Status and Trends of Flow, Water Quality and Suspended Sediment Quality in the Peel River Watershed

Prepared for:

Water Resources Division
Renewable Resources and Environment Directorate
Aboriginal Affairs and Northern Development Canada
Yellowknife, Northwest Territories

March 2012

Reviewed and edited by:
Andrea Czarnecki and Stefan Goodman
Water Resources Division
Department of Environment and Natural Resources
Government of the Northwest Territories
Yellowknife, Northwest Territories
(March 2015)

Summary

The quantity and quality of water flowing within an undeveloped river, such as the Peel River and its tributaries, largely depends on the climate, relief, vegetation and geology of the surrounding watershed. Ignoring anthropogenic influences, the quantity and quality of water in the river reflects the cycle of the seasons, the rate of movement and volume of water that moves from the land into the river, and the amount and type of material, both particulate and dissolved, that the water transfers from the land of the watershed into the river.

The climate of the Peel River watershed is northern; there are long, cold, dark winters, and short cool summers with long days and abundant sunshine. In the spring, the days begin to lengthen, ice and snow rapidly start to melt and the creeks and rivers within the watershed quickly rise and flow faster. The pace of change during the ‘spring freshet’ is rapid because of the many mountain ranges, relatively few wetland areas, and almost continuous permafrost that occurs within the watershed. The dramatic relief within the watershed means that the spring melt-water runs down the mountainsides, rather than meandering slowly along a flat plain. The relative lack of wetlands and presence of permafrost means that there is only a limited area and depth in which melt-water can be stored, so that the spring melt-water typically runs quickly off the land rather than soaking into the ground and being released slowly over a long time period. In the lower reaches of the Peel River, the result is a ‘spring freshet’ that starts during the early part of May each year, and reaches its peak flow only a week or two later. The timing of the spring freshet, though it is variable from year-to-year and can start anytime from late April to early June, does not appear to have undergone any consistent changes over the past 40 years. There has been no significant trend towards an earlier or later spring freshet in the lower reaches of the Peel River watershed. The intensity of the spring freshet is variable. The maximum flow rate during the spring freshet varies from year-to-year by over five-fold, though again, there has been no significant trend towards either an increased or decreased maximum flow, or total flow.

The same factors that contribute to the pace of the spring freshet, also make the watershed responsive to summer rains. Soon after a large rainfall, the river rises very quickly as the water runs off the landscape, and almost as quickly falls. The period following the spring freshet is called the ‘summer recession’, and has perhaps the most changeable flow rates of any season within the Peel River. Following the summer recession, flow rates gradually decrease as the season progresses. Over the period of record, there has been a significant decrease in flow rates in June, during the early part of the summer recession. This perhaps suggests that the volume of spring rains have lessened over the years, or that the length of the spring freshet has decreased.

In the fall, as the days shorten and temperatures drop, flow within the river continues to decrease. Later, when ice and snow dominate the landscape, the Peel River continues to flow

lower and slower, and reaches its lowest point usually around the end of March or the beginning of April.

Over the past 40 years, there has been no significant change in the timing of the lowest flow rates in the lower reaches of the Peel River. There have, however, been significant changes to the timing and amount of winter flow ("winter baseflow") in the Peel River. The beginning of the baseflow period has become significantly later in the year, which means that flow is significantly higher than it used to be for longer into the fall. There has also been a significant increase in the annual minimum flow rate and the average rate of flow over the entire baseflow period. In the period from 2005 to 2010, though variable from year-to-year, the average rate of flow during the winter was about double what it was in the early 1970's. The increase in winter flow suggests that new hydrological flowpaths may have developed in recent years in association with warming permafrost.

Despite the observed increases in winter flow in the Peel River above Fort McPherson, there has been no significant increase in the total amount of water flowing in the Peel River, measured over the whole year. It is important to note that the flow in the winter ranges from about 50 to 100 m^3/s, while the flow during the spring freshet can be as high as, and higher than, 8000 m^3/s. The relatively large flow rates in the spring dominant the total amount of water flowing in the Peel River which means the spring trend is not strong enough to influence or cause an overall trend in annual flows. The lack of a trend in Peel River annual flows suggests that the <u>total</u> amount of water flowing in the river, though variable from year-to-year, has not steadily increased or decreased over the past 40 years.

The dramatic changes in flow rates within the Peel River have a dramatic effect on water quality. As river-flow rates change, the amount of sand, silt and clay suspended within the water also change. The levels of these particulates (collectively known as turbidity or total suspended solids) in the Peel River above Fort McPherson are above government (Canadian Council of Ministry of the Environment; CCME) guideline values for the protection of aquatic life, but the levels are natural to the Peel River so it is expected that the fish communities have adapted to their presence. Over the past 40 years, no significant changes in the turbidity or total suspended solids levels in the Peel River above Fort McPherson have been observed.

The particles of sand, silt and clay that are washed into the river contain metals, so that the total amounts of metals tend to increase as the amount of particulates increase. During periods of high flow when high levels of particulates are suspended in the water, total concentrations of metals including copper, iron, nickel and zinc are also high and above government guideline values for protection of aquatic life. Again, these metals are natural to the Peel River so that fish communities are expected to be adapted to their presence. Because the amount of particulates within the river has not changed over the past 40 years, it is also expected that the amount of total metals has also not increased or decreased over the same time period.

Dissolved concentrations of metals are also measured in the Peel River. It is the dissolved fraction of a metal that is generally considered more biologically available to fish and the other animals that inhabit the river. As expected, the dissolved concentrations are much lower than the total metal concentrations. With the data generated to date, dissolved aluminum, cadmium, copper and lead have occasionally exceeded existing government water quality guidelines for the protection of aquatic life. The current dataset for dissolved metals (2006-2012) is relatively short and therefore not amenable to an assessment of long term trends but with continued monitoring, assessment of trends may be possible.

The Peel River watershed is dominated by sedimentary rocks that contain calcium, magnesium, carbonate and sulphate. Because of this, as water runs off the land and into the many creeks and rivers within the watershed, large amounts of these four major ions are present in the water and define the water chemistry within the Peel River. These processes result in water that can be described as hard and alkaline. Within the watershed, rivers contain relatively high concentrations of calcium, magnesium and sulphate, and relatively low concentrations of the major ions sodium, potassium and chloride. The sedimentary rocks also release large amounts of carbonate, so that the waters of the Peel River watershed have a pH greater than 7 and are highly buffered (that is, resistant to change in pH). This occurs throughout the watershed, so that the major ion chemistry of the water is similar in the major rivers, and unique to the Peel River watershed.

The concentration of major ions is also affected by changes in seasonal flow rates. During the spring freshet, the concentrations of most major ions decrease as they are diluted by melting ice and snow. As the summer progresses, concentrations of most major ions begin to increase, until they reach a maximum during the winter baseflow period. The seasonal pattern and flow in concentration for the major ions is opposite to the pattern displayed by total metals.

Over the past 40 years, there has been a significant increase in the concentration of dissolved calcium, magnesium and sulphate in the Peel River above Fort McPherson during the spring freshet, the summer recession and the winter baseflow period. This suggests that the amount of calcium, magnesium and sulphate that is moving from the land into the water has increased over the period of record for all seasons of the year. These observed increases suggest that the watershed landscape has changed over the past 40 years. The increase in summer concentrations of major ions is linked to the development of large permafrost disturbances which are making immense volumes of previously frozen materials available to chemical weathering, erosion and runoff into the river.

Within the industrial landscapes of the world, many organic chemicals/compounds are produced. These chemicals include pesticides and herbicides used in agriculture, and many other organic compounds used by industry for the manufacture of plastics and other products of the industrial age. These chemicals can be toxic and persistent in the environment. Many of these organic chemicals can evaporate into the atmosphere and are capable of moving large distances from their sources with prevailing winds. These chemicals can then fall out of the atmosphere during rain or snow events, particularly in areas that are cold, such as mountains, and northern areas such as the Yukon. The Peel River watershed, being located in a cold and mountainous northern region, is therefore vulnerable to deposition of these persistent and toxic chemicals. Because of this, efforts have been made to measure the concentration of these organic chemicals in the Peel River (above Fort McPherson). In the water, concentrations of most organic compounds are below detection limits, and for others are well below the existing government water quality guideline values. Currently, it does not appear that persistent organic chemicals are present in the water of the Peel River. These same organic substances are measured in the suspended sediment that are collected from the Peel River. On occasion, some hydrocarbon compounds were detected in the suspended sediment samples that were collected and at levels that were above the CCME bottom sediment quality guidelines for the protection of aquatic life.

In this report, water quality conditions have been defined for many water quality analytes of the Peel River above Fort McPherson. This information provides a benchmark for the derivation of site-specific water quality guidelines, if required. Further, it will allow for comparisons to be made and for the detection of any future temporal trends due to the effects of climate change, development and land use activity that might occur within the region.

Table of Contents

Appendices

List of Tables

List of Figures

1.0 Introduction

On January 16, 2012, Stantec Consulting Ltd. was retained to produce a report discussing water quality and quantity in the Peel River watershed. The goal of the study was to provide information that might be used to address community concerns regarding water quality and quantity within the Peel River watershed, and to support the development of site specific water quality guidelines for the Yukon/Northwest Territories Bilateral Water Management Agreement. In support of these goals, the objectives of the study were to develop an understanding of baseline water quality and quantity for the long term monitoring station: Peel River above Fort McPherson. This report defines the seasonal hydrological cycle, describes any seasonal differences in water chemistry and any temporal trends in water chemistry and/or hydrology for this station. In addition, this report also describes the spatial variability in water chemistry throughout the watershed, moving from the headwaters of the Peel River (Ogilvie and Blackstone Rivers) downstream towards Fort McPherson (Caribou River).

To address these objectives, several comprehensive datasets were provided, including:

1) Flow data collected from the Peel River above Fort McPherson (1969 to 2010);

2) Water quality data collected from the Peel River above Fort McPherson (1960 to 2011);

3) Suspended sediment quality data collected from the Peel River above Fort McPherson (2002 to 2012); and

4) Water quality data collected from various sites throughout the Peel River Watershed in 1999 and once a year between 2002 and 2007.

2.0 Study Area

The Peel River Watershed drains an area of approximately 70,600 km^2, and is located largely in the northern part of the Yukon Territory; from 64° to 67° north, and from 131° to 140° west (Figure 2-1). There are six major tributaries within the Peel River watershed, including the Ogilvie, Blackstone, Hart, Wind, Bonnet Plume and Snake Rivers (Kenyon and Whitley 2008). The Ogilvie and Blackstone Rivers flow east out of the Ogilvie Mountains and join to form the Peel River. Whereas, the Hart, Wind, Bonnet Plume and Snake Rivers flow north out of the Wernecke Mountains and join the Peel River downstream (Figure 2-1). Other, smaller tributaries arise out of the Richardson Mountains, and include the Caribou, Trail, Road and Vittrekwa Rivers.

The headwaters of the Peel River watershed are located in the Taiga Cordillera Ecozone. This remote mountainous region "*contains some of Canada's largest waterfalls, deepest canyons and wildest rivers*" (Smith et al. 2004). This region encompasses the northernmost extent of the Rocky Mountains, but also contains rolling foothills, upland plateaus and low-lying basins (Czarnecki and Beavers 2002). The boreal forest reaches its northern limit here (Peepre and Locke 2008), and transitions to treeless Arctic tundra further north and at higher elevations. Summers are warm to cool with extended periods of daylight and average temperatures of 6 to 10°C depending on elevation and aspect. Winters are long and cold with little daylight and average temperatures approaching -25°C (Smith et al. 2004). The mean annual temperature ranges from -5 to -10°C. Annual precipitation ranges between 300 and 700 mm/yr and runoff is high relative to precipitation because of the underlying permafrost, high relief, relative lack of wetlands, and limited evapotranspiration. Sedimentary rocks such as sandstone, shale, limestone and dolomite dominate the Ecozone (Smith et al. 2004) and are important factors in determining the water chemistry of the Peel River and its tributaries.

The lower reaches of the Peel River are located in the Taiga Plains Ecozone, which is centered on the Mackenzie River valley (Peepre and Locke 2008). This part of the watershed is characterized by continuous permafrost, and extensive areas of low relief, low elevation peatlands (Smith et al. 2004). Summers are short and cool with average temperatures of approximately 10°C. Winters are long and cold and are typical of a high subarctic climate. Mean annual precipitation is approximately 300 mm/yr and runoff is low relative to precipitation because of the low relief and relatively extensive wetlands (Smith et al. 2004).

Wildlife in the watershed is diverse, and includes Dall Sheep, woodland and barren ground caribou, moose, mountain goat, black and grizzly bear, wolf, lynx, and a concentration of wolverine, among others (Smith et al. 2004). The watershed also contains 24 species of fish, including game fish such as Chum Salmon, Arctic Grayling, Dolly Varden, Lake Trout, Broad Whitefish, Lake Whitefish, Inconnu, Northern Pike, and Walleye (EDI Environmental 2006). Slimy Sculpin are also present in the fast, boulder-strewn reaches of the watershed's many rivers. This is a potentially important species for future environmental monitoring efforts because of its sensitivity to pollutants and limited movement.

Hydrological data collected between 1969 and 2010 indicates that flow of the Peel River above Fort McPherson averages 23 million dam3 per year while other tributaries range in flow from just over 300,000 to 3 million dam3 per year (Kenyon and Whitley 2008).

The Peel River watershed is almost completely undeveloped, except for the Dempster Highway that crosses the upper reaches of the basin and historical mineral and oil and gas exploration. Currently, "*The water, wildlife and fisheries resources produced in the Peel Basin are used to support the traditional culture and subsistence lifestyle (hunting, trapping, fishing) of numerous residents within the area…* [that]*… include the Tetlit Gwich'in of Fort McPherson, the Inuvialuit of Aklavik, the Na-Cho Ny'a'k Dun of Mayo and the Tr'on Dek Hwech'in of Dawson City* (Czarnecki and Beaver 2002)."

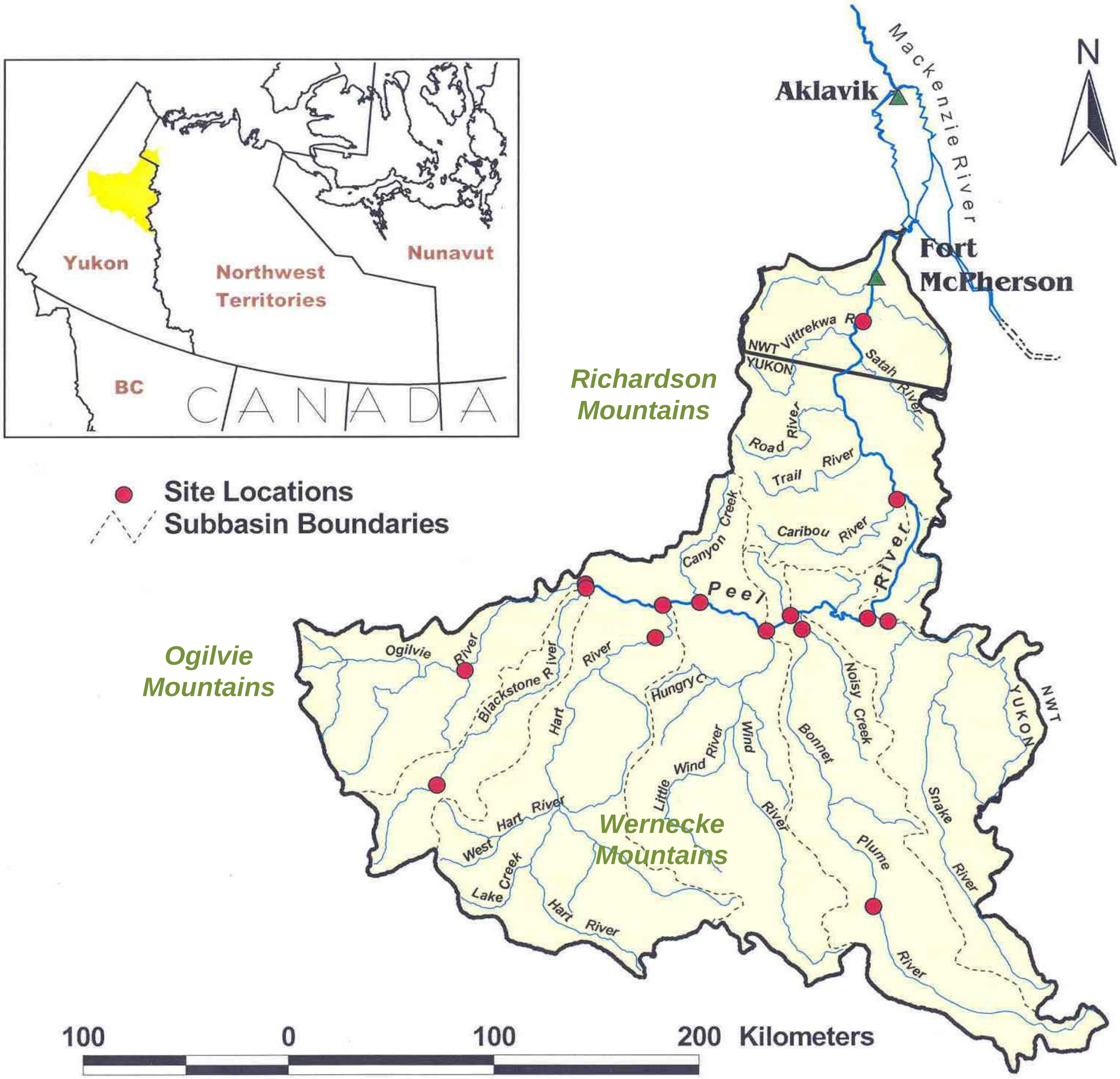


Figure 2-1: Peel River Watershed (and Water Quality Monitoring Sites)

3.0 Methods

Analysis methods were determined by dataset characteristics and the questions to be addressed by the study. Each of the datasets thus required a separate methodological approach. The datasets included:

- Peel River above Fort McPherson (flow data)
- Peel River above Fort McPherson (water quality data and suspended sediment quality data)
- Peel River Watershed (numerous sites; water quality data)

3.1 FLOW - PEEL RIVER ABOVE FORT MCPHERSON

In addition to the 1969-2010 hydrometric data for Peel River at Fort McPherson that was provided to Stantec, an attempt was made to obtain the 2011 streamflow (Q) data from the Water Survey Canada (WSC) of Environment Canada archive hydrometric database. However, the streamflow data for Peel River above Fort McPherson were available only for the period from 1969 to 2010 from the WSC database (see Figure D-1 in Appendix D).

Stantec has reviewed the 1969 to 2010 streamflow data from the Peel River above Fort McPherson hydrometric station. The assessment indicated that there are a number of years where streamflow data are missing. Table 3-1 tabulates the years where streamflow data are missing, including the number of missing days in a particular year. The remaining years have year-round streamflow data that can be used for trends analysis for the Peel River.

Table 3-1: List of Missed Streamflow Data for Peel River at Fort McPherson

Year	No. of Missing Days	Year	No. of Missing Days
1969	272	1974	69
1970	55	1987	365
1971	106	1997	61
1972	18	1998	59
1973	33	2004	1

3.1.1 Trend Analysis

Generally, trends (positive or negative) in streamflow occur gradually (a trend) or abruptly (a 'step change'). Stantec assessed the Peel River above Fort McPherson streamflow for long term trends. The assessment was for the entire period of streamflow records (1969-2010) and for the last decade of streamflow records (2001-2010). Trend analyses were undertaken using linear regression (graphical trend analysis) and a Mann-Kendall test (Appendix A). An R^2 value was calculated using simple linear regression. Tests for significance (calculation of p values) were undertaken using the Mann-Kendall test. Analysis was undertaken for Peel River above Fort McPherson including long term trends in:

- Total annual streamflow
- Mean annual streamflow
- First Julian day above 1000 m^3/s: the first day during freshet when flow rate increases to above 1,000 m^3/s
- Annual maximum daily flow: the maximum daily flow rate in each year
  - Julian-calendar day of maximum freshet daily flow
- Annual minimum daily flow: the minimum daily flow rate in each year
  - Julian day of minimum daily flow
- Mean monthly streamflow to assess any temporal changes in seasonality

In addition to the trends analysis, the following were determined:

- Definition of seasonal periods was based on streamflow and turbidity (Table 3-2). This is an arbitrary framework overlain on a continuous and temporally variable natural process, but is useful for describing the progression of the seasons within the Peel River watershed, for the delineation of the seasonal variability in baseline chemistry, and for determining temporal trends on a seasonal basis. It is also convenient for use in determining optimal sampling dates. The start date of the spring freshet was defined as the first date when flow increased to greater than 300 m^3/s, the start date of the summer recession was arbitrarily chosen as July 1st, and the start date of the winter baseflow was defined as the first date when flow decreased to less than 300 m^3/s (Table 3-2). This delineation was based on the characteristics of flow increase during the spring, and the relationship between flow rate and turbidity.

Table 3-2: Definition of Seasonal Flow Periods

Season	Spring Freshet	Summer/Fall Recession	Winter Baseflow
Flow Rate	**>300 m^3/s**	**>300 m^3/s**	**<300 m^3/s**
Earliest Start Date	April 14	July 1	September 15
Median Start Date	May 9	----	October 22
Median End Date	----	October 22	May 9
Latest End Date	June 30	November 23	May 24
Trends Analysis	May-June	July-October	November-April

- Flow-Duration Curve (FDC): FDCs were constructed using available daily streamflow data in order to assess changes in the flow regime between the entire period of streamflow records (1969-2010) and for the last decade of streamflow data (2001-2010). This is useful to show the relationship between the magnitude and frequency of streamflow of the two periods. Moreover, it will highlight key streamflow features; such as the variability in the range of flows, changes in low and high flows. They also provide a measure of the percentage of time a given streamflow is equaled or exceeded over the daily time interval.

3.2 WATER QUALITY - PEEL RIVER ABOVE FORT MCPHERSON

The Peel River above Fort McPherson dataset, collected by Environment Canada and Aboriginal Affairs and Northern Development Canada (AANDC), provides the longest time-series of surface water-chemistry data for the Peel River. The data can be divided into four sets of data, based on the measured variables. The four datasets include:

- Routine Water Chemistry Analytes
- Total and Dissolved Metals
- Nutrients
- Organic Compounds of Potential Concern

For each set of data, a quality-control check of the data was undertaken. This included determination and/or calculation of the following:

- Identification of anomalous data points.
- Identification of missing data points.

- Determination of ionic balance.
- The raw dataset contains duplicates and triplicates for some stations for the same date. The dataset was reduced through calculation of the average values.
- Reduction of dataset by year, and by analyte where, and if required.
- Rationalization of multiple analyte versions. This is especially important for the nitrogen and phosphorus datasets, each of which has multiples of categories, some of which are identical.

The purpose of the QA was to provide a core dataset for each category that was free of anomalous data, had a minimal amount of missing data, that had an equal number of data points for each sampling event, and that had one consistent record for each analyte.

3.2.1 Routine Water Chemistry Analytes

There are ten analytes within a 200-sample-event dataset spanning 1960 to 2011. These include: alkalinity, dissolved calcium, dissolved chloride, dissolved magnesium, pH, dissolved potassium, dissolved sodium, conductivity, dissolved sulphate, and turbidity. For each analyte, the sampling period was not regular, so that there are missing time periods, relatively few samples from the freshet period, and there are from 6 to 31 missing values for each analyte within the 200 sampling events. The dataset was comprehensive enough to analyze the analytes as follows:

- Definition of baseline chemistry using box and whisker plots. For each plot, the lower line represents the 25th percentile, the middle line represents the 50th percentile (median), and the upper line represents the 75th percentile of the data. The whiskers define the maximum and minimum observed values that were within 1.5X the interquartile range (distance between the 25th and 75th percentile). Values outside the whiskers are defined as outliers. Only the highest or lowest outliers were plotted for each boxplot. Box and whisker plots using data percentiles were used to define baseline chemistry because they are non-parametric and so make no assumptions regarding data structure, are resistant to the effect of outliers and values below detection limit, and provide clear outlier-cutoff values. For comparison, mean values were also included in each figure (represented by a black circle).
- Delineation of analyte concentration versus flow for the entire dataset, for flow rates less than 1,000 m^3/s, and for flow rates less than 300 m^3/s. These flow-rate cutoffs were selected as being important determinants of flow period (see Section 3.1.1 above). The purpose was to determine the relationship between concentration and flow rate.
- Delineation of concentration versus time for the period 1989 to 2010. The purpose was to clearly illustrate the relationship between concentration and time over the recent period of record. The shorter period was chosen so that seasonal alterations could be delineated within the figure.

- Delineation of concentration by flow, separated by flow regime (baseflow, freshet and recession). The purpose was to examine and characterize the effect of flow rate and season on analyte concentration. Data were separated into spring freshet, summer recession and winter baseflow datasets. Each dataset was tested, and if model residuals conformed to assumptions of normality and equal variance, ANOVA was used to first detect a difference, and if one existed, it was followed with a posthoc Student's t multiple comparison. Routine analytes analyzed using these tests included pH, total alkalinity, conductivity, turbidity, calcium, magnesium, potassium, sodium, chloride and sulphate. If assumptions of normality and equal variance were not met, then non-parametric tests (Kruskal-Wallis) were performed on rank-transformed data. For the non-parametric post hoc multiple comparison, a Wilcoxon Each Pair test was used on rank-transformed data.

- An examination of trends over time for each analyte by flow regime. The first step in the trends analysis was to separate the data into their respective seasonal periods. The data for each year in each seasonal period were then averaged. This was necessary because the number of samples per year was variable. Finally, a Mann Kendall (Appendix A) trends test was used to determine if a statistically significant temporal trend was evident through the period of record and for the last 10 years. A Mann Kendall test was used because it is non-parametric and makes no assumptions regarding the structure of the data. The trend assessment was undertaken for the ten routine analytes listed previously. For those variables that showed a highly significant trend over time, the percent change was calculated using the regression of concentration vs time. For the trends analysis, statistical significance (p-value) was defined as follows:

  - <0.05 marginally significant
  - <0.005 moderately significant
  - <0.001 highly significant
  - <0.0001 highly significant in all circumstances

  A p-value of 0.05 is standard for statistical testing. This p-value indicates a marginally significant difference. Because the probability of error increases as the number of tests increases, a second level of significance was established for testing of trends for the analytes. The value of 0.005 was calculated based on a Bonferroni correction, where $\alpha' = \alpha/n$, and;

  - $\alpha = 0.05$
  - n = the number of analytes being tested (10)
  - α' = the corrected p-value

For some groups of analyses, there were up to 30 time/variable combinations being tested. To ensure that the probability of finding an effect in error remained reasonable, a third and fourth level of significance was established (Table 3-3). It was considered that a p-value of <0.0001 indicated a highly significant result under all conditions (Table 3-3).

Table 3-3: The Probability of at Least One Type 1 Error at Three Test Levels

P-value	N (# tests)		
	1	10	30
0.05	5%	40%	78%
0.005	0.5%	5%	14%
0.001	0.1%	1%	3%
0.0001	0.01%	0.1%	0.3%

- For calcium (Ca), a loading rate calculation was also undertaken. The loading rate was calculated (for each seasonal period) as the mean Ca concentration multiplied by the mean flow rate and then multiplied by the duration of the seasonal period, for a value measured as tons Ca/yr. The yearly loading rate was calculated as the sum of the three seasonal loading rates.

- Comparison to chronic guideline values (Table 3-4), where applicable. The CCME water quality guidelines for 'The Protection of Aquatic Life' and Health Canada's drinking-water guidelines were used (CCME 2012), if available. For a few variables (sulphate, cobalt, manganese and vanadium) the BC water-quality guidelines were used (BCMOE 2012). For turbidity, the CCME guideline values are a narrative where, under clear flow conditions, a maximum increase of 8 NTUs from background levels are allowed for a short-term exposure (e.g., 24-h period), and a maximum average increase of 2 NTUs from background levels is allowed for a longer-term exposure (e.g., 30-d period). A maximum increase of 8 NTUs from background levels at any one time is allowed when background levels are between 8 and 80 NTUs, and turbidity should not increase by more than 10% of background levels when background is > 80 NTUs (CCME 2012). This guideline provides a useful strategy, given the variable and extreme turbidity levels recorded in the Peel River over the past 50 years. Turbidity provides an estimate of the amount of particulate material suspended in the water column. Turbidity can be caused by inorganic material, and/or organic components such as algae or dead algal cells.

Table 3-4: CCME Guidelines for the Protection of Aquatic Life and Health Canada Drinking Water Quality Guidelines for Treated Water

Element	Symbol	Value[1]	Value[2]	Units
Aluminum	Al	100		ug/L
Antimony	Sb		6	ug/L
Arsenic	As	5	10	ug/L
Barium	Ba		1000	ug/L
Boron	B	1,500	5,000	ug/L
Cadmium	Cd	0.054*	5	µg/L
Chloride	Cl	120,000		µg/L
Chromium (VI)	Cr	1	50	µg/L
Chromium (III)	Cr	8.9		µg/L
Cobalt**	Co	4		µg/L
Copper	Cu	3.87*		µg/L
Iron	Fe	300		µg/L
Lead	Pb	6.63*	10	µg/L
Manganese**	Mn	1400		µg/L
Mercury	Hg	0.026	1	µg/L
Molybdenum	Mo	73		µg/L
Nickel	Ni	148*		µg/L
Selenium	Se	1	10	µg/L
Silver	Ag	0.1		µg/L
Sulphate**	SO4	100,000		µg/L
Thallium	Tl	0.8		µg/L
Turbidity	---		1	NTU
Vanadium**	V	6		µg/L
Zinc	Zn	30		µg/L

CCME guidelines accessed at: http://st-ts.ccme.ca/?chems =all&chapters=1
*at a hardness of 178 mg/L as $CaCO_3$
**BC Guideline Value
[1] CCME Long term guideline values for the Protection of Aquatic Life
[2] Health Canada Drinking Water Guideline

3.2.2 Nutrients

For the purposes of this report, nutrients include dissolved organic carbon (DOC), total nitrogen (TN) and total phosphorus (TP). Total nitrogen was the sum of ammonia, nitrate, nitrite and particulate N. Analysis included the following:

- Definition of baseline chemistry using box and whisker plots. Analysis was undertaken for each variable in terms of freshet, recession and baseflow seasonal periods.
- An examination of the relationship between flow rate, season and concentration.
- Comparison to guideline values, where applicable.

3.2.3 Trace Metals

The longest record for trace metals is for total metals. After examination of the characteristics of the data, including detection limits and completeness, data from 1983 to 2010 were used to assess the baseline chemistry for total trace metals. Metals that were analyzed (selected because the majority of the data were above detection limits) include: Aluminum (Al), Barium (Ba), Beryllium (Be), Cadmium (Cd), Cobalt (Co), Chromium (Cr), Copper (Cu), Iron (Fe), Lithium (Li), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Lead (Pb), Strontium (Sr), Vanadium (V) and Zinc (Zn). For this set of data, analyses included the following:

- Relationship between concentration and turbidity. Because this relationship was highly significant for almost all total metals, it was considered that a trends analysis of turbidity (by seasonal period) also provided an indication of trends in total metal concentrations. To summarize the correlation between turbidity and total metal concentration, data for the total metals that were correlated to turbidity were combined by normalizing each set of metal data to the highest concentration for that metal, and then summing all relative metal concentrations for each date. Because of the uneven distribution of data and the variable number of data points for any given turbidity level, seven turbidity categories were selected and a ‘mean relative metal concentration’ was then calculated for each turbidity category. The turbidity categories (as mean NTU) were; 3, 48, 145, 250, 402, 603 and 1138 NTU. The ‘mean relative metal concentration’ data were then plotted against turbidity and a “best fit” line was calculated.
- A trends analysis was undertaken for a select group of total metals during the winter baseflow period (only; not enough data points existed to assess long-term trends during the spring or summer). Metals assessed for long term trends (in the winter) included Al, Cr, Cu, Fe, Li, Mn, Mo, Ni, Sr and Zn for the period from 1993 to 2010. Because of missing winter data, only twelve or thirteen years out of 18 were used in the trends analysis. This compromised the analysis and means the results should be interpreted cautiously.
- Calculation of the Water Quality Index (WQI; CCME 2001) was undertaken using the ten metals that were analyzed for both dissolved and total fractions and that have guideline

values (Al, Cd, Cr, Co, Cu, Mn, Mo, Ni, Pb and Zn). The WQI is a tool that can be used to compare the water quality of two or more sites using the following categories (CCME 2001);

- "Excellent" (CCME WQI 95-100). Water quality is protected with a virtual absence of threat or impairment. Conditions are very close to natural or pristine levels.
- "Good" (CCME WQI 80-94). Water quality is protected with only a minor degree of threat or impairment. Conditions rarely depart from natural or desirable levels.
- "Fair" (CCME WQI 65-79). Water quality is usually protected but occasionally threatened or impaired. Conditions sometimes depart from natural or desirable levels.
- "Marginal" (CCME WQI 45-64). Water quality is frequently threatened or impaired. Conditions often depart from natural or desirable levels.
- "Poor" (CCME WQI 0-44). Water quality is almost always threatened or impaired. Conditions usually depart from natural or desirable levels.

There is also a smaller dataset for dissolved metals collected from 2006 to present. For this set of data, analyses included the following:

- Definition of baseline chemistry using box and whisker plots. For each plot, the lower line represents the 25th percentile, the middle line represents the 50th percentile (median), and the upper line represents the 75th percentile of the data. The whiskers define the maximum and minimum observed values that were within 1.5X the interquartile range (distance between the 25th and 75th percentile). Values outside the whiskers are defined as outliers. Only the highest or lowest outliers were plotted for each boxplot. Box and whisker plots using data percentiles were used to define baseline chemistry because they are non-parametric and so make no assumptions regarding data structure, are resistant to the effect of outliers, and provide clear outlier-cutoff values. For comparison, mean values were also included in each figure and table.
- An examination of the relationship between flow rate, turbidity and dissolved concentration.
- Comparison to guideline values, where applicable (Table 3-4). As with the other categories, the CCME guidelines for "The Protection of Aquatic Life" were used for comparison (CCME 2012). For determination of CCME guideline values for Cu, Cd, Ni and Pb, an average hardness of 178 mg/L CaCO3 was used for all calculations. BC guideline values (BCMOE 2012) were used for Mn and Co.

3.2.4 Organic Compounds of Potential Concern

This dataset includes a variety of organic compounds that are susceptible to long-range transport and subsequent deposition in arctic or alpine environments. The Peel River above Fort McPherson monitoring program includes the analyses of water and suspended sediment for human-made pollutants such as pesticides, herbicides and polycyclic biphenyls (PCBs). Polycyclic aromatic hydrocarbons (PAHs) which have both natural and human sources are also measured in the water and suspended sediment of the Peel River above Fort McPherson. The organic compounds were compared to guideline values, where possible.

As part of the Peel River Transboundary Monitoring Program, both surface and centrifugate water are analyzed for organic compounds/chemicals. The centrifugate water, which is surface water that has had the suspended sediments removed, was collected with a centrifuge. The centrifuge separates the suspended sediment from the river water, and provides two types of samples:

1) Centrifugate water samples (sediment–free surface water)

2) Suspended sediment samples (see below)

3.3 SUSPENDED SEDIMENT QUALITY - PEEL RIVER ABOVE FORT MCPHERSON

Environment Canada and Aboriginal Affairs and Northern Development Canada's (AANDC) monitoring programs also provide information regarding the levels of metals and organic compounds that are found in the suspended sediment of the Peel River above Fort McPherson.

Suspended sediment is collected with a centrifuge. The centrifuge is a large mechanical sampler that separates the river's surface water from the suspended sediment. This is important because the water and suspended sediments of the Peel River can have very different chemistry. Suspended sediments are a good medium to look for organic compounds because metals and organic compounds tend to attach to these particles.

Where possible, results were compared to the CCME guidelines for the protection of aquatic life. Since suspended sediment guidelines do not exist, comparisons were made to the CCME bottom sediment guidelines

3.4 WATER QUALITY - PEEL RIVER WATERSHED

Surface water quality samples were collected from 15 monitoring sites throughout the Peel River Watershed between 1999 and 2005. The dataset contains information on the concentration of routine water chemistry variables: physical parameters and major ion as well as nutrients and trace (total and dissolved) metals. Data below detection limit (BDL) were common, and were assumed to be equal to the reported detection limits. For some parameters, multiple detection limits, differing by an order of magnitude, were reported (e.g., Cd and Ag). The raw dataset contains duplicates and triplicates for some sites for the same date. Triplicates and duplicates were reduced by calculating and using the average of the values (Appendix E; Table E-1).

The dataset was checked by calculating charge balance. It is assumed that in an aquatic environment the positive and negative charges of the various analytes will be in balance. This can be checked by summing the milliequivalents (ie charges) for both the cations and anions. If the chemical analyses are accurate, then the sum of the positive charges (cations) and negative charges (anions) should be zero. If they are not zero, then the analyses have been inaccurate for one or more analytes. It is considered that a precision of ±10% is acceptable. However, the charge balance error was outside of a 10% threshold in 16 of 66 major ion analyses, which indicated an unacceptable accuracy for one or more parameters. However, because there was no possibility of re-analyzing the samples, the dataset remained uncorrected for further manipulation. The reduced dataset was further used to calculate a number of measurements including; median, average values and associated standard deviations for each site in the Peel River watershed. Pearson's correlation coefficients were calculated for selected parameters.

Due to the limited number of samples per station (usually < 5), it was decided to use averages and standard deviations for plotting, rather than producing box plots. Average values were also used to create pie charts to illustrate the dominant major ions for each site. Therefore, major differences observed in the watershed are generally based on the comparison of the average values calculated between sites.

The analytes were compared with *Canadian Drinking Water Quality Guidelines* (CDWQ, Health Canada 2008) using Maximum Acceptable Concentrations (MAC) and Aesthetic Objectives (AO). *Canadian Council of Ministries of the Environment Guidelines for the Protection of the Freshwater Aquatic Life* (CCME, 2012) *and British Columbia Guidelines* (BCMOE 2012) were also used (Table 3-4).

4.0 Results

4.1 FLOW - PEEL RIVER ABOVE FORT MCPHERSON

Flow in the Peel River above Fort McPherson is marked by considerable seasonality (Figure 4-1). There is a relatively long period of 'baseflow' that occurs during the approximately seven to eight months of winter, considered here to be between approximately October 15th (Julian Day 288/289) and April 30th (Julian Day 120/121) when flow rates are generally well below 300 m^3/s (Figure 4-1). Though somewhat arbitrary, the cutoff of 300 m^3/s for baseflow was chosen because that is the maximum flow rate at which turbidity remains low (Figure 4-1). Once flows increase beyond this value, turbidity increases and water chemistry changes considerably.

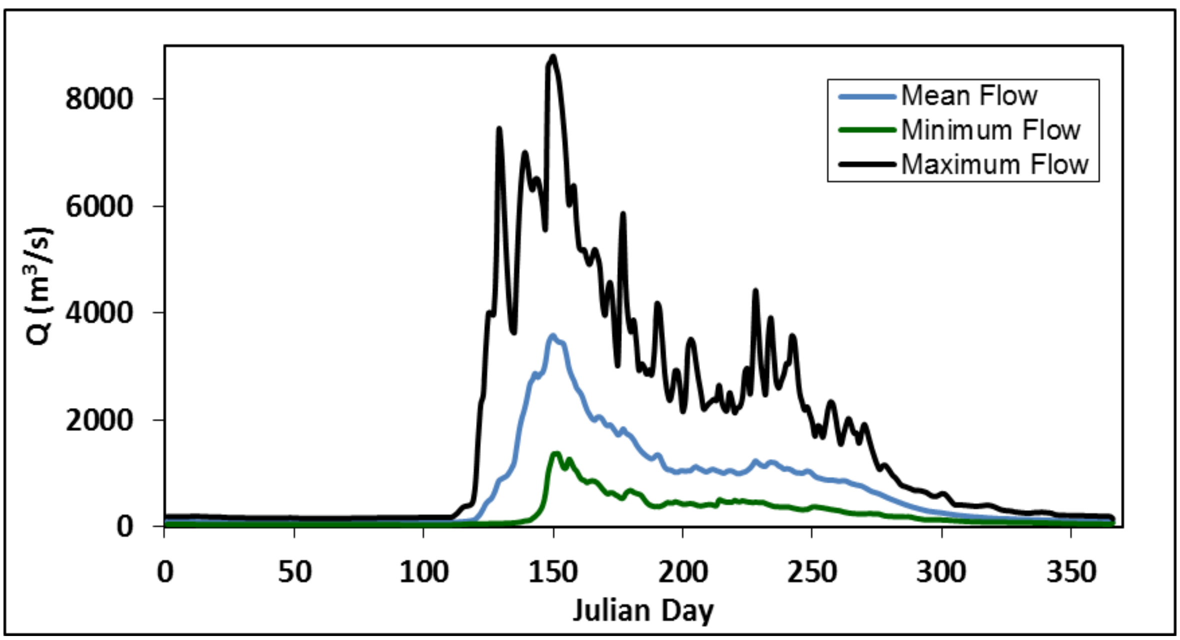


Figure 4-1: Seasonal Flow Dynamics in the Peel River above Fort McPherson

Minimum flow rates occur in March and April, with April 1st (Julian Day 91/92) being the median date for minimum flow over the period of record (Figures 4-1 and 4-2). After the period of minimum flow, there is a slow increase over a period of weeks until a flow rate of 200 to 300 m^3/s is reached. Over the period of record, the median date for the first day with flow rates over 300 m^3/s is May 9/10(Julian Day 129/131; Figures 4-1 and 4-2). This is followed by the spring freshet, which due to the mountainous terrain, continuous permafrost, and relatively sparse wetlands, is an abrupt event (Figure 4-1). On average, flow rates increase from

<300 m^3/s to over 1,000 m^3/s in four to five days, with the median first day over 1,000 m^3/s being May 14th (Julian Day 134/135; Figure 4-2). Annual peak freshet flows occur from one to two weeks later, with the median date being May 23rd (Julian Day 143/144; Figure 4-2). Over the period of record, freshet and peak flow rates have almost always occurred during May, though occasionally they have begun in April and ended in June (Appendix D; Table D-1). To accommodate the variability in onset and duration of freshet, it was considered that the spring freshet occurred between approximately April 15th and June 30th when flow rates were >300 m^3/s. This somewhat arbitrary designation includes declining freshet flows that occur in June. After freshet peak flow, flow rates are variable with some large spikes in response to rain events, but gradually decreasing through the summer and fall until baseflow once again occurs (Figure 4-1). It was considered that the first day of the 'summer recession' occurred on July 1st (Julian Day 212/213) and lasted approximately until the end of October (Julian Day 304/305). The median first day for flow under 300 m^3/s is October 22nd (Julian Day 295/296; Figure 4-2).

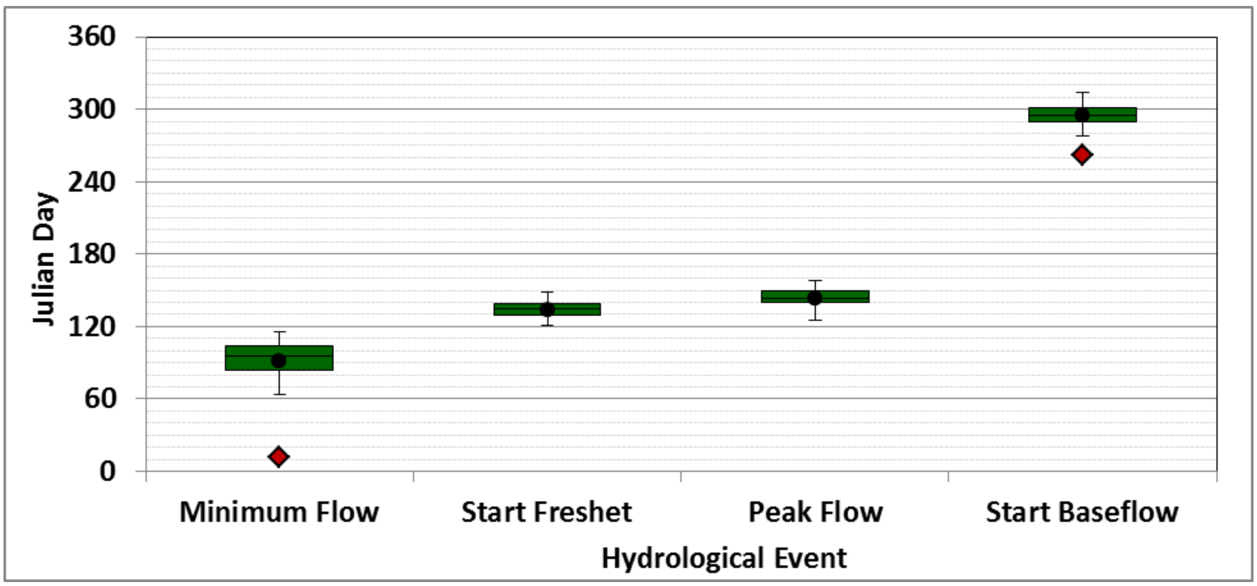


Figure 4-2: Event Dates for the Hydrological Cycle in the Peel River above Fort McPherson

'Minimum Flow' is the day on which the lowest yearly flow is recorded. The spring freshet starts when the flow rate increases to above 1000 m^3/s. 'Peak Flow' is the day on which the highest freshet flows are recorded. 'Start of Winter Baseflow' occurs when flows decrease to below 300 m^3/s.

Over the period of record, there has been no significant trend for the Julian day on which minimum flow occurs, freshet begins or maximum freshet flow rates occur (Table 4-1). There has, however, been a marginally significant increase in the date on which baseflow begins in the fall (Table 4-1). The later date for the start of baseflow is consistent with the trend towards increasing seasonal baseflow (see below).

There is also considerable year to year variability in flow rates. Annual peak freshet flow rates below 2000 m^3/s and over 8000 m^3/s have been recorded (Figure 4-1). The highest peak flow rates apparently occur shortly after the peak spring flows (Figure 4-1), which perhaps indicates heavy spring runoff compounded by heavy spring rains.

No significant trends in annual mean flow, or total annual flow for both the entire 40 years of record, and over the last decade (Table 4-1: Appendix D; Figure D-1 and D-2) were observed for the Peel River above Fort McPherson. The lack of trends indicates that the total amount/volume of water flowing in the Peel River (above Fort McPherson) is the same now as it was 40 years ago, and suggests that overall the hydrological cycle has not changed over the period of record.

Table 4-1: Mann-Kendall Trends Statistics for the "Peel River above Fort McPherson"

Flow Category	1970-2010		2001-2010	
	p-value	Significance	p-value	Significance
Mean Annual Flow	0.122	NS	0.601	NS
Total Annual Flow	0.116	NS	0.601	NS
Maximum Daily Flow	0.861	NS	0.216	NS
Minimum Daily Flow	< 0.0001	*** (+)	0.484	NS
Baseflow[1]	< 0.0001	*** (+)	1.000	NS
Freshet[1]	0.361	NS	0.484	NS
Recession[1]	0.917	NS	0.727	NS
January	< 0.0001	*** (+)	0.601	NS
February	< 0.0001	*** (+)	0.727	NS
March	< 0.0001	*** (+)	0.484	NS
April	< 0.0001	*** (+)	1.000	NS
May	0.559	NS	0.291	NS
June	0.003	** (-)	0.216	NS
July	0.486	NS	1.000	NS
August	0.385	NS	0.601	NS
September	0.428	NS	0.862	NS
October	0.025	* (+)	1.000	NS
November	0.007	* (+)	0.727	NS
December	< 0.0001	*** (+)	0.601	NS
Date of Annual Minimum	0.089	NS		

Table 4-1: Mann-Kendall Trends Statistics for the "Peel River above Fort McPherson"

Flow Category	1970-2010		2001-2010	
	p-value	Significance	p-value	Significance
Flow				
Date of First Day Above 1000 m^3/s	0.100	NS		
Date of Peak Freshet Flow	0.064	NS		
Date of First Day Below 300 m^3/s	0.006	* (+)		

[1] Baseflow: ~October 15 to ~April 30, and/or flow <300m^3/s, Freshet: ~April 15 to June 30, and flow >1000 m^3/s, Summer Recession: July 1 to ~October 31, and flow >300 m^3/s

P-value: <0.05 = Marginally Significant (*), <0.005 = Moderately Significant (**), <0.0001 = Highly Significant (***)

However, there has been a highly significant ($p < 0.0001$) positive trend in the minimum daily flow rate in the period 1970 to 2010 (Table 4-1: Figure 4-3: Appendix D; Figure D-3). It is apparent that the minimum volume of water flowing under the ice in winter has increased; in the period from 1970 to 1975, the annual minimum flow rate was approximately 50 m^3/s, while over the past five years the minimum annual flow rate has been measured at approximately 100 m^3/s (Figure 4-3).

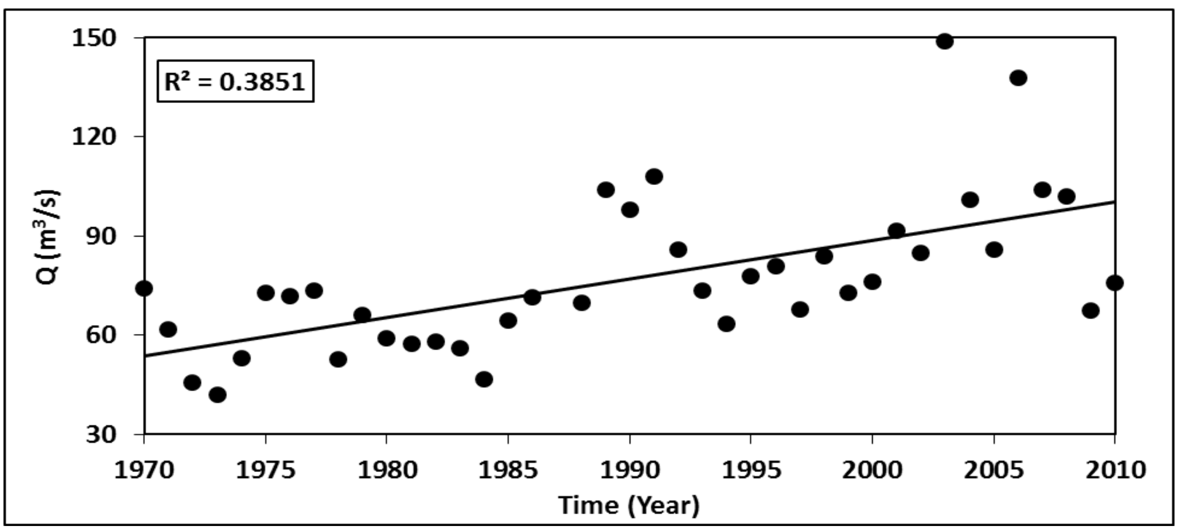


Figure 4-3: Daily Minimum Streamflow (Peel River above Fort McPherson; 1970-2010)

There has also been a highly significant ($p<0.0001$) increase in mean winter baseflow rate over the past 40 years (Figure 4-4; Table 4-1), which includes the date of minimum flow rate discussed above. In the period from 1970 to 1975, baseflow averaged approximately 75 m^3/s, while over the period 2005 to 2010, average baseflow was approximately 150 m^3/s (Figure 4-4). Consistent with the increasing trend in baseflow, there have also been highly significant ($p<0.0001$) increases in mean monthly flow rates in the Peel River above Fort McPherson from December to April over the period of record (Table 4-1). These results suggest that groundwater and/or shallow subsurface flow[1] have increased in the watershed during the winter baseflow period and confirm a fundamental alteration in the seasonal timing of the hydrological cycle.

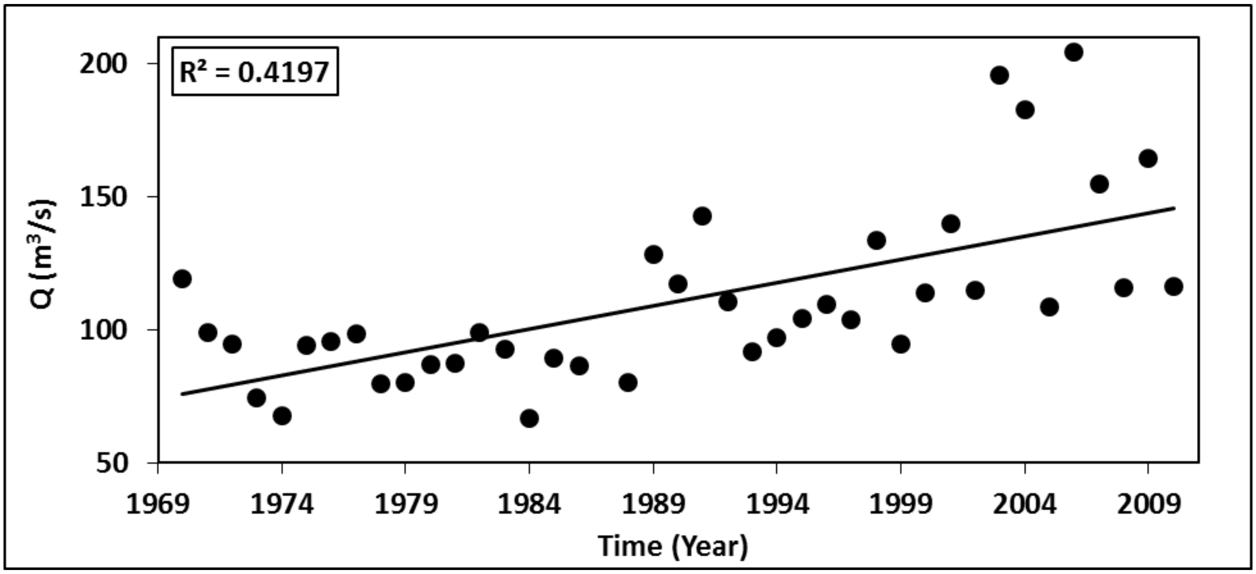


Figure 4-4: Mean Winter Baseflow (Peel River above Fort McPherson; 1970-2010)

In contrast to the increases seen in winter baseflow, there has been no significant alteration in flow rates during spring freshet, or during the summer recession flow period (Appendix D; Figures D5 and D6: Table 4-1), either over the period of record, or over the past 10 years. However, there has been a moderately significant ($p<0.003$) decrease in flow during June, which is the month immediately following the month of annual maximal flow (May; Table 4-1). A possible explanation for declining June flows is that degrading permafrost results in greater snowmelt and rainfall infiltration to the ground. This process may be producing longer pathways to the stream channel which is distributing snowmelt and rainfall amounts over a longer duration, thereby potentially resulting in lower peak flows (Pers. Comm. R. Janowicz, 2015). The degrading permafrost may explain both the lower flows in June and the higher base flows in the winter.

[1] Shallow subsurface flow refers to water moving above the permafrost table prior to complete ground freezing in the winter.

Above Fort McPherson, in the Peel River, there has been no significant increase in the maximum daily flow (Table 4-1; Appendix D, Figure D-7). Variability in flow rates during the spring freshet and summer recession periods have also not increased noticeably (Appendix D, Figures D-5 and D-6). This suggests that the frequency and occurrence of extreme events such as intense summer rainstorms, precipitous spring freshet melting events, and/or unusually large snowpack have not increased within the Peel River watershed. Consistent with this is the fact that the Q_{10} (which represents high flows) for the last decade is identical to the Q_{10} calculated for the period 1970-2010 (Figure 4-5).

In contrast, variability in minimum baseflow rates has been relatively large over the past 10 years (Figures 4-3 and 4-4), and this has been mirrored by an increase in the Q_{90} (which represents low flows) over the last decade versus the period of record (Figure 4-5). It is apparent that variability in flow rates in the winter has increased and that winter baseflow conditions have become less predictable.

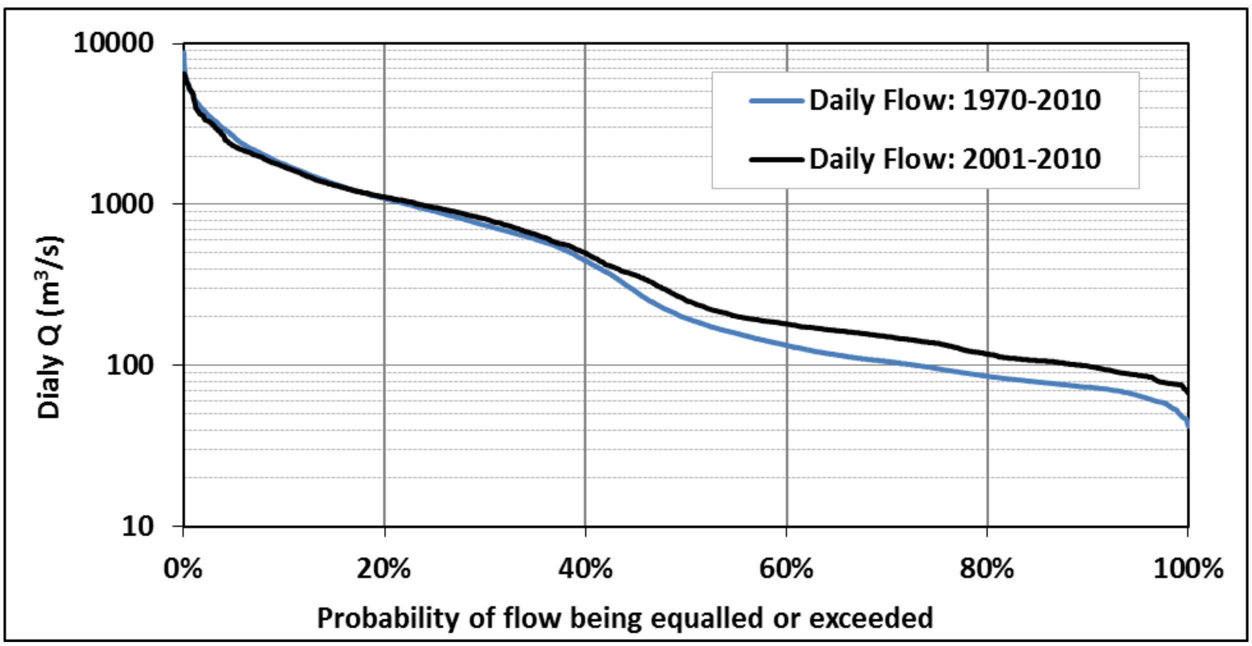


Figure 4-5: Flow Duration Curve for Peel River above Fort McPherson

The results of the hydrological flow and trends analysis suggests that, over the past 40 years, the Peel River (above Fort McPherson) has not experienced significant changes in the total amount of water flowing in the river but the predictability and seasonal distribution of flow has changed. There has been an increase in winter baseflow over the period of record, and a corresponding decrease in flow during June (late spring freshet). Flow rates during the baseflow period have also increased in variability, such that there are larger year-to-year differences in baseflow. These results suggest that new hydrological flowpaths may have developed in association with warming permafrost (Kokelj and Burns, 2005).

4.2 SURFACE WATER QUALITY - PEEL RIVER ABOVE FORT MCPHERSON

Water quality samples have been collected from the Peel River (above Fort McPherson). The water sampling program, operated by Environment Canada since 1960, has produced the largest and longest set of water chemistry data for the Peel River. Analysis of the data is separated into four parts; Routine Water Chemistry Variables, Dissolved and Total Trace Metals, Nutrients, and Organic Compounds of Potential Concern. Analysis is variable for each section because of different types and amount of available data.

4.2.1 Routine Water Chemistry Analytes

The routine water chemistry variables include; turbidity, pH and conductivity, the cations: calcium, magnesium, sodium and potassium, and the anions: chloride, total alkalinity and sulphate. These are the variables that are at the highest concentration and therefore define the hardness, buffering capacity and ionic character of the water within the Peel River. The concentration of the major ions within the Peel River can be considered to be the result of mechanical and chemical weathering, runoff flow, and groundwater flow within the larger watershed.

4.2.1.1 Turbidity and Total Suspended Solids

There are almost 45 years of turbidity and total suspended solids (TSS) data (Appendix C) collected from the Peel River above Fort McPherson (Figure 2-1). Turbidity is positively correlated to TSS (R^2 = 0.79), so for the purposes of this report, turbidity is the variable used to describe the characteristics of suspended material within the Peel River. It is expected that the major contributor to turbidity in the Peel River is the presence of inorganic clay, silt and sand particles suspended within the water column arising from both resuspension of sediments within the Peel River and the mechanical weathering of upland watershed materials. Considering the mountainous terrain and the relatively sparse vegetation within much of the watershed, the amount of mechanical weathering is likely considerable. Within the Peel River, there is a strong positive log/log relationship between flow rate and turbidity (Figure 4-6). As flow increases, the amount of entrained particulate matter also increases. At flow rates below 300 m^3/s, turbidity is consistently less than 10 NTU, and often measured at less than 1 NTU (Figure B-64; Table 4-2). Once flow rates increase further, turbidity begins to increase exponentially (Figure B-64). Over the period of record, the highest recorded turbidity has been measured at over 1,300 NTU at a flow rate of just over 5,000 m^3/s (Figure 4-6; Table 4-2). The seasonal and yearly rhythm of flow within the Peel River, and the correlation between flow rate and turbidity, is of critical importance because the interplay between these two variables defines seasonal water chemistry within the Peel River for both major ions and trace metals.

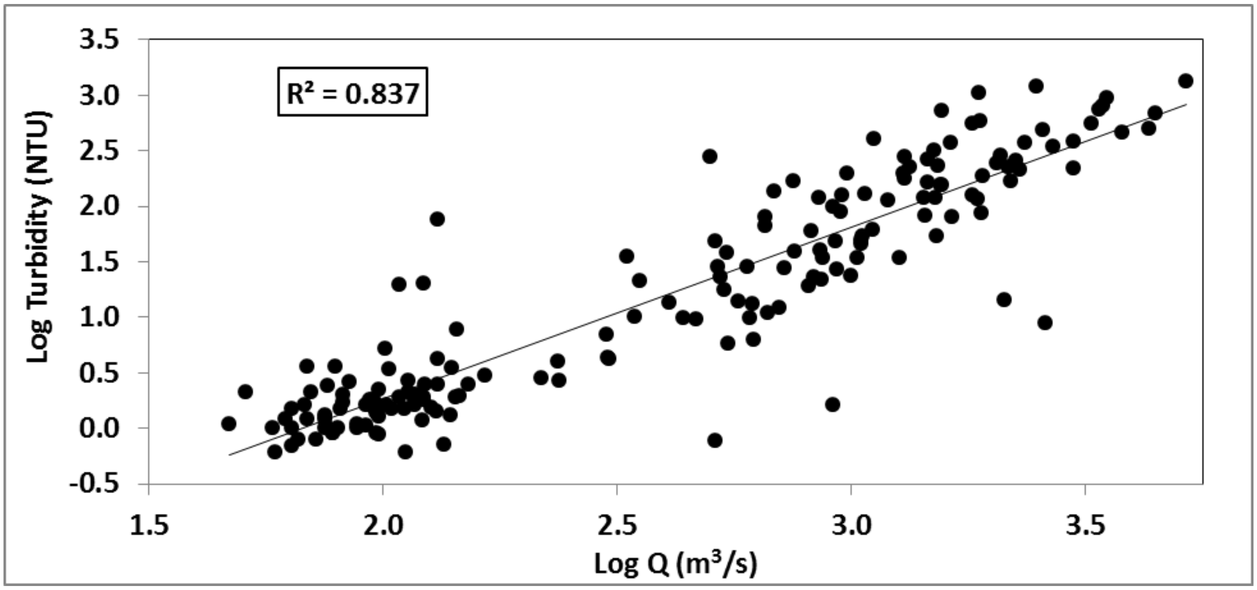


Figure 4-6: The Relationship between Turbidity and Flow Rate (Peel River above Fort McPherson)

Because turbidity responds strongly to flow, there is a yearly seasonal trend in turbidity (Figure B-65), with a peak during the spring freshet (Figure 4-7). Plotting turbidity from 1989 to 2010 indicates the extreme seasonal variability that is observable over time, and also indicates considerable yearly variability (Figure B-65). In some years peak turbidity levels barely reach 200 NTU, while in other years turbidity exceeds 800 NTU (Figure B-65). During the winter baseflow period, turbidity is consistently less than 10 NTU and usually less than 1 NTU. At the onset of the spring freshet, turbidity increases and it is during this time that the highest turbidity levels have been recorded (Figure 4-7). Over the summer recession period, turbidity levels decline, particularly when flow rates fall to less than 1000 m^3/s. However, during the recession, turbidity levels are the most variable (Table 4-2) and can reach levels comparable to the spring freshet (Figure 4-7), likely after heavy summer rainfall events when flow rates can increase sharply.

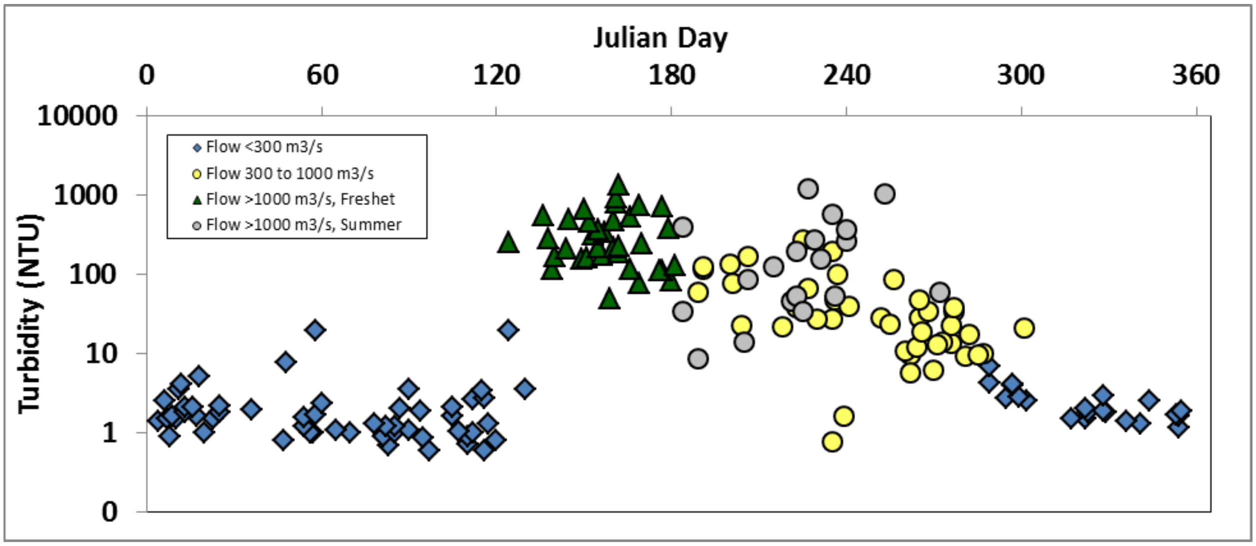


Figure 4-7: The Relationship between Season, Flow & Turbidity (Peel River above Fort McPherson; 19889-2010)

Definition of baseline conditions for turbidity is difficult because of the correlation of turbidity with flow, and because of the large variability in flow rate through seasonal and yearly cycles (Figure 4-1). However, baseline conditions can be described for seasonal periods with the understanding of the inherent uncertainty in the definition of baseline due to the considerable variability within any seasonal period (Table 4-2). The Coefficient of Variation (CV) for turbidity reflects this variability; the CV values for turbidity are greater than for all major ions. There is also a relatively large difference between the median and mean turbidity values (Tables 4-2 & 4-3 & 4-5); the median is considerably less in all three periods. This indicates the presence of 'anomalous' or 'rare' high turbidity values in all seasons.

Within the period of record, turbidity values vary from 0.6 NTU to 1340 NTU (Table 4-2). The median winter baseflow turbidity in the Peel River above Fort McPherson is 1.7 NTU, 236 NTU for spring freshet, and 38 NTU for the summer recession (Figure 4-8: Table 4-2). Upper cutoff values are 3.6 NTU for winter baseflow, 947 NTU for spring freshet, and 264 for summer recession (Figure 4-8: Table 4-2). Levels of turbidity above these cutoff values occur within each season (defined as values above 'Max' in Table 4-2), and indicate unusual conditions within the Peel River and/or sampling error, though any such determination, as discussed, should be made with caution (Table 4-2). Statistical analysis indicates that the differences in turbidity between the three seasons are highly significant ($p<0.0001$; Figure 4-8; Table 4-3).

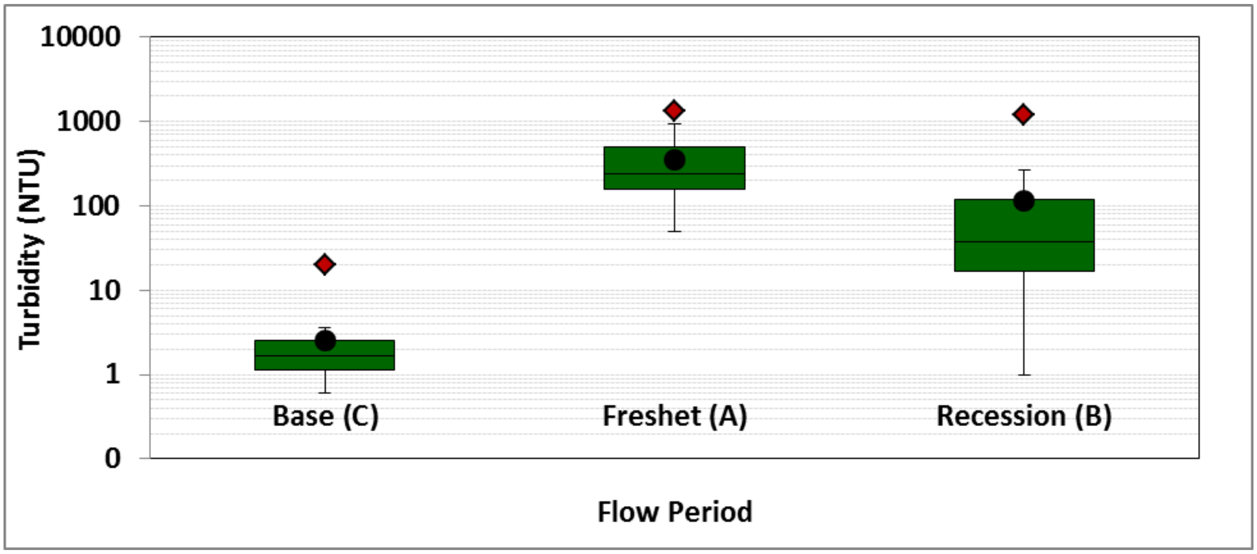


Figure 4-8: Baseline Conditions for Turbidity (Peel River above Fort McPherson).

