Nitrate as N

### Seasonal Kendall

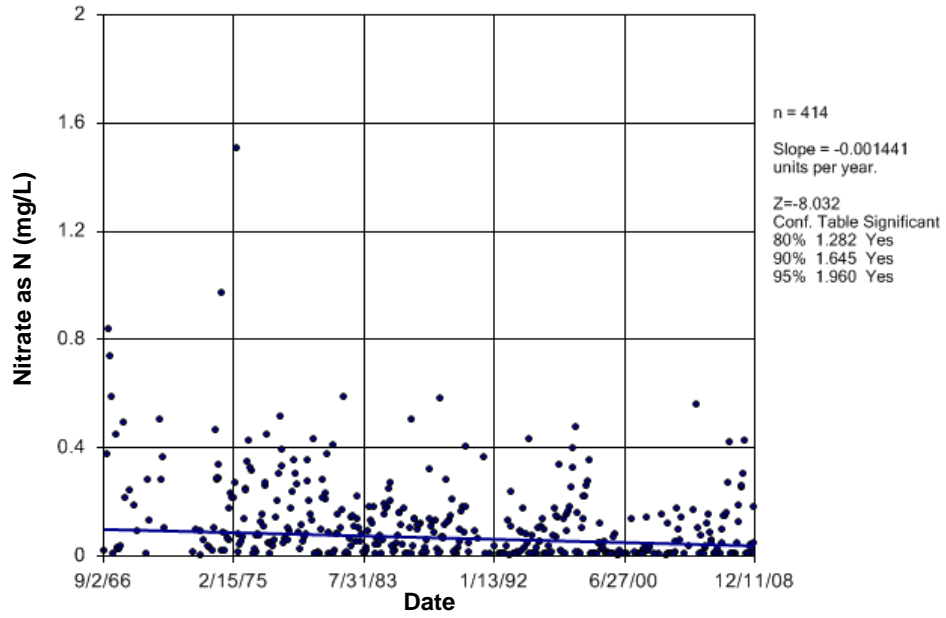


Figure B21 Beaver River: Nitrate as N

### Time Series

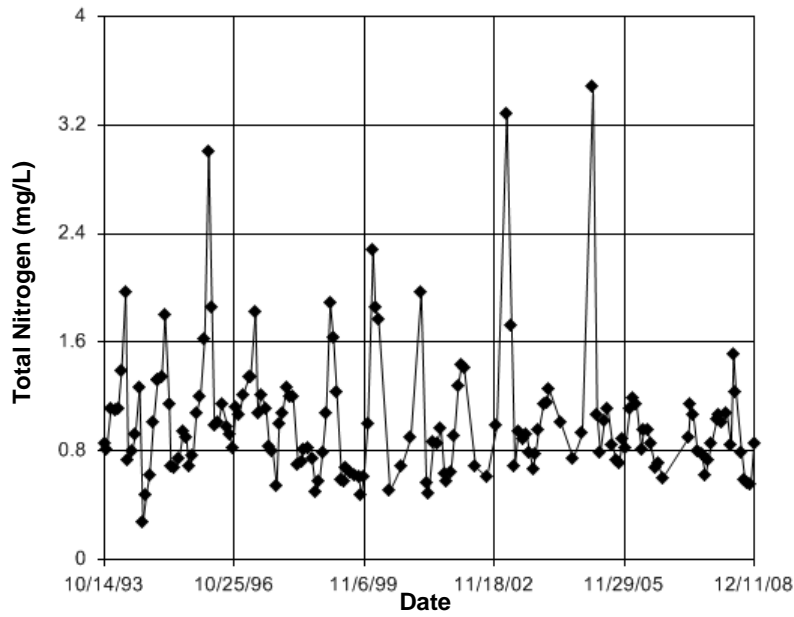
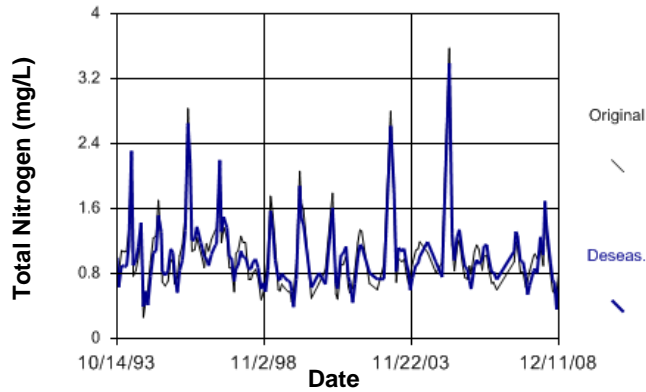


Figure B22 Beaver River: Total Nitrogen

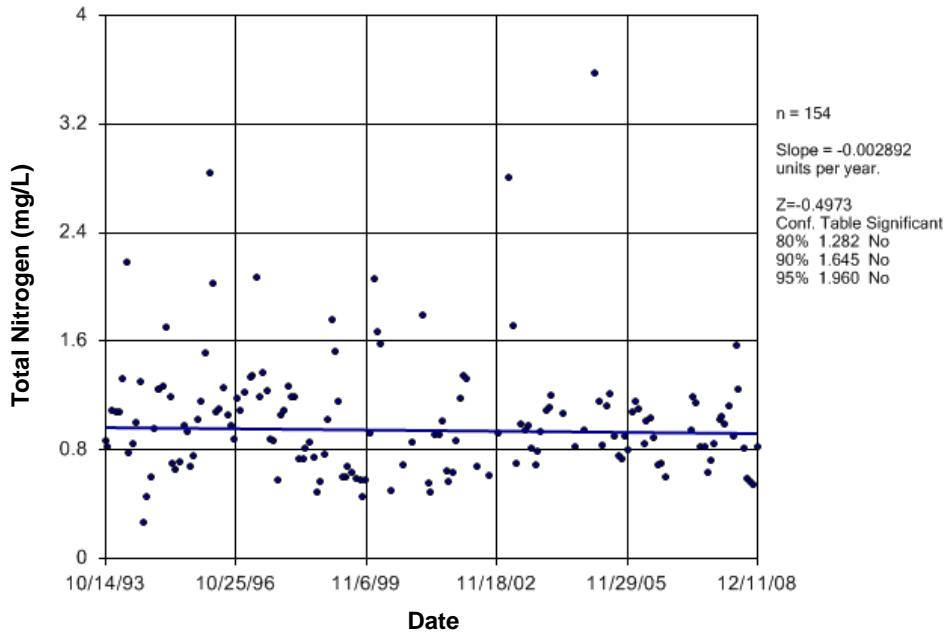
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 24.71  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 24.71  
 Adjusted Kruskal-Wallis statistic (H') = 24.71



**Figure B23 Beaver River: Total Nitrogen**

## Seasonal Kendall



**Figure B24 Beaver River: Total Nitrogen**

### Time Series

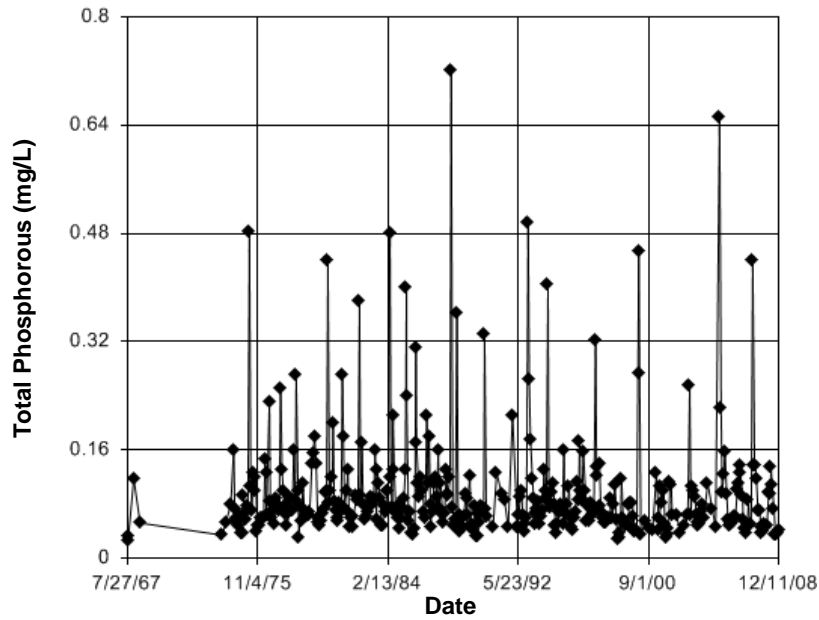


Figure B25 Beaver River: Total Phosphorous

### Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 0.7976  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 11 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 0.7975  
Adjusted Kruskal-Wallis statistic (H') = 0.7976

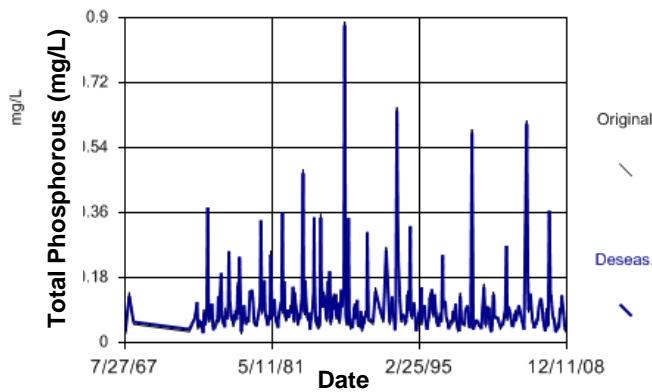


Figure B26 Beaver River: Total Phosphorous

### Sen's Slope Estimator

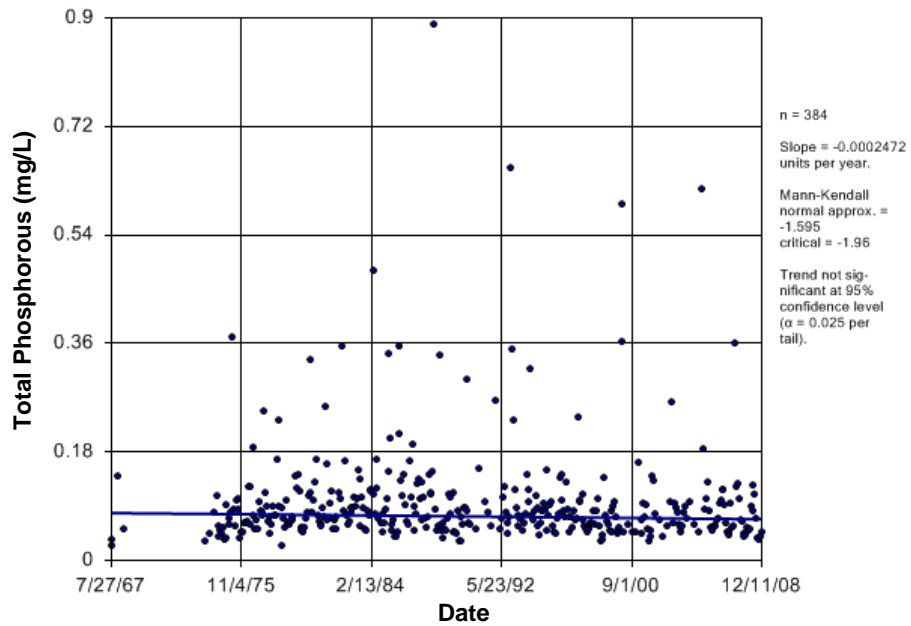


Figure B27 Beaver River: Total Phosphorous

### Time Series

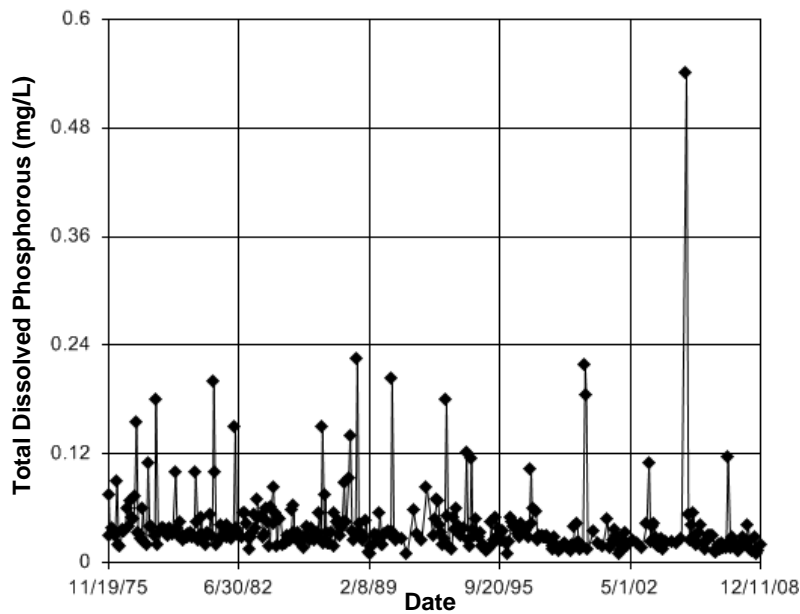
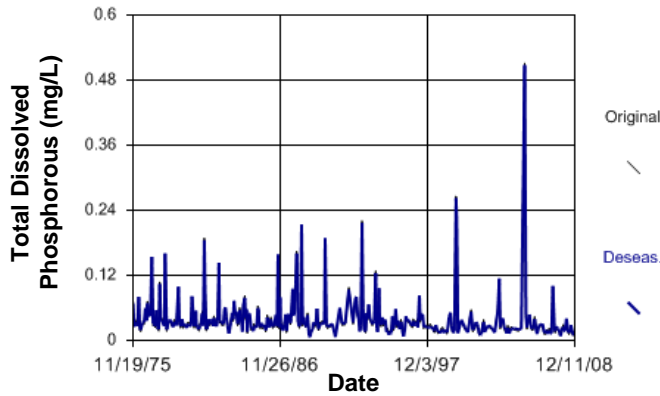


Figure B28 Beaver River: Total Dissolved Phosphorous

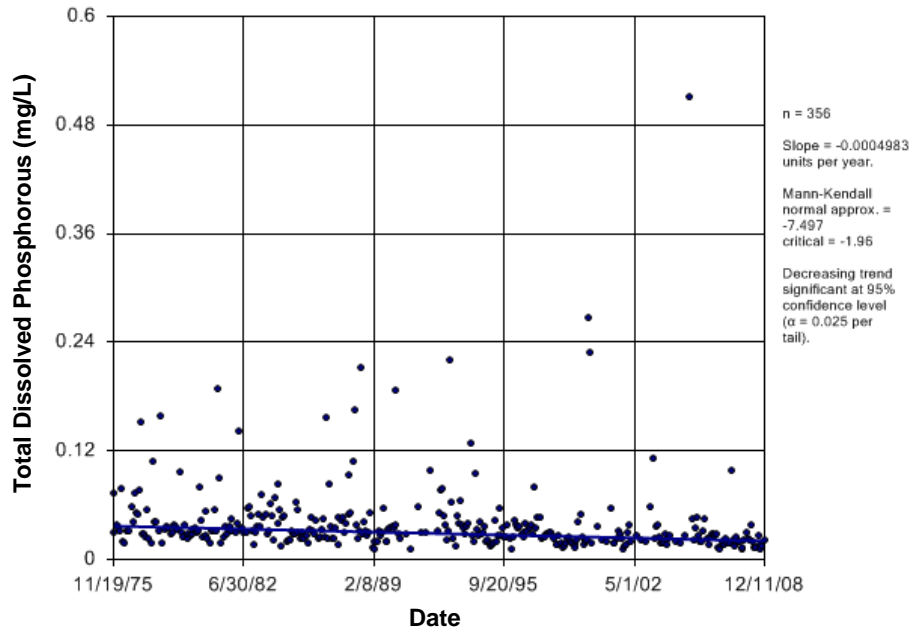
## Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 0.3131  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 13 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 0.3131  
 Adjusted Kruskal-Wallis statistic (H') = 0.3131



**Figure B29 Beaver River: Total Dissolved Phosphorous**

## Sen's Slope Estimator



**Figure B30 Beaver River: Total Dissolved Phosphorous**



## Time Series

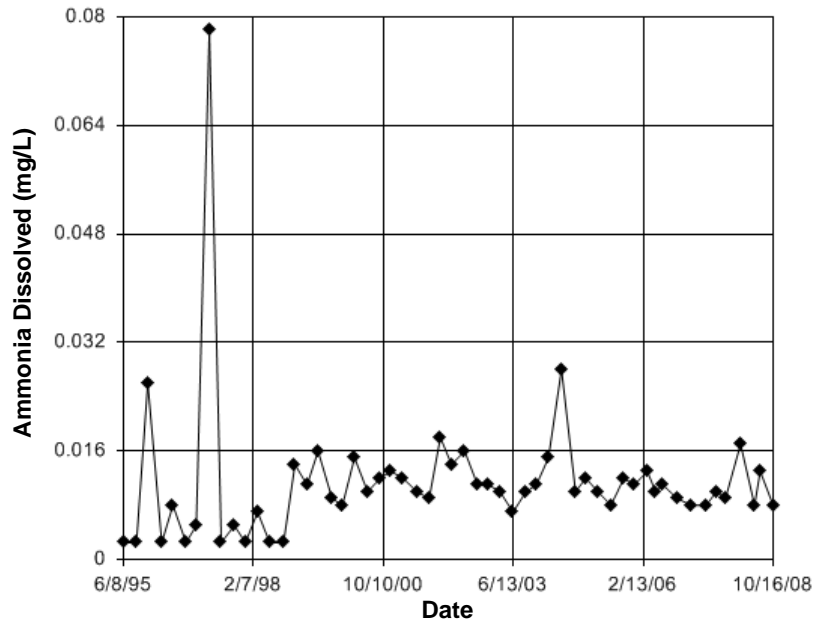


Figure B31 Cold River: Ammonia Dissolved

## Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 1.332  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 1.332  
Adjusted Kruskal-Wallis statistic (H') = 1.332

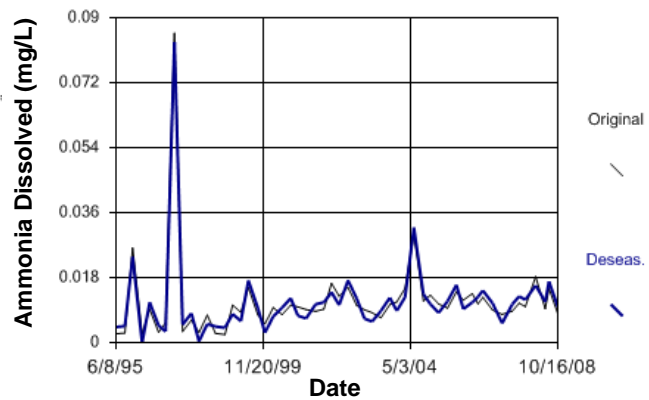


Figure B32 Cold River: Ammonia Dissolved

### Sen's Slope Estimator

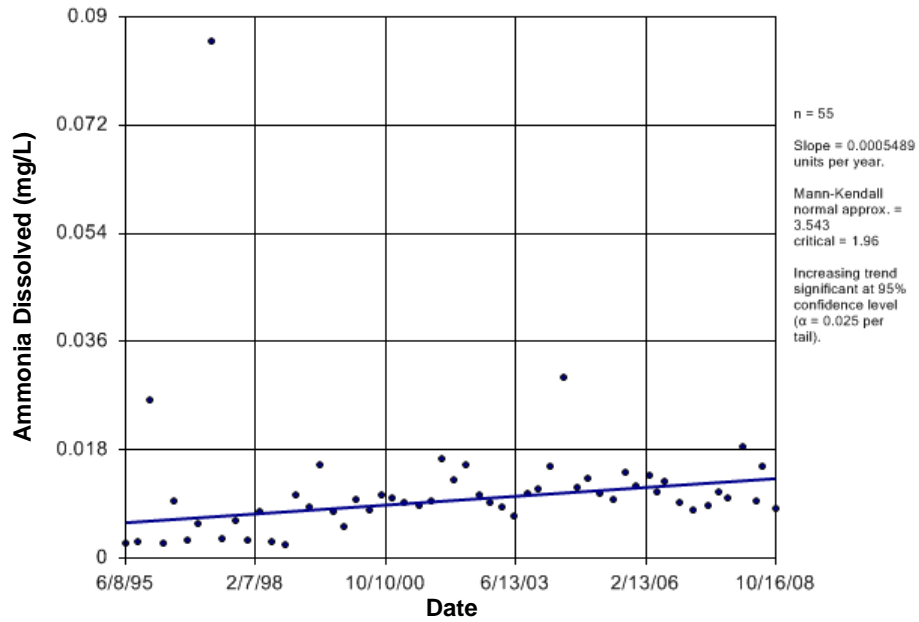


Figure B33 Cold River: Ammonia Dissolved

### Time Series

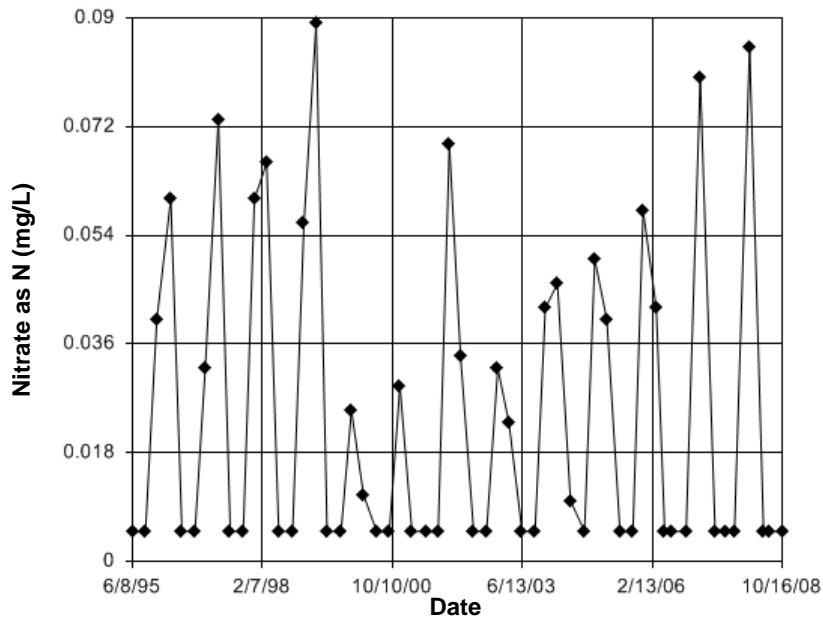


Figure B34 Cold River: Nitrate as N

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 32.13  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.

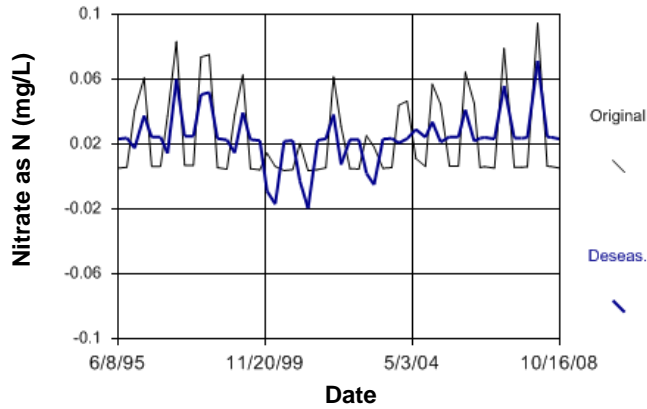


Figure B35 Cold River: Nitrate as N

## Seasonal Kendall

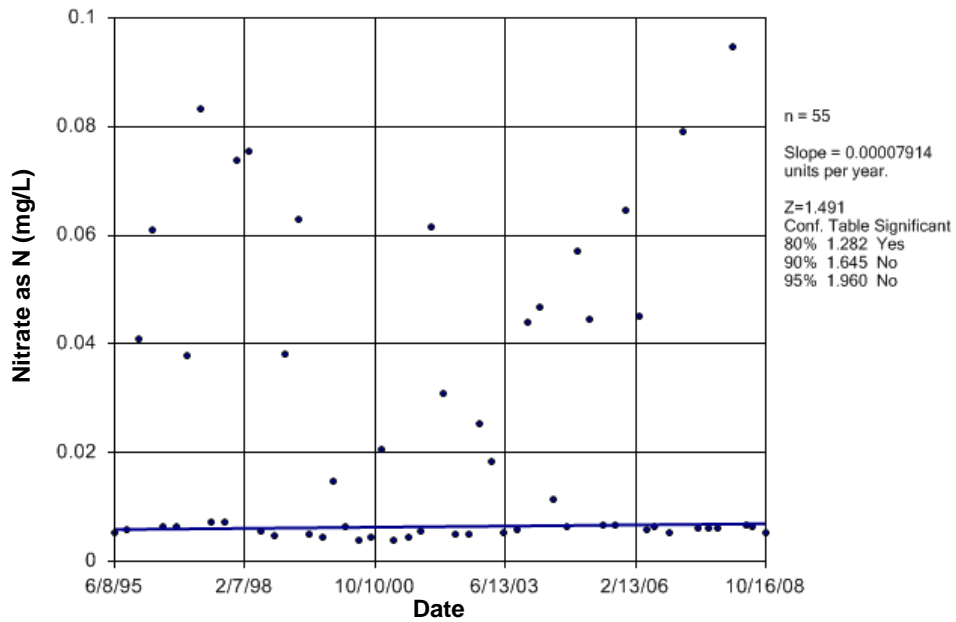


Figure B36 Cold River: Nitrate as N

### Time Series

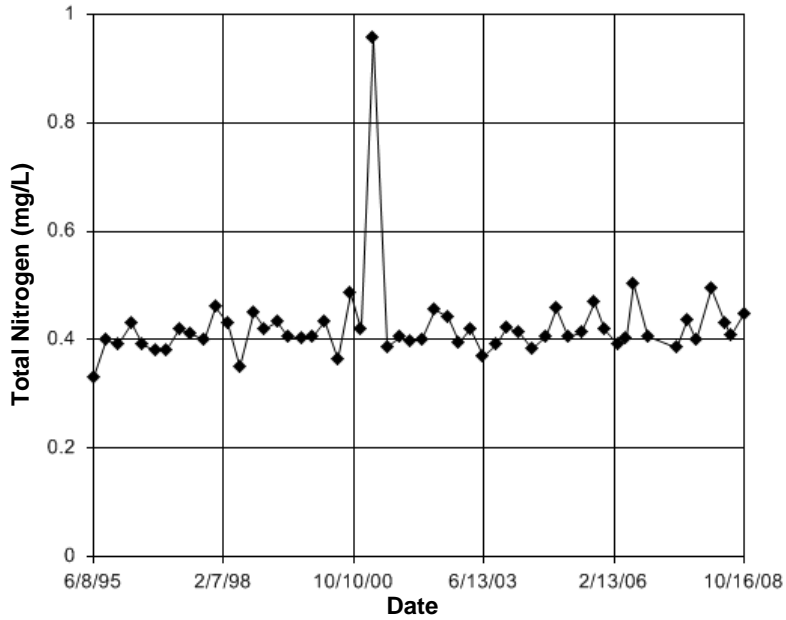


Figure B37 Cold River: Total Nitrogen

### Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 0.09915  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 0.09915  
 Adjusted Kruskal-Wallis statistic (H') = 0.09915

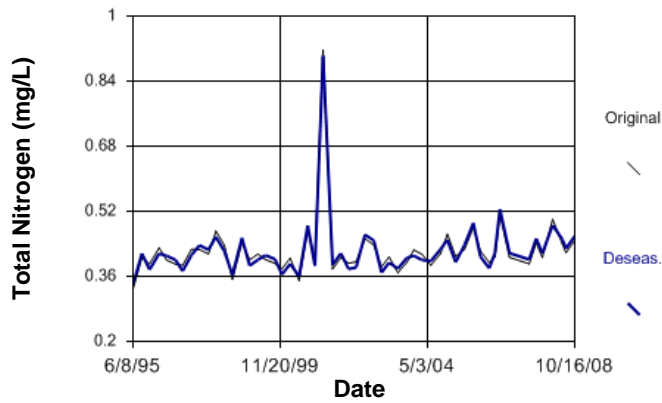


Figure B38 Cold River: Total Nitrogen

### Sen's Slope Estimator

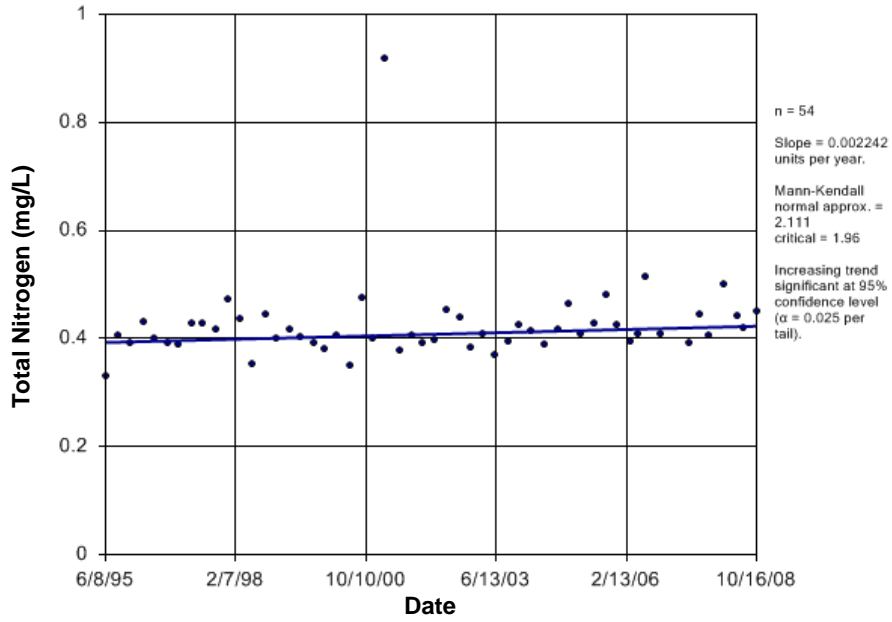


Figure B39 Cold River: Total Nitrogen

### Time Series

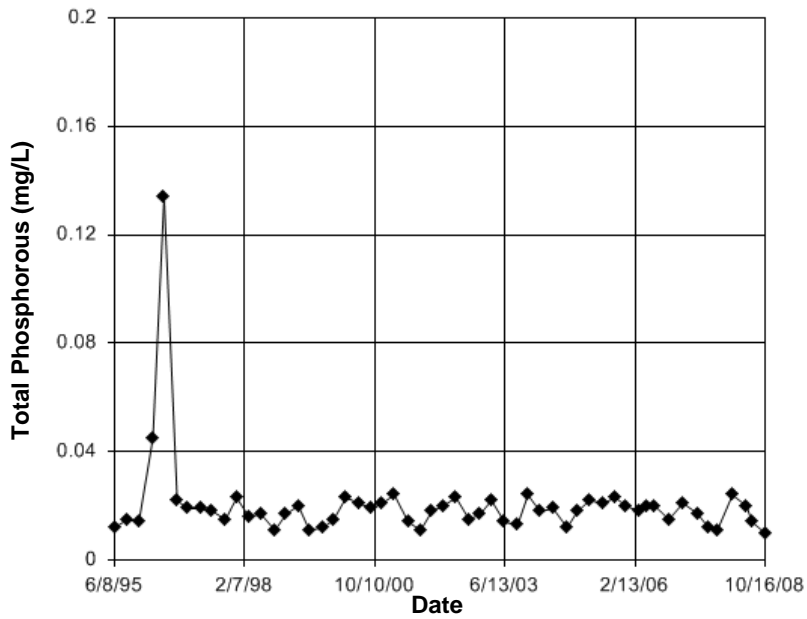
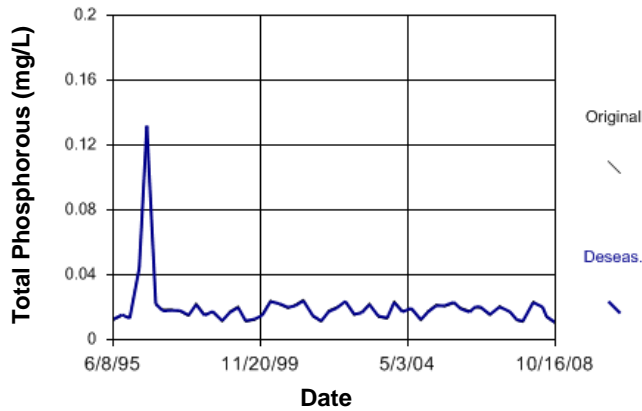


Figure B40 Cold River: Total Phosphorous

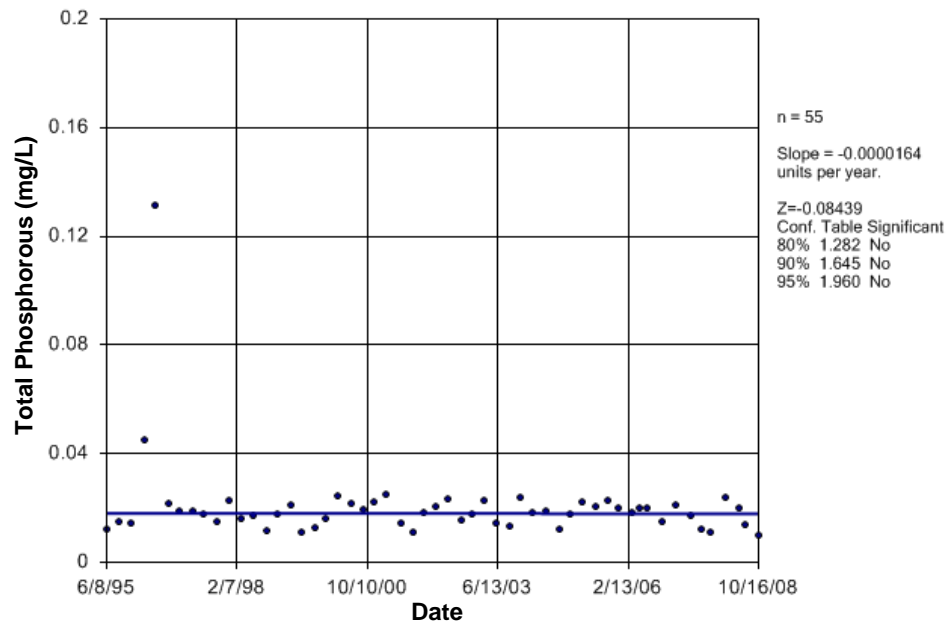
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 11.29  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.