The (letters) indicate significance categories

Table 4-2: Peel River above Fort McPherson (1960-2010) Baseline Water Chemistry (mg/L) for Routine Variables

Analyte	Season	N[1]	BDL	Min	Low	25%	50%	75%	High	Max	Mean	STD	CV
Conductivity	Baseflow	85	0	210	280	350	390	414	500	520	378	28	7
	Freshet	38	0	103	103	190	240	262	345	345	234	50	21
	Recession	66	0	135	205	290	338	379	512	512	336	64	19
pH	Baseflow	77	0	7.5	7.5	7.8	7.9	8.0	8.2	8.4	7.9	0.2	3
	Freshet	34	0	6.7	7.4	7.7	7.9	8.0	8.2	8.2	7.8	0.3	4
	Recession	61	0	7.5	7.8	8.0	8.1	8.2	8.5	8.6	8.1	0.2	2
Turbidity	Baseflow	76	0	0.6	0.6	1.2	1.7	2.6	3.6	20	2.5	3.2	128
	Freshet	36	0	50	50	160	236	494	942	1340	354	285	81
	Recession	61	0	1.0	1.0	17	38	119	264	1210	116	219	189
Total Alkalinity	Baseflow	76	0	98	130	143	150	155	163	174	146	14	10
	Freshet	32	0	52	52	75	82	93	117	117	82	14	17
	Recession	57	0	88	88	105	117	124	136	136	115	12	10
Dissolved Calcium	Baseflow	81	0	37	46	51	54	57	63	63	53	5	9
	Freshet	34	0	22	22	29	32	35	43	43	32	5	16
	Recession	66	0	25	31	41	46	50	58	58	45	6	13

Table 4-2: Peel River above Fort McPherson (1960-2010) Baseline Water Chemistry (mg/L) for Routine Variables

Analyte	Season	N[1]	BDL	Min	Low	25%	50%	75%	High	Max	Mean	STD	CV
Dissolved Magnesium	Baseflow	81	0	9.6	14	16	17	18	20	20	17	1.9	11
	Freshet	33	0	5.8	5.8	7.8	9.4	11	14	14	9.4	2.3	24
	Recession	61	0	7.8	9.9	13	15	16	21	21	15	2.3	15
Dissolved Sodium	Baseflow	81	0	3.9	3.9	4.8	5.1	5.4	6.3	10.6	5.4	1.2	22
	Freshet	34	0	1.8	1.8	2.4	2.7	3.2	4.3	6.7	2.9	1.0	34
	Recession	66	0	2.5	2.5	3.8	4.5	5.1	6.5	12.5	4.6	1.4	30
Dissolved Potassium	Baseflow	81	0	0.40	0.40	0.50	0.53	0.60	0.75	1.19	0.58	0.14	24
	Freshet	34	0	0.25	0.40	0.56	0.63	0.74	0.92	1.11	0.66	0.14	21
	Recession	66	0	0.25	0.40	0.50	0.54	0.60	0.75	1.02	0.56	0.13	23
Dissolved Sulphate	Baseflow	80	0	32	32	48	54	66	89	89	57	13	23
	Freshet	34	0	18	18	29	38	47	61	78	40	13	33
	Recession	67	0	21	21	43	57	72	100	100	58	19	33
Dissolved Chloride	Baseflow	80	0	2.3	2.3	3.4	3.7	4.2	5.0	12.0	4.0	1.6	40
	Freshet	34	0	0.8	0.8	1.0	1.3	1.6	2.2	7.6	1.5	1.1	73
	Recession	67	0	1.0	1.0	1.5	1.8	2.1	2.9	3.7	1.8	0.5	28

1. N= number of samples; BDL = number of samples Below Detection Limit; Min = the lowest recorded value; Low = the lower limit of baseline chemistry beyond which the data is considered an outlier; 25% = the 25th percentile of the data; 50%= the median of the data; 75% = the 75th percentile of the data; High = the upper limit of baseline chemistry beyond which the data is considered an outlier; Max = the highest recorded value; Mean = the average of the data; STD = standard deviation; CV = coefficient of variation (STD/Mean)

Table 4-3: Statistical Summary for Seasonal Differences of Routine Variables (1960-2010)

Analyte	Season	Mean	Median	P-value	Range[1]
Conductivity	Baseflow	378	390	<0.0001	A
	Freshet	234	240		C
	Recession	336	338		B
pH	Baseflow	7.9	7.9	<0.0001	B
	Freshet	7.8	7.9		B
	Recession	8.1	8.1		A
Turbidity	Baseflow	2.5	1.7	<0.0001	C
	Freshet	354	236		A
	Recession	116	38		B
Dissolved Calcium	Baseflow	53	54	<0.0001	A
	Freshet	32	32		C
	Recession	45	46		B

Table 4-3: Statistical Summary for Seasonal Differences of Routine Variables (1960-2010)

Analyte	Season	Mean	Median	P-value	Range[1]
Dissolved Magnesium	Baseflow	17	17	<0.0001	A
	Freshet	9.4	9.4		C
	Recession	15	15		B
Dissolved Sodium	Baseflow	5.4	5.1	<0.0001	A
	Freshet	2.9	2.7		C
	Recession	4.6	4.5		B
Dissolved Potassium	Baseflow	0.58	0.53	0.0003	B
	Freshet	0.66	0.63		A
	Recession	0.56	0.54		B
Dissolved Sulphate	Baseflow	57	54	<0.0001	A
	Freshet	40	38		B
	Recession	58	57		A
Dissolved Chloride	Baseflow	4.0	3.7	<0.0001	A
	Freshet	1.5	1.3		C
	Recession	1.8	1.8		B
Total Alkalinity	Baseflow	146	150	<0.0001	A
	Freshet	82	82		C
	Recession	115	117		B

[1] Range = Significance categories. Different letters indicate the flow periods are significantly different.

Because of the significant increases in flow during winter baseflow, and because of the significant reductions in flow during the beginning of the summer recession in June (Table 4-1), it is reasonable to expect that significant trends in turbidity might also have occurred over the period of record.

Trends analysis, however, indicates that there have been no trends in turbidity (either increasing or decreasing) for either the spring freshet or the summer recession, and that there has been only a marginally significant positive trend in turbidity during winter baseflow (Table 4-4). The increasing trend in winter baseflow, however, is not an important consideration in the overall chemistry of the Peel River, because the turbidity levels during the winter baseflow period are relatively low, and the small observed increases in turbidity are not likely to alter the chemistry of other analytes.

Table 4-4: Peel River above Fort McPherson (1960-2010) Trends Analysis for Routine Variables										
Analyte	**Season**	**N[1]**	**1979-2010 P-value**	**Direction**	**Comparison-wise Significance**	**Experiment-wise Significance**	**2001-2010 P-value**	**Direction**	**Comparison-wise Significance**	**Experiment-wise Significance**
Conductivity	Baseflow	29	0.151		NS	NS	0.038	+	*	NS
	Recession	30	0.021	+	*	NS	0.142		NS	NS
pH	Baseflow	26	0.076		NS	NS	---		---	---
	Recession	30	0.017	+	*	NS	0.126		NS	NS
Turbidity	Baseflow	27	0.026	+	*	NS	---		---	---
	Freshet	21	0.225		NS	NS	0.024	-	*	NS
	Recession	30	0.058		NS	NS	0.174		NS	NS
Dissolved Calcium	Baseflow	27	<0.0001	+18%	***	***	0.542		NS	NS
	Freshet	19	0.0095	+16%	*	NS	0.054		NS	NS
	Recession	30	<0.001	+21%	***	**	0.265		NS	NS
Dissolved Magnesium	Baseflow	27	<0.001	+19%	***	**	0.301		NS	NS
	Freshet	19	0.0016	+50%	**	*	0.076		NS	NS
	Recession	30	0.0011	+23%	**	*	0.142		NS	NS
Dissolved Sodium	Baseflow	27	0.015	+	*	NS	0.377		NS	NS
	Recession	30	0.056		NS	NS	0.054		NS	NS
Dissolved Potassium	Baseflow	27	0.265		NS	NS	0.417		NS	NS
	Recession	30	0.071		NS	NS	0.464		NS	NS
Total Alkalinity	Baseflow	25	0.264		NS	NS	---		---	---
	Recession	29	0.440		NS	NS	0.542		NS	NS
Dissolved Sulphate	Baseflow	27	<0.0001	+47%	***	***	0.377		NS	NS
	Freshet	19	0.0025	+75%	**	*	0.301		NS	NS
	Recession	30	<0.0001	+77%	***	***	0.237		NS	NS
Dissolved Chloride	Baseflow	27	0.164		NS	NS	0.377		NS	NS
	Recession	30	0.123		NS	NS	0.36		NS	NS

Comparison	*	<0.05	Experiment	*	<0.005
	**	<0.005		**	<0.001
	***	<0.001		***	<0.0001

4.2.1.2 Routine Water Quality Analytes

As mentioned above, the interplay between season, turbidity and surface and groundwater flow within the Peel River also profoundly affects the chemistry of all major ions. Calcium is the dominant cation within the Peel River watershed (Table 4-2) and is appropriate to use as an example to illustrate the interaction between season, turbidity, flow and ionic concentration.

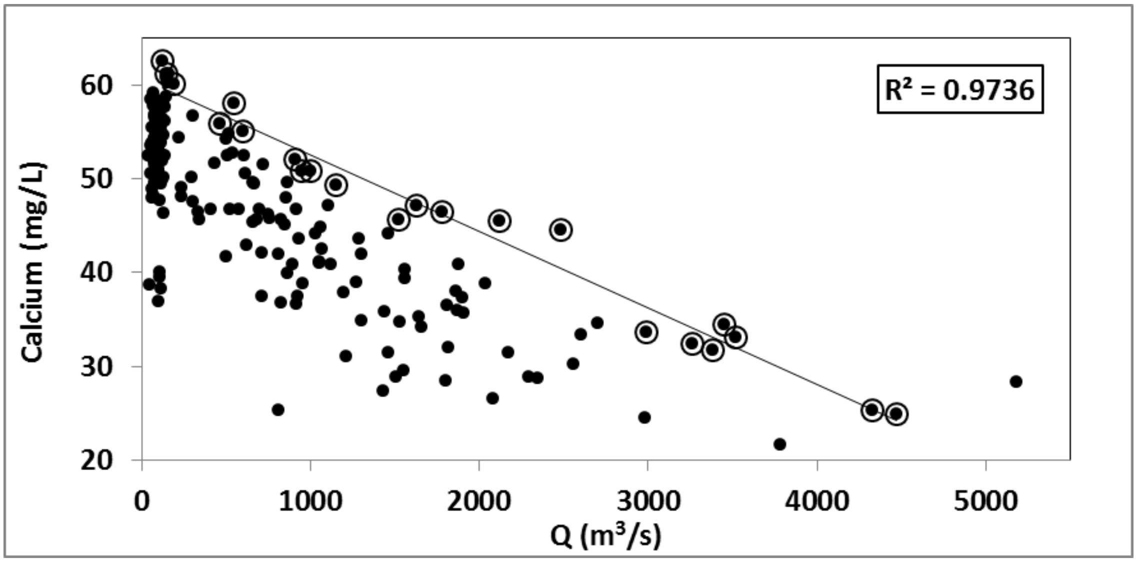


Figure 4-9: The Relationship between Flow and Dissolved Calcium Concentration

The open circles indicate the data points used in the linear regression to define maximum concentration.

The concentration of calcium within the Peel River is variable, with values ranging from a low of 22 mg/L and a high of 63 mg/L (Table 4-2). Through the period of record, the overall variability has resulted in a coefficient of variation (standard deviation/mean) of 20% for estimation of calcium concentration (Table 4-5). Variability of the other major variables is comparable, with the notable exceptions for pH which varies little, and turbidity, which exhibits extreme variability over the period of record (Table 4-5). The consistency of pH values and variability of turbidity are not surprising given: 1) the high buffering capacity within the watershed that stabilizes pH; and 2) the variability in flow that affects turbidity. The concordance of median and mean values, however, is surprising. Water-chemistry data often exhibit non-normal distributions, with occasional high values skewing mean values upwards. This is observed for turbidity but not for any of the other routine variables (Table 4-5).

Table 4-5: Peel River above Fort McPherson Comparison of Mean and for Median Values for the Routine Water Quality Variables

Analyte	Median	Mean	Standard Deviation	Coefficient of Variation
Conductivity	345	334	79	24
pH	8.0	7.9	0.2	3
Turbidity	14	116	225	194
Total Alkalinity	124	123	28	23
Dissolved Calcium	48	46	9.5	20
Dissolved Magnesium	16	15	3.5	24
Dissolved Sodium	4.8	4.6	1.5	33
Dissolved Potassium	0.54	0.59	0.14	24
Dissolved Sulphate	53	54	17	31
Dissolved Chloride	2.3	2.7	1.7	60

In contrast to turbidity, there is a decrease in the concentration of dissolved calcium (Figure 4-9) with increasing flow. This suggests that the main source of dissolved calcium in the Peel River above Fort McPherson is from chemical weathering in the watershed. That is, calcium dissolves into runoff as precipitation occurs and percolates through the watershed soils, then enters the river through surface and/or groundwater flow. During periods of very high flow, the rate of dissolution appears to decrease. During periods of low flow, the rate of dissolution increases or the relative contribution of groundwater to total flow increases. The same relationship holds for conductivity, magnesium, sulphate, chloride, and total alkalinity (Figures B-68 to 83; Table 4-3).

The relationship between flow and calcium concentration, however, is not so much related to the mean calcium concentration for any given flow rate, but rather to the maximum concentration for any given flow rate (Figure 4-9). As the flow rate increases, the maximum calcium concentration decreases in a linear relationship. At lower flow rates, the concentration is variable and can range from high to low values, but at higher flow rates the highest recorded calcium concentrations progressively decrease (Figure 4-9). The form of this relationship indicates that the calcium concentration is not so much altered by turbidity, but by an interaction between the flow itself and chemical weathering processes. The relationship is not as obvious at flow rates less than 1000 m^3/s and more particularly so at flow rates less than 300 m^3/s (Figure B-66). At the lower flow rates, calcium concentrations vary from less than 40 mg/L to over 60 mg/L (Figure 4-9). The reason for this relatively large variability in calcium concentration is unclear. It might be related to year over year fluctuations in chemical weathering, alterations in groundwater interaction, or perhaps changes over time in analytical procedures. Whatever the cause, the result is that outliers in calcium concentration are at low rather than high concentration (Table 4-2). This is somewhat unusual for water-chemistry data. Magnesium, sodium, sulphate and conductivity follow the same pattern (Figures B-68 to 83). For total alkalinity and chloride, although their concentrations also decrease at increasing flow rates, there is an exponential decrease in concentration with increased flow (Figures B-68 and 70). The reasons for the slightly different relationship between flow and concentration for these two variables are unknown.

In contrast are the responses of pH and potassium to changes in flow rate (Figures B-76 and 78). Potassium concentrations increase slightly during periods of high flow, and pH is relatively stable, regardless of flow. It is perhaps expected that the pH would be relatively stable within the watershed (as mentioned above), particularly considering the relatively high buffering capacity (i.e., total alkalinity) within the Peel River, but the different response of potassium to flow indicates that the source of potassium within the watershed is fundamentally different than for the other major cations. Potassium is at a relatively low concentration (Table 4-2) and, as mentioned, increases slightly in concentration during the spring freshet (Figure B-79; Table 4-3). This suggests that the major source of potassium within the watershed is related to seasonal fluctuations in turbidity rather than flow rate and/or groundwater interactions. It appears that potassium is dominantly associated with particulate material (Table 4-3) and undergoes dissolution into the water column during periods of high turbidity/flow, rather than entering the water through chemical weathering within the watershed.

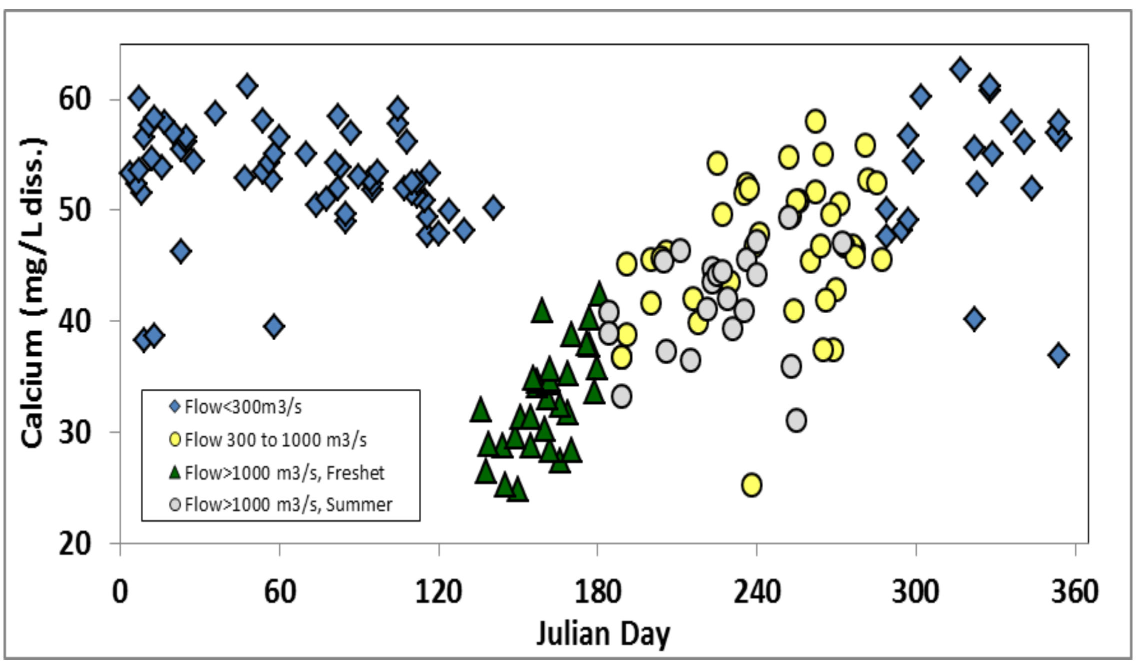


Figure 4-10: The Effect of Season and Flow Rate on Calcium Concentration

Not unexpectedly, there are consistent and significant alterations in calcium concentration on a seasonal basis (Figure 4-10 and 4-11; Table 4-3). Concentrations are relatively high during winter baseflow and drop precipitously at the onset of spring freshet (Figure 4-10 and 4-11; Table 4-3). Once the spring freshet progresses, calcium concentrations within the Peel River begin to increase and it is noteworthy that the increases occur over time regardless of flow rates (Figures 4-10 and 4-11; Table 4-3). During the summer recession, for instance, there appears to be little difference in calcium concentration between samples taken during periods of high flow or periods of low flow (Figure 4-10 and 4-11; Table 4-3). This suggests that the decrease in calcium concentration observed at the start of the spring freshet is caused not so much by the increased flow, but by the lack of chemical weathering in early spring when the watershed material is frozen and unavailable for dissolution reactions. Once the snow and ice melt, then chemical weathering processes and groundwater interactions likely dominate and slowly increase concentrations to the winter maximum. The greatest variability in calcium concentration occurs during the summer recession, not coincidentally during the period with the greatest variability in flow rates (Figure 4-10 and 4-11; Table 4-3) and also likely the greatest amount of chemical weathering and groundwater flows.

The significant seasonal pattern observed for calcium is also observed for magnesium, sodium, chloride, total alkalinity and sulphate, but not for pH or potassium (Figures B-68 to 83; Table 4-3). This differentiation of pH and K is consistent with the separate relationship observed for flow rate. This suggests, again, that the processes that determine the level of these variables are different than for the other major ions.

Water chemistry data for the major ions is adequate for definition of baseline conditions within the lower reaches of the Peel River (Table 4-2). There is a mostly consistent yearly record of concentration for all major variables over a period of approximately 30 years, the data can be conveniently separated by season, and there appears to be relative consistency in concentration over time for most seasonal periods and for most variables (though not all, see below).

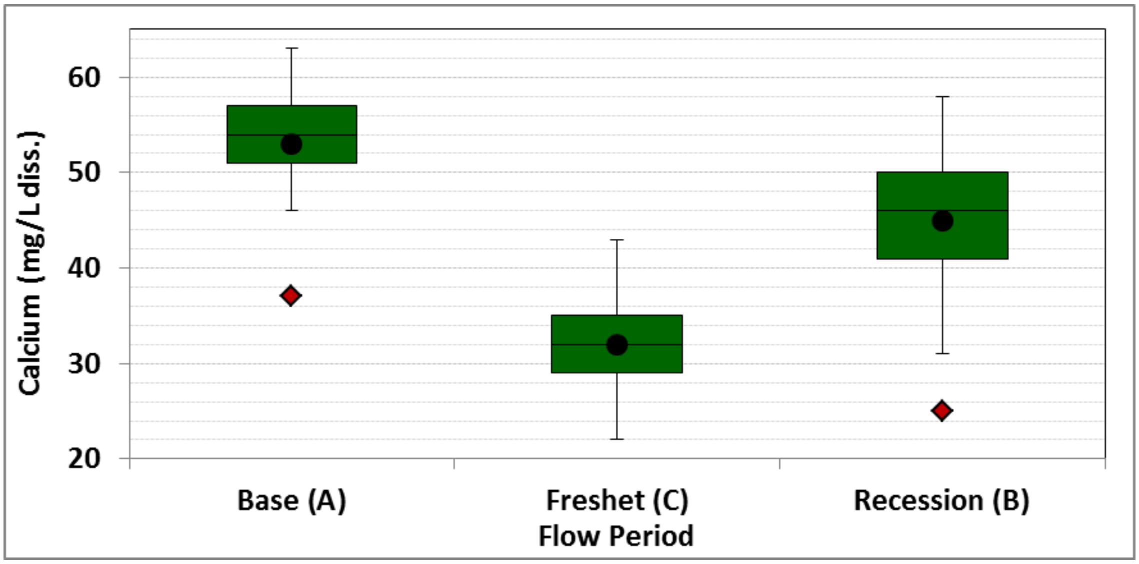


Figure 4-11: The Effect of Season and Time on Dissolved Calcium Concentration in the Peel River above Fort McPherson

The (letters) indicate significance categories (cf. Table 4-3).

For calcium, the median concentration within the lower reaches of the Peel River is 54 mg/L for winter baseflow, 32 mg/L for spring freshet, and 46 mg/L for the summer recession (Figure 4-11:Table 4-2). Upper cutoff values are 63 mg/L for winter baseflow, 43 mg/L for spring freshet, and 58 mg/L for summer recession (Figure 4-11:Table 4-2). Lower cutoff values are 46 mg/L for winter baseflow, 22 mg/L for spring freshet, 31 mg/L for summer recession. Levels of calcium above or below these cutoff values would be considered outliers, but for calcium these occur only rarely within the period of record and only for the lower cutoff values (Table 4-2). Statistical analysis indicates that the differences in calcium concentration between the three seasons are highly significant ($p<0.0001$; Figure 4-11; Table 4-3). The lowest concentrations, as discussed, occur during the spring freshet and the highest concentrations occur during winter baseflow (Figure 4-11). Identical patterns are observed for conductivity, magnesium, sodium, sulphate, chloride and total alkalinity (Table 4-3). The opposite pattern is observed for turbidity (see Section 4.2.1.1) and potassium.

Trends analysis indicates that there are moderately to highly significant positive trends over the period of record for calcium, magnesium and sulphate (Table 4-4). Moreover, over the period of record, the concentrations of these three ions have increased in all three seasonal periods; 15-20% for calcium, 20-50% for magnesium, and 50-75% for sulphate (Table 4-4). For calcium, the concentration data are variable from year-to-year, but are clearest for the winter baseflow season (Figure B-84; Figure 4-12). The significant trends suggest that the amount of chemical weathering within the watershed has consistently increased year after year, and/or that the contribution of groundwater to total flow has increased. It is expected that groundwater would have a higher concentration of the major ions due to the longer contact with watershed material and the greater opportunity for chemical weathering. Either of these processes would result in the observed increases, particularly for cations (Kokelj and Burns 2005). Burns and Kokelj suggest that the increase in concentrations of major ions (particularly during the summer) is linked to the development of large permafrost disturbances which are making immense volumes of previously frozen materials available to chemical weathering, erosion and runoff into the river (Kokelj et al., 2013; Malone et al., 2013).

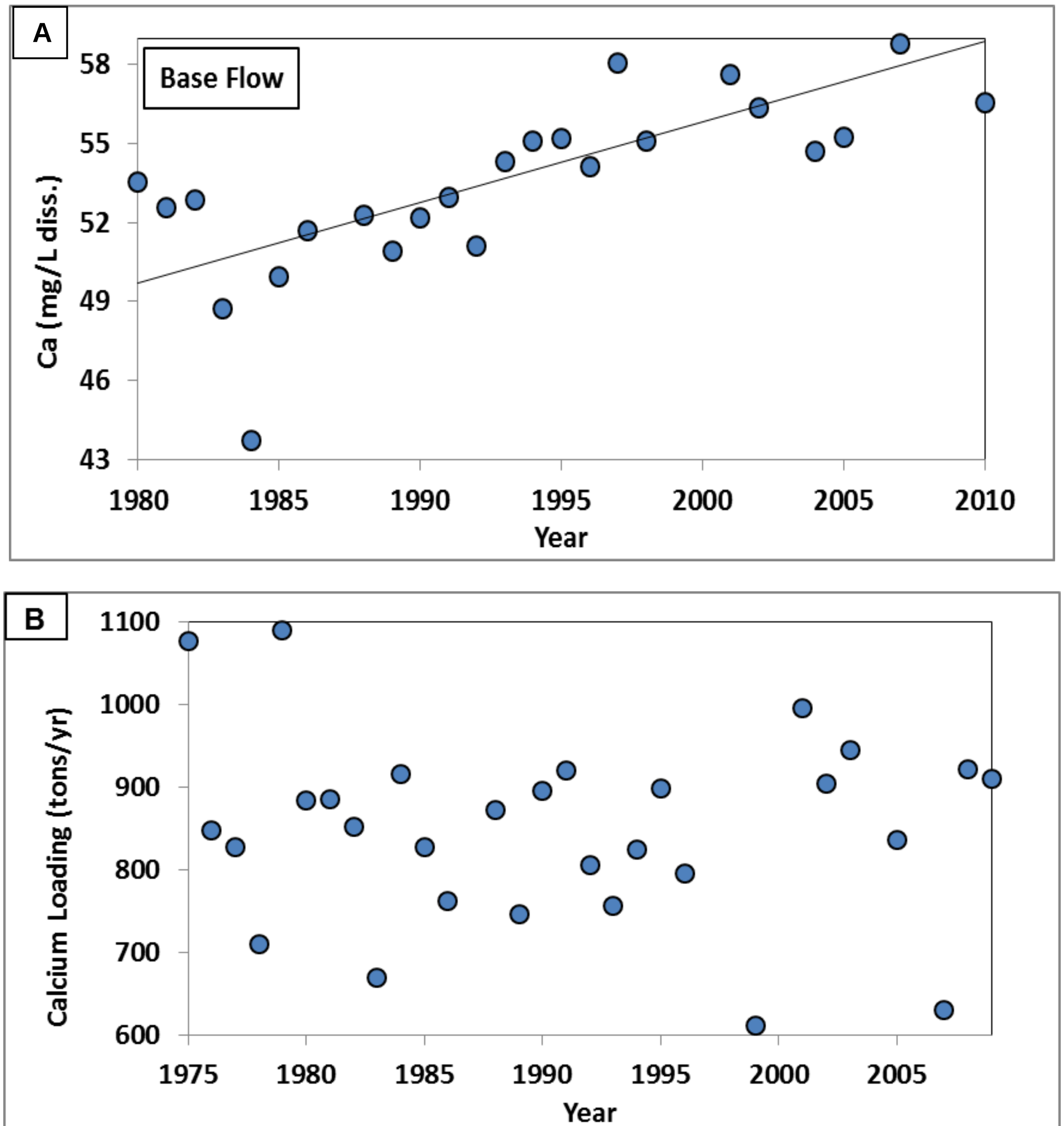


Figure 4-12: Calcium Concentration (A) and Loading Rate (B) over the Period of Record in the Peel River above Fort McPherson

Despite the significant trend in calcium concentration, there has been no observable increase in loading rate (Figure 4-12B). This is somewhat unexpected, but suggests that the considerable variability in flow from year-to-year obscures the relationship between calcium concentration and calcium loading rate.

4.2.2 Total Trace Metals

Of the fifteen total trace metals that were analyzed, all but one were positively correlated to turbidity, with correlation coefficients ranging from 0.38 for Cd, to 0.96 for Al (Appendix B: Figures B-49 to B-63). The lower correlation coefficients were generally associated with total metals that were at or near the detection limit (e.g., Cd). The data indicates that the amount of total metals increases as the amount of entrained particulates (i.e. turbidity) increases, though the combined total metal data (Figure 4-13) indicates that the correlation between turbidity and total metal concentration is not linear for many of the metals. These include Al, Be, Co, Cr, Cu, Li, Mn, Ni, Pb, and Zn (Appendix B: Figures B-49 to B-63). As turbidity increases, there is a proportionately lower increase in metal concentration. This suggests that the character of the particles change as turbidity increases. Considering that turbidity is positively correlated to flow rate (Figure 4-6), this suggests that at high flow rates and high turbidity there are fewer metals associated with the particulate fraction than at low flow rates and low turbidity. This is reasonable, considering that at relatively low flow rates it is likely that silts and clays that dominate, while at higher flow rates, proportionately larger particles (such as sand) become entrained within the water column. Smaller particles have a higher cation exchange capacity, and so would be expected to contain relatively higher metal concentrations.

Metals for which the best fit line was linear included Ba, Cd, Mo, and V. The data suggest that these metals may be at a relatively low concentration within the particulate fraction, and variability within the data perhaps obscures the relationship between particle size and metal content. Alternatively, it is possible that concentrations of these metals are independent of particle size.

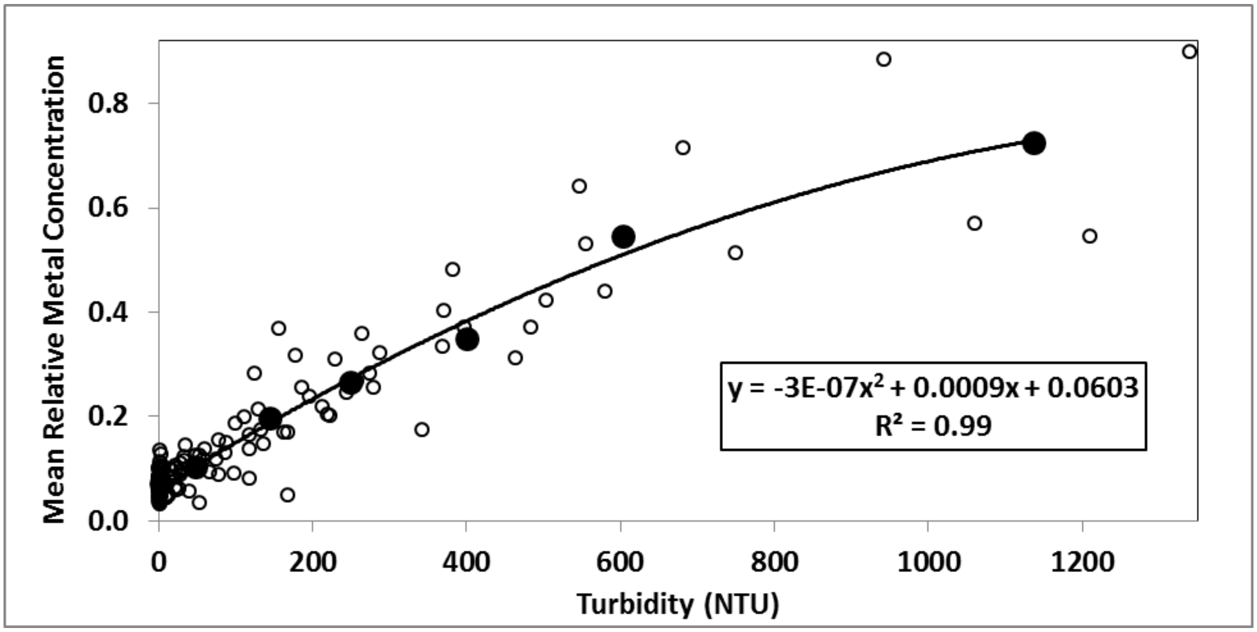


Figure 4-13: The Positive Relationship of Mean Relative Metal Concentration with Turbidity

Open circles are the combined daily metal relative concentrations. Closed circles are the 'mean relative metal concentration' data with which the regression was calculated. The relationship is polynomial, so should not be extrapolated.

The lone exception to the relationship between turbidity and concentration was total strontium, the concentration of which varied throughout the year in the same way as the major ions (Appendix B: Figure B-63). This suggests that strontium is not a major component of the inorganic particulate material entrained within the Peel River, but rather enters the river through weathering and runoff from within the watershed.

Because total metals are correlated to turbidity, it is difficult to undertake a trends analysis or to define 'baseline' chemistry for total metals. Turbidity is highly variable seasonally, so trend analysis and definition of baseline can only be calculated within narrowly defined turbidity limits. This constraint is further exacerbated by the sporadic sampling events that have been undertaken over time. Due to the remoteness of the water quality monitoring site, even for the most complete dataset there are simply not enough data for any defined level of turbidity. Perhaps the one exception is the water quality data for winter baseflow which is relatively extensive due to the length of the winter baseflow period. Trends analysis on winter baseflow indicates there have been no trends in total metal concentration for nine of the ten metals for which there were enough data (Table 4-6). The one exception was Li, which has significantly decreased over the period of record (Table 4-6). These results, however, must be interpreted with caution, because even for these ten metals, trends analysis was only undertaken for 12 or 13 years out of an 18-year record. The gaps in data compromise the validity of the trends analysis. Because the amount of particulates within the river has not changed significantly over the past 40 years (Table 4-4), it was expected that the amount of total metals have also not increased or decreased over the same time period.

Table 4-6: Peel River above Fort McPherson Trends Analysis for Total Metals in the Winter Baseflow Period

Total Metal	Season	N[1]	1993-2010 p-value	Direction	Comparison wise Significance	Experiment wise Significance
Aluminum	Baseflow	12	0.250		NS	NS
Chromium	Baseflow	13	0.271		NS	NS
Copper	Baseflow	13	0.590		NS	NS
Iron	Baseflow	13	0.737		NS	NS
Lithium	Baseflow	13	0.002	-	**	*
Manganese	Baseflow	13	0.435		NS	NS
Molybdenum	Baseflow	13	0.495		NS	NS
Nickel	Baseflow	13	0.100		NS	NS
Strontium	Baseflow	13	0.426		NS	NS
Zinc	Baseflow	12	0.947		NS	NS

[1] Out of a total of 18 years. The missing data compromises the trends analysis.

During periods of high flow, when turbidity and particulate load are considerable, total concentrations of aluminum, copper, zinc and many other metals are well above government guideline values for protection of aquatic life (Table 4-7).

Table 4-7: CCME Chronic Guideline Values for the Protection of Aquatic Life Compared to Maximum Dissolved and Total Metal Concentrations

Element	Symbol	Guideline Value[1]	Units	Max. Diss.	Max. Total
Aluminum	Al	100*	ug/L	127	19967
Cadmium	Cd	0.054[2]	ug/L	0.231	5.6
Chromium (VI)	Cr	1	ug/L	0.61	30.1
Cobalt[3]	Co	4	ug/L	0.49	14.6
Copper	Cu	3.87[2]	ug/L	4.43	38.7

Table 4-7: CCME Chronic Guideline Values for the Protection of Aquatic Life Compared to Maximum Dissolved and Total Metal Concentrations

Element	Symbol	Guideline Value[1]	Units	Max. Diss.	Max. Total
Iron	Fe	300	ug/L	259	59833
Lead	Pb	6.63[2]	ug/L	69	22.6
Manganese[3]	Mn	1400	ug/L	37	476
Molybdenum	Mo	73	ug/L	1.27	3.47
Nickel	Ni	148[2]	ug/L	5.91	49.5
Vanadium	V	6[3]	ug/L	0.5	71
Zinc	Zn	30	ug/L	16	198

[1] Long-term guideline value for the Protection of Aquatic Life. CCME values accessed at; http://st-ts.ccme.ca/?chems=all&chapters=1

[2] Calculated at a hardness of 178 mg/L as $CaCO_3$

[3] BC Guideline Value (BCMOE 2012)

* dissolved metal guideline

NOTE: Period of Record for Dissolved Metals (2006 to 2011); Period of Record for Total Metals (1983 or 1993 to 2011)

The guideline value for copper, for example, is approximately 3-4 ug/L, while the highest concentration of total copper was measured at almost 40 ug/L (Table 4-7; Figure 4-14). This is a considerable exceedance of the CCME guideline value, and most of the metals that have guideline values show similarly high concentrations of total metals. The exceptions are Mn, Mo and Ni which are all below guideline at even the highest total concentration (Table 4-7).

High metal concentrations, however, are natural to the Peel River, so that fish communities are expected to be adapted to the presence of elevated total metal concentrations. In addition, metals bound to particles in the water are considered less biologically available to the aquatic communities that inhabit the Peel River watershed; it is generally considered that it is the dissolved form of metals that can cause toxicity (e.g., Vigneault and Gopalapillai 2009). Note that most dissolved metal concentrations except Al, Cd, Cu and Pb were always below the total metal guideline. Related to this concept is the expectation that metals bound to the particulate fraction do not easily exchange with the dissolved fraction. If this is the case, then the concentration of the dissolved metal fraction should not be positively correlated to the total metal fraction, turbidity or flow rate (see Section 4.2.3 below).

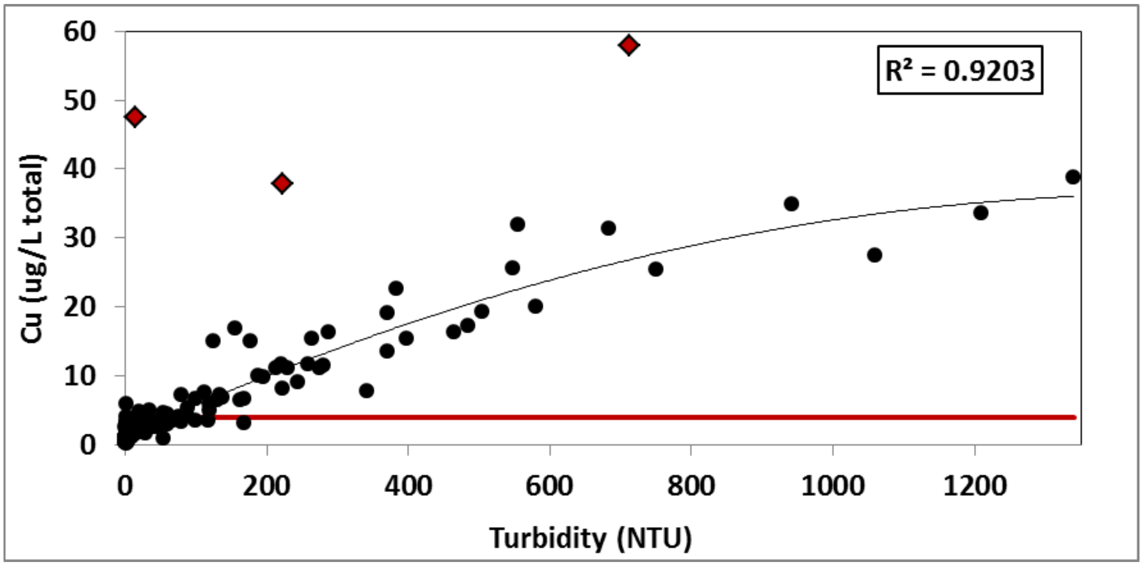


Figure 4-14: The Relationship between Turbidity and Copper at Peel River above Fort McPherson

Red data points are considered outliers for the purposes of describing the correlation. The 'outlier' samples were consistently different for almost all the metal data examined. The red line is the CCME guideline for Protection of Aquatic Life.

Water quality based on total vs dissolved metal concentration can be compared using the Water Quality Index (WQI). Calculation of the WQI (CCME 2001) indicates that water in the lower reaches of the Peel River is considered 'marginal' (60%) using total metals, but is considered 'good to excellent' (94%) using dissolved metals. For total metals, water quality is considered 'marginal', with conditions that 'often depart from natural or desirable levels', while for dissolved metals, conditions are considered to be 'very close to natural or pristine levels'. Considering the relatively pristine condition of the Peel River watershed, it is clear that total metal concentrations (or more accurately, the 'marginal' categorical ranking) do not reflect the health of the watershed.

4.2.3 Dissolved Trace Metals

The chemistry of dissolved trace metals is relatively complex. The marked seasonality of flow within the Peel River watershed potentially reduces dissolved metal concentrations through dilution with spring melt water, and the marked seasonality of turbidity and total metal concentration potentially increases dissolved concentrations through exchange between particulate and dissolved fractions. The former dynamic is identical to that observed for major ions and is considered to be caused by variation in the amount of weathering versus flow through the seasons. The latter dynamic is caused by equilibrium reactions that might occur between the dissolved and particulate trace metal fractions. The interplay between these two processes potentially creates a variety of responses, depending on the metal. These relationships are further obscured for this particular dataset because of the limited amount of dissolved metal data, and its relatively low precision.

Of the 22 dissolved metals that were analyzed, 20 showed a decreasing trend in the dissolved/total ratio as turbidity increased (Appendix B, Figures B-1 to B-44). For most metals, such as cobalt, the dissolved/total ratio decreased rapidly as turbidity increased and then continued to decrease at a lower rate at higher turbidity levels (Figure 4-15). This is the relationship that might be expected if the metals bound to the particulate fraction do not readily exchange with the dissolved fraction. The exceptions to this relationship were for B, Li and Sr where there was a negative linear correlation between turbidity and the dissolved/total ratio, and for Mo and Sb where there was no obvious relationship. For Mo and Sb, the dissolved/total ratios were approximately 1 regardless of turbidity (Appendix B, Figure B-29 and B-37), and there was little increase in total Mo as the turbidity increased (Appendix B, Figure B-58). This suggests that the particulate fraction within the lower reaches of the Peel River contains relatively low amounts of Mo (Figure E-8) and Sb (Figure E-6) and consequently almost of the molybdenum and antimony in the Peel River is in the dissolved fraction regardless of turbidity levels.

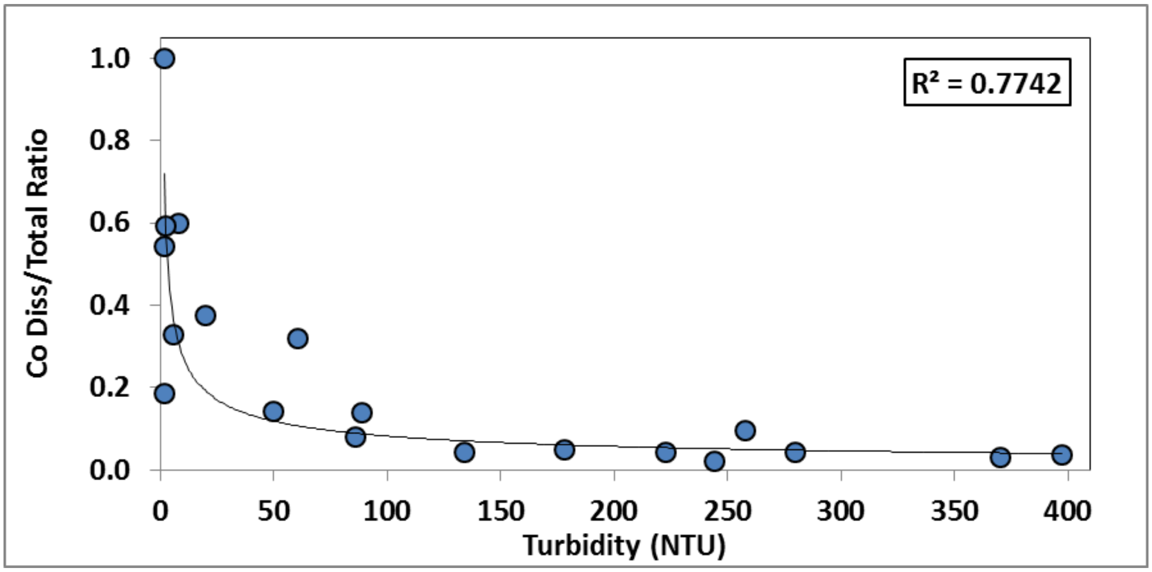


Figure 4-15: The Relationship between Turbidity and the Dissolved/Total Ratio for Cobalt at Peel River above Fort McPherson

It was expected that the dissolved/total ratio would be close to 1 at the lowest levels of turbidity, because in clear water conditions there should be almost no particulates to bind metals (eg Figure 4-15). This was observed for many, but not all metals (Appendix B: Figures B-1 to B-44). For instance, the maximum dissolved/total ratio for Al was less than 0.35 (Appendix B, Figure B-1). Other metals with low dissolved/total ratios at low turbidity were Be, Ce, Cs, Fe, Pb, and V (Appendix B: Figure B-1 to B-44). The reasons for this are unclear and more investigation is required. There were also several instances where the dissolved/total ratio was greater than 1 (which means that, on a particular sampling event, the dissolved concentration was higher than the total concentration), which can only be caused by lack of analytical precision and accuracy.

Of the 22 dissolved metals analyzed, 20 are not correlated with flow within the Peel River (Appendix B: Figure B-1 to B-44). Copper, for instance, varies consistently between 0.4 and 4 ug/L, regardless of flow rate (Figure 4-16). This suggests that there is little to no seasonality in dissolved trace metal concentration within the lower reaches of the Peel River. This is an unexpected result, because, as mentioned above, it is reasonable to consider that either concentrations fall as flow increases during freshet (as for the major ions), or concentrations rise due to equilibrium reactions between the dissolved and particulate metal fractions. However, dissolved metals have only been measured since 2006, so the dataset for dissolved metals is relatively limited. In addition, dissolved trace metal concentrations are relatively variable over time within the dataset (Table 4-6). For instance, the coefficient of variation for trace metals averages over 50%, and varies from 14 to 351% (Table 4-6). The causes of the variability are unknown, but are perhaps indicative of the difficulties inherent in measuring dissolved fractions at low concentration. The variability and lack of precision are important to recognize, however, because they perhaps obscure any subtle seasonal relationships, and ultimately affect definition of baseline conditions. It may also be important to review sampling and analytical protocols to ensure data quality.

Finally, there were no positive correlations between flow and dissolved metal concentration (Appendix B: Figure B-1 to B-44), consistent with the concept of a low rate of exchange between particulate and dissolved metal fractions. This again suggests that particulate metal fractions are not biologically available and are unlikely to cause toxicity within the watershed.

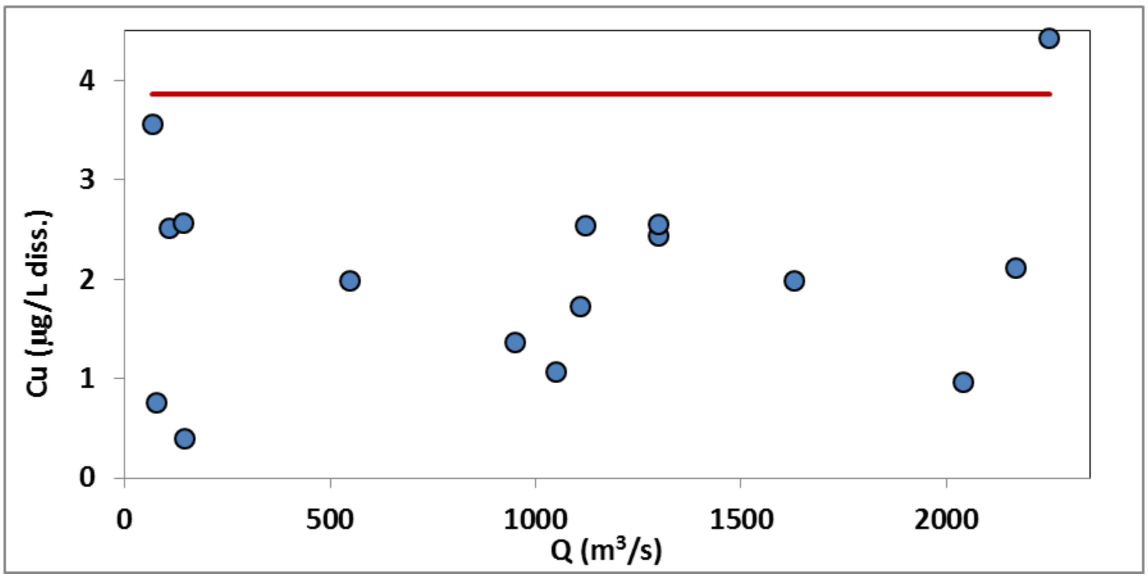


Figure 4-16: Relationship between Flow Rate and Dissolved Copper Concentration in the Peel River above Fort McPherson

The red line is the CCME chronic copper guideline value (at a hardness of 178 mg/L).

The two exceptions to the lack of correlation of flow with concentration are for dissolved barium and strontium, which were both negatively correlated to flow and were similar to the relationship found between flow and the major ions (Figure 4-9). This suggests that the major source of barium and strontium is from weathering and runoff, and that the particulate fraction in the Peel River above Fort McPherson contains relatively insoluble barium and strontium (Figure E-6). Consistent with this, the concentration of total barium is relatively constant as the turbidity increases (Appendix B, Figure B-50), and the concentration of total strontium actually decreases at increased flow rates (Appendix B, Figure B-63).

Baseline conditions for 22 dissolved trace metal concentrations have been described using box and whisker plots (Table 4-8; Appendix B, Figure B-45). The plots define the median, various data percentiles, and the upper and lower limits of baseline conditions (Table 4-8). For instance, the upper limit of dissolved metal concentration is 106 µg/L for Al, 3.56 µg/L for Cu and 7.90 µg/L for Zn (Table 4-8; Figure 4-17). The upper baseline limit is above the guideline for Al, just below the guideline for Cu and well below the guideline for Ni (Table 4-7). These three metals describe the range of upper limit values compared with CCME guidelines, but most elements are below guideline (for those with established guideline values). The exceptions are Al and Cu as noted, and also Cd and Pb.

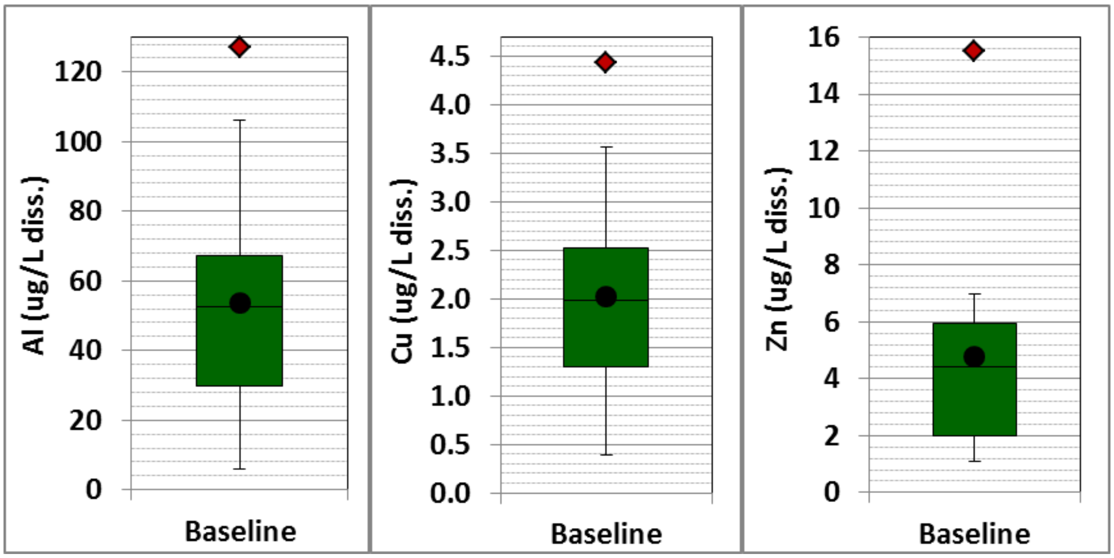


Figure 4-17: Baseline Chemistry for Dissolved Al, Cu & Zn in the Peel River above Fort McPherson

Many of the metals also contain outliers (shown as red diamonds), defined as data points greater than 1.5 times above or below the inter-quartile range (25th to 75th percentile; Figure 4-17; Table 4-8). Outliers may be real and may describe actual unusual conditions, but can also be caused by sampling error, analytical error and/or transcription errors. Outliers can seriously skew the understanding of baseline chemistry or temporal trends, particularly if means and standard deviations are used. For instance, upper limits for lead are uncertain, because of the extremely high outlier values that have been measured for dissolved Pb (Appendix B; Figure B-45). It is important to understand and define outlier-cutoff concentrations under baseline conditions, because one of the effects of development/activities is to increase variability, and defined cutoff values allow for recognition of such potential increases.

Table 4-8: Peel River above Fort McPherson Baseline Water Chemistry (µg/L) for Dissolved Trace Metals

Analyte (µg/L)	Symbol	CCME*	N	BDL**	Min	Low	25%	50%	75%	High	Max	Mean	STD	CV
Aluminum	Al	100	19	0	6	6	30	53	67	106	127	54	36	0.67
Arsenic	As	5	19	0	0.12	0.12	0.27	0.33	0.37	0.53	0.53	0.31	0.11	0.36
Boron	B	1500	19	0	6.7	6.7	8.1	9.5	12.1	15.9	15.9	10.0	2.5	0.25
Barium	Ba		19	0	42	42	56	62	79	85	85	66	14	0.22
Beryllium	Be		19	0	0.001	0.001	0.003	0.007	0.008	0.013	0.013	0.006	0.004	0.57
Cadmium	Cd	0.054	19	0	0.021	0.021	0.028	0.043	0.087	0.141	0.231	0.069	0.060	0.87
Cerium	Ce		19	0	0.007	0.007	0.067	0.125	0.148	0.263	0.263	0.116	0.074	0.64
Cobalt	Co	4	19	0	0.041	0.041	0.072	0.136	0.197	0.372	0.490	0.161	0.120	0.75
Chromium	Cr	1	19	0	0.113	0.113	0.151	0.166	0.230	0.259	0.610	0.220	0.123	0.56
Cesium	Cs		19	1	0.003	0.003	0.006	0.010	0.017	0.030	0.030	0.013	0.009	0.68
Copper	Cu	3.87	19	0	0.40	0.40	1.29	1.99	2.53	3.56	4.43	2.02	0.98	0.48
Iron	Fe	300	19	0	16	16	92	123	163	259	259	127	70	0.55
Lithium	Li		19	0	2.8	3.7	5.0	5.7	6.3	7.0	8.2	5.6	1.3	0.24
Manganese	Mn	1400	19	0	3.5	3.5	5.9	8.3	11	18	37	9.9	7.6	0.77
Molybdenum	Mo	73	19	0	0.63	0.90	0.95	1.06	1.12	1.22	1.22	1.04	0.15	0.14
Nickel	Ni	148	19	0	1.24	1.24	1.54	2.58	3.24	4.71	5.91	2.59	1.33	0.51
Lead	Pb	6.63	19	0	0.043	0.043	0.096	0.12	0.31	2.32	69	4.49	16	3.51
Rubidium	Rb		19	0	0.31	0.31	0.40	0.45	0.57	0.77	0.97	0.51	0.16	0.32
Antimony	Sb		19	0	0.14	0.14	0.18	0.21	0.26	0.29	0.58	0.23	0.09	0.40
Strontium	Sr		19	0	72	72	133	162	184	255	255	158	43	0.28
Vanadium	V		19	0	0.12	0.12	0.22	0.33	0.41	0.49	0.49	0.32	0.12	0.38
Zinc	Zn	30	19	0	1.4	1.4	2.0	4.4	5.9	7.9	16	4.8	3.9	0.82

* CCME guideline for the protection of aquatic life at a hardness of 178 mg/L $CaCO_3$
** Below Detection Limit
Shading = values exceeding CCME guideline
Min = lowest observed value in the entire dataset
Low = lowest value within 1.5 x the interquartile (25^{th} to 75^{th} %)
25% = 25^{th} percentile of the entire dataset
50% = 50^{th} percentile of the entire dataset (median)
High = highest value within 1.5 x the interquartile (25^{th} to 75^{th} %)
Max = highest observed value in the dataset
STD = Standard Deviation
CV = Coefficient of Variation (STD/Mean)

With the current set of data, it is not possible to determine if there has been an increase or decrease in dissolved metal concentrations over time. However, with continued monitoring, assessment of trends may be possible at some point in the future. This is important, because if dissolved metals increase in concentration, particularly those that are already near guideline values, they have the potential to become harm fish and other aquatic organisms within the Peel River watershed.

4.2.4 Nutrients

For the purposes of this discussion, nutrients include dissolved organic carbon (DOC), total nitrogen (TN) and total phosphorus (TP). For all three of these analytes, concentration is positively correlated to flow rate (Appendix B: Figure B85, 87 & 89) and turbidity (Appendix B: Figure B91). During periods of high flow (spring freshet and summer recession), nutrient concentrations reach their maximum levels but are highly variable (Figure 4-18). This relationship means that the nutrient concentrations increase during the spring freshet and then slowly decrease until reaching a consistent minimum during winter baseflow (Figure 4-18). The seasonal pattern is the same as that seen for turbidity and opposite to the seasonal pattern for most of the major ions (Section 4.2.1). The seasonal differences in concentration suggest that all three nutrients are associated with particulate material within the Peel River. This is perhaps expected for TN and TP, because the particulate fraction for both nutrients generally dominates. For DOC, however, the positive correlation with flow/turbidity is less easily understood, unless algal productivity increases during the summer season. However, given the complete lack of phytoplankton and chlorophyll a data, algal community structure, biomass and productivity within the Peel River are unknown at the present time.

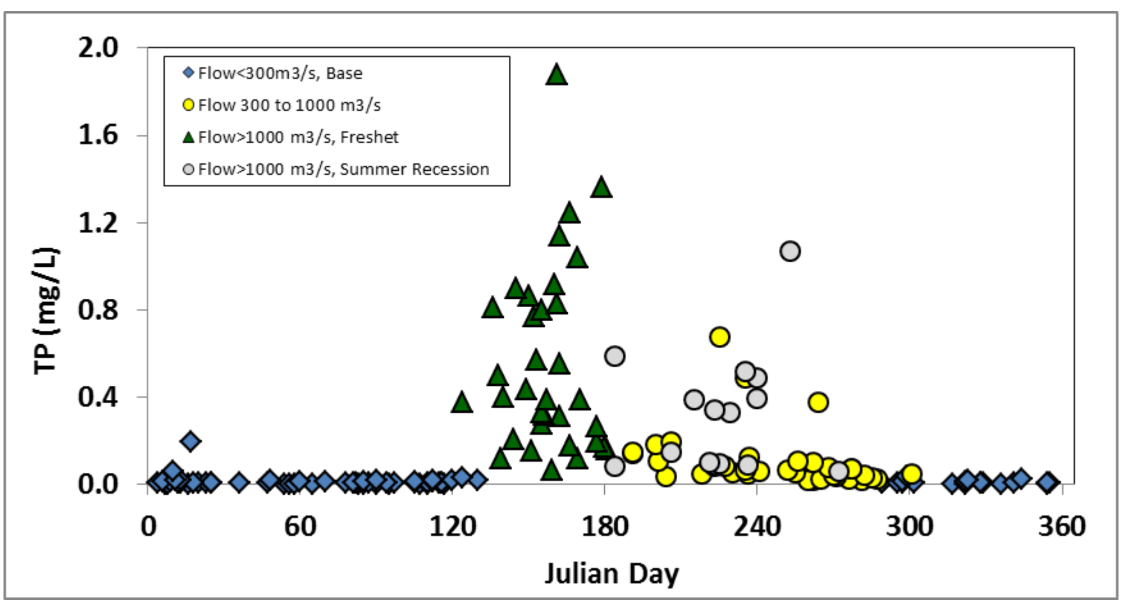


Figure 4-18: The Effect of Season and Flow Rate on Total Phosphorus Concentration

Within the period of record, concentrations vary from 0.3 mg/L to 24.6 mg/L for DOC, 0.07 to 3.71 mg/L for TN, and 2 to 1880 µg/L for TP (Table 4-9). Within any given seasonal period for the three nutrients, variability is relatively high, with CV values ranging from 39 to 122% (Table 4-9). This indicates that nutrient concentrations within the river are changeable, even within a seasonal period.

Table 4-9: Peel River above Fort McPherson Baseline Water Chemistry for Dissolved Organic Carbon (DOC), Total Nitrogen (TN) and Total Phosphorus (TP)

Analyte	Season	N	BDL	Min	Low	25%	50%	75%	High	Max	Mean	STD	CV
DOC (mg/L)	Baseflow	68	0	0.3	0.3	1.2	1.5	2.4	3.9	13.5	2.3	2.4	104
	Freshet	33	0	1.8	1.8	4.7	6.6	8.9	13.7	16.0	7.1	3.5	50
	Recession	52	0	0.8	0.8	2.5	3.4	5.1	8.6	24.6	4.3	3.4	80
Total Nitrogen (mg/L)	Baseflow	68	0	0.13	0.13	0.20	0.23	0.28	0.40	0.65	0.26	0.10	39
	Freshet	32	0	0.14	0.14	0.55	0.90	1.34	2.08	2.08	0.98	0.57	59
	Recession	51	0	0.07	0.07	0.22	0.33	0.52	0.96	3.71	0.55	0.62	113
Total Phosphorus (µg/L)	Baseflow	72	0	2	2	6	8	13	23	200	10	6	60
	Freshet	33	0	70	70	208	517	820	1360	1880	613	430	70
	Recession	50	0	20	20	49	86	185	390	1070	173	211	122

Nevertheless, the DOC, TN and TP data are sufficient for definition of baseline conditions (Table 4-9). The median baseflow nutrient concentrations within the lower reaches of the Peel River are 1.5 mg/L for DOC, 0.23 mg/L for TN, and 8 ug/L for TP (Figure 4-19: Table 4-9; Appendix B; Figure 86, 88 & 90). Median concentrations are considerably higher and more variable during spring freshet and intermediate during the summer recession (e.g., Figure 4-19). Nutrient concentrations above the defined cutoff values occur within each season (defined as values above 'High' in Table 4-9), and indicate unusual conditions within the Peel River and/or sampling error, though any such determination, as discussed, should be made with caution (Table 4-9). In contrast, there were no outliers at low concentrations, which is generally typical of most water-chemistry data.

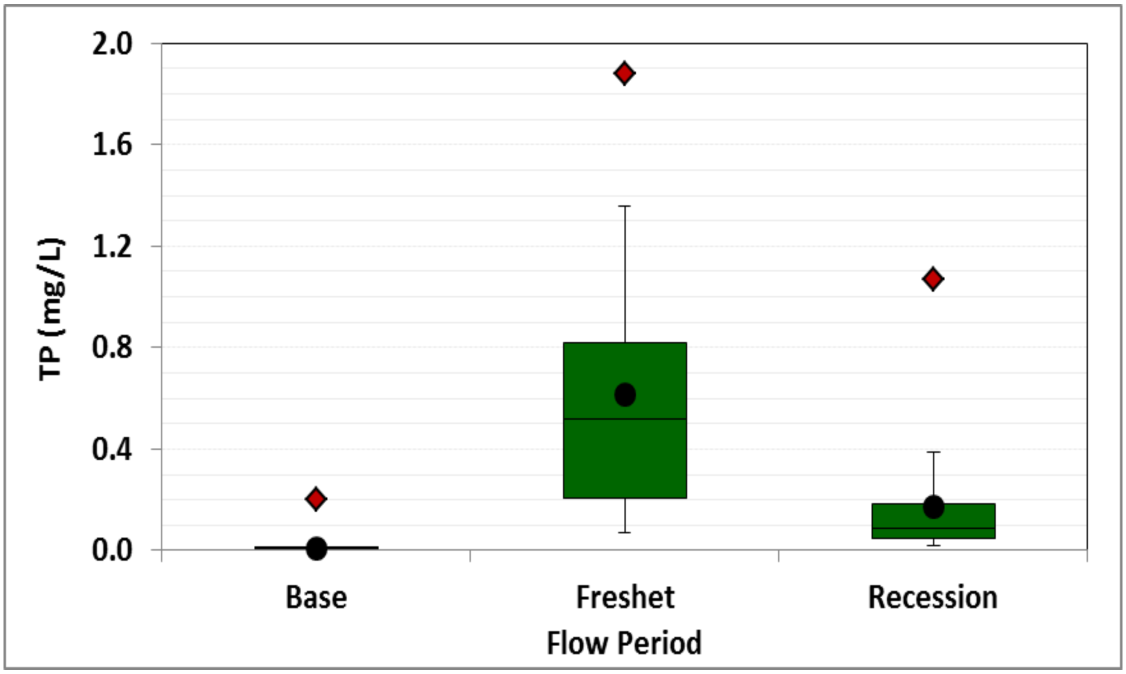


Figure 4-19: Definition of Seasonal Baseline Concentrations for Total Phosphorus

Nitrogen and/or phosphorus are considered the nutrients most often limiting primary productivity in aquatic ecosystems (Wetzel 1983). Based on TN and TP concentrations, aquatic ecosystems can be classified on the basis of their primary productivity. Water bodies are considered “oligotrophic” when TN, TP and productivity are low, “mesotrophic” when productivity is intermediate, and “eutrophic” when TN, TP and productivity are high (Wetzel 1983). Classification of water bodies within these categories has been developed, most commonly for lentic systems (e.g., Carlson 1996), but also for lotic systems such as the Peel River and its tributaries (Dodds et al. 1998).

Table 4-10: Trophic Status in Lotic Systems Related to TN and TP Concentrations		
Trophic Status	**Total Nitrogen (mg/L)**	**Total Phosphorus (µg/L)**
Oligotrophic	<0.7	<25
Mesotrophic	0.7 – 1.5	25 – 75
Eutrophic	>1.5	>75
Source: Dodds et al. 1998		

Because of the seasonal variability of the TN and TP data, trophic status within the lower reaches of the Peel River changes throughout the year. During the winter baseflow period, the Peel River can be considered oligotrophic, with even the defined high cutoff concentrations (75%) of TN and TP below the threshold of mesotrophy (Figure 4-19, Tables 4-9 and 4-10). In contrast, the Peel River would be classified as eutrophic during the spring freshet, when concentrations of TN and TP are above the threshold value for eutrophy (Figure 4-19, Tables 4-9 and 4-10). This suggests that the nutrient conditions for considerable algal productivity are present within the Peel River during the spring and summer months. However, given the turbulence and turbidity within the river, algal biomass may never actually increase to potential. If future flows decrease at some point in the future, perhaps due to climate change or hydroelectric development, then the potential for increased algal biomass within the river should be understood to exist (e.g., Bormans et al. 2004, 2005).

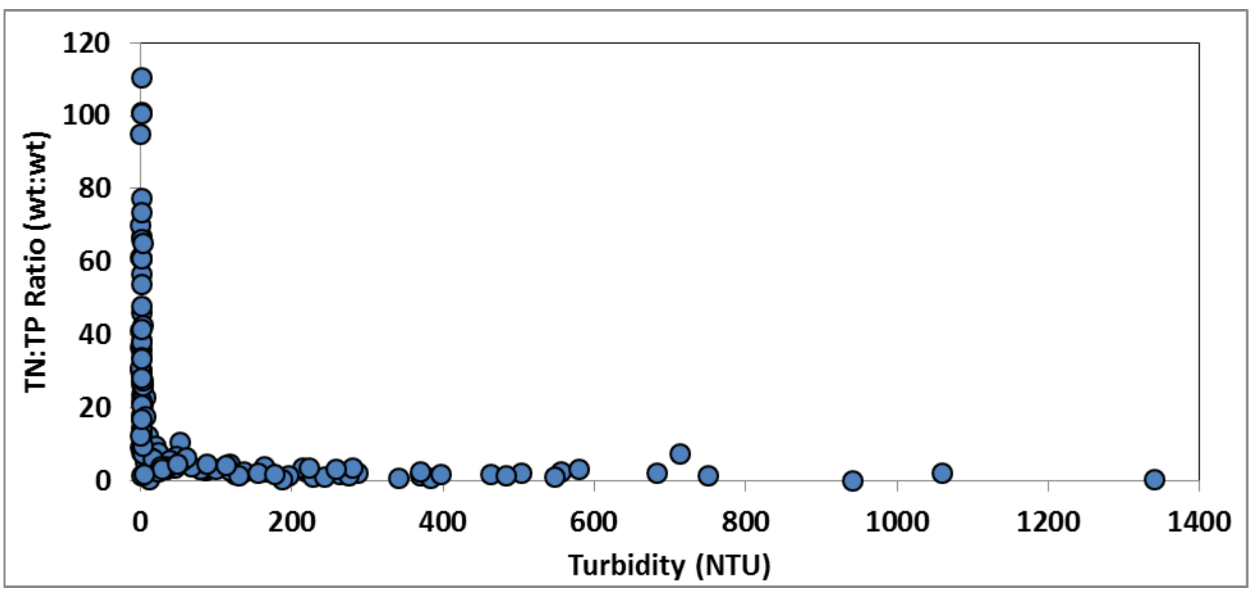


Figure 4-20: The Relationship between Turbidity and TN:TP Ratio in the Peel River above Fort McPherson

Algal community structure is partially influenced by the ratio of nitrogen to phosphorus (Elser 1999). At low TN:TP ratios, the potential for blue green algal blooms exists, while at high TN:TP ratios, blue green algae are often an insignificant component of the algal community. Increased abundance of blue green algae is of concern because of its toxicity and bloom-forming ability. While there are many factors that can influence community structure, it is considered that a TN:TP ratio less than 30 by weight (Smith 1983) increases the potential for blue green algal blooms. Within the Peel River there appears to be a marked seasonality to TN:TP ratios. During periods of high turbidity and high flow, the TN:TP ratio is consistently less than 10:1, while during periods of low turbidity and low flow the ratio increases to greater than 100:1 (Figure 4-20). The data suggest that there is disproportionate increase in Total P as flows and turbidity increase. The threshold for the change from high to low TN:TP ratio occurs at a flow rate of approximately 900 m^3/s and a turbidity of approximately 55 NTU (Figure 4-6; Figure 4-20). This flow rate occurs yearly at the threshold of the spring freshet, when flows rapidly increase from <300 m^3/s to >1000 m^3/s over a period of four or five days (Section 4.1). The seasonal alteration in TN:TP ratio suggests that the Peel River watershed is potentially nitrogen limited in the spring freshet and summer recession, during periods of high flow/turbidity, and potentially phosphorus limited in baseflow conditions during periods of low flow/turbidity.

4.3 CENTRIFUGATE WATER QUALITY AND SUSPENDED SEDIMENT QUALITY – PEEL RIVER ABOVE FORT MCPHERSON

4.3.1 Organic Compounds of Potential Concern

Organic chemicals produced by industrial society are often highly toxic and persistent in the environment. Also, many of these organic chemicals are volatile, evaporate into the atmosphere and are capable of moving large distances with prevailing winds from their source. These chemicals then tend to fall out of the atmosphere during rain or snow events, particularly in areas that are cold, such as mountains, and in northern areas such as the Yukon. The Peel River watershed, being located in a cold and mountainous northern region, is therefore vulnerable to deposition of these persistent and toxic chemicals. The monitoring conducted by Environment Canada and the Government of the Northwest Territories (formally Aboriginal Affairs and Northern Development Canada) measures the concentrations of these organic chemicals in both the water and suspended sediment of the Peel River (above Fort McPherson).

4.3.2 Pesticides and Polychlorinated Biphenyls (PCBs)

The Peel River above Fort McPherson monitoring program includes the analyses of water and suspended sediment samples for human-made pollutants such as pesticides and polychlorinated biphenyls (PCBs) (Appendix C; Tables C5, 6, 7, and 11). Where possible, water quality results were compared to the CCME guidelines for the protection of aquatic life and suspended sediment results were compared to the CCME bottom[2] sediment guidelines for the protection of aquatic life (TEL and PEL).

Since 2002, 10 Peel River water and suspended sediment samples have been analyzed for 38 different pesticides. Pesticides include chemicals such as DDT (dichloro-diphenyl-trichloroethane) and herbicides such as 2,4-D (dichlorophenoxy acetic acid). To date, none of these chemicals have been found in any of the water samples collected. However, in suspended sediment, 2,4-D was found in one sample in 2004 and PP-DDE and methoxychlor were found in one sample in 2012.

2,4-D is a herbicide commonly used to control weeds on lawns. Today, it is the third-most widely used herbicide in North America. PP-DDE is a breakdown product of DDT, a chemical that was used in North America until 1972 to control pests. DDT is still used by some tropical countries to control malaria. Methoxychlor was first developed as a replacement for DDT. It has been used to control various pests including the beetles that spread Dutch elm disease. As these chemicals are not used in the region, lab contamination or atmospheric transport is the most probable source for them.

In each instance, the concentrations of the pesticides detected in the suspended sediment samples collected from the Peel River were low. The one time, PP-DDE was detected, the value measured 6.5 ug/kg. This is slightly below the CCME aquatic life guideline (TEL; 6.75 ug/kg) that represents the value where an effect could occur. CCME guidelines do not exist for 2,4-D and methoxychlor. In general, the available data suggest that pesticide concentrations within the Peel River are very low.

Of the water samples collected from 2002-2007 (n=8), total PCBs have not been detected. However, a few individual congeners have been detected in the suspended sediment samples. A PCB congener is a single, unique chemical compound in the PCB category. Each suspended sediment sample (n=8) was analyzed for 209 different PCB congeners. The congeners are very useful because they can be measured by the laboratory at exceptionally low detection limits. The sum of the individual congeners in the eight samples of the Peel River ranged from 0.07-0.4 ppb. The maximum PCB concentration (0.4 ppb) measured in the Peel River is low and well below the recommended guideline of 34.1 ppb. Based on the laboratory report and the kinds of PCBs found, atmospheric transport is the most likely source.

4.3.3 Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic aromatic hydrocarbons (PAHs), on the other hand, have been found more often and at higher concentrations than pesticides and PCBs. This is partly because PAHs have natural sources (e.g., forest fires, natural oil seeps and gas deposits), as well as anthropogenic sources (e.g., industrial projects, urban runoff and the burning of fossil fuels).

[2] Suspended sediment quality guidelines do not exist and therefore results were compared to the CCME bottom sediment guidelines for context.

Several hydrocarbons have been detected in the water samples collected from the Peel River above Fort McPherson (2002-2007; n=10). On all occasions, the concentrations in water have been below the CCME guidelines for the protection of aquatic life.

Also from 2002 and 2007, 10 Peel River suspended sediment samples were analyzed for 19 different hydrocarbon compounds; all of which have been detected on one occasion of more. Of these 19 compounds, CCME guidelines exist for 12 (Table 4-11). Although some PAH values have exceeded the threshold effect level (TEL), all PAH results except 2-methylnaphthalene were lower than the probable effect level (PEL), at which adverse effects are predicted to occur frequently (CCME, 2001). 2-methylnapthalene was only recently added to the monitoring program. Monitoring for this compound and all PAHs will continue.