**Figure B41 Cold River: Total Phosphorous**

## Seasonal Kendall



**Figure B42 Cold River: Total Phosphorous**

### Time Series

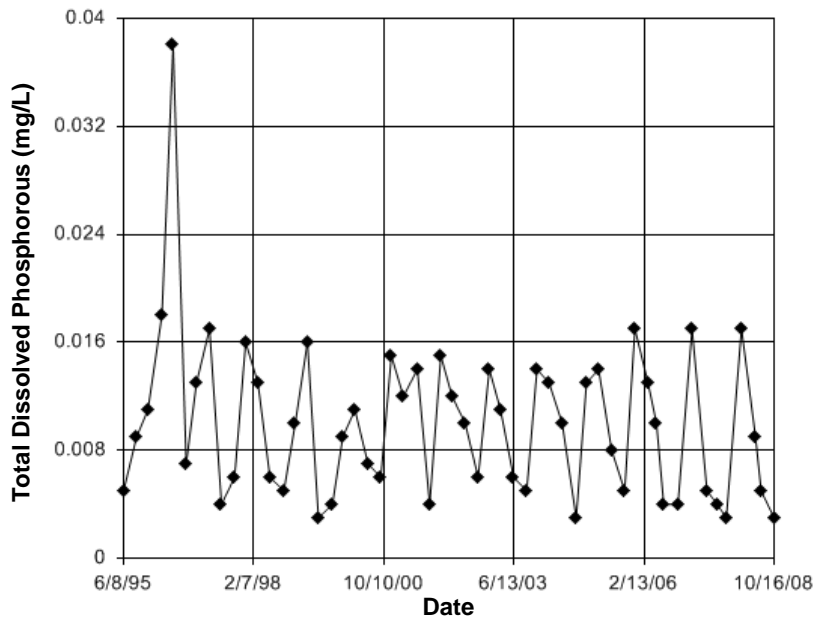


Figure B43 Cold River: Total Dissolved Phosphorous

### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 28.4  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 28.4  
 Adjusted Kruskal-Wallis statistic (H') = 28.4

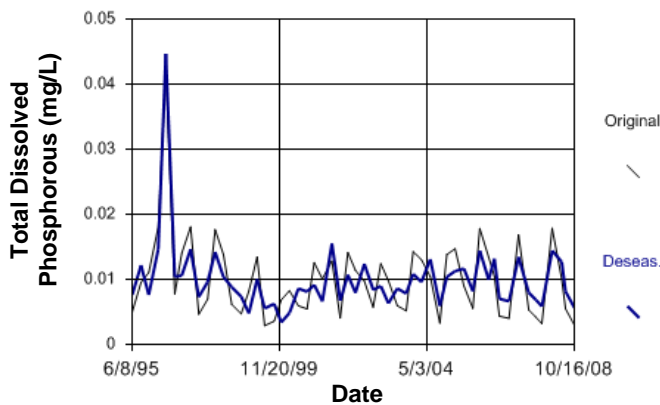


Figure B44 Cold River: Total Dissolved Phosphorous

### Seasonal Kendall

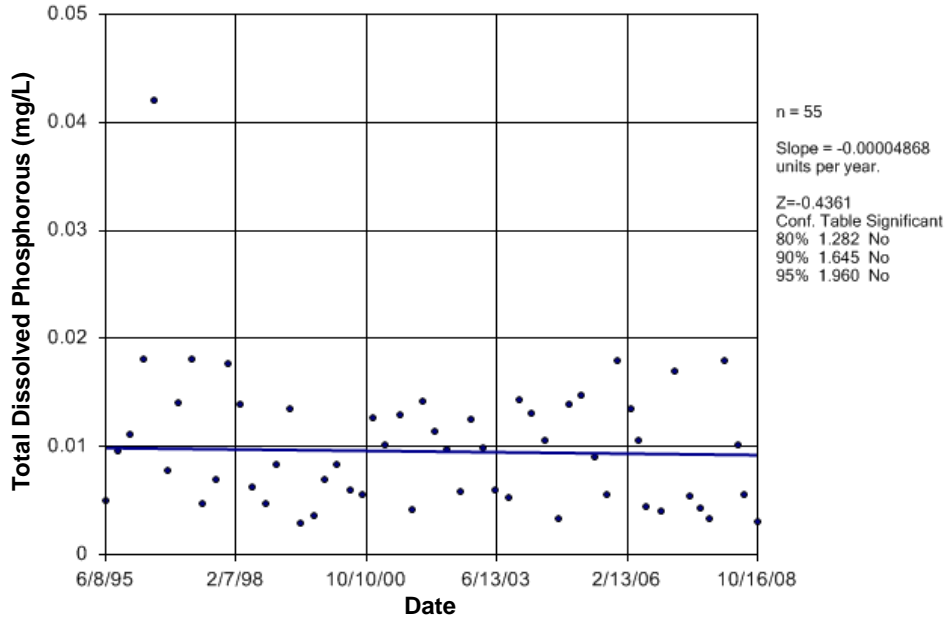


Figure B45 Cold River: Total Dissolved Phosphorous

### Time Series

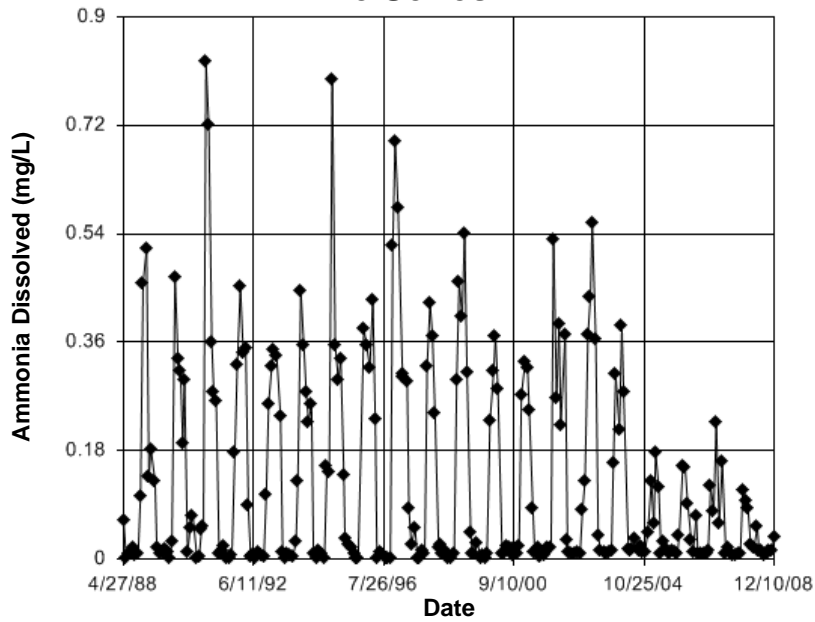
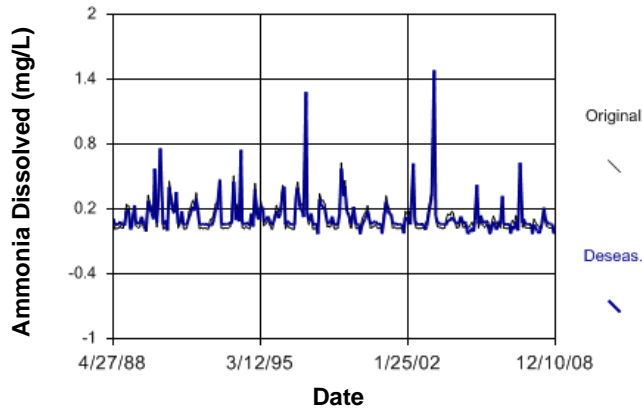


Figure B46 North Saskatchewan River: Ammonia Dissolved



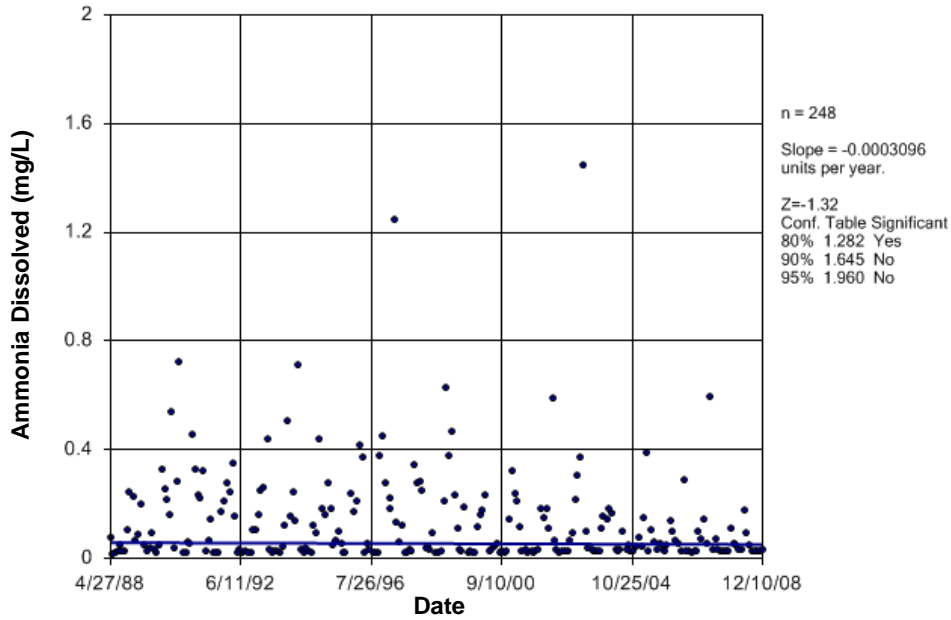
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 73.93  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 73.93  
 Adjusted Kruskal-Wallis statistic (H') = 73.93



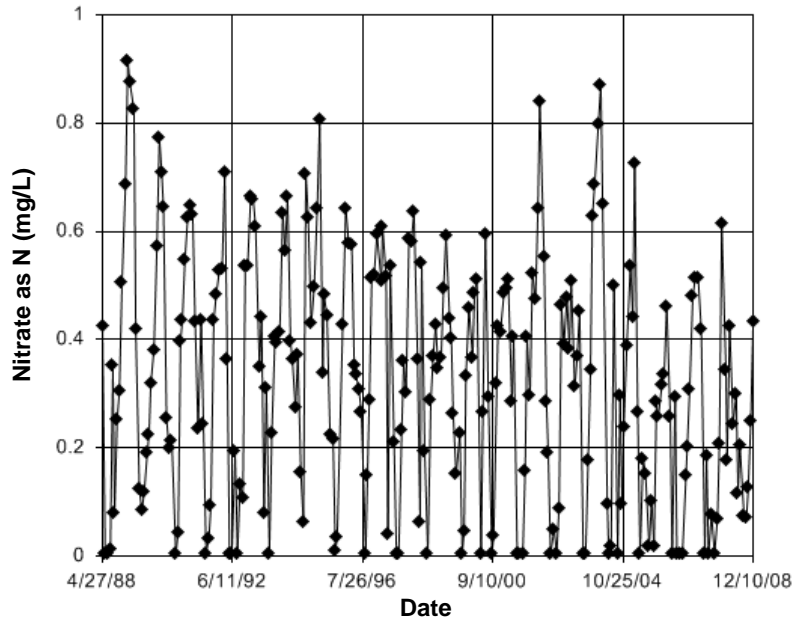
**Figure B47 North Saskatchewan River: Ammonia Dissolved**

## Seasonal Kendall



**Figure B48 North Saskatchewan River: Ammonia Dissolved**

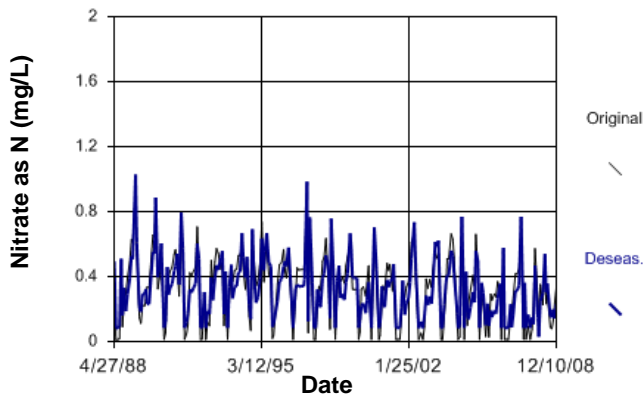
### Time Series



**Figure B49 North Saskatchewan River: Nitrate as N**

### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 45.31  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 45.31  
 Adjusted Kruskal-Wallis statistic (H') = 45.31



**Figure B50 North Saskatchewan River: Nitrate as N**

### Seasonal Kendall

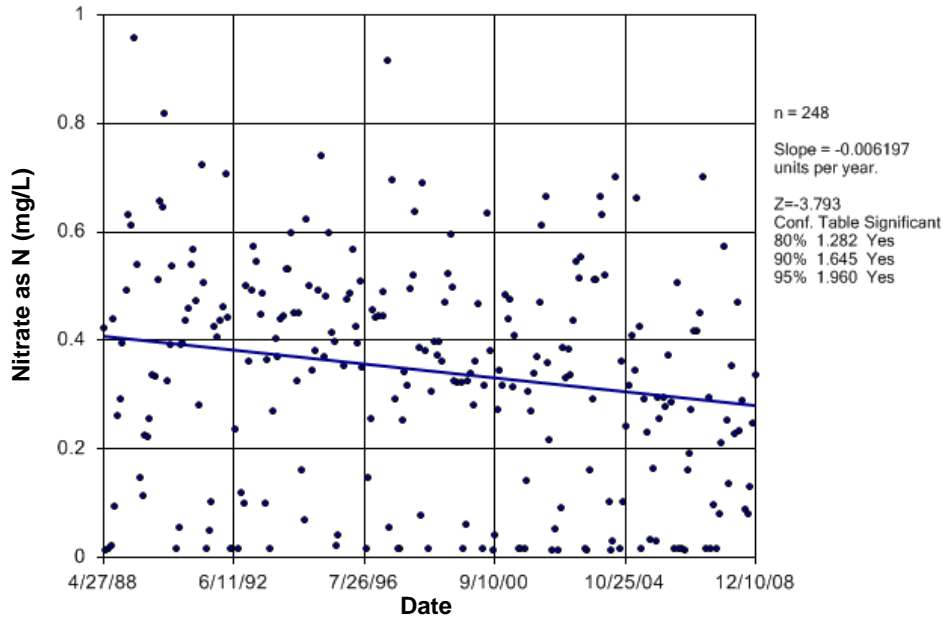


Figure B51 North Saskatchewan River: Nitrate as N

### Time Series

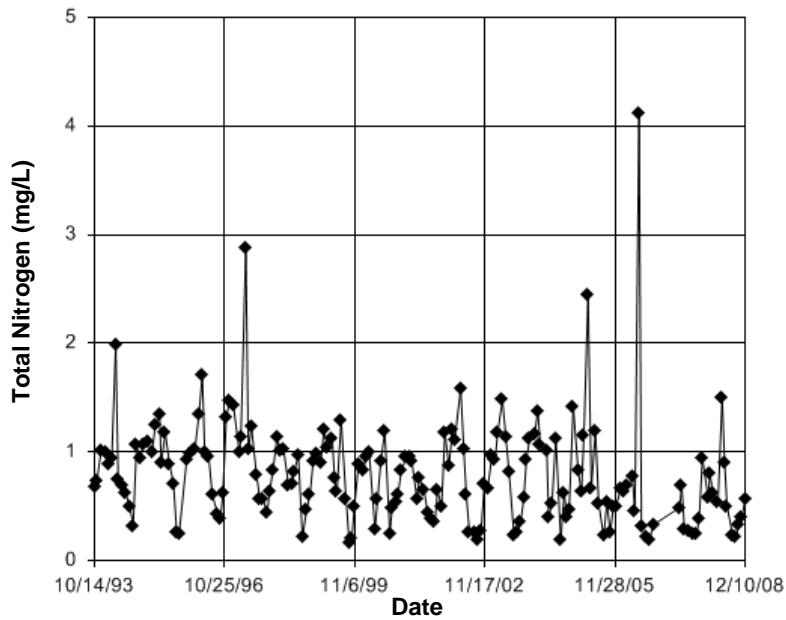
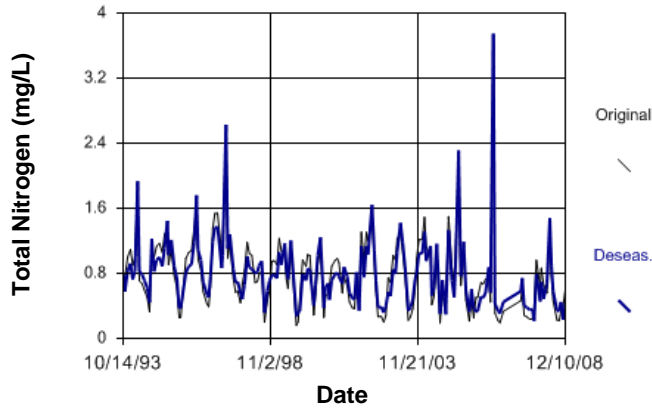


Figure B52 North Saskatchewan River: Total Nitrogen

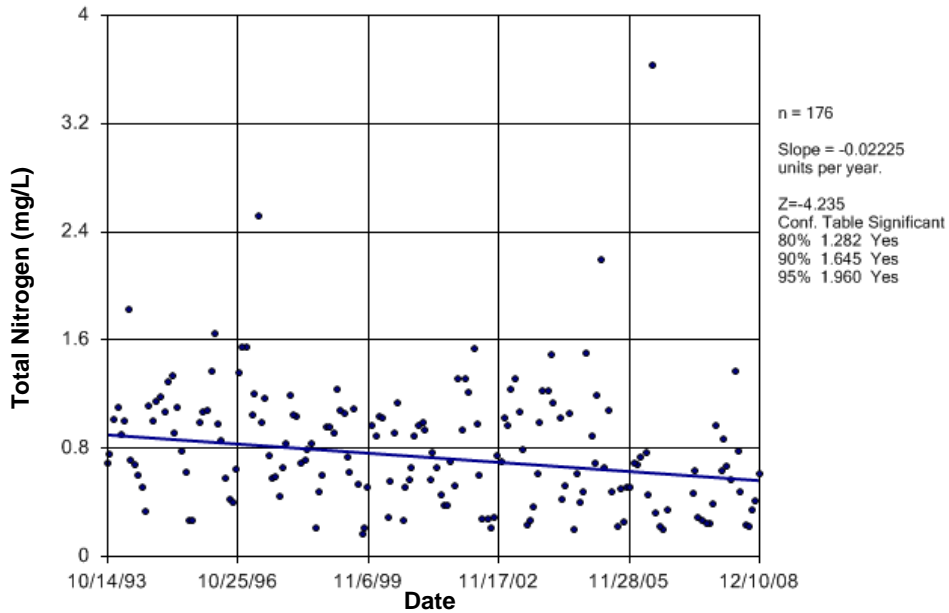
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 36.52  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 36.52  
 Adjusted Kruskal-Wallis statistic (H') = 36.52

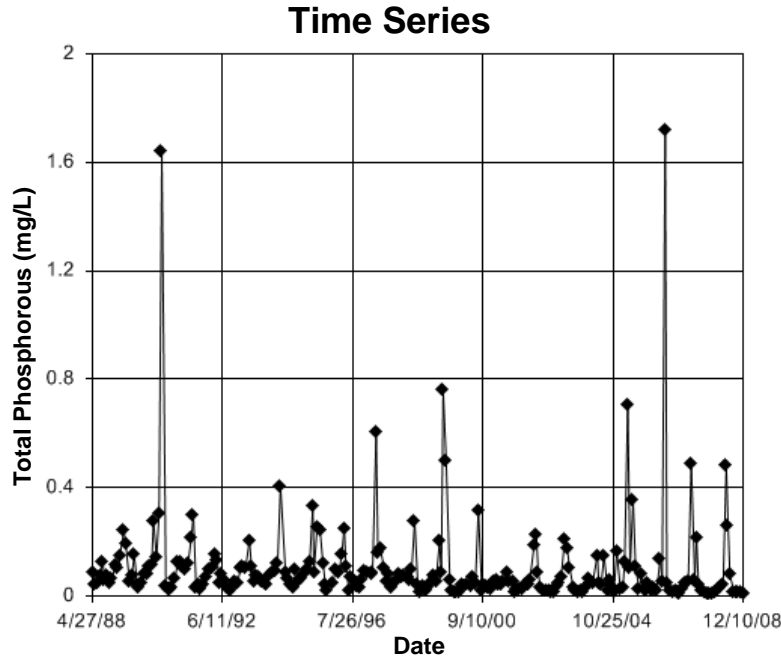


**Figure B53 North Saskatchewan River: Total Nitrogen**

## Seasonal Kendall



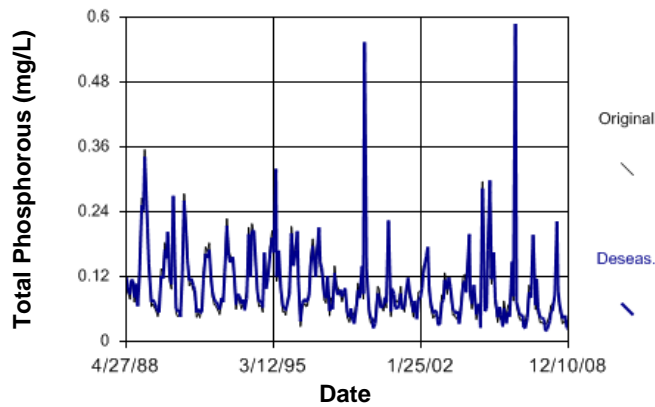
**Figure B54 North Saskatchewan River: Total Nitrogen**



**Figure B55 North Saskatchewan River: Total Phosphorous**

### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 11.95  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 11.95  
 Adjusted Kruskal-Wallis statistic (H') = 11.95



**Figure B56 North Saskatchewan River: Total Phosphorous**

### Seasonal Kendall

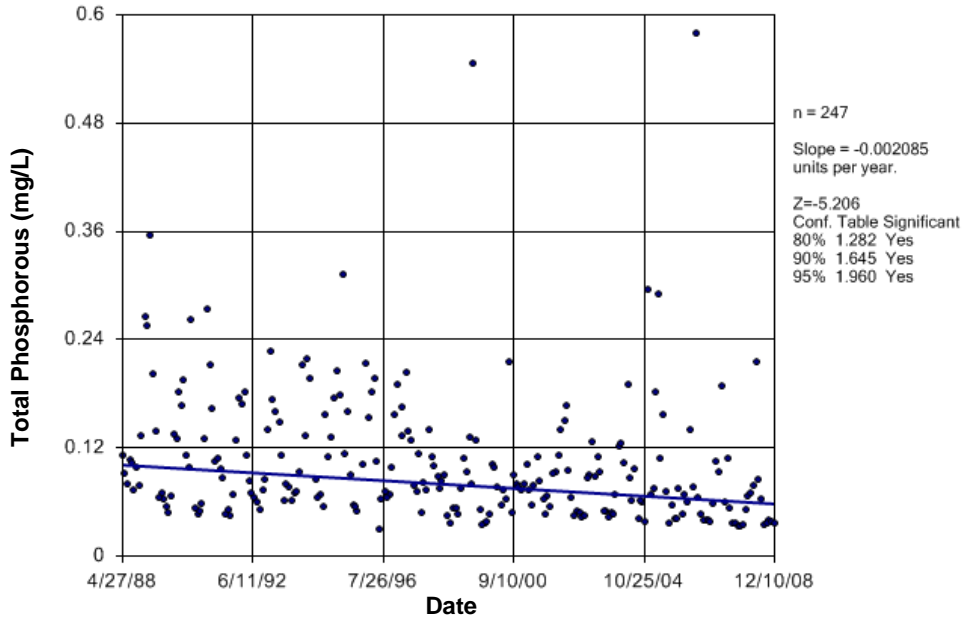


Figure B57 North Saskatchewan River: Total Phosphorous

### Time Series

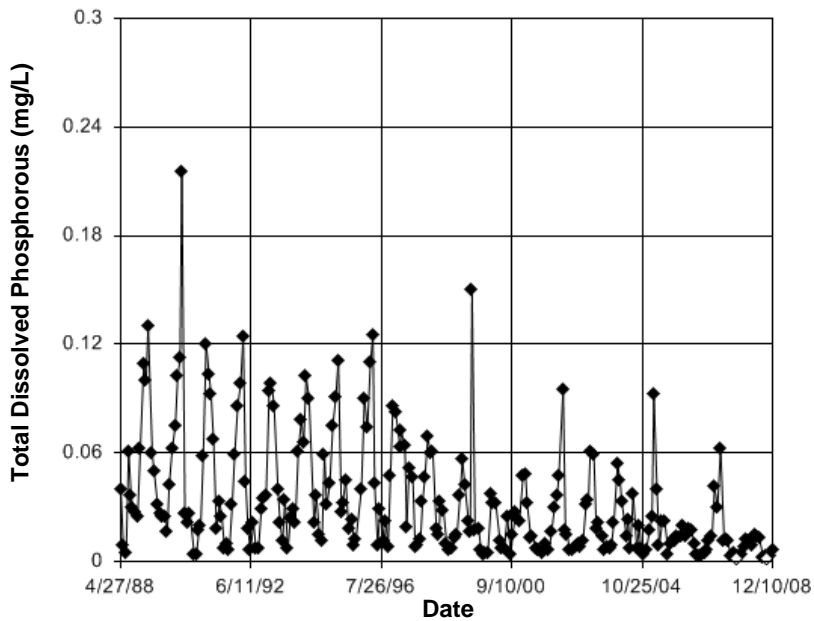


Figure B58 North Saskatchewan River: Total Dissolved Phosphorous

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 30.92  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 5 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 30.92  
 Adjusted Kruskal-Wallis statistic (H') = 30.92

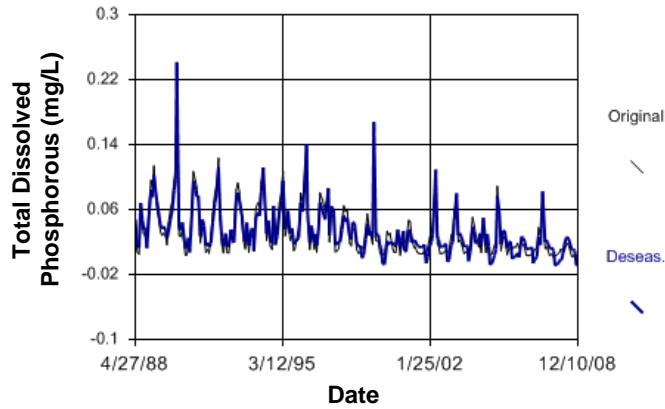


Figure B59 North Saskatchewan River: Total Dissolved Phosphorous

## Seasonal Kendall

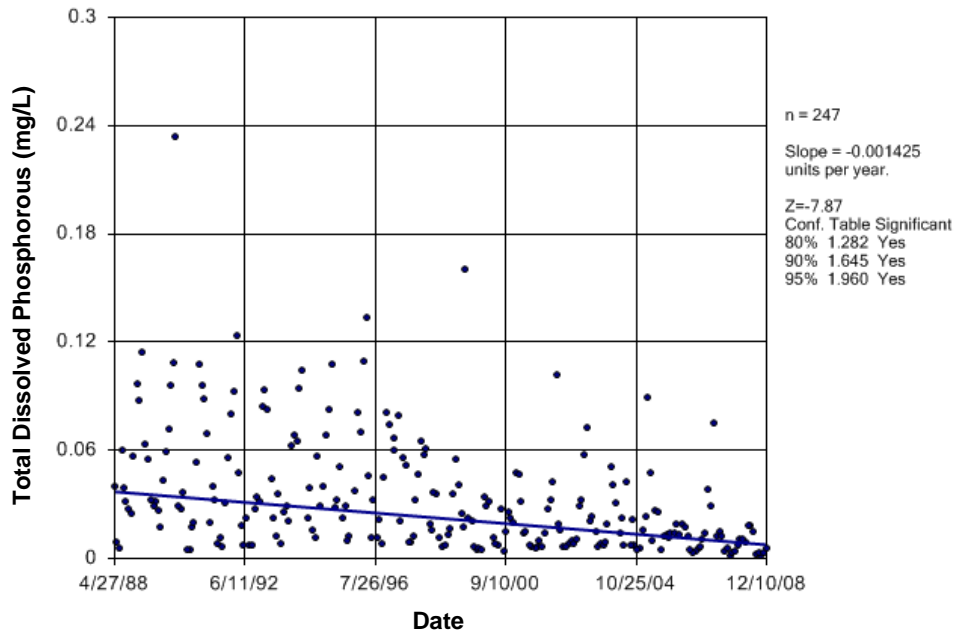
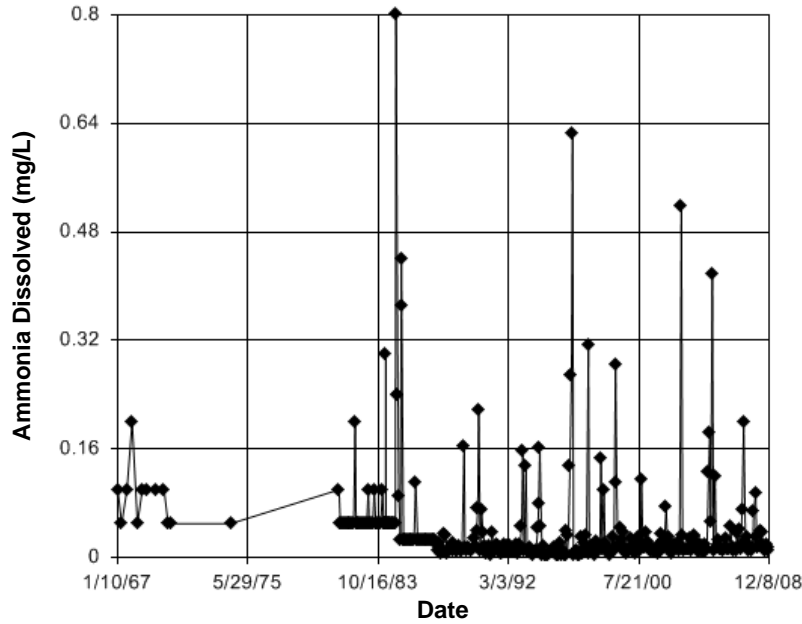