Table 4-11: CCME TEL and PEL Guideline Values for the Protection of Aquatic Life Compared with Maximum PAH Concentration (2002-2007)

PAH Compound	CCME Guideline (TEL / PEL)	Units	Range	Date of Max Conc
Acenaphthene	6.71 / 88.9	ug/kg	<10-20	August 2007
Acenaphthylene	5.87 / 128	ug/kg	<3-14	July 2007
Anthracene	46.9 / 245	ug/kg	<3-28	July 2007
Benz(a)anthracene	31.7 / 385	ug/kg	<10-88	July 2007
Benzo(a)pyrene	31.9 / 782	ug/kg	<10-82	July 2007
Chrysene	57.1 / 862	ug/kg	<10-74	July 2007
Dibenz(a,h)anthracene	6.22 / 135	ug/kg	<10-47	August 2007
Fluoranthene	111 / 2355	ug/kg	<10-146	July 2007
Fluorene	21.2 / 144	ug/kg	<10-33	July 2007
2-Methylnaphthalene	20.2/201	ug/kg	159, 330	June 2012
Naphthalene	34.6 / 391	ug/kg	30-95	July 2007
Phenanthrene	41.9 / 515	ug/kg	60-220	July 2007
Pyrene	53/875	ug/kg	10-146	July 2007

In June 2012, the analyses of alkylated PAHs were added to the monitoring program. Alkylated PAHs are the form of hydrocarbons that can have more of an impact on aquatic life than the conventional parent compounds that have been measured to date. Because these kinds of hydrocarbons can be measured at lower detection levels, several were detected in the samples that were collected in 2012. This does not mean that there are more hydrocarbons in the river now than there were before. Alkylated PAH compounds are good indicators of the kinds of hydrocarbons (and associated levels) that are in the river and will continue to be a part of the monitoring program, so that future levels can be compared to them.

4.3.4 Metals

The suspended sediment samples collected from the Peel River above Fort McPherson were also analyzed for up to twenty-eight metals. The major constituents of the entrained sediment included iron, calcium, aluminum, magnesium and potassium (Table 4-12). The relatively high potassium content is consistent with the positive relationship between potassium concentration and turbidity discussed above (Section 4.2). Average values were above the ISQG for arsenic, cadmium and zinc and individual data points were above ISQG for Cu and Cr. It is clear that metal content within watershed materials is naturally substantial.

Table 4-12: Metal Content (mg/kg) in the Suspended Sediments Collected from the Peel River Above Fort McPherson

Analyte	DL	CCME		Sample Date						Mean	STD
		PEL	ISQG	Jul-02	Jun-03	Aug-04	Jun-05	Aug-06	Jun-07		
Iron (Fe)	200			33600	27300	29600	30200	36700	29800	31200	3369
Calcium (Ca)	100			17800	19900	6200	37000	9600	18500	18167	10719
Aluminum (Al)	50			13300	9100	12300	12900	16900	11800	12717	2529
Magnesium (Mg)	10			9040	10600	4830	17200	6490	10800	9827	4304
Potassium (K)	20			2090	1440	2910	2660	3400	2400	2483	679
Barium (Ba)	5			672	525	660	1010	779	525	695	182
Manganese (Mn)	0.5			377	340	162	498	335	360	345	108
Sodium (Na)	20			190	200	300	400	300	300	282	78
Zinc (Zn)	5	315	123	149	172	138	175	186	208	171	25
Strontium (Sr)	1			54	58	61	81	73	69	66	10
Vanadium (V)	0.1			43	39	53	64	67	55	54	11
Nickel (Ni)	0.5			46	45	38	48	48	53	47	4.8
Copper (Cu)	2	197	35.7	31	34	35	32	38	39	35	3.1
Chromium (Cr)	0.2	90	37.3	34	26	30	41	34	30	32	5.3
Lead (Pb)	0.5	91.3	35	18	14	17	17	18	17	17	1.5
Cobalt (Co)	0.1			13	12	10	13	15	14	13	1.6
Arsenic (As)	0.5	17	5.9	11	13	15	12	13	13	13	1.3
Boron (B)	2			9.0	6.0	15	15	18	13	13	4.4
Titanium (Ti)	0.5			6.4	9.0	11	19	11	13	12	4.3
Molybdenum (Mo)	0.1			1.4	2.3	3.1	2.5	1.8	2.1	2.2	0.59
Selenium (Se)	0.2			0.9	1.6	1.4	1.4	1.3	1.7	1.4	0.28
Uranium (U)	0.1			1.1	1.3	1.2	1.6	1.2	1.4	1.3	0.17
Cadmium (Cd)	0.1	3.5	0.6	0.50	0.90	0.50	0.90	0.60	1.00	0.73	0.23
Beryllium (Be)	0.2			0.60	0.50	0.70	0.80	0.90	0.80	0.72	0.15
Thallium (Tl)	0.05			0.30	0.29	0.53	0.39	0.45	0.39	0.39	0.09

Table 4-12: Metal Content (mg/kg) in the Suspended Sediments Collected from the Peel River Above Fort McPherson

Analyte	DL	CCME		Sample Date						Mean	STD
		PEL	ISQG	Jul-02	Jun-03	Aug-04	Jun-05	Aug-06	Jun-07		
Tin (Sn)	0.1			<0.1	<2	<2	<2	<2	<2	BDL	---
Bismuth (Bi)	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	BDL	---
Silver (Ag)	0.1			<0.1	<0.2	<0.2	<0.2	0.2	<0.2	BDL	---

Major Constituents are Fe, Ca, Al, Mg, K

Mean > ISQG are Zn, As, Cd

High K is consistent with increased K with increased turbidity/flow

Shading = Value above the Interim Sediment Quality Guideline (ISQG)

4.4 SURFACE WATER QUALITY - PEEL RIVER WATERSHED

Water quality samples were collected from 15 monitoring sites throughout the Peel River Watershed (Sites A to O; Figure 2-1) between 1999 and 2005. Sampling effort was variable across the monitoring stations, which resulted in seasonal differences between sites and over time. The dataset contains routine variables such as pH, TSS, TDS, turbidity, conductivity, as well as major ions, nutrients and total and dissolved trace metals.

Peel River Watershed Water Quality Sampling Locations	
A	Ogilvie River above Engineer Creek
B	Ogilvie River near Mouth
C	Blackstone River near Champion Lake
D	Blackstone River near Mouth
E	Peel River above Hart River
F	Hart River near Hungry Lake
G	Peel River above Canyon Creek
H	Wind River near Mouth
I	Peel River above the Bonnet Plume River
J	Bonnet Plume River above Gillespie Creek
K	Bonnet Plume River above Mouth
L	Peel River above Snake River
M	Snake River above Mouth
N	Peel River above Caribou River
N_1	Caribou River above Mouth
O	Peel River above Fort McPherson

4.4.1 Major Water Chemistry Parameters

Within the Peel River watershed, flow rate is a major determinant of water chemistry in general, and turbidity, which is correlated to flow, exerts a major effect on total trace metal chemistry (Section 4.2). Throughout the Peel River watershed, there is considerable variability in both flow and turbidity amongst sites and sampling dates (Table 4-13). Flow rates at the Peel River above Fort McPherson vary from 77 to 1870 m^3/s amongst the various sample dates, and turbidity varies from less than 1 NTU, to over 300 NTU over the same time period (Table 4-13). Turbidity within the various tributaries is also variable, with an increase from the headwaters downstream, and with the highest values found in the Bonnet Plume and Snake rivers (Table 4-12; Figure 4-21). The Bonnet Plume River watershed consists of unconsolidated deposits (Smith et al. 2004), which are easily eroded relative to the bedrock underlying upstream tributaries. Unconsolidated deposits release significantly more suspended sediments than consolidated rock, particularly in high flow events.

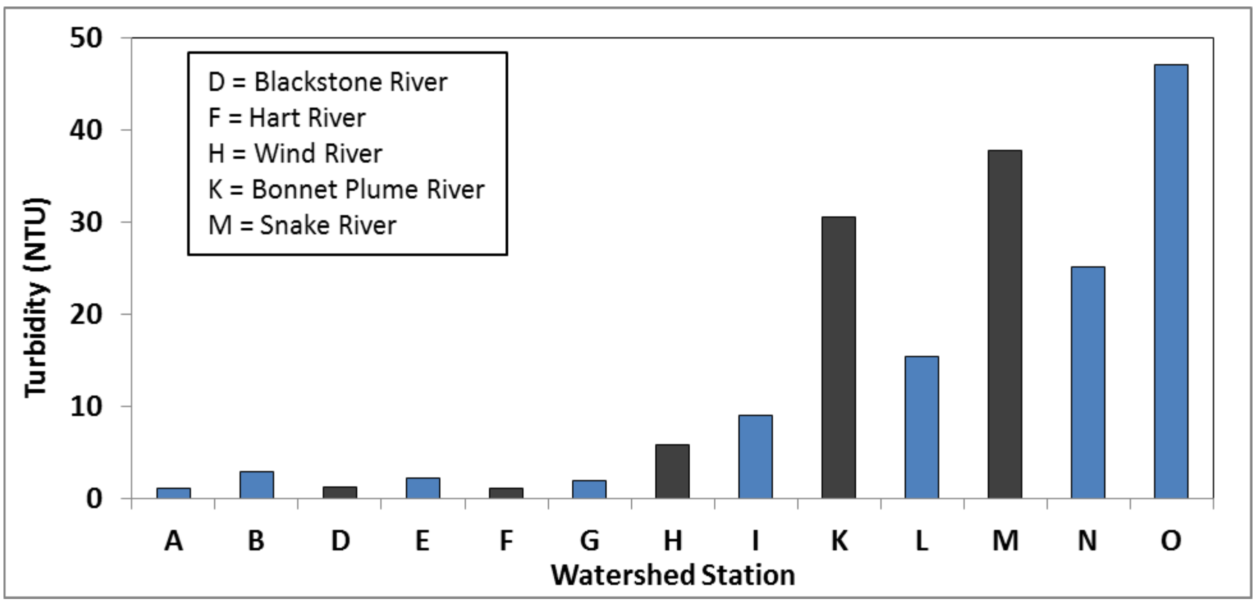


Figure 4-21: Comparison of turbidity levels throughout the Peel River Watershed on June 26, 2003 (Flow Rate at Fort McPherson on June 26, 2003 measured: 936 m^3/s)

Grey bars represent turbidity levels in the furthest downstream section of tributaries, while blue bars represent turbidity levels in the Ogilvie/Peel River mainstem. Water samples were collected on June 26, 2003 (see Table 4-12)

The variability in flow/turbidity will necessarily increase variability for many water chemistry parameters, and may ultimately obscure potential upstream/downstream relationships within the watershed. A notable exception is pH, which is consistently 8.2 from upstream to downstream (Figure E-1). Despite the variability in the other parameters, baseline water chemistry throughout the watershed has been defined, primarily through calculation of average and standard deviation (Tables 4-13, 14 and 15). There are not enough data to calculate median and cutoff values as was done for the Peel River above Fort McPherson (Site O) sampling location (Section 4.2). None of the major water chemistry parameters exceeded CCME guideline values for the protection of aquatic life, though guideline values were exceeded for some of the total and dissolved metals (Tables 4-13, 14 and 15).

Calcium (Ca), magnesium (Mg), bicarbonate (HCO_3^-;calculated from alkalinity) and sulphate (SO_4^{2-}) are the dominant ions in the Peel River watershed from upstream to downstream and in all major tributaries, with Ca and bicarbonate occurring at slightly higher concentrations (Figures 4-22 and 4-23). Other major ions, such as sodium (Na), potassium (K), and chloride (Cl), generally comprise less than 3% of the total ion concentration (Figures 4-22 and 4-23). The dominance of the Ca cation and bicarbonate anion within the Peel River and its tributaries is the result of the wide-spread prevalence of limestone and dolomite within the watershed (Figure 2-1) and the chemical weathering of these carbonate minerals (Kenyon and Whitley 2008).

Table 4-13: Turbidity (NTU) in the Peel River Watershed															
Sample Date	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**K**	**L**	**M**	**N**	**O**	**'O' Flow (m^3/s)**
9-Mar-99	0.25	0.20	0.50	0.20	0.20	0.30	0.20	0.10	0.15	0.20	0.30	0.75	127	0.90	77
29-Jul-02	7.7	5.6	4.0	0.90	5.6	12	14	64	46	167	107	331	260	174	1280
26-Jun-03	1.1	3.0	1.0	1.2	2.2	1.1	2.0	5.9	9.0	31	16	38	25	47	936
27-Aug-04		0.31		0.17	0.38	0.29	0.31	1.5	1.9	2.6	3.2	6.5	7.9	182	375
16-Jun-05														123	1870
12-Jul-05		0.27		0.18	0.28	0.67	0.55	4.8	2.9	1.6	3.0	5.3	3.5	22	842
10-Aug-05														49	680
Mean	**3.0**	**1.9**	**1.8**	**0.5**	**1.7**	**2.9**	**3.4**	**15**	**12**	**40**	**26**	**76**	**85**	**85**	**866**
STD	**4.1**	**2.4**	**1.9**	**0.5**	**2.3**	**5.1**	**6.0**	**28**	**19**	**72**	**46**	**143**	**110**	**74**	**589**
CV	**135**	**128**	**103**	**92**	**134**	**178**	**175**	**179**	**161**	**178**	**177**	**188**	**130**	**86**	**68**

Blue *values are for tributaries of the Ogilvie/Peel River, including the Blackstone (C/D), Hart (F), Wind (H), Bonnet Plume (K), and Snake (M) Rivers (See Figure 2-1 for locations). Green shading indicates outliers within the dataset.*

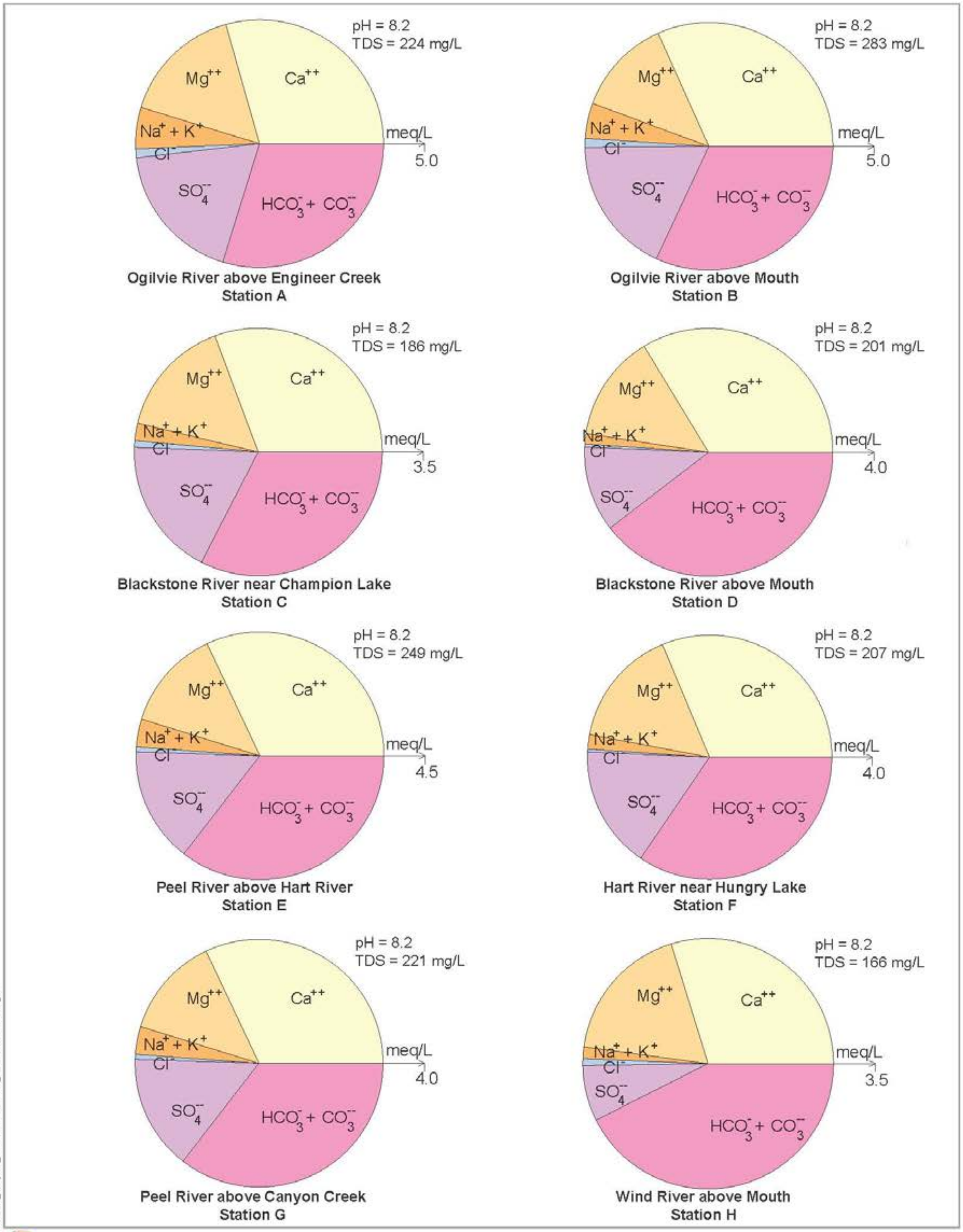


Figure 4-22: Major Ion Compositions of Major Rivers in the Peel River Watershed (Stations A-H)

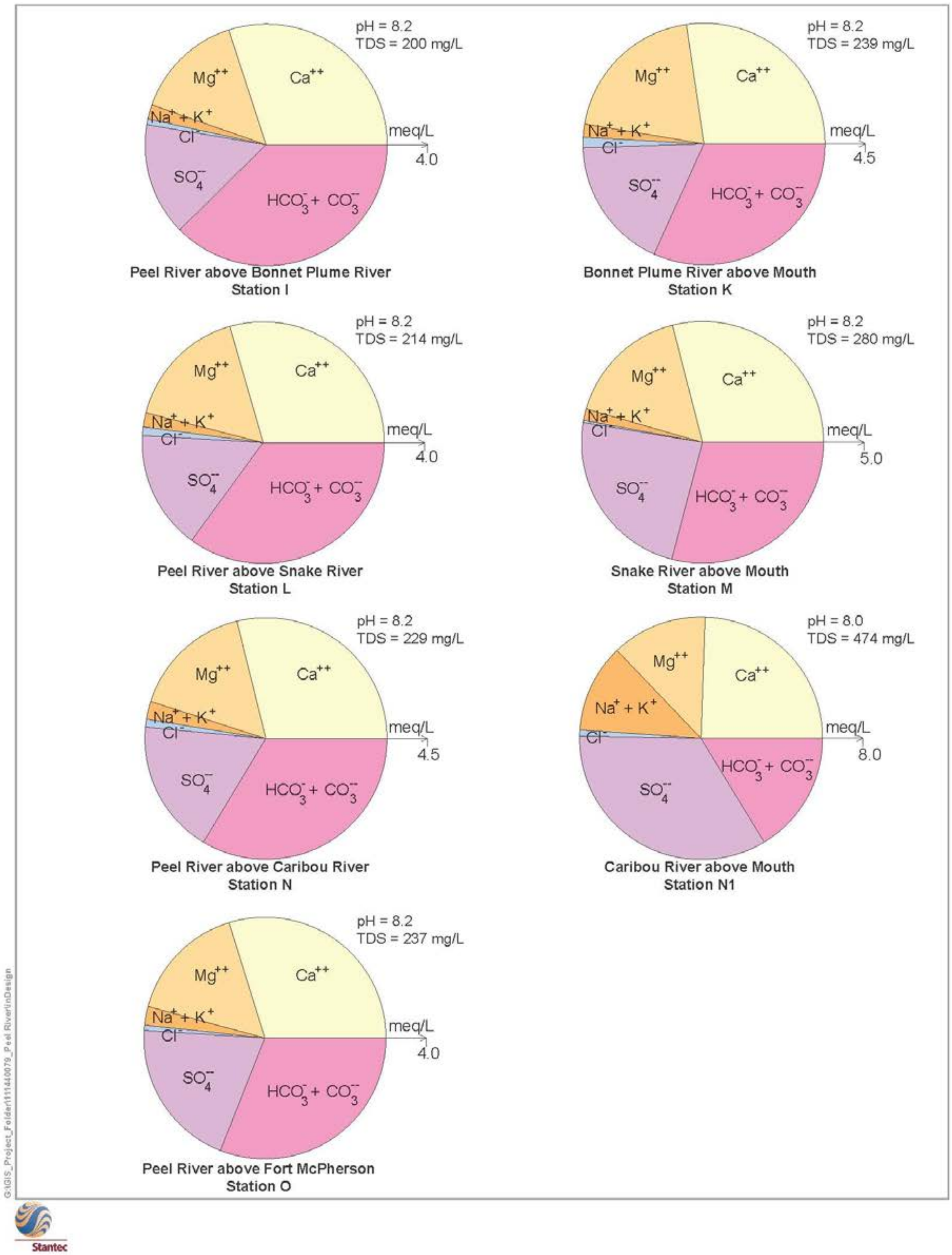


Figure 4-23: Major Ion Composition of Major Rivers in the Peel River Watershed (Stations I-O)

Within the watershed, Ca concentrations range from 31 to 85 mg/L with the highest values and greatest variability occurring in the Ogilvie (A/B) River (Figure 4-24). The concentrations of Ca in the Blackstone (C/D), Hart (F), and Wind (H) Rivers (Figure 4-24) are slightly lower than in the Peel as they join, and appear to stabilize the average Ca concentration downstream in the Peel River to approximately 45 to 50 mg/L (Figure 4-24). The concentration in the Snake River (M) is relatively high and variable compared to many of the other sites. This pattern is observed for many other analytes (Figures E-1 to E-5), and suggests that weathering in the Snake River watershed is highly variable.

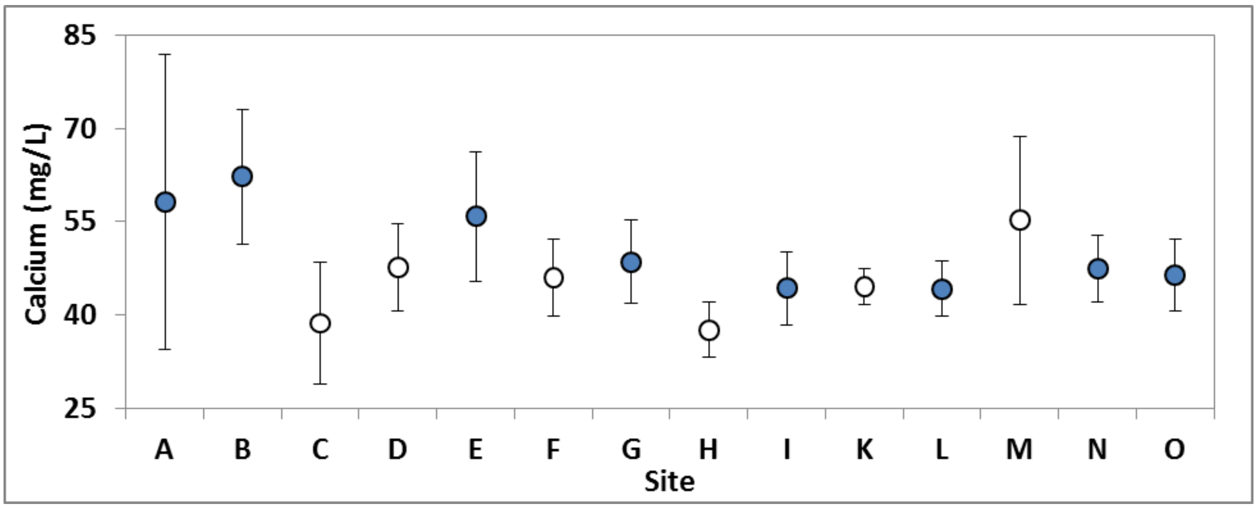


Figure 4-24: Calcium Concentrations in the Peel River Watershed

The blue data points are those moving from upstream (A) to downstream (O) in the Ogilvie/Peel Rivers. The white dots are from tributaries as described in Figure 2-1 and include the Blackstone (C/D), Hart (F), Wind (H), Bonnet Plume (K) and Snake (M) Rivers.

The concentration of Mg is somewhat lower than Ca, and ranges from 6.9 to 28 mg/L within the watershed (Figure E-3; Table E-1). Elevated average concentrations of magnesium (>20 mg/L) are associated with the Ogilvie (A/B), Bonnet Plume (K) and Snake (M) rivers (Figure E-3).

Sodium and K, as mentioned, are minor components within the watershed, and range between 1.3 and 14 mg/L for Na, and 0.1 to 1.7 mg/L for K (Table E-1). The Na concentration in the Ogilvie River (A/B) is considerably higher than at other sites, so that the Ogilvie River contributes a major amount of Na in the Peel River (Figure E-3). The source of Na within the Ogilvie River is likely from chemical weathering of saline beds in the Ogilvie formation that are exposed near Sapper Hill (Smith et al. 2004).

The dominant anion in the Peel River watershed is bicarbonate (Figures 4-22 and 4-23). Bicarbonate is not usually measured in water, but can be determined through measurement of total alkalinity for most natural waters, including the Peel River watershed. Therefore, alkalinity is used as a surrogate for the bicarbonate ion. Total alkalinity ranges from 77 to 198 mg/L (Table E-1), with average values between 100 and 150 mg/L (Table 4-12). The highest total alkalinity is observed upstream in the Ogilvie River (A/B), though alkalinity is relatively consistent throughout the watershed (Figure E-4). Alkalinity originates in part from the dissolution of calcium carbonates, which is the dominant component of the limestone and dolomites that occur in the Ogilvie Mountains and Taiga Ranges (Figure 2-1). Concentrations of sulphate are lower, and range from 16 to 230 mg/L (Table E-1). Elevated average sulphate concentrations are observed in the Ogilvie (A/B), Snake (M) and Bonnet Plume (K) Rivers (Figure E-4). The lowest anion concentrations were found for Cl, which range from 0.4 to 8.5 mg/L (Table E-1). The highest chloride values were observed in the Ogilvie (A/B) and Bonnet Plume (K) Rivers (Figure E-4). Similar to sodium, chloride is generally sourced from saline beds occurring in marine sedimentary rocks.

Patterns of ionic composition of dissolved chemical components within the watershed are summarized by conductivity and/or TDS, which are correlated as shown in a previous report (Czarnecki and Beavers, 2002). Unlike the pattern of increasing turbidity (or TSS) from headwaters downstream, conductivity patterns are subtle and reflect concentrations of major ions. There is a relatively high conductivity in the Ogilvie River (A/B) and lower concentrations in the other tributaries moving downstream (Figure 4-25). The exception is the Snake River (M), which has greater variability and higher average concentration than other tributaries and the Peel River (Figure 4-25). This relationship, as mentioned, is consistent with that seen for Ca (Figure 44-24), and for many of the other major ions (Figures E-1 to E-4).

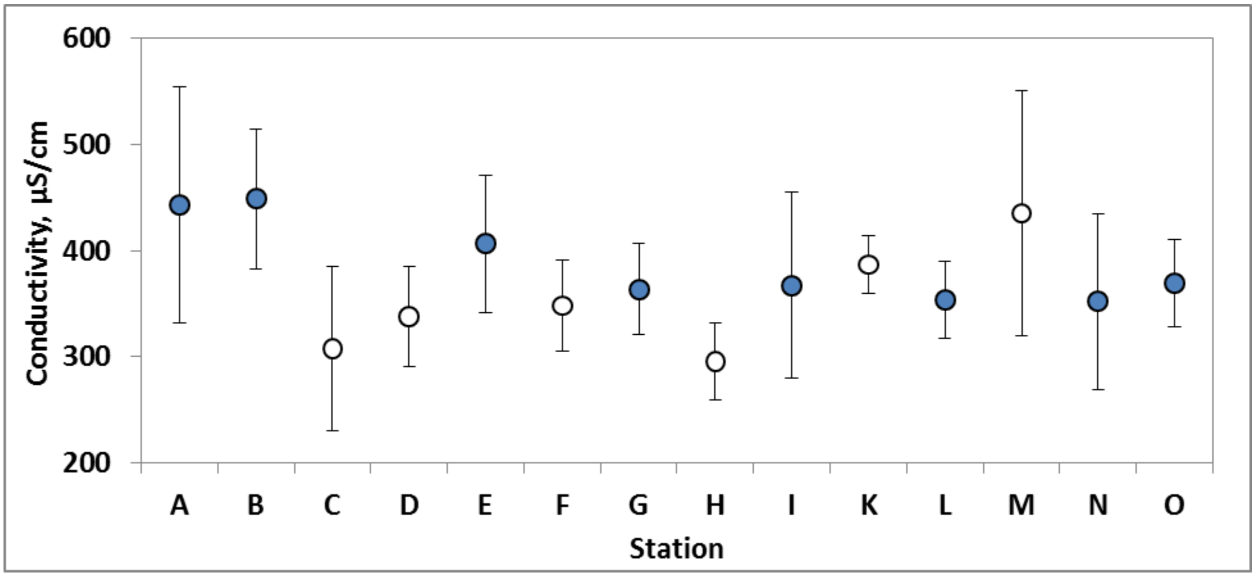


Figure 4-25: Conductivity in the Peel River Watershed

The blue data points are those moving upstream (A) to downstream (O) in the Ogilvie/Peel Rivers. The white dots are from tributaries as described in Figure 2-1 and include the Blackstone (C/D), Hart (F), Wind (H), Bonnet Plume (K) and Snake (M) Rivers.

4.4.2 Nutrients

For the purposes of this discussion, major nutrients are considered to be phosphorus (total and dissolved), the various forms of nitrogen (nitrate, nitrite, ammonia), and organic carbon (total and dissolved). Reactive silica was measured only at Station O and is therefore not considered in this section.

Nitrate/nitrite nitrogen concentrations range from 0.04 to 0.3 mg/L in the watershed and are also highly variable (Figure E-5). This precludes a detailed analysis of differences in concentration through the watershed. Ammonia concentrations are low, and follow the general pattern of an increase moving downstream that is observed for turbidity (Figures E-5 and E-2). This suggests that ammonia may be associated with the particulate fraction within the watershed. Total organic carbon is relatively high in the Ogilvie (A/B) and Blackstone (C/D) Rivers and then consistent throughout the watershed (Figure E-5). Dissolved organic carbon ranges from 1 to 5 mg/L and shows no spatial pattern within the watershed (Figure E-5). Concentrations of total phosphorous vary from 0.006 to 0.56 mg/L (Table E-1), with extreme values occasionally observed between the mouth of the Bonnet Plume River and Fort McPherson (Figure E-5). As with ammonia, the downstream increase is consistent with the increased turbidity in the lower reaches of the watershed.

4.4.3 Metals (total and dissolved)

Trace metals are minor, but important components of natural waters. They often work as micro-nutrients for aquatic organisms, but can also be toxic if present in higher than natural concentrations and available forms. This section is focused on metals that are regulated by the stipulated guidelines (Table 3-4). These include Al, Sb, As, Ba, Cd, Cr, Co, Cu, Fe, Pb, Mn, Mo, Hg, Ni, Se, Ag, Tl, U, and Zn. The total metal guidelines are compared to both the particulate and dissolved (biologically available) form of the metals.

The chemistry of dissolved and total metals is complex. The marked seasonality of flow within the Peel River watershed (Section 4.1) potentially reduces trace metal concentrations through dilution with spring melt water, and the marked seasonality of turbidity and total metal concentration (Section 4.2) potentially increases dissolved concentrations through exchange between particulate and dissolved fractions. The former dynamic is identical to that observed for major ions and is considered to be caused by variation in the amount of weathering versus flow through the seasons. The latter dynamic is caused by equilibrium reactions that might occur between the dissolved and particulate trace metal fractions. The interplay between these two processes potentially creates a variety of responses, depending on the metal. These relationships are further obscured for this particular dataset because of the limited amount of data, and the variability in flow and turbidity between sample periods and within the watershed.

Despite these confounding factors, watershed relationships for the trace elements are apparent for many of the elements. For Ba, Cu, Mn, Ni and Zn the dissolved fraction dominates in upstream portions of the watershed and at some point downstream, the particulate fraction increases substantially (Figures E-6 to E-9). Average values of total manganese, for example, increase by approximately an order of magnitude from the upper reaches downstream while dissolved concentrations increase only slightly (Figure 4-26).

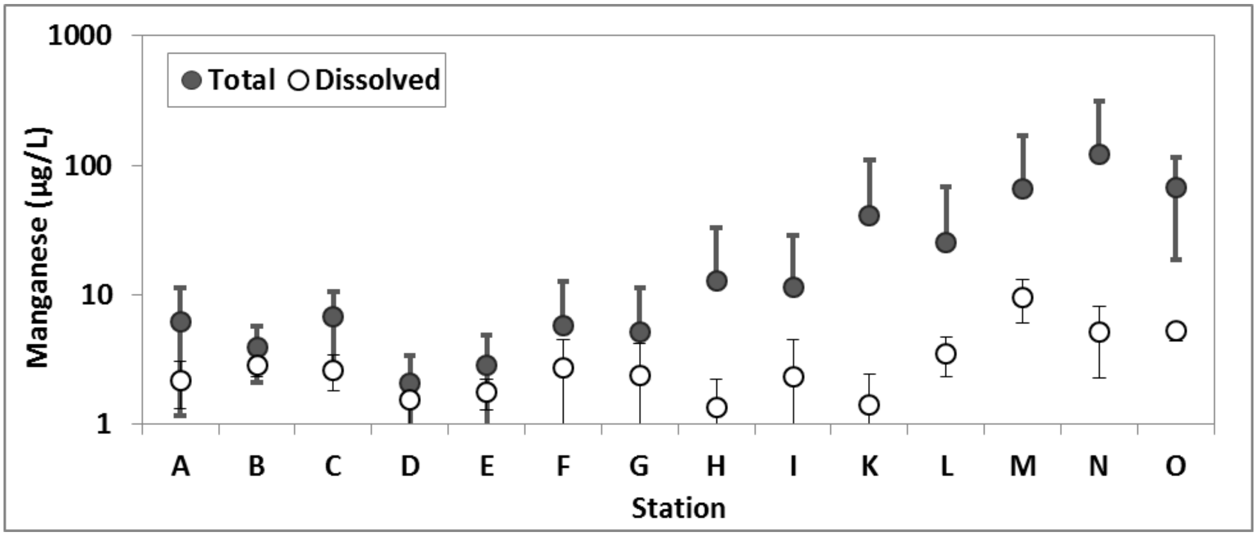


Figure 4-26: Dissolved and Total Manganese in the Peel River Watershed

The increase in total concentration occurs downstream of the Wind River (H) for Mn, downstream of the Bonnet Plume River (K) for Cu, Ni, and Zn, and downstream of the Snake River (M) for Ba (Figures E-6 to E-9). This indicates that the various tributaries contain suspended solids with variable chemistry, likely due to differences in geology within each sub-basin. For instance, elevated concentrations of dissolved copper in the headwaters of Ogilvie River are possibly associated with natural sulfide oxidation that has been documented in the vicinity of Engineer Creek (Kwong and Whitley 1992). For other metals, the particulate fraction dominates throughout the watershed. These include Al, Co, Cr, and Fe (Figures E-6 to E-9). These metals also increase in concentration moving downstream, consistent with increases in turbidity associated with higher flow rates. Aluminum, for instance, is likely associated with clay particles throughout the watershed and is positively correlated to turbidity (Section 4.3; Figure B-49). There are also two metals (Sb and Mo) that occur predominantly as dissolved metals throughout the watershed (Figure E-6, E-8). It is likely that these two metals are at low concentration within the suspended sediment fraction entrained within the Peel River and tributaries (Section 4.2.3). The upstream source of Mo and Sb is likely from the weathering of sulfide minerals, which are abundant in the Jones Ridge and Canol formations that are exposed in the Ogilvie Mountains (Smith et al. 2004).

As discussed in Section 4.2.3 (Table 4-7) for the downstream portion of the Peel River, the total metal concentration of many metals exceeds guideline values for the protection of aquatic life throughout the watershed. Metals that consistently exceed guideline values within the watershed include Al, Cr, Cu, Fe, and Pb (Figure E6 to E-9). As discussed, however, it is not expected that these metal levels are toxic within the watershed, because it is considered that only the dissolved metals are biologically available. In contrast, dissolved concentrations for almost all trace elements were below applicable guideline values almost all the time. Exceptions included dissolved Al, Cd, Cr, Cu, Ag, and Zn, which occasionally exceeded guideline values (Table E-1).

Selenium occurs naturally in coal deposits found in the Camic formation and in the sulfide rich shales of the Canol formation, both of which occur in the Ogilvie Mountains (Smith et al., 2004). Concentrations of Se are often above the guideline value of 1 ug/L (Table E-1), but the data are compromised by high detection limits (1-10 ug/L). A concerted effort to analyze Se using low detection limits would perhaps be useful.

5.0 Key Observations

5.1 FLOW - PEEL RIVER ABOVE FORT MCPHERSON

- There were considerable differences found in seasonal flow:
  - Seasonal flow periods were differentiated by Julian day and flow rate:
    - Spring freshet ~April 15 to June 30, AND flow >300 m^3/s
    - Summer recession July 1 to ~ October 30, AND flow >300 m^3/s
    - Winter baseflow ~October 15 to ~ April 30, AND/OR flow <300 m^3/s
- Significant temporal trends in flow are evident:
  - There has been a significant increase in winter baseflow over the entire period of record.
  - There has been a significant increase in annual minimum flow rate, although with considerable year-to-year variability.
  - There has been a significant decrease in flow rate during late spring freshet in the month of June.

5.2 WATER QUALITY - PEEL RIVER ABOVE FORT MCPHERSON

5.2.1 Water Chemistry Analytes

- Consistent seasonal differences occurred in concentration, related to flow rate and season:
  - The lowest concentrations of major ions occurred during spring freshet.
  - Slightly higher concentrations occurred during the recession of flow through the summer.
  - Highest concentrations occurred during winter baseflow.
- Positive and increasing temporal trends were observed for sulphate, magnesium and calcium for the entire period of record (1980 to 2010), but not for the last ten years.
- Inconsistent and/or marginally significant trends were observed for a few other analytes/time periods.
- Turbidity CCME guidelines were routinely exceeded.
- Concentrations of most total metals were strongly and positively correlated to turbidity.

- Long term trend analysis was limited to winter baseflow data for total Al, Cr, Cu, Fe, Li, Mn, Mo, Ni, Sr and Zn. There were no statistically significant temporal trends except for lithium, which showed a marginally significant decreasing temporal trend.
- For most total metals, concentrations were considerably higher than guideline values during periods of high flow.

5.2.2 Dissolved Metals

- There were consistent seasonal differences in dissolved/total ratio related to flow rate and season:
  - Higher relative concentrations of dissolved metals occurred during winter baseflow.
  - Lower relative concentrations of dissolved metals occurred as flow rate increased.
- There was no relationship between seasonal flow rate and dissolved concentration for most dissolved metals.
- Dissolved metal concentrations were occasionally above CCME guideline for Protection of Freshwater Aquatic Life for a few metals, including: Al, Cd, Cu, and Pb.
- Temporal trends analysis was not possible with the current dataset for dissolved metals.

5.2.3 Nutrients

- The Peel River trophic status (based on TP and/or TN) is changeable. During periods of high flow it is considered potentially eutrophic, and during periods of low flow it is considered potentially oligotrophic.
- During the spring freshet and summer recession, the Peel River appears to be potentially nitrogen limited, though with the high turbidity levels at this time, it may be that light is actually the factor limiting productivity.

5.2.4 Organic Compounds of Potential Concern

- Concentrations of organic compounds were low in the water samples collected from the Peel River above Fort McPherson.

5.3 SUSPENDED SEDIMENT QUALITY - PEEL RIVER ABOVE FORT MCPHERSON

- Of the 19 hydrocarbons compounds measured in the suspended sediment of the Peel River (above Fort McPherson), CCME guidelines exist for 12 PAH compounds. Although several PAH values have exceeded the threshold effect level (TEL), all results were lower than the probable effect level (PEL), at which adverse effects are predicted to occur frequently.

- PCBs were either very low or not detectable. Levels were below the TEL guideline.

- Average values of metals were above the TEL guidelines for arsenic, cadmium and zinc; individual data points were above TEL guidelines for arsenic, cadmium, copper, chromium and zinc.

5.4 WATER QUALITY - PEEL RIVER WATERSHED

- The Peel River and its tributaries are alkaline (pH = 7.9-8.4) with total dissolved solids generally ranging from 170 to 300 mg/L.

- Calcium (Ca), magnesium (Mg), bicarbonate (HCO_3^-) and sulphate (SO_4^{2-}) are the dominant major ions in the Peel River watershed. Calcium, Mg and HCO_3^- are produced by dissolution of carbonate rocks such as limestone and dolomite, whereas sulphate is generated from the weathering of gypsum lenses and oxidation of sulfide-rich rocks.

- Turbidity increases from the headwaters of the Peel River downstream. The Bonnet Plume and Snake Rivers appear to contribute a considerable sediment load.

- Trace metals are divided into three major groups based on the dominant form of occurrence within the Peel River watershed:

  - Al, Co, Cr, and Fe are generally present in the particulate form.

  - Dissolved Ba, Cu, Mn, Ni and Zn dominate in the headwaters of the Peel River, whereas the particulate form of these metals becomes dominant in the middle and lower watershed.

  - Sb and Mo are generally present in the dissolved fraction within the watershed.

- Concentrations of total Al, Cr, Cu, Fe, and Pb consistently exceed CCME FAL guideline values.

- Dissolved Al, Cd, Cr, Cu, Ag, Se and Zn occasionally exceed the CCME FAL Guideline. In some cases, dissolved Al and Mn concentrations are above the CDWQ aesthetic objective.

- Analytical results for Se, Ag, Hg and Tl are consistently reported as below detection limit. It is recommended that detection limits for these elements be reduced to below guideline values.

6.0 Recommendations

- Format the data as a flat file and enter into a database.
- For optimal sampling of persistent organic pollutants of potential concern, collect snow samples in March, just before spring freshet (Kelly et al. 2009, Jacques Whitford 2008). Snow sampling may provide an indication of the aerial deposition of air borne substances.
- Review trace metal sampling and analytical procedures to ensure maximum precision and accuracy.
- Measure Chl*a* in water samples.
- Lower the detection limit for P, Se, Ag, Hg and TI.
- Sample each flow period on a regular basis:
    - Baseflow in February/March.
    - Freshet in May after/during peak flow if this is safely possible.
    - Recession in late August. This is the most difficult period to time correctly because of the variability in flow and the continuous alteration of ion concentration through the season.
- Consider the development of risk-based site-specific protective criteria based on *in situ* bioassay studies for all parameters (e.g., total metals) which are naturally, and consistently, greater than “guideline” values in selected areas (e.g., above Fort McPherson).
- Consider development of reach-specific seasonal nutrient limitations consistent with understandings of the switch from oligotrophy to eutrophy, or from N-limitations in spring to P-limitations during winter.

7.0 Closure

This report was prepared on behalf of *Aboriginal Affairs and Northern Development Canada*. The report may not be relied upon by any other person or entity without the express written consent of Stantec Consulting Ltd. and *Aboriginal Affairs and Northern Development Canada*.

Any use which a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with accepted scientific practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgment of Stantec Consulting Ltd. based on the data obtained from the work and on the site conditions encountered at the time the work was performed at the specific sampling, testing, and/or observation locations.

STANTEC CONSULTING LTD.

Written by:

Dave Huebert, Ph.D., P.Biol.
Environmental Scientist
Tel: (204) 942-2505
dave.huebert@stantec.com

Technical contributions from:

Sitotaw Yirdaw-Zeleke, Ph.D., P.Eng.
Environmental Scientist
Tel: (204) 928-7622
sitotaw.yirdaw@stantec.com

Technical contributions from:

Nikolay Sidenko, Ph.D., P.Geo.
Geochemist
Tel: (204) 928-8862
nikolay.sidenko@stantec.com

Senior Reviewer:

Mike McKernan, M.Sc., MES, P.Biol.
Principal and Practice Leader
Tel: (204) 924-5734
mike.mckernan@stantec.com

Senior Reviewer:

John McCullum
Team Lead, Environmental Services
Tel: (867) 920-2216
John.mccullum@stantec.com

8.0 References

Bormans, M. Ford, P.W., and Fabbro, L. 2005. Spatial and temporal variability in cyanobacterial populations controlled by physical processes. Journal of Plankton Research 27: 61-70.

Bormans, M., Ford, P.W., Fabbro, L. and Hancock, G. 2004. Onset and persistence of cyanobacterial blooms in a large impounded tropical river, Australia. Marine and Freshwater Research 55: 1-15.

British Columbia Ministry of Environment (BCMOE). 2012. Water Quality Guideline Reports. Accessed at; http://www.env.gov.bc.ca/wat/wq/wq_guidelines.html#approved

Canadian Council of Ministers for the Environment (CCME). 2012. Canadian Environment Quality Guidelines Summary Table. Accessed at; http://st-ts.ccme.ca/?chems=all&chapters=all

Canadian Council of Ministers for the Environment (CCME). 2001. Water Quality Index. Accessed at; http://www.ccme.ca/sourcetotap/wqi.html

Carlson, R.E. and J. Simpson. 1996. A Coordinator's Guide to Volunteer Lake Monitoring Methods. North American Lake Management Society. 96pp

Czarnecki, A. and Beavers, R. 2002. Peel River Basin Water Quality Report. Water Resources Division, INAC, Yellowknife, NT. 47pp. and appendices.

Dodds, W.K., J.R. Jones, and E.B. Welch. 1998. Suggested classification of stream trophic state: distributions of temperate stream types by chlorophyll, total nitrogen, and phosphorus. Wat. Res. 32(5): 1455-1462.

EDI Environmental. 2006. Peel River Watershed Fisheries Information Summary Report – Preliminary Assessment. Prepared for: Peel Watershed Planning Commission, Whitehorse, YT. 53pp.

Elser, J.J. 1999. The pathway to noxious cyanobacteria blooms in lakes: the food web as the final turn. Freshwat. Biol. 42: 537-543

Health Canada 2008. Guidelines for Canadian Drinking Water Quality.

Jacques Whitford/AXYS. 2008. Metals in Snow Columns, Flin Flon. Prepared for: Hudson Bay Mining and Smelting Co. Ltd., Flin Flon, Manitoba. 41pp.

Janowicz, Richard. Manager, Hydrology, Department of the Environment, Yukon Government. Pers. Comm. March 2015.

Kelly, E.N, J.W. Short, D.W. Schindler, P.V. Hodson, M. Ma, A.K. Kwan and B. L. Fortin. 2009. Oil sands development contributes polycyclic aromatic compounds to the Athabasca River and its tributaries. PNAS 106: 22346-22351.

Kenyon, J. and Whitley, W.G. 2008. Water Resources Assessment for the Peel Watershed. Prepared for the Peel River Planning Commission. 17p.

Kokelj, S.V. and Burns, C.R. 2005. Geochemistry of the active layer and near-surface permafrost, Mackenzie delta region, Northwest Territories, Canada. Can. J. Earth Sci. 42: 37-48

Kokelj, S.V., D. Lacelle, T.C. Lantz, L. Malone, J. Tunnicliffe, I.D. Clark and K.S. Chin (2013) Thawing of massive ground ice in thaw slumps drives increases in stream sediment and solute flux across a range of watershed scales. Journal of Geophysical Research.

Kwong and Whitley, G. 1992. Natural Acid Rock Drainage at Macmillian Pass, Yukon. DIAND MEND Project No. 11.Whitehorse, Yukon.

Malone, L., D. Lacelle, S. Kokelj and I.D. Clark (2013). Impacts of hillslope thaw slumps on the geochemistry of permafrost catchments (Stony Creek watershed, NWT, Canada). Chemical Geology. 356: 38-49..

Peepre, J. and Locke, S. 2008. Wild Rivers of the Yukon's Peel Watershed. Whitehorse, YK. ISBN 978-0-09810021-0-1. 212pp.

Smith, C.A.S., Meikle, J.C. and Roots,C.F. (editors), 2004. Ecoregions of the Yukon Territory - Biophysical Properties of Yukon Landscapes. Agriculture and Agri-Food Canada, PARC Technical Bulletin 04-01, Summerland, British Columbia, pages 61 to 148.

Smith, V.H. 1983. Low nitrogen to phosphorus ratios favor dominance by blue-green algae in lake phytoplankton. Science 221: 669-671.

Vigneault, B. and Gopalapillai, Y. 2009. Literature Review Report: Interactions Between Trace Metals and Aquatic Organisms. CANMET Mining and Mineral Sciences Laboratories. NRC.

Wetzel, R.G. 1983. Limnology. 2nd Ed. Saunders College Publishing, New York. 767 pp.

APPENDIX A

MANN-KENDALL TRENDS TEST

Appendix A: Mann Kendall Trends Test

The Mann-Kendall trends test is a non-parametric test for identifying trends in time series data. The test is valid for datasets with greater than 10 values and few ties, and does not require that the data conform to any particular distribution. The test can also accommodate chemistry data that is below detection limit by assigning non-detects a common value that is lower than the lowest value in the data set. The test requires that the data set be monotonic over time, and that there is only one value per time period. When multiple data points exist for a single time period, the data is averaged to produce a single value.

The Mann-Kendall test evaluates data as an ordered time series where each value of a time series is compared with all the remaining data in a sequential order. The Mann-Kendall statistic 'S' is the sum of the time series differences. If the later value is greater than the earlier, then S is increased by 1, if the later value is less than the earlier, then S is decreased by 1 as follows;

$$S = \sum_{k=1}^{n-1} \sum_{j=k+1}^{n} sign(xj - xk)$$

Where;

$$sign(x_j - x_k) = +1, \text{ if } x_j > x_k$$
$$sign(x_j - x_k) = 0, \text{ if } x_j = x_k$$
$$sign(x_j - x_k) = -1, \text{ if } x_j < x_k$$

The variance of S (VAR(S)) is calculated as follows;

$$VAR(S) = 1/18[n(n-1) * (2n+5) - \sum_{p=1}^{g} tp * (tp-1) * (2tp+5)]$$

Where:

n = number of data points
g = the number of tied groups
tp = the number of data points in the pth group

The normalized Mann-Kendall test statistic, 'Z' is calculated as follows;

$$Z = \frac{S-1}{\sqrt{[Var(S)]}} \, if \; S > 0$$

$$Z = \frac{S+1}{\sqrt{[Var(S)]}} \, if \; S < 0$$

$$\text{and } Z = 0 \text{ if } S = 0$$

The probability associated with this normalized test statistic can then be calculated using Microsoft Excel function 'NORMDIST()'.

A trend is said to be increasing if the value of S is positive and less than the level of significance (typically 0.05), and is said to be decreasing if the value of S is negative and less than the level of significance.

APPENDIX B

WATER-CHEMISTRY FIGURES FOR PEEL RIVER ABOVE FORT MCPHERSON

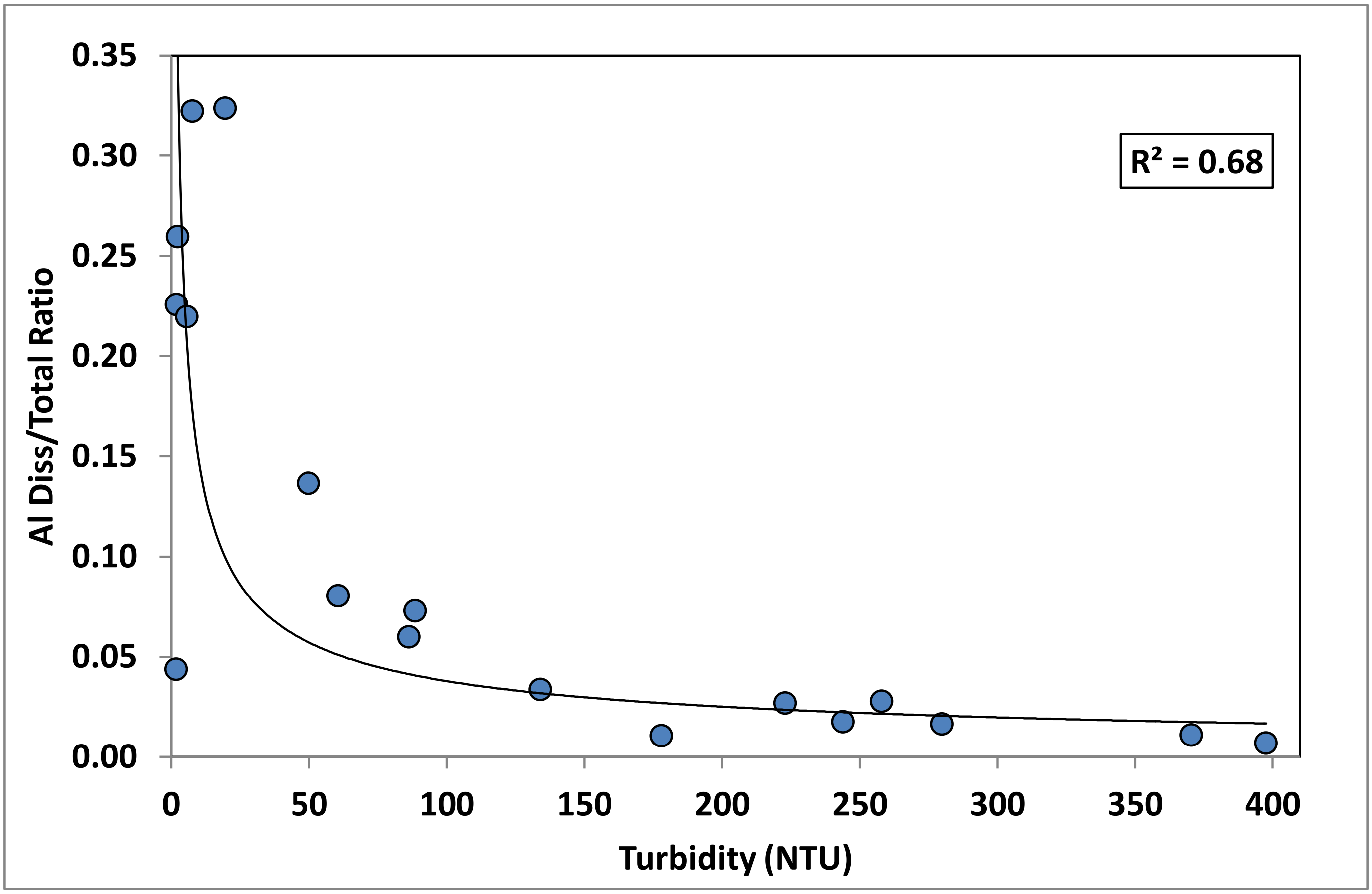


Figure B-1: The Effect of Turbidity on Dissolved/Total Ratio for Aluminum

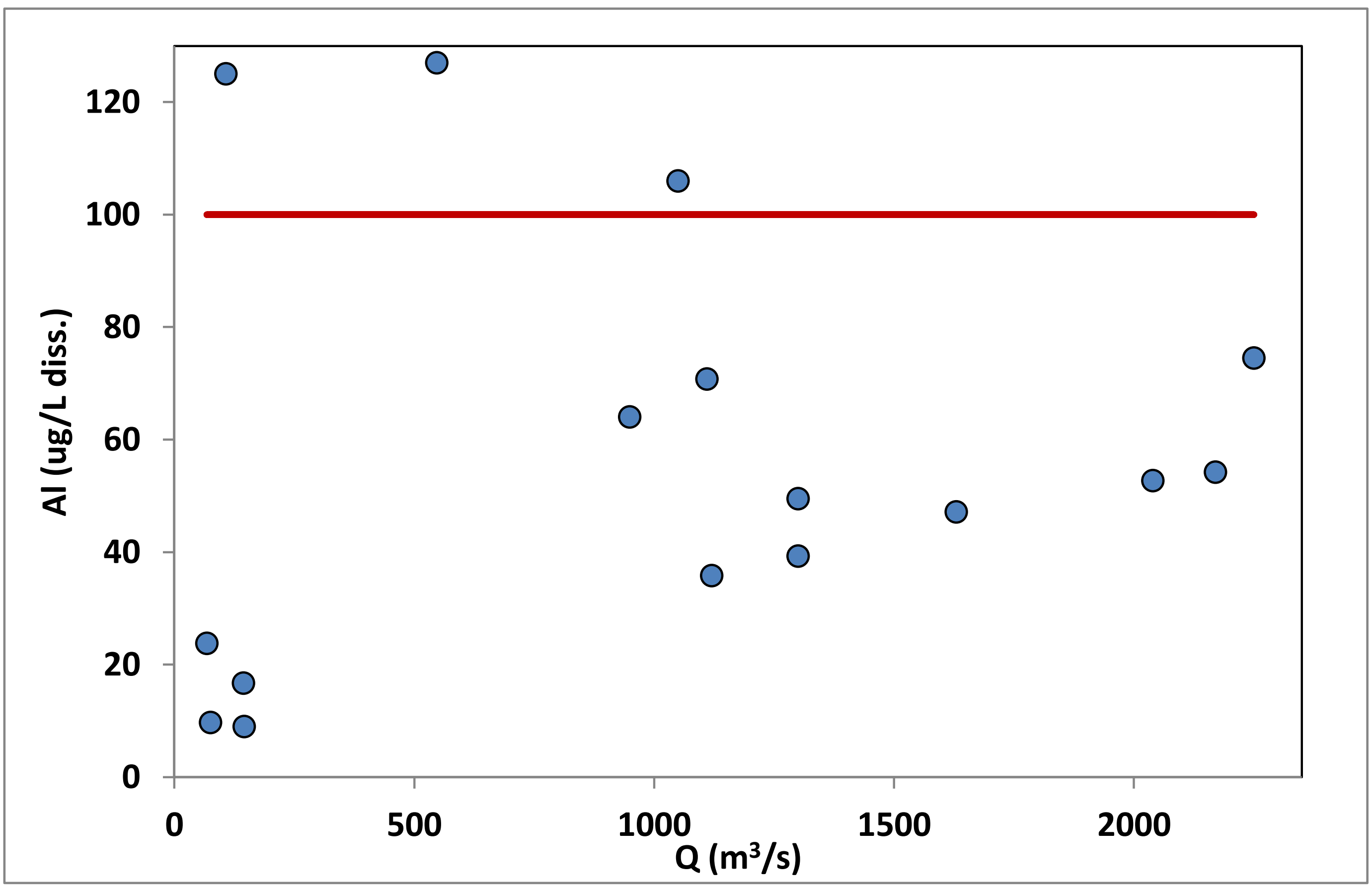


Figure B-2: The Effect of Flow on dissolved Aluminum Concentration.
The Red Line is the CCME Guideline for protection of freshwater aquatic life.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

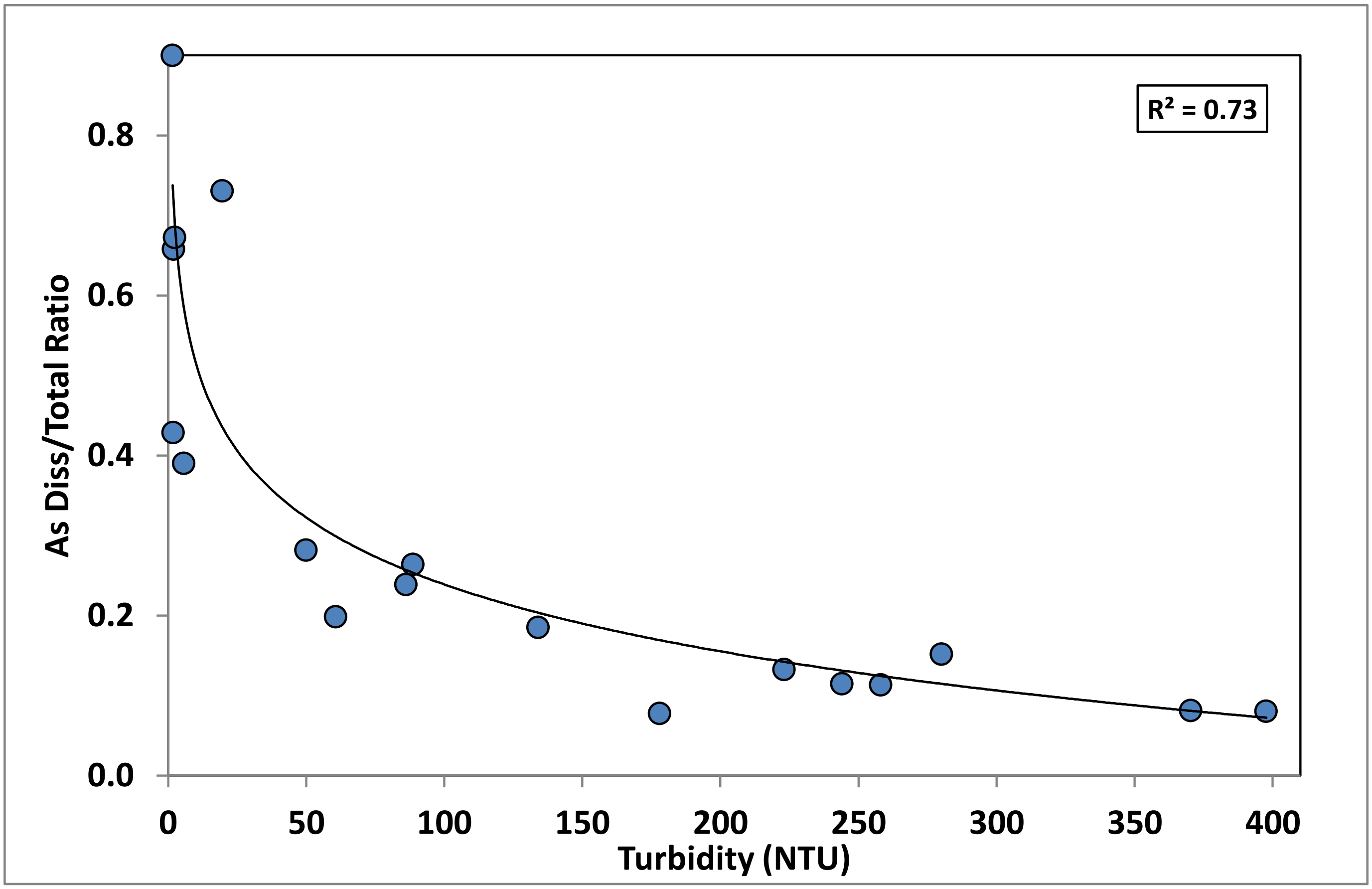


Figure B-3: The Effect of Turbidity on Dissolved/Total Ratio for Arsenic

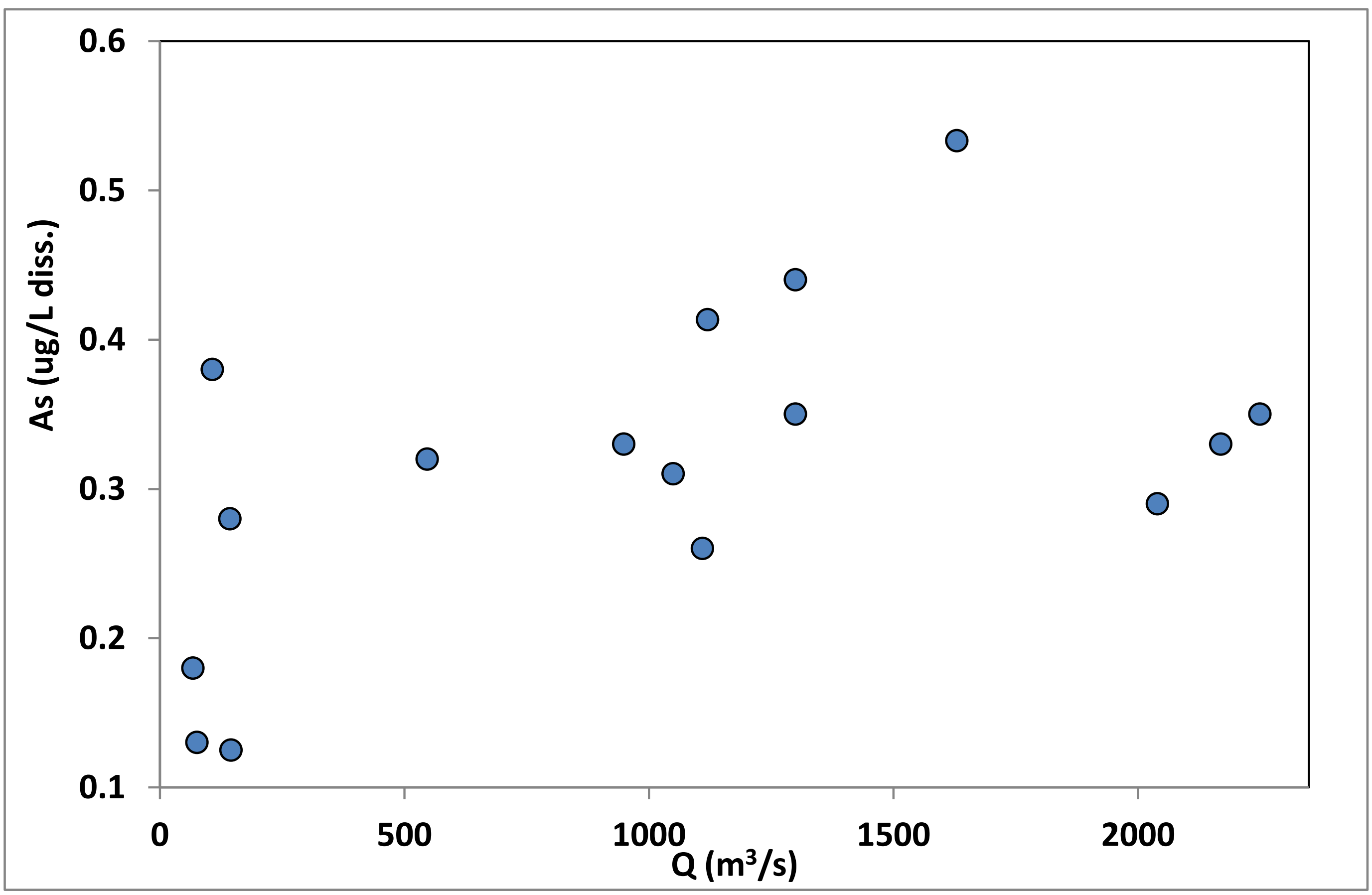


Figure B-4: The Effect of Flow Rate on dissolved Arsenic Concentration.

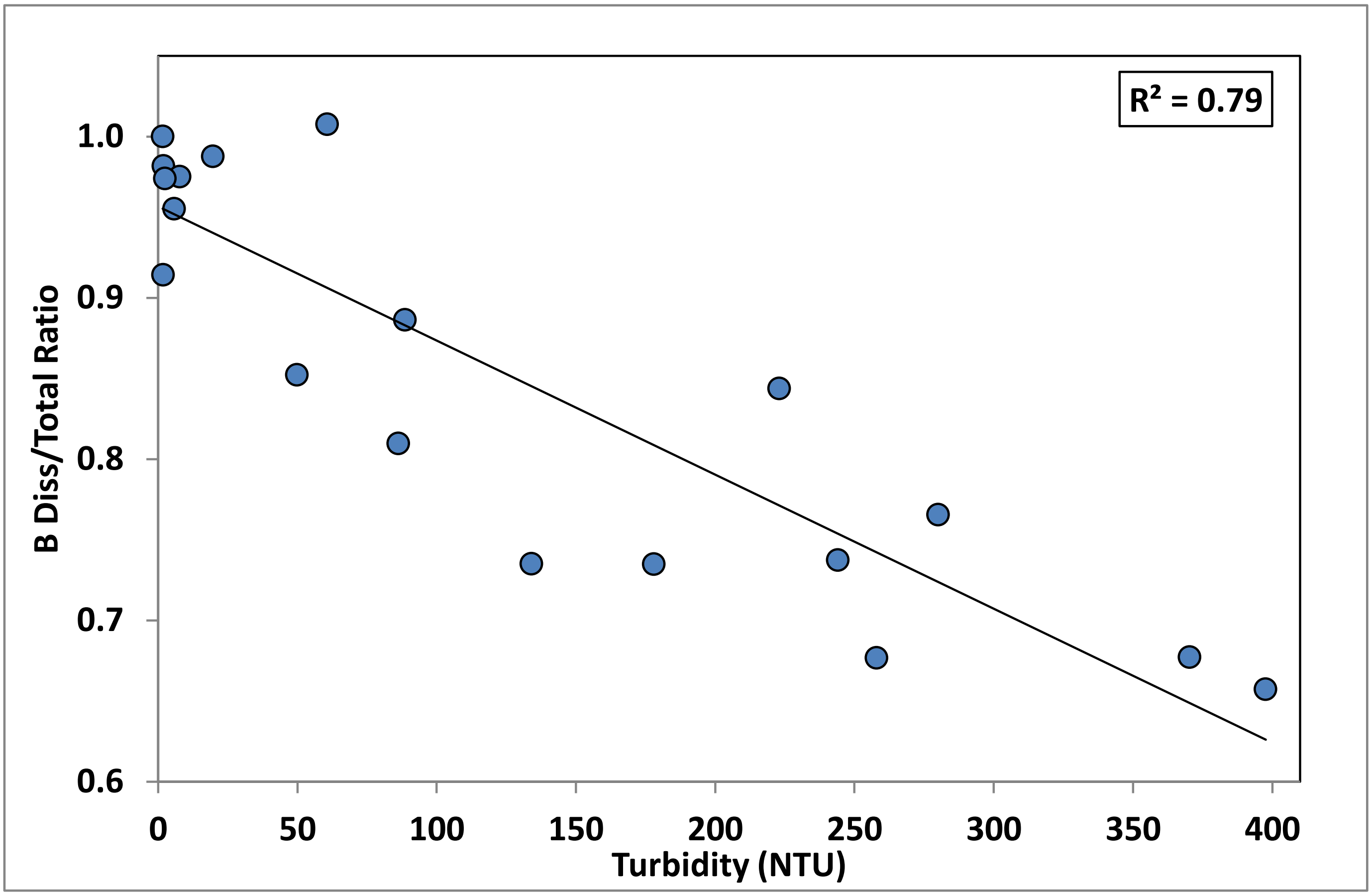


Figure B-5: The Effect of Turbidity on Dissolved/Total Ratio for Boron

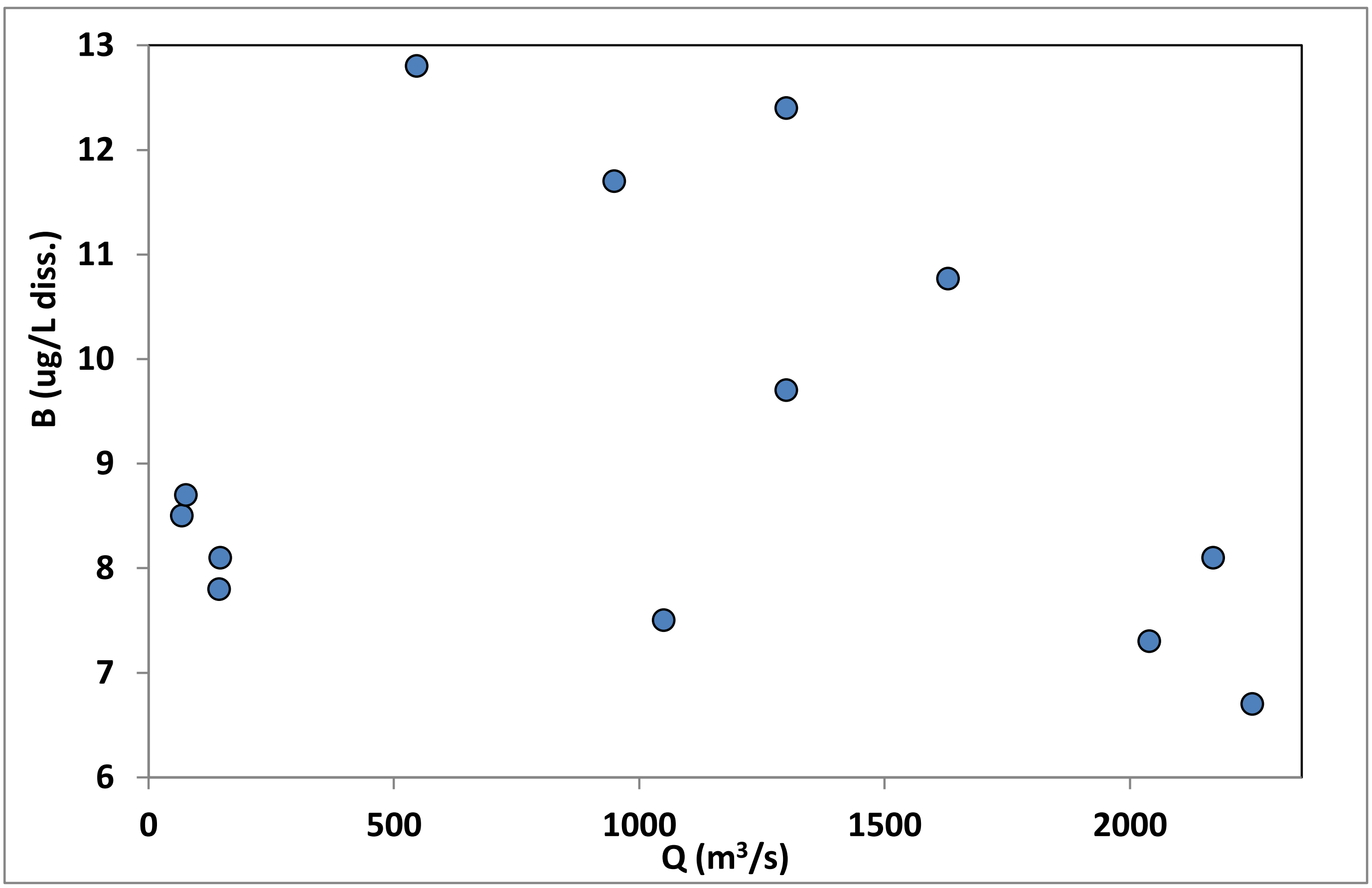


Figure B-6: The Effect of Flow Rate on dissolved Boron Concentration.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

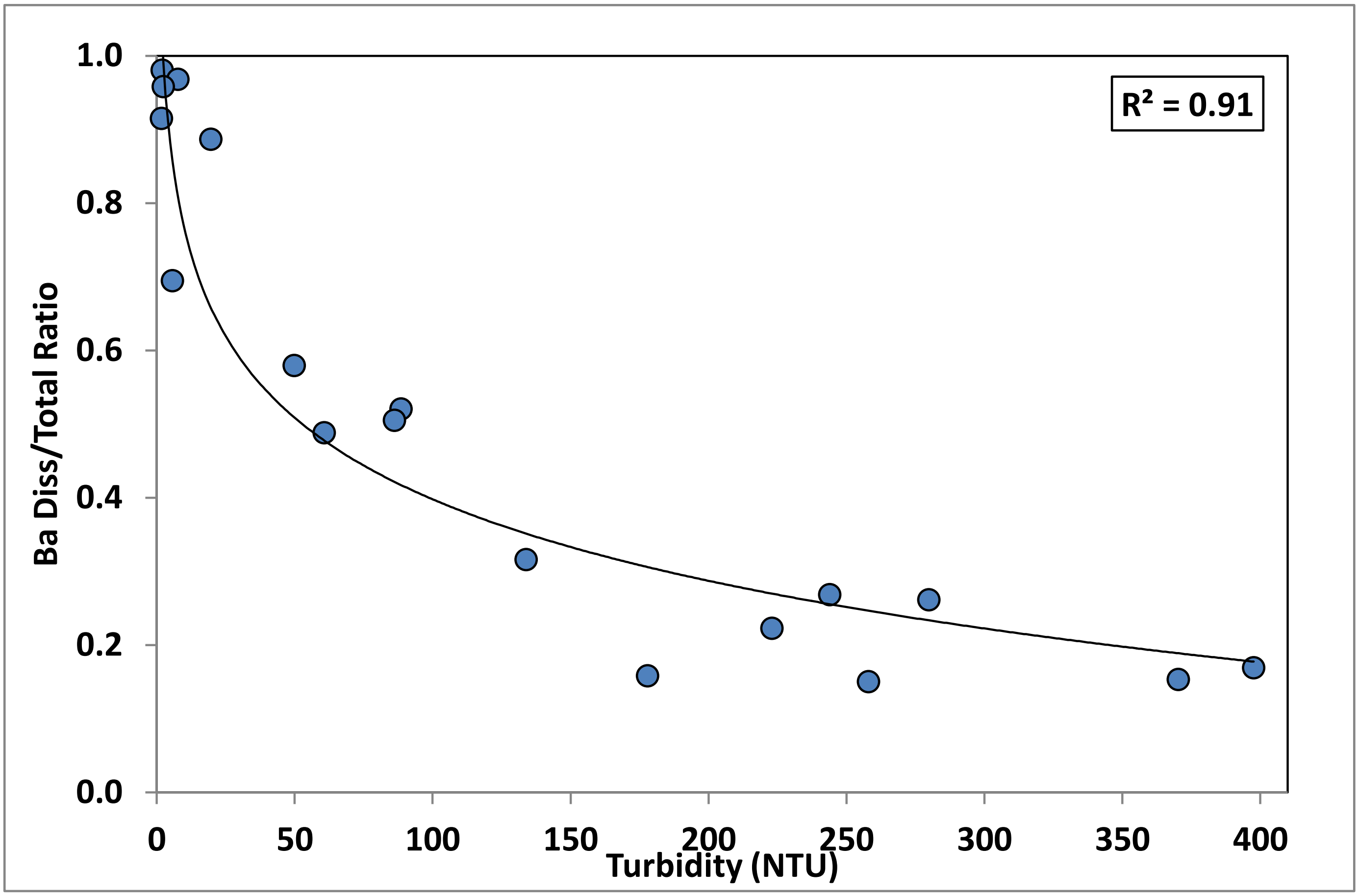


Figure B-7: The Effect of Turbidity on Dissolved/Total Ratio for Barium

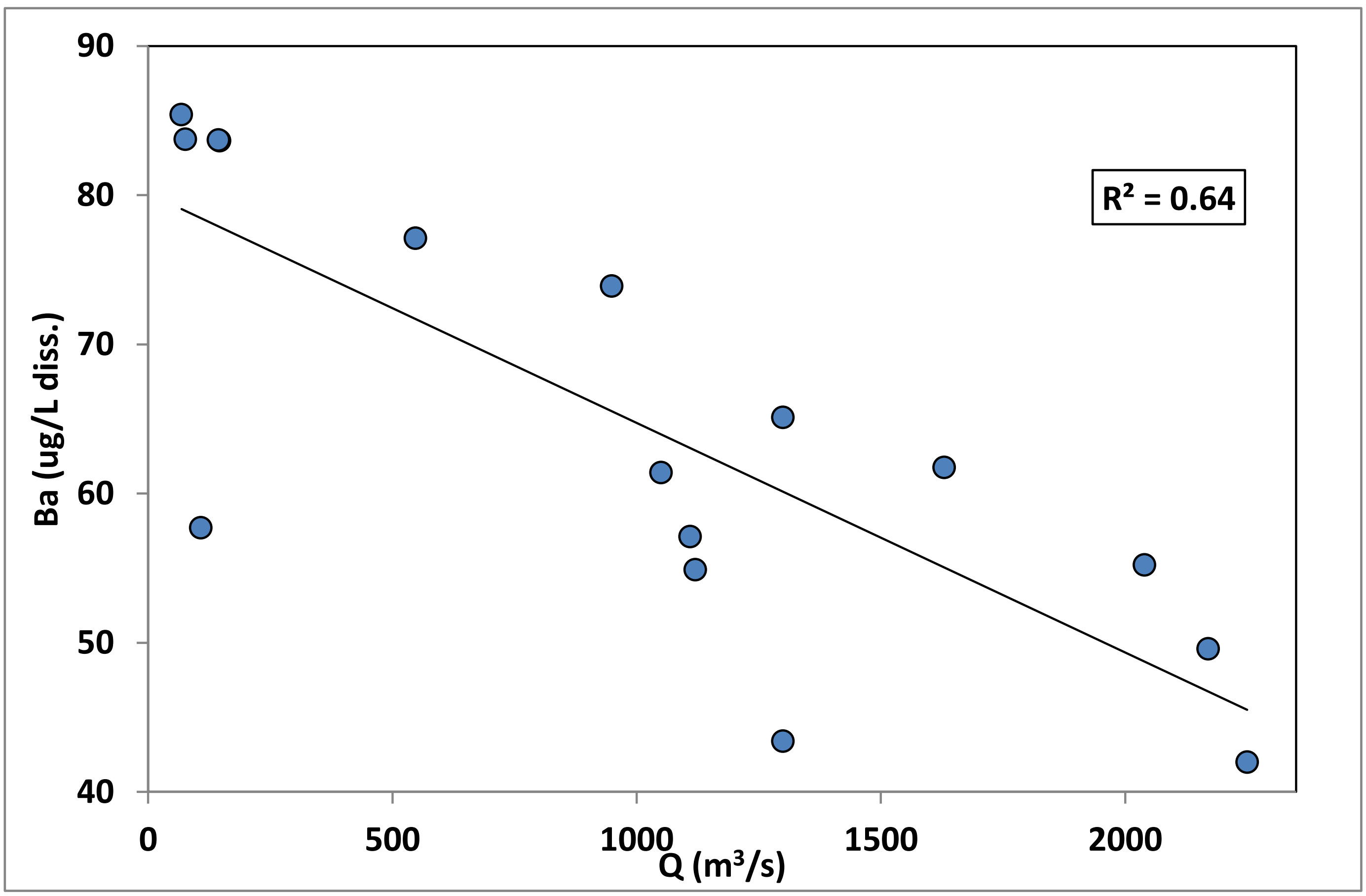


Figure B-8: The Effect of Flow Rate on dissolved Barium Concentration.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

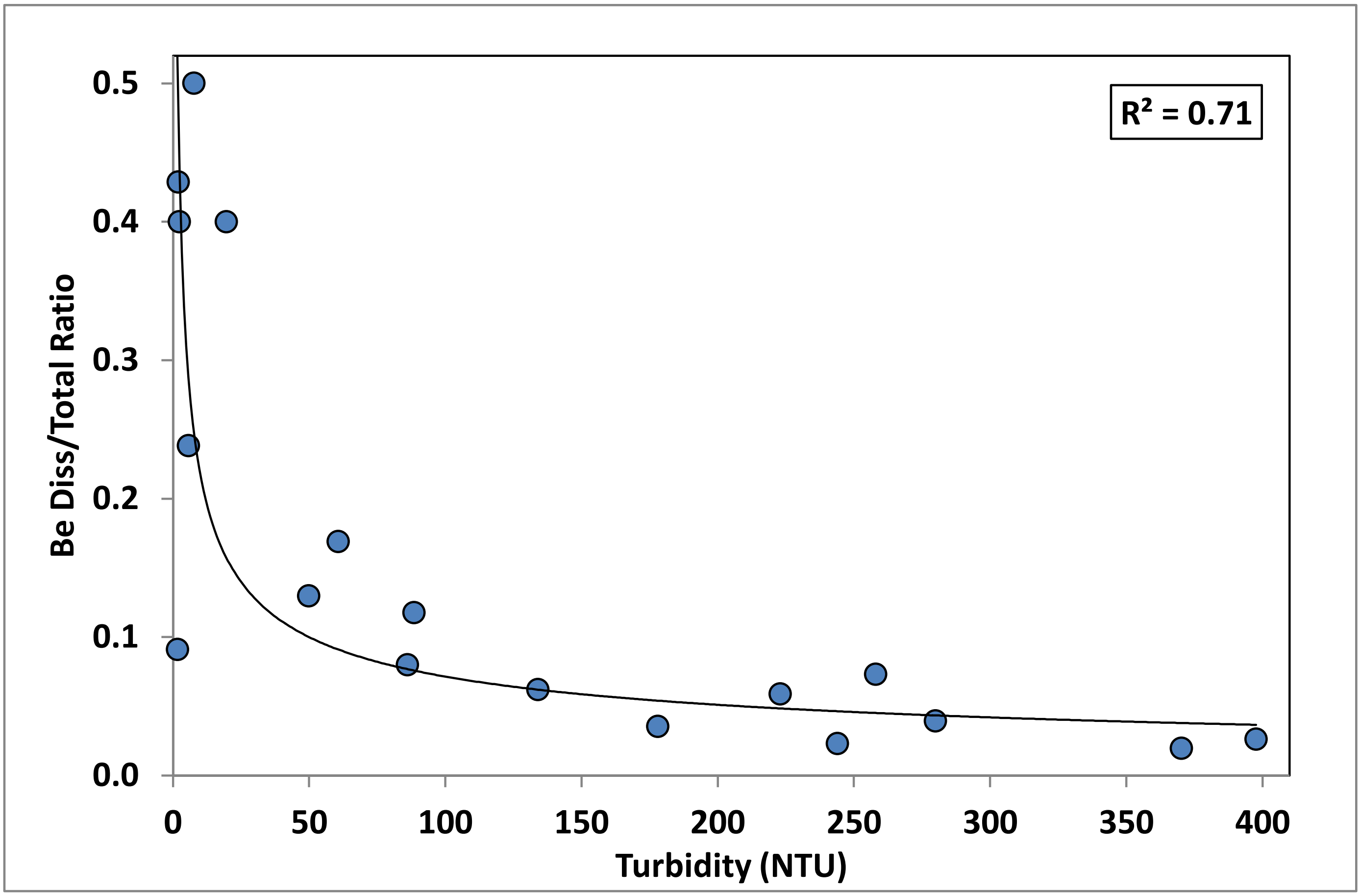


Figure B-9: The Effect of Turbidity on Dissolved/Total Ratio for Beryllium

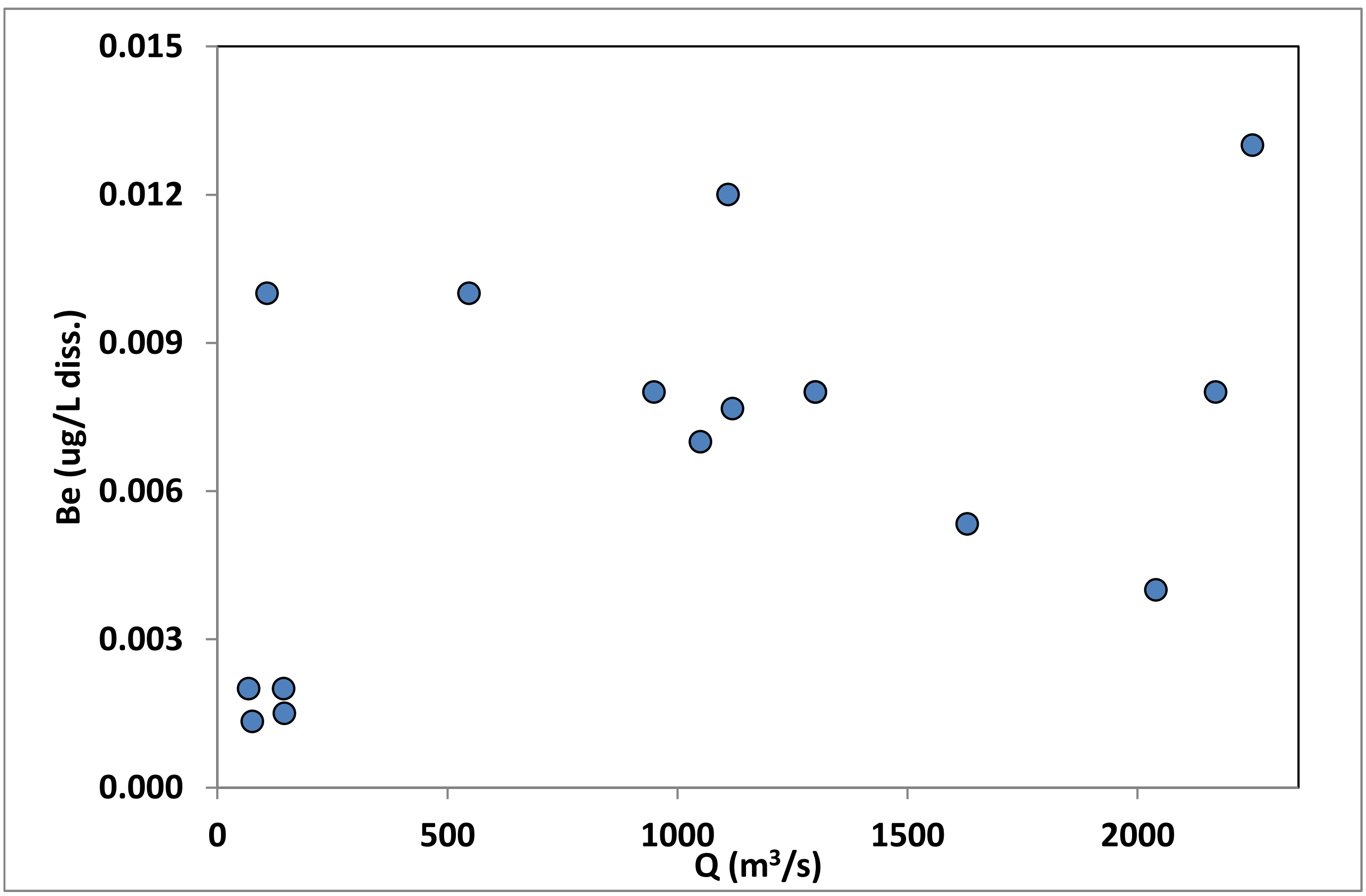


Figure B-10: The Effect of Flow Rate on dissolved Beryllium Concentration.

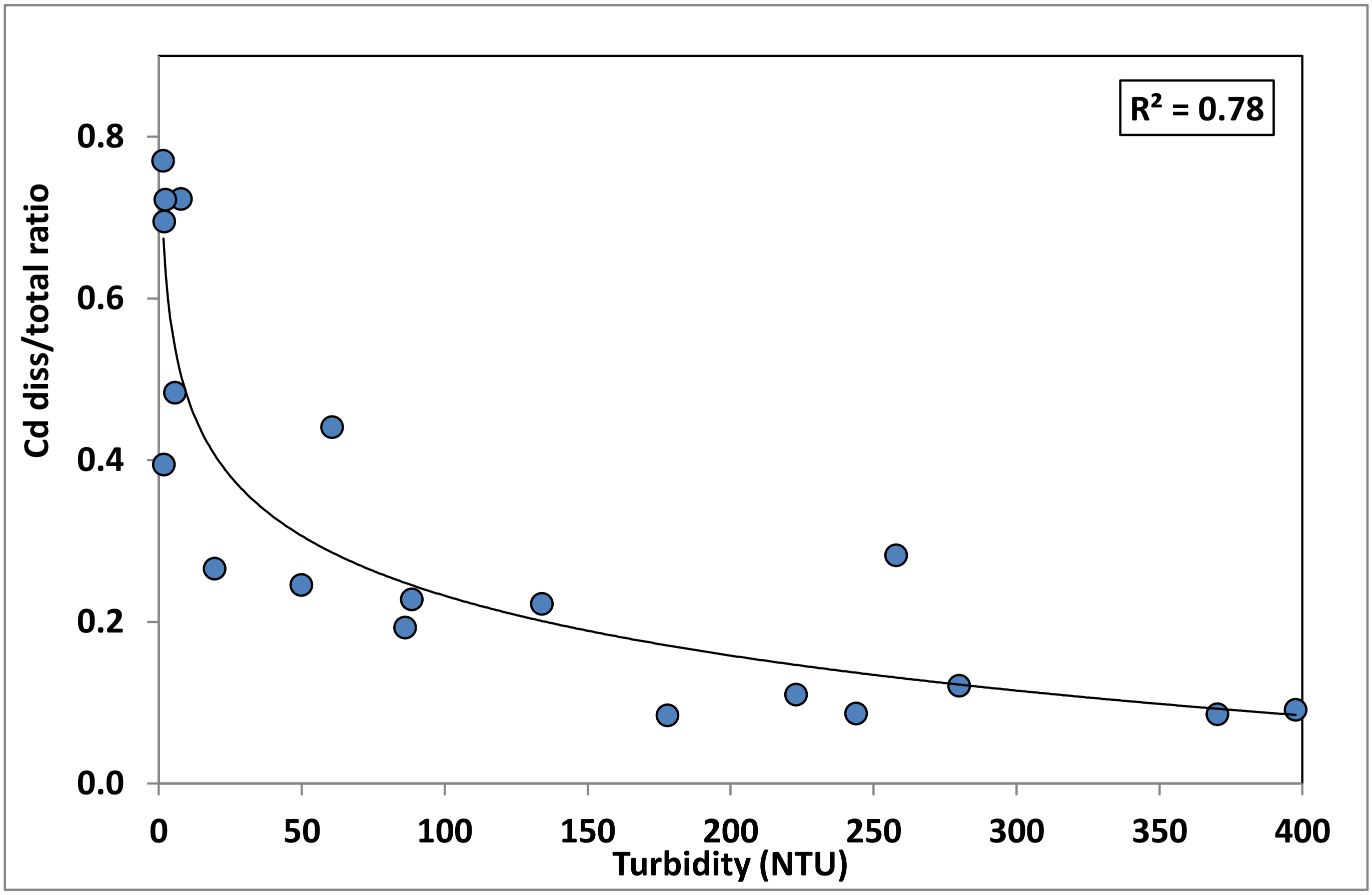


Figure B-11: The Effect of Turbidity on Dissolved/Total Ratio for Cadmium

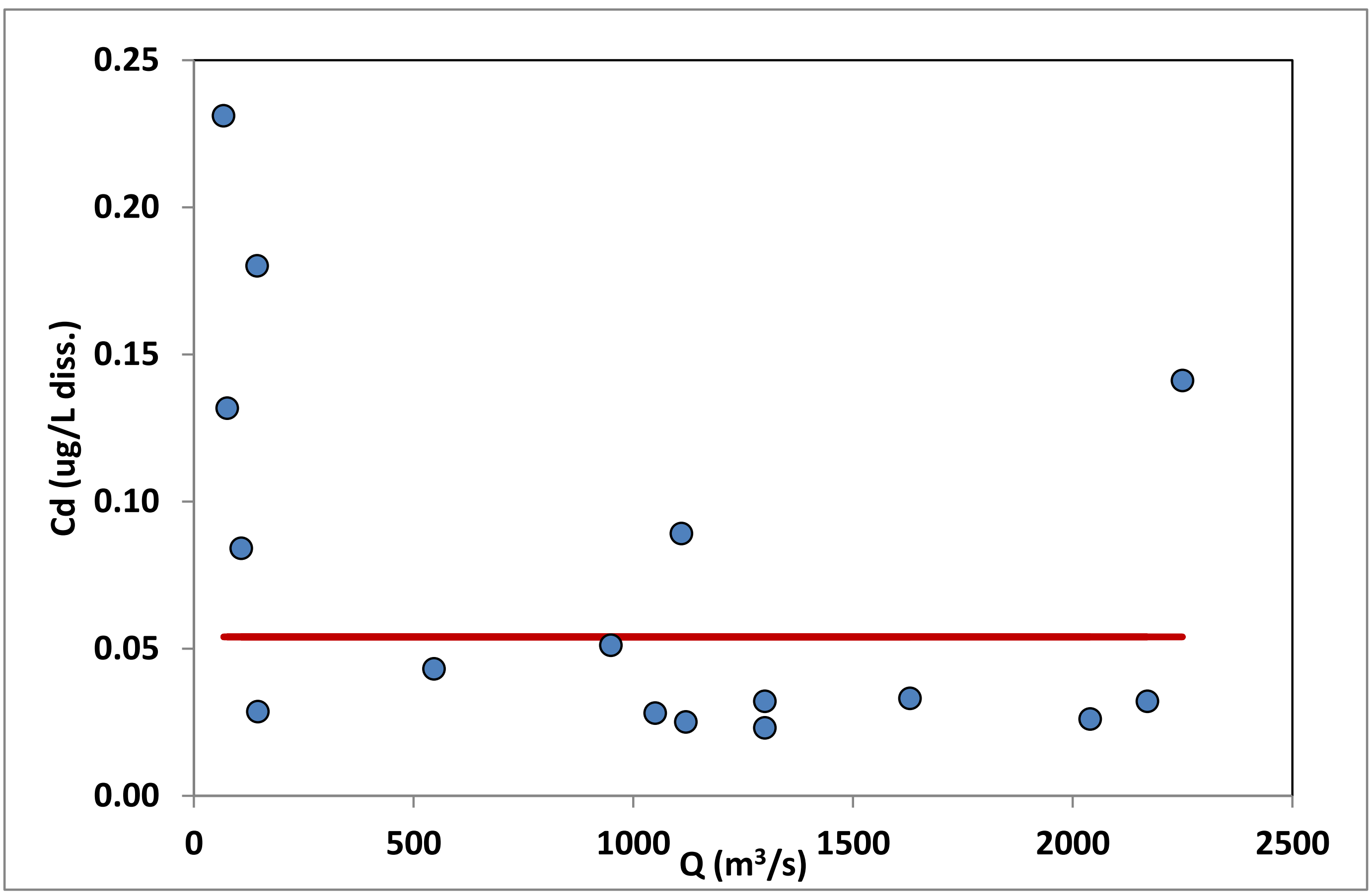


Figure B-12: The Effect of Flow on dissolved Cadmium Concentration.
The Red Line is the CCME guideline for protection of freshwater aquatic life.

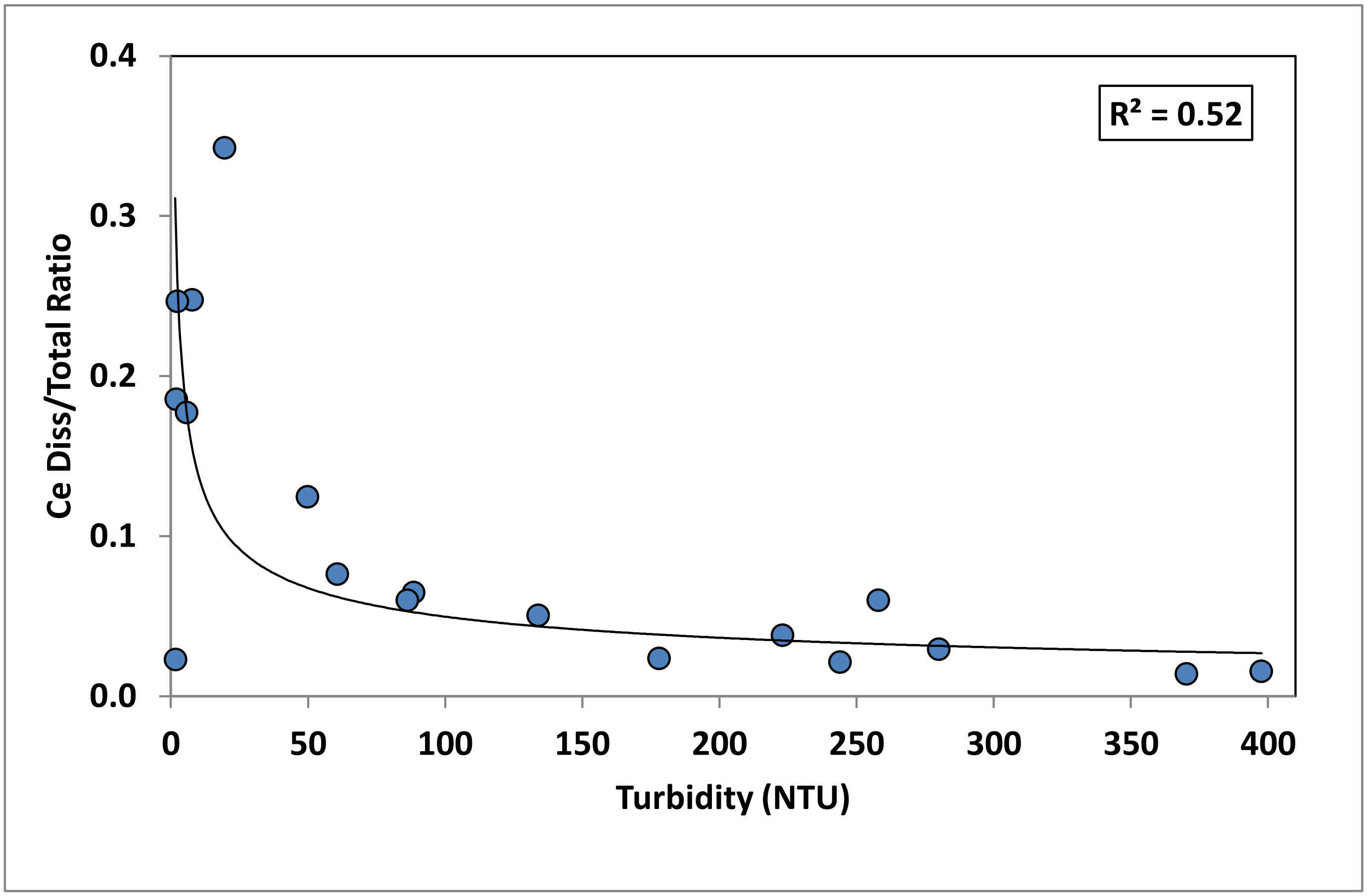


Figure B-13: The Effect of Turbidity on Dissolved/Total Ratio for Cerium

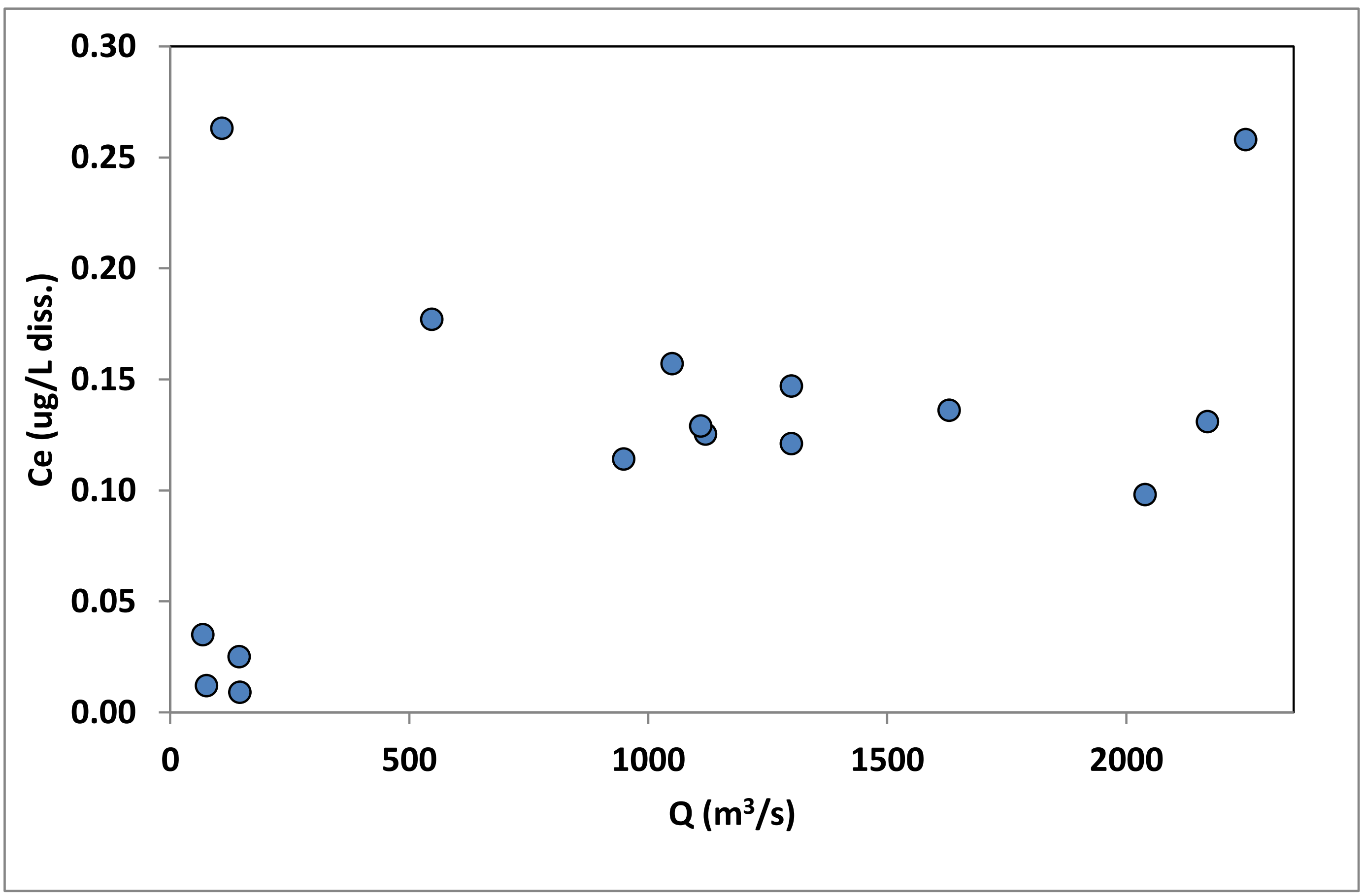


Figure B-14: The Effect of Flow Rate on dissolved Cerium Concentration.

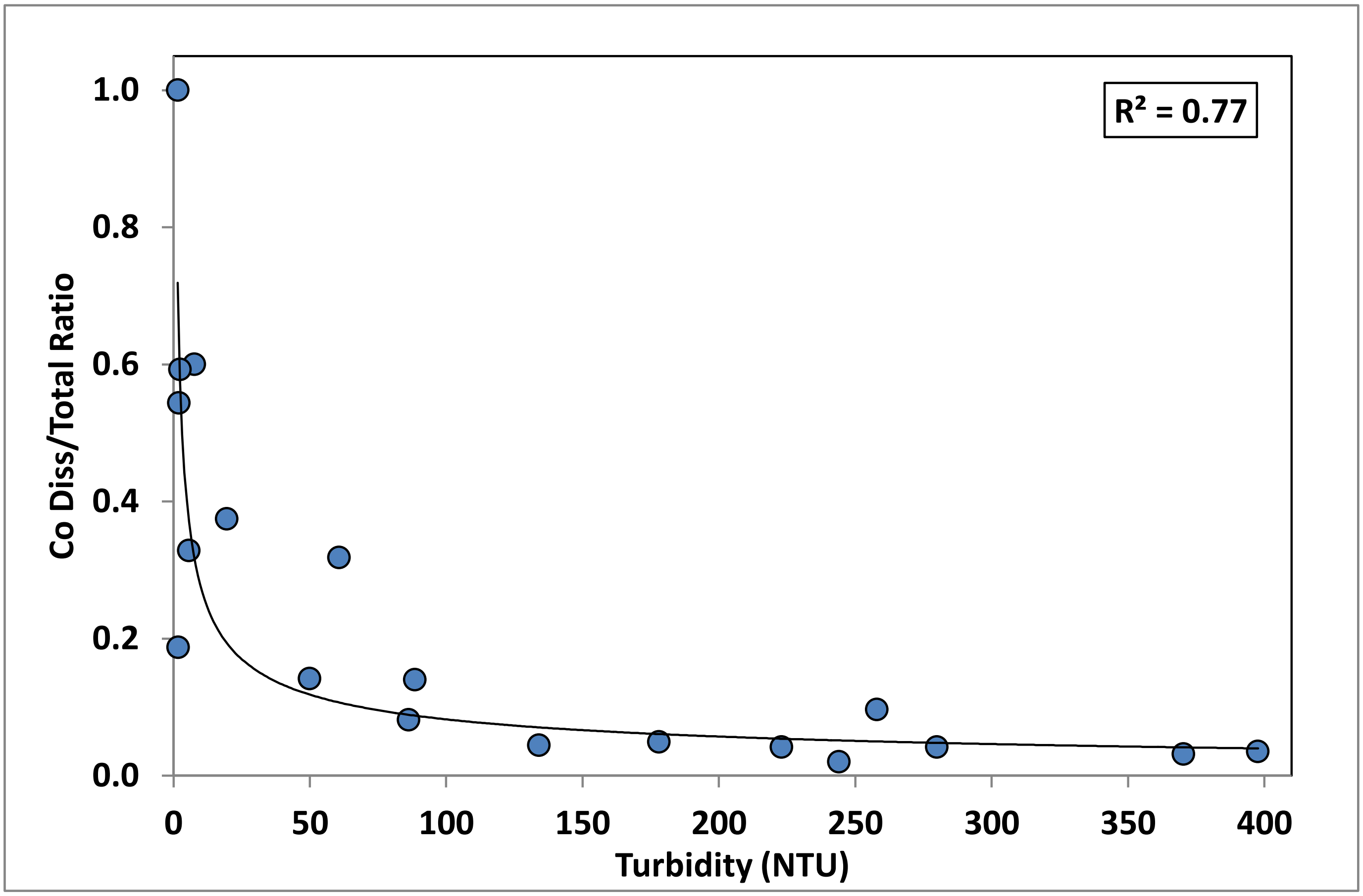


Figure B-15: The Effect of Turbidity on Dissolved/Total Ratio for Cobalt

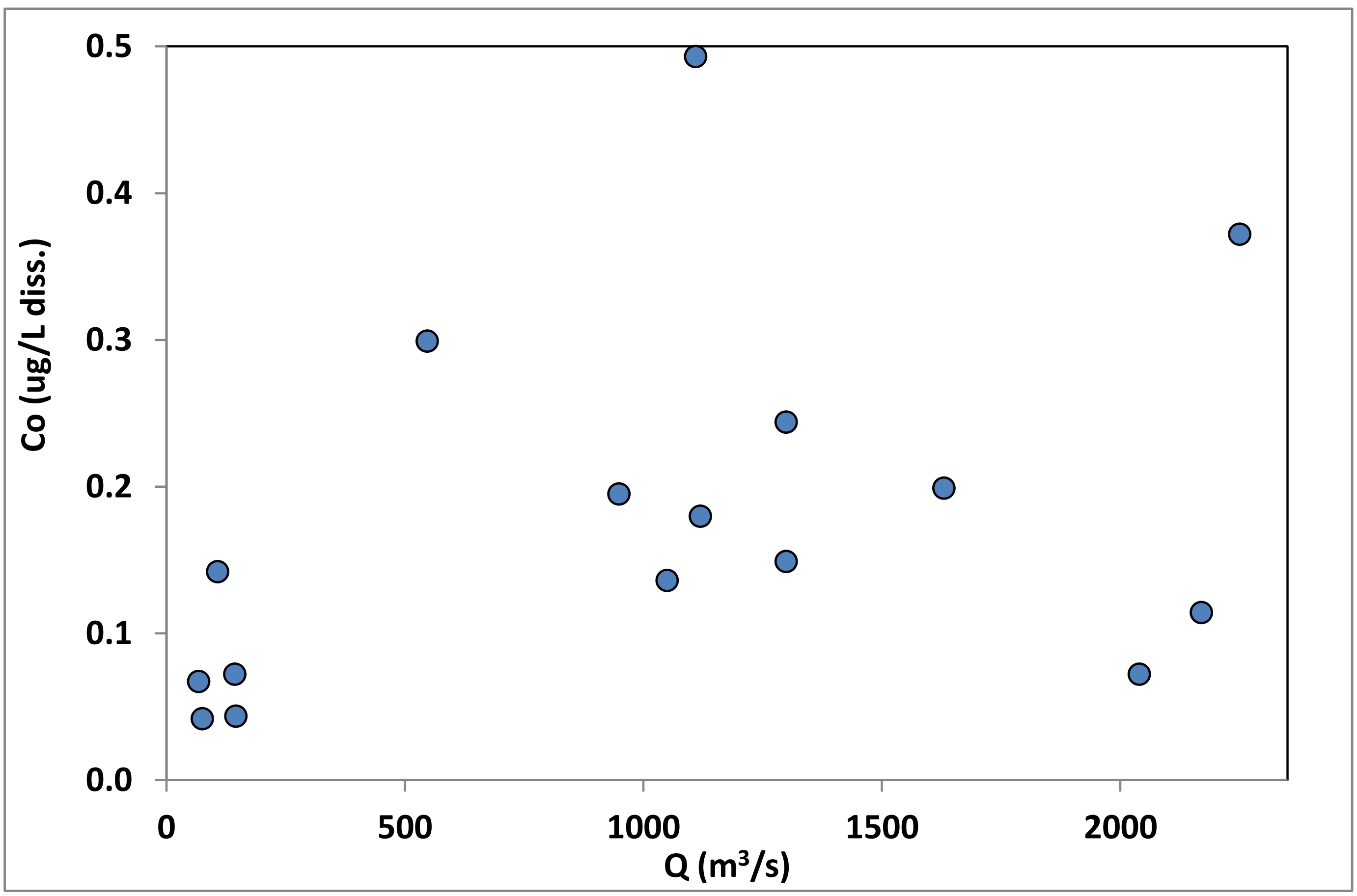


Figure B-16: The Effect of Flow Rate on dissolved Cobalt Concentration.

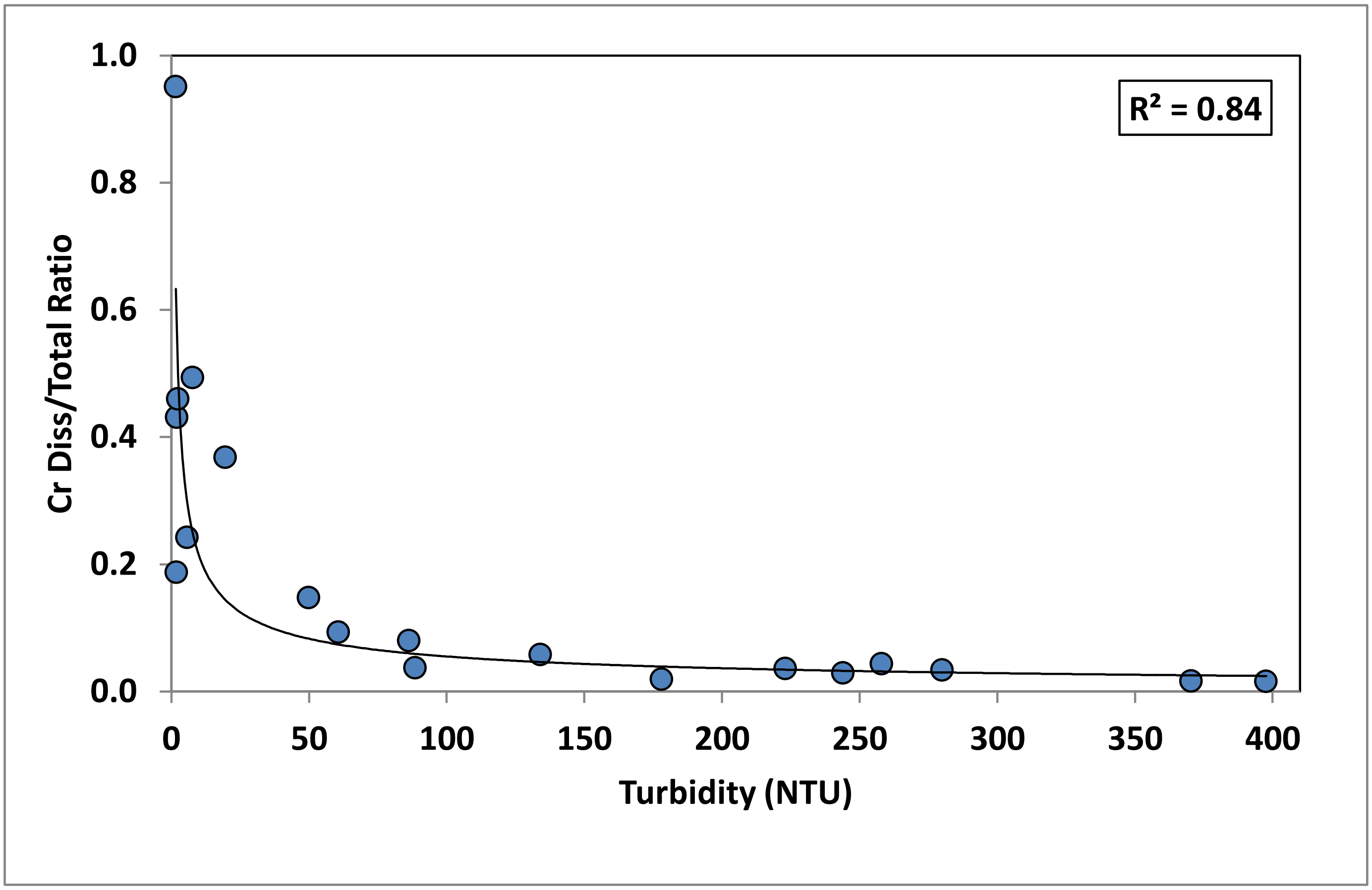


Figure B-17: The Effect of Turbidity on Dissolved/Total Ratio for Chromium

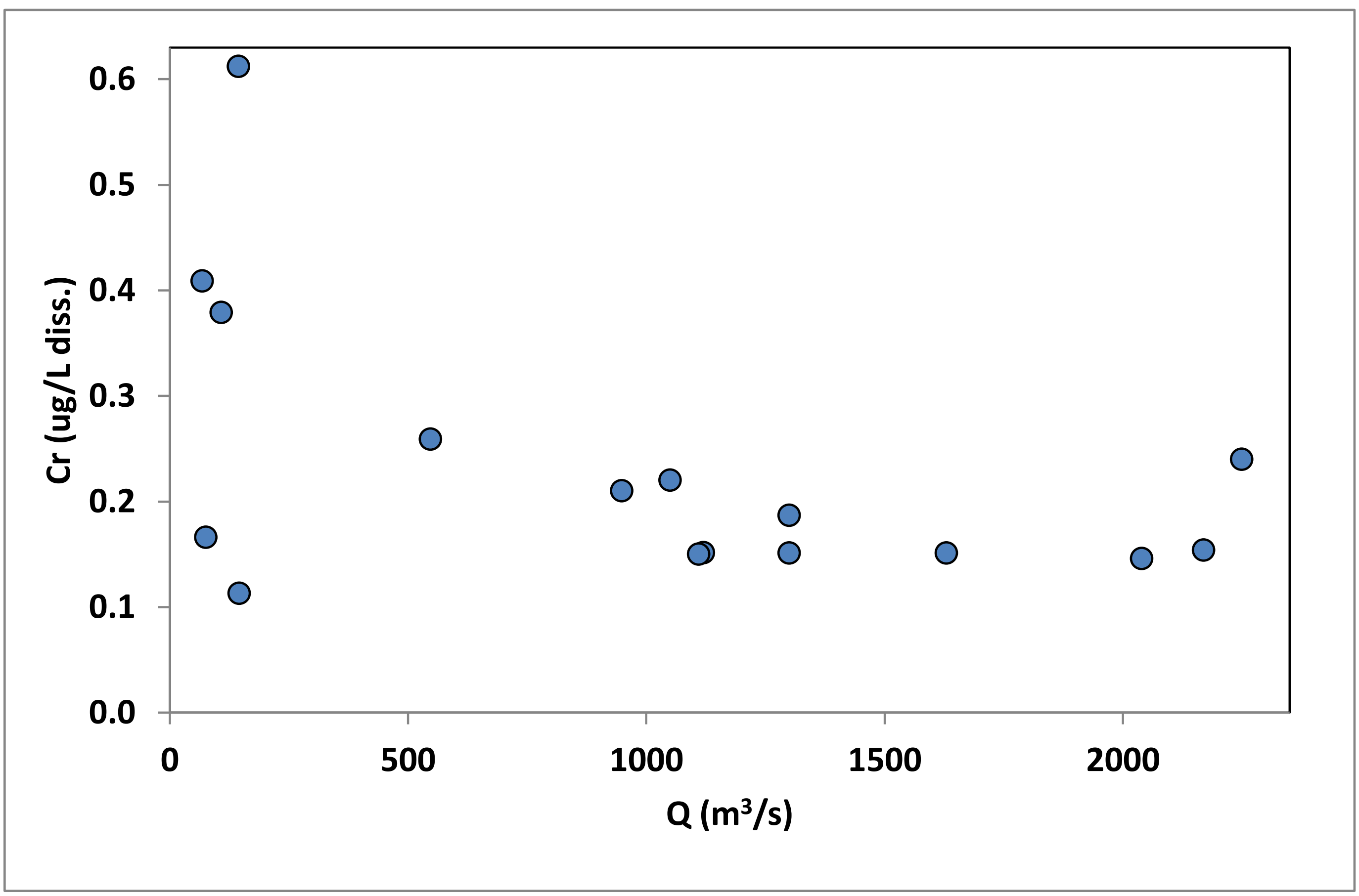


Figure B-18: The Effect of Flow Rate on dissolved Chromium Concentration.

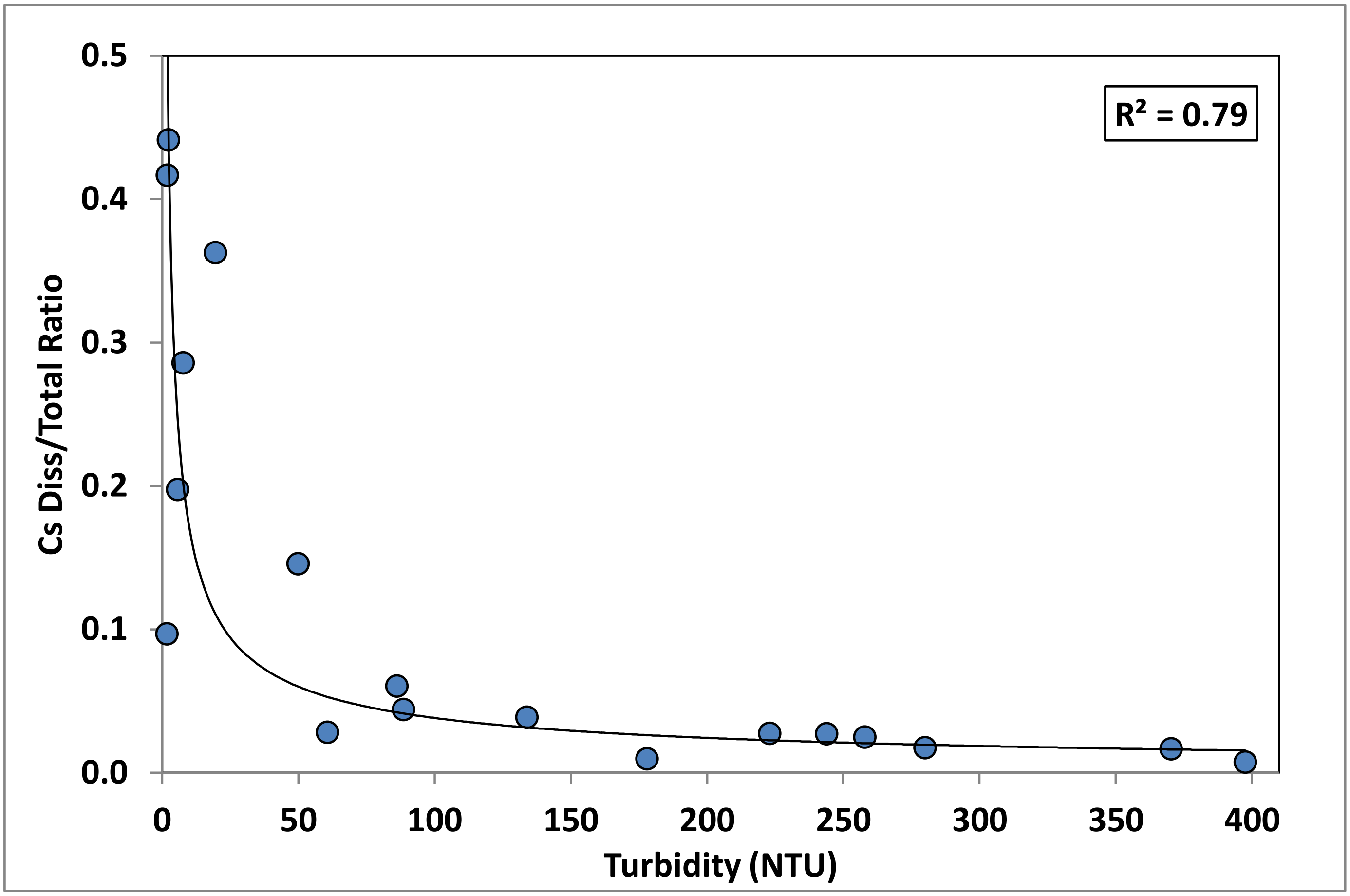


Figure B-19: The Effect of Turbidity on Dissolved/Total Ratio for Cesium

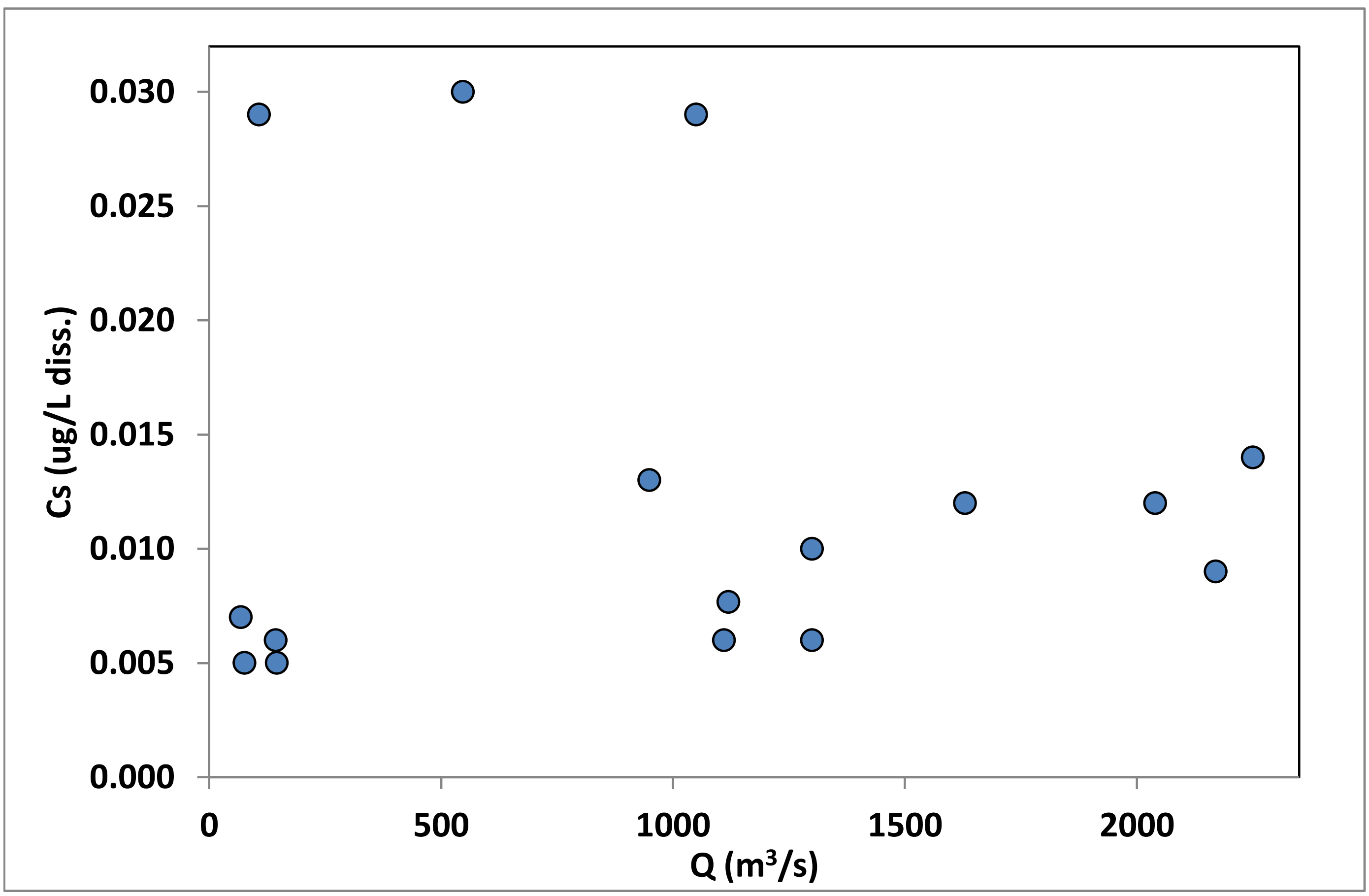


Figure B-20: The Effect of Flow Rate on dissolved Cesium Concentration.

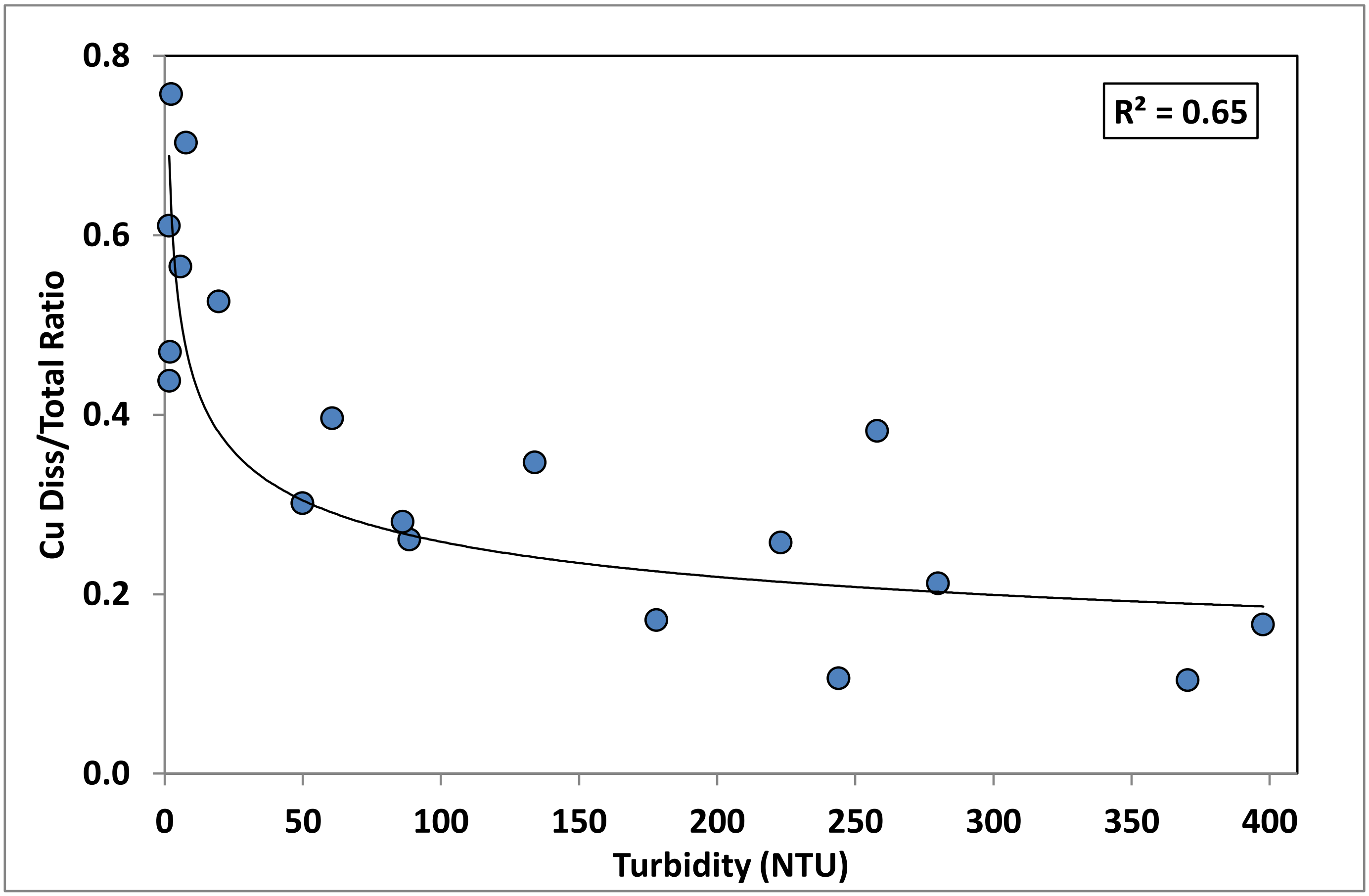


Figure B-21: The Effect of Turbidity on Dissolved/Total Ratio for Copper

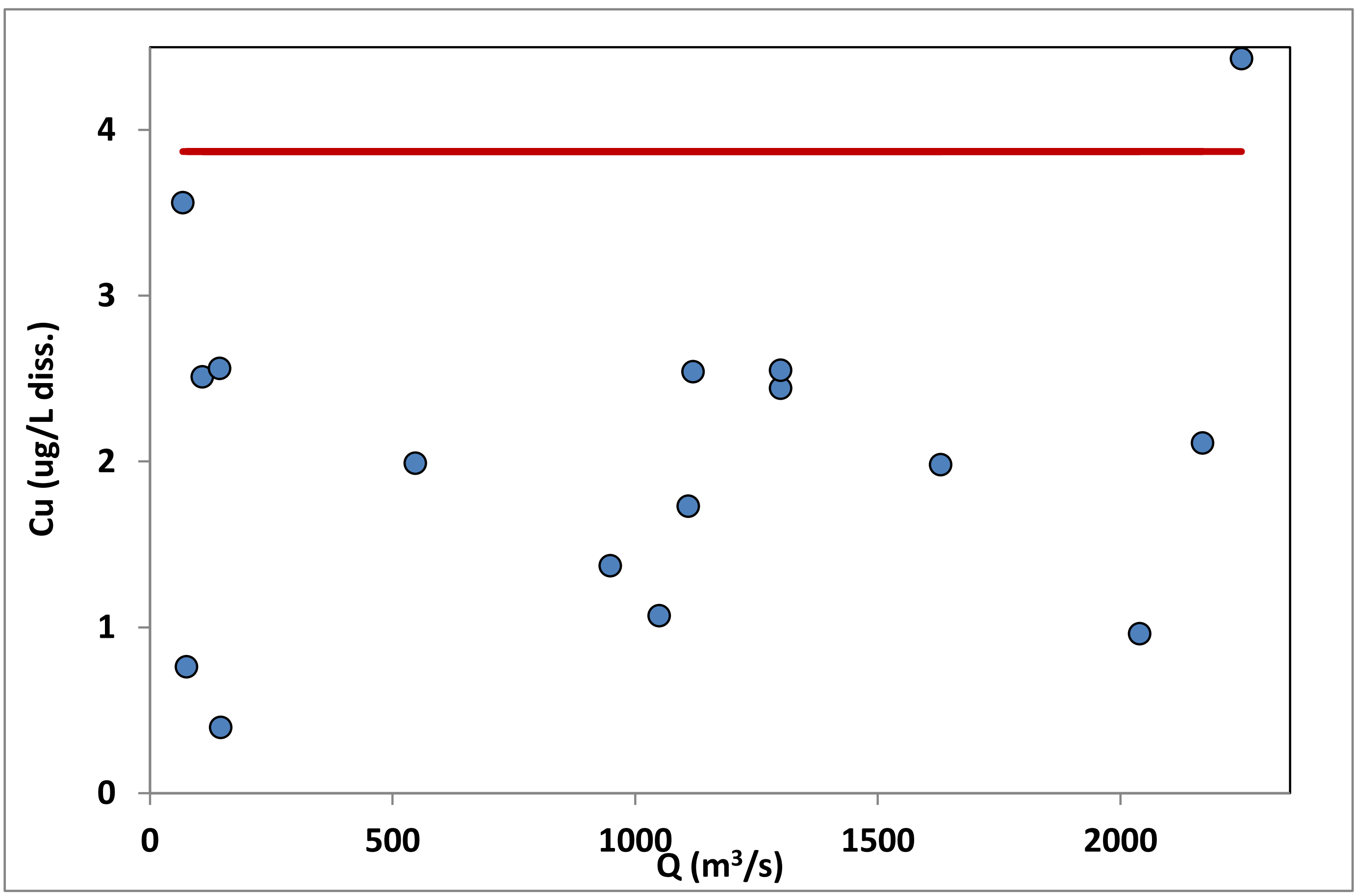


Figure B-22: The Effect of Flow on dissolved Copper Concentration.
The Red Line is the CCME Guideline for protection of freshwater aquatic life.

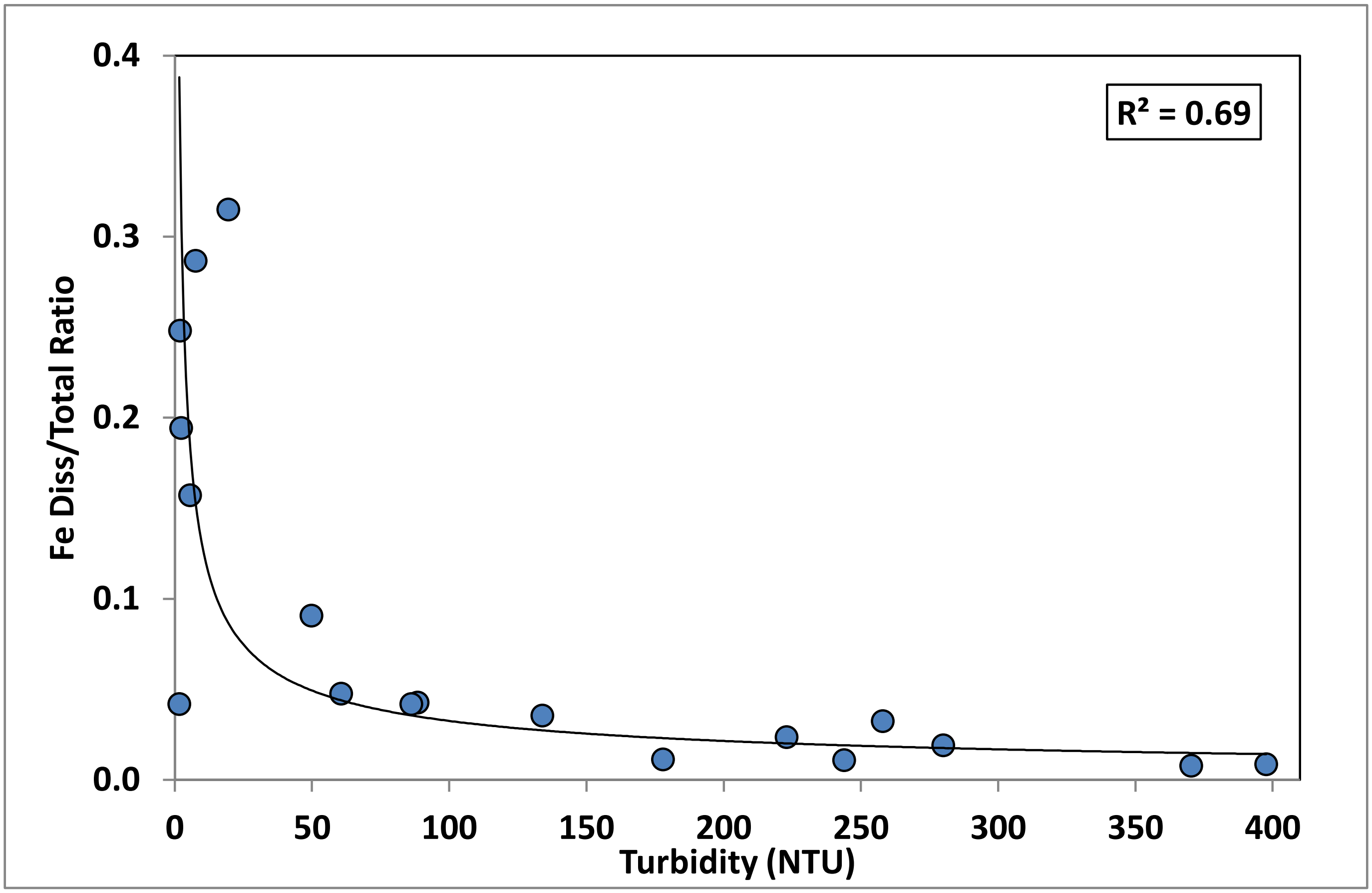


Figure B-23: The Effect of Turbidity on Dissolved/Total Ratio for Iron

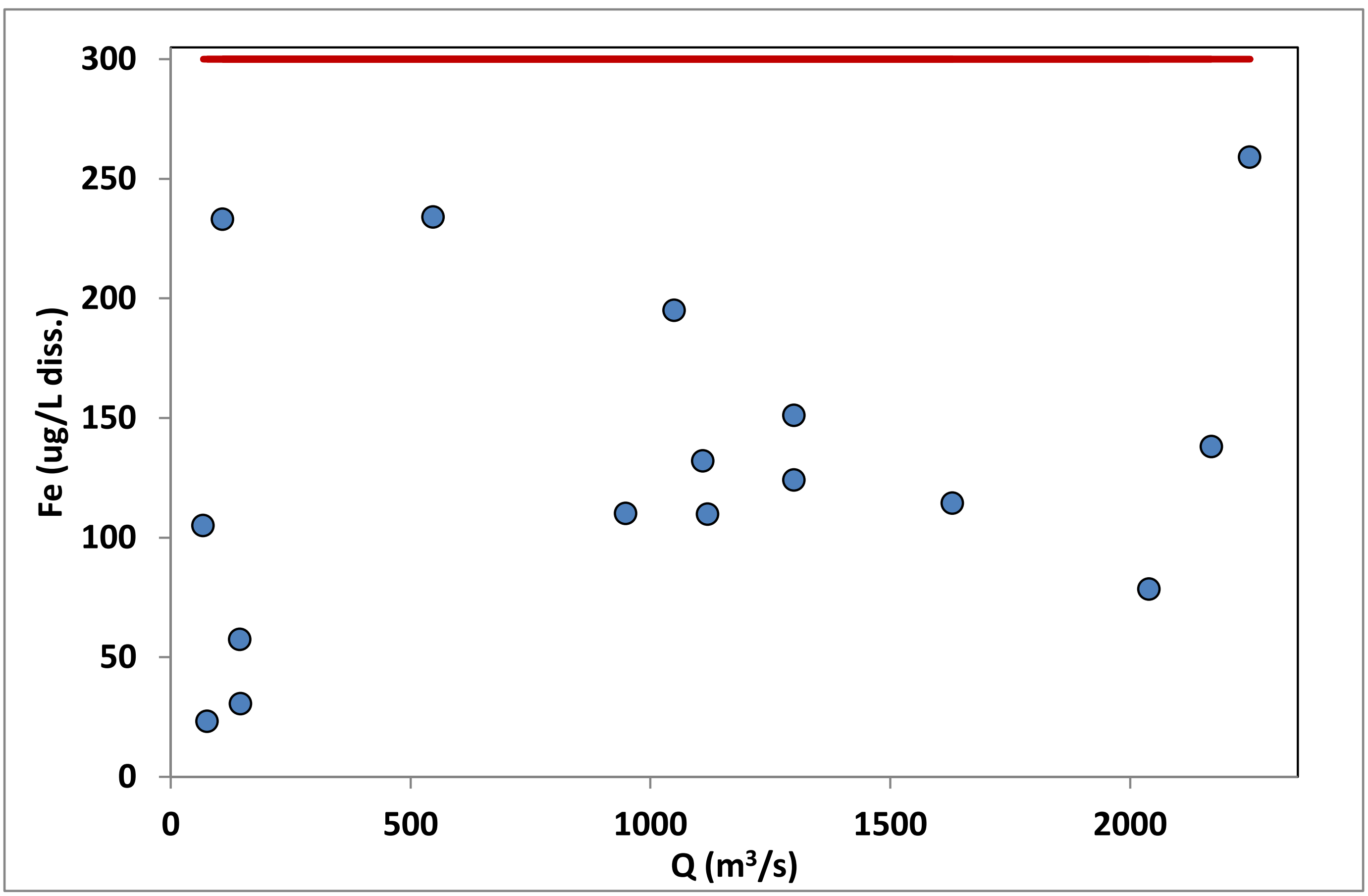


Figure B-24: The Effect of Flow on dissolved Iron Concentration.
The Red Line is the CCME Guideline for protection of freshwater aqautic life.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

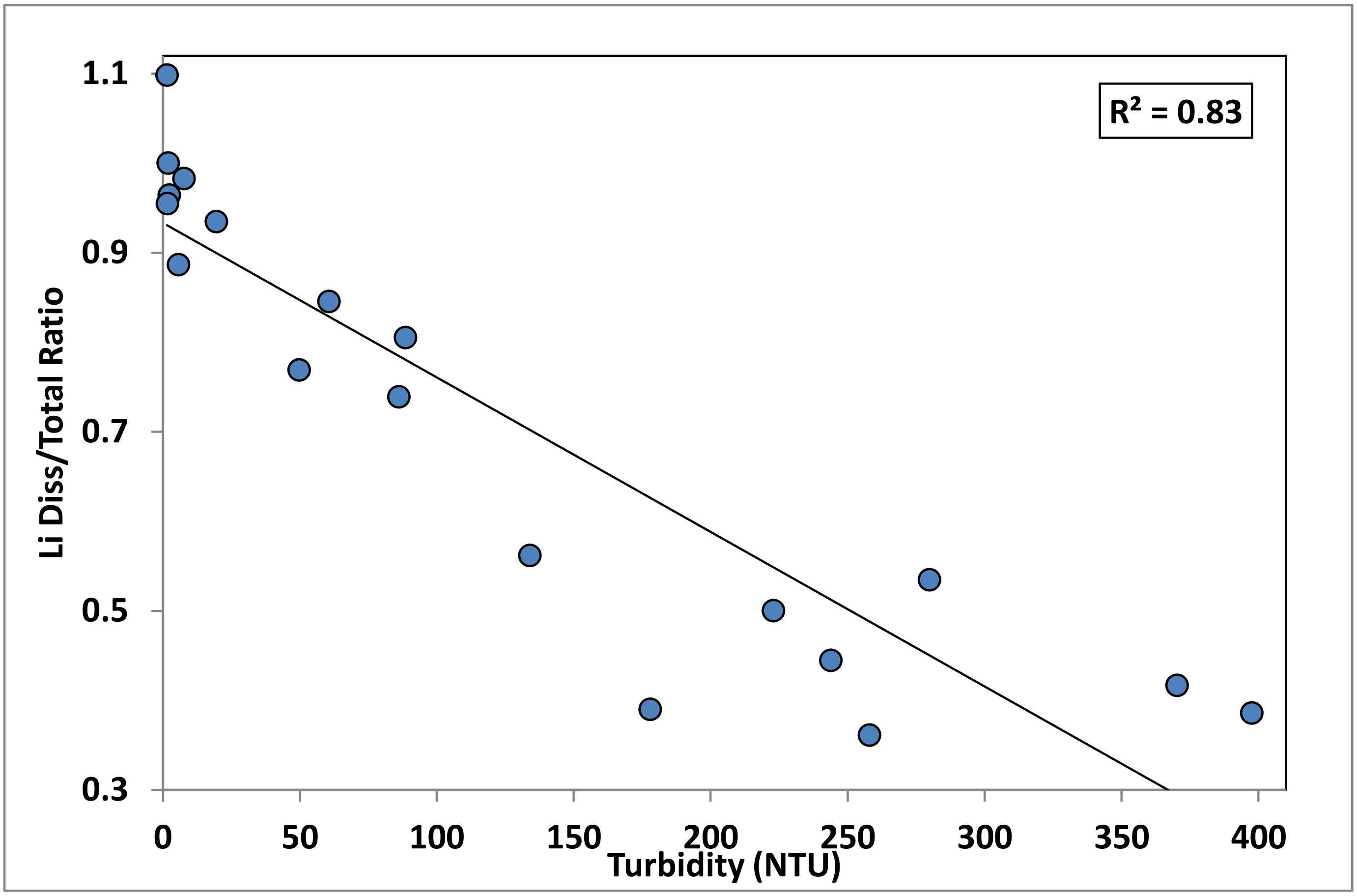


Figure B-25: The Effect of Turbidity on Dissolved/Total Ratio for Lithium

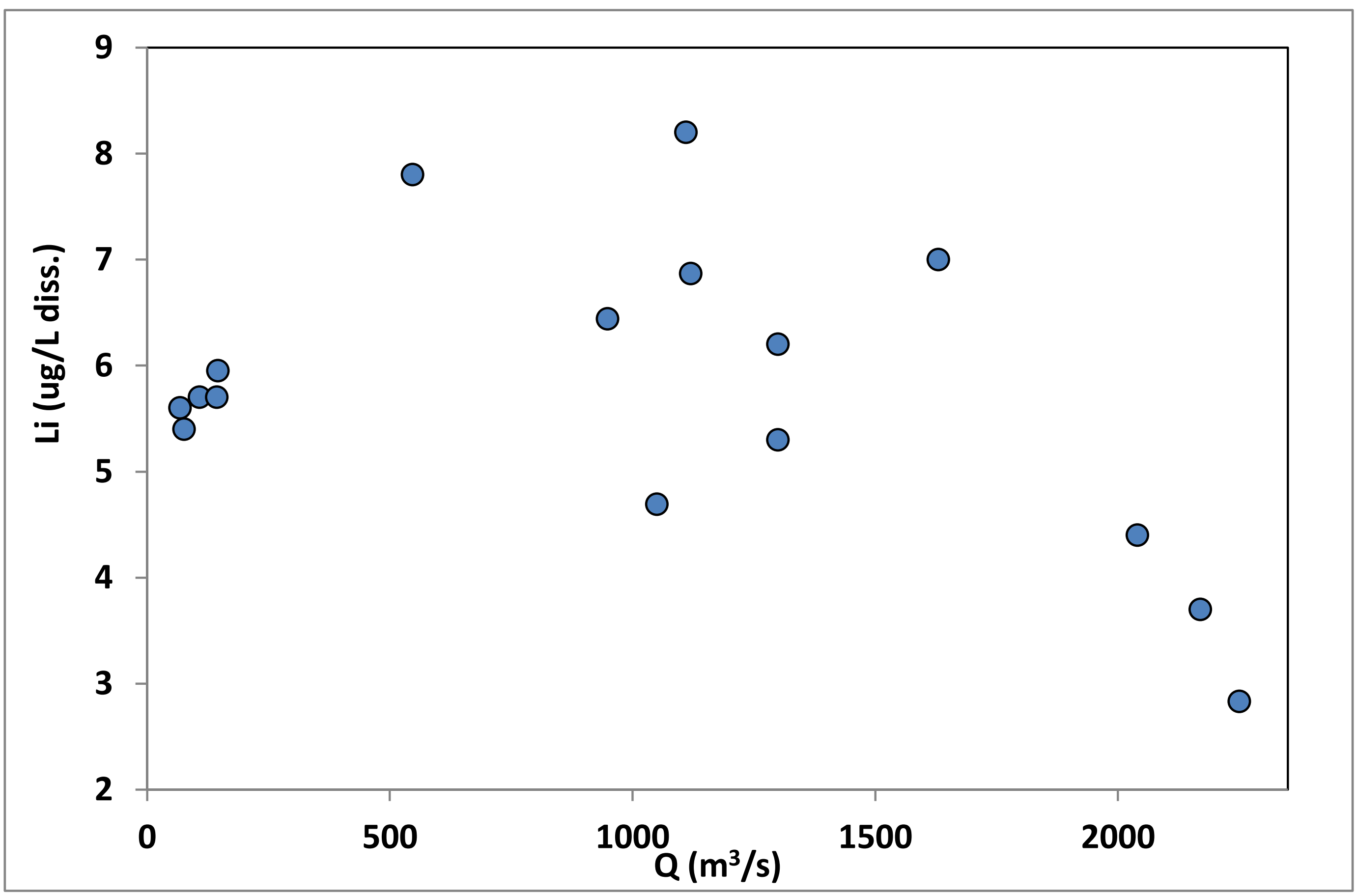


Figure B-26: The Effect of Flow Rate on dissolved Lithium Concentration.