Figure B60 North Saskatchewan River: Total Dissolved Phosphorous

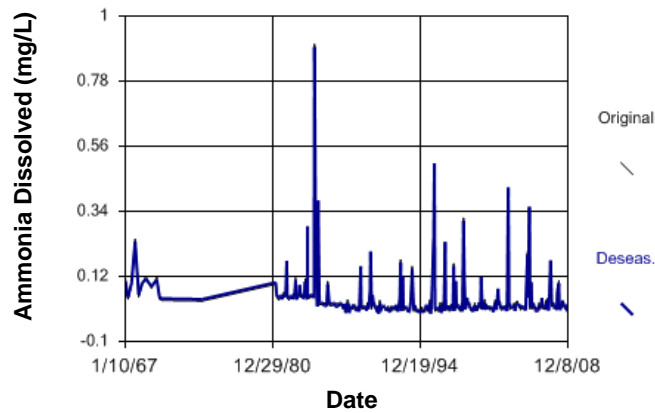
### Time Series



**Figure B61 Red Deer River (AB-SK): Ammonia Dissolved**

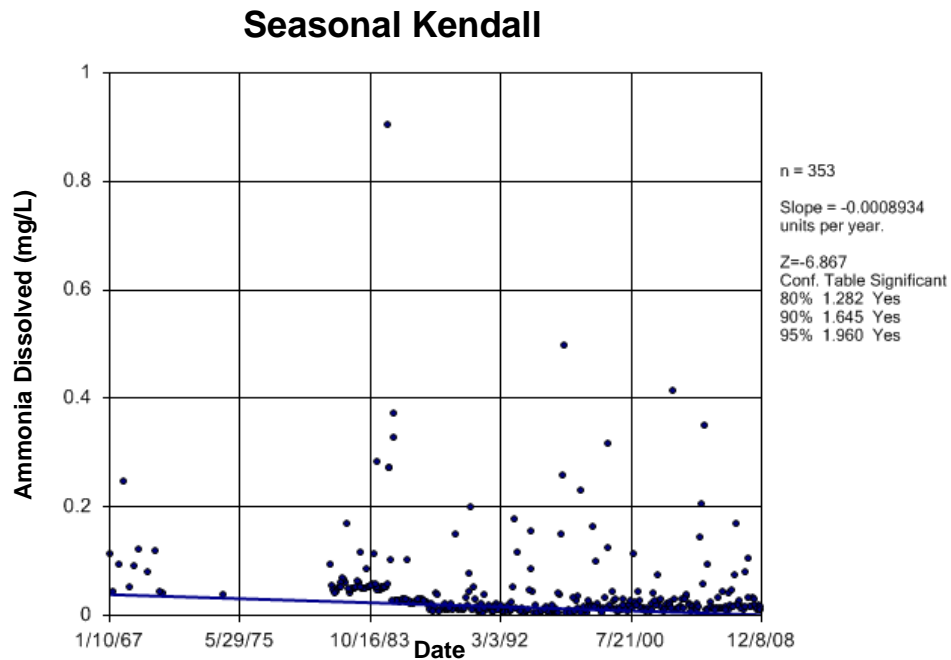
### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 15.19  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 11 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 15.19  
 Adjusted Kruskal-Wallis statistic (H') = 15.19

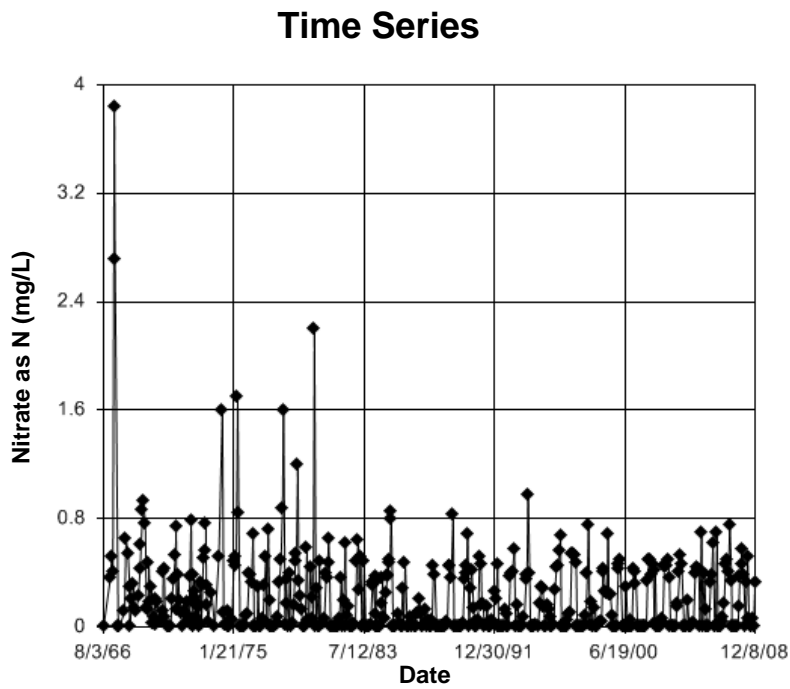


**Figure B62 Red Deer River (AB-SK): Ammonia Dissolved**





**Figure B63 Red Deer River (AB-SK): Ammonia Dissolved**



**Figure B64 Red Deer River (AB-SK): Nitrate as N**

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 51.83  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 51.83  
 Adjusted Kruskal-Wallis statistic (H') = 51.83

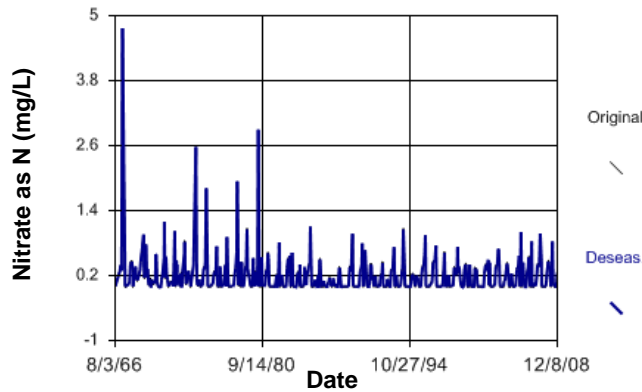


Figure B65 Red Deer River (AB-SK): Nitrate as N

## Seasonal Kendall

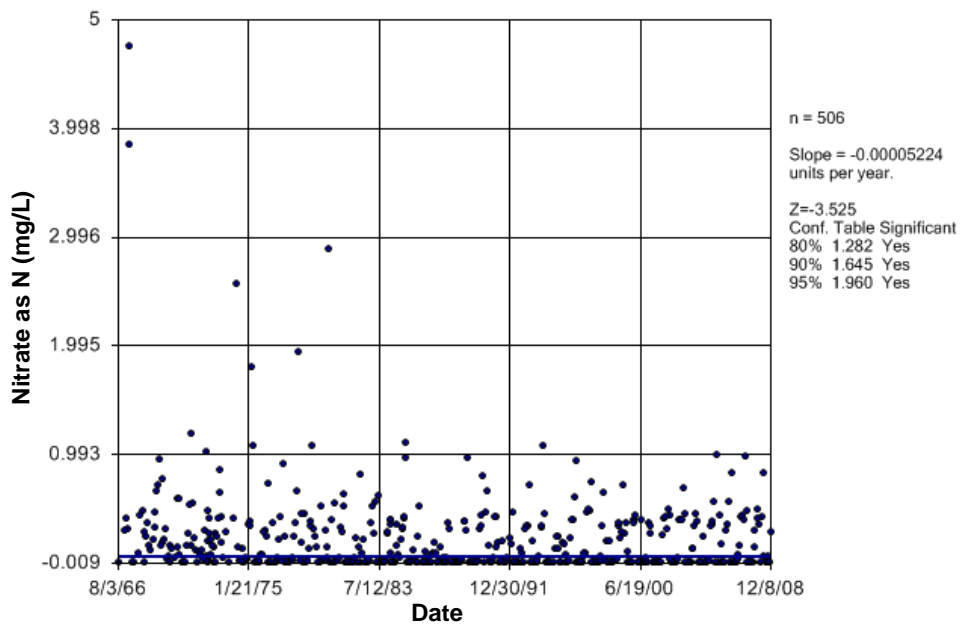


Figure B66 Red Deer River (AB-SK): Nitrate as N

## Time Series

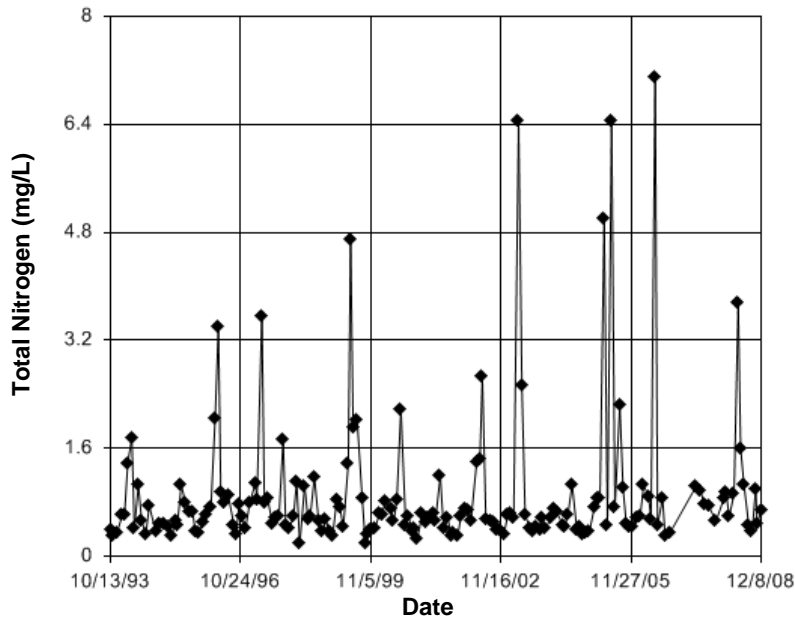


Figure B67 Red Deer River (AB-SK): Total Nitrogen

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 11.05  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 5 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 11.05  
 Adjusted Kruskal-Wallis statistic (H') = 11.05

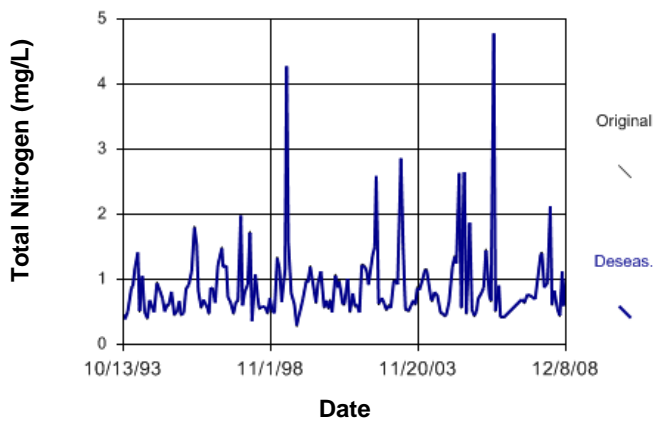


Figure B68 Red Deer River (AB-SK): Total Nitrogen

### Seasonal Kendall

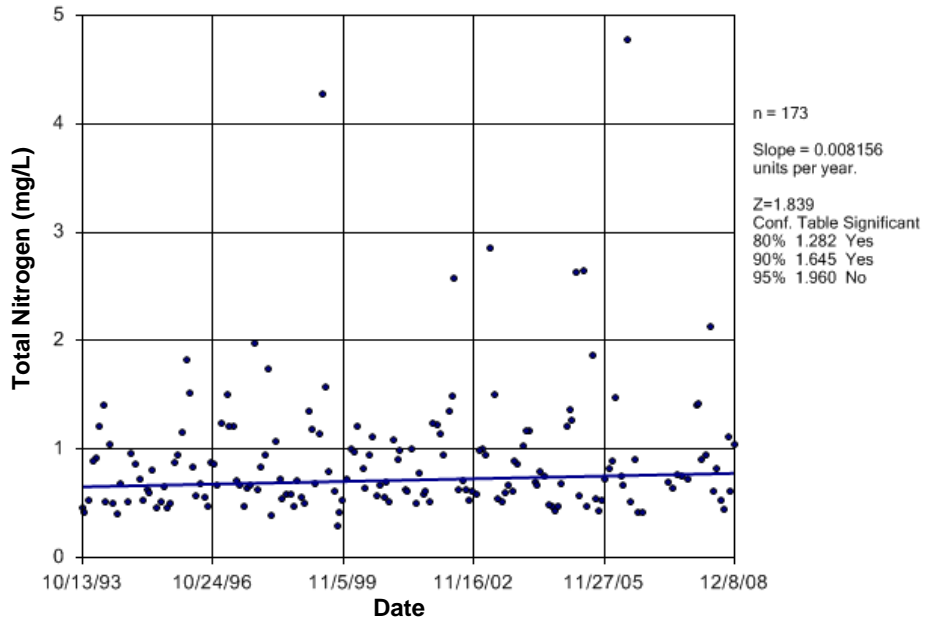


Figure B69 Red Deer River (AB-SK): Total Nitrogen

### Time Series

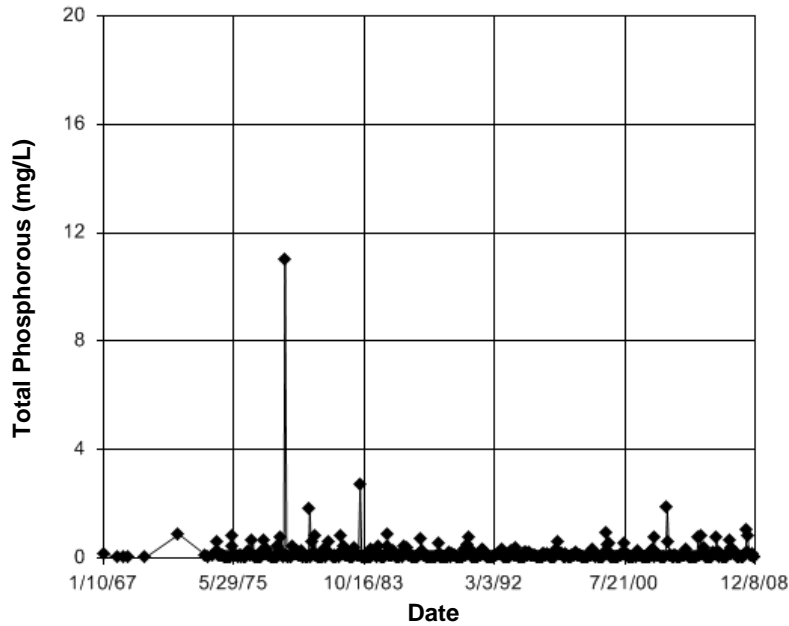


Figure B70 Red Deer River (AB-SK): Total Phosphorous

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 13.46  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 51 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 13.46  
Adjusted Kruskal-Wallis statistic (H') = 13.46

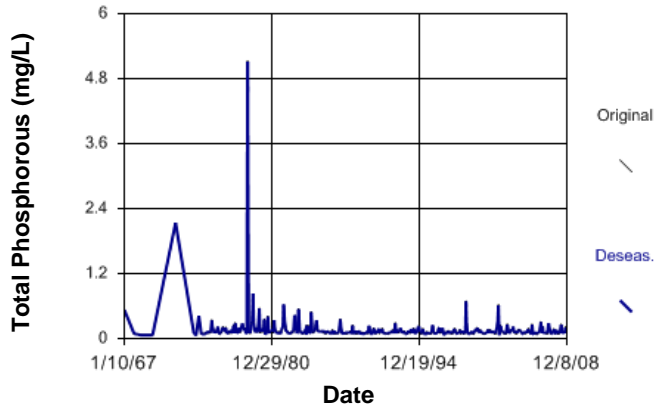


Figure B71 Red Deer River (AB-SK): Total Phosphorous

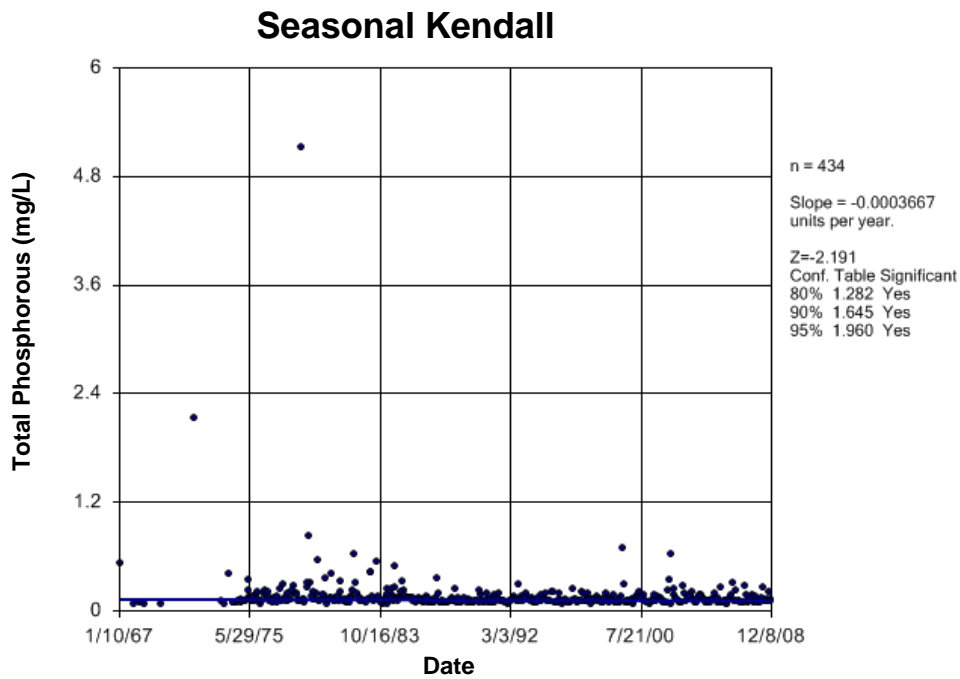


Figure B72 Red Deer River (AB-SK): Total Phosphorous

## Time Series

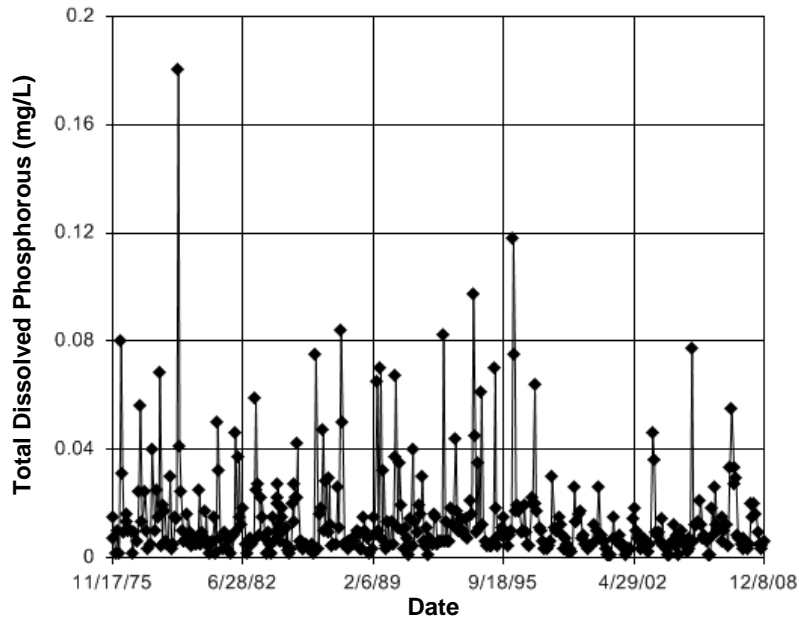


Figure B73 Red Deer River (AB-SK): Total Dissolved Phosphorous

## Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 0.1615  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 18 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 0.1615  
Adjusted Kruskal-Wallis statistic (H') = 0.1615

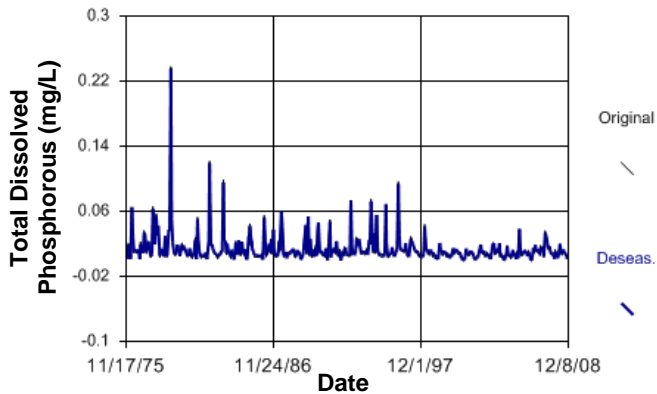


Figure B74 Red Deer River (AB-SK): Total Dissolved Phosphorous

### Sen's Slope Estimator

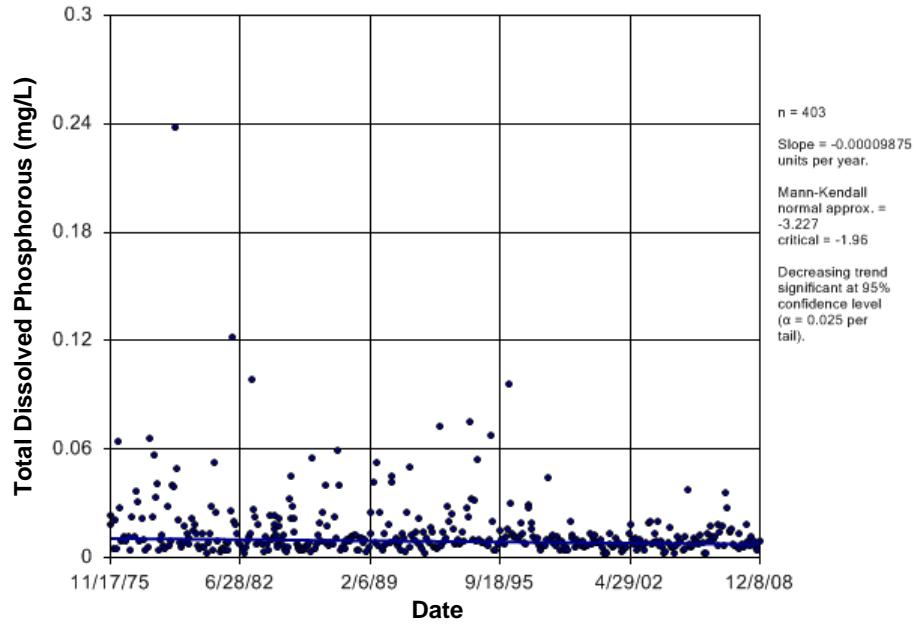


Figure B75 Red Deer River (AB-SK): Total Dissolved Phosphorous

### Time Series

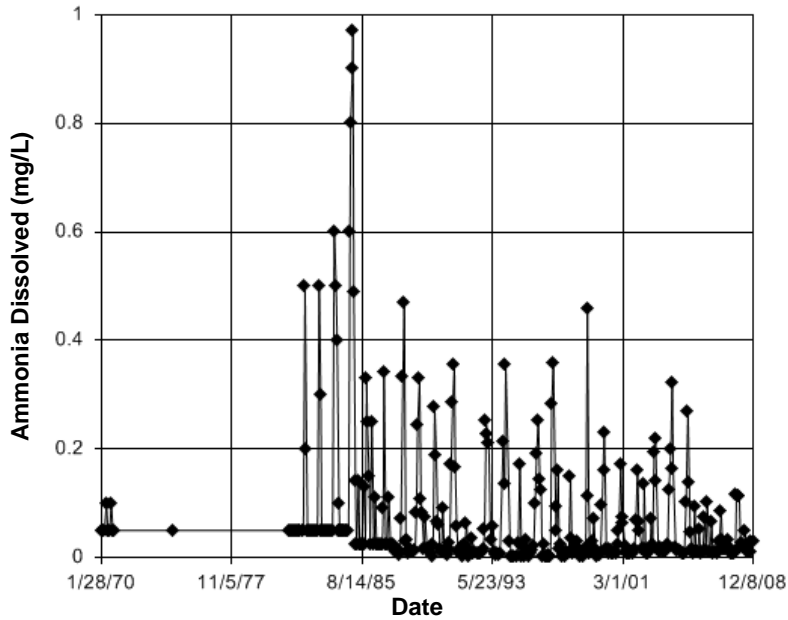
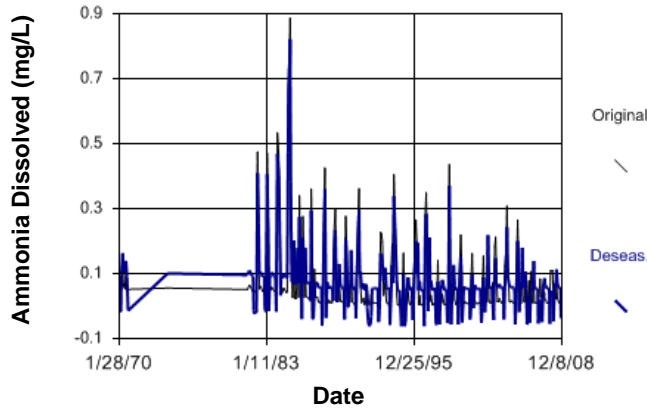


Figure B76 South Saskatchewan River: Ammonia Dissolved

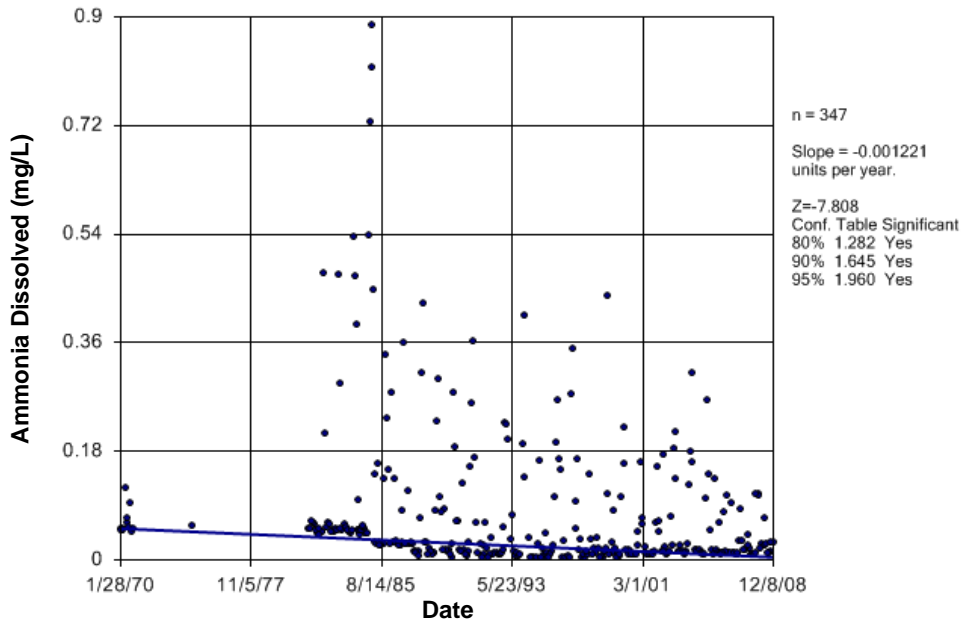
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 81.19  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 6 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 81.19  
 Adjusted Kruskal-Wallis statistic (H') = 81.19



**Figure B77 South Saskatchewan River: Ammonia Dissolved**

## Seasonal Kendall



**Figure B78 South Saskatchewan River: Ammonia Dissolved**



## Time Series

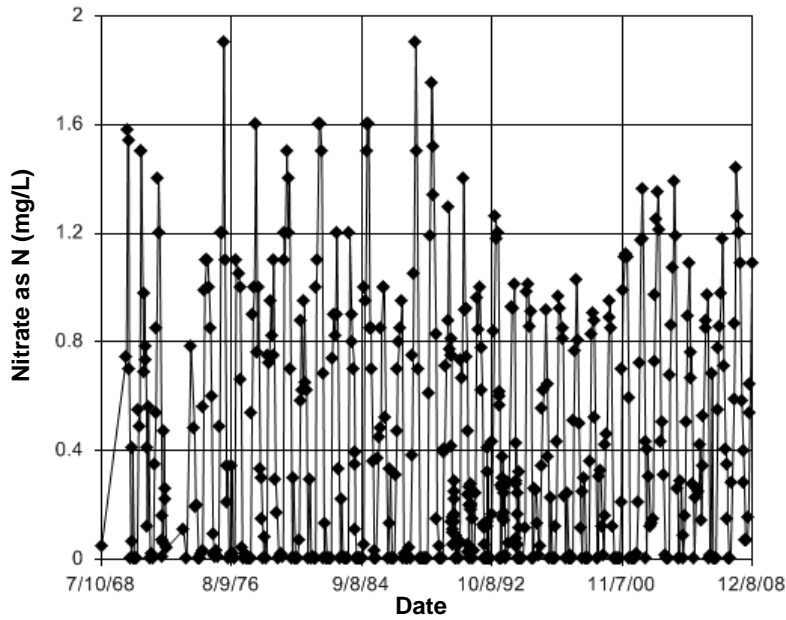


Figure B79 South Saskatchewan River: Nitrate as N

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 331.8  
Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
There were 13 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 331.8  
Adjusted Kruskal-Wallis statistic (H') = 331.8