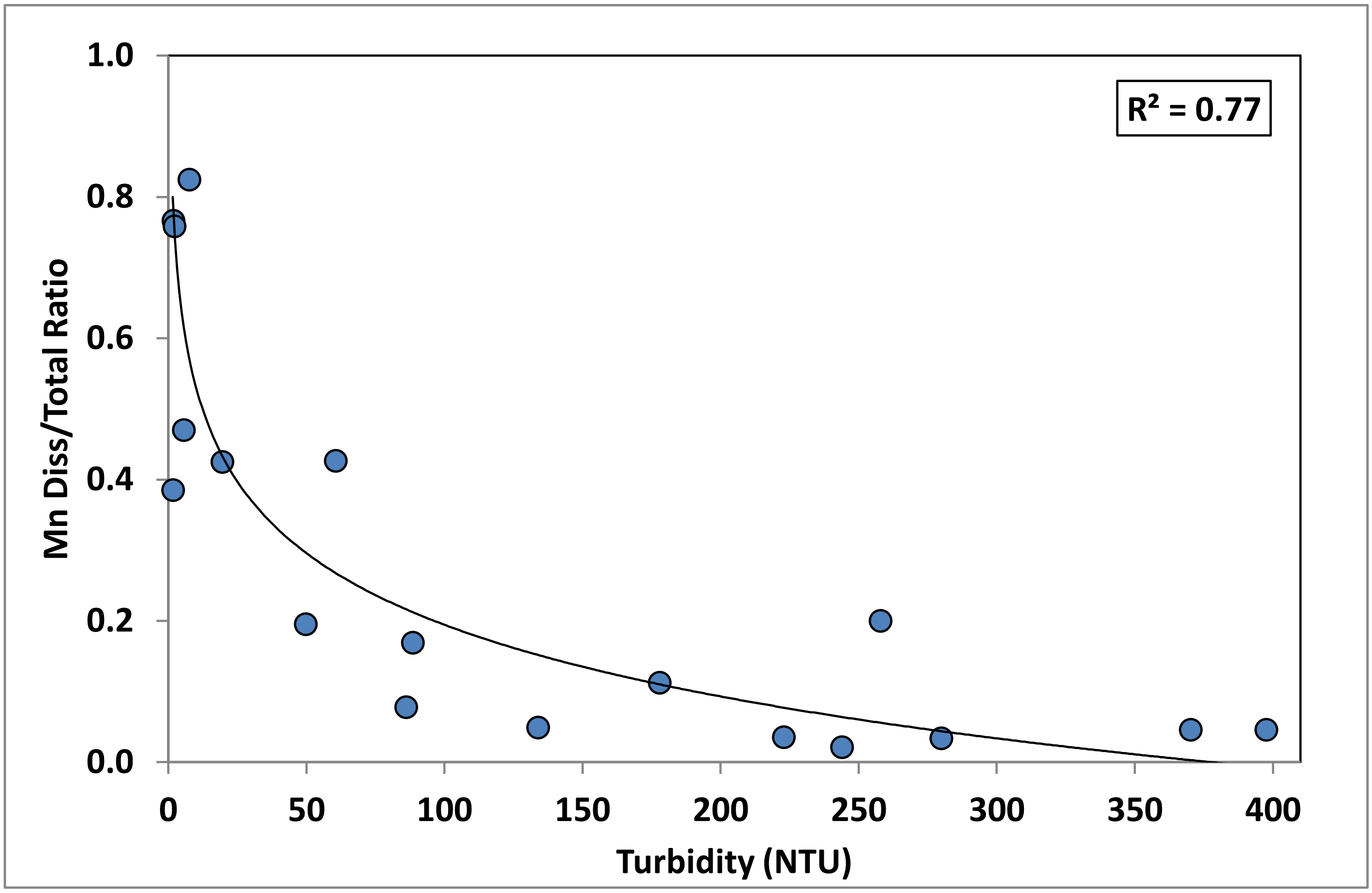


Figure B-27: The Effect of Turbidity on Dissolved/Total Ratio for Manganese

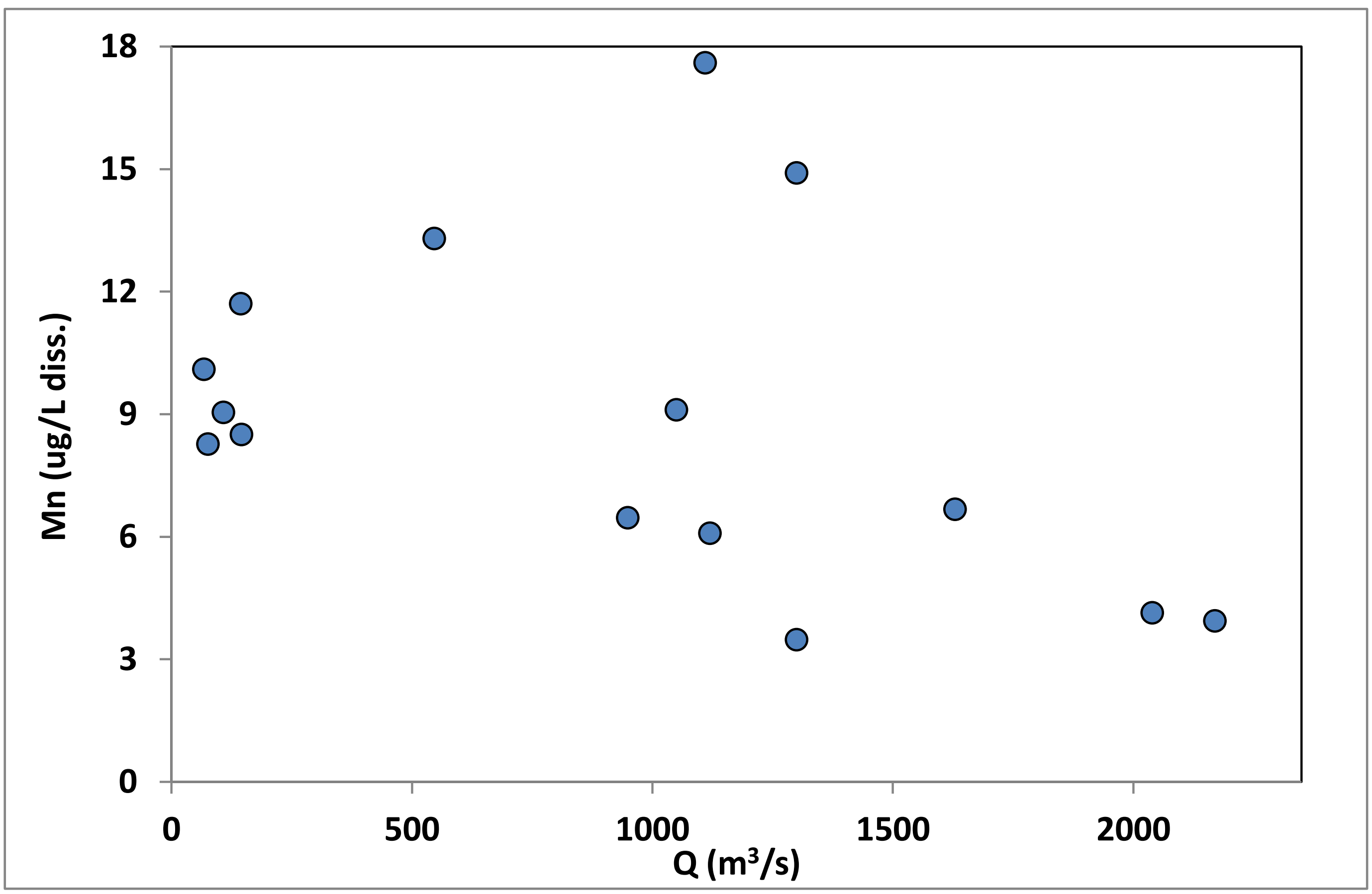


Figure B-28: The Effect of Flow Rate on dissolved Manganese Concentration.

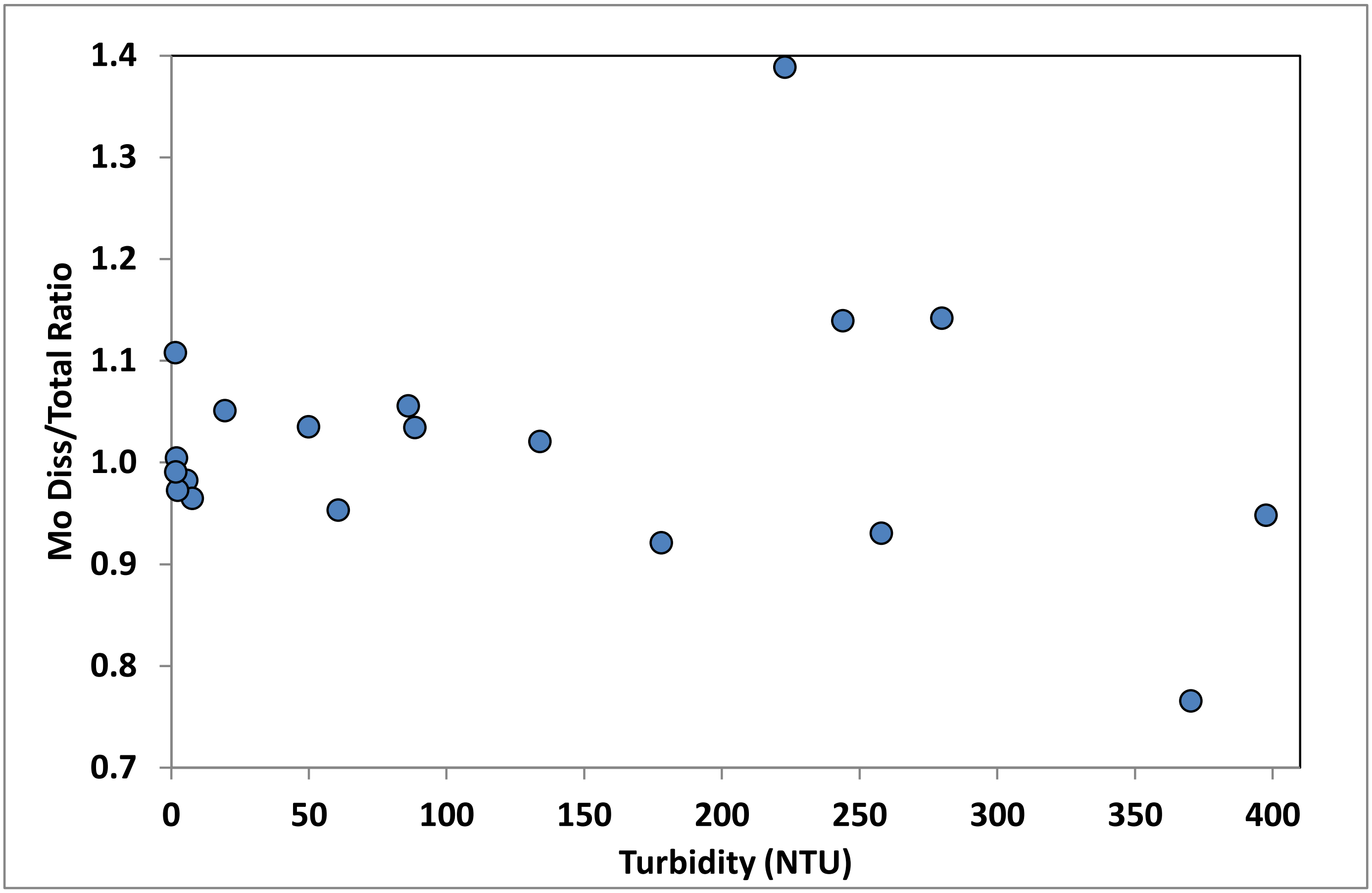


Figure B-29: The Effect of Turbidity on Dissolved/Total Ratio for Molybdenum

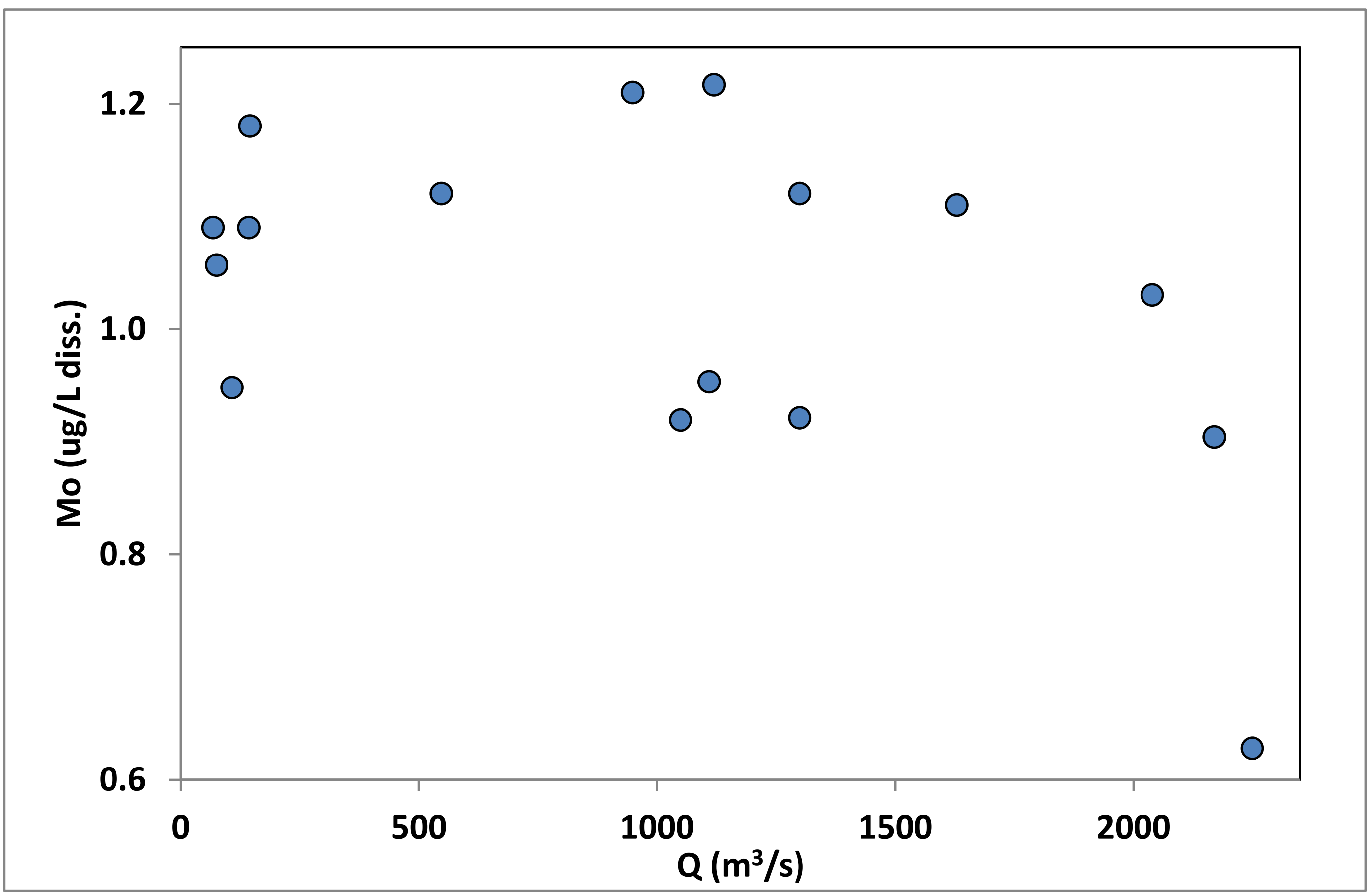


Figure B-30: The Effect of Flow Rate on dissolved Molybdenum Concentration.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

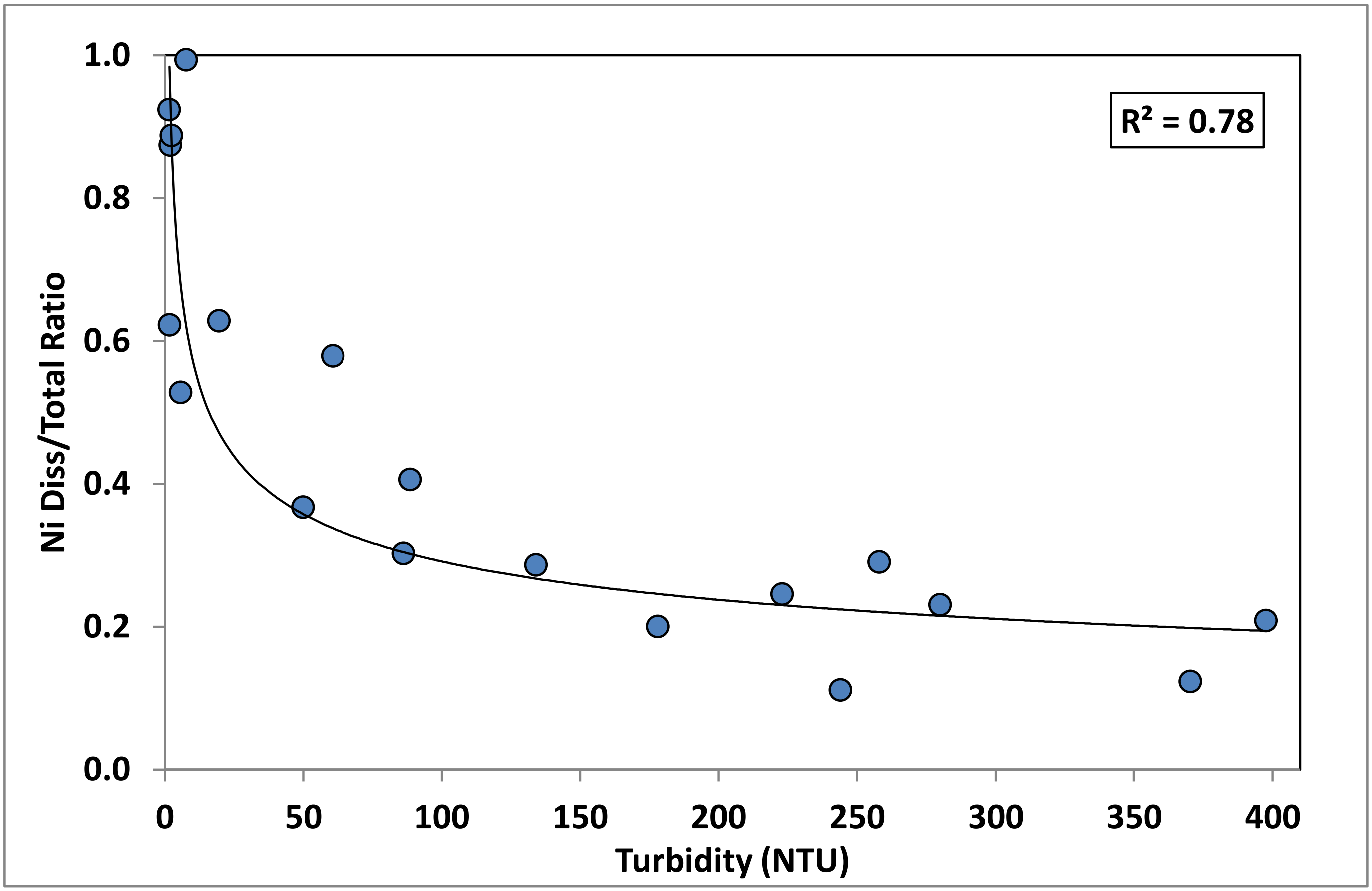


Figure B-31: The Effect of Turbidity on Dissolved/Total Ratio for Nickel

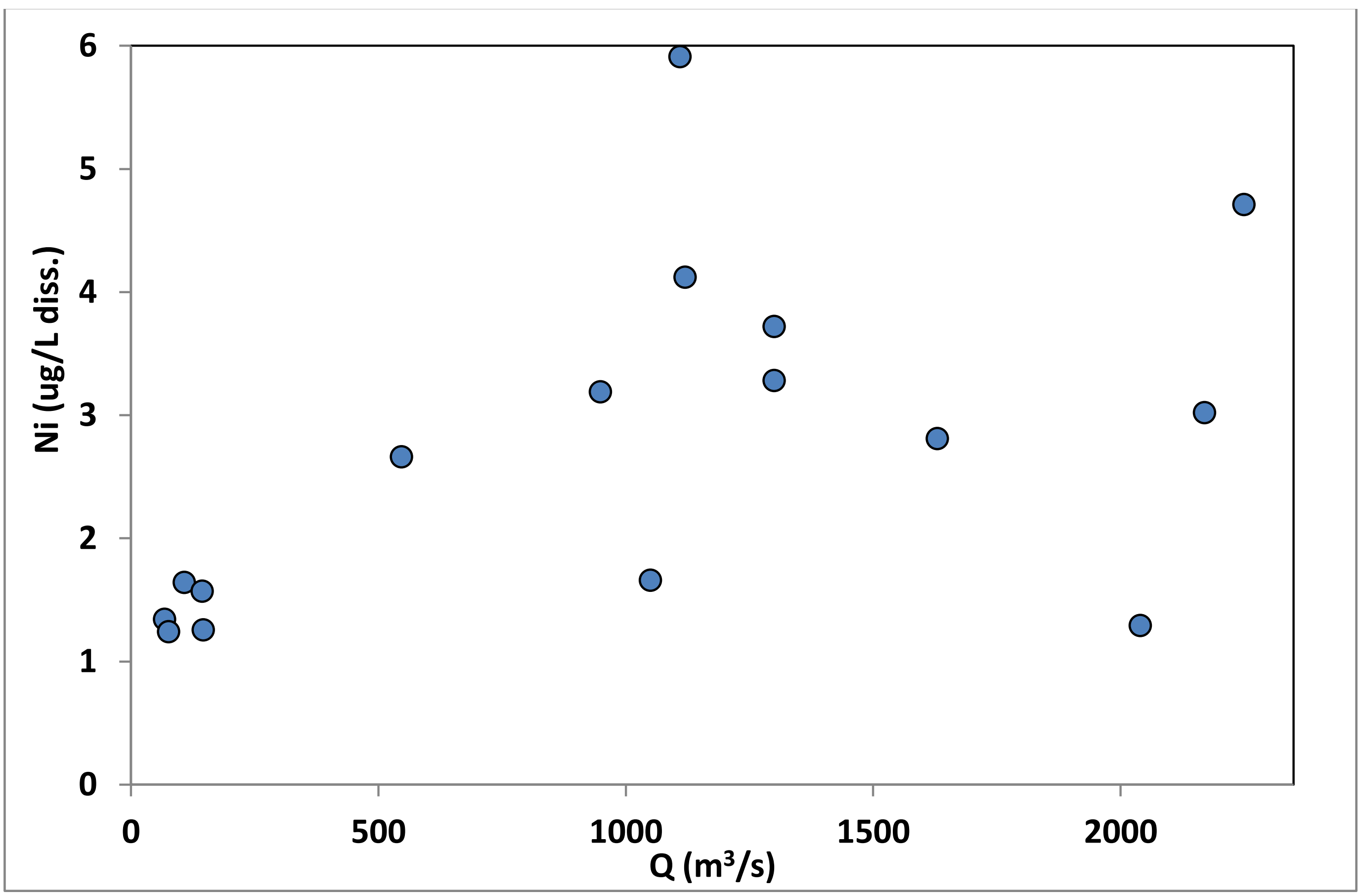


Figure B-32: The Effect of Flow Rate on dissolved Nickel Concentration.

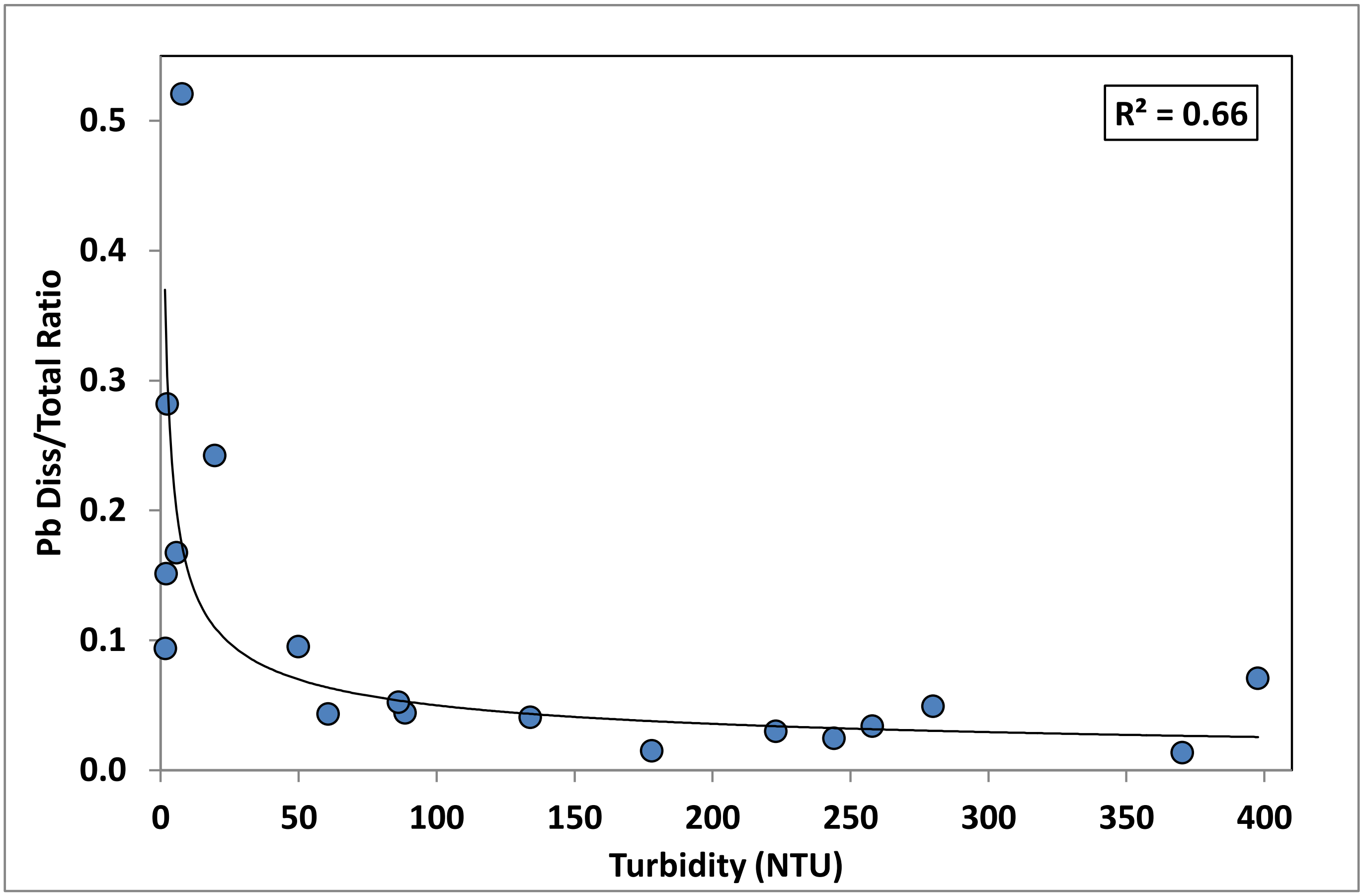


Table B-33: The Effect ofTurbidity on Dissolved/Total Ratio for Lead

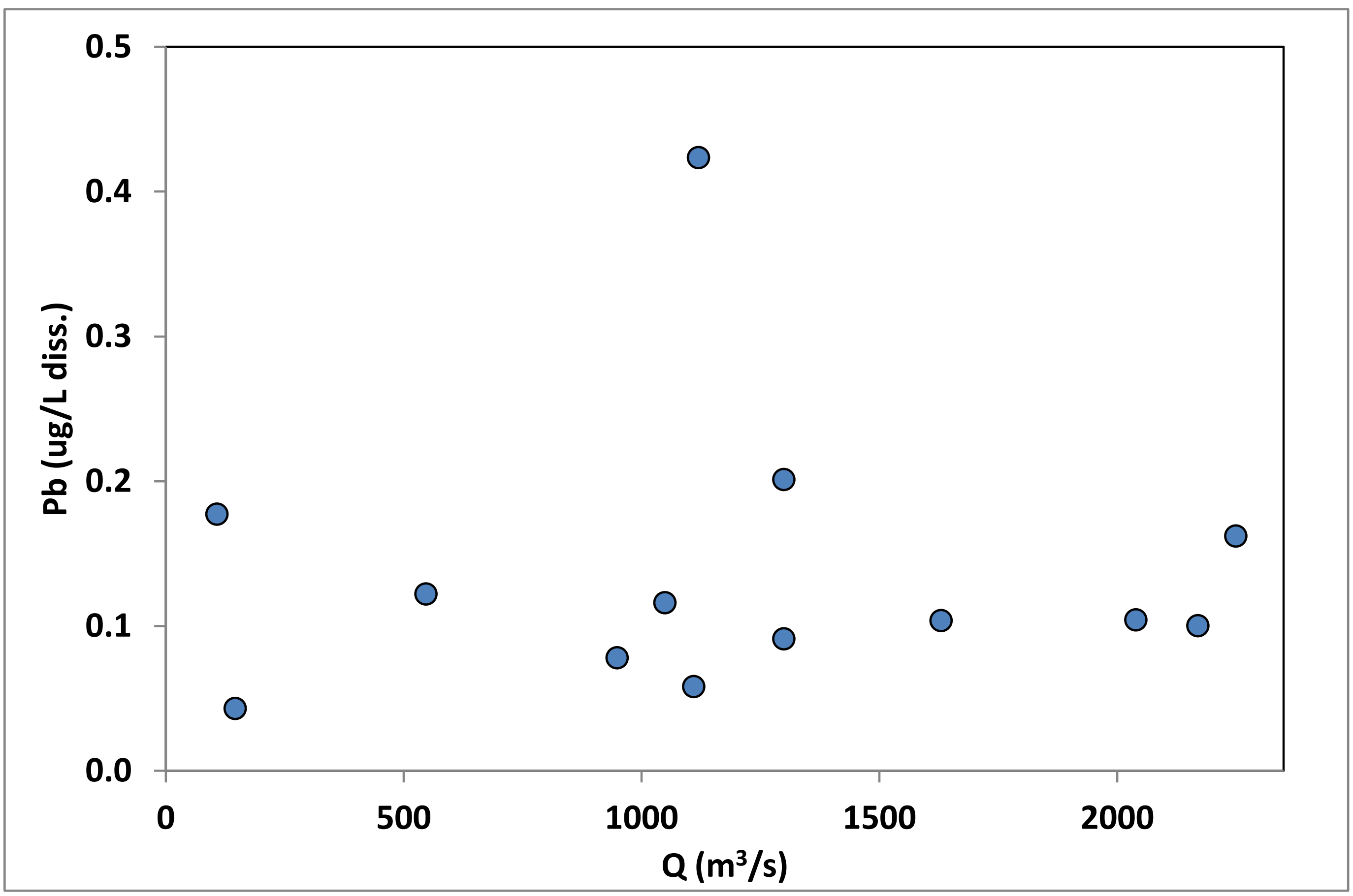


Table B-34: The Effect of Flow Rate on dissolved Lead Concentration

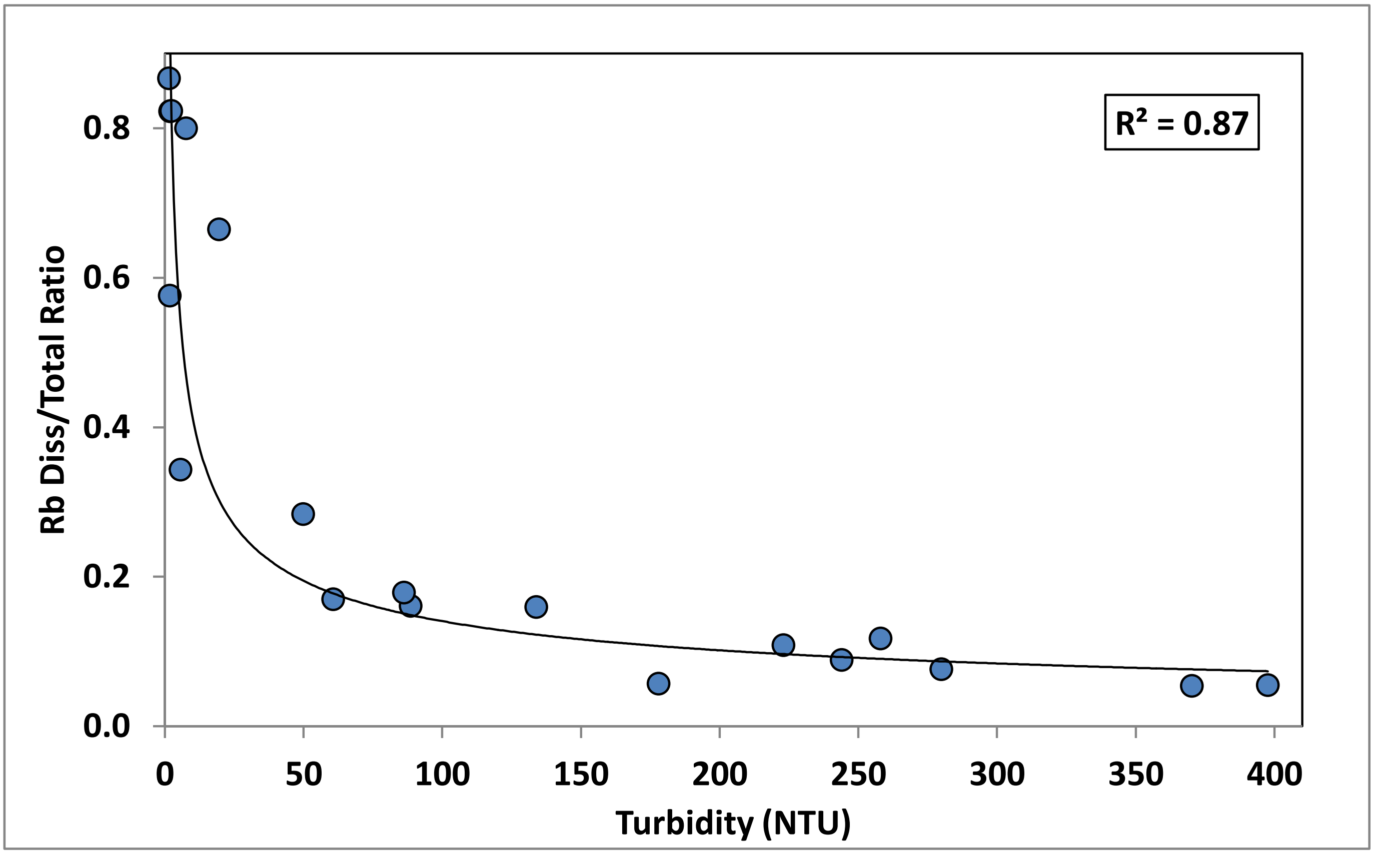


Figure B-35: The Effect of Turbidity on Dissolved/Total Ratio for Rubidium

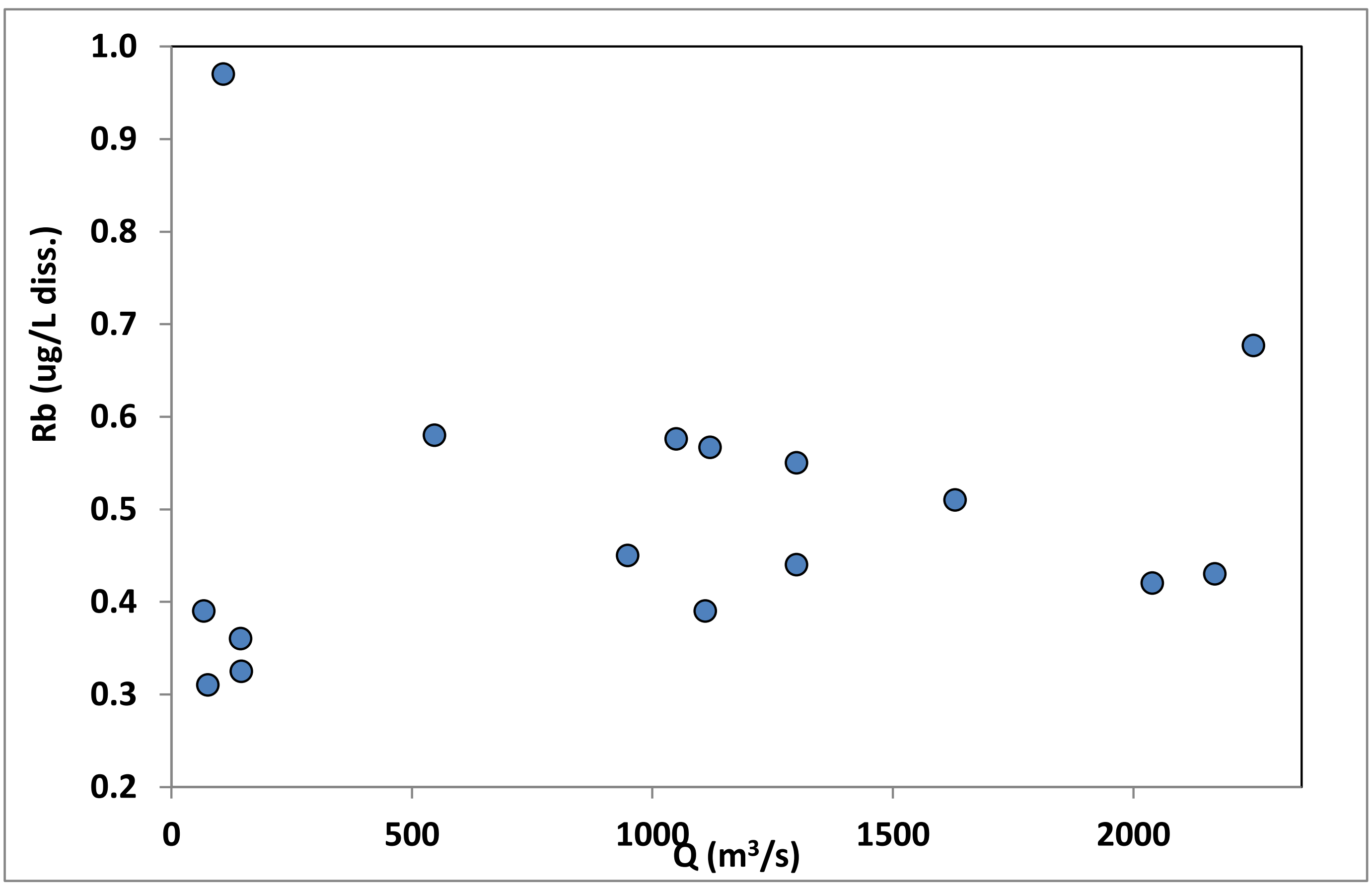


Figure B-36 The Effect of Flow Rate on dissolved Rubidium Concentration.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

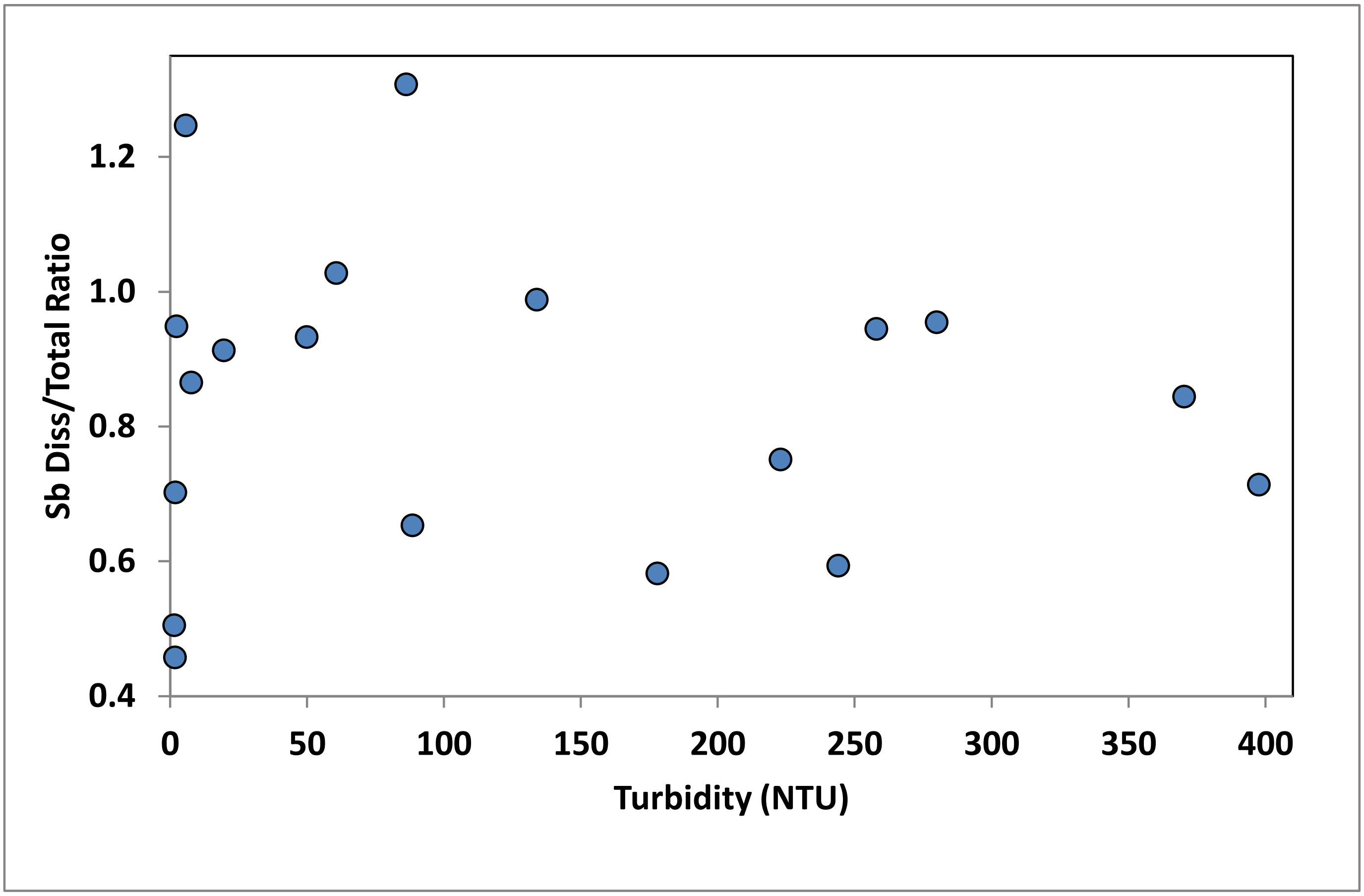


Figure B-37: The Effect of Turbidity on Dissolved/Total Ratio for Antimony

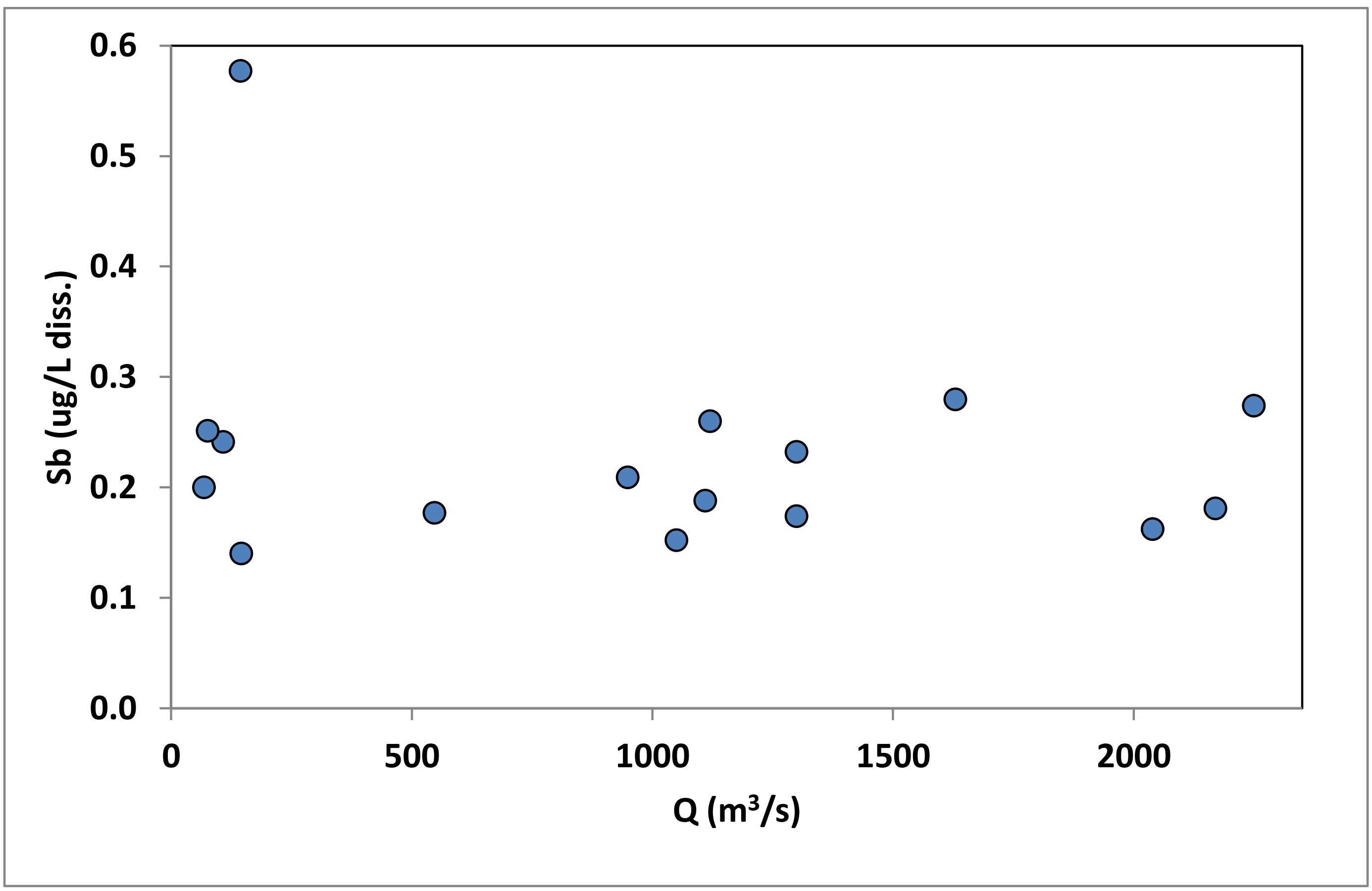


Figure B-38: The Effect of Flow Rate on dissolved Antimony Concentration.

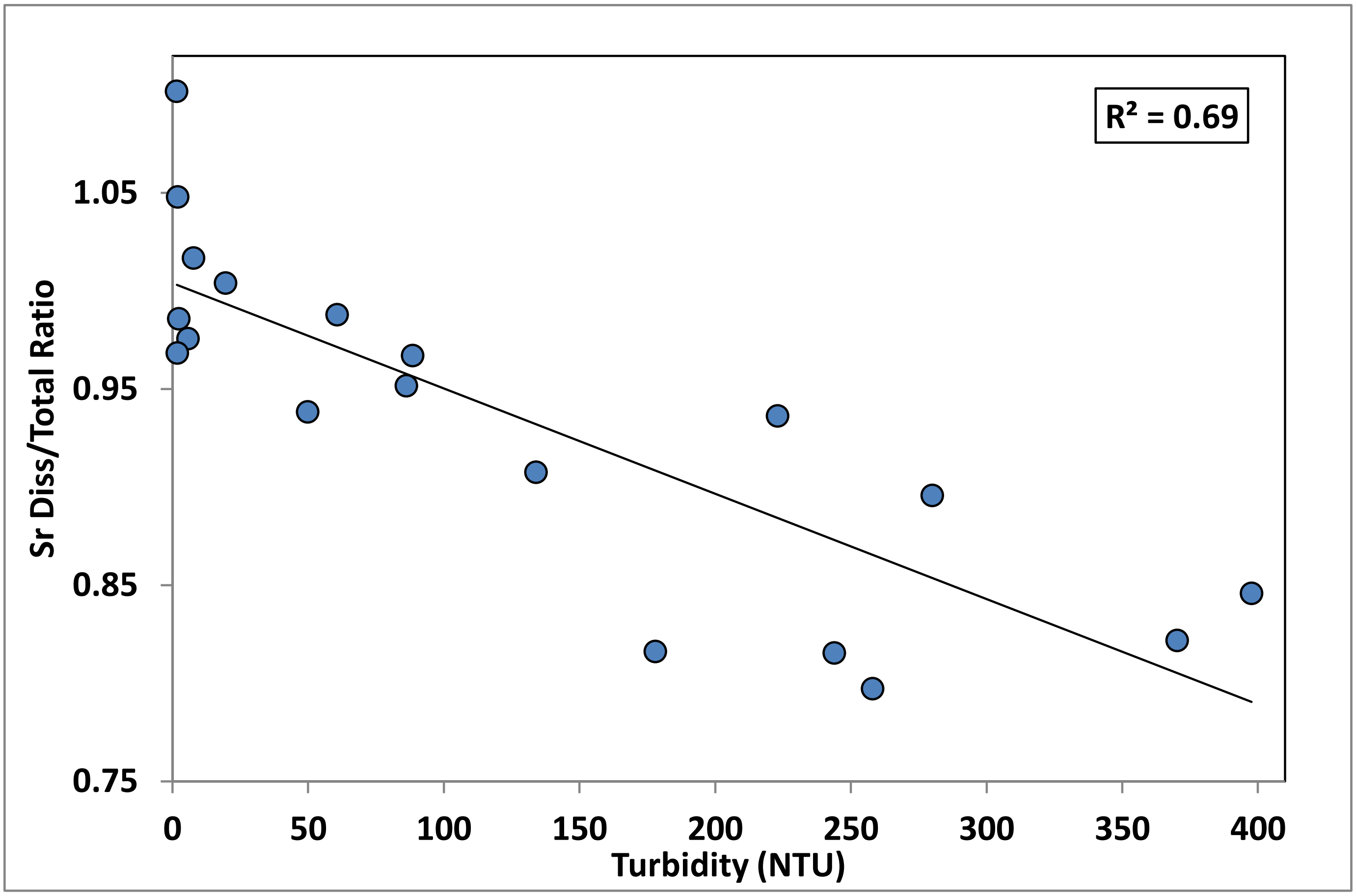


Figure B-39: The Effect of Turbidity on Dissolved/Total Ratio for Strontium

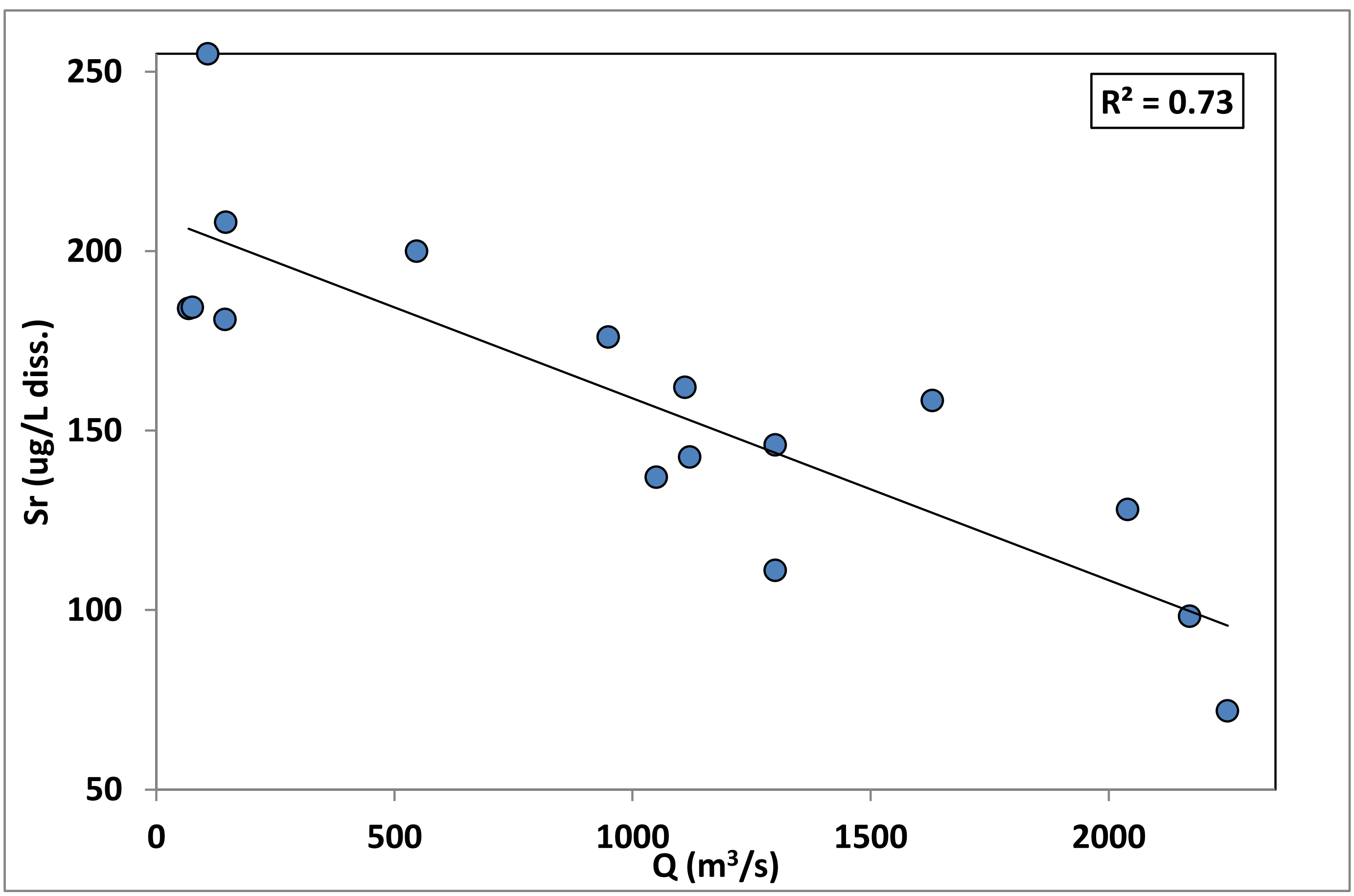


Figure B-40: The Effect of Flow Rate on dissolved Strontium Concentration.

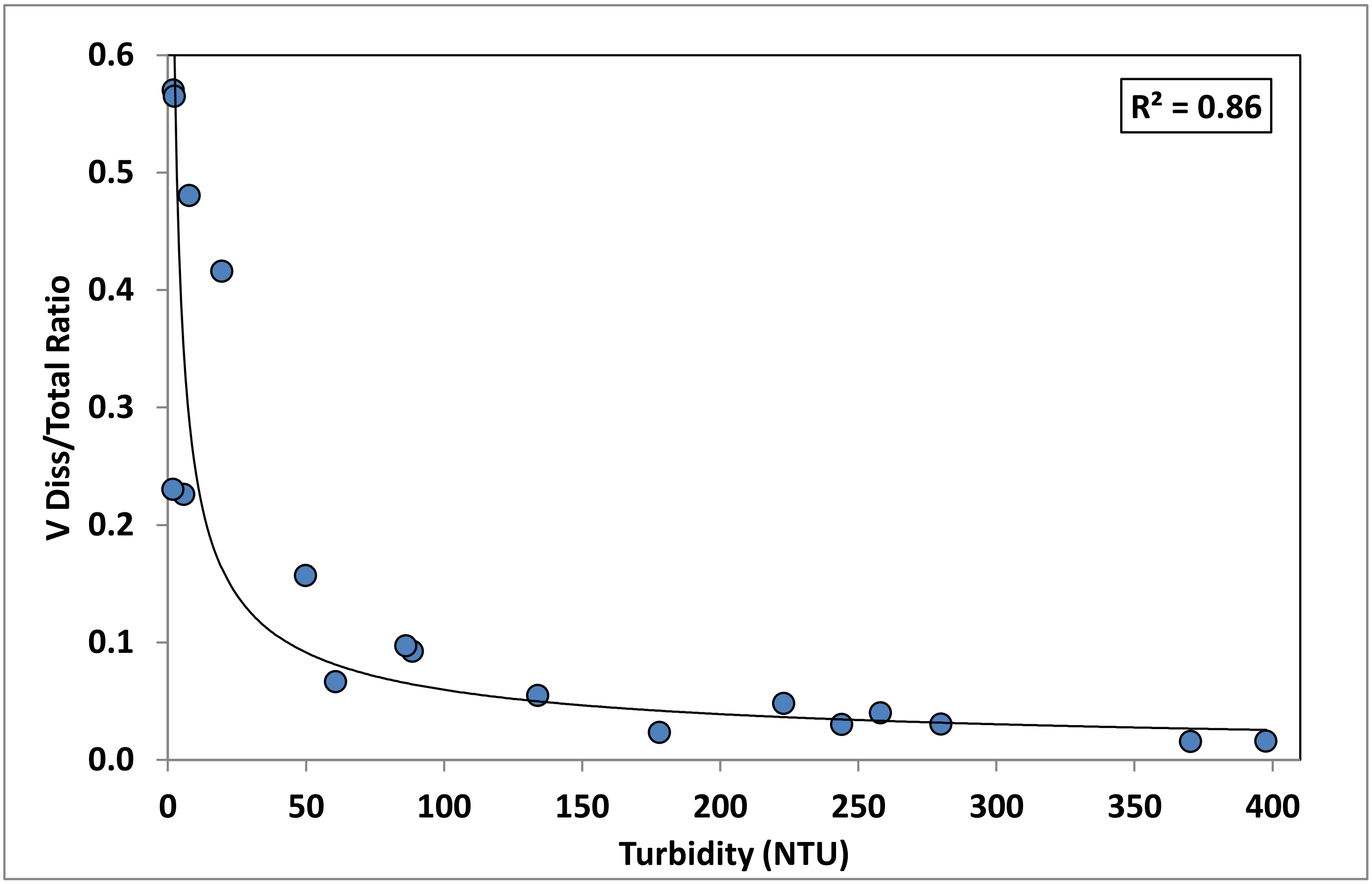


Figure B-41: The Effect of Turbidity on Dissolved/Total Ratio for Vanadium

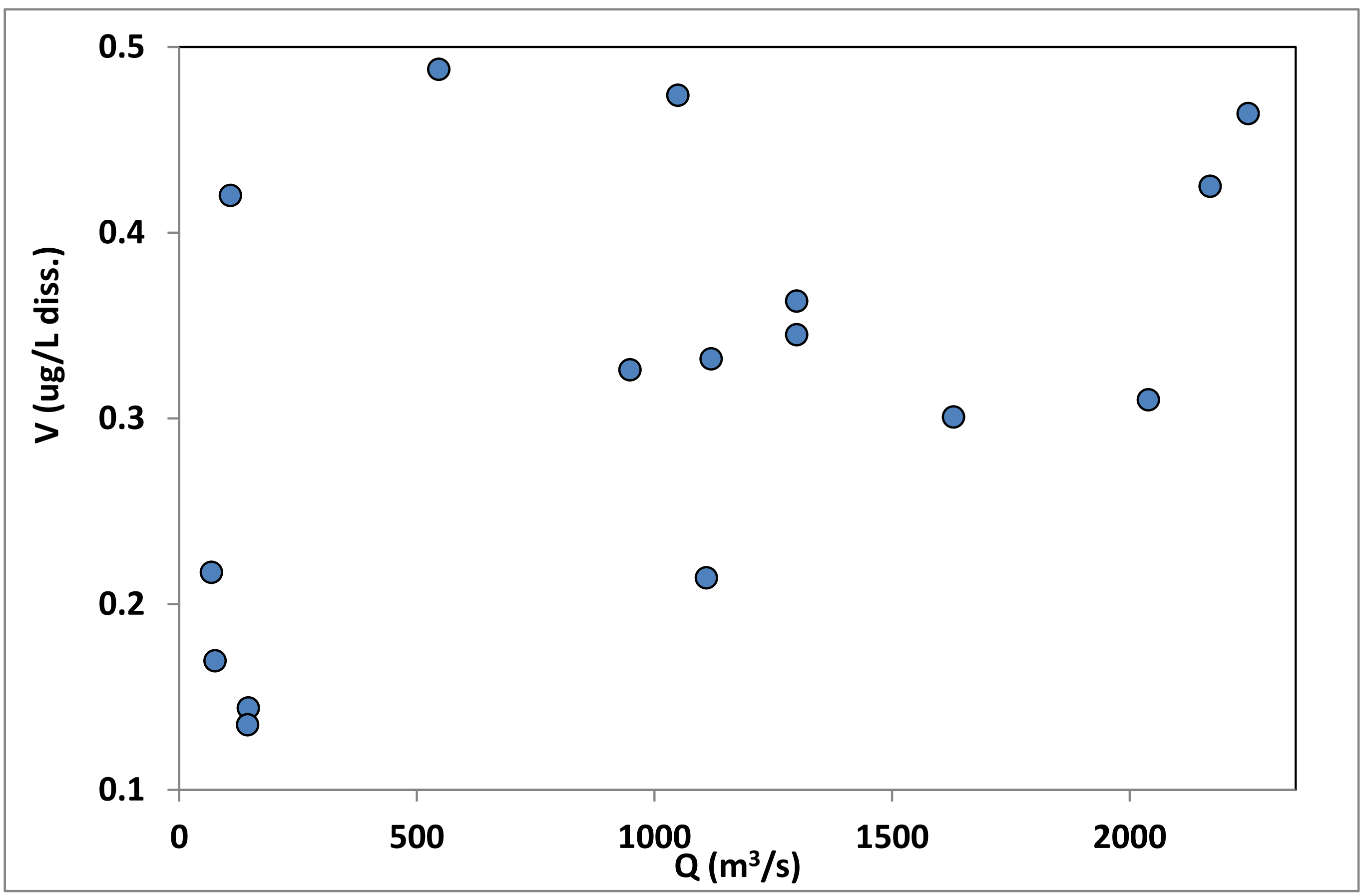


Figure B-42: The Effect of Flow Rate on dissolved Vanadium Concentration.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

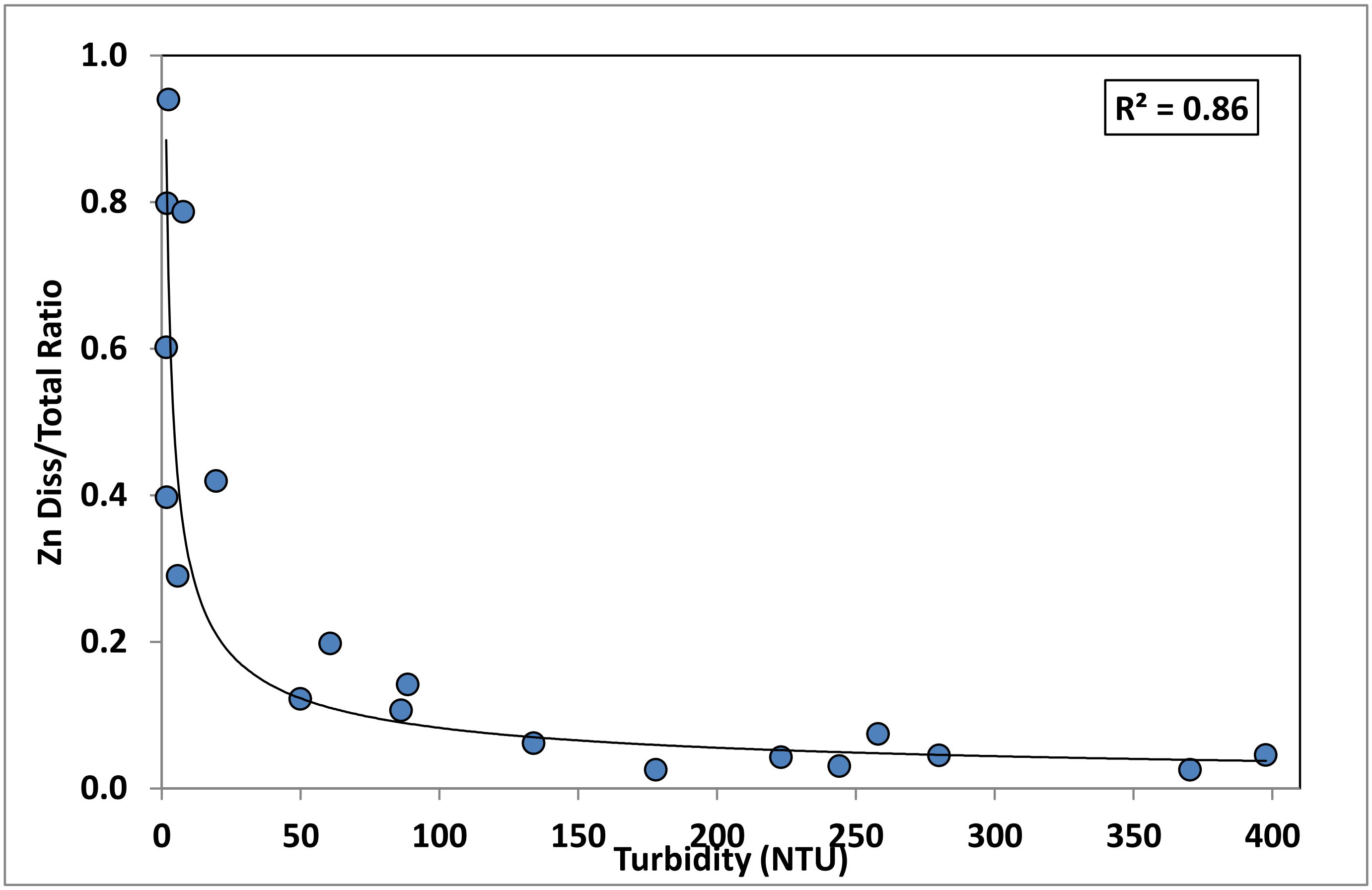


Figure B-43: The Effect of Turbidity on Dissolved/Total Ratio for Zinc

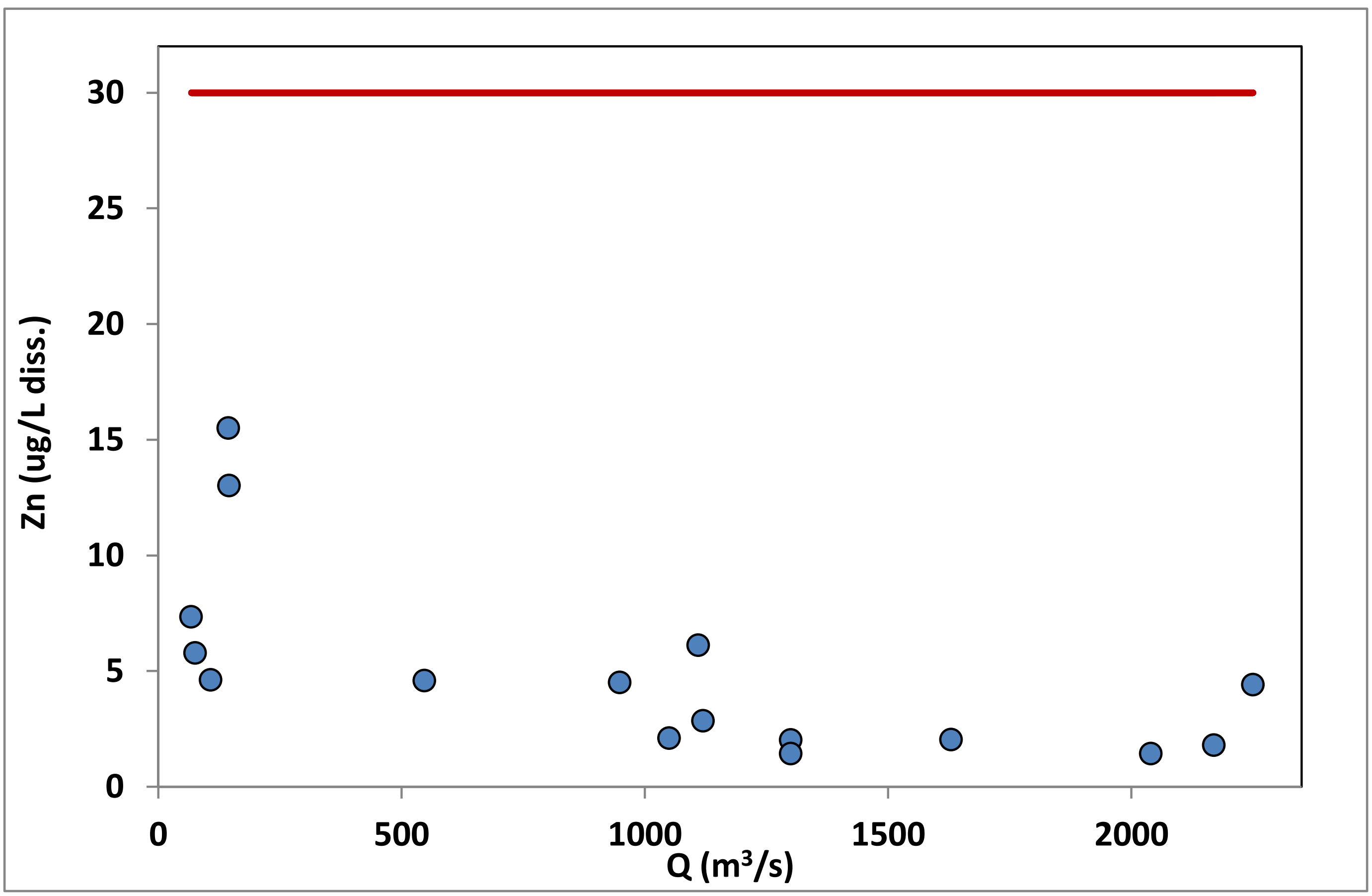


Figure B-44: The Effect of Flow on dissolved Zinc Concentration.
The Red Line is the CCME Guideline for protection of freshwater aquatic life.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

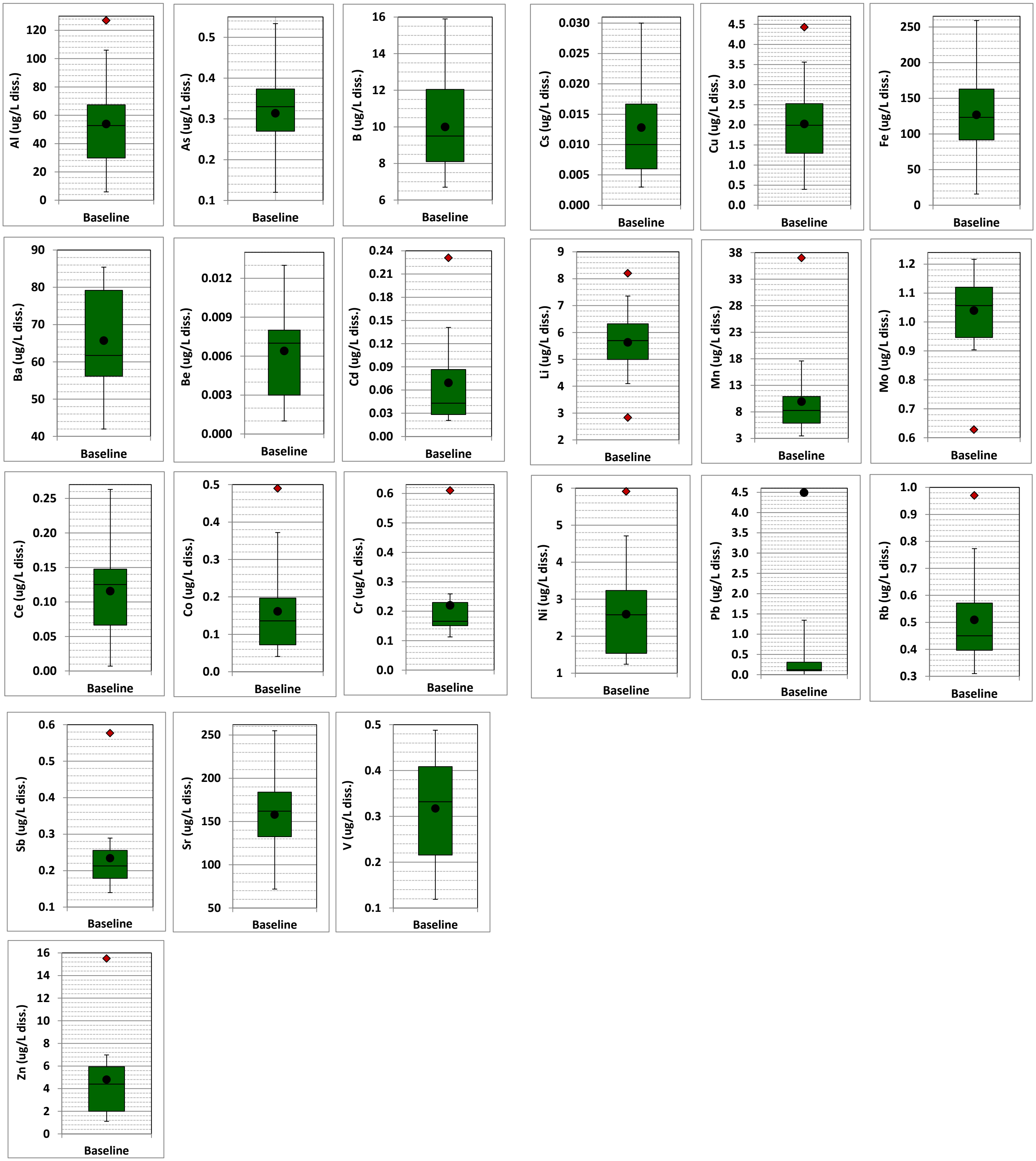


Figure B-45: Baseline Water Chemistry for Dissolved Trace Metals for All Data

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

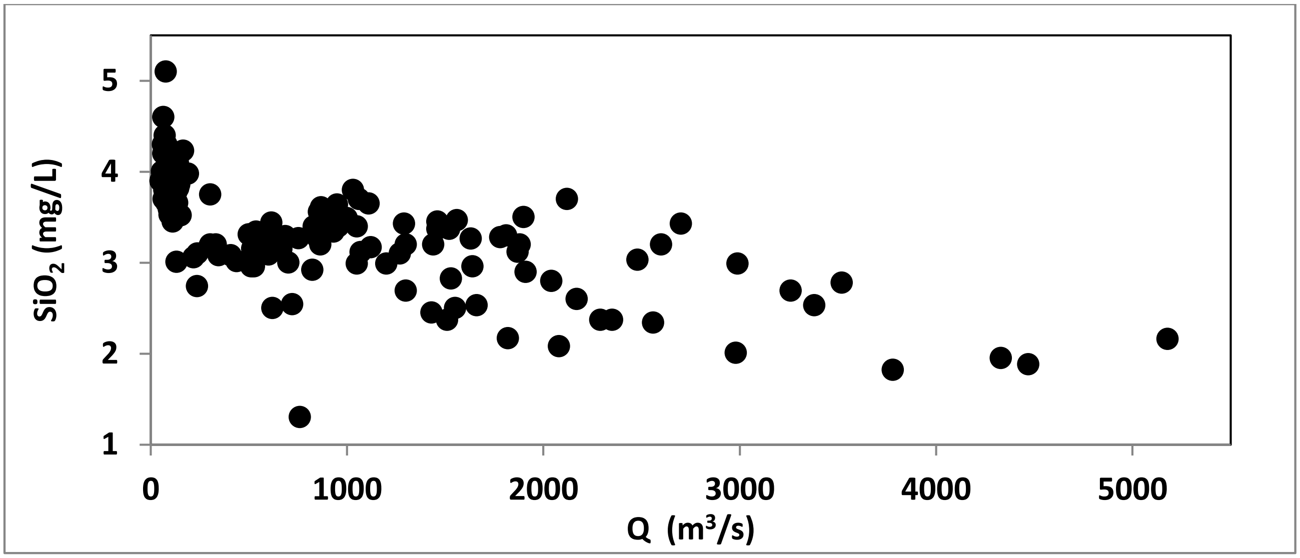


Figure B-46: The Effect of Flow Rate on the Concentration of Reactive Silica in the Peel River

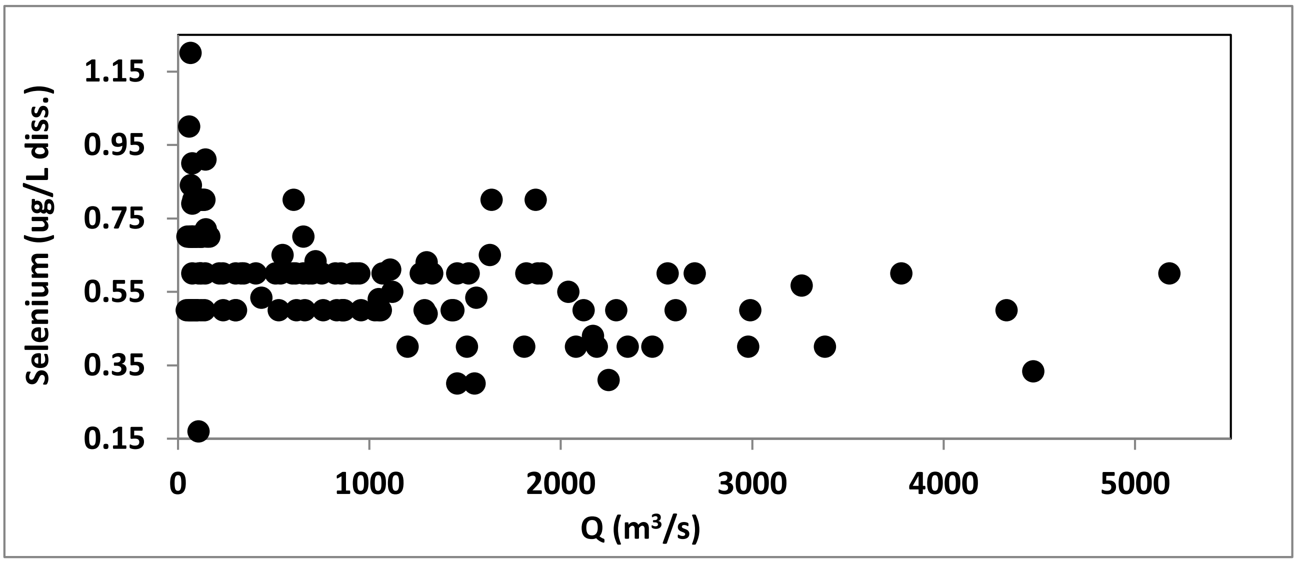


Figure B-47: The Effect of Flow Rate on the Concentration of Selenium in the Peel River

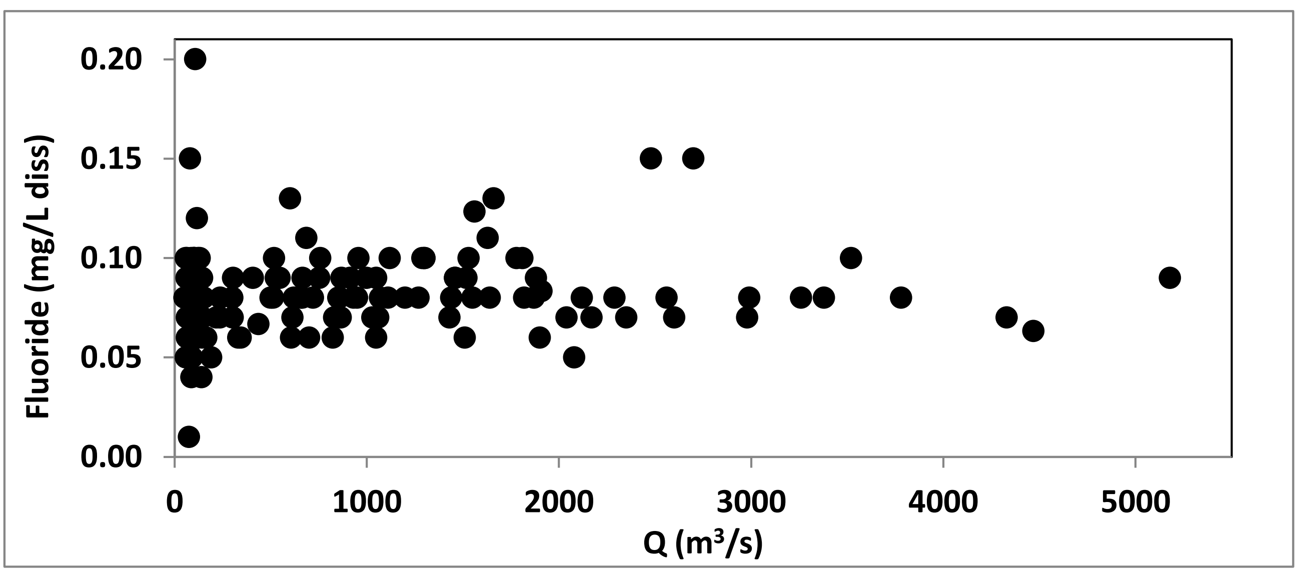


Figure B-48: The Effect of Flow Rate on the Concentration of dissolved Fluoride in the Peel River

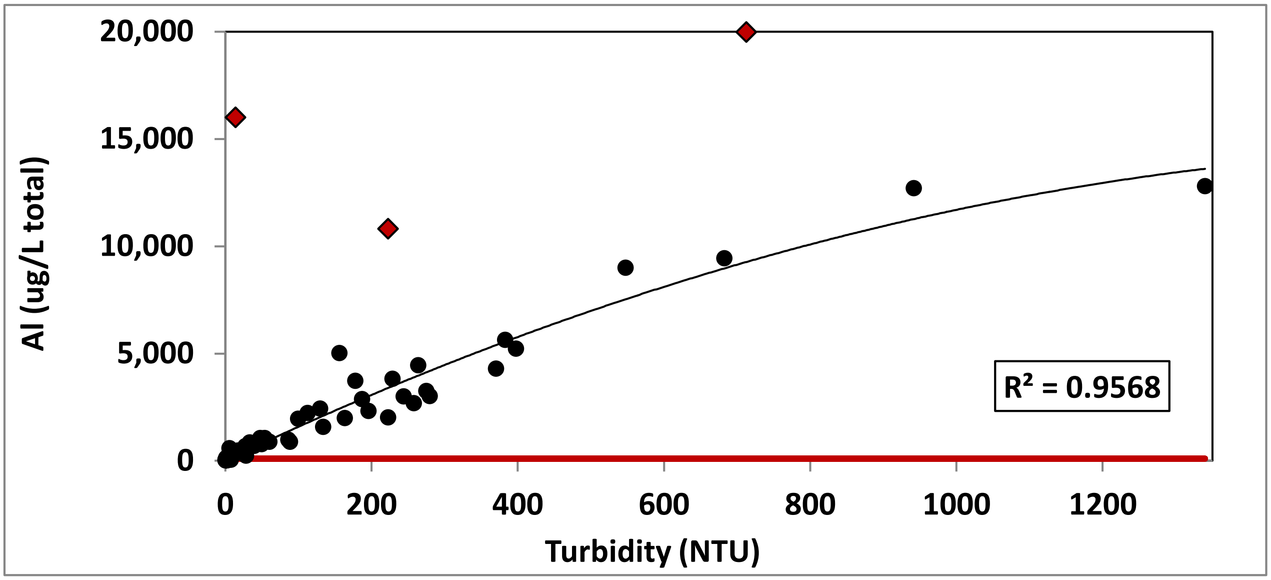


Figure B- 49: The Relationship between Turbidity and Total Aluminum

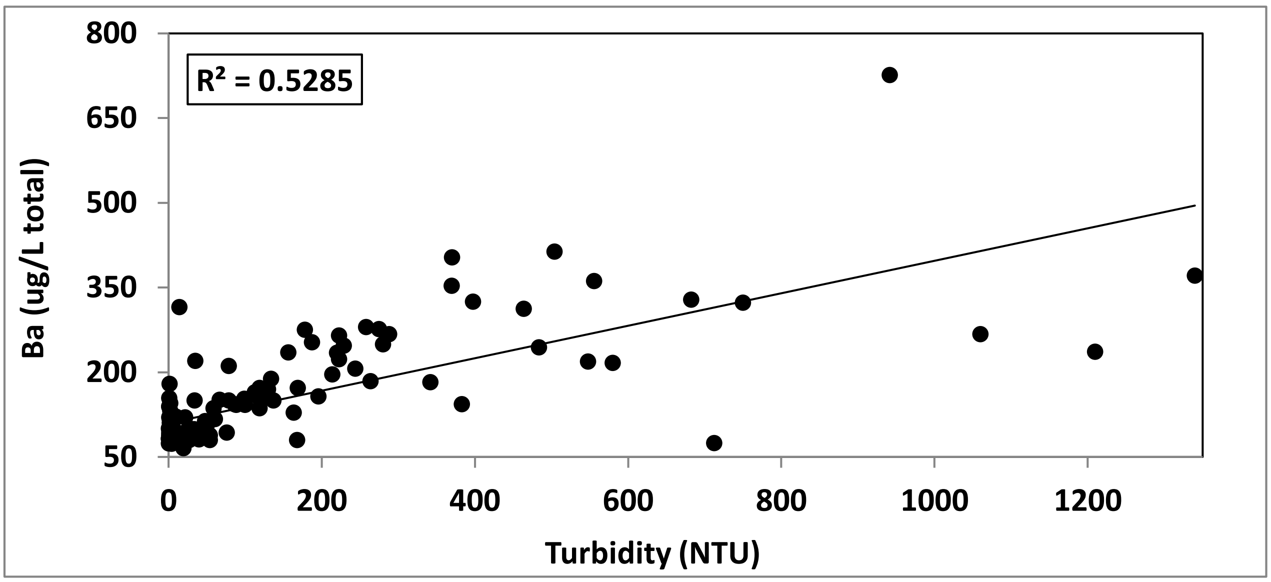


Figure B- 50: The Relationship between Turbidity and Total Barium

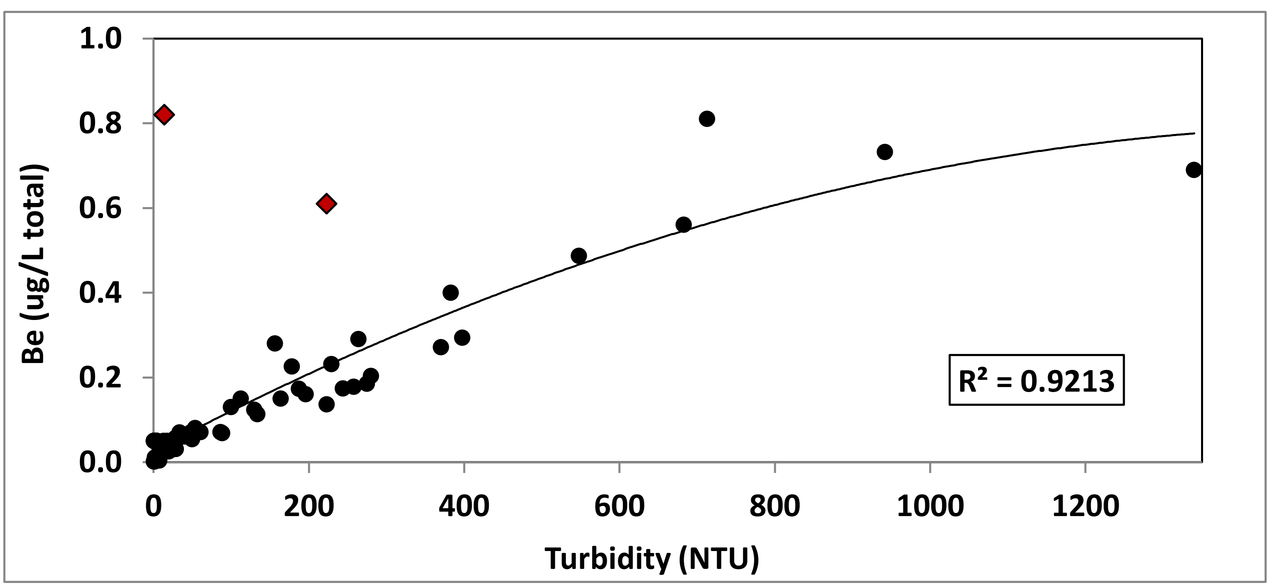


Figure B- 51: The Relationship between Turbidity and Total Beryllium

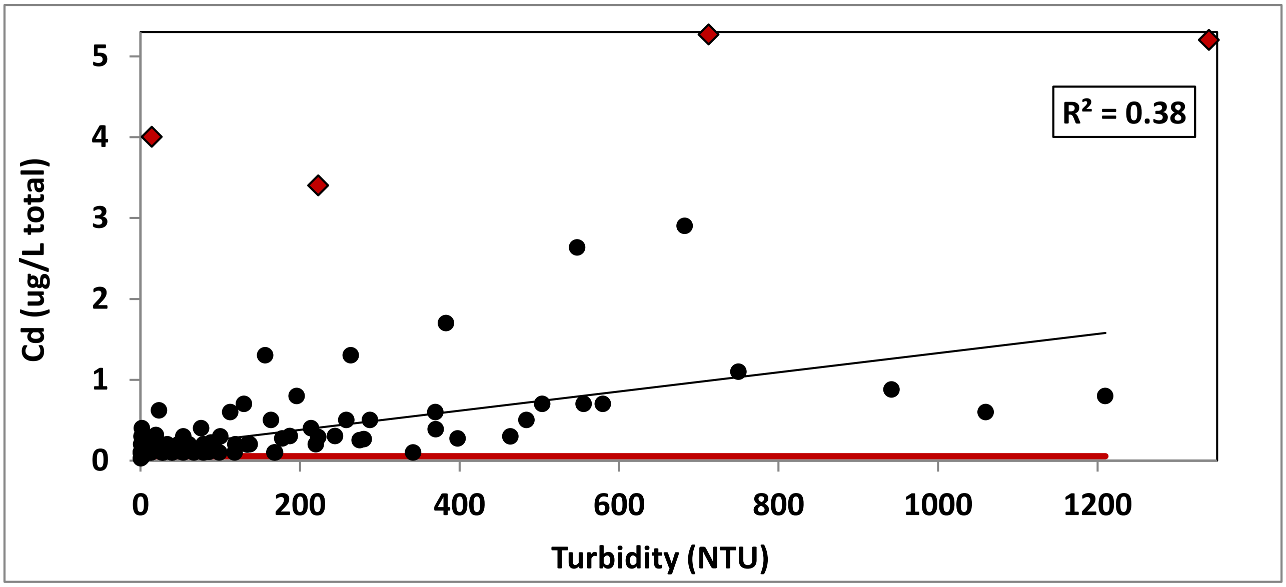


Figure B- 52: The Relationship between Turbidity and Total Cadmium

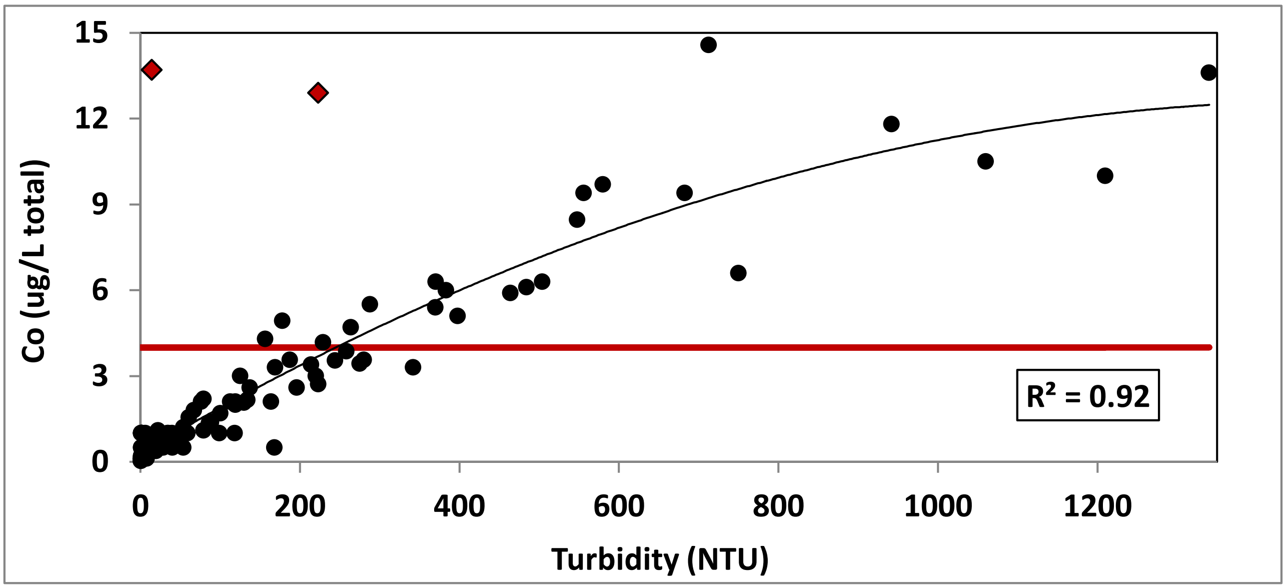


Figure B- 53: The Relationship between Turbidity and Total Cobalt

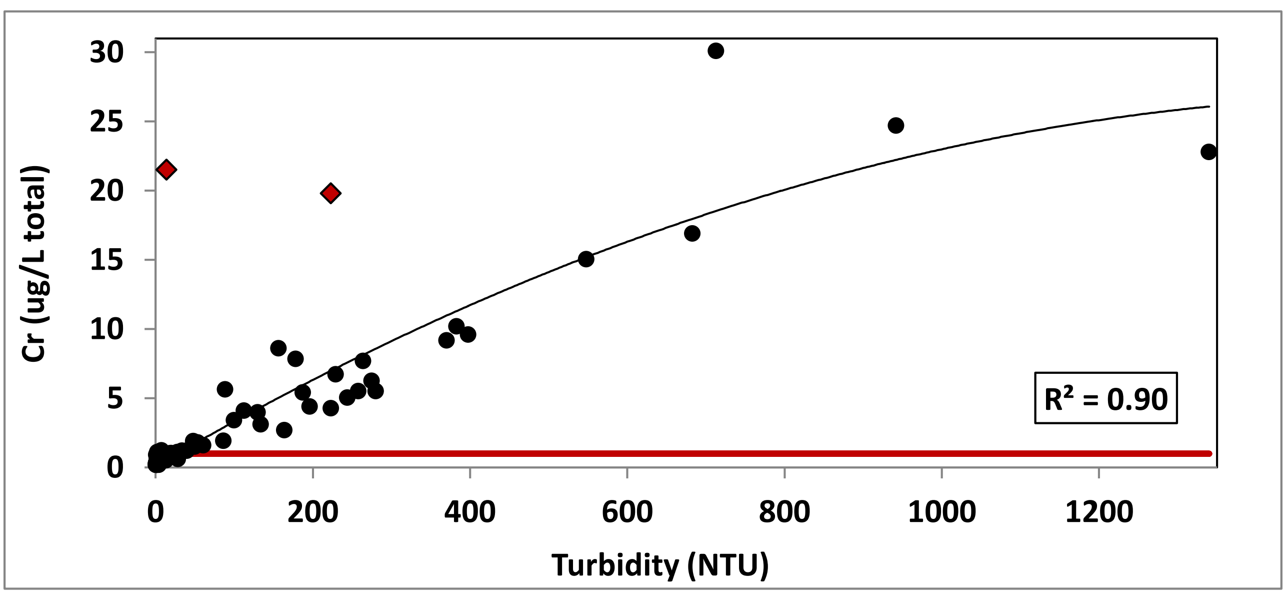


Figure B- 54: The Relationship between Turbidity and Total Chromium

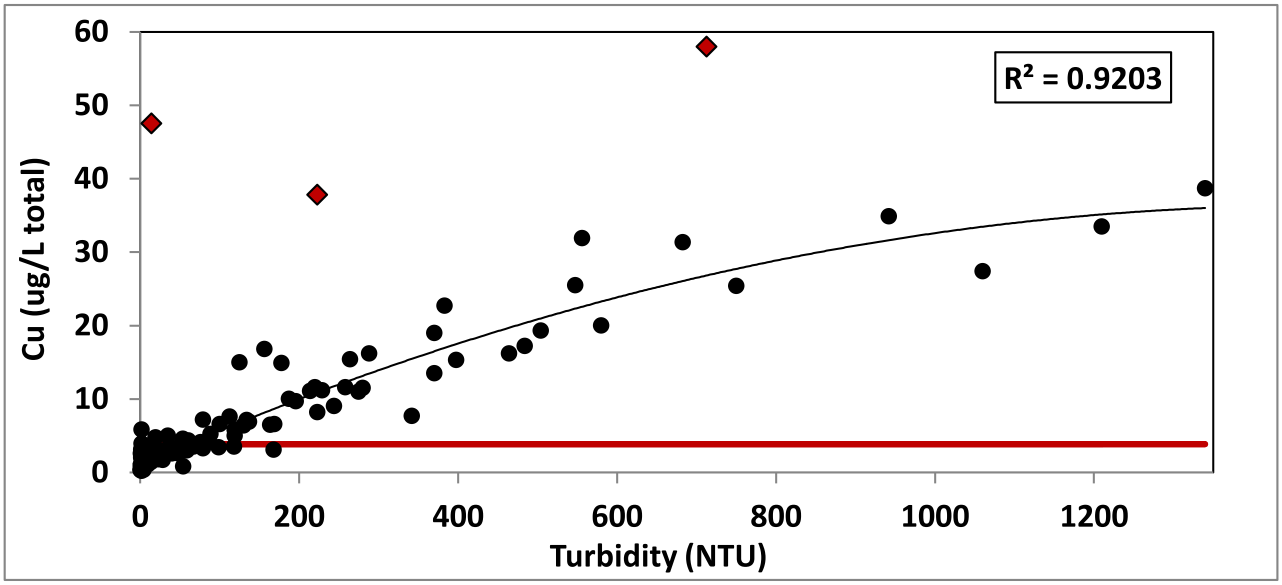


Figure B- 55: The Relationship between Turbidity and Total Copper

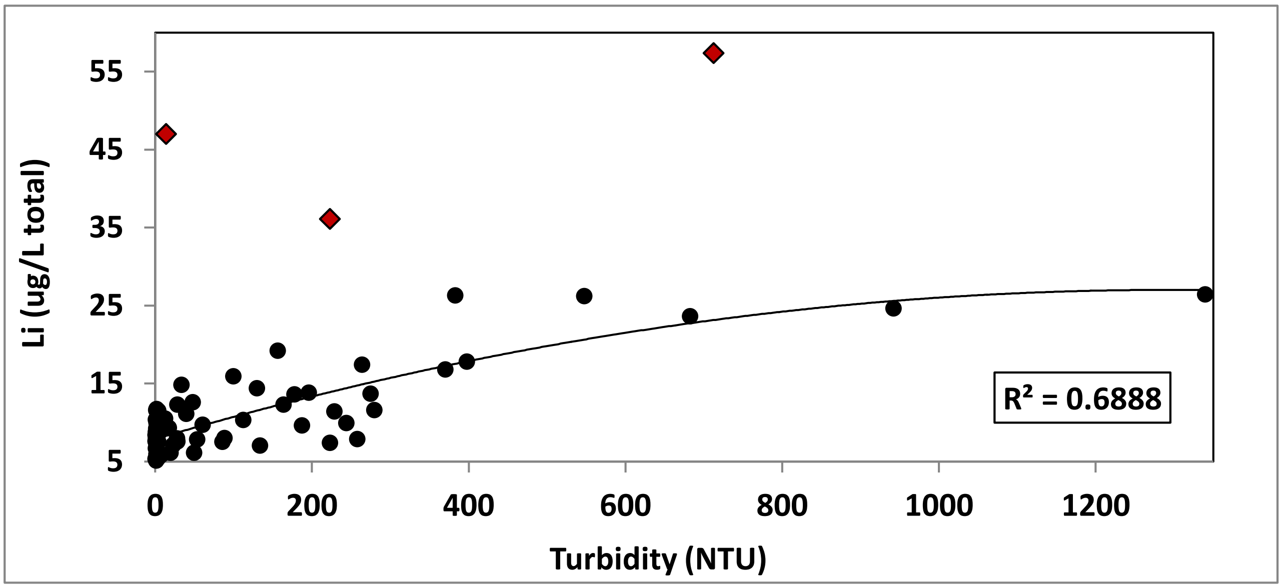


Figure B- 56: The Relationship between Turbidity and Total Lithium

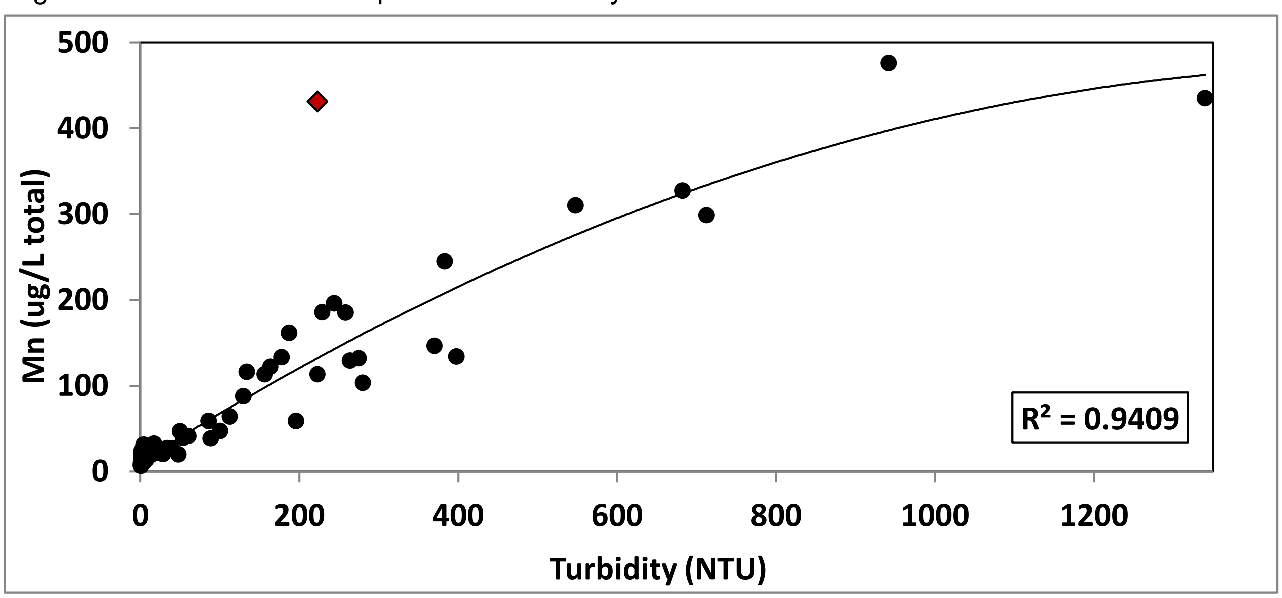


Figure B- 57: The Relationship between Turbidity and Total Manganese

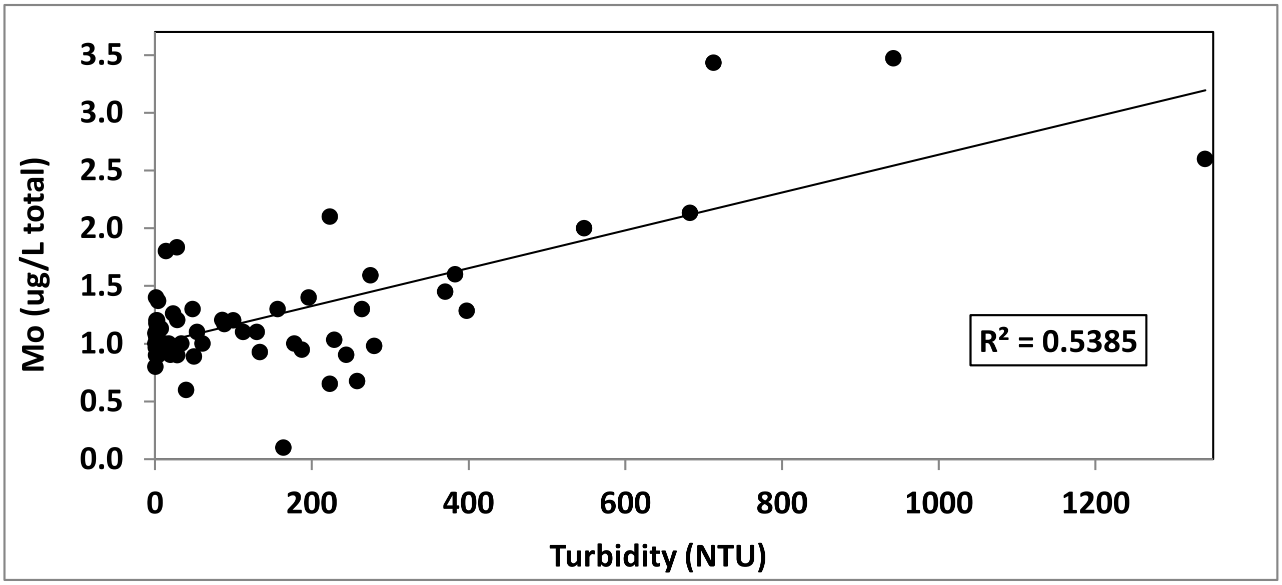


Figure B- 58: The Relationship between Turbidity and Total Molybdenum

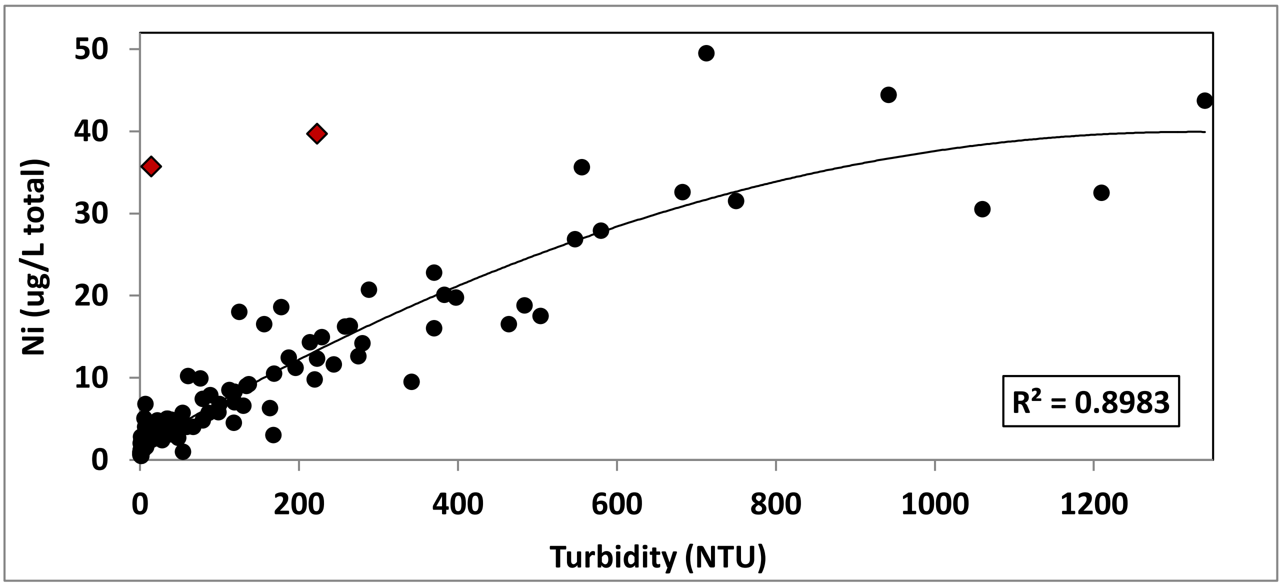


Figure B- 59: The Relationship between Turbidity and Total Nickel

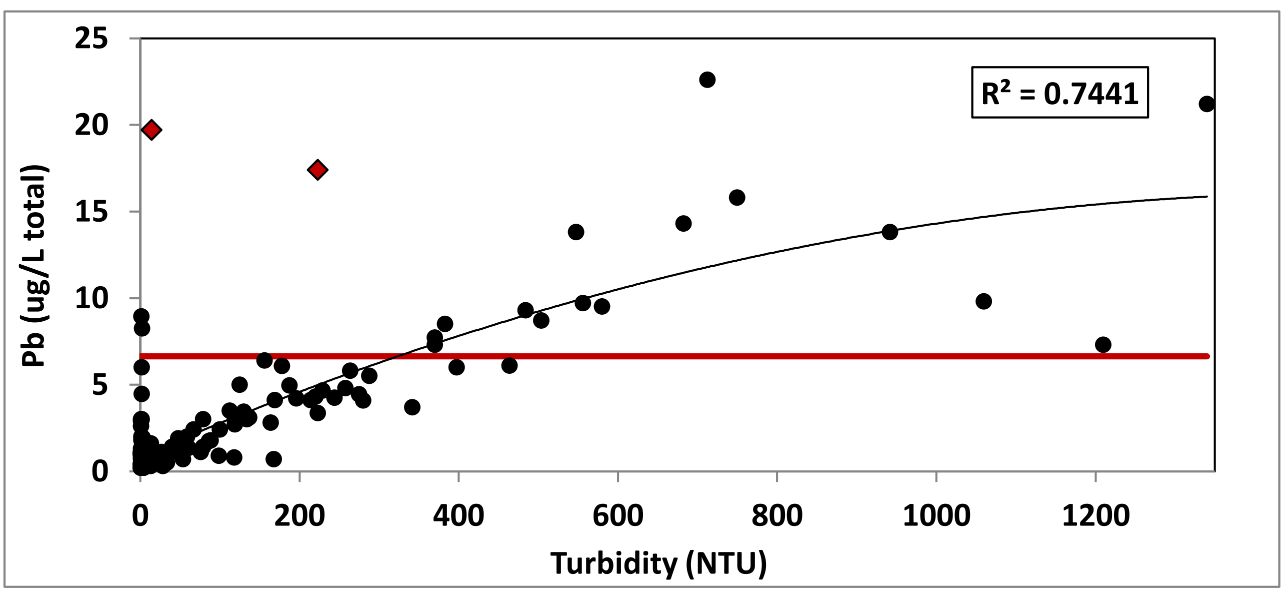


Figure B- 60: The Relationship between Turbidity and Total Lead

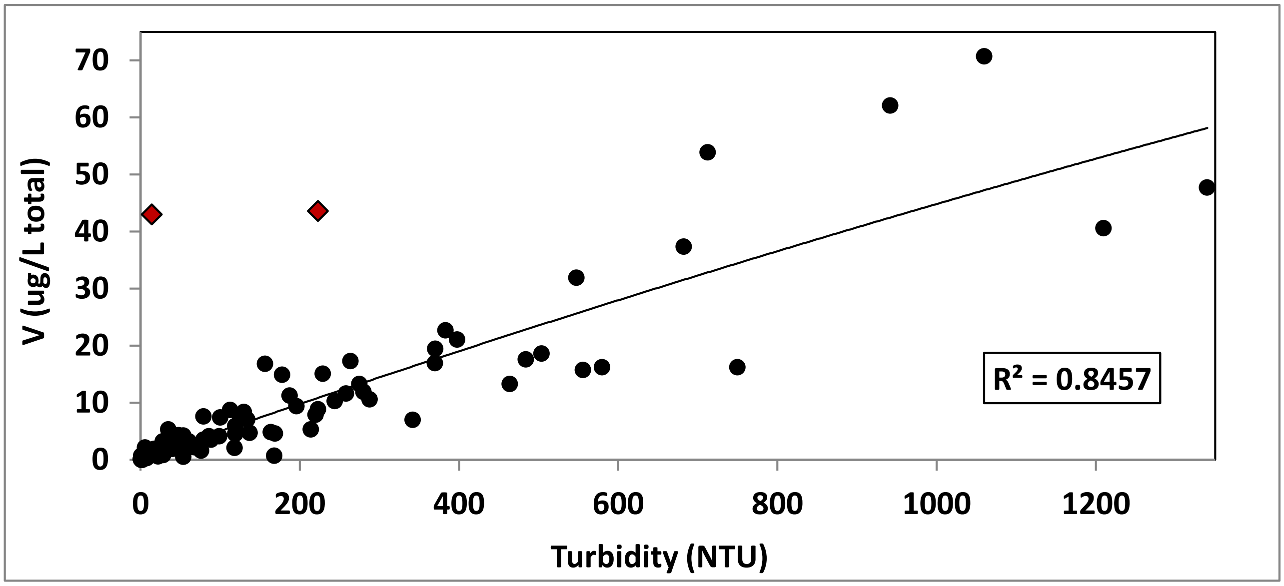


Figure B- 61: The Relationship between Turbidity and Total Vandadium

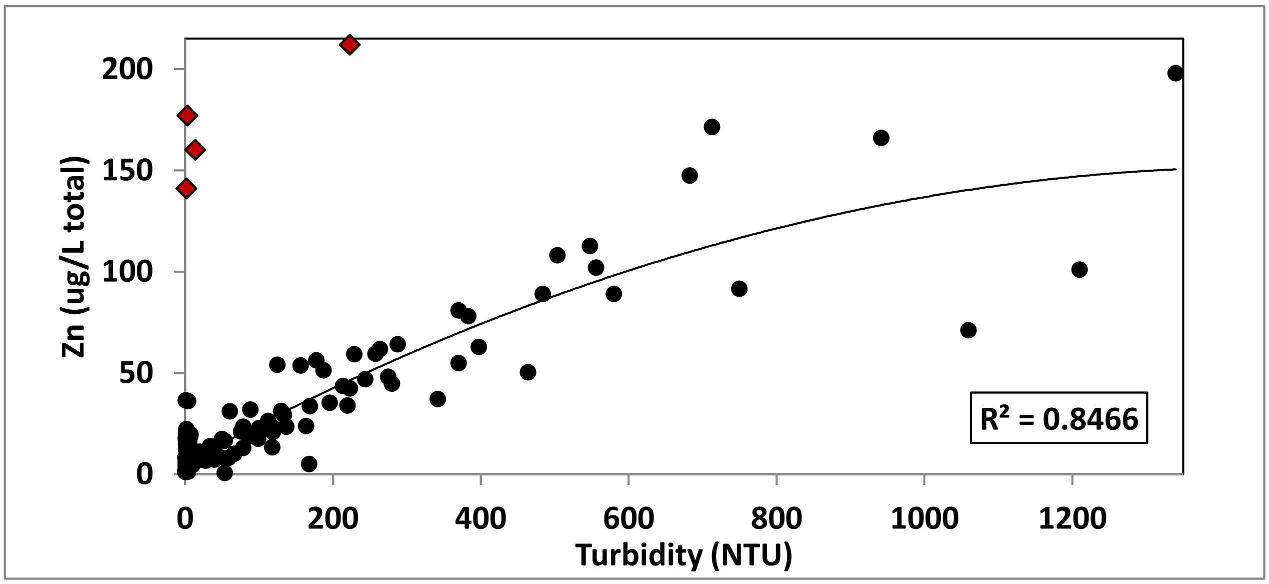


Figure B- 62: The Relationship between Turbidity and Total Zinc

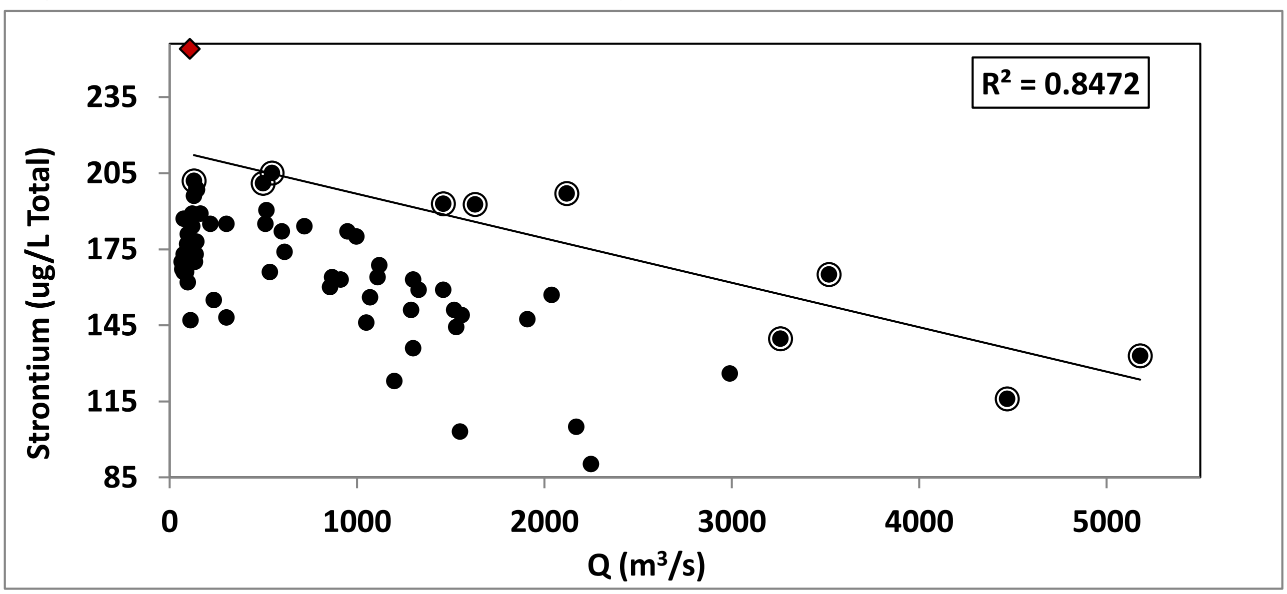


Figure B- 63: The Relationship between Turbidity and Total Strontium

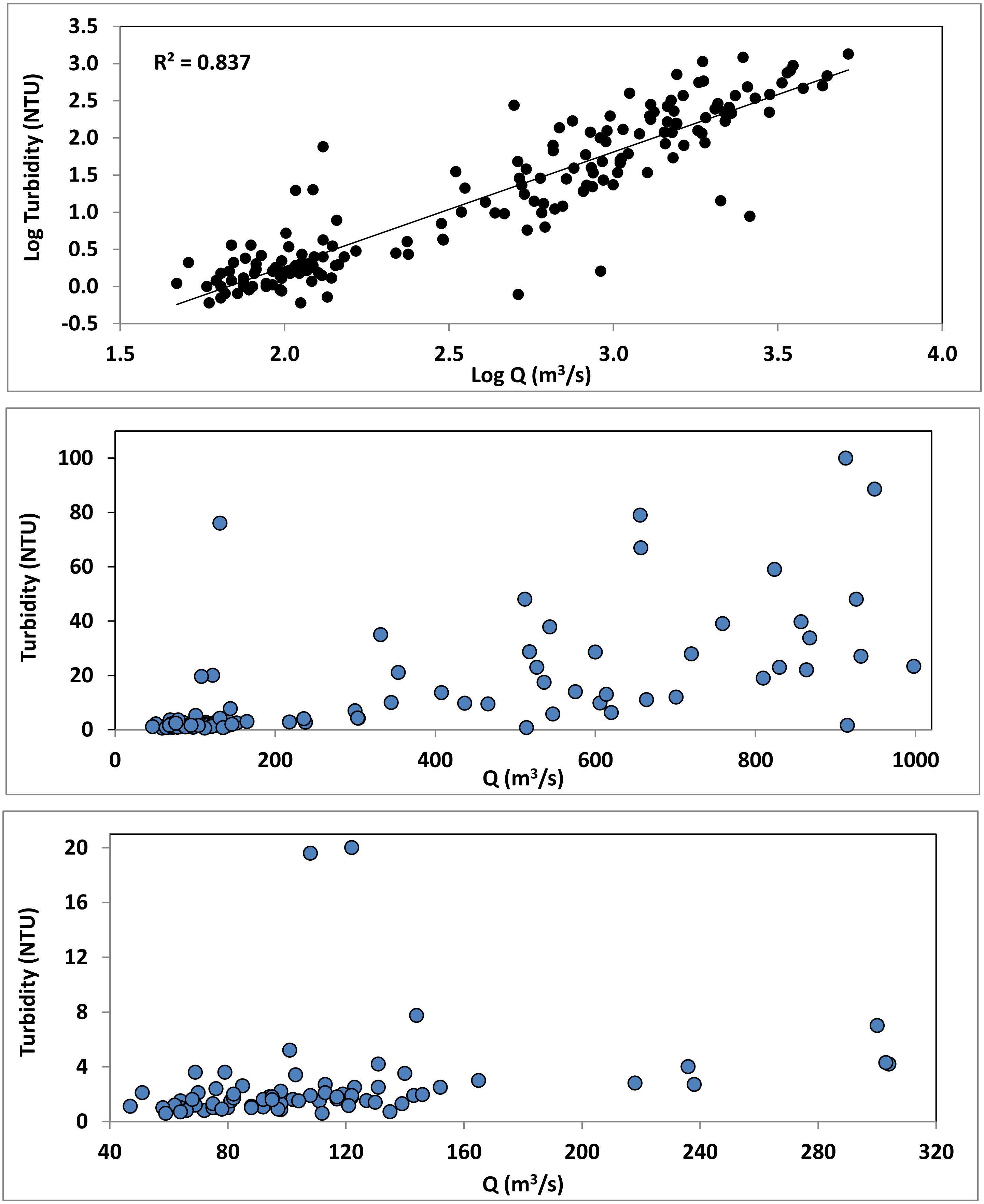


Figure B-64; The Effect of Flow Rate on Turbidity in the Peel River above Ft. McPherson

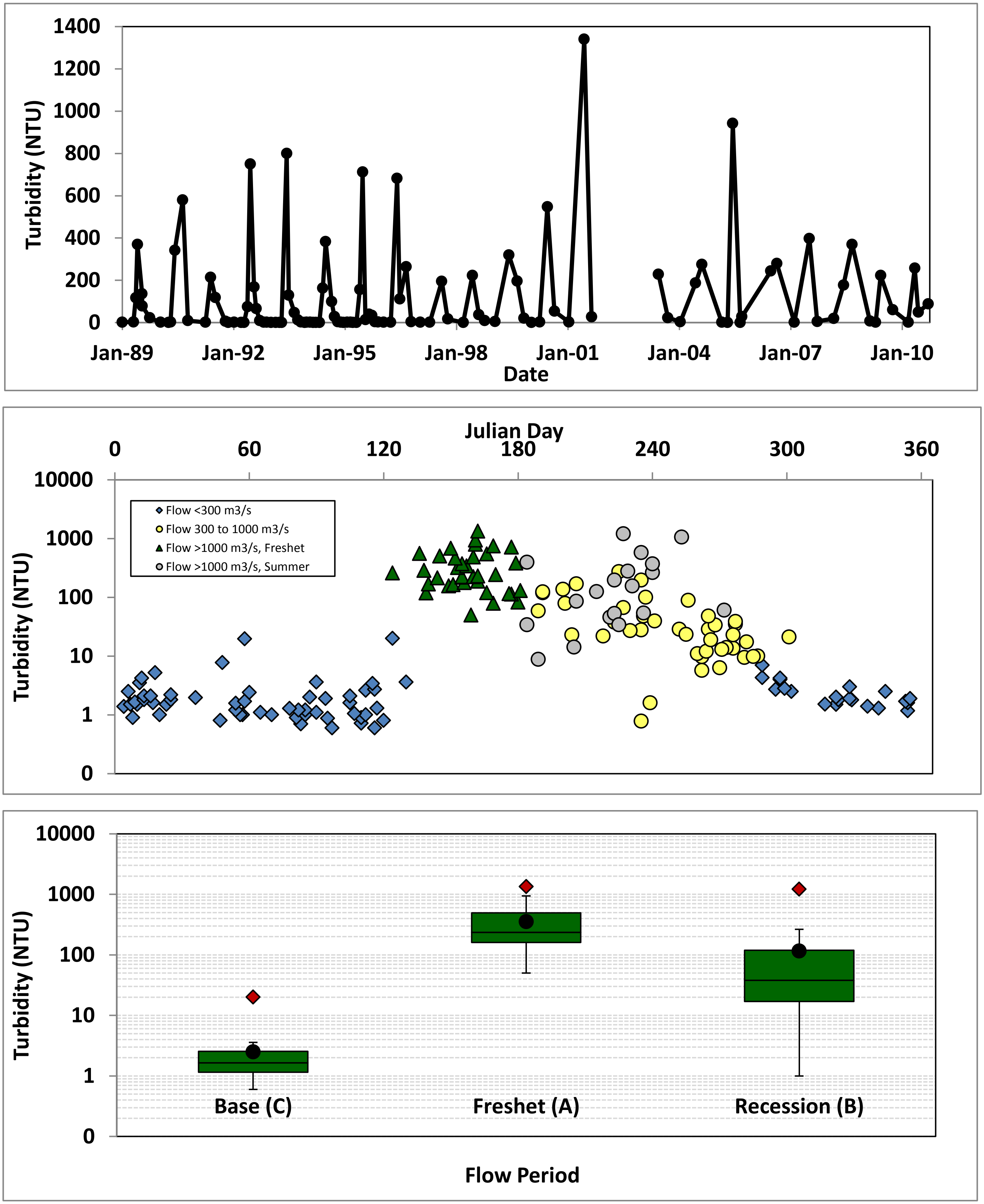


Figure B-65. The Effect of Season and Time on Turbidity in the Peel River above Ft. McPherson.
The (letters) indicate significance categories.

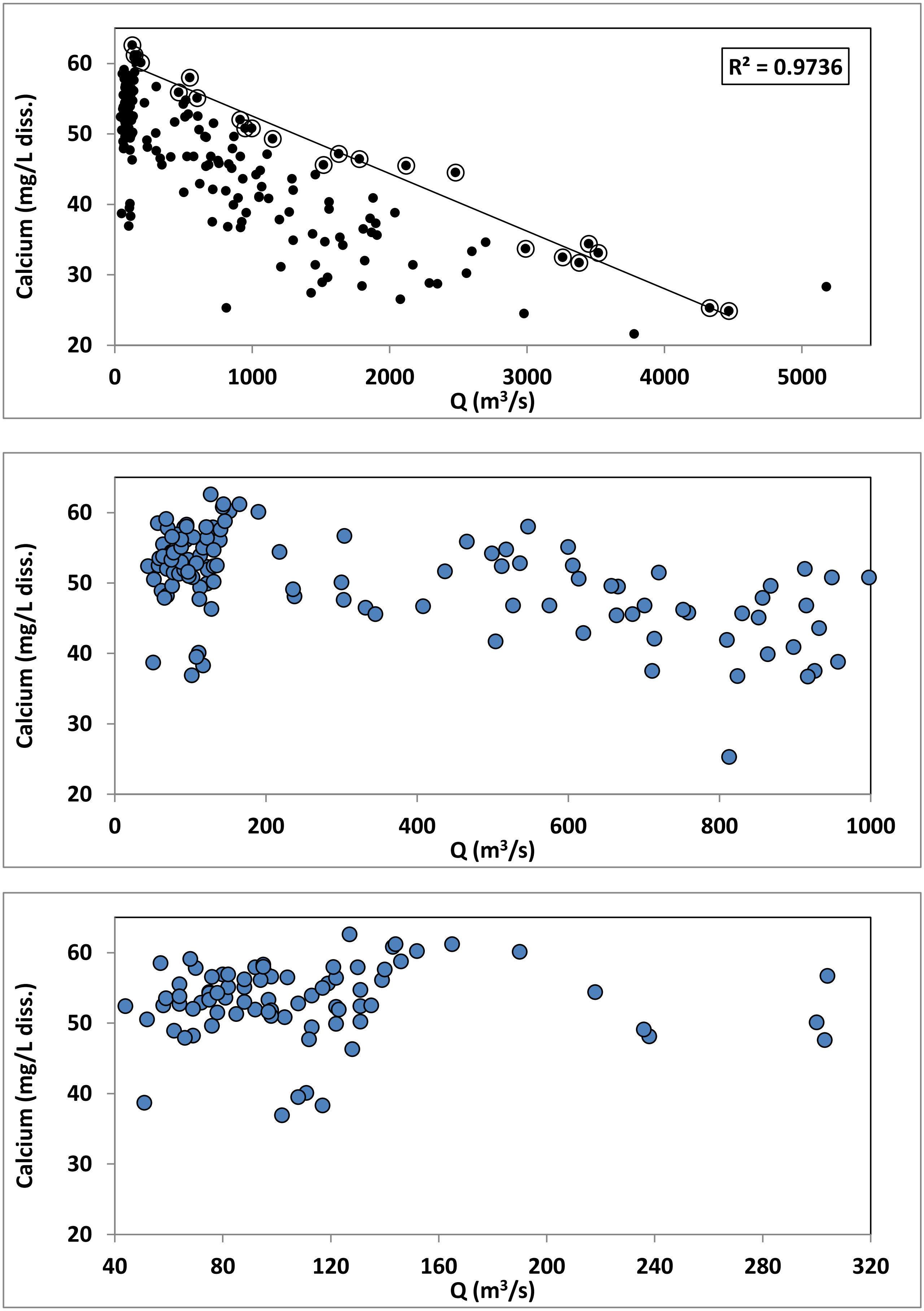
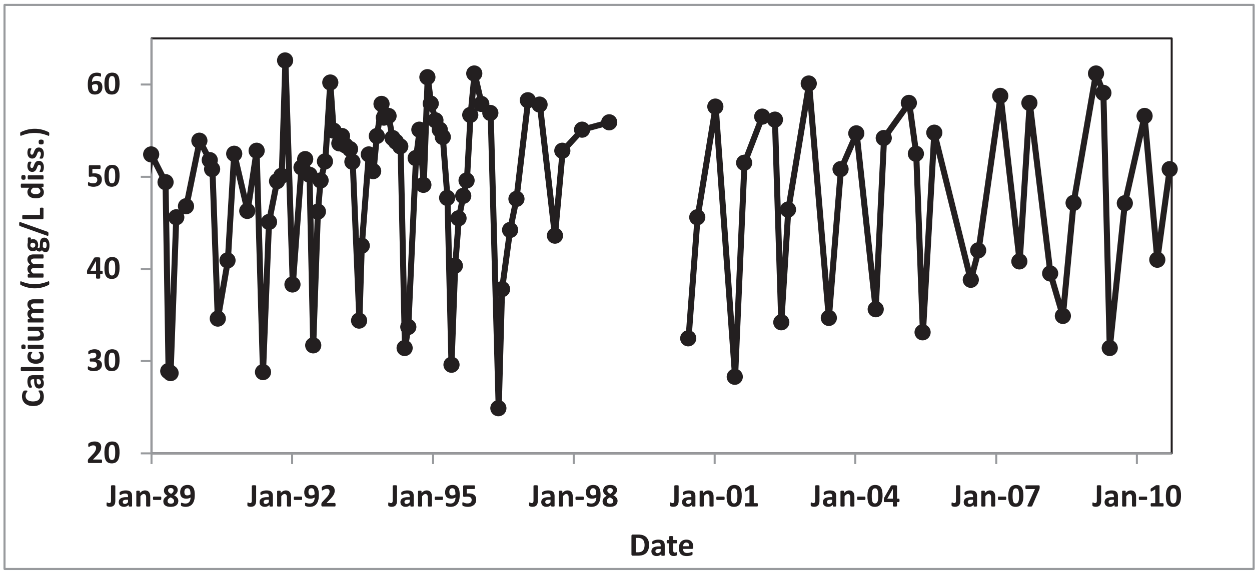
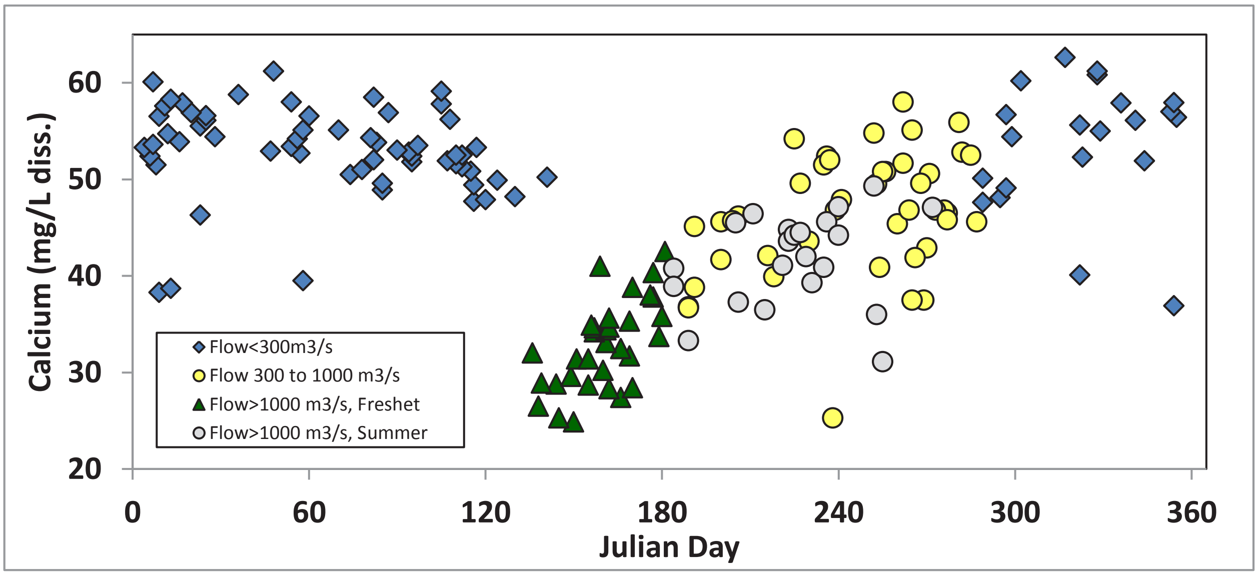


Figure B-66. The Effect of Flow Rate on Calcium in the Peel River above Ft. McPherson





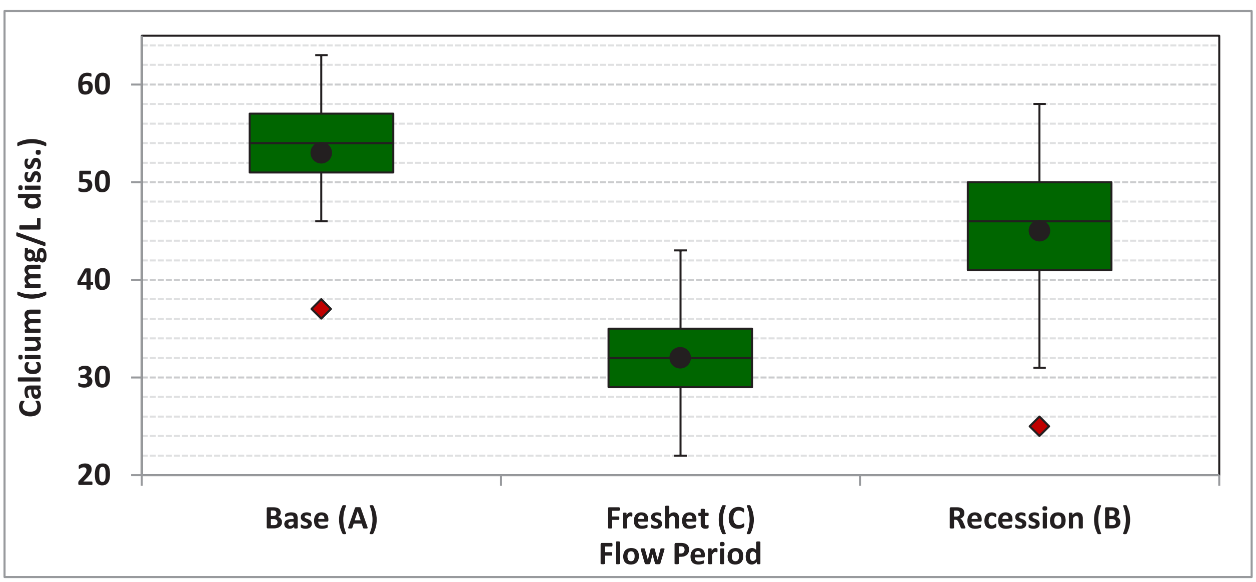


Figure B-67. The Effect of Season and Time on Calcium in the Peel River above Ft. McPherson
The (letters) indicate significance categories.