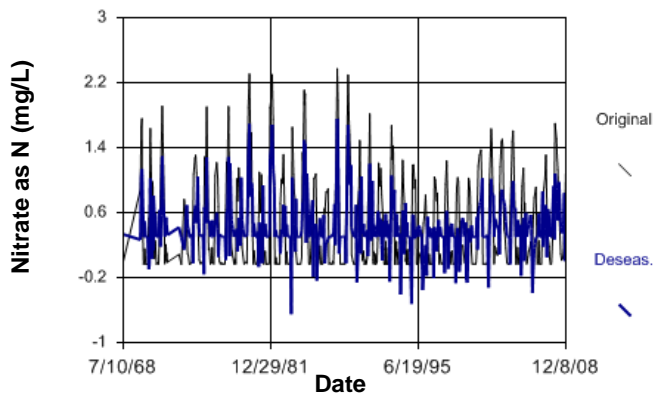


Figure B80 South Saskatchewan River: Nitrate as N

### Seasonal Kendall

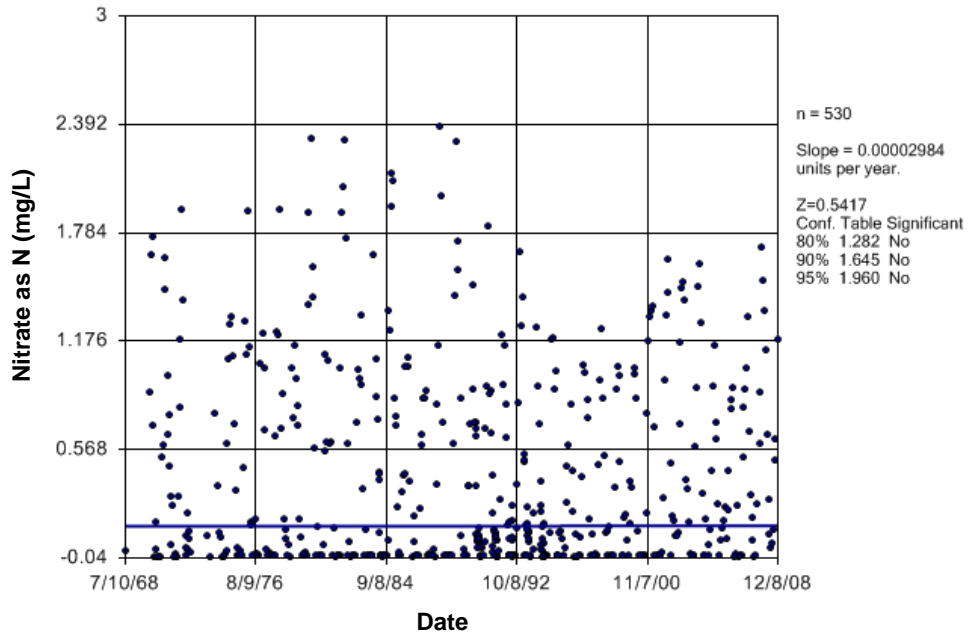


Figure B81 South Saskatchewan River: Nitrate as N

### Time Series

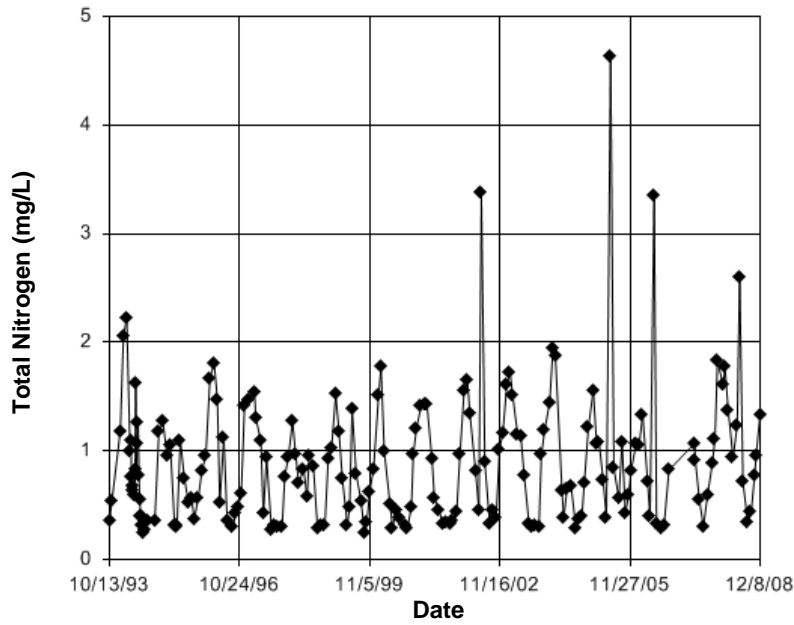
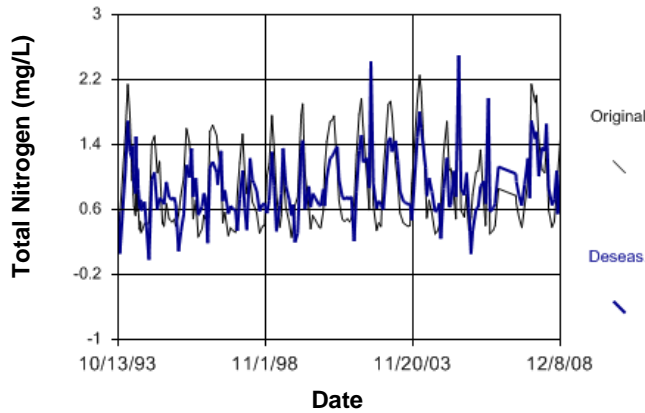


Figure B82 South Saskatchewan River: Total Nitrogen

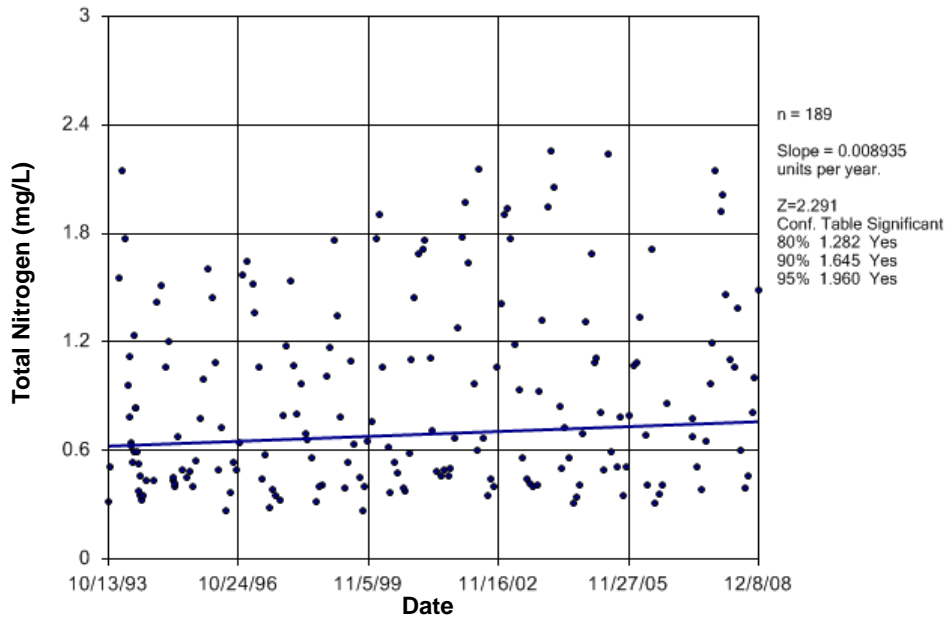
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 85.82  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 85.82  
 Adjusted Kruskal-Wallis statistic (H') = 85.82



**Figure B83 South Saskatchewan River: Total Nitrogen**

## Seasonal Kendall



**Figure B84 South Saskatchewan River: Total Nitrogen**

## Time Series

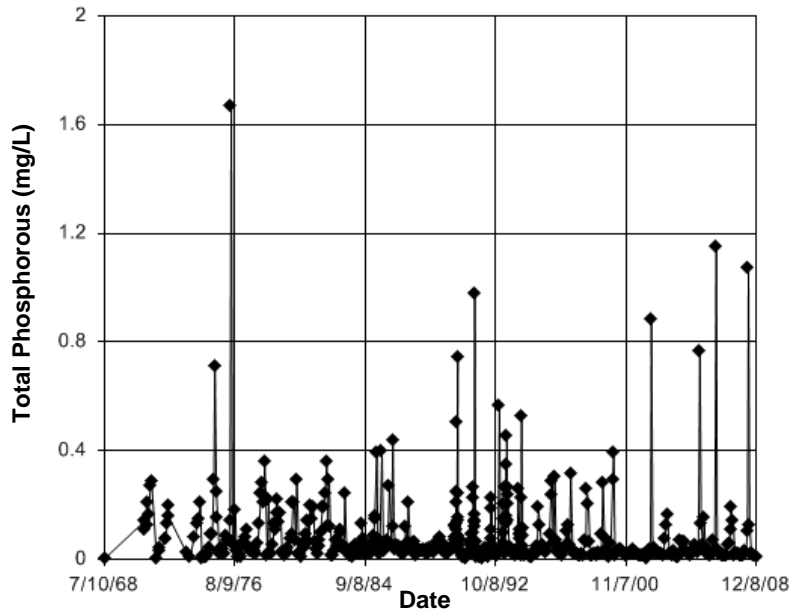


Figure B85 South Saskatchewan River: Total Phosphorous

## Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 3.343  
Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
There were 15 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 3.343  
Adjusted Kruskal-Wallis statistic (H') = 3.343

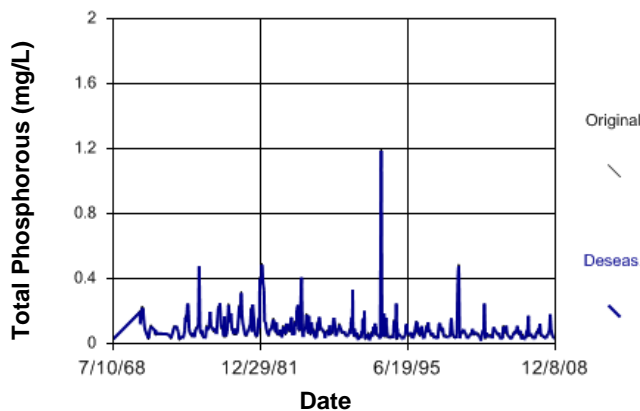


Figure B86 South Saskatchewan River: Total Phosphorous

### Sen's Slope Estimator

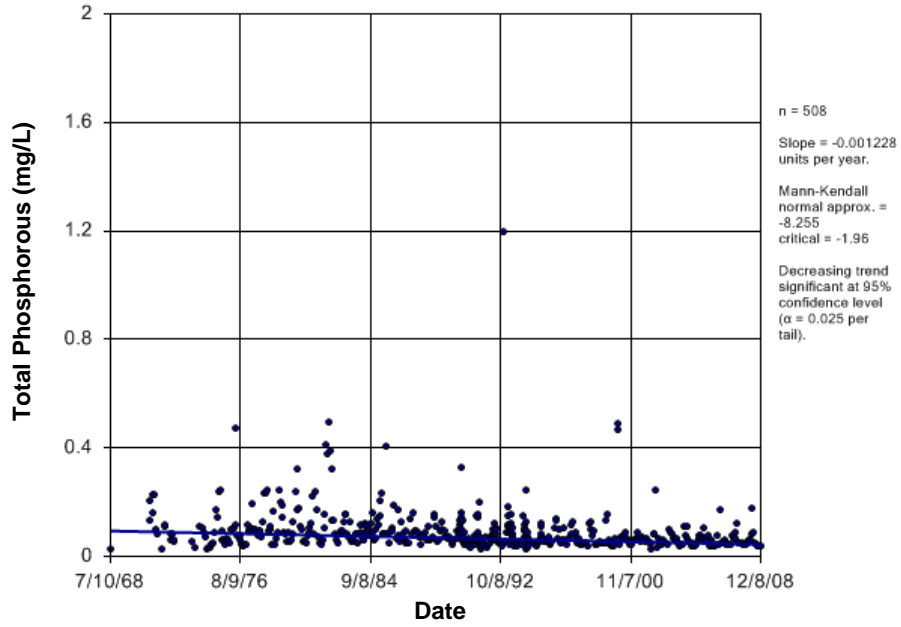


Figure B87 South Saskatchewan River: Total Phosphorous

### Time Series

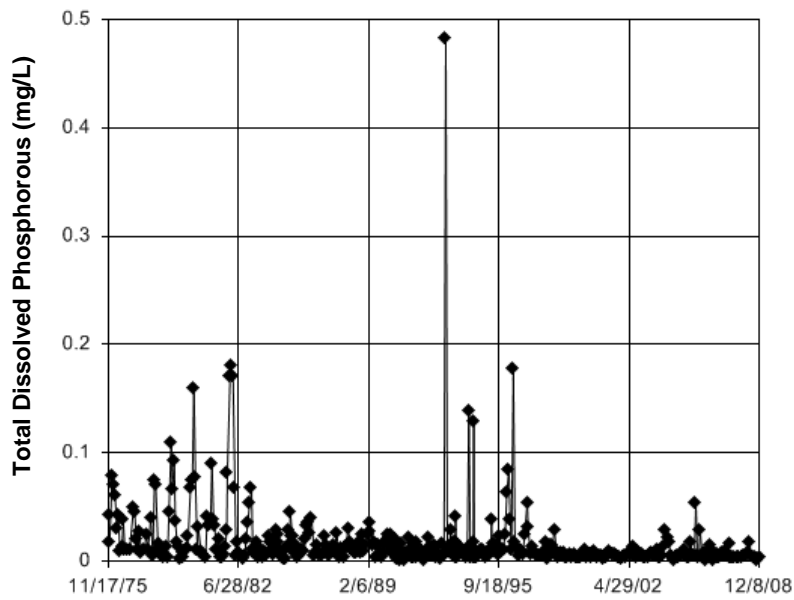
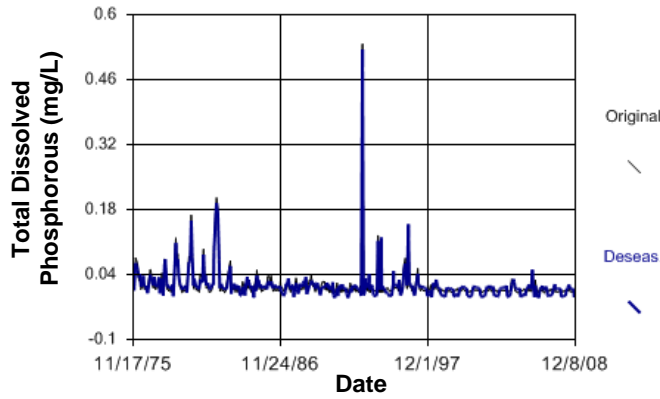


Figure B88 South Saskatchewan River: Total Dissolved Phosphorous

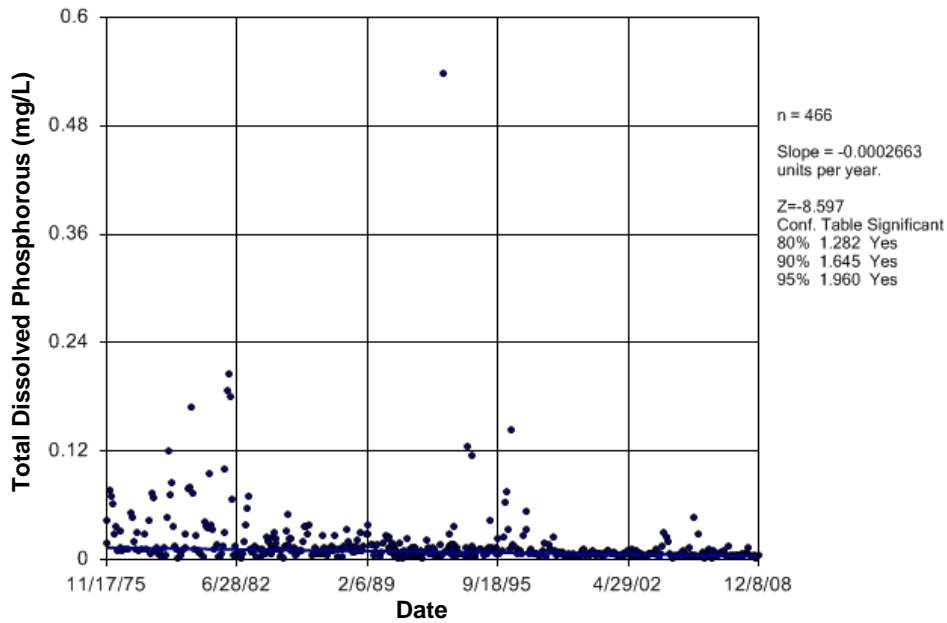
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 12.44  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 14 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 12.44  
 Adjusted Kruskal-Wallis statistic (H') = 12.44



**Figure B89 South Saskatchewan River: Total Dissolved Phosphorous**

## Seasonal Kendall



**Figure B90 South Saskatchewan River: Total Dissolved Phosphorous**

## Time Series

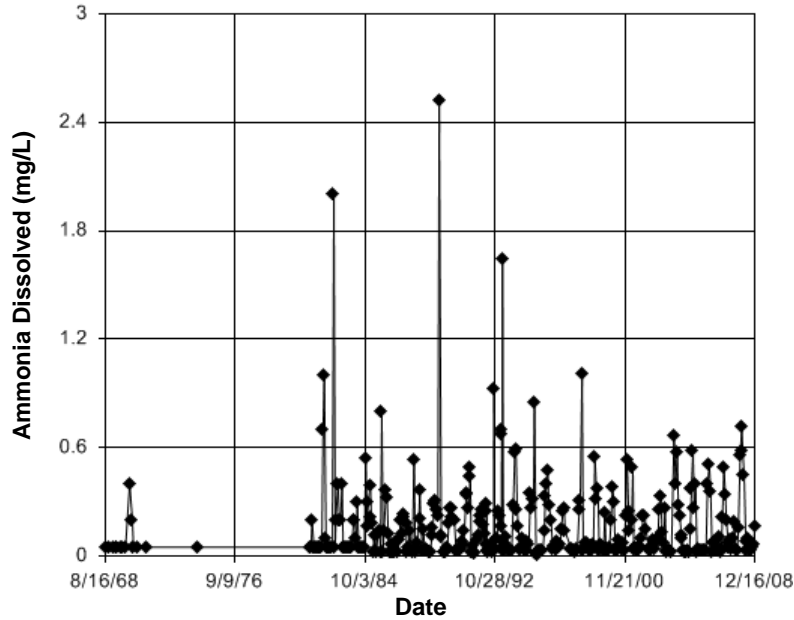


Figure B91 Assiniboine River: Ammonia Dissolved

## Seasonality

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For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 113.6  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 113.6  
Adjusted Kruskal-Wallis statistic (H') = 113.6

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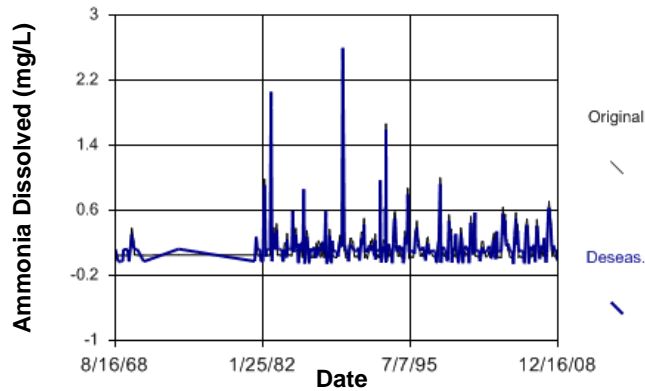


Figure B92 Assiniboine River: Ammonia Dissolved

### Seasonal Kendall

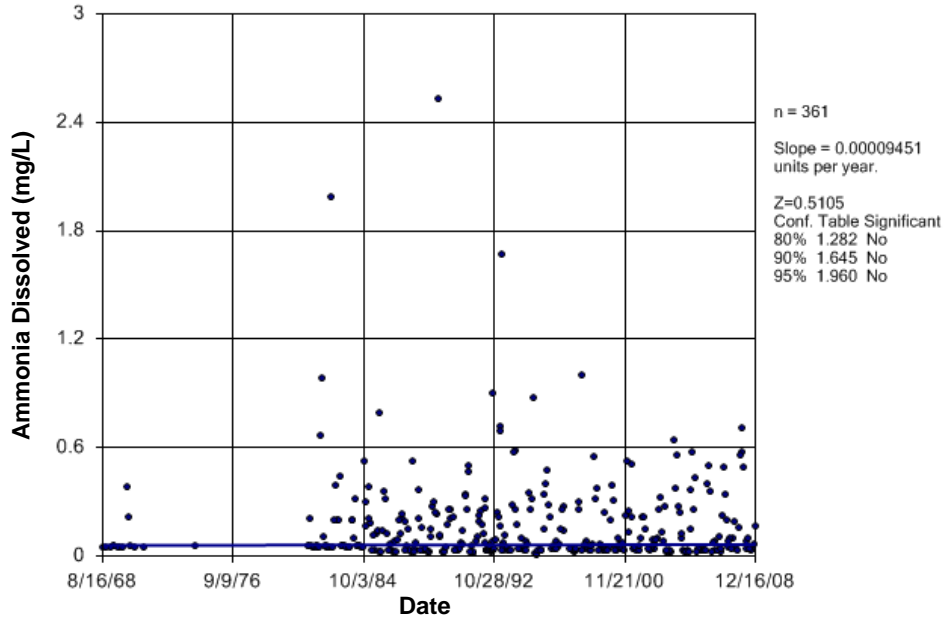


Figure B93 Assiniboine River: Ammonia Dissolved

### Time Series

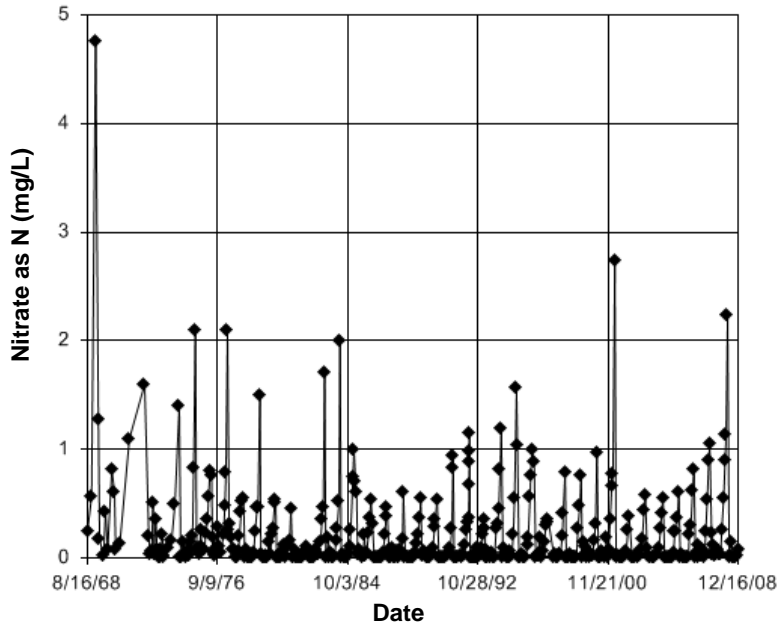


Figure B94 Assiniboine River: Nitrate as N



## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 169.8  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 19 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 169.8  
 Adjusted Kruskal-Wallis statistic (H') = 169.8

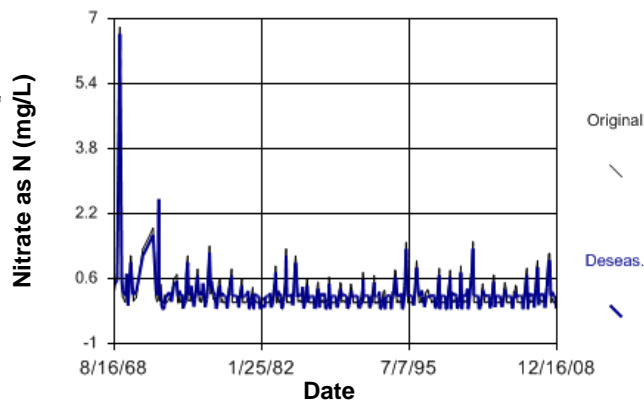


Figure B95 Assiniboine River: Nitrate as N

## Seasonal Kendall

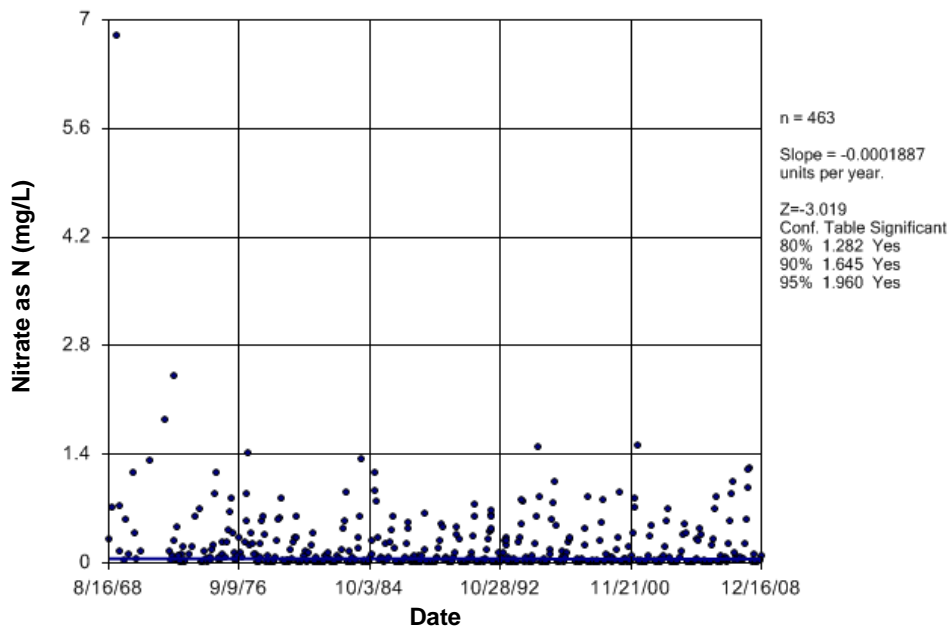


Figure B96 Assiniboine River: Nitrate as N

### Time Series

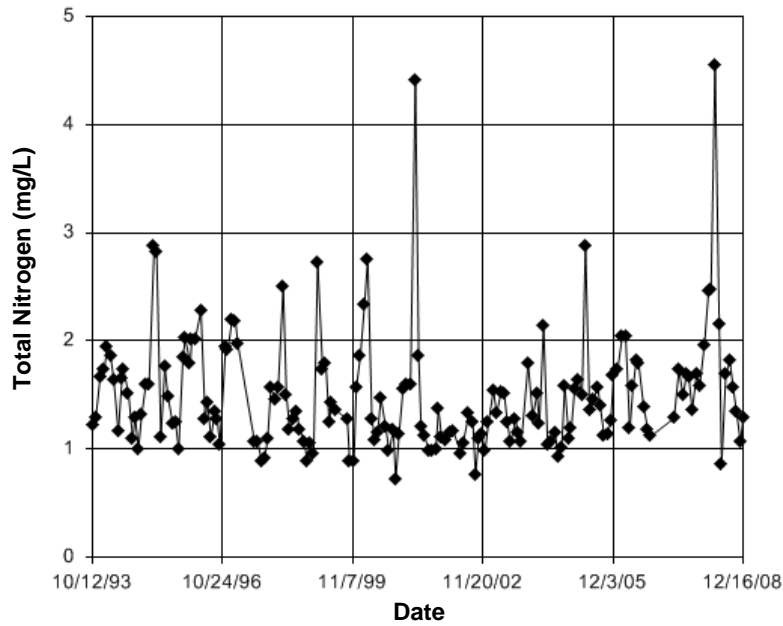


Figure B97 Assiniboine River: Total Nitrogen

### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 31.7  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 7 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 31.7  
 Adjusted Kruskal-Wallis statistic (H') = 31.7

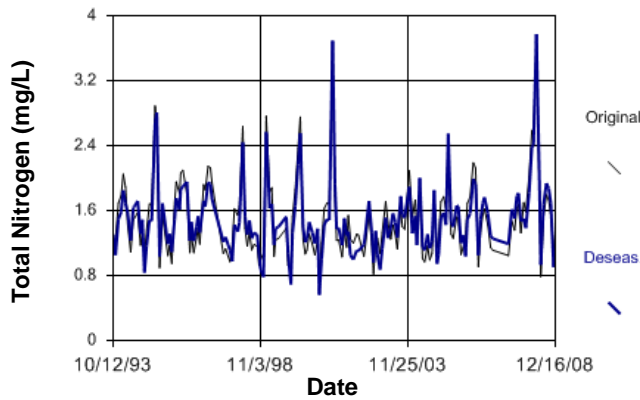
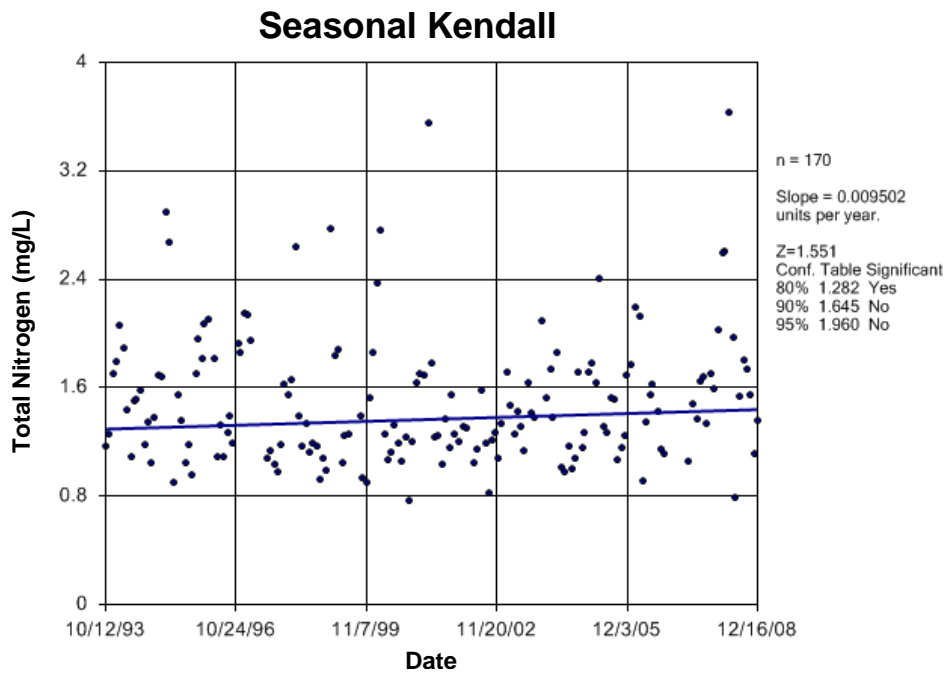
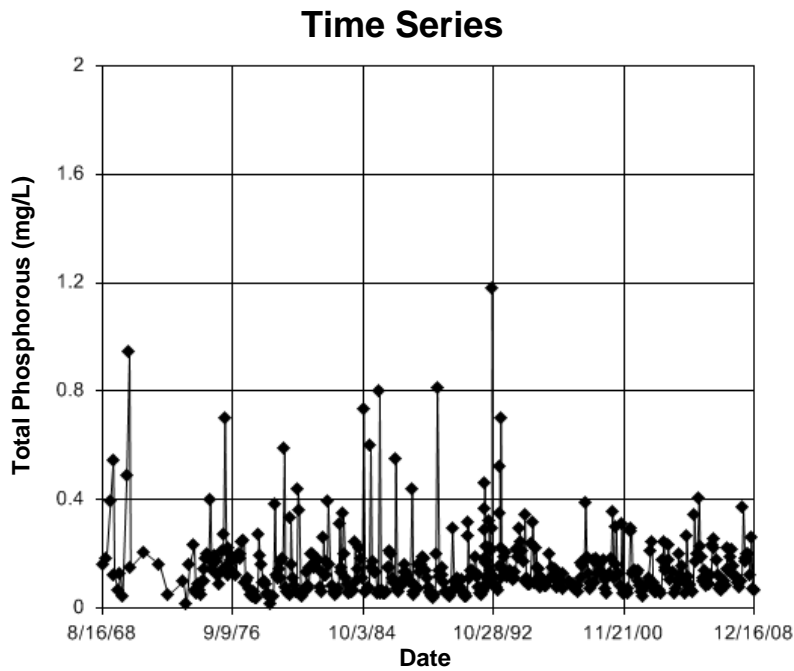


Figure B98 Assiniboine River: Total Nitrogen



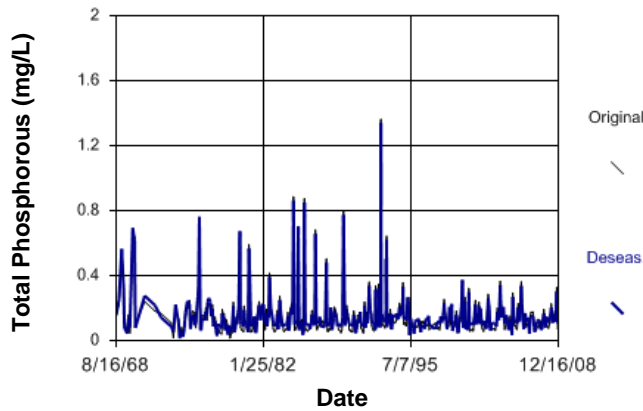
**Figure B99 Assiniboine River: Total Nitrogen**



**Figure B100 Assiniboine River: Total Phosphorous**

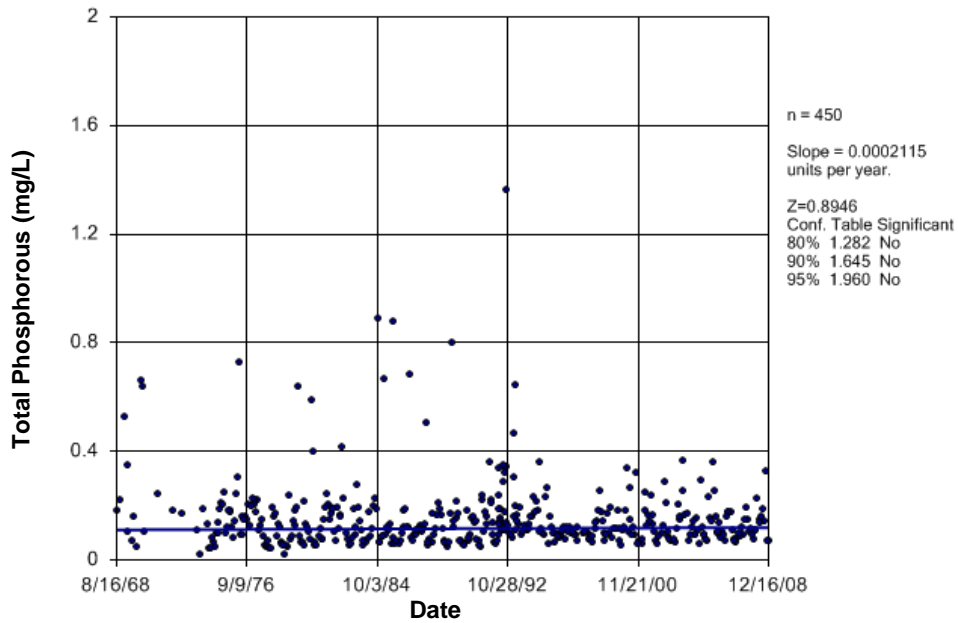
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 91.35  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 26 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 91.35  
 Adjusted Kruskal-Wallis statistic (H') = 91.35



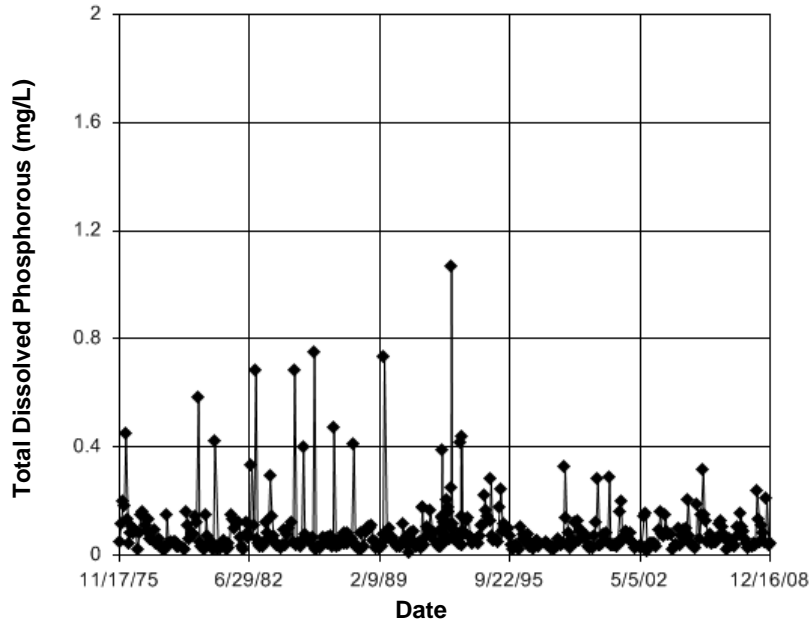
**Figure B101 Assiniboine River: Total Phosphorous**

## Seasonal Kendall



**Figure B102 Assiniboine River: Total Phosphorous**

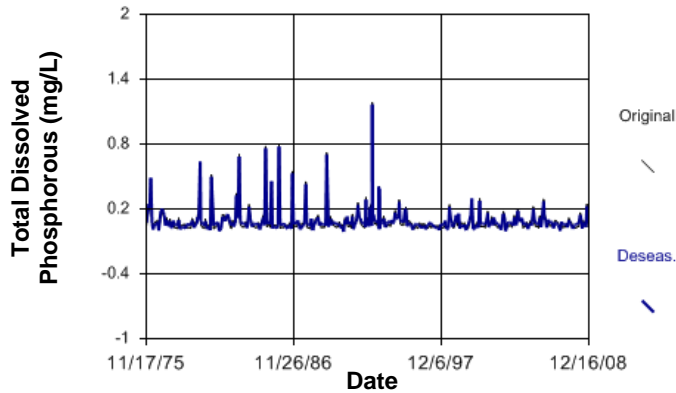
### Time Series



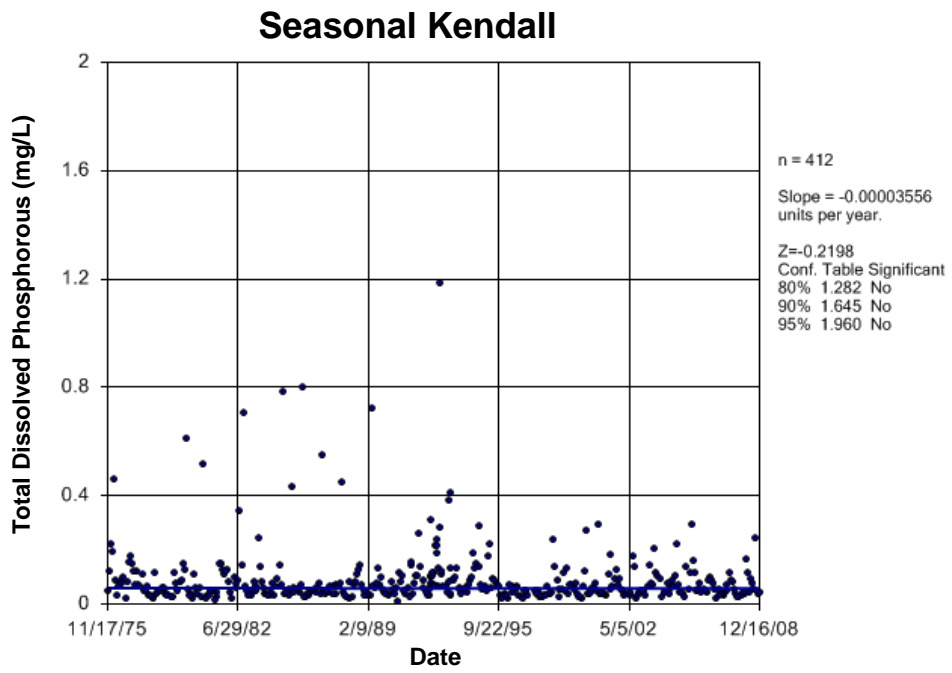
**Figure B103 Assiniboine River: Total Dissolved Phosphorous**

### Seasonality

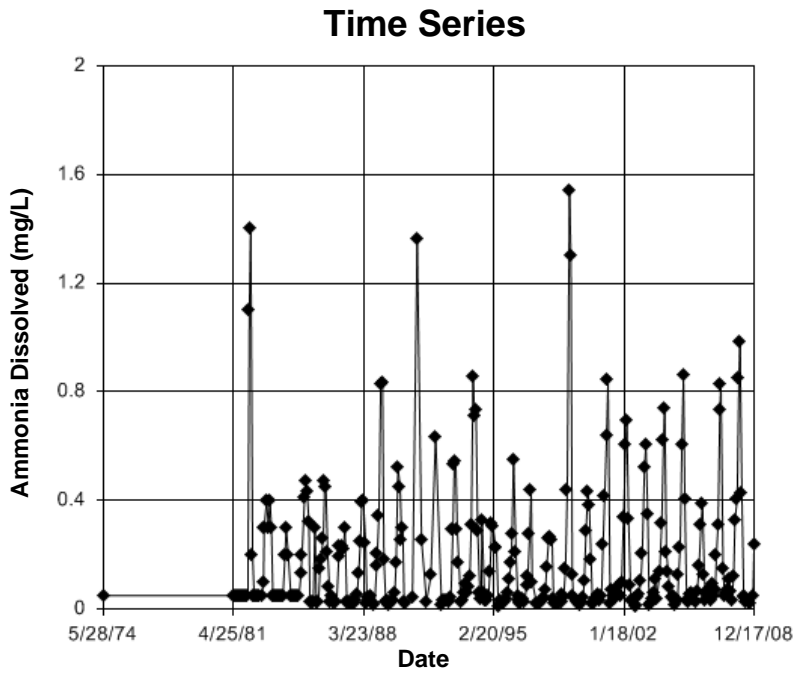
For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 74.35  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 74.35  
 Adjusted Kruskal-Wallis statistic (H') = 74.35



**Figure B104 Assiniboine River: Total Dissolved Phosphorous**



**Figure B105 Assiniboine River: Total Dissolved Phosphorous**



**Figure B106 Carrot River: Ammonia Dissolved**

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 134.1  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 9 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 134.1  
Adjusted Kruskal-Wallis statistic (H') = 134.1

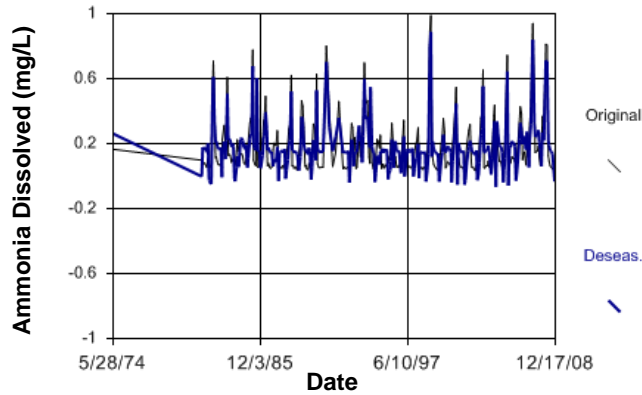


Figure B107 Carrot River: Ammonia Dissolved

## Seasonal Kendall

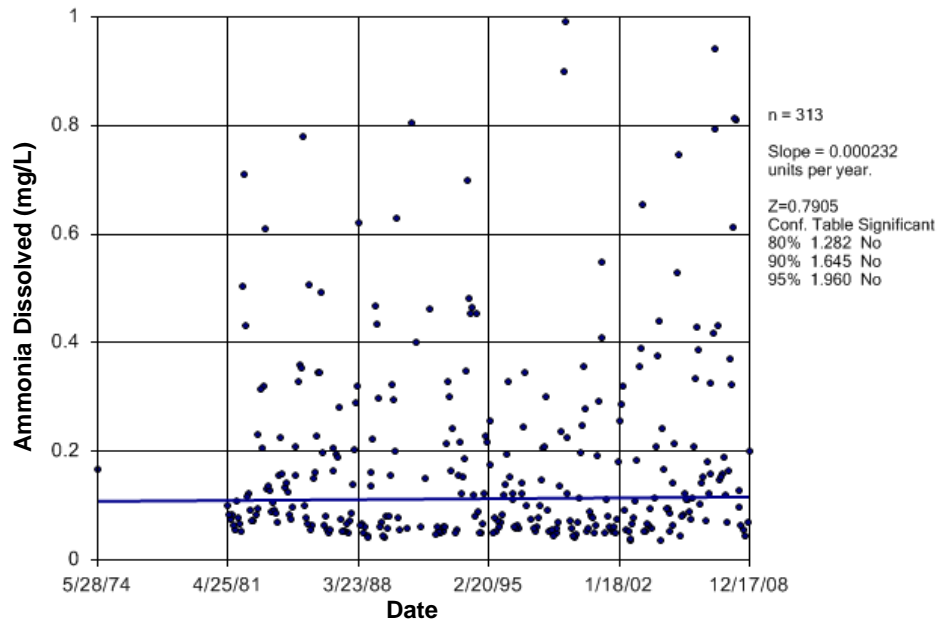
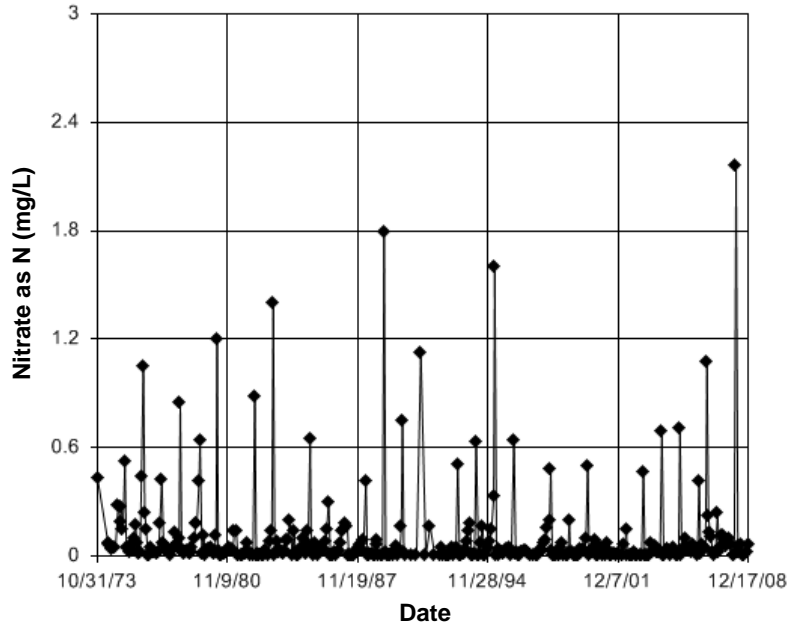


Figure B108 Carrot River: Ammonia Dissolved

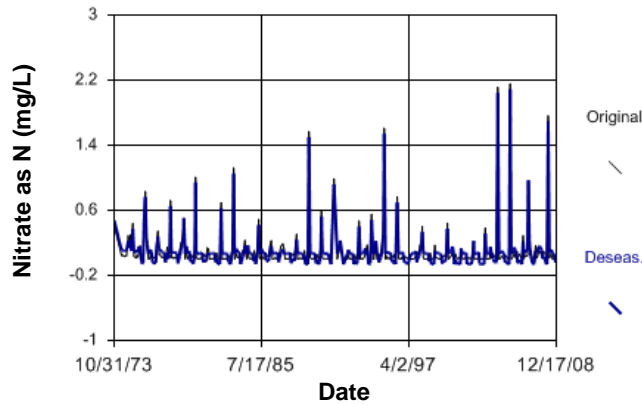
## Time Series



**Figure B109 Carrot River: Nitrate as N**

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 85.84  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 9 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 85.84  
 Adjusted Kruskal-Wallis statistic (H') = 85.84



**Figure B110 Carrot River: Nitrate as N**



### Seasonal Kendall

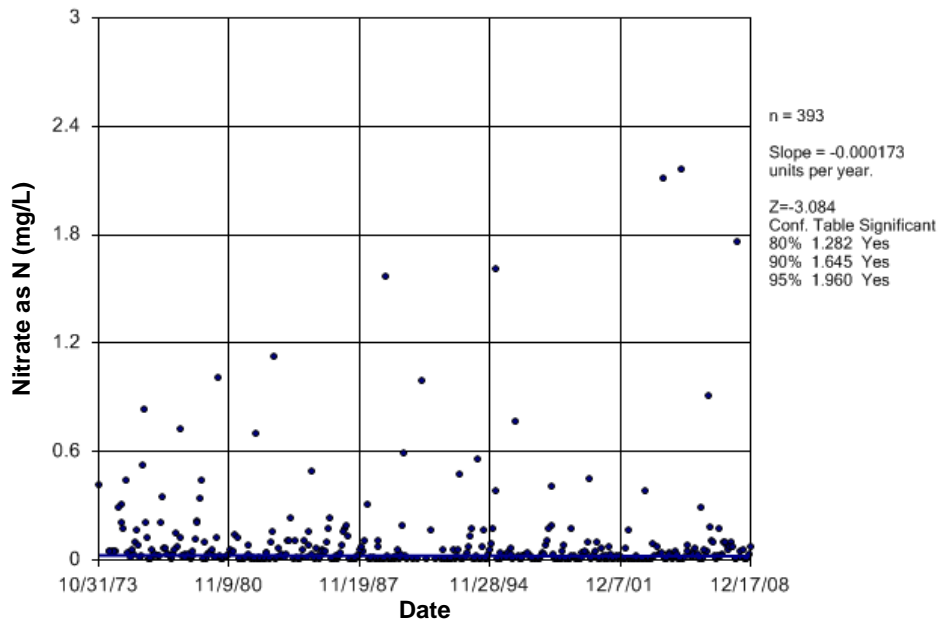


Figure B111 Carrot River: Nitrate as N

### Time Series

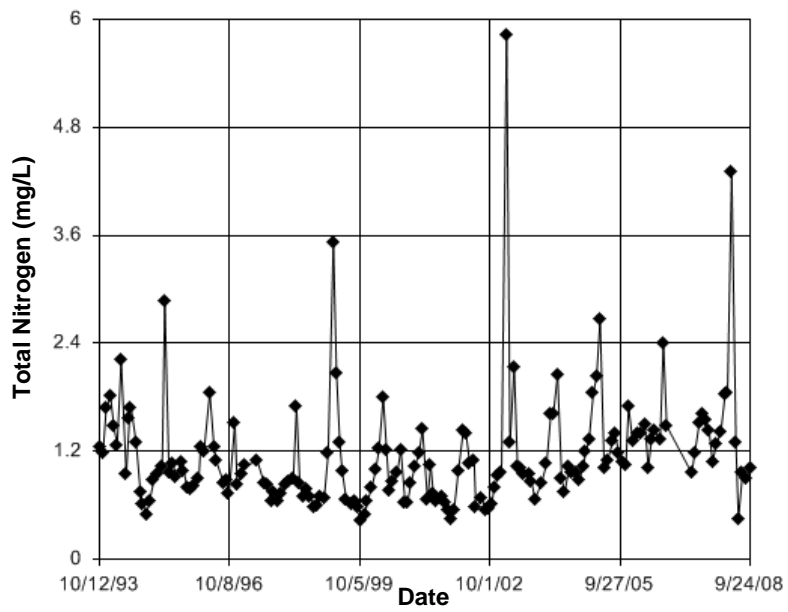
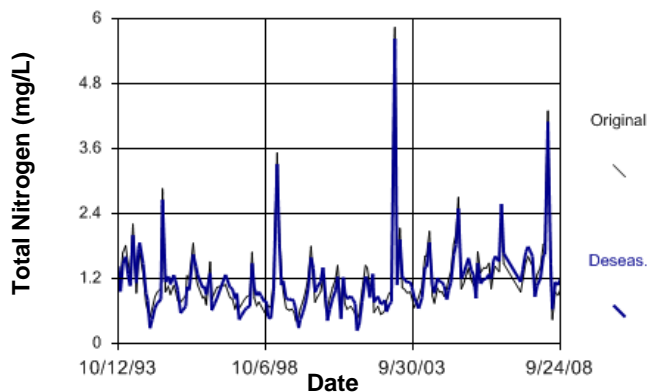


Figure B112 Carrot River: Total Nitrogen

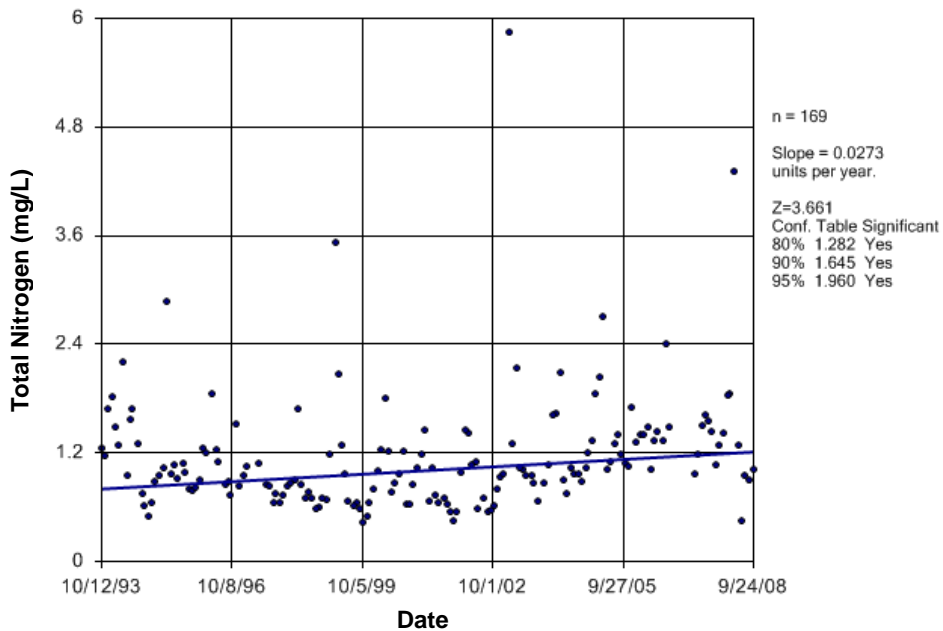
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 15.52  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 5 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 15.52  
 Adjusted Kruskal-Wallis statistic (H') = 15.52



**Figure B113 Carrot River: Total Nitrogen**

## Seasonal Kendall



**Figure B114 Carrot River: Total Nitrogen**

### Time Series

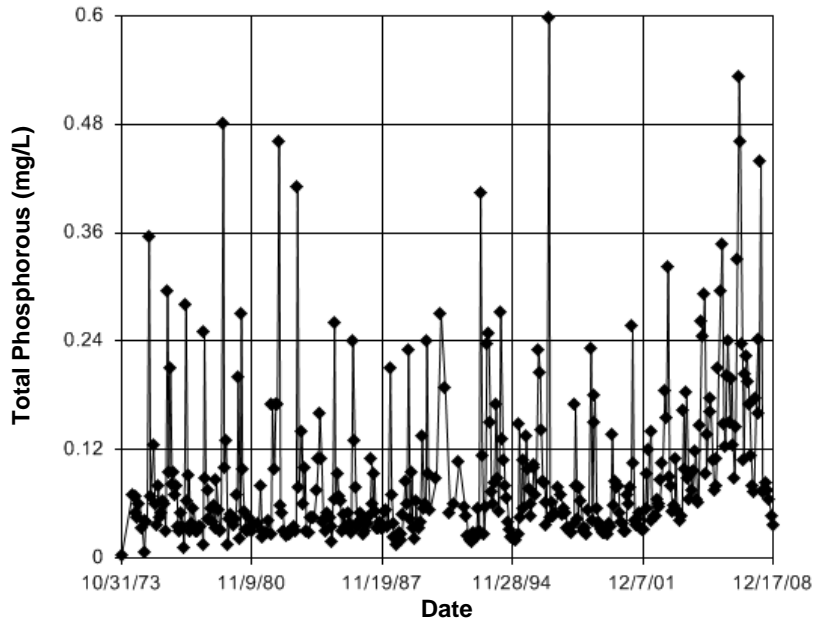


Figure B115 Carrot River: Total Phosphorous

### Seasonality

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For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 6.924  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 16 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 6.924  
Adjusted Kruskal-Wallis statistic (H') = 6.924

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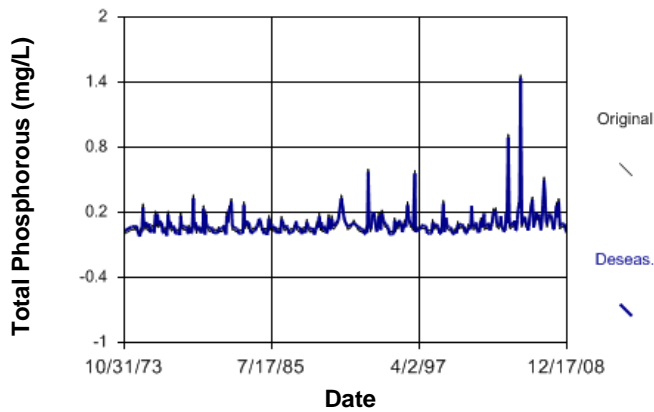
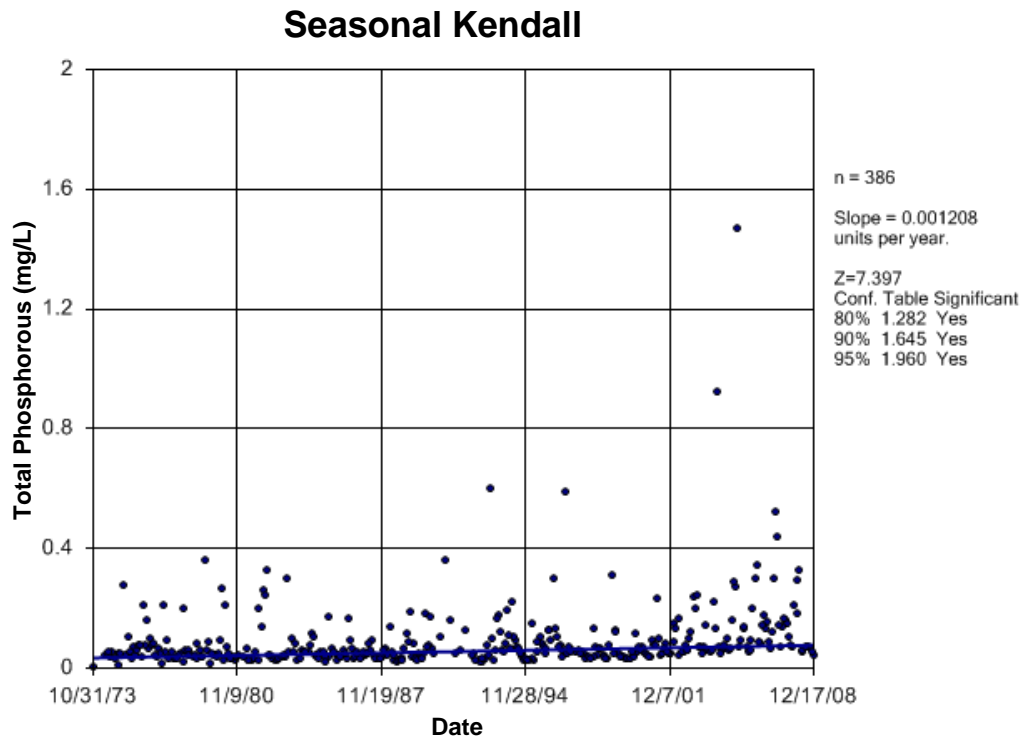
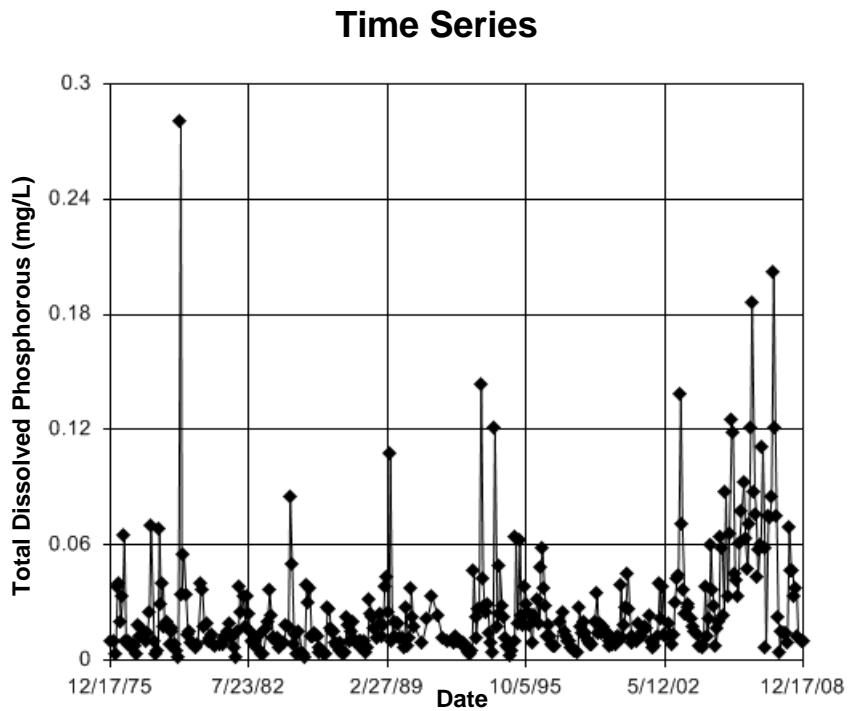


Figure B116 Carrot River: Total Phosphorous



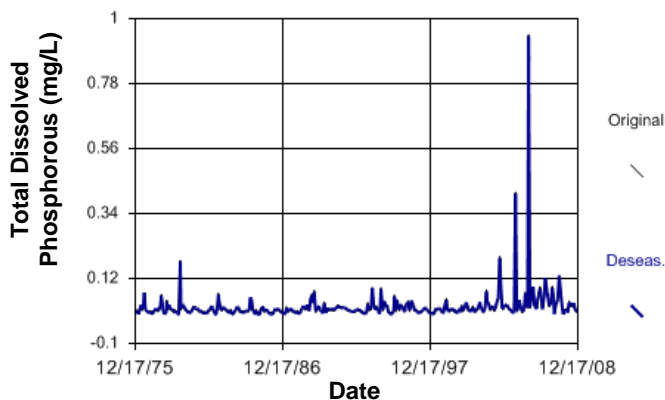
**Figure B117 Carrot River: Total Phosphorous**



**Figure B118 Carrot River: Total Dissolved Phosphorous**

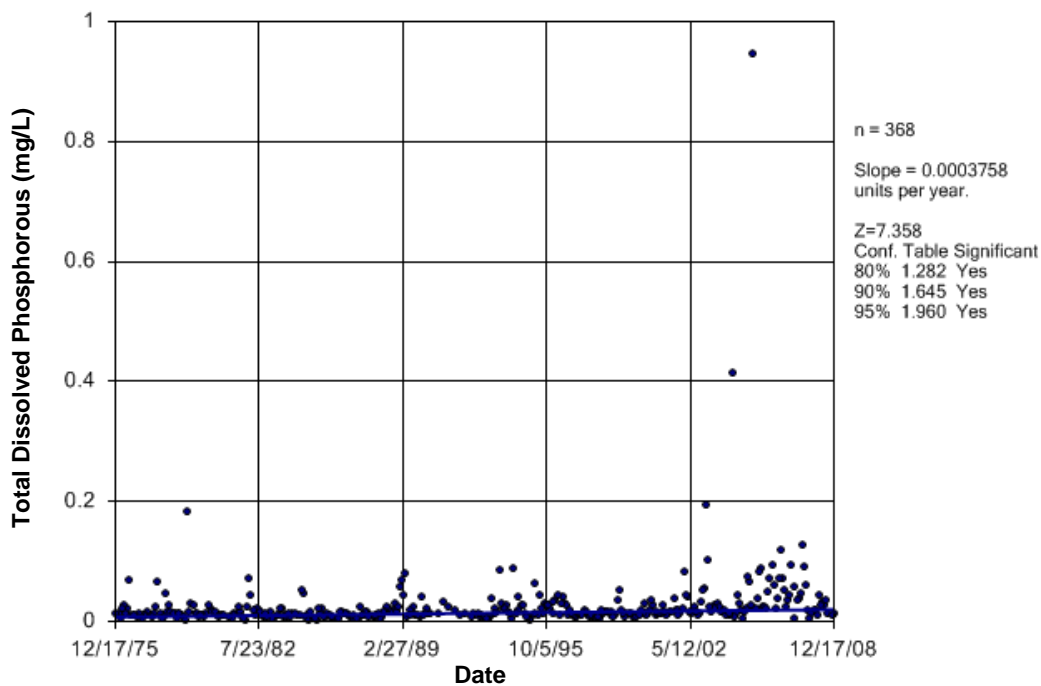
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 4.397  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 9 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 4.397  
 Adjusted Kruskal-Wallis statistic (H') = 4.397