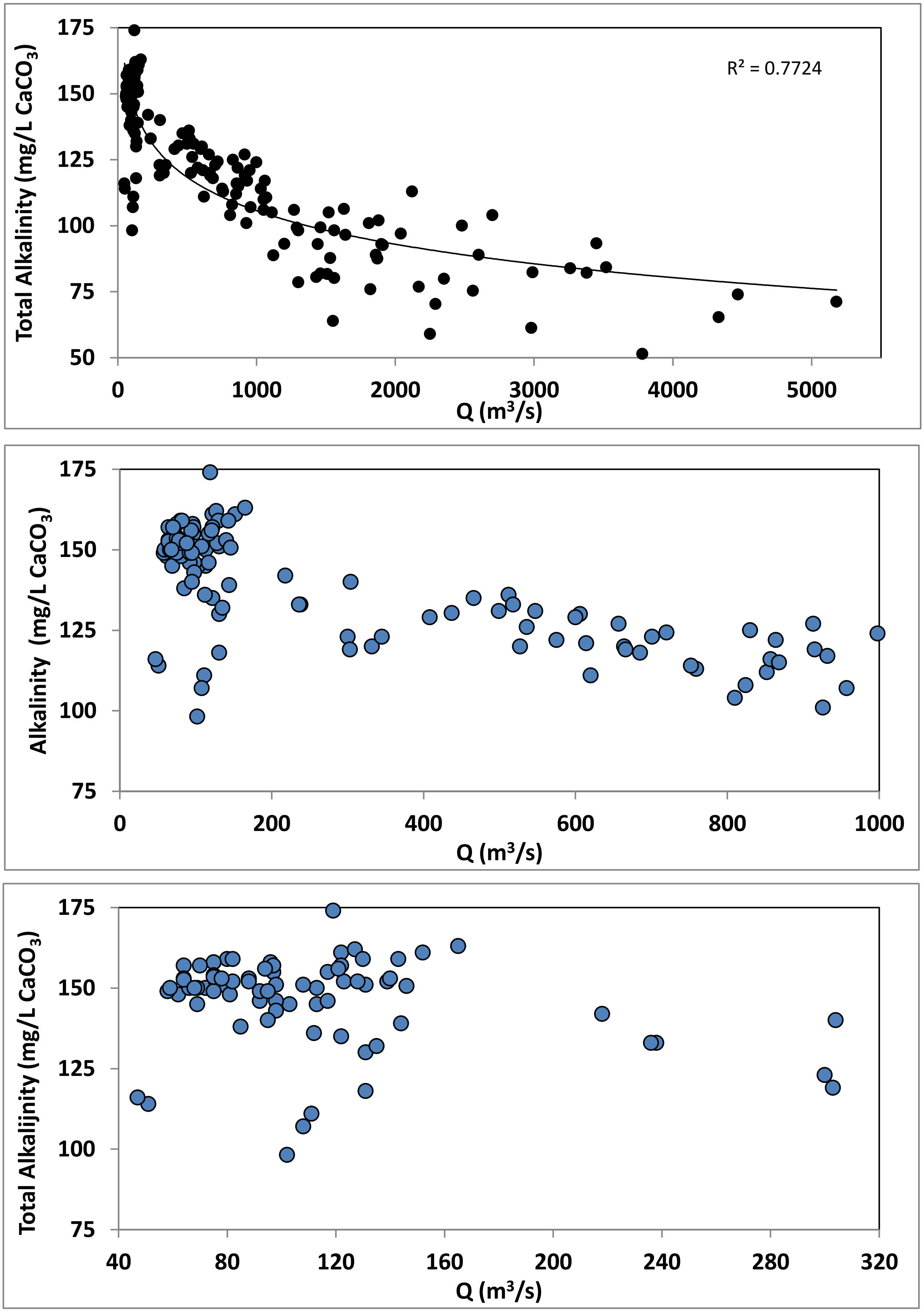
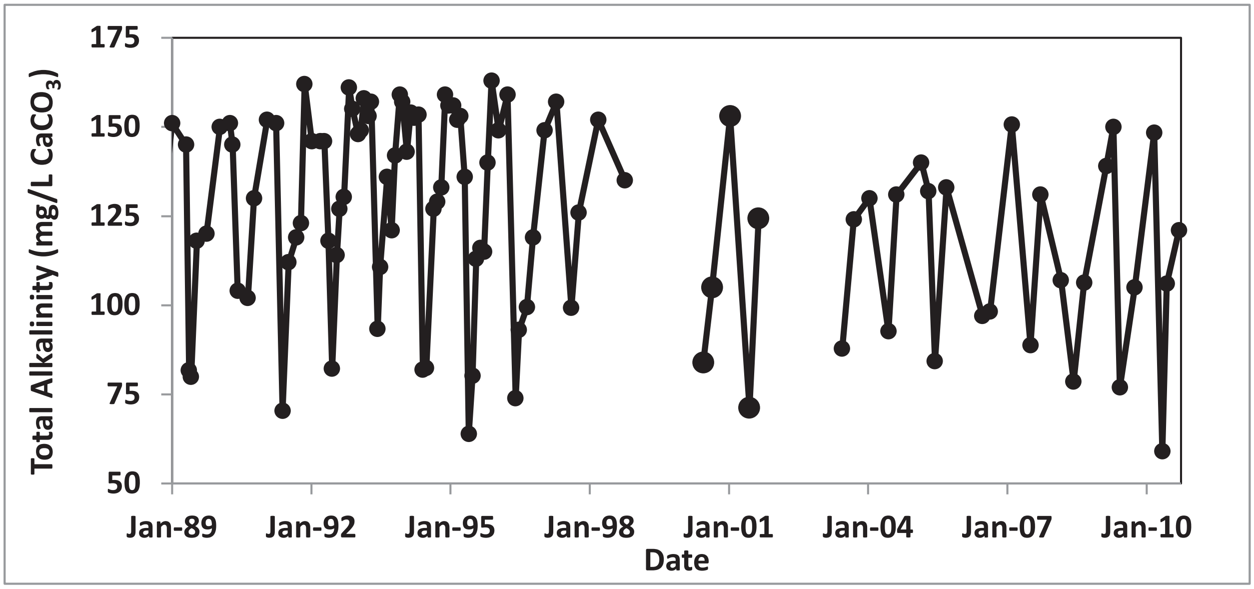
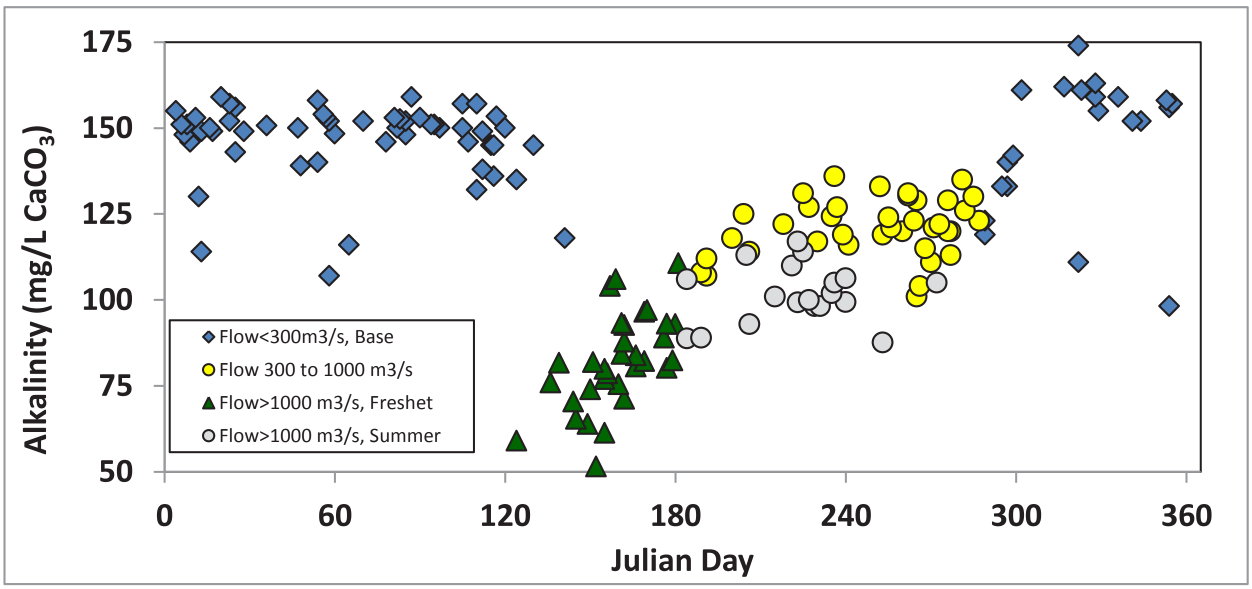


Figure B-68. The Effect of Flow Rate on Alkalinity in the Peel River

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec





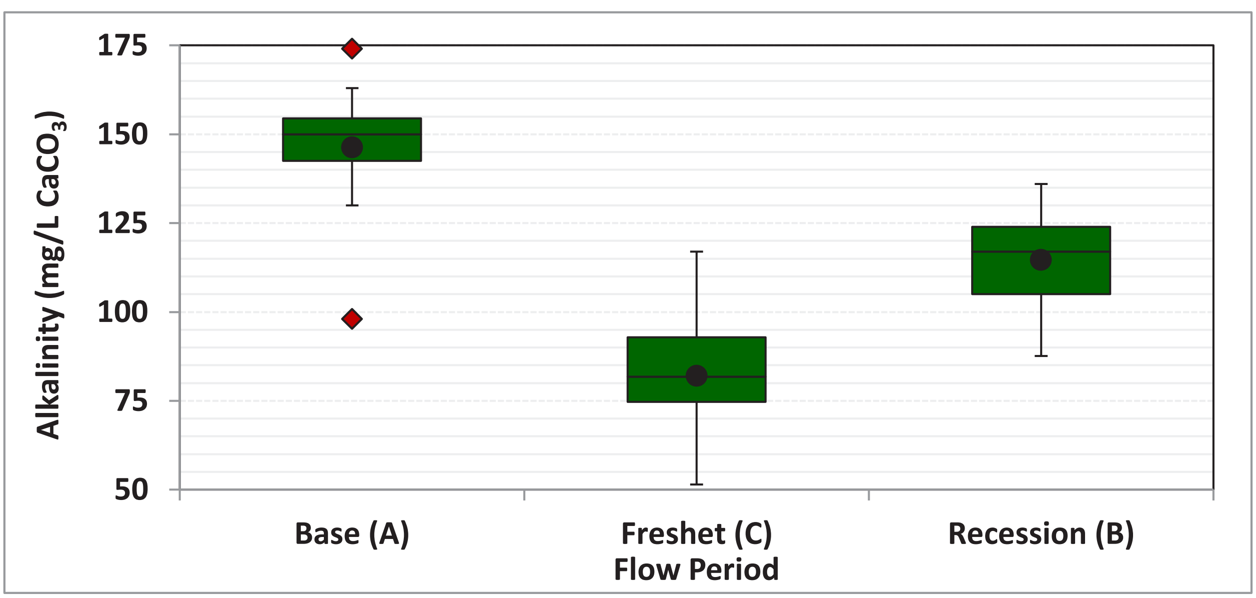


Figure B-69. The Effect of Season and Time on Alkalinity in the Peel River
The (letters) indicate significance categories.

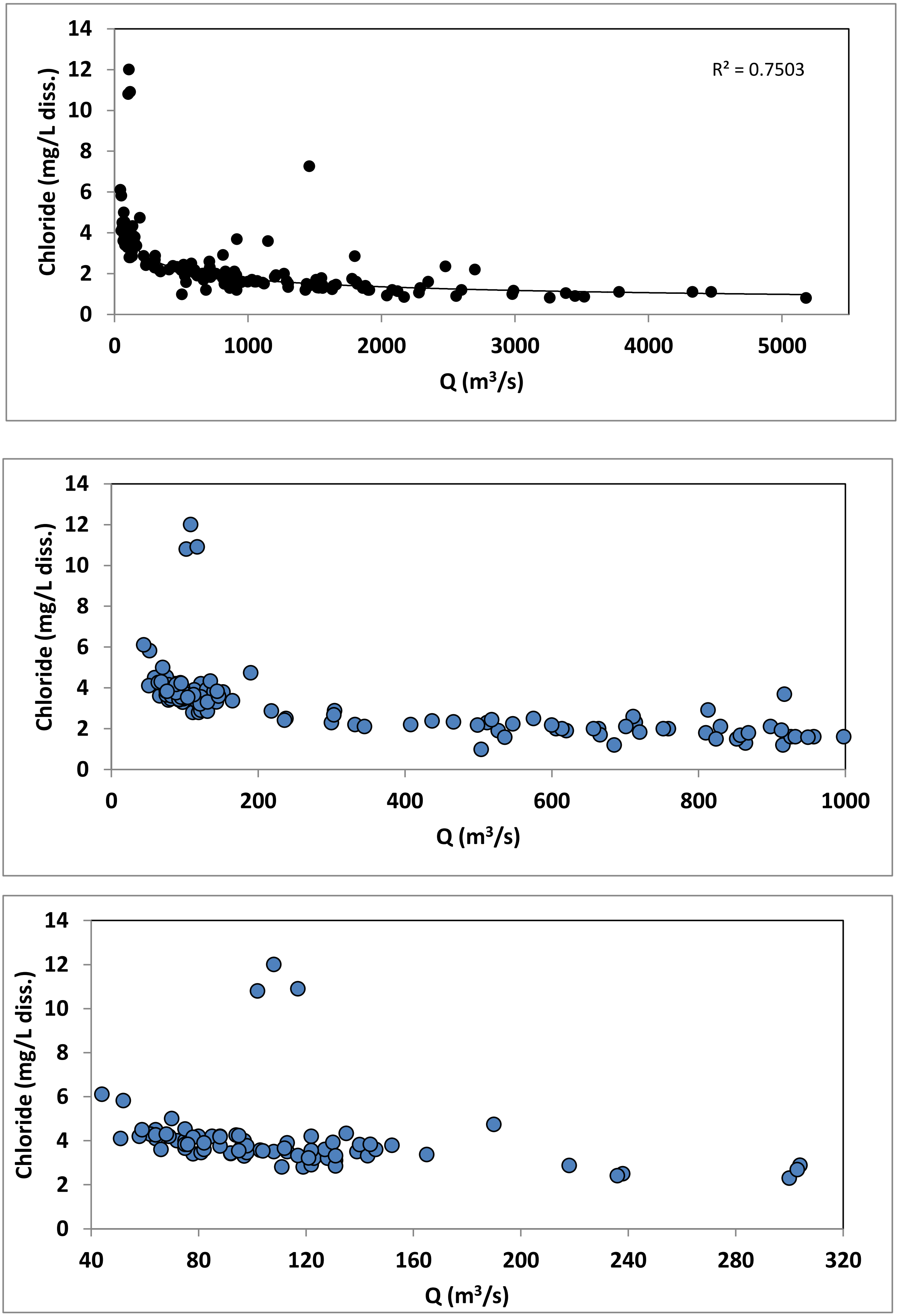
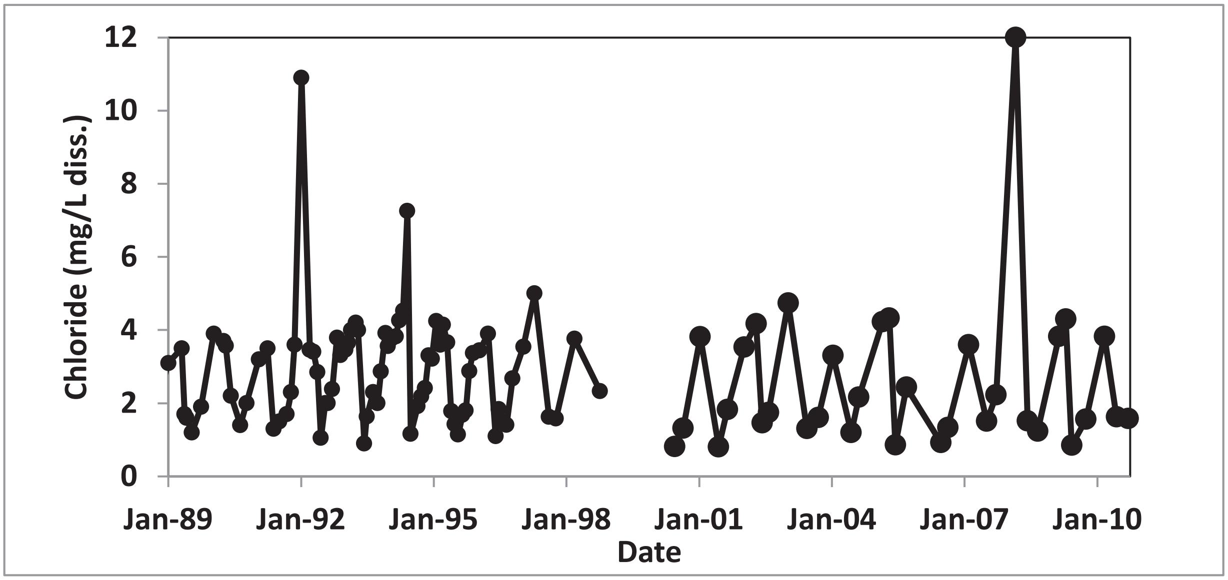
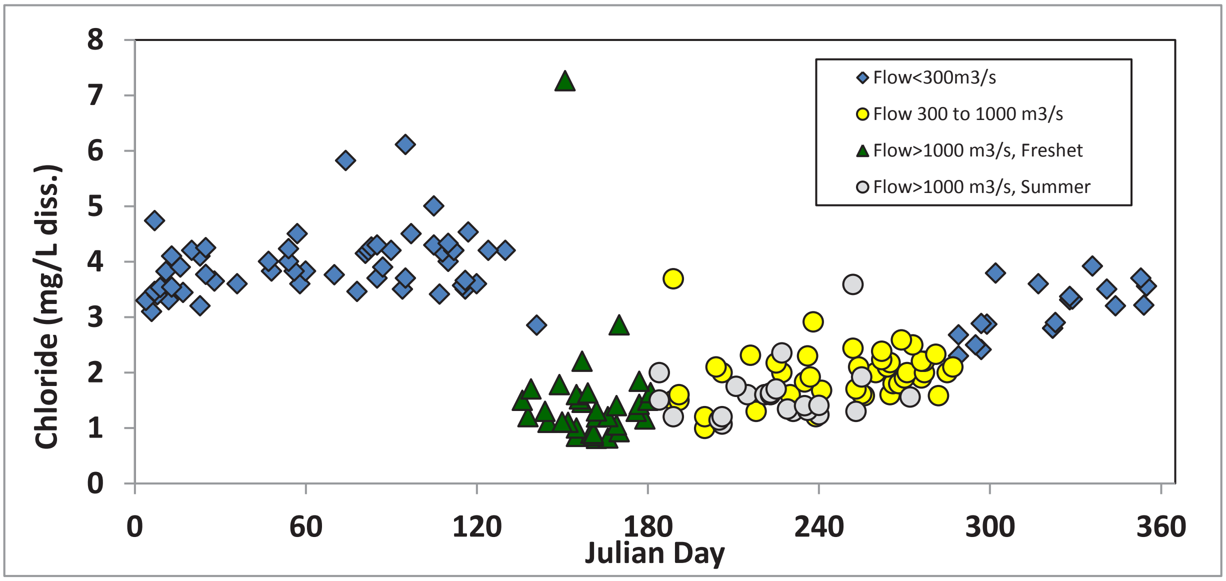


Figure B-70. The Effect of Flow Rate on Chloride in the Peel River above Ft. McPherson

G:\GIS_Project_Folder\111440079_Peel River\inDesign\charts

Stantec





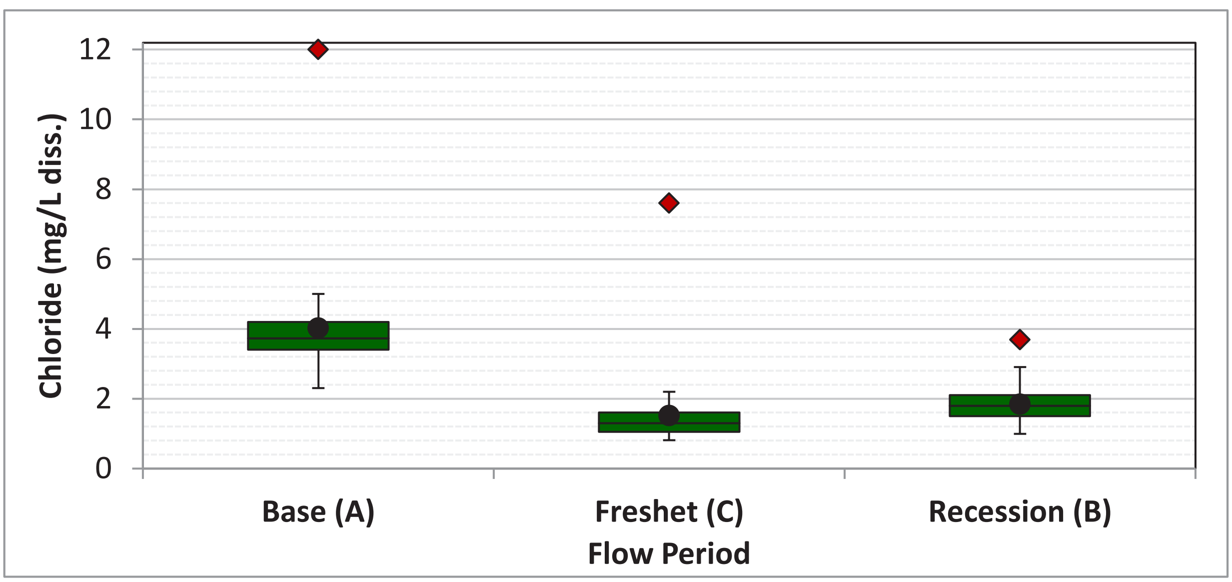


Figure B-71. The Effect of Season and Time on Chloride in the Peel River above Ft. McPherson
The (letters) indicate significance categories.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

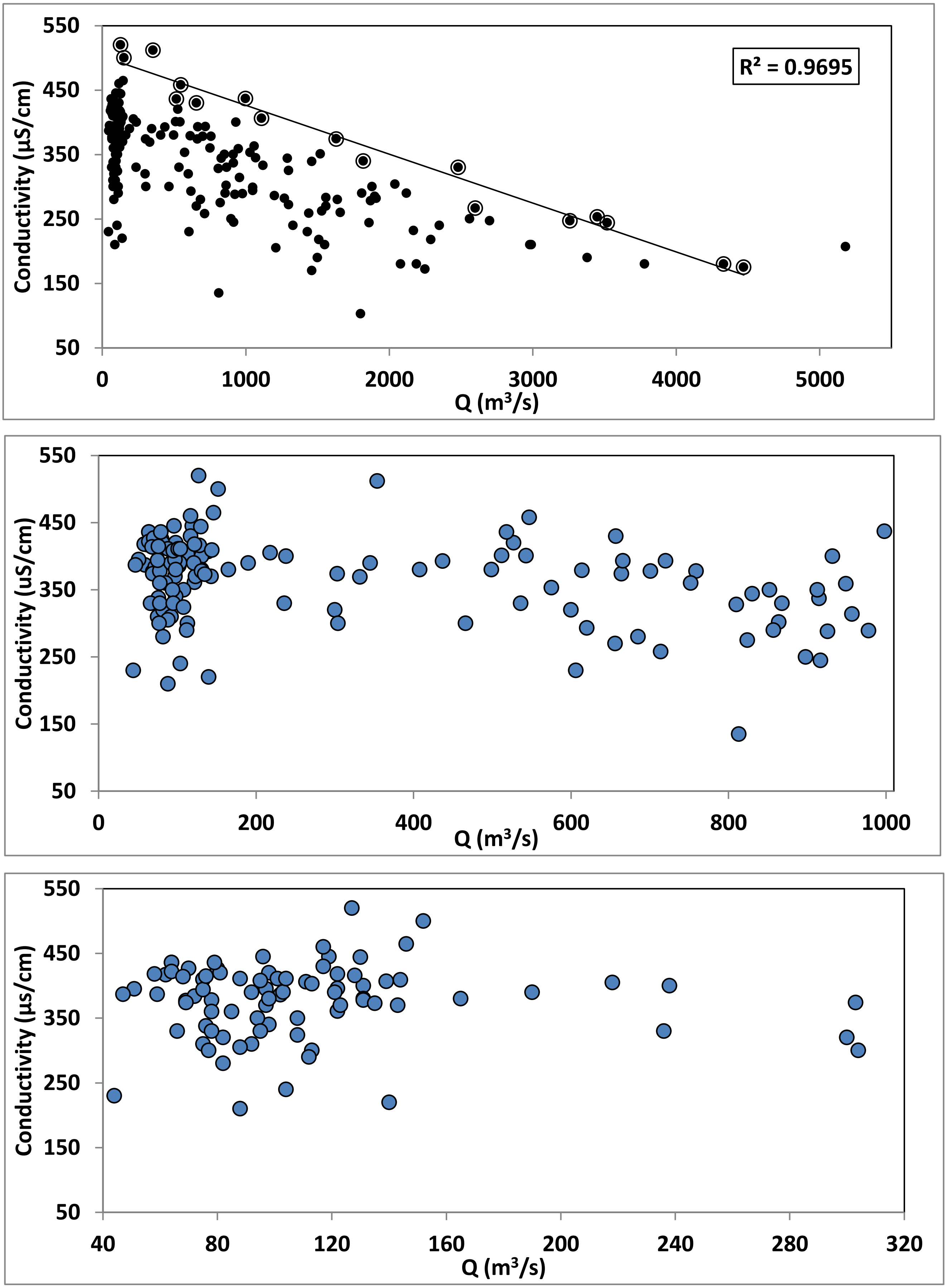


Figure B-72. The Effect of Flow Rate on Conductivity in the Peel River above Ft. McPherson

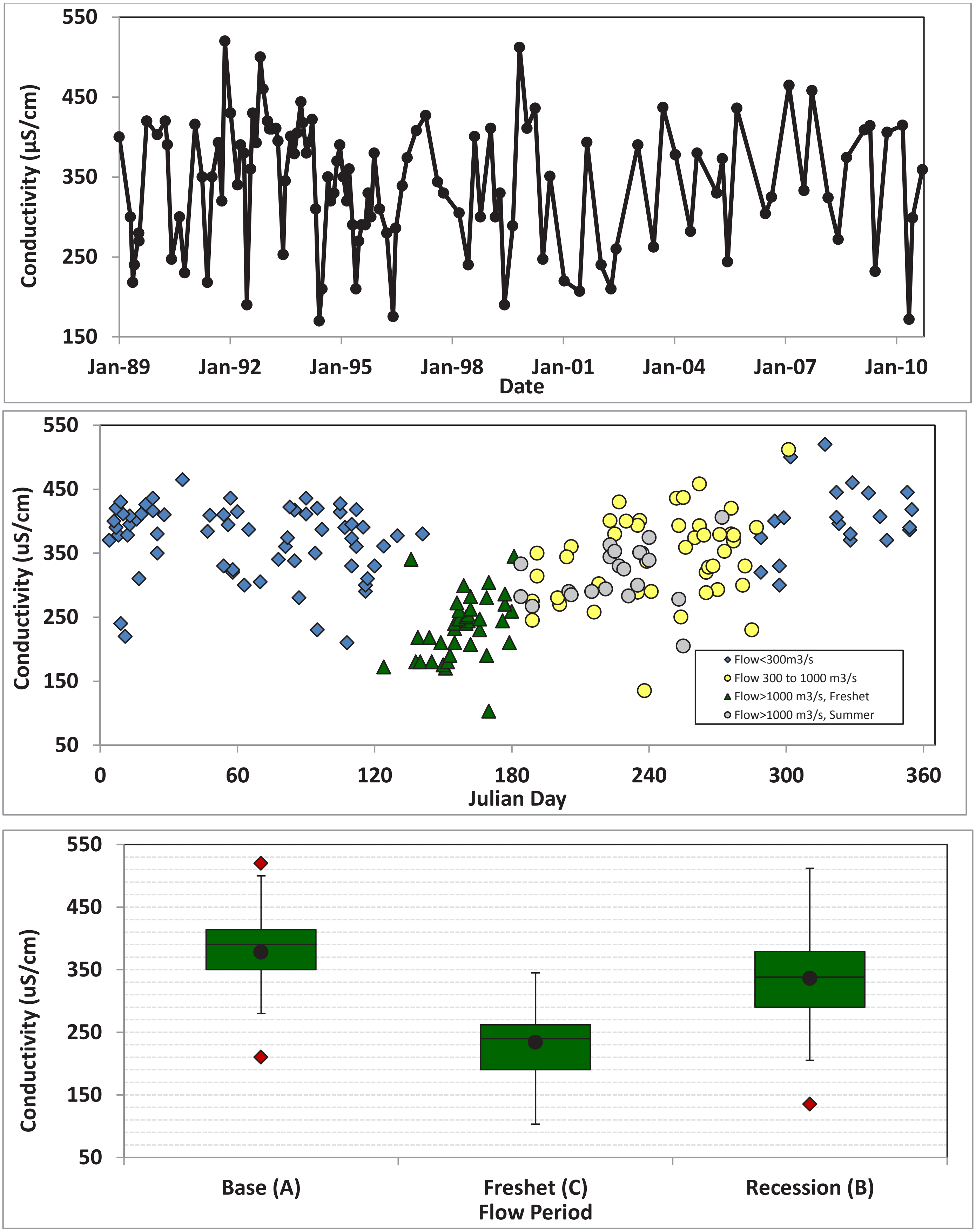


Figure B-73. The Effect of Season and Time on Conductivity in the Peel River above Ft. McPherson
The (letters) indicate significance categories.

G:\GIS_Project_Folder\111440079_Peel River\inDesign\charts

Stantec

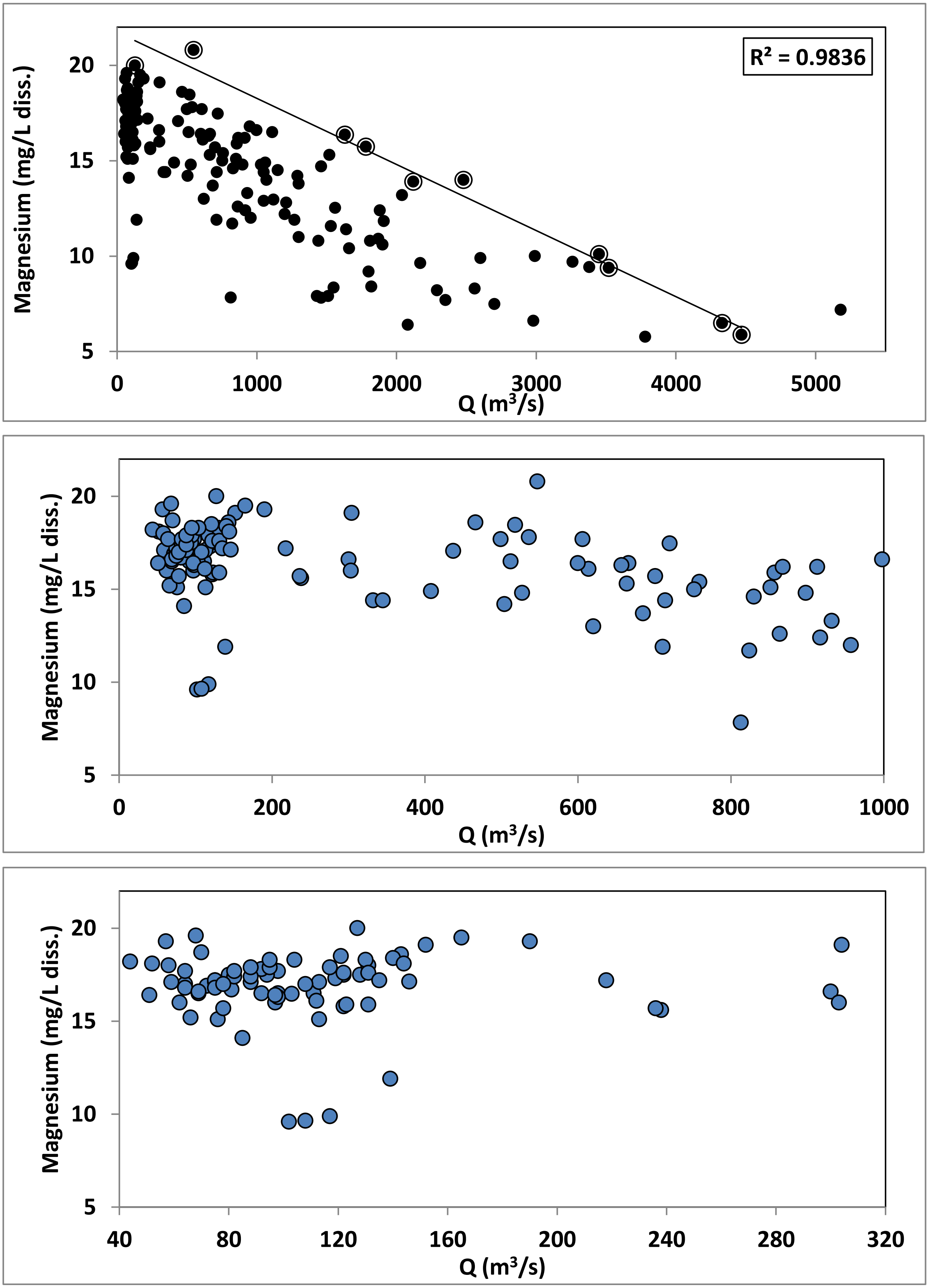


Figure B-74. The Effect of Flow Rate on Magnesium in the Peel River above Ft. McPherson

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

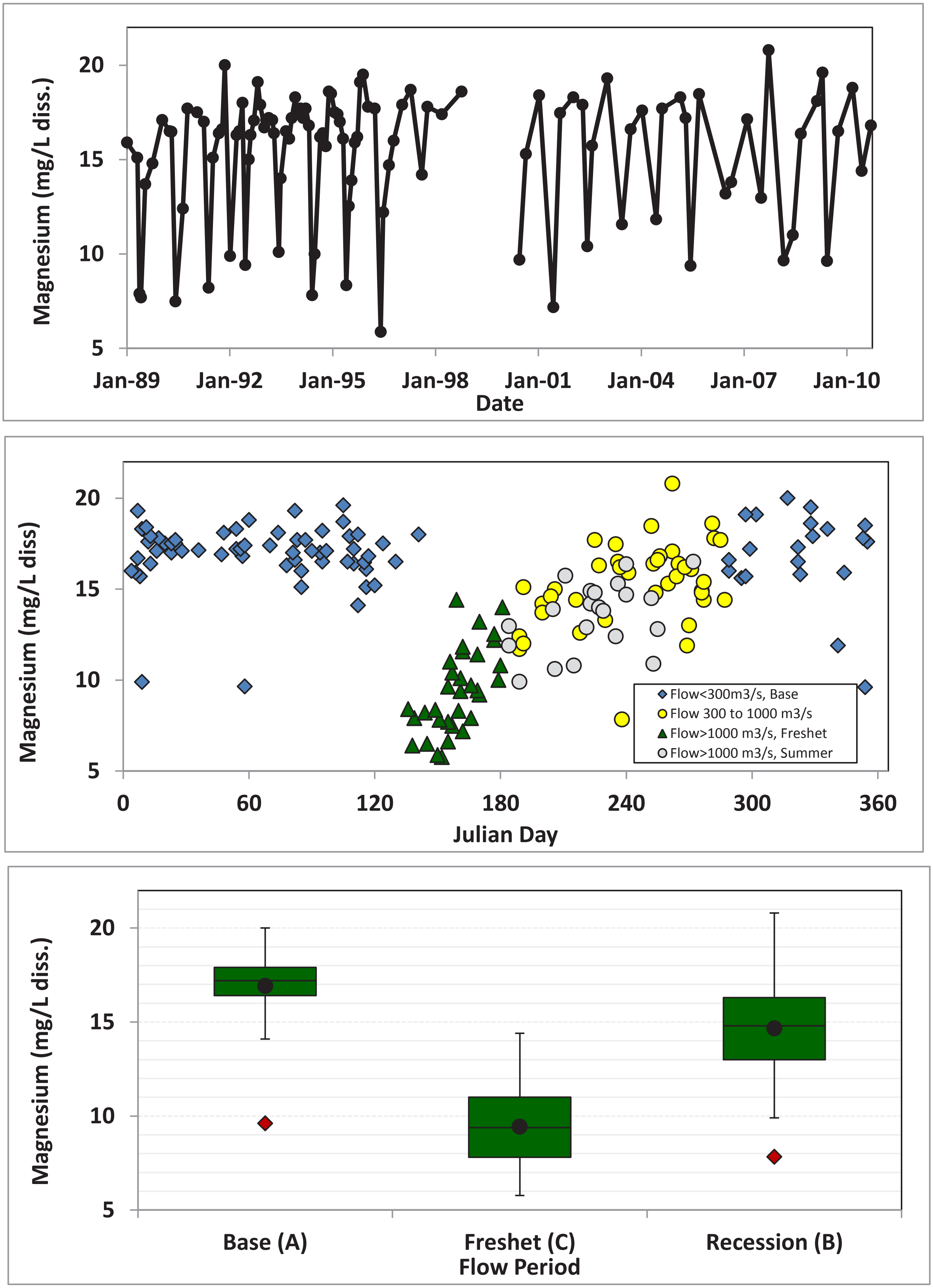


Figure B-75. The Effect of Season and Time on Magnesium in the Peel River above Ft. McPherson
The (letters) indicate significance categories.

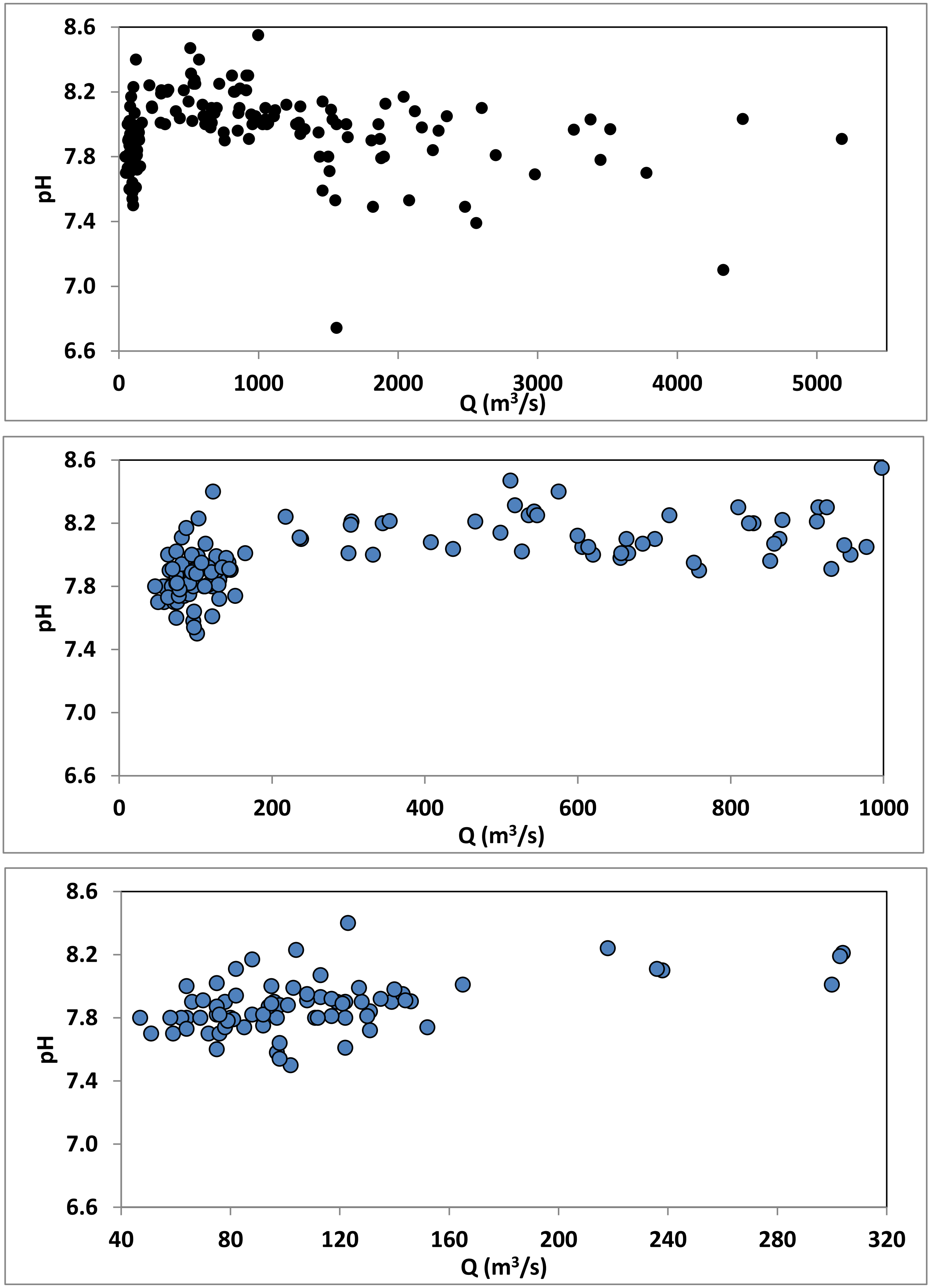
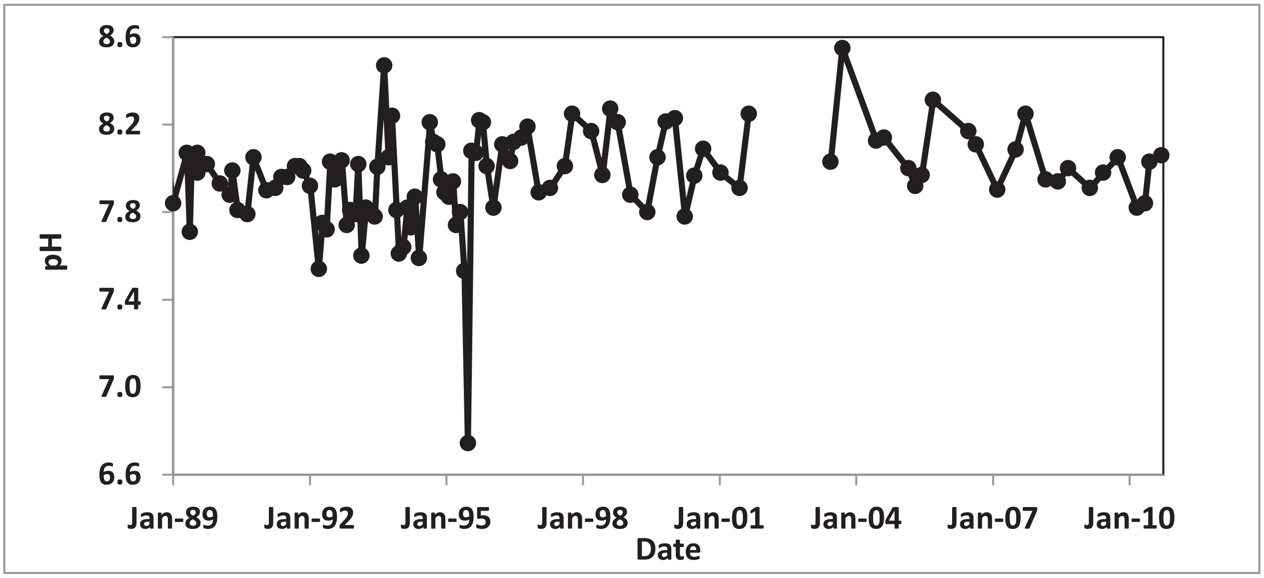
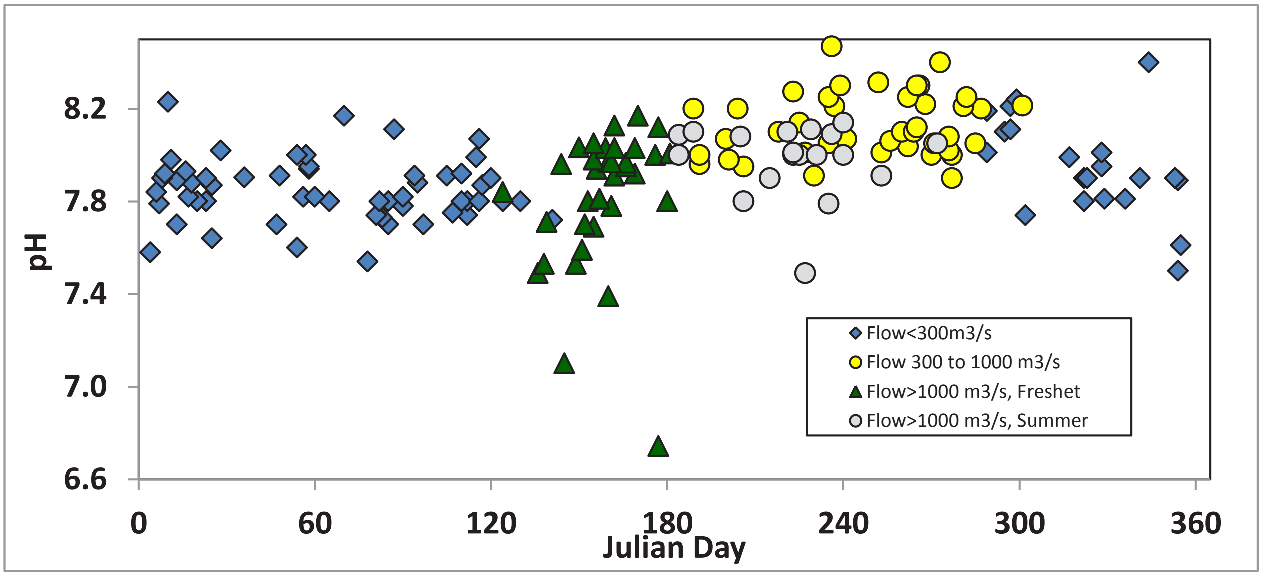


Figure B-76. The Effect of Flow Rate on pH in the Peel River above Ft. McPherson





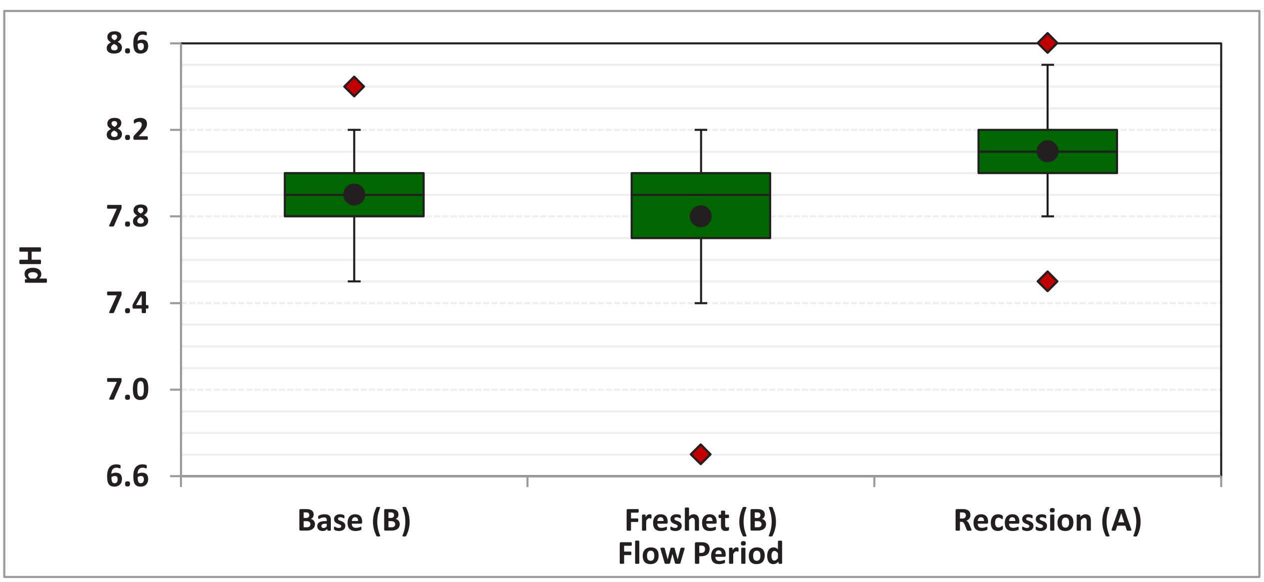


Figure B-77. The Effect of Season and Time on pH in the Peel River above Ft. McPherson
The (letters) indicate significance categories.

G:\GIS_Project_Folder\111440079_Peel River\inDesign\charts

Stantec

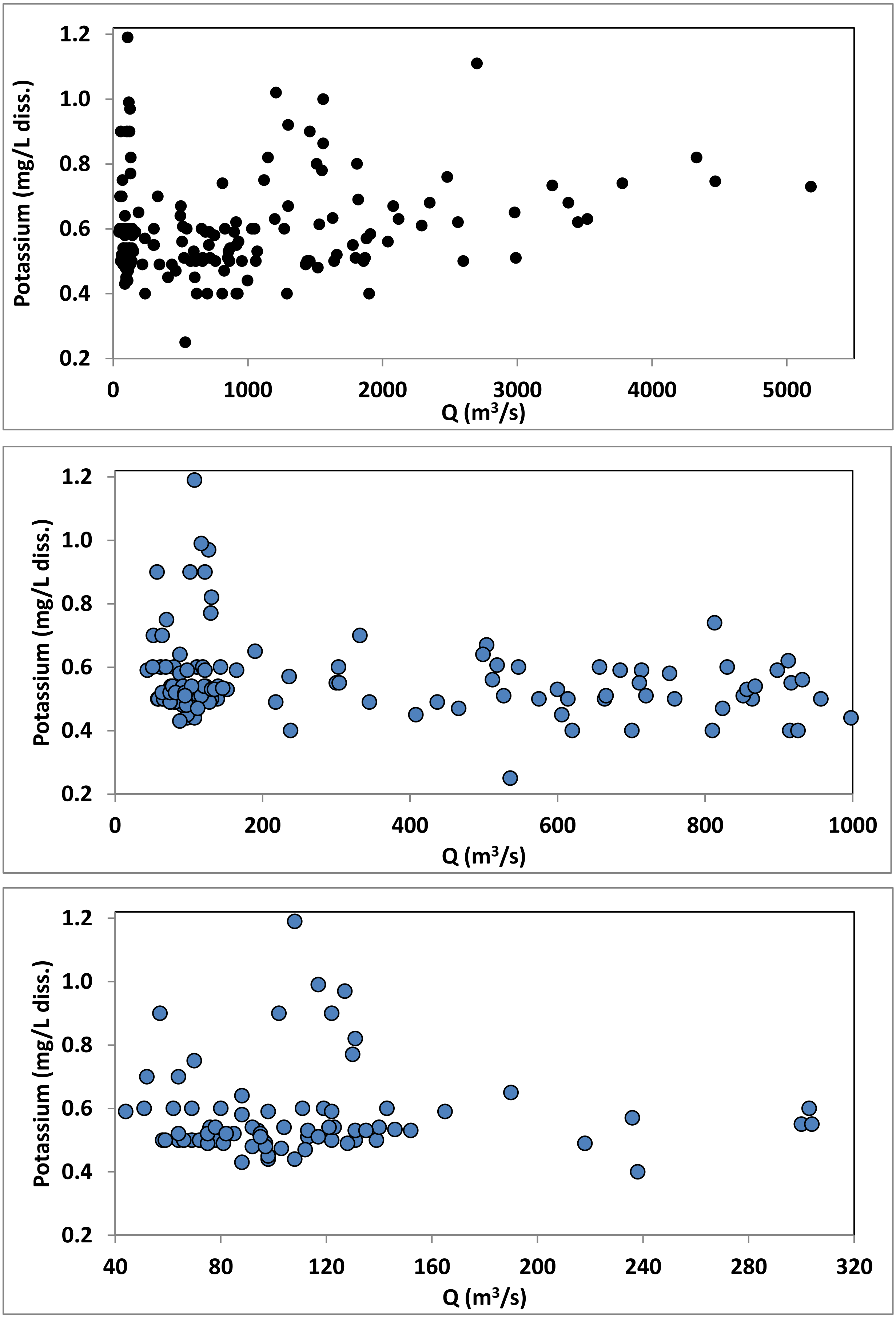


Figure B-78. The Effect of Flow Rate on Potassium in the Peel River above Ft. McPherson

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

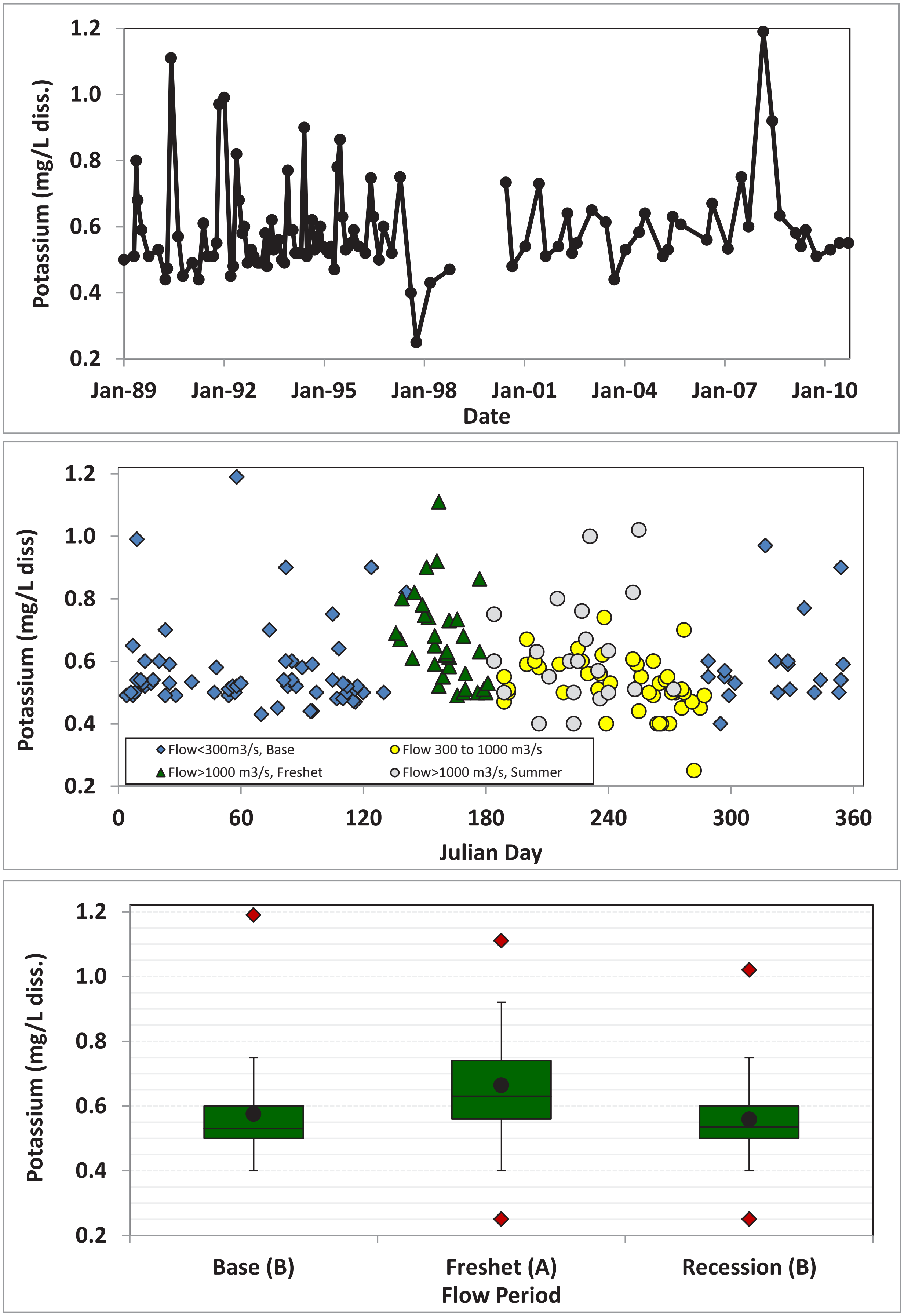
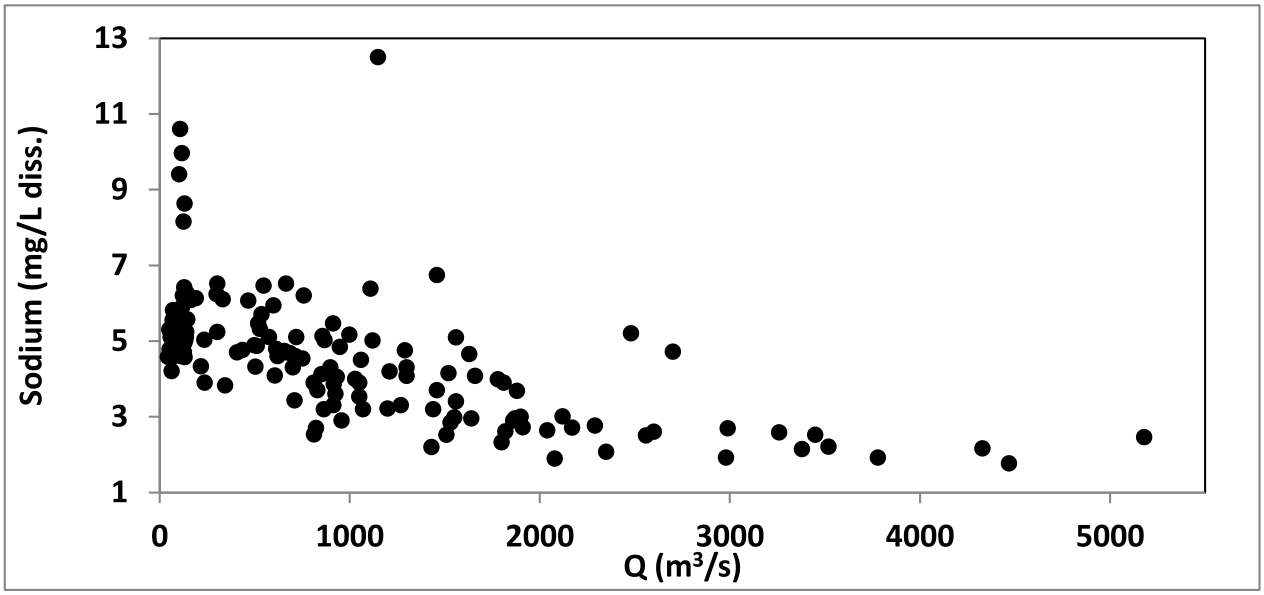
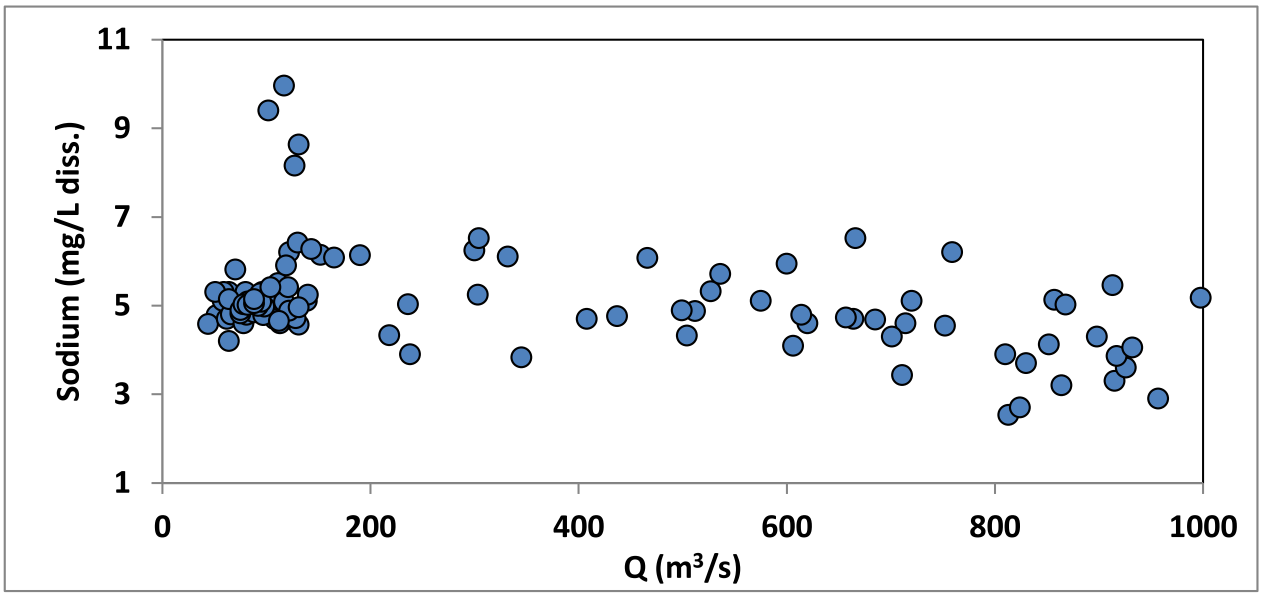


Figure B-79. The Effect of Season and Time on Potassium in the Peel River above Ft. McPherson
The (letters) indicate significance categories.





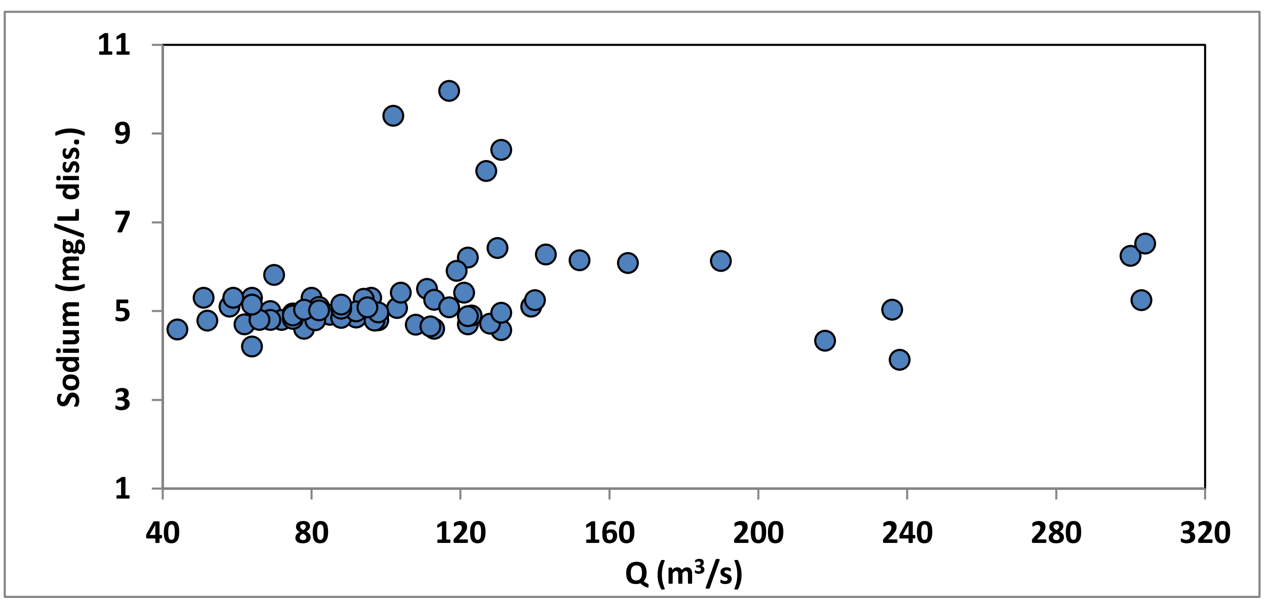


Figure B-80 The Effect of Flow Rate on Sodium in the Peel River above Ft. McPherson

G:\GIS_Project_Folder\111440079_Peel River\inDesign\charts

Stantec

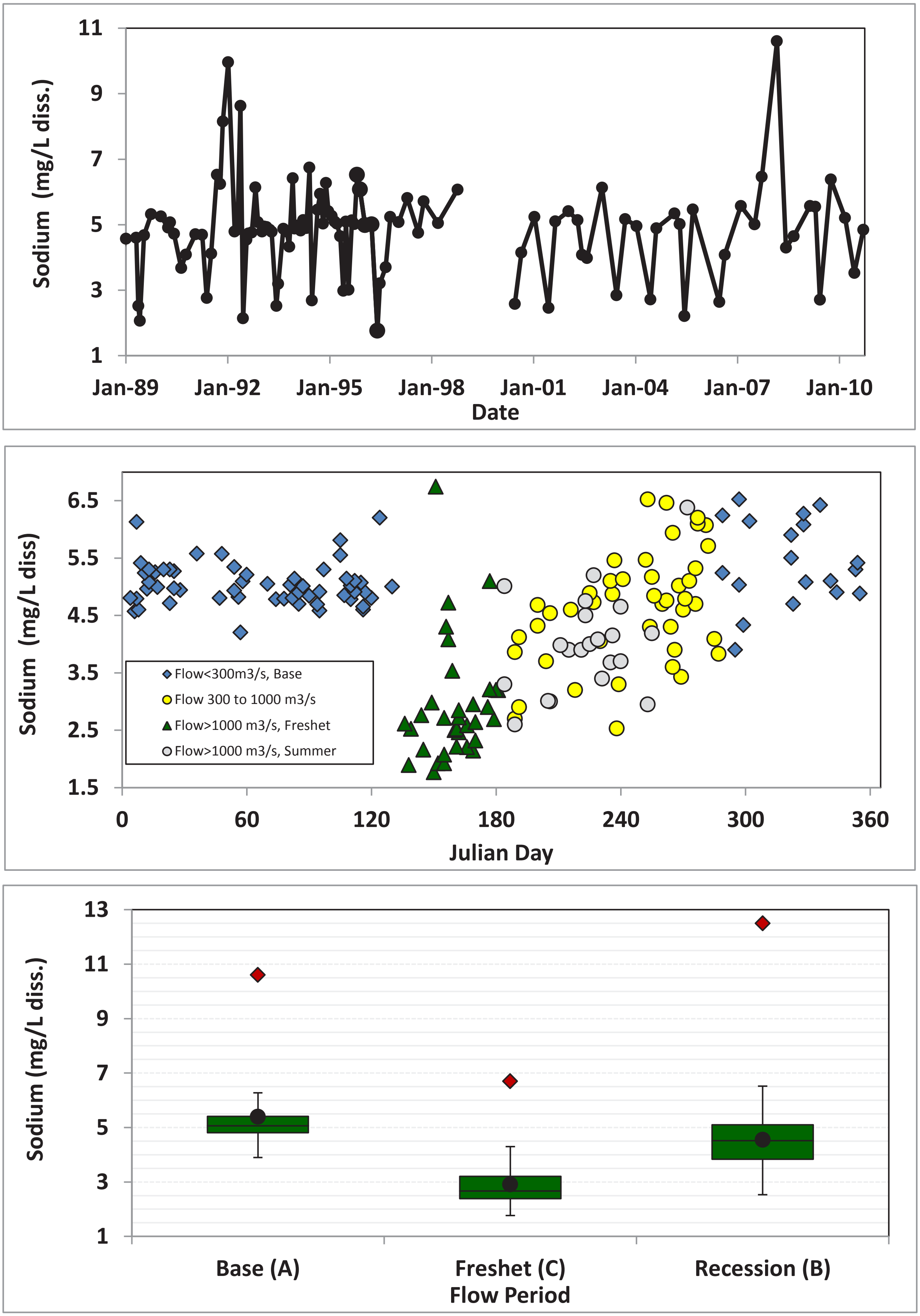
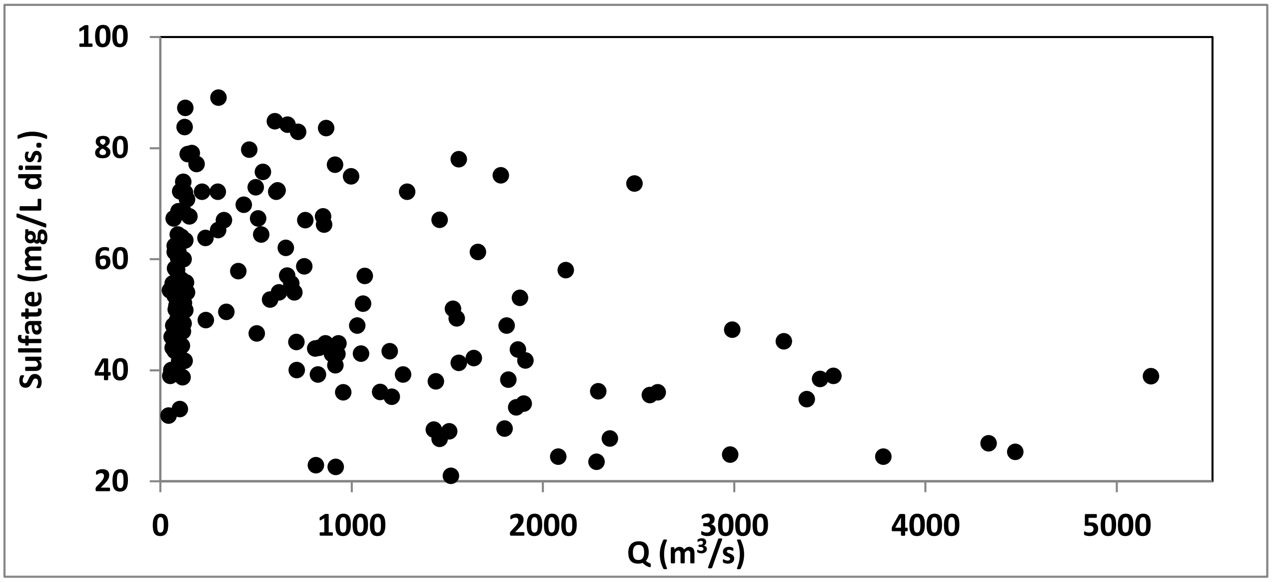
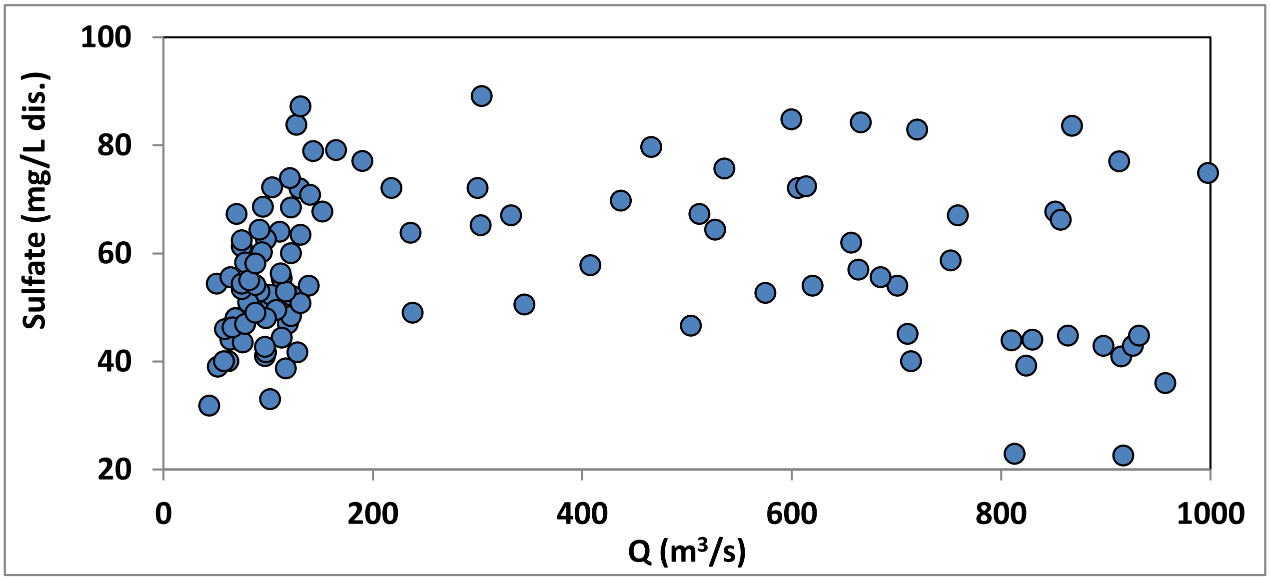


Figure B-81. The Effect of Season and Time on Sodium in the Peel River above Ft. McPherson
The (letters) indicate significance categories.





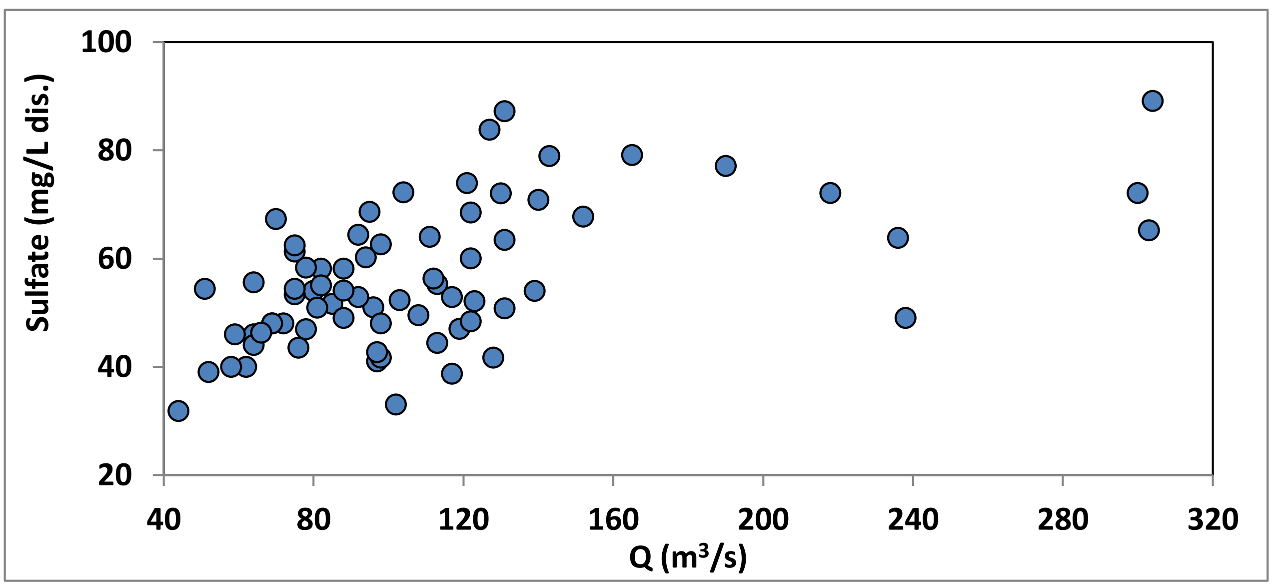


Figure B-82; The Effect of Flow Rate on Sulfate in the Peel River above Ft. McPherson

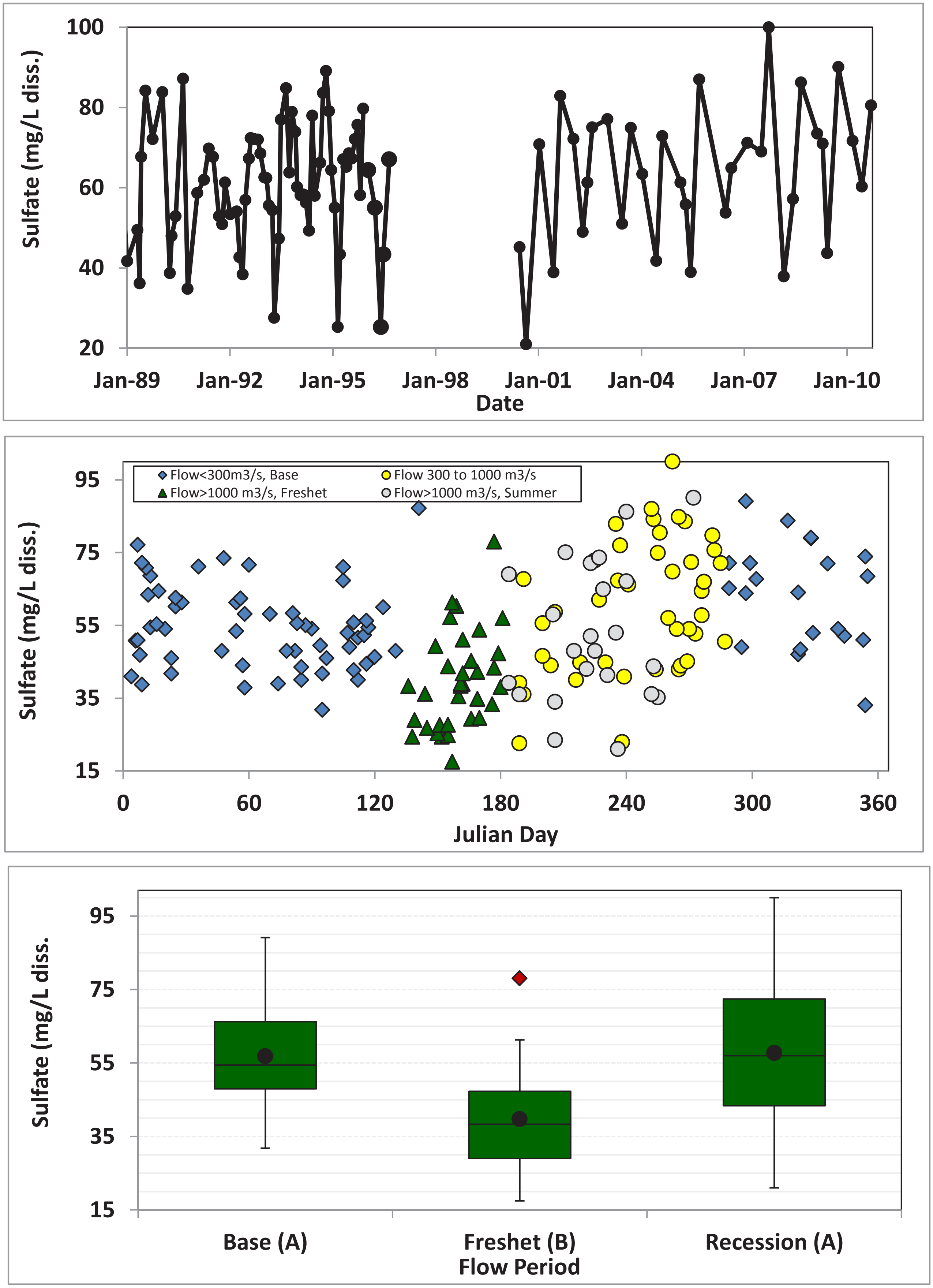


Figure B-83. The Effect of Season and Time on Sulfate in the Peel River above Ft. McPherson
The (letters) indicate significance categories.