**Figure B119 Carrot River: Total Dissolved Phosphorus**

## Seasonal Kendall



**Figure B120 Carrot River: Total Dissolved Phosphorus**

### Time Series

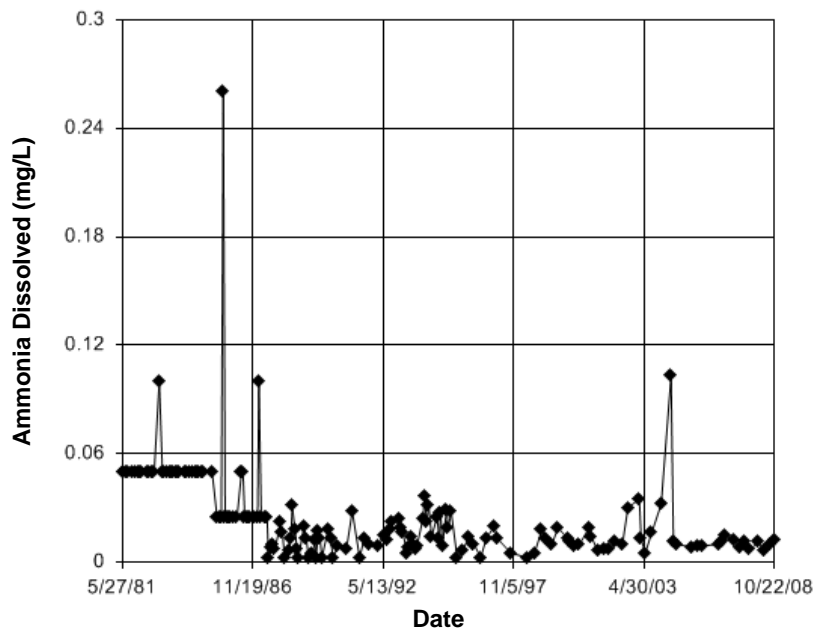


Figure B121 Churchill River: Ammonia Dissolved

### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 6.425  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 6.425  
 Adjusted Kruskal-Wallis statistic (H') = 6.425

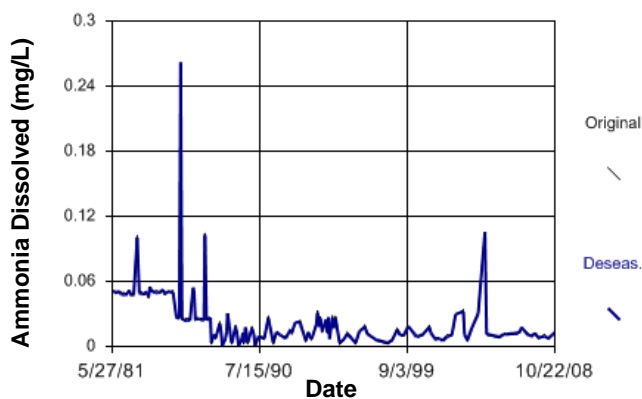


Figure B122 Churchill River: Ammonia Dissolved

### Seasonal Kendall

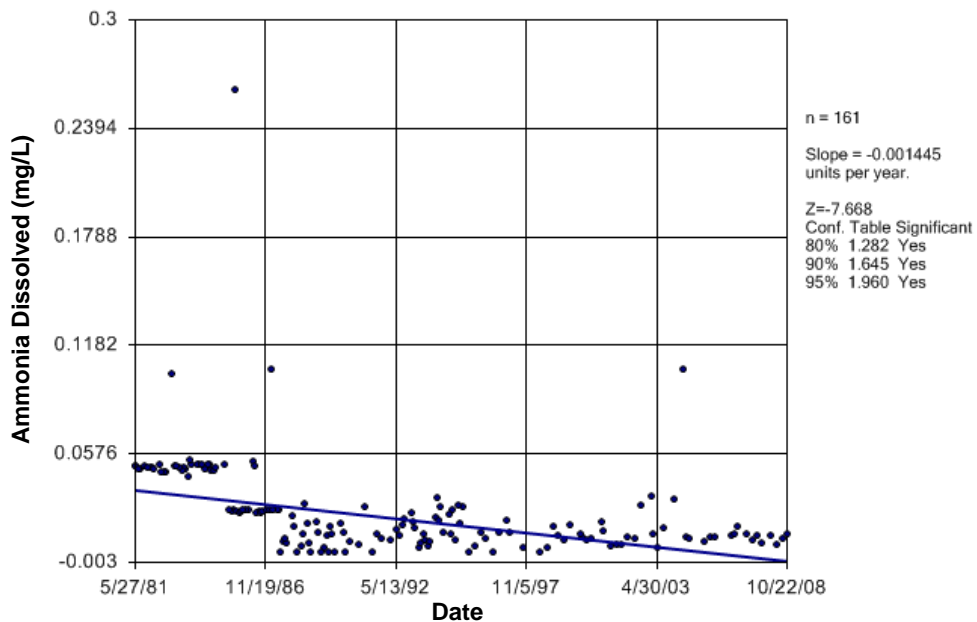


Figure B123 Churchill River: Ammonia Dissolved

### Time Series

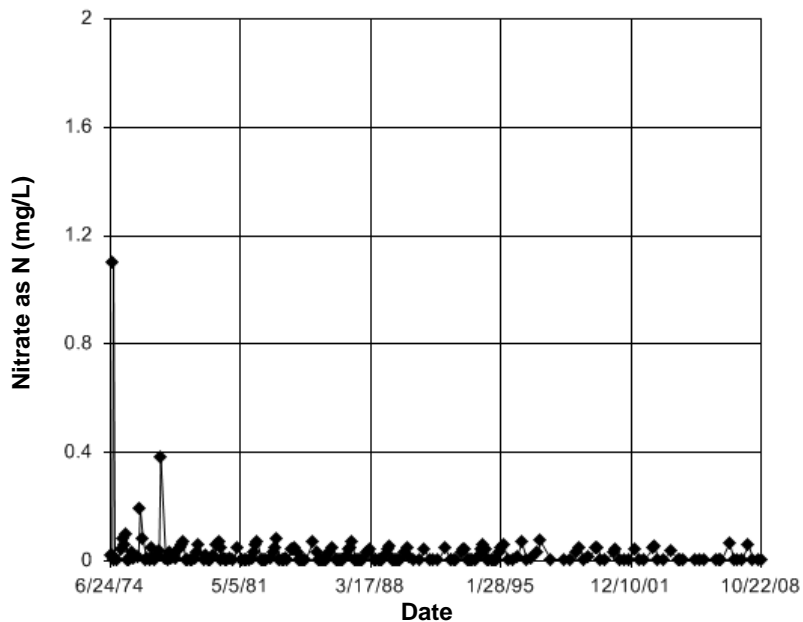


Figure B124 Churchill River: Nitrate as N

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 127.5  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 18 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 127.5  
 Adjusted Kruskal-Wallis statistic (H') = 127.5

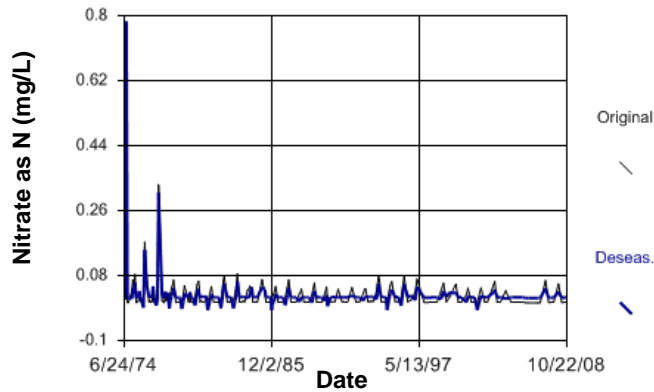


Figure B125 Churchill River: Nitrate as N

## Seasonal Kendall

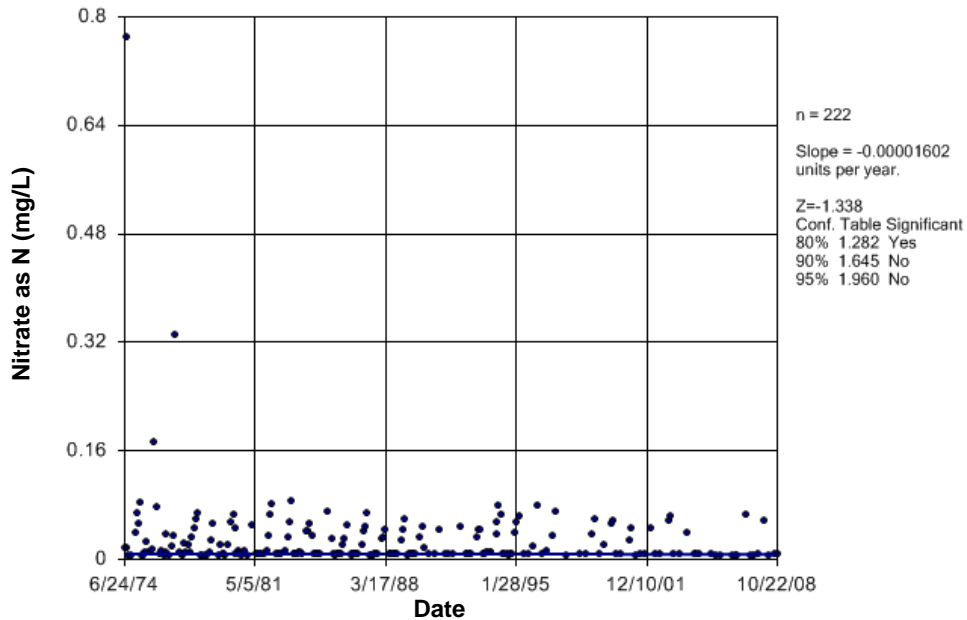


Figure B126 Churchill River: Nitrate as N



## Time Series

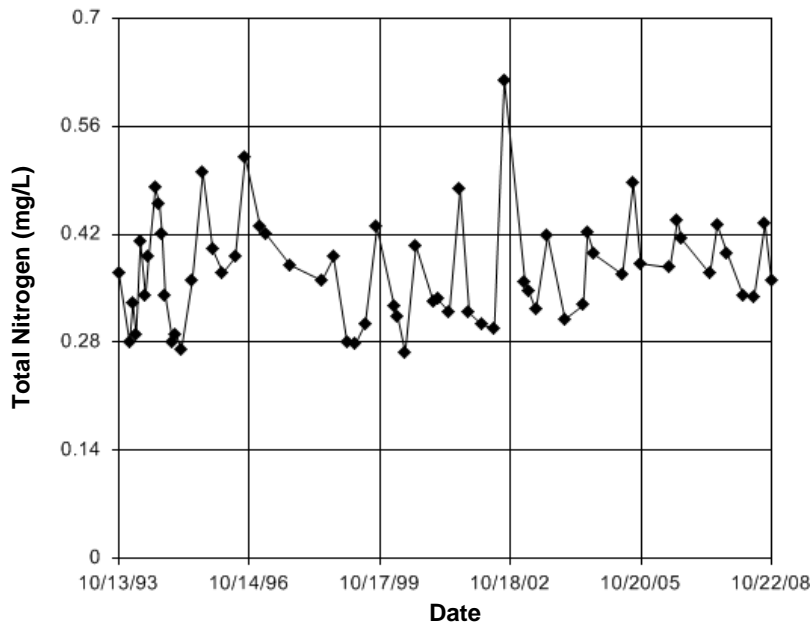


Figure B127 Churchill River: Total Nitrogen

## Seasonality

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For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 12.43  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 0 groups of ties in the data, so no adjustment to the Kruskal-Wallis statistic (H) was necessary.

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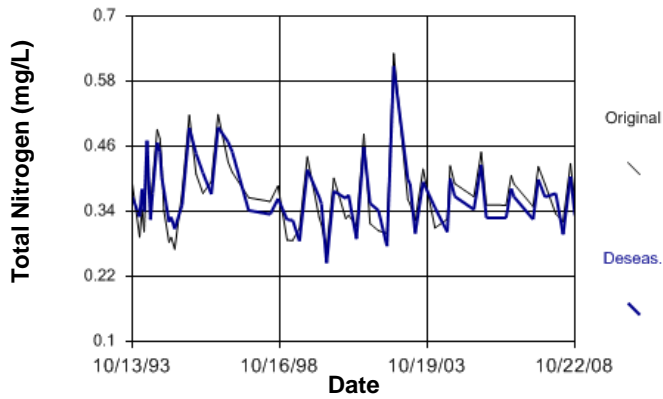


Figure B128 Churchill River: Total Nitrogen

### Seasonal Kendall

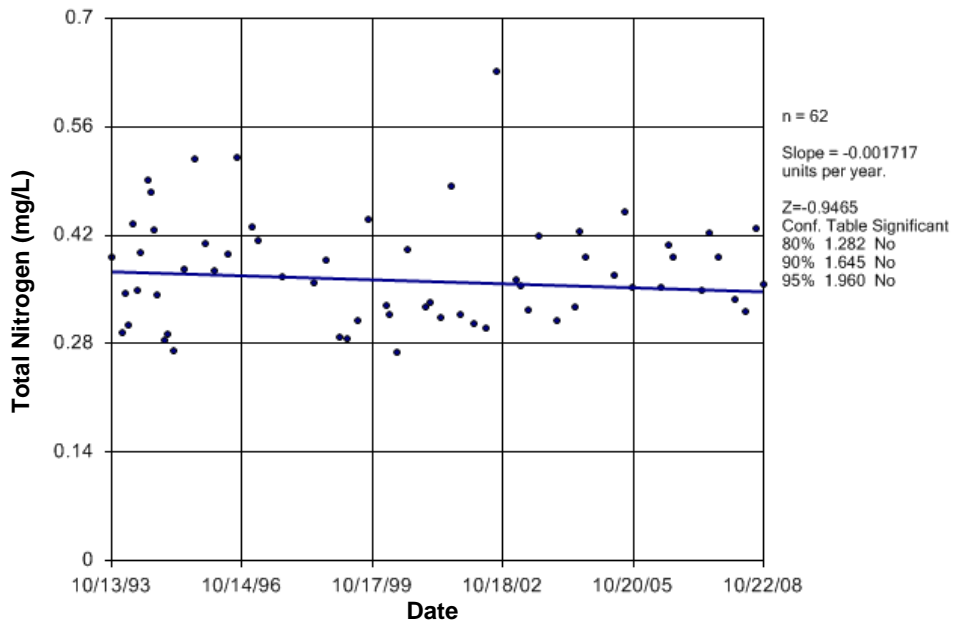


Figure B129 Churchill River: Total Nitrogen

### Time Series

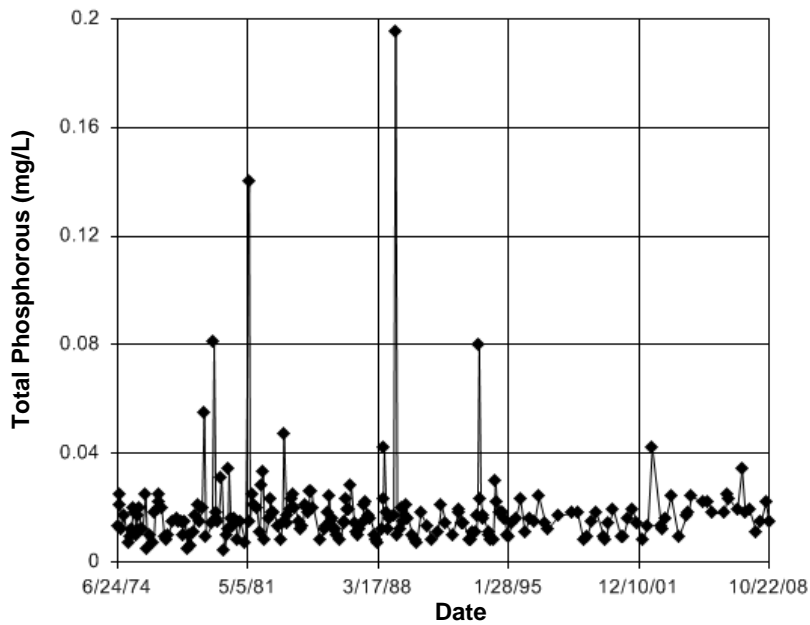


Figure B130 Churchill River: Total Phosphorous

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 74.21  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 11 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 74.21  
 Adjusted Kruskal-Wallis statistic (H') = 74.21

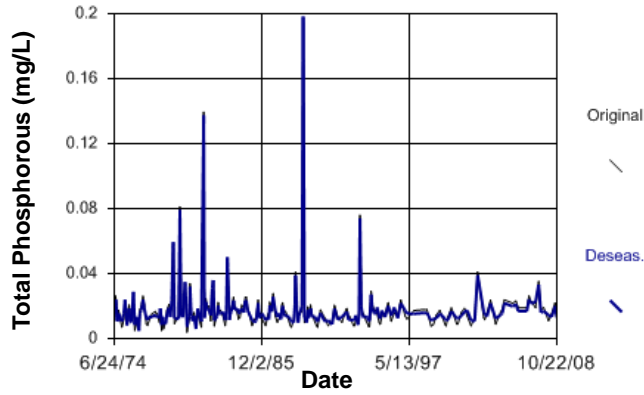


Figure B131 Churchill River: Total Phosphorous

## Seasonal Kendall

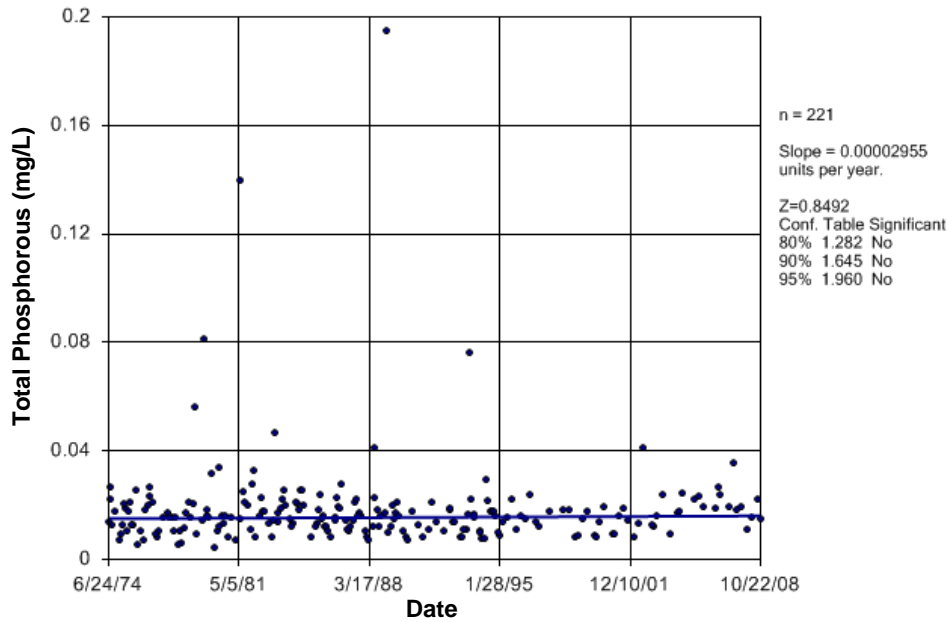
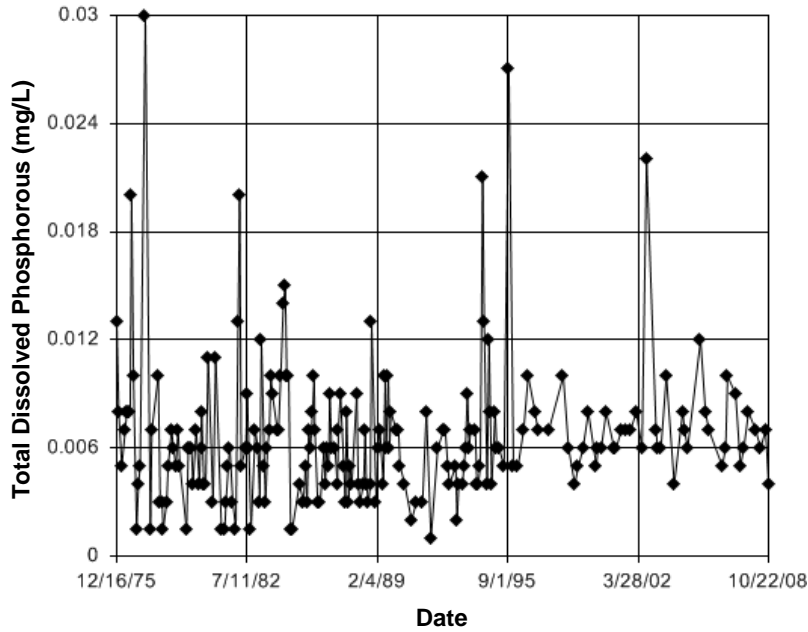


Figure B132 Churchill River: Total Phosphorous

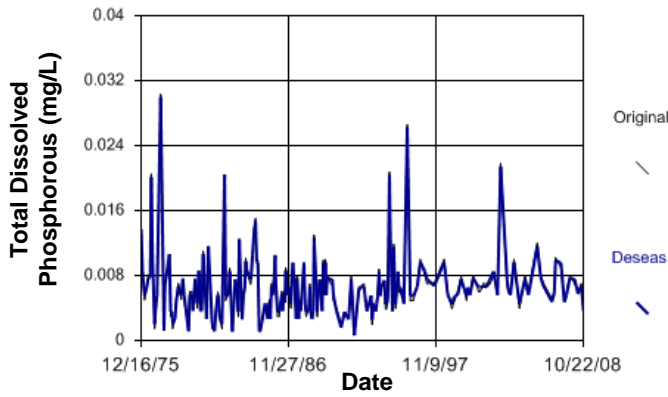
### Time Series



**Figure B133 Churchill River: Total Dissolved Phosphorous**

### Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 1.224  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 15 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 1.224  
 Adjusted Kruskal-Wallis statistic (H') = 1.224



**Figure B134 Churchill River: Total Dissolved Phosphorous**

### Sen's Slope Estimator

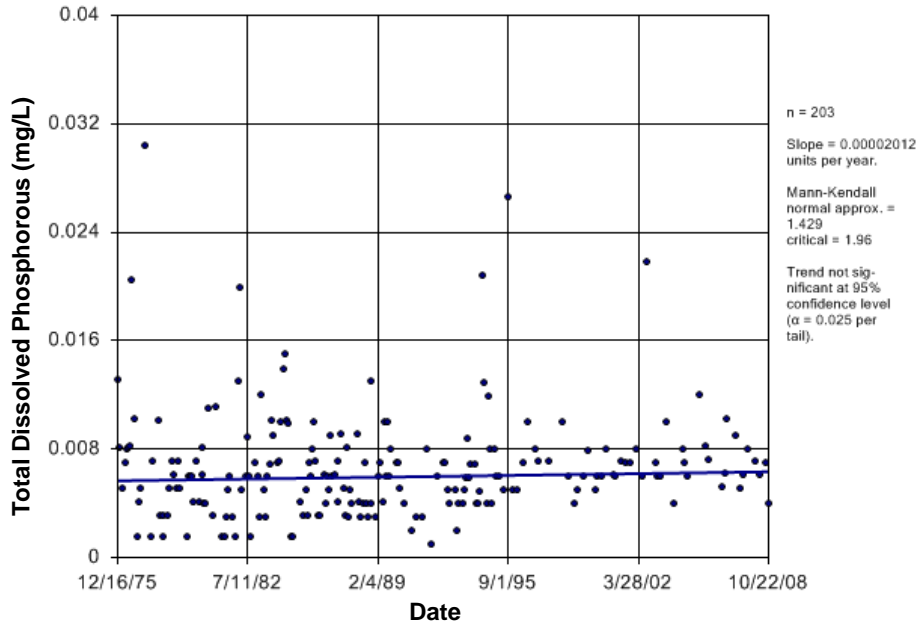


Figure B135 Churchill River: Total Dissolved Phosphorous

### Time Series

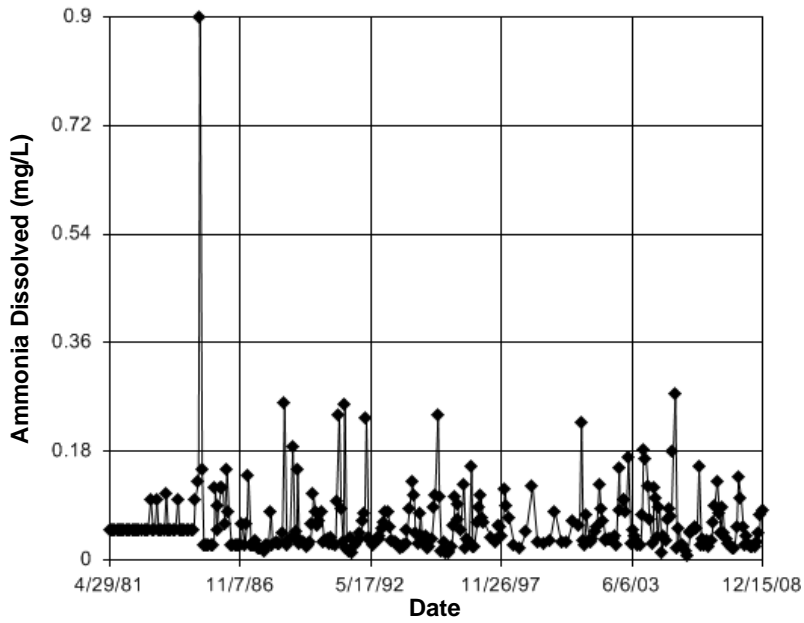
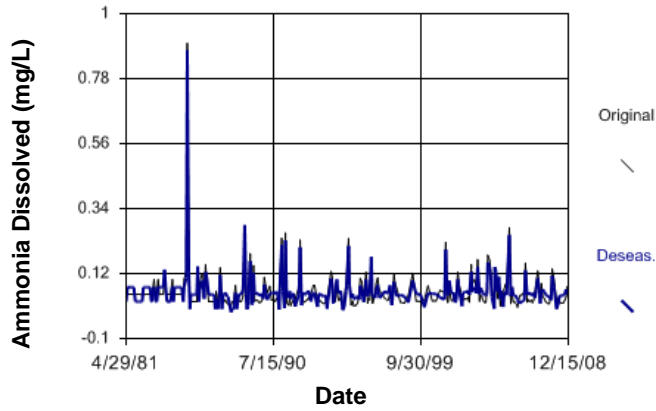


Figure B136 Qu'Appelle River: Ammonia Dissolved

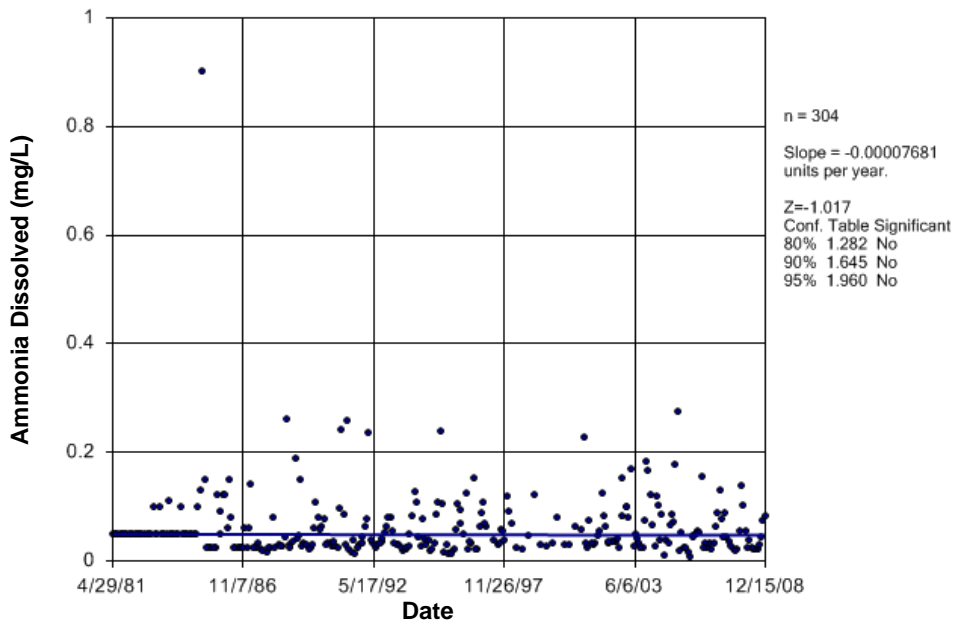
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 106.9  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 49 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 106.7  
 Adjusted Kruskal-Wallis statistic (H') = 106.9



**Figure B137 Qu'Appelle River: Ammonia Dissolved**

## Seasonal Kendall



**Figure B138 Qu'Appelle River: Ammonia Dissolved**

## Time Series

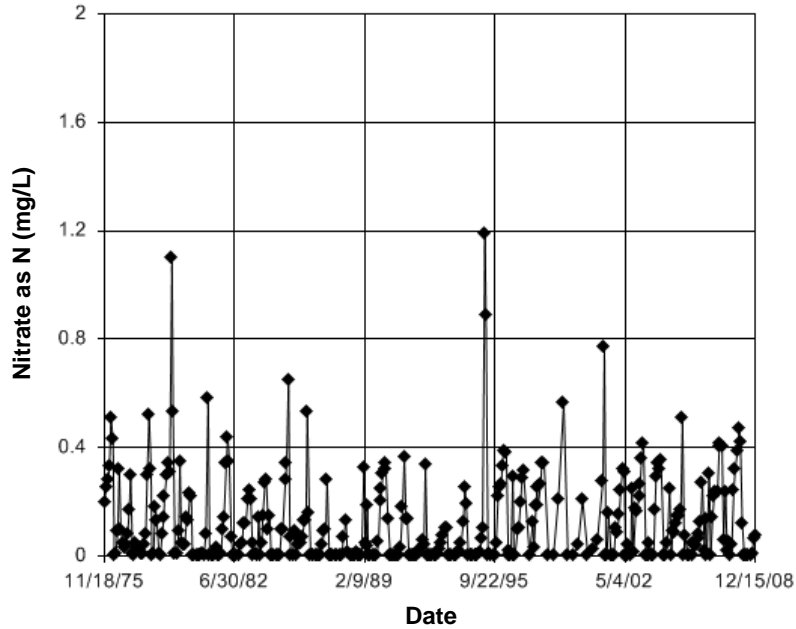


Figure B139 Qu'Appelle River: Nitrate as N

## Seasonality

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For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 157.4  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 12 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 157.4  
Adjusted Kruskal-Wallis statistic (H') = 157.4

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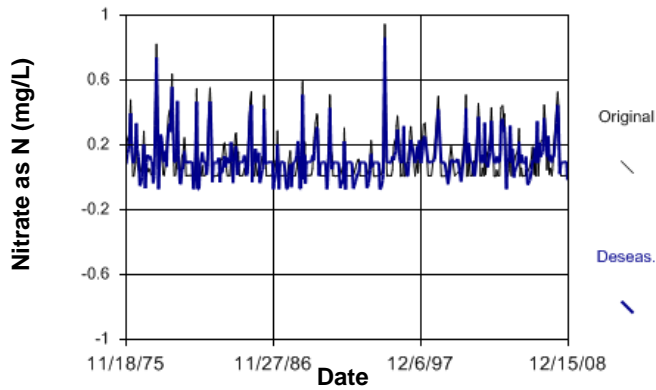


Figure B140 Qu'Appelle River: Nitrate as N

### Seasonal Kendall

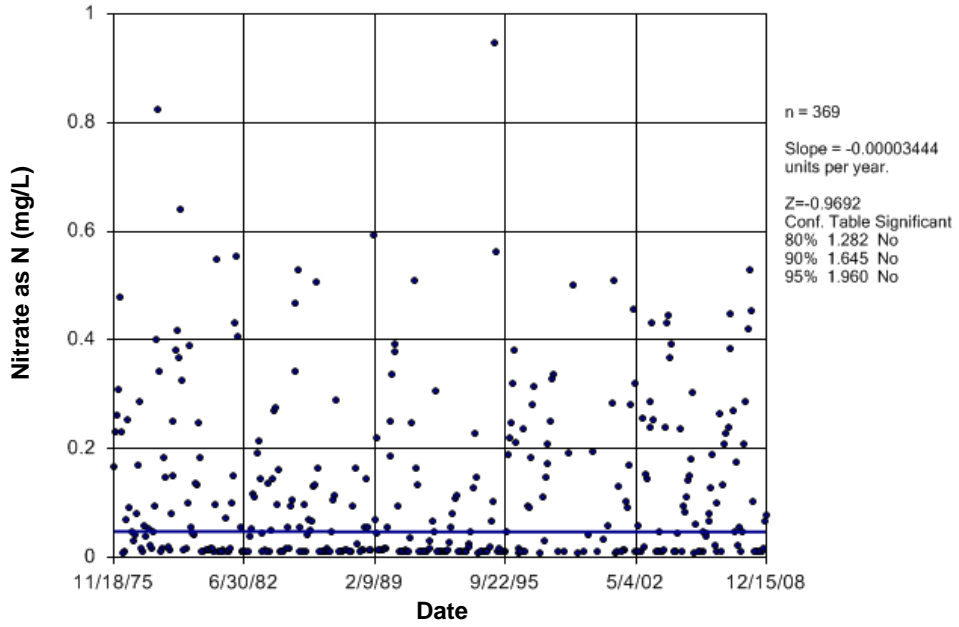


Figure B141 Qu'Appelle River: Nitrate as N

### Time Series

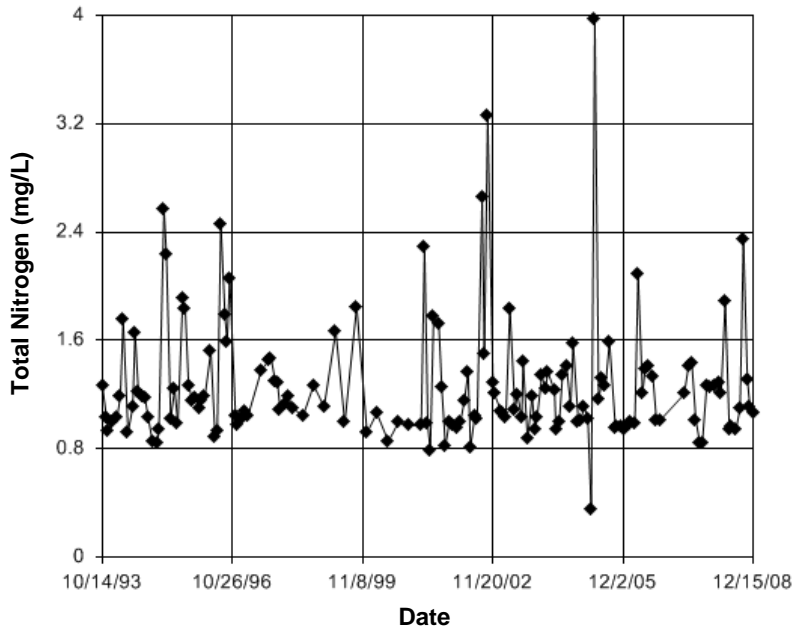


Figure B142 Qu'Appelle River: Total Nitrogen



## Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 0.3419  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 9 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 0.3419  
 Adjusted Kruskal-Wallis statistic (H') = 0.3419

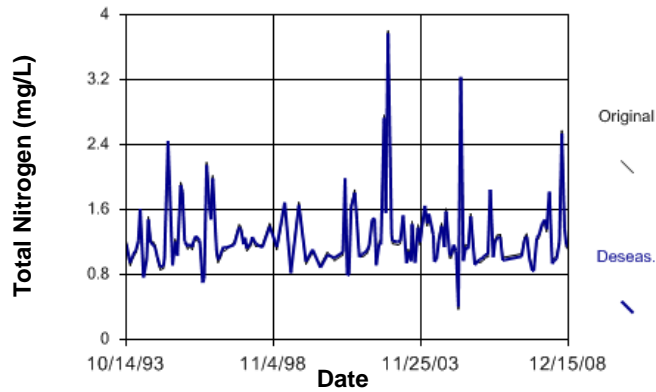


Figure B143 Qu'Appelle River: Total Nitrogen

## Sen's Slope Estimator

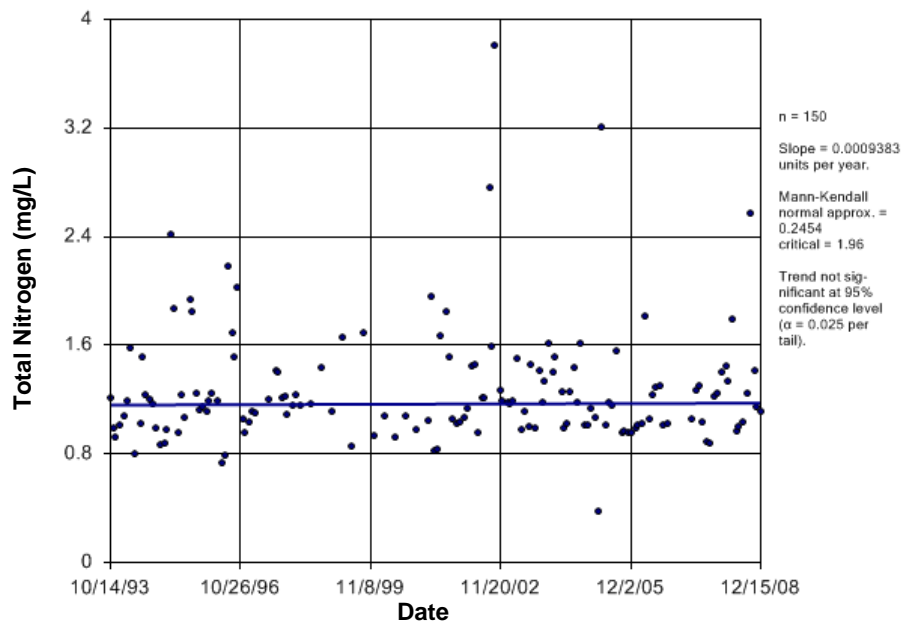
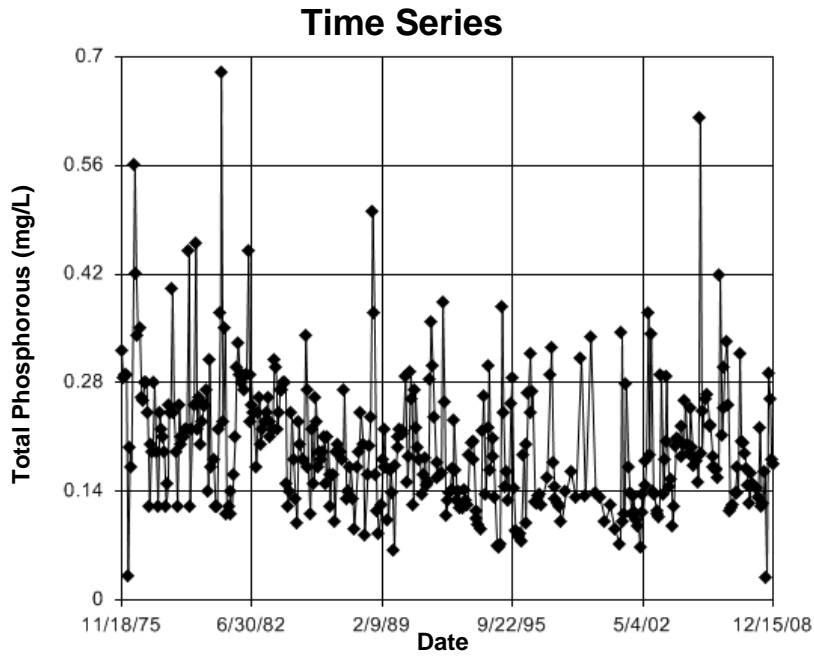


Figure B144 Qu'Appelle River: Total Nitrogen



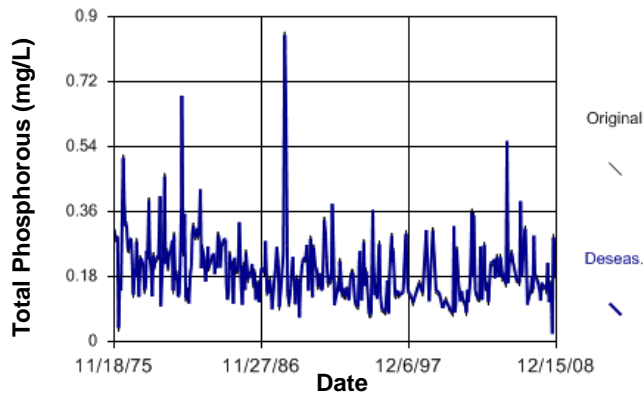
**Figure B145 Qu'Appelle River: Total Phosphorous**

### Seasonality

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For the data shown, the Kruskal-Wallis test indicates **NO SEASONALITY** at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 3.694  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 31 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 3.694  
 Adjusted Kruskal-Wallis statistic (H') = 3.694

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**Figure B146 Qu'Appelle River: Total Phosphorous**

### Sen's Slope Estimator

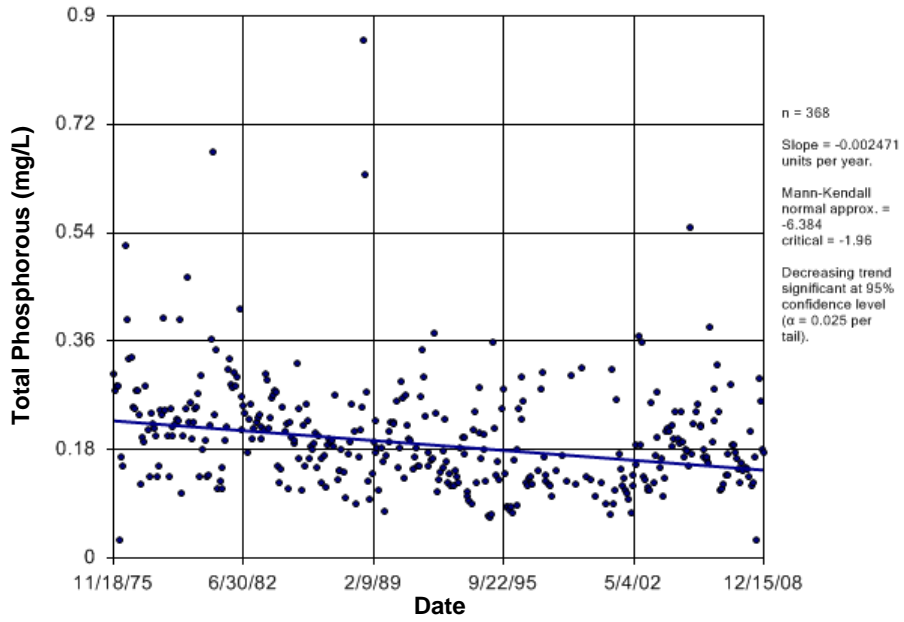


Figure B147 Qu'Appelle River: Total Phosphorous

### Time Series

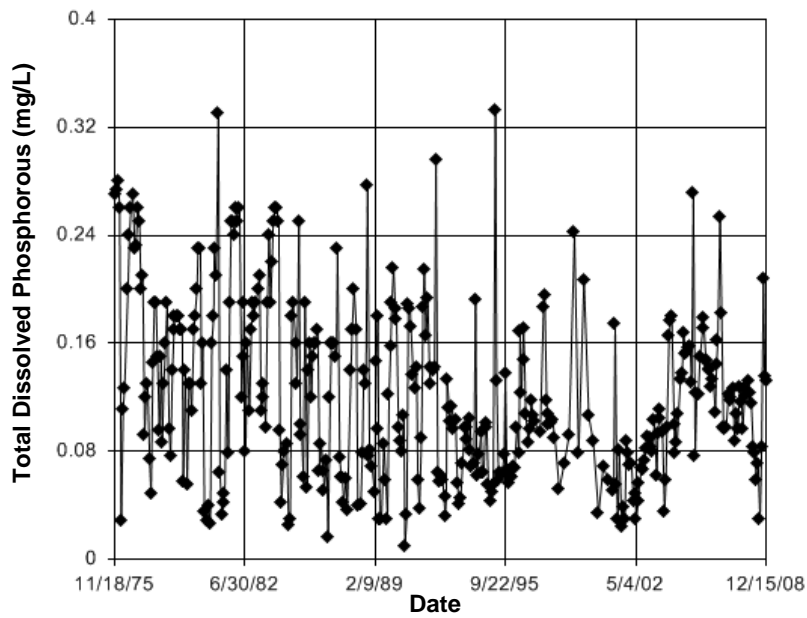
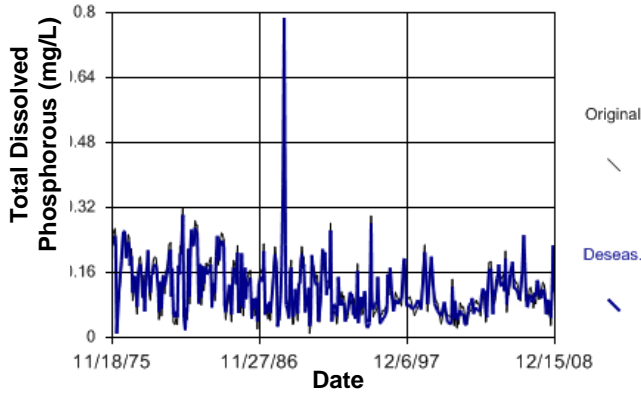


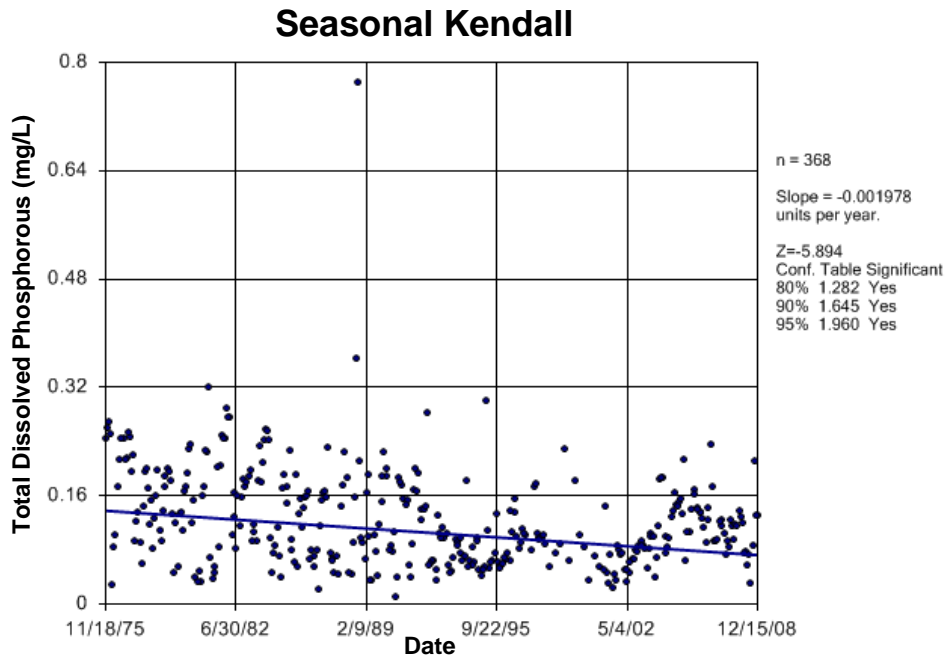
Figure B148 Qu'Appelle River: Total Dissolved Phosphorous

## Seasonality

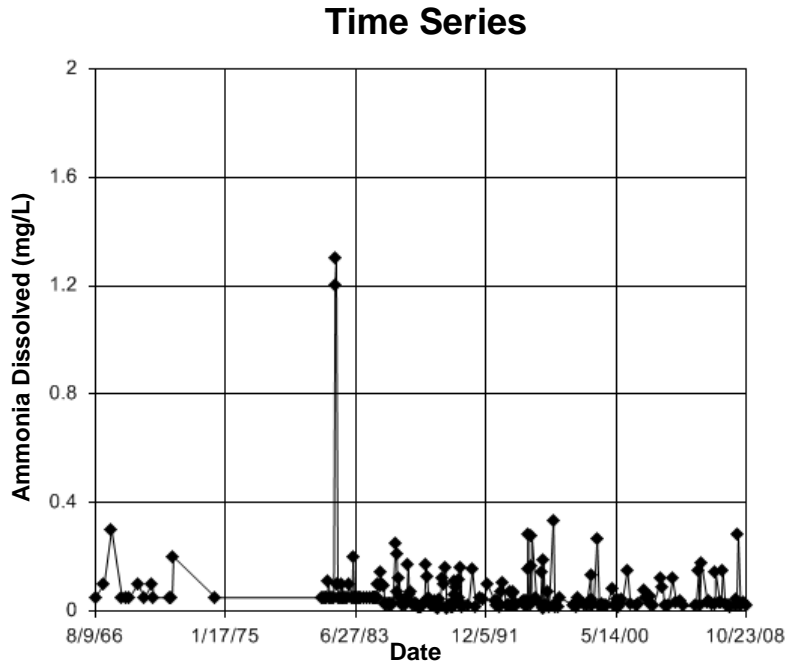
For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 35.12  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 15 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 35.12  
 Adjusted Kruskal-Wallis statistic (H') = 35.12



**Figure B149 Qu'Appelle River: Total Dissolved Phosphorous**



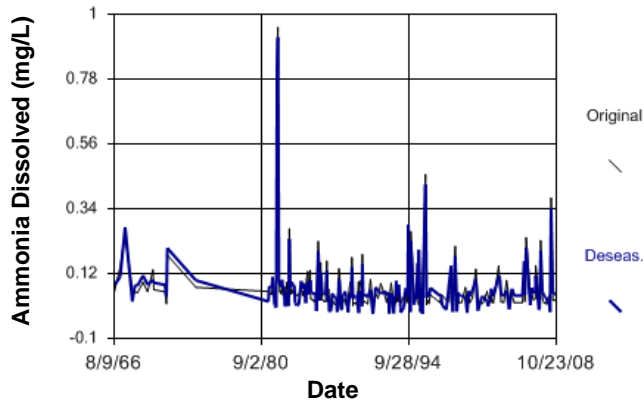
**Figure B150 Qu'Appelle River: Total Dissolved Phosphorous**



**Figure B151 Red Deer River (SK-MB): Ammonia Dissolved**

### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 29.43  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 29.43  
 Adjusted Kruskal-Wallis statistic (H') = 29.43



**Figure B152 Red Deer River (SK-MB): Ammonia Dissolved**

### Seasonal Kendall

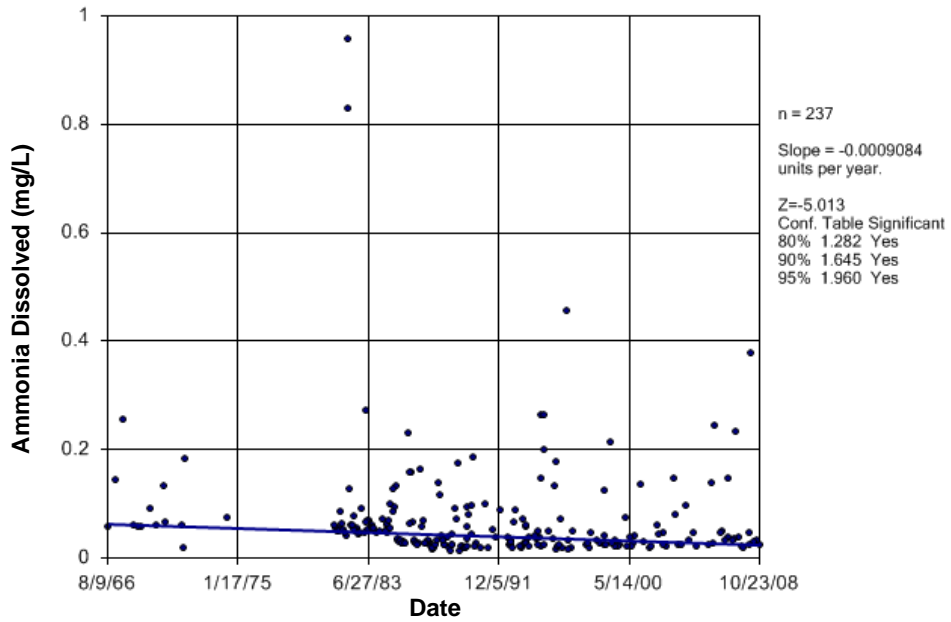


Figure B153 Red Deer River (SK-MB): Ammonia Dissolved

### Time Series

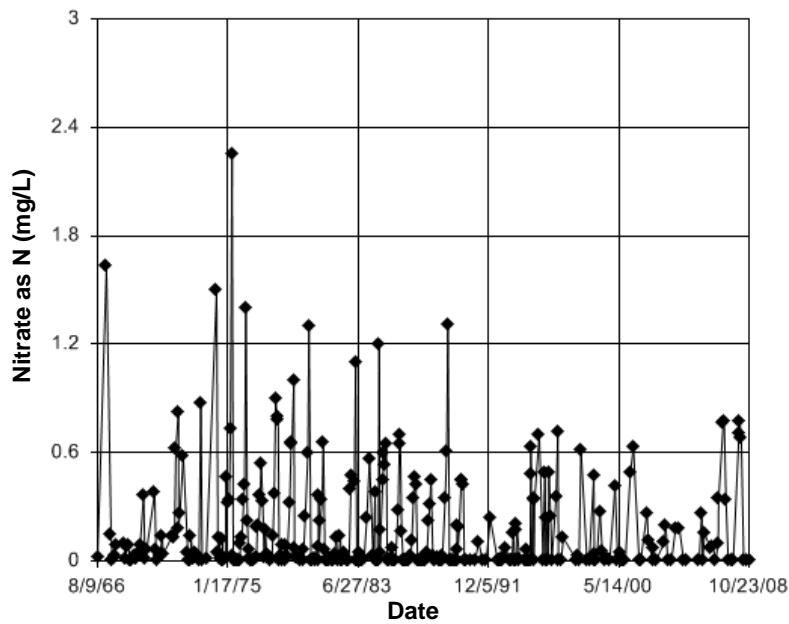
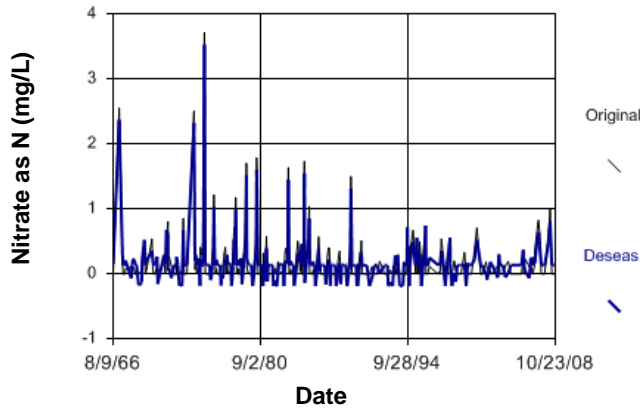


Figure B154 Red Deer River (SK-MB): Nitrate as N

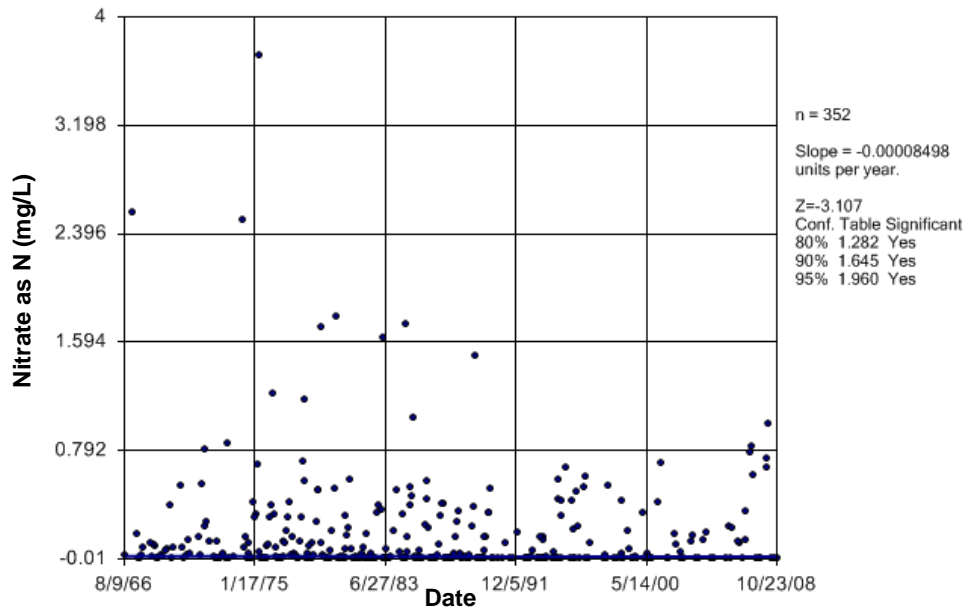
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 98.25  
 Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.  
 There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 98.25  
 Adjusted Kruskal-Wallis statistic (H') = 98.25

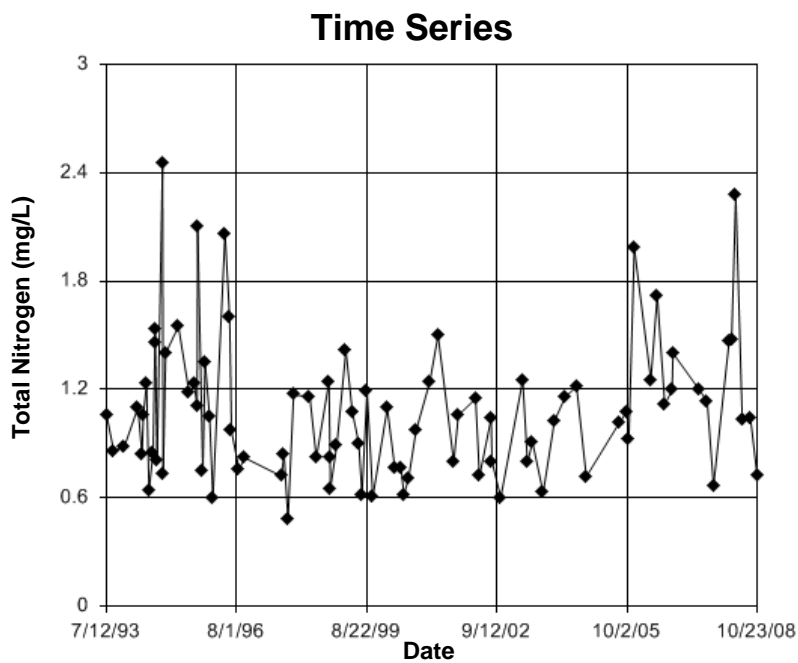


**Figure B155 Red Deer River (SK-MB): Nitrate as N**

## Seasonal Kendall



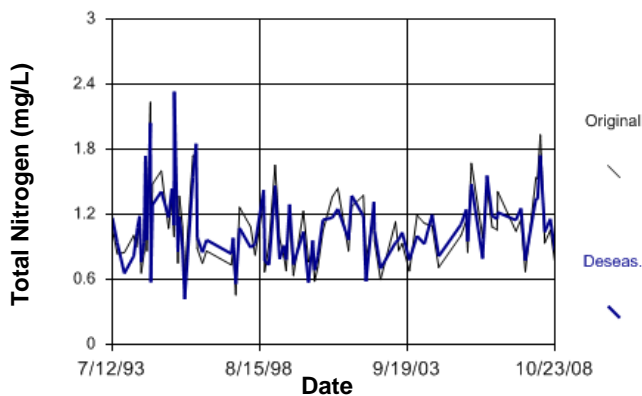
**Figure B156 Red Deer River (SK-MB): Nitrate as N**



**Figure B157 Red Deer River (SK-MB): Total Nitrogen**

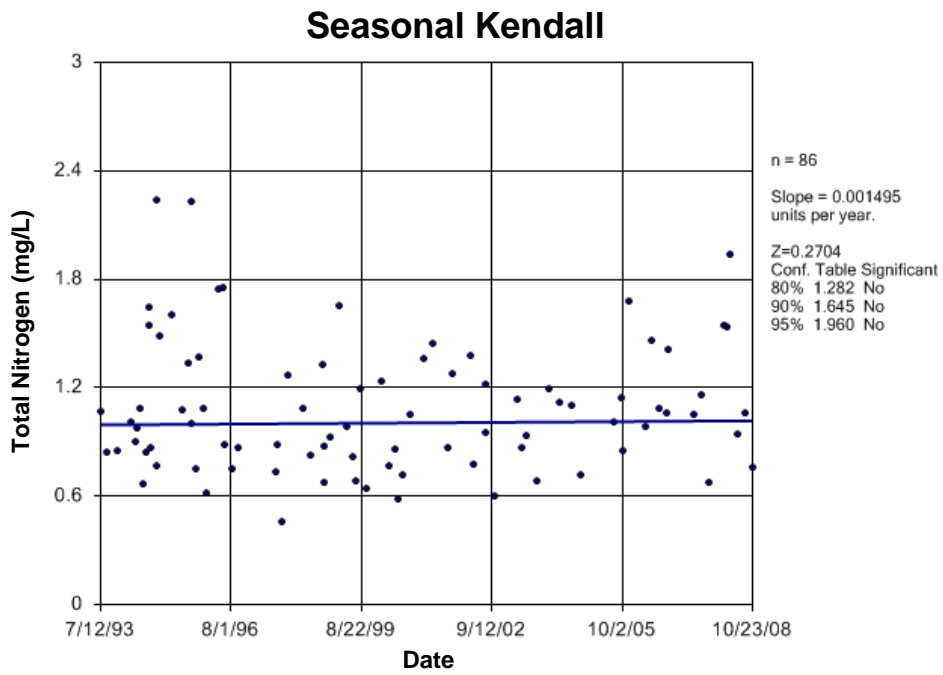
### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
 Calculated Kruskal-Wallis statistic = 13.77  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 13.77  
 Adjusted Kruskal-Wallis statistic (H') = 13.77

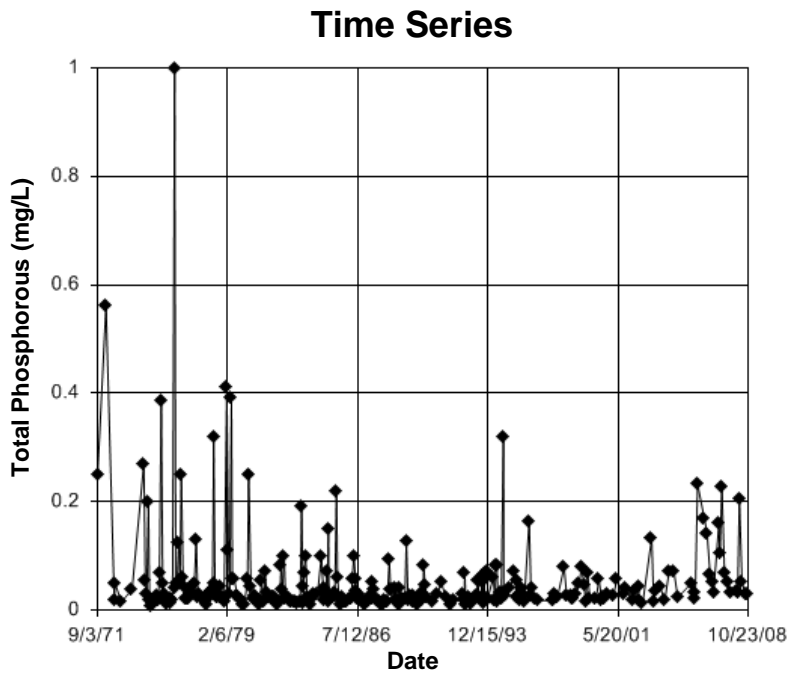


**Figure B158 Red Deer River (SK-MB): Total Nitrogen**





**Figure B159 Red Deer River (SK-MB): Total Nitrogen**



**Figure B160 Red Deer River (SK-MB): Total Phosphorous**

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 13.96  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 13.96  
 Adjusted Kruskal-Wallis statistic (H') = 13.96

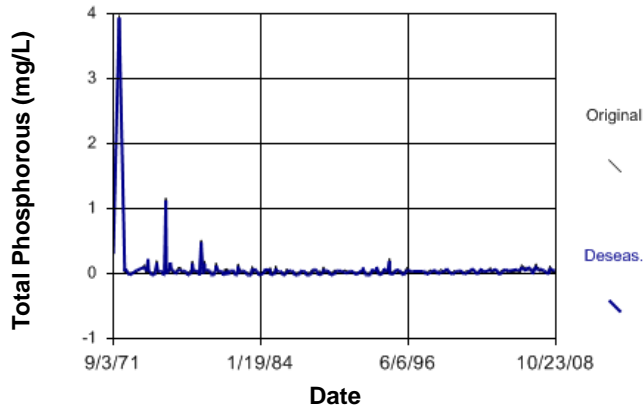


Figure B161 Red Deer River (SK-MB): Total Phosphorous

## Seasonal Kendall

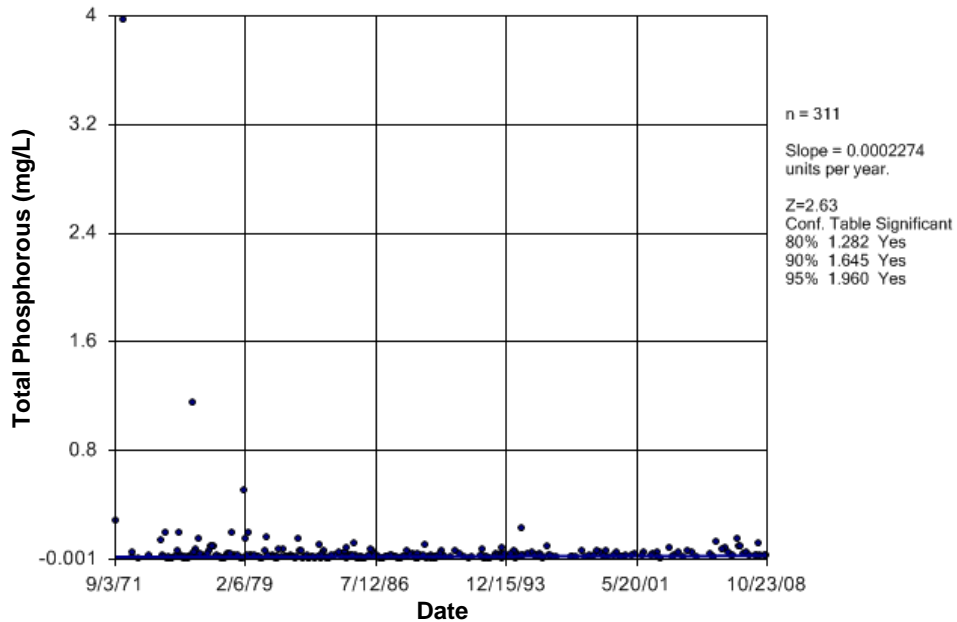
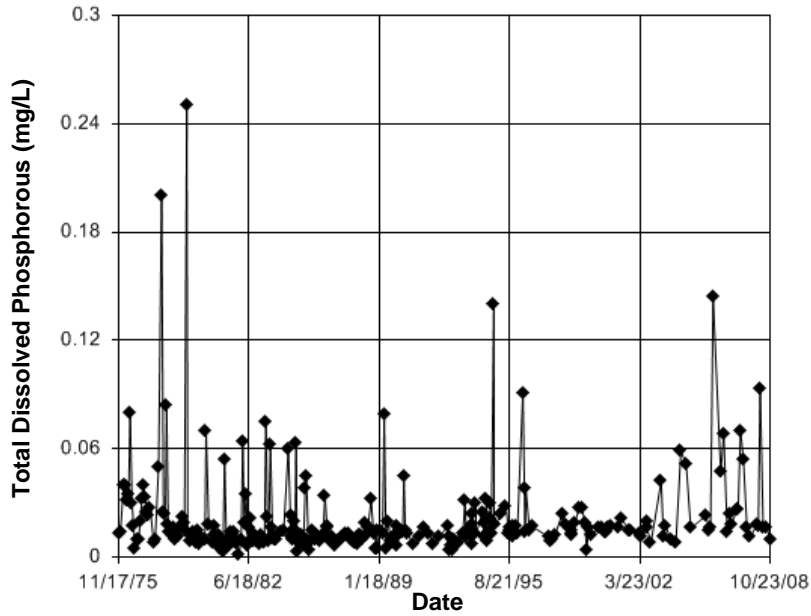


Figure B162 Red Deer River (SK-MB): Total Phosphorous

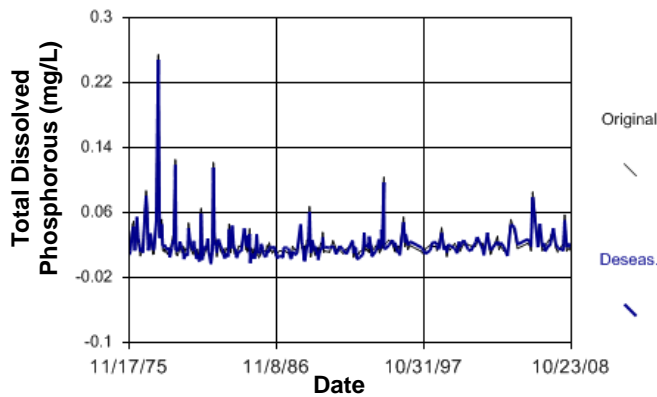
### Time Series



**Figure B163 Red Deer River (SK-MB): Total Dissolved Phosphorous**

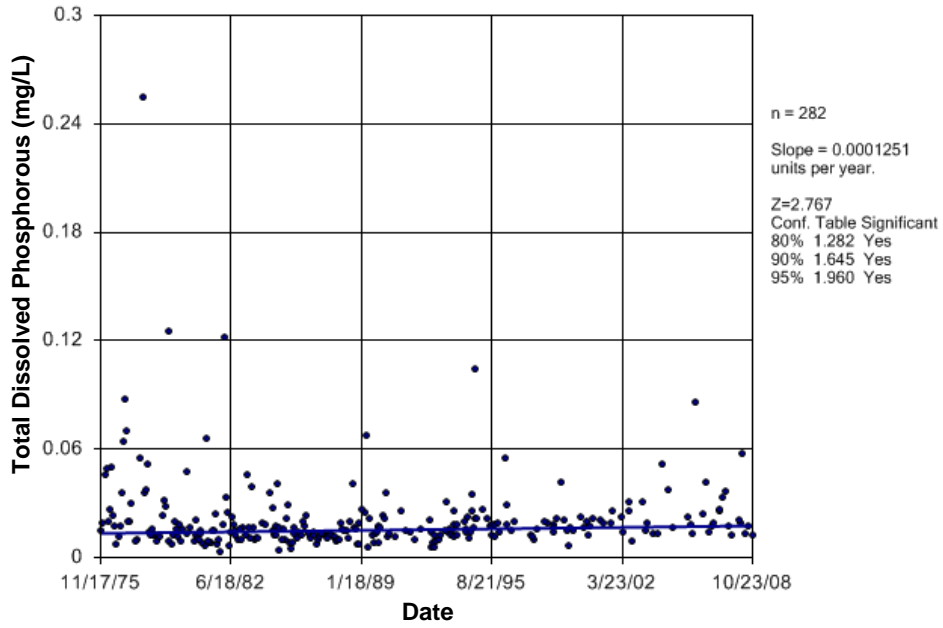
### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 20.56  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 9 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 20.56  
Adjusted Kruskal-Wallis statistic (H') = 20.56



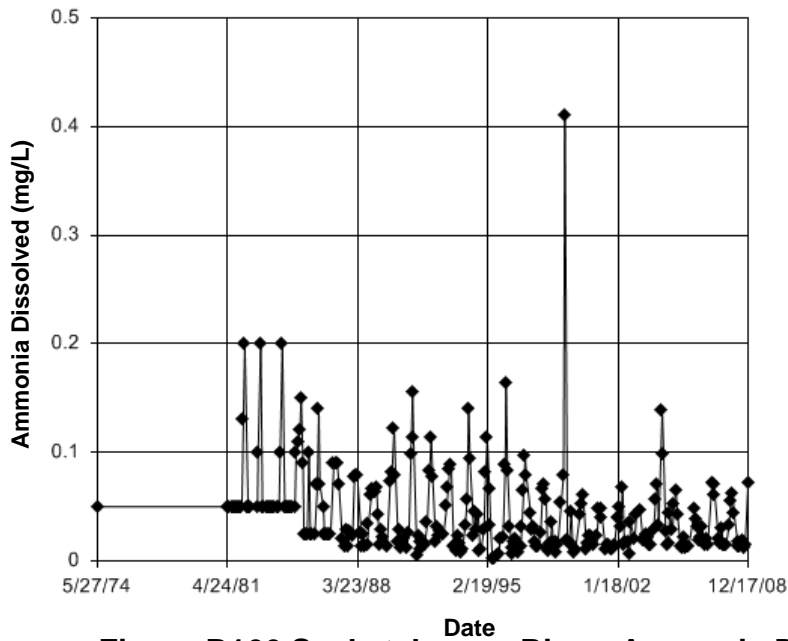
**Figure B164 Red Deer River (SK-MB): Total Dissolved Phosphorous**

### Seasonal Kendall



**Figure B165 Red Deer River (SK-MB): Total Dissolved Phosphorous**

### Time Series



**Figure B166 Saskatchewan River: Ammonia Dissolved**

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 104.8  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 104.8  
 Adjusted Kruskal-Wallis statistic (H') = 104.8

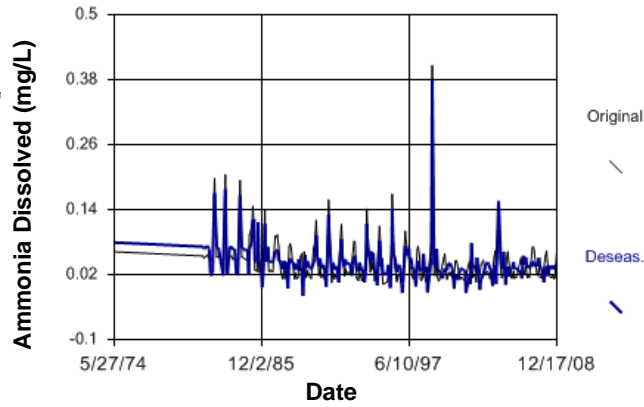


Figure B167 Saskatchewan River: Ammonia Dissolved

## Seasonal Kendall

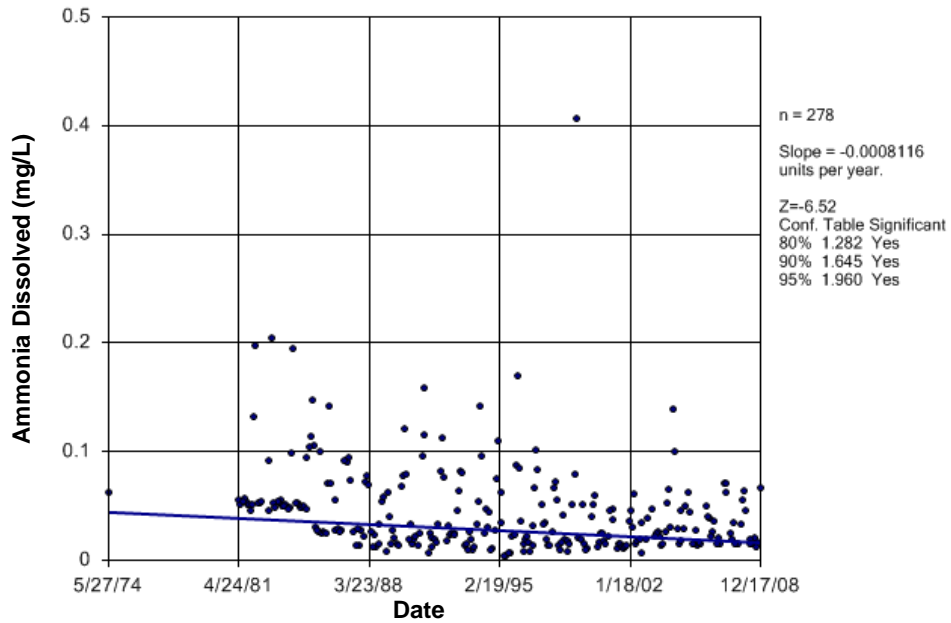


Figure B168 Saskatchewan River: Ammonia Dissolved

### Time Series

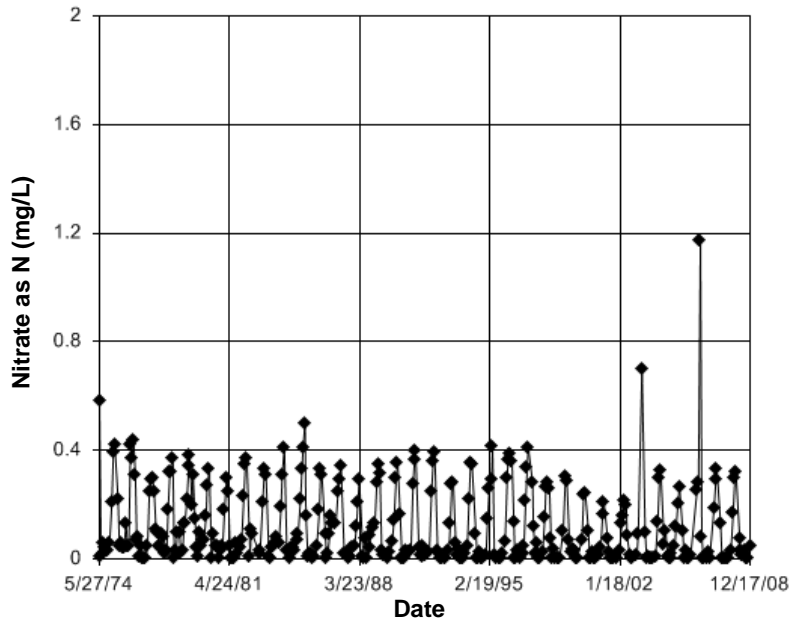


Figure B169 Saskatchewan River: Nitrate as N

### Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 110.2  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 110.2  
 Adjusted Kruskal-Wallis statistic (H') = 110.2

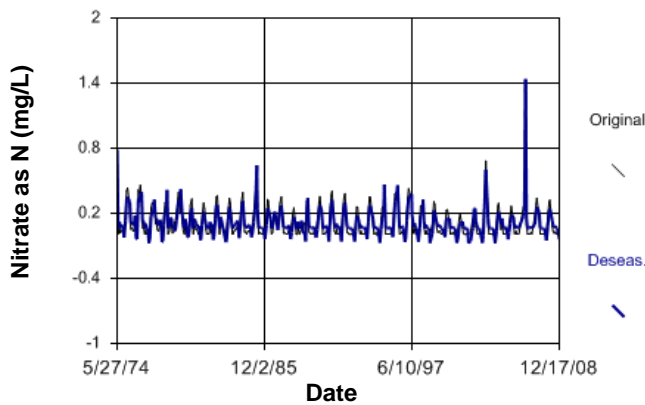


Figure B170 Saskatchewan River: Nitrate as N

### Seasonal Kendall

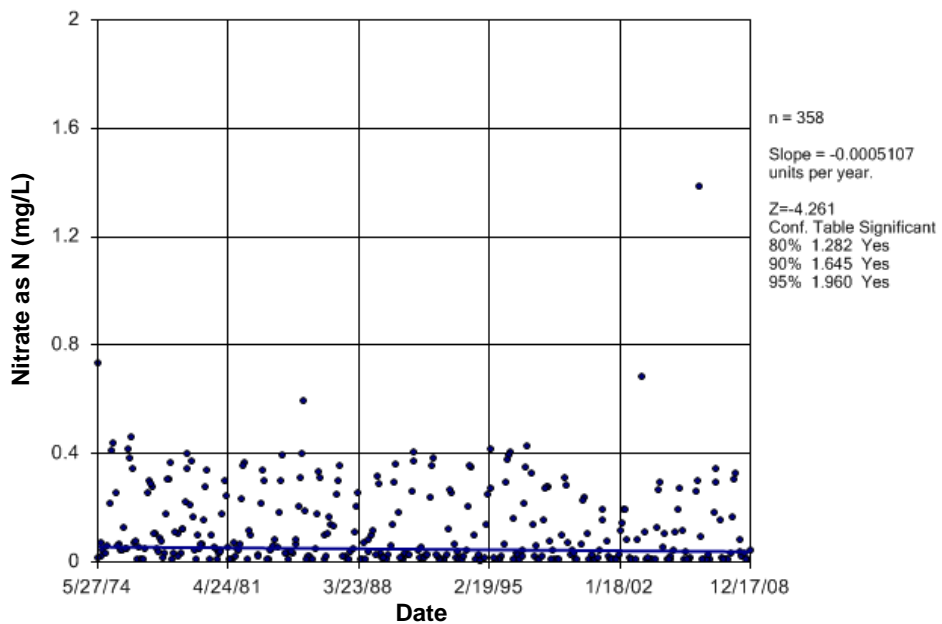


Figure B171 Saskatchewan River: Nitrate as N

### Time Series

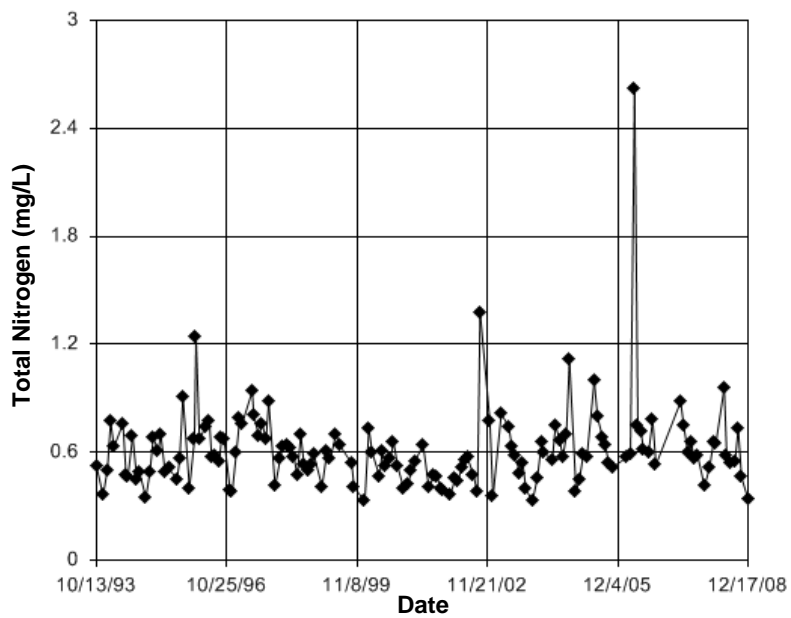


Figure B172 Saskatchewan River: Total Nitrogen

## Seasonality

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 0.2174  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 0.2174  
Adjusted Kruskal-Wallis statistic (H') = 0.2174

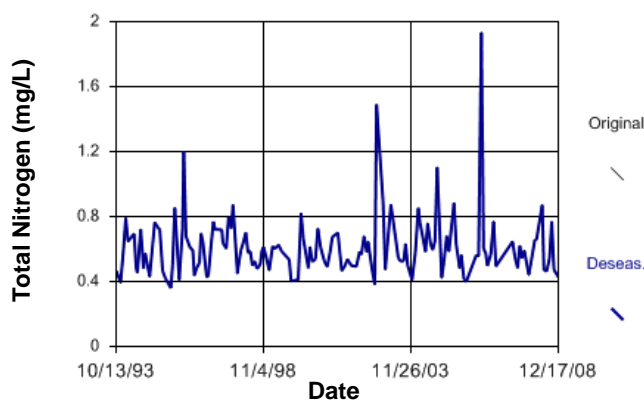


Figure B173 Saskatchewan River: Total Nitrogen

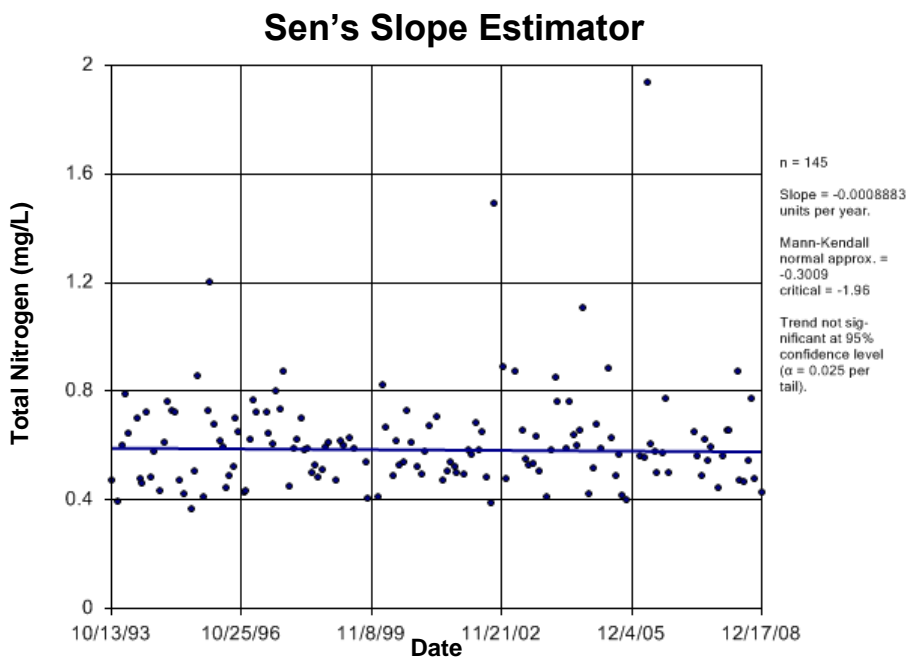


Figure B174 Saskatchewan River: Total Nitrogen



## Time Series

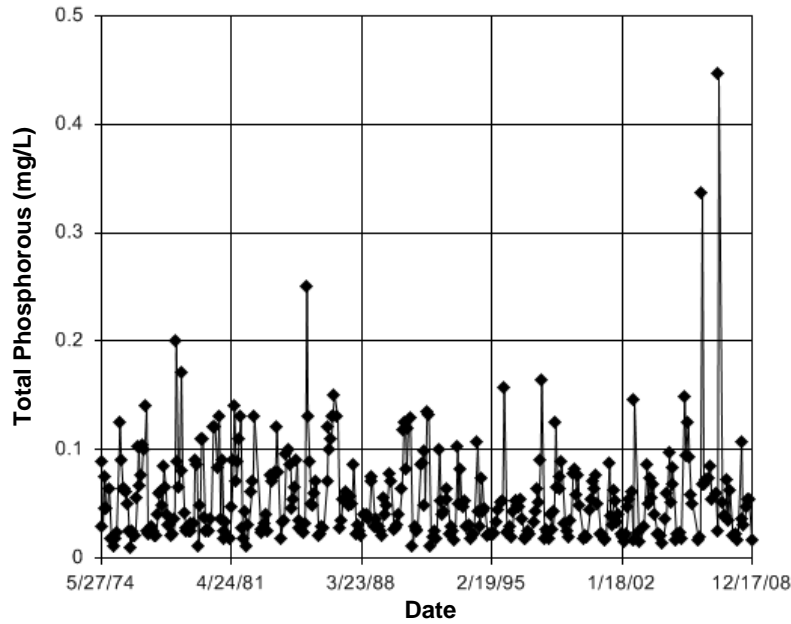


Figure B175 Saskatchewan River: Total Phosphorous

## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season.  
Calculated Kruskal-Wallis statistic = 181.8  
Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
There were 8 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
Kruskal-Wallis statistic (H) = 181.8  
Adjusted Kruskal-Wallis statistic (H') = 181.8

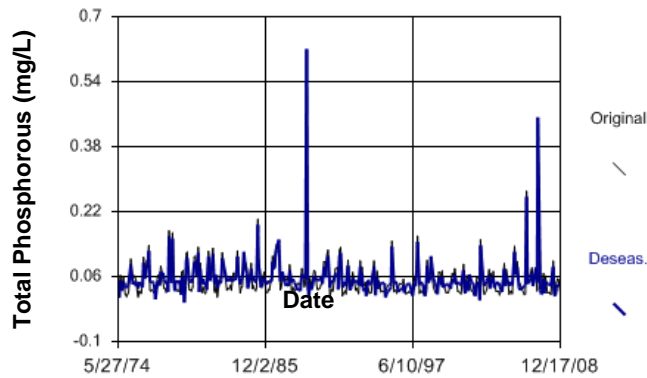
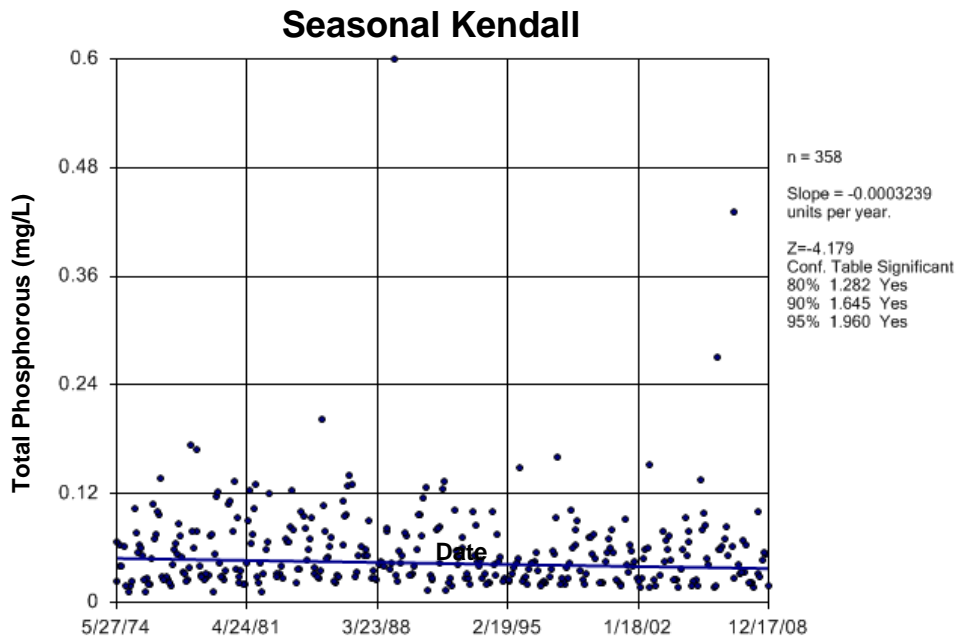
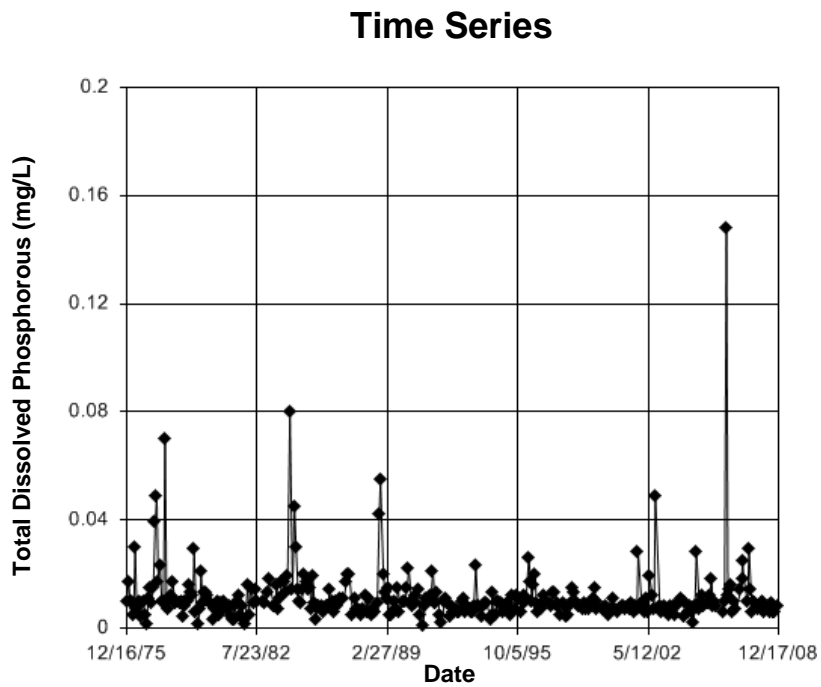


Figure B176 Saskatchewan River: Total Phosphorous



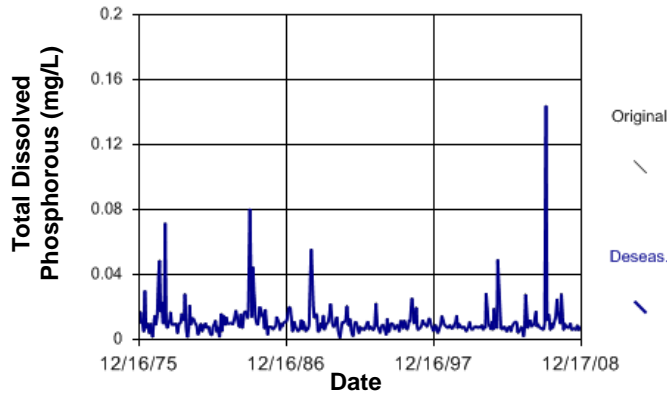
**Figure B177 Saskatchewan River: Total Phosphorous**



**Figure B178 Saskatchewan River: Total Dissolved Phosphorous**

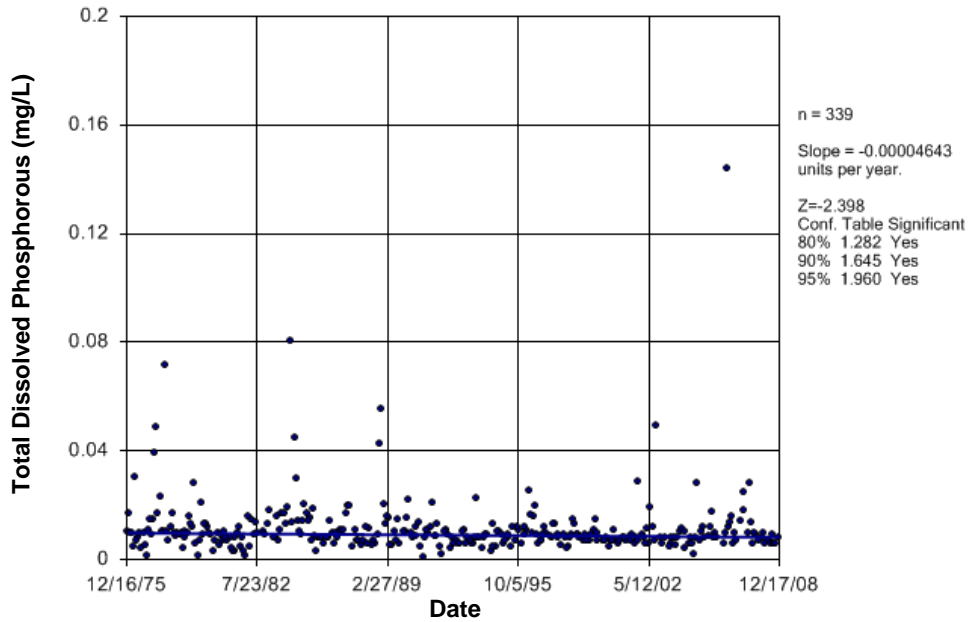
## Seasonality

For the data shown, the Kruskal-Wallis test indicates SEASONALITY at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one season has a significantly different median concentration of this constituent than any other season. Calculated Kruskal-Wallis statistic = 5.214  
 Tabulated Chi-Squared value = 3.841 with 1 degrees of freedom at the 5% significance level.  
 There were 27 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.  
 Kruskal-Wallis statistic (H) = 5.214  
 Adjusted Kruskal-Wallis statistic (H') = 5.214



**Figure B179 Saskatchewan River: Total Dissolved Phosphorous**

## Seasonal Kendall



**Figure B180 Saskatchewan River: Total Dissolved Phosphorous**