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

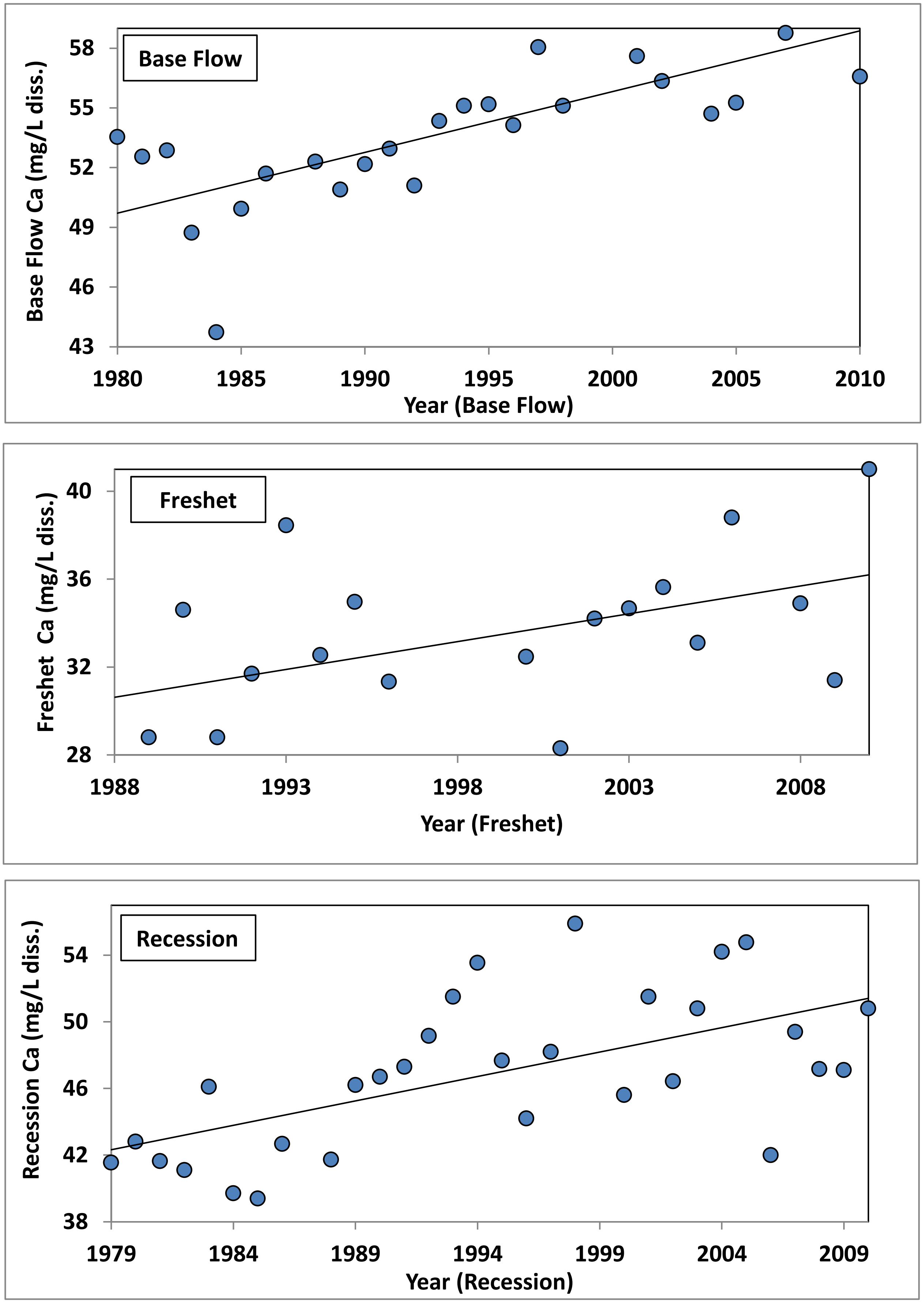
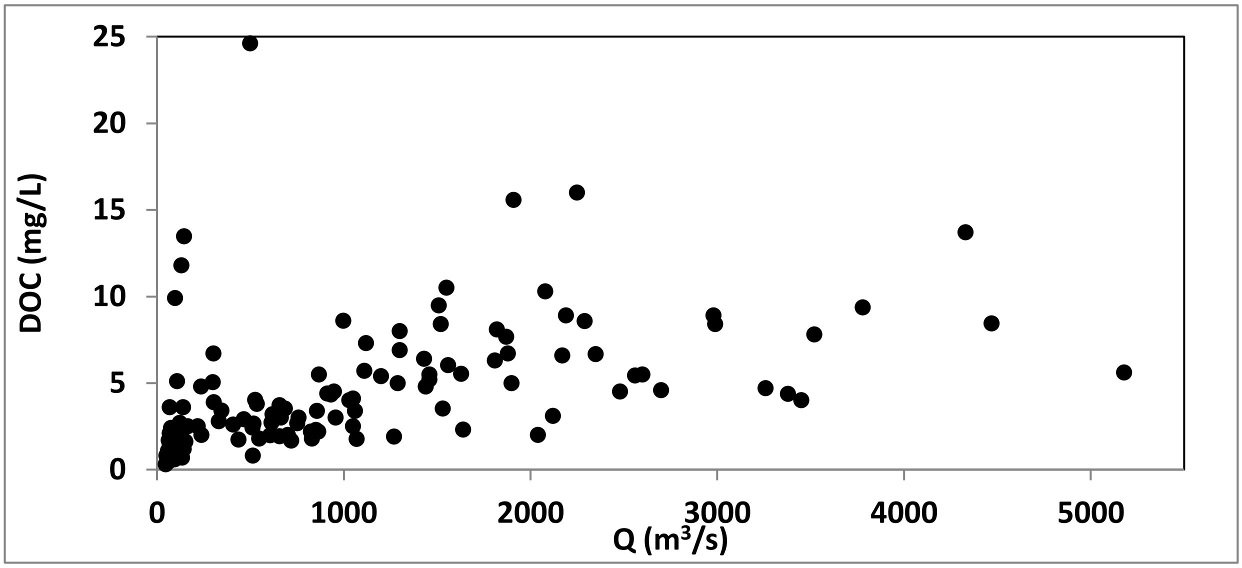
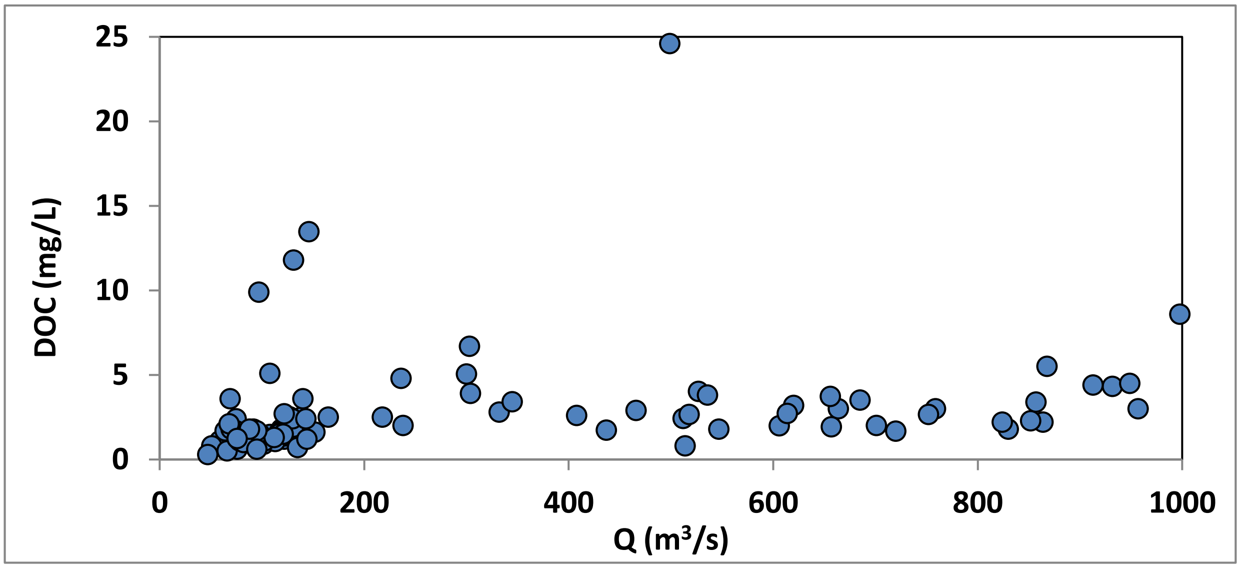


Figure B-84: Temporal Trends in Dissolved Calcium Concentration During Base Flow, Freshet, and Recession Periods





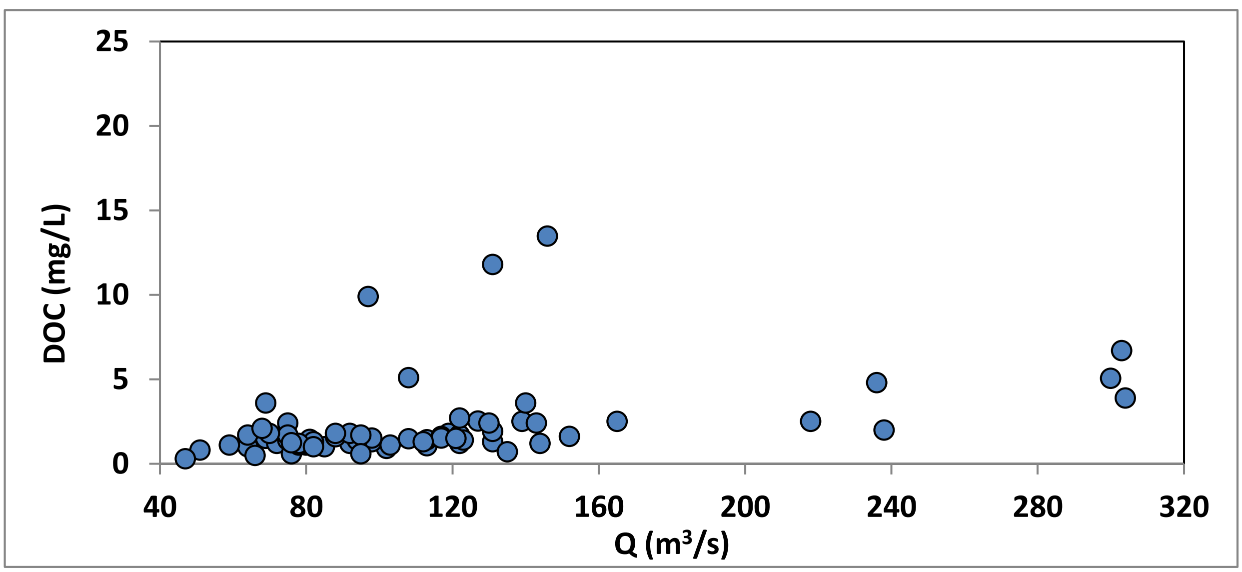


Figure B-85. The Effect of Flow Rate on Dissolved Organic Carbon (DOC) in the Peel River above Ft. McPherson

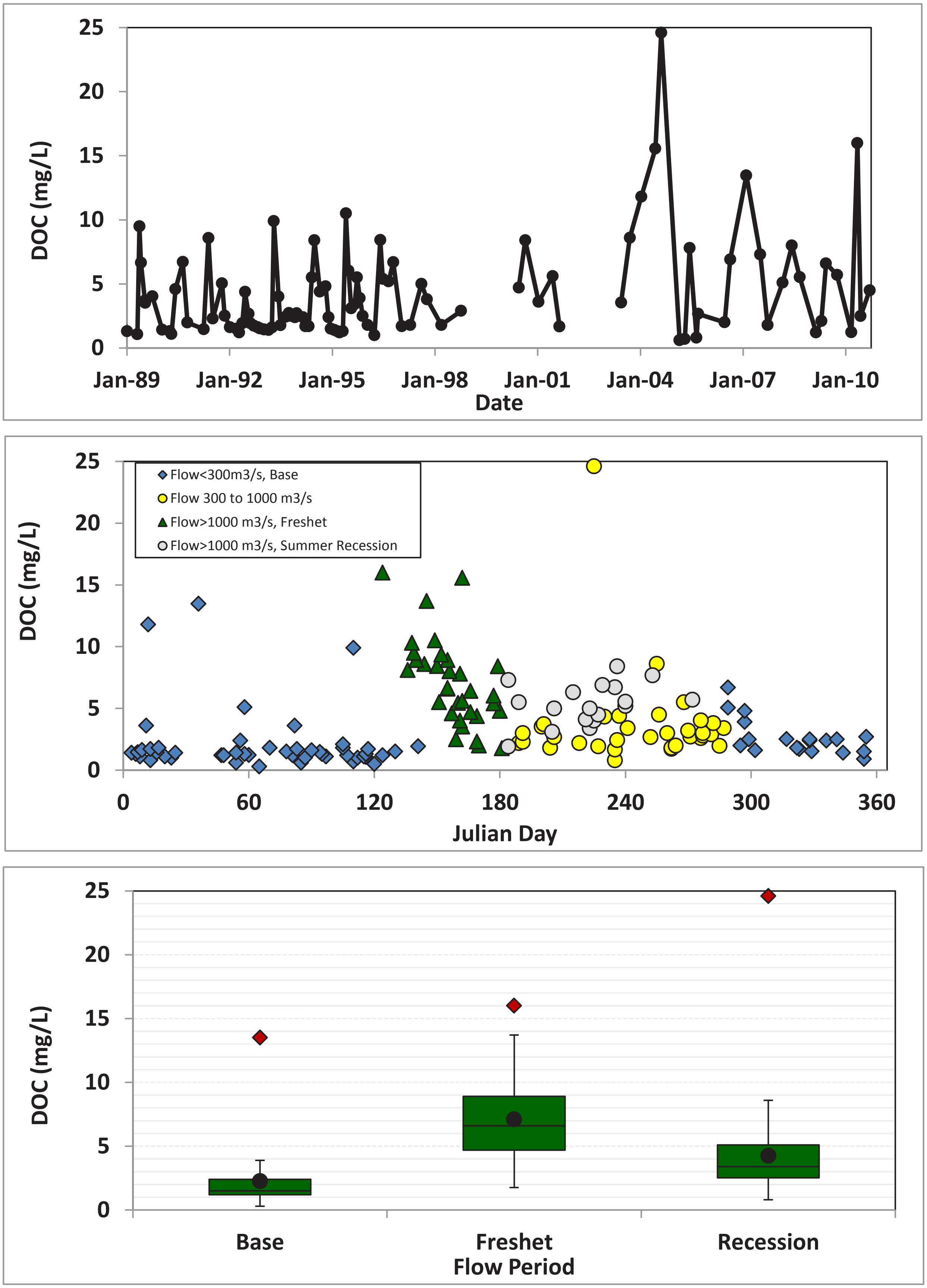


Figure B-86. The Effect of Season and Time on DOC in the Peel River above Ft. McPherson

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

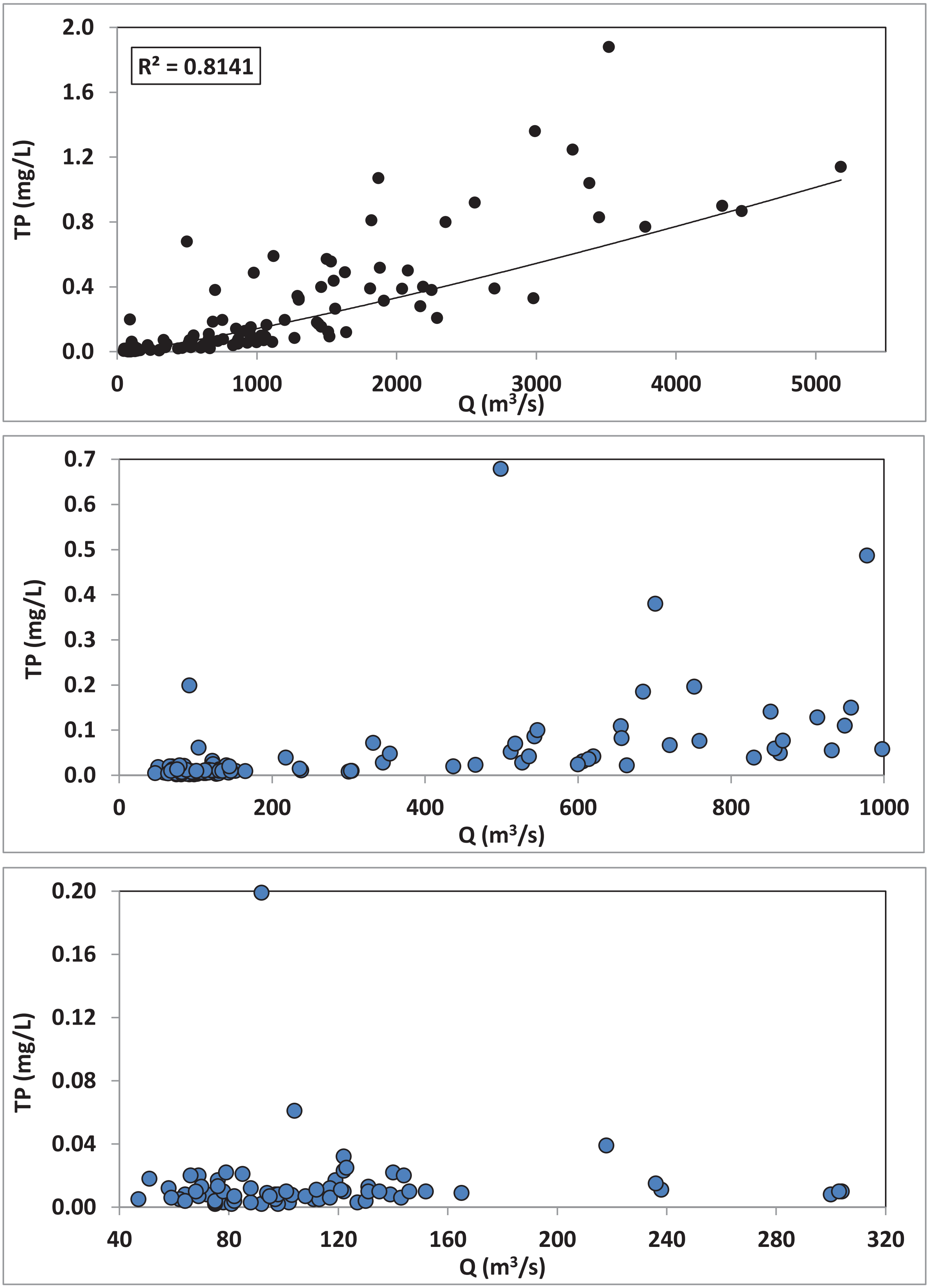


Figure B-87. The Effect of Flow Rate on Total Phosphorus in the Peel River above Ft. McPherson

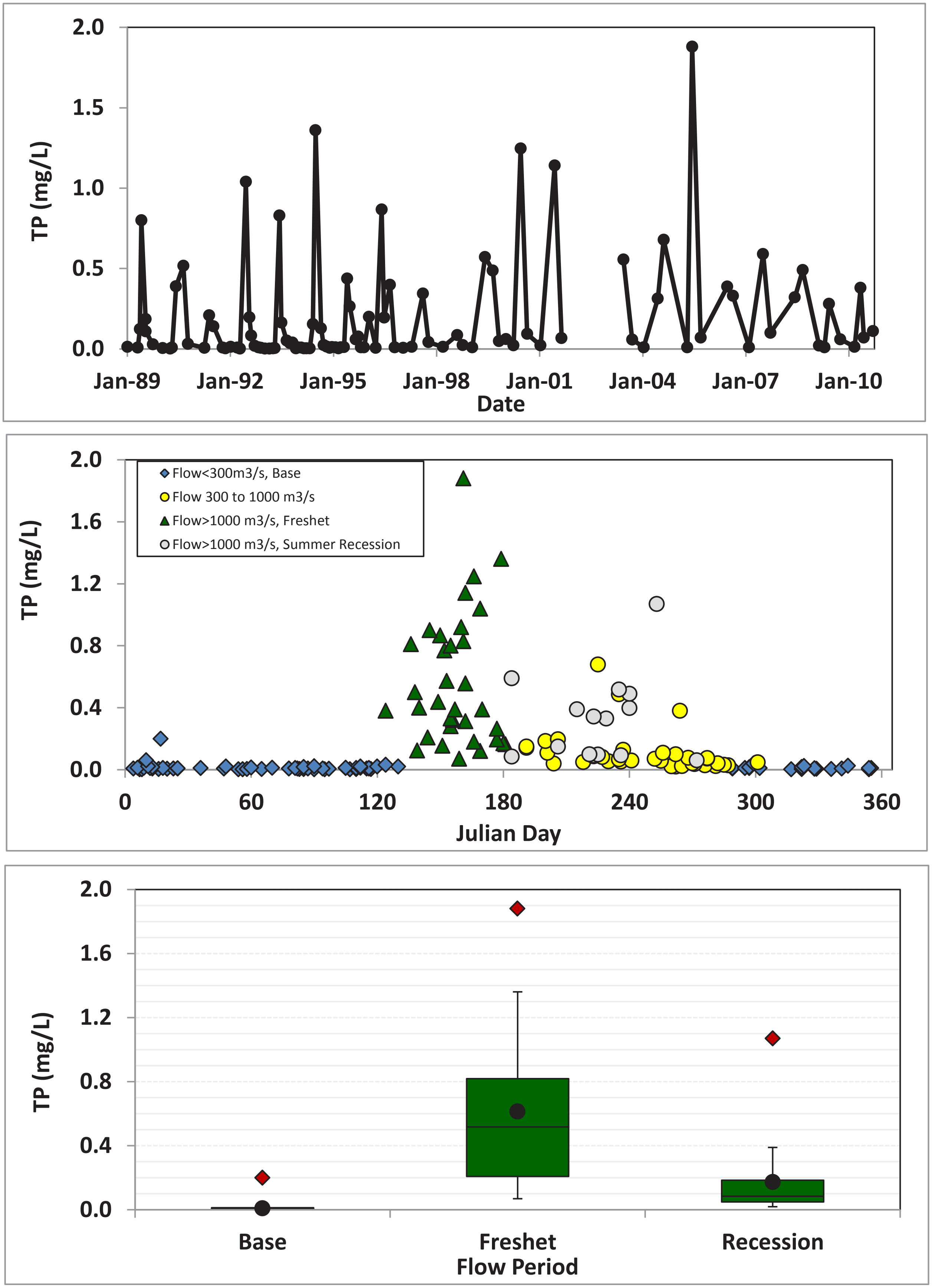


Figure B-88. The Effect of Season and Time on Total Phosphorus in the Peel River above Ft. McPherson

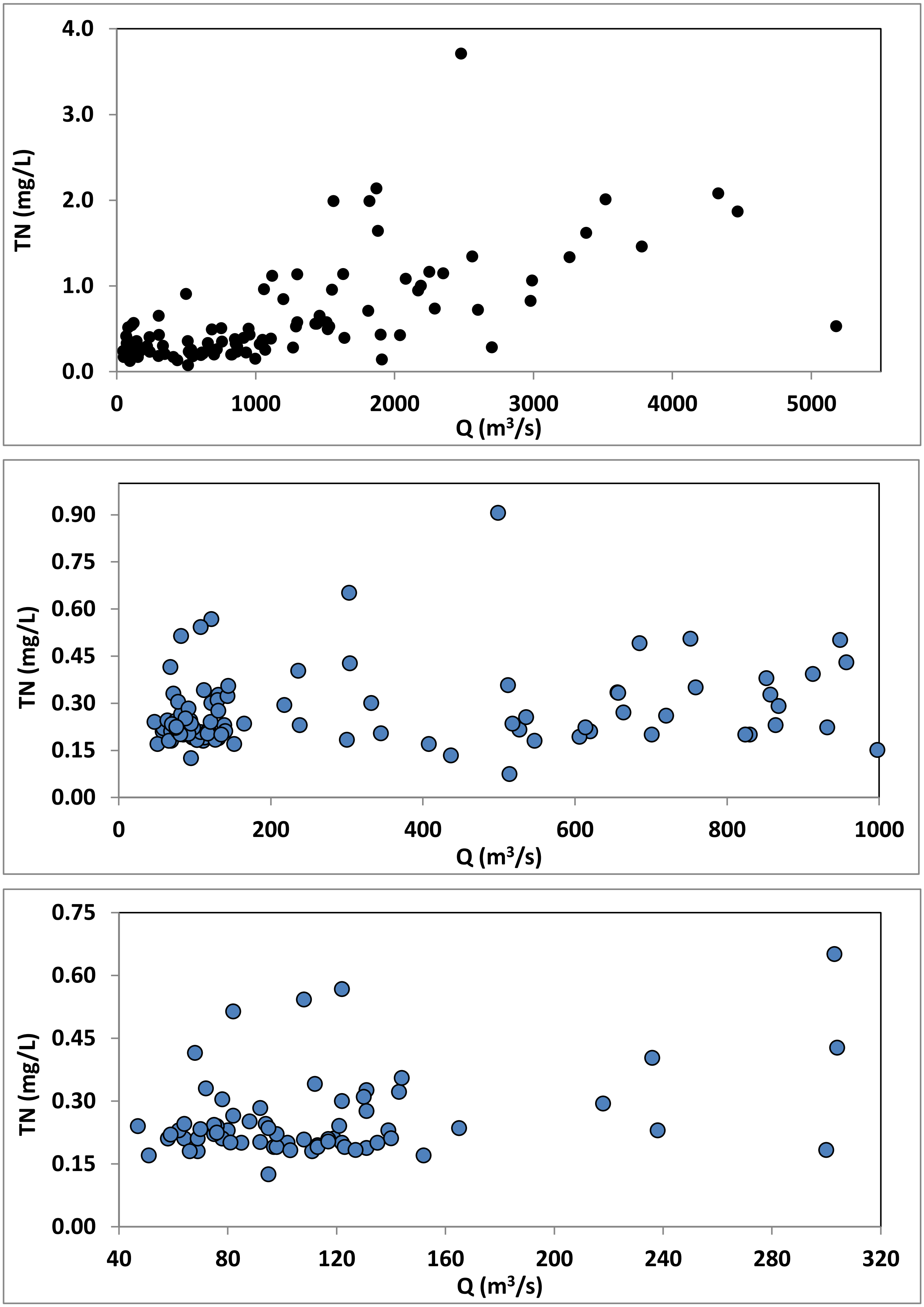


Figure B-89. The Effect of Flow Rate on Total Nitrogen (TN) in the Peel River above Ft. McPherson

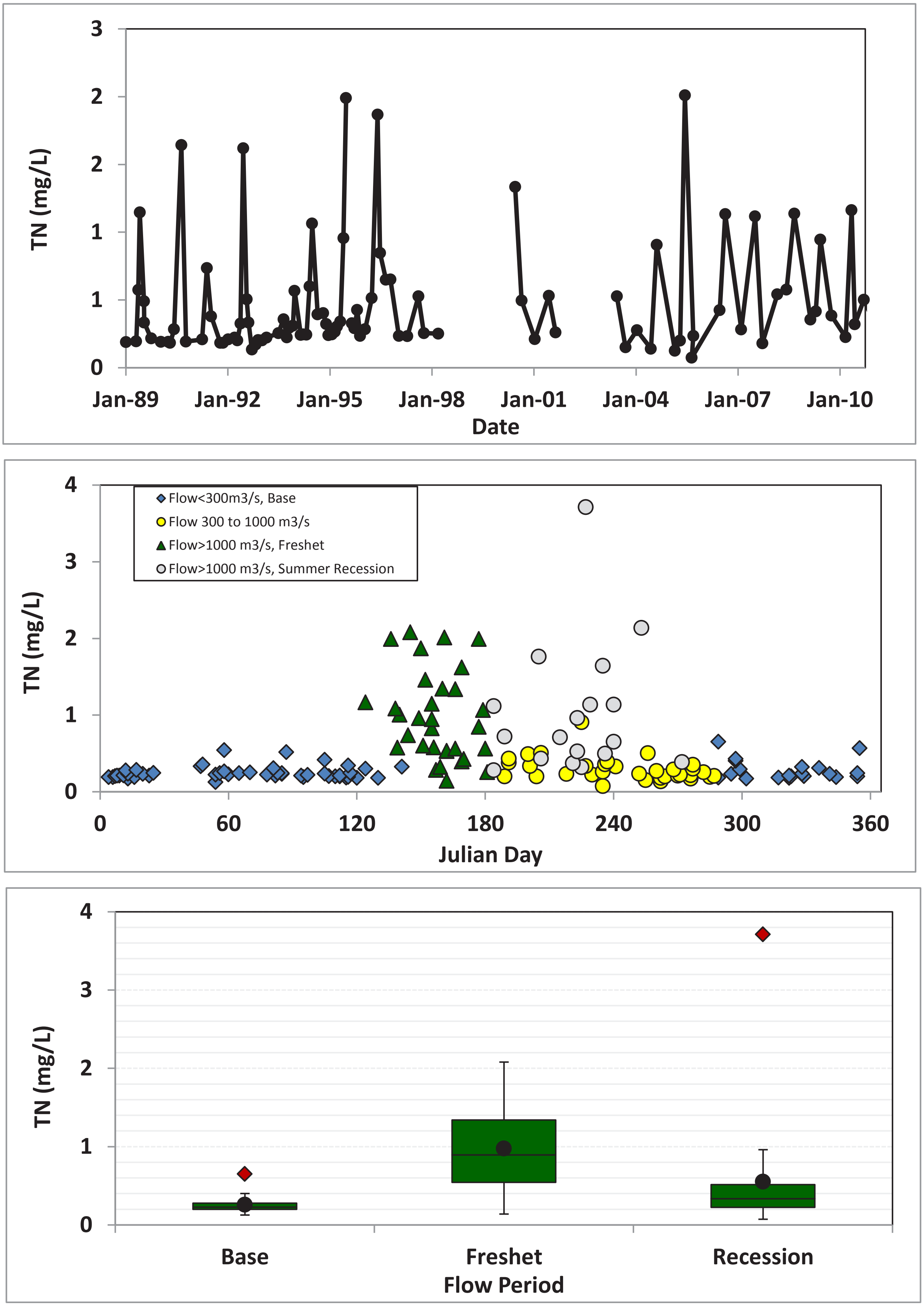
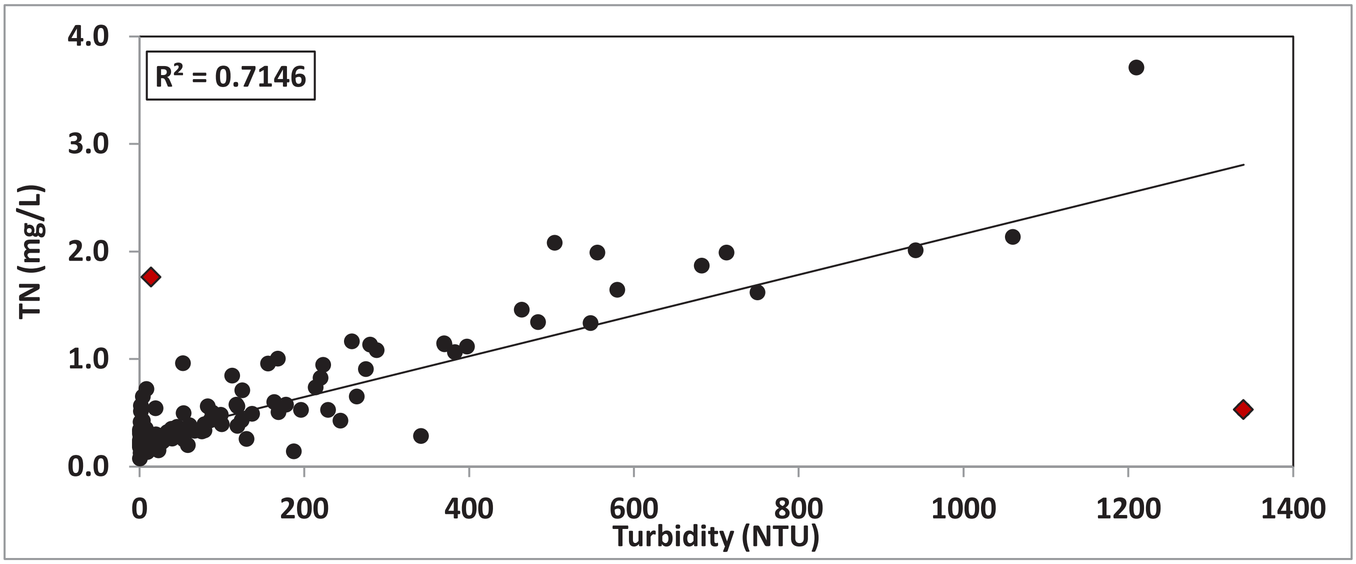
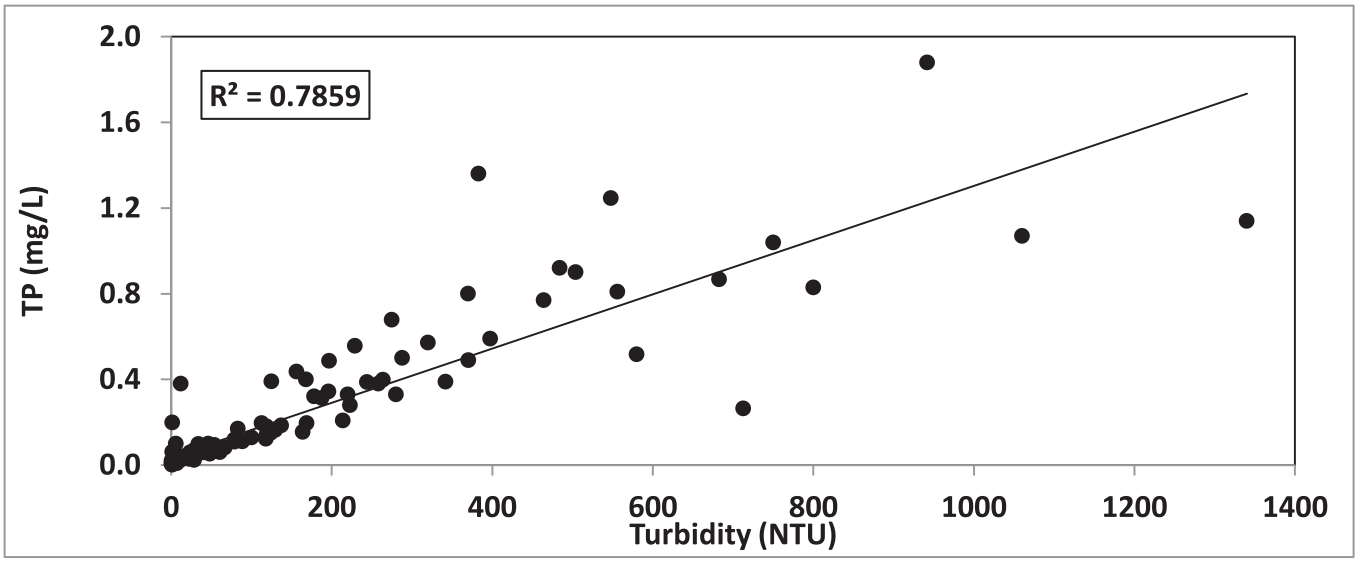


Figure B-90. The Effect of Season and Time on TN in the Peel River above Ft. McPherson





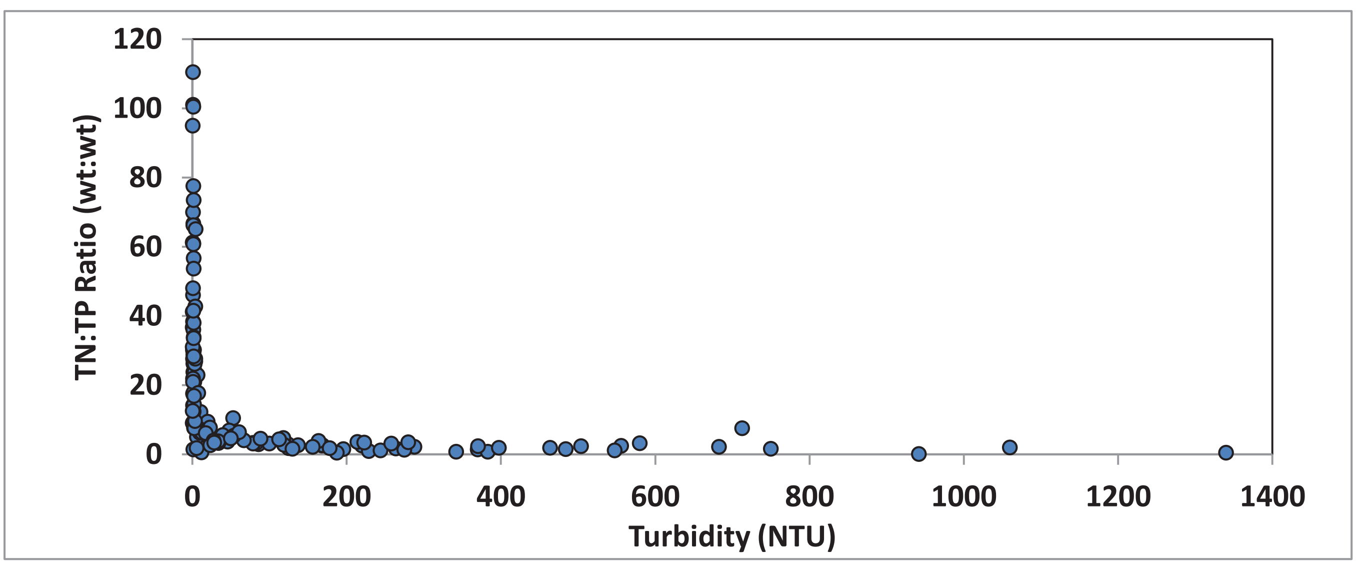


Figure B91: The relationship between Turbidity, Total Nitrogen, and Total Phosphorus in the Peel River Above Fort McPherson (Site O).

G:\GIS_Project_Folder\111440079_Peel River\inDesign\charts

Stantec

APPENDIX C

PEEL RIVER ABOVE FORT MCPHERSON WATER-CHEMISTRY DATA

Table C1: Water Chemistry of Major Nutrients at 'Peel River Above Fort McPherson' (Site O)

Sample No.	Station Number	Station Latitude	Station Longitude	Sample_Type	Sample Date	Serial Date	Year	Month	Day	Julian	Flow	TURBIDITY	Total Alk (CaCO3)	Ca diss	Cl diss	Mg diss	pH	K diss	Na diss	Cond	SO4 diss
											m^3/s	NTU	MG/L	MG/L	MG/L	MG/L	UNITS	MG/L	MG/L	US/CM	MG/L
1960PN950007	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	8-Jun-60	22075	1960	6	8	160		33	76	27	2.20	8	7.7	0.70	2.0	211	25
1960PN953113	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	22-Jun-60	22089	1960	6	22	174		900	86	33	1.70	8	7.8	1.00	2.1	243	34
1960PN953222	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	6-Jul-60	22103	1960	7	6	188		33	103	36	1.30	9	8.0	0.80	2.0	244	29
1960PN953223	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	20-Jul-60	22117	1960	7	20	202		17	112	37	2.00	12	8.1	0.90	2.9	275	38
1960PN953350	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	3-Aug-60	22131	1960	8	3	216		55	99	35	1.70	10	8.0	0.50	2.2	257	38
1960PN953663	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31-Aug-60	22159	1960	8	31	244		17	105	38	1.50	12	7.8	0.40	2.9	290	44
1960PN953664	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	14-Sep-60	22173	1960	9	14	258		850	80	33	1.80	9	7.6	0.90	3.0	259	49
1969PN950133	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-Feb-69	25244	1969	2	10	41		5	127	47	2.80		7.8	0.40	2.8	310	31
1969PN952582	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	30-Sep-69	25476	1969	9	30	273	575	14	122	47	2.50		8.4	0.50	5.1	353	53
1970PN952342	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Jun-70	25744	1970	6	25	176	1860	115	89	38	1.30		8.0	0.50	2.9	244	33
1970PN953083	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	19-Aug-70	25799	1970	8	19	231	1560	156	98	39	1.30		8.0	1.00	3.4	283	41
1970PN953508	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Sep-70	25834	1970	9	23	266	810	19	104	42	1.80		8.3	0.40	3.9	328	44
1970PN953578	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	27-Aug-70	25807	1970	8	27	239	915	2	119	47	1.20		8.3	0.40	3.3	337	41
1971PN950143	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	12-Sep-71	26188	1971	9	12	255	1210			31	1.92	13		1.02	4.2	205	35
1971PN950148	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	3-Aug-71	26148	1971	8	3	215				33	1.99	13		0.59	3.4	290	26
1971PN952426	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**3-Jun-71**	26087	**1971**	**6**	**3**	**154**		**180**	**66**	**25**	**1.55**	**6**	**8.1**	**0.62**	**1.6**	**155**	**33**
1971PN953965	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**15-Jul-71**	26129	**1971**	**7**	**15**	**196**		**118**	**97**	**40**	**1.70**		**8.2**			**306**	**49**
1971PN954697	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Aug-71	26149	1971	8	4	216		73	118	41	1.90		8.4	0.50	3.3	321	39
1971PN956604	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	22-Sep-71	26198	1971	9	22	265	926	48	101	38	1.60		8.3	0.40	3.6	288	43
1972PN950255	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	18-Jul-72	26498	1972	7	18	200	504			42	0.99	14		0.67	4.3		47
1972PN950256	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-May-72	26536	1972	8	25	238	813			25	2.91	8		0.74	2.5	135	23
1972PN950257	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	22-Mar-72	26380	1972	3	22	82	57			59		19		0.90	91.1	1	
1972PN950304	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	7-Jul-72	26487	1972	7	7	189	917			37	3.69	12		0.55	3.9	245	23
1972PN950440	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	3-Aug-72	26514	1972	8	3	216	714			42	2.31	14		0.59	4.6	258	40
1972PN950667	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-Sep-72	26552	1972	9	10	254	898			41	2.10	15		0.59	4.3	250	43
1972PN950686	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	8-Sep-72	26550	1972	9	8	252	1150			49	3.59	15		0.82	12.5		36
1973PN950117	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	15-Mar-73	26738	1973	3	15	74	52			51	5.82	18		0.70	4.8		39
1973PN950169	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	5-Apr-73	26759	1973	4	5	95	44			52	6.11	18		0.59	4.6	230	32
1973PN950322	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	19-Jun-73	26834	1973	6	19	170	1800			28	2.86	9		0.51	2.3	103	30
1973PN950625	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Jul-73	26870	1973	7	25	206	2280				1.07						24
1973PN950988	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	26-Sep-73	26933	1973	9	26	269	711			38	2.59	12		0.55	3.4		45
1979PN951864	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Jul-79	29061	1979	7	25	206	1900	86	93	37	1.20	11	7.8	0.40	3.0	285	34
1979PN952846	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Oct-79	29132	1979	10	4	277	759	39	113	46	2.00	15	7.9	0.50	6.2	378	67
1979PN954356	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Jan-80	29243	1980	1	23	23	64	2	157	56	4.10	17	7.8	0.70	5.3	436	46
1980PN951748	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	9-Jul-80	29411	1980	7	9	191	957	124	107	39	1.60	12	8.0	0.50	2.9	314	36
1980PN952452	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	12-Aug-80	29445	1980	8	12	225	1030	34	114	44	1.70	15	8.0	0.60	4.0	353	48
1980PN952998	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	16-Sep-80	29480	1980	9	16	260	664	11	120	45	2.00	15	8.1	0.50	4.7	374	57
1980PN953554	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	21-Oct-80	29515	1980	10	21	295	238	3	133	48	2.50	16	8.1	0.40	3.9	400	49
1980PN954267	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	18-Dec-80	29573	1980	12	18	353	96	2	158	57	3.70	18	7.9	0.50	5.3	445	51
1980PN955010	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	26-Feb-81	29643	1981	2	26	57	64	1	153	53	4.50	17	8.0	0.50	4.2	436	44
1981PN950173	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	26-Mar-81	29671	1981	3	26	85	62	1	148	49	4.30	16	7.8	0.60	4.7	417	40
1981PN950412	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	22-Apr-81	29698	1981	4	22	112	58	1	149	53	4.20	18	7.8	0.50	5.1	418	40
1981PN952329	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	11-Aug-81	29809	1981	8	11	223	1060	53	117	45	1.60	15	8.0	0.50	4.5	363	52
1981PN952985	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	8-Jul-81	29775	1981	7	8	189	2600	9	89	33	1.20	10	8.1	0.50	2.6	267	36
1981PN953217	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	21-Sep-81	29850	1981	9	21	264	701	12	123	47	2.10	16	8.1	0.40	4.3	378	54
1981PN954271	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	7-Dec-81	29927	1981	12	7	341	139	1	152	56	3.50	12	7.9	0.50	5.1	407	54
1981PN954588	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	20-Jan-82	29971	1982	1	20	20	80	1	159	57	4.20	18	7.8	0.60	5.3	426	54
1982PN950225	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	7-Apr-82	30048	1982	4	7	97	59	1	150	54	4.50	17	7.7	0.50	5.3	387	46
1982PN950653	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-May-82	30081	1982	5	10	130	69	4	145	48	4.20	17	7.8	0.50	5.0	377	48
1982PN951109	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	29-Jun-82	30131	1982	6	29	180	1440	83	93	36	1.50	11	7.8	0.50	3.2	259	38
1982PN951454	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	9-Aug-82	30172	1982	8	9	221	1050	46	110	41	1.60	13	8.1	0.60	3.9	294	43
1982PN952631	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	16-Feb-83	30363	1983	2	16	47	72	1	150	53	4.00	17	7.7	0.50	4.8	384	48
1983PN950140	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Mar-83	30398	1983	3	23	82	69	1	150	52	4.20	17	7.8	0.60	4.8	374	48
1983PN950327	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-May-83	30440	1983	5	4	124	122	20	135	50	4.20	18	7.8	0.90	6.2	361	60
1983PN950809	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Jul-83	30520	1983	7	23	204	830	23	125	46	2.10	15	8.2	0.60	3.7	344	44
1983PN951241	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Oct-83	30593	1983	10	4	277	332	35	120	47	2.20	14	8.0	0.70	6.1	369	67
1983PN951452	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	18-Nov-83	30638	1983	11	18	322	111	2	111	40	2.80	17	7.8	0.60	5.5	406	64

Table C1: Water Chemistry of Major Nutrients at 'Peel River Above Fort McPherson' (Site O)

Sample No.	Station Number	Station Latitude	Station Longitude	Sample_Type	Sample Date	Serial Date	Year	Month	Day	Julian	Flow	TURBIDITY	Total Alk (CaCO3)	Ca diss	Cl diss	Mg diss	pH	K diss	Na diss	Cond	SO4 diss
											m^3/s	NTU	MG/L	MG/L	MG/L	MG/L	UNITS	MG/L	MG/L	US/CM	MG/L
1983PN951557	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	13-Jan-84	30694	1984	1	13	13	51	2	114	39	4.10	16	7.7	0.60	5.3	395	54
1983PN951741	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	5-Mar-84	30746	1984	3	5	65	47	1	116				7.8			387	
1984PN950870	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	2-Aug-84	30896	1984	8	2	215	1810	125	101	37	1.60	11	7.9	0.80	3.9	290	48
1984PN951321	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	26-Sep-84	30951	1984	9	26	270	620	6	111	43	1.90	13	8.0	0.40	4.6	293	54
1984PN951559	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	17-Nov-84	31003	1984	11	17	322	119	2	174	56	2.80	17	7.9	0.60	5.9	445	47
1984PN951682	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	19-Dec-84	31035	1984	12	19	354	102	2	98	37	10.80	10	7.5	0.90	9.4	386	33
1985PN950040	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	26-Mar-85	31132	1985	3	26	85	76	1	152	50	3.70	15	7.7	0.54	4.9	338	44
1985PN950127	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	30-Apr-85	31167	1985	4	30	120	66	1	150	48	3.60	15	7.9	0.50	4.8	330	46
1985PN950467	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	3-Jul-85	31231	1985	7	3	184	1270	34	106	39	2.00	12	8.0	0.60	3.3	282	39
1985PN950590	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	6-Aug-85	31265	1985	8	6	218	864	22	122	40	1.30	13	8.1	0.50	3.2	302	45
1985PN950918	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	19-Nov-85	31370	1985	11	19	323	122	2	161	52	2.90	16	7.9	0.50	4.7	396	48
1985PN951035	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	8-Jan-86	31420	1986	1	8	8	78	1	151	52	3.40	16	7.9	0.50	4.6	378	47
1986PN950323	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	15-Jun-86	31578	1986	6	15	166	1430	119	81	27	1.20	8	8.0	0.49	2.2	230	29
1986PN950416	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	8-Jul-86	31601	1986	7	8	189	824	59	108	37	1.50	12	8.2	0.47	2.7	275	39
1986PN950593	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	15-Aug-86	31639	1986	8	15	227	2480	1210	100	45	2.35	14	7.5	0.76	5.2	330	74
1986PN950818	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	3-Oct-86	31688	1986	10	3	276	408	14	129	47	2.20	15	8.1	0.45	4.7	380	58
1986PN951138	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-Dec-86	31756	1986	12	10	344	123	3	152	52	3.20	16	8.4	0.54	4.9	370	52
1986PN951300	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-Feb-87	31818	1987	2	10	41		2	153	51	3.40	16	7.7	0.51	4.7	440	45
1987PN950014	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Mar-87	31861	1987	3	25	84		1	151	53	4.00	16	7.9	0.56	4.9	400	55
1987PN950581	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	2-Jul-87	31960	1987	7	2	183		54	112	40	1.50	12	8.0	0.53	3.2	310	42
1987PN950976	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Aug-87	31993	1987	8	4	216		40	112	40	1.30	12	8.0	0.49	3.4	250	41
1987PN951561	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	3-Sep-87	32023	1987	9	3	246		99	102	38	1.50	12	7.8	0.51	3.9	260	44
1987PN951912	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	6-Oct-87	32056	1987	10	6	279		22	118	43	1.90	14	8.0	0.46	4.7	340	55
1987PN952332	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Jan-88	32146	1988	1	4	4	97	1	155	53	3.30	16	7.6	0.49	4.8	370	41
1988PN950335	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	21-Apr-88	32254	1988	4	21	112	85	3	138	51	4.20	14	7.7	0.52	4.9	360	52
1988PN950593	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	15-May-88	32278	1988	5	15	136	1820	556	76	32	1.50	8	7.5	0.69	2.6	340	38
1988PN950594	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	17-May-88	32280	1988	5	17	138	2080	288		27	1.20	6	7.5	0.67	1.9	180	24
1988PN950604	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-May-88	32287	1988	5	24	145	4330	504	65	25	1.10	6	7.1	0.82	2.2	180	27
1988PN950741	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31-May-88	32294	1988	5	31	152	3780	464	52	22	1.10	6	7.7	0.74	1.9	180	24
1988PN950746	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	3-Jun-88	32297	1988	6	3	155	2980	220	61	25	1.00	7	7.7	0.65	1.9	210	25
1988PN950834	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	8-Jun-88	32302	1988	6	8	160	2560	484	75	30	0.90	8	7.4	0.62	2.5	250	36
1988PN951093	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	17-Jun-88	32311	1988	6	17	169	1640	79	97	35	1.40	11	7.9	0.50	3.0	280	42
1988PN951937	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	17-Aug-88	32372	1988	8	17	230	932	27	117	44	1.60	13	7.9	0.56	4.1	400	45
1988PN952145	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	9-Sep-88	32395	1988	9	9	253	1870	1060	88	36	1.30	11	7.9	0.51	3.0	278	44
1988PN952731	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	13-Oct-88	32429	1988	10	13	287	345	10	123	46	2.10	14	8.2	0.49	3.8	390	51
1988PN953100	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	6-Jan-89	32514	1989	1	6	6	131	3	151	52	3.10	16	7.8	0.50	4.6	400	51
1989PN950276	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	26-Apr-89	32624	1989	4	26	116	113	3	145	49	3.50	15	8.1	0.51	4.6	300	44
1989PN950453	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	19-May-89	32647	1989	5	19	139	1510	118	82	29	1.70	8	7.7	0.80	2.5	218	29
1989PN950606	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Jun-89	32663	1989	6	4	155	2350	370	80	29	1.60	8	8.1	0.68	2.1	240	28
1989PN951431	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	19-Jul-89	32708	1989	7	19	200	685	137	118	46	1.20	14	8.1	0.59	4.7	280	56
1989PN951432	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	20-Jul-89	32709	1989	7	20	201	656	79					8.0			270	
1989PN952185	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	3-Oct-89	32784	1989	10	3	276	527	23	120	47	1.90	15	8.0	0.51	5.3	420	64
1989PN952728	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	16-Jan-90	32889	1990	1	16	16	113	2	150	54	3.90	17	7.9	0.53	5.3	403	55
1990PN950026	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	5-Apr-90	32968	1990	4	5	95	98	1	151	52	3.70	17	7.9	0.44	4.9	420	42
1990PN950120	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**25-Apr-90**	32988	**1990**	**4**	**25**	**115**	**103**	**3**	**145**	**51**	**3.57**	**16**	**8.0**	**0.47**	**5.1**	**390**	**52**
1990PN950610	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	6-Jun-90	33030	1990	6	6	157	2700	342	104	35	2.20	7	7.8	1.11	4.7	247	18
1990PN951423	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Aug-90	33108	1990	8	23	235	1880	580	102	41	1.40	12	7.8	0.57	3.7	300	53
1990PN951763	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	12-Oct-90	33158	1990	10	12	285	606	10	130	53	2.00	18	8.1	0.45	4.1	230	72
1990PN952347	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Jan-91	33261	1991	1	23	23	128		152	46	3.20	18	7.9	0.49	4.7	416	42
1991PN950259	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Apr-91	33332	1991	4	4	94	108	2	151	53	3.50	17	7.9	0.44	4.7	350	50
1991PN951417	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-May-91	33382	1991	5	24	144	2290	214	70	29	1.30	8	8.0	0.61	2.8	218	36
1991PN952278	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-Jul-91	33429	1991	7	10	191	852	119	112	45	1.50	15	8.0	0.51	4.1	350	68
1991PN952826	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-Sep-91	33491	1991	9	10	253	666		119	50	1.70	16	8.0	0.51	6.5	393	84
1991PN953247	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	16-Oct-91	33527	1991	10	16	289	300	7	123	50	2.30	17	8.0	0.55	6.2	320	72
1991PN953466	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	13-Nov-91	33555	1991	11	13	317	127	2	162	63	3.60	20	8.0	0.97	8.2	520	84
1991PN953641	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	9-Jan-92	33612	1992	1	9	9	117	2	146	38	10.90	10	7.9	0.99	10.0	430	39
1991PN954000	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	18-Mar-92	33681	1992	3	18	78	98	1	146	51	3.46	16	7.5	0.45	4.8	340	48

Table C1: Water Chemistry of Major Nutrients at 'Peel River Above Fort McPherson' (Site O)

Sample No.	Station Number	Station Latitude	Station Longitude	Sample_Type	Sample Date	Serial Date	Year	Month	Day	Julian	Flow	TURBIDITY	Total Alk (CaCO3)	Ca diss	Cl diss	Mg diss	pH	K diss	Na diss	Cond	SO4 diss
											m^3/s	NTU	MG/L	MG/L	MG/L	MG/L	UNITS	MG/L	MG/L	US/CM	MG/L
1992PN950172	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	16-Apr-92	33710	1992	4	16	107	92	1	146	52	3.41	17	7.8	0.48	4.9	390	53
1992PN950405	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	20-May-92	33744	1992	5	20	141	131	76	118	50	2.85	18	7.7	0.82	8.6	380	87
1992PN950535	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	17-Jun-92	33772	1992	6	17	169	3380	750	82	32	1.05	9	8.0	0.68	2.1	190	35
1992PN950734	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-Jul-92	33809	1992	7	24	206	752	169	114	46	2.00	15	8.0	0.58	4.5	360	59
1992PN950970	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	14-Aug-92	33830	1992	8	14	227	657	67	127	50	2.00	16	8.0	0.60	4.7	430	62
1992PN951249	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**18-Sep-92**	33865	**1992**	**9**	**18**	**262**	**437**	**10**	**130**	**52**	**2.38**	**17**	**8.0**	**0.49**	**4.8**	**393**	**70**
1992PN951667	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	28-Oct-92	33905	1992	10	28	302	152	3	161	60	3.79	19	7.7	0.53	6.1	500	68
1992PN951739	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-Nov-92	33932	1992	11	24	329	117	2	155	55	3.32	18	7.8	0.51	5.1	460	53
1992PN951878	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	7-Jan-93	33976	1993	1	7	7	81	2	148	54	3.46	17	7.8	0.49	4.8	420	51
1992PN951970	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	28-Jan-93	33997	1993	1	28	28	75		149	54	3.65	17	8.0	0.49	4.9	410	61
1992PN952106	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Feb-93	34023	1993	2	23	54	75	1	158	53	4.00	17	7.6	0.49	4.9	410	53
1993PN957001	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31-Mar-93	34059	1993	3	31	90	88	1	153	53	4.20	17	7.8	0.58	4.8	411	54
1993PN957008	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	20-Apr-93	34079	1993	4	20	110	97	1	157	52	4.00	16	7.8	0.48	4.8	395	43
1993PN957044	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-Jun-93	34130	1993	6	10	161	3450	800	93	34	0.90	10	7.8	0.62	2.5	253	38
1993PN957071	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**30-Jun-93**	34150	**1993**	**6**	**30**	**181**	**1070**	**130**	**111**	**43**	**1.64**	**14**	**8.0**	**0.53**	**3.2**	**345**	**57**
1993PN957113	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-Aug-93	34205	1993	8	24	236	512	48	136	52	2.30	17	8.5	0.56	4.9	401	67
1993PN957185	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	28-Sep-93	34240	1993	9	28	271	614	13	121	51	2.00	16	8.1	0.50	4.8	379	72
1993PN957198	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	26-Oct-93	34268	1993	10	26	299	218	3	142	54	2.87	17	8.2	0.49	4.3	405	72
1993PN957249	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	2-Dec-93	34305	1993	12	2	336	130	1	159	58	3.92	18	7.8	0.77	6.4	444	72
1993PN957255	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	21-Dec-93	34324	1993	12	21	355	122	2	157	56	3.56	18	7.6	0.59	4.9	418	69
1993PN957291	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Jan-94	34359	1994	1	25	25	98	2	143	57	3.77	18	7.6	0.59	5.0	380	63
1993PN957321	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Feb-94	34390	1994	2	25	56	75	1	154	54	3.83	17	7.8	0.52	4.8	394	62
1993PN957342	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-Mar-94	34417	1994	3	24	83	64	1	153	54	4.26	18	7.7	0.52	5.1	422	56
1994PN957050	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	27-Apr-94	34451	1994	4	27	117	75	1	153	53	4.53	17	7.9	0.52	4.9	310	54
1994PN957081	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31-May-94	34485	1994	5	31	151	1460	164	82	31	7.26	8	7.6	0.90	6.7	170	28
1994PN957132	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	28-Jun-94	34513	1994	6	28	179	2990	383	82	34	1.16	10		0.51	2.7	210	47
1994PN957167	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Aug-94	34571	1994	8	25	237	913	100	127	52	1.92	16	8.2	0.62	5.5	350	77
1994PN957244	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	22-Sep-94	34599	1994	9	22	265	600	29	129	55	2.18	16	8.1	0.53	5.9	320	85
1994PN957271	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-Oct-94	34631	1994	10	24	297	236	4	133	49	2.41	16	8.1	0.57	5.0	330	64
1994PN957294	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-Nov-94	34662	1994	11	24	328	143	2	159	61	3.31	19	8.0	0.60	6.3	370	79
1994PN957311	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**20-Dec-94**	34688	**1994**	**12**	**20**	**354**	**121**	**1**	**156**	**58**	**3.21**	**19**	**7.9**	**0.54**	**5.4**	**390**	**74**
1994PN957323	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Jan-95	34724	1995	1	25	25	94	2	156	56	4.25	18	7.9	0.53	5.3	350	60
1994PN957345	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	27-Feb-95	34757	1995	2	27	58	82	2	152	55	3.60	17	7.9	0.52	5.1	320	58
1994PN957354	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	22-Mar-95	34780	1995	3	22	81	78	1	153	54	4.15	17	7.7	0.54	5.0	360	58
1995PN957372	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	26-Apr-95	34815	1995	4	26	116	112	1	136	48	3.66	16	7.8	0.47	4.7	290	56
1995PN957398	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	29-May-95	34848	1995	5	29	149	1550	156	64	30	1.78	8	7.5	0.78	3.0	210	49
1995PN957442	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**26-Jun-95**	34876	**1995**	**6**	**26**	**177**	**1560**	**713**	**80**	**40**	**1.42**	**13**	**6.7**	**0.86**	**5.1**	**270**	**78**
1995PN957481	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-Jul-95	34904	1995	7	24	205	2120	14	113	46	1.14	14	8.1	0.63	3.0	290	58
1995PN957518	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	29-Aug-95	34940	1995	8	29	241	857	40	116	48	1.68	16	8.1	0.53	5.1	290	66
1995PN957549	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Sep-95	34967	1995	9	25	268	868	34	115	50	1.80	16	8.2	0.54	5.0	330	84
1995PN957568	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-Oct-95	34996	1995	10	24	297	304	4	140	57	2.88	19	8.2	0.55	6.5	300	89
1995PN957585	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	24-Nov-95	35027	1995	11	24	328	165	3	163	61	3.37	20	8.0	0.59	6.1	380	79
1995PN957603	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	17-Jan-96	35081	1996	1	17	17	92	2	149	58	3.44	18	7.8	0.54	5.0	310	64
1995PN957634	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	28-Mar-96	35152	1996	3	28	87	82	2	159	57	3.90	18	8.1	0.52	5.0	280	55
1996PN667680	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**29-May-96**	35214	**1996**	**5**	**29**	**150**	**4470**	**683**	**74**	**25**	**1.10**	**6**	**8.0**	**0.75**	**1.8**	**175**	**25**
1996PN667722	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	25-Jun-96	35241	1996	6	25	177	1200	113	93	38	1.84	12	8.1	0.63	3.2	286	43
1996PN667762	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	27-Aug-96	35304	1996	8	27	240	1460	264	99	44	1.41	15	8.1	0.50	3.7	339	67
1996PN667827	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	15-Oct-96	35353	1996	10	15	289	303	4	119	48	2.68	16	8.2	0.60	5.2	374	65
1996PN957841	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	13-Jan-97	35443	1997	1	13	13	95	2	149	58	3.54	18	7.9	0.52	5.1	408	69
1997PN667856	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	15-Apr-97	35535	1997	4	15	105	70	2	157	58	5.00	19	7.9	0.75	5.8	427	67
1997PN667921	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	11-Aug-97	35653	1997	8	11	223	1290	196	99	44	1.63	14	8.0	0.40	4.8	344	72
1997PN667963	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	9-Oct-97	35712	1997	10	9	282	536	17	126	53	1.58	18	8.3	0.25	5.7	330	76
1997PN667986	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	11-Mar-98	35865	1998	3	11	70	88	1	152	55	3.76	17	8.2	0.43	5.1	305	58
1998PN667032	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	9-Jun-98	35955	1998	6	9	160	1330	223					8.0			240	
1998PN667107	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**11-Aug-98**	**36018**	**1998**	**8**	**11**	**223**	**543**	**38**					**8.3**			**401**	
1998PN667175	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	8-Oct-98	36076	1998	10	8	281	466	10	135	56	2.33	19	8.2	0.47	6.1	300	80
1998PN667217	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	18-Jan-99	36178	1999	1	18	18	101	5					7.9			411	

Table C1: Water Chemistry of Major Nutrients at 'Peel River Above Fort McPherson' (Site O)

Sample No.	Station Number	Station Latitude	Station Longitude	Sample_Type	Sample Date	Serial Date	Year	Month	Day	Julian	Flow	TURBIDITY	Total Alk (CaCO3)	Ca diss	Cl diss	Mg diss	pH	K diss	Na diss	Cond	SO4 diss
											m^3/s	NTU	MG/L	MG/L	MG/L	MG/L	UNITS	MG/L	MG/L	US/CM	MG/L
1998PN667232	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Mar-99	36223	1999	3	4	63	77									300	
1999PN017250	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	20-Apr-99	36270	1999	4	20	110	78									330	
1999PN017282	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	2-Jun-99	36313	1999	6	2	153	1500	320					7.8			190	
1999PN017436	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Aug-99	36395	1999	8	23	235	978	197					8.1			289	
1999PN237547	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-Jan-00	36535	2000	1	10	10	104	2					8.2			411	
1999PN237586	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	30-Mar-00	36615	2000	3	30	90	79	4					7.8			436	
1999PN247538	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**28-Oct-99**	36461	**1999**	**10**	**28**	**301**	**354**	**21**					**8.2**			**512**	
2000PNF17624	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**14-Jun-00**	36691	**2000**	**6**	**14**	**166**	**3260**	**548**	**84**	**32**	**0.82**	**10**	**8.0**	**0.73**	**2.6**	**247**	**45**
2000PNF17750	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Aug-00	36761	2000	8	23	236	1520	54	105	46	1.32	15	8.1	0.48	4.2	351	21
2000PNG17801	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	11-Jan-01	36902	2001	1	11	11	140	4	153	58	3.82	18	8.0	0.54	5.2	220	71
2001PNG17027	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	11-Jun-01	37053	2001	6	11	162	5180	1340	71	28	0.81	7	7.9	0.73	2.5	207	39
2001PNG17174	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**23-Aug-01**	37126	**2001**	**8**	**23**	**235**	**720**	**28**	**124**	**52**	**1.83**	**17**	**8.3**	**0.51**	**5.1**	**393**	**83**
2001PNG17221	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	9-Jan-02	37265	2002	1	9	9	104			57	3.53	18		0.54	5.4	240	72
2002PNG17326	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**29-Jul-02**	37466	**2002**	**7**	**29**	**211**	**1780**			**46**	**1.75**	**16**		**0.55**	**4.0**		**75**
2002PNG17404	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	7-Jan-03	37628	2003	1	7	7	190			60	4.74	19		0.65	6.1	390	77
2002PNH17252	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	18-Apr-02	37364	2002	4	18	108	88			56	4.17	18		0.64	5.1	210	49
2002PNH17271	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	6-Jun-02	37413	2002	6	6	157	1660			34	1.46	10		0.52	4.1	260	61
2003PN010037	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**11-Jun-03**	37783	**2003**	**6**	**11**	**162**	**1530**	**229**	**88**	**35**	**1.31**	**12**	**8.0**	**0.61**	**2.8**	**262**	**51**
2003PN010143	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	12-Sep-03	37876	2003	9	12	255	998	23	124	51	1.61	17	8.6	0.44	5.2	437	75
2003PN010176	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	12-Jan-04	37998	2004	1	12	12	131	4	130	55	3.31	18		0.53	5.0	378	63
2004PN010039	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**10-Jun-04**	38148	**2004**	**6**	**10**	**162**	**1910**	**187**	**93**	**36**	**1.20**	**12**	**8.1**	**0.58**	**2.7**	**282**	**42**
2004PN010130	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	12-Aug-04	38211	2004	8	12	225	499	275	131	54	2.17	18	8.1	0.64	4.9	380	73
2004PN010234	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	23-Feb-05	38406	2005	2	23	54	95	2	140	58	4.23	18	8.0	0.51	5.3	330	61
2005PN010004	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	20-Apr-05	38462	2005	4	20	110	135	1	132	53	4.33	17	7.9	0.53	5.0	373	56
2005PN010047	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	10-Jun-05	38513	2005	6	10	161	3520	942	84	33	0.86	9	8.0	0.63	2.2	244	39
2005PN010163	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**9-Sep-05**	38604	**2005**	**9**	**9**	**252**	**518**	**29**	**133**	**55**	**2.44**	**18**	**8.3**	**0.61**	**5.5**	**436**	**87**
2006PN010048	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	19-Jun-06	38887	2006	6	19	170	2040	244	97	39	0.93	13	8.2	0.56	2.6	304	54
2006PN010102	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	17-Aug-06	38946	2006	8	17	229	1300	280	98	42	1.34	14	8.1	0.67	4.1	325	65
2006PN010148	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**5-Feb-07**	39118	**2007**	**2**	**5**	**36**	**146**	**2**	**151**	**59**	**3.60**	**17**	**7.9**	**0.53**	**5.6**	**465**	**71**
2007PN010050	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**3-Jul-07**	39266	**2007**	**7**	**3**	**184**	**1120**	**398**	**89**	**41**	**1.51**	**13**	**8.1**	**0.75**	**5.0**	**333**	**69**
2007PN010097	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	19-Sep-07	39344	2007	9	19	262	547	6	131	58	2.23	21	8.3	0.60	6.5	458	100
2007PN330057	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	27-Feb-08	39505	2008	2	27	58	108	20	107	40	12.00	10	8.0	1.19	10.6	324	38
2008PN010016	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Jun-08	39603	2008	6	4	156	1300	178	79	35	1.52	11	7.9	0.92	4.3	272	57
2008PN010121	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**27-Aug-08**	39687	**2008**	**8**	**27**	**240**	**1630**	**370**	**106**	**47**	**1.24**	**16**	**8.0**	**0.63**	**4.7**	**374**	**86**
2008PN010152	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	17-Feb-09	39861	2009	2	17	48	144	8	139	61	3.83	18	7.9	0.58	5.6	409	74
2009PN010007	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	15-Apr-09	39918	2009	4	15	105	68	2	150	59	4.30	20		0.54	5.6	414	71
2009PN010021	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-Jun-09	39968	2009	6	4	155	2170	223	77	31	0.85	10	8.0	0.59	2.7	232	44
2009PN010081	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	29-Sep-09	40085	2009	9	29	272	1110	61	105	47	1.56	17	8.1	0.51	6.4	406	90
2009PN010112	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**1-Mar-10**	40238	**2010**	**3**	**1**	**60**	**76**	**2**	**148**	**57**	**3.83**	**19**	**7.8**	**0.53**	**5.2**	**415**	**72**
2010PN010016	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	4-May-10	40302	2010	5	4	124	2250	258	59				7.8			172	
2010PN010028	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	8-Jun-10	40337	2010	6	8	159	1050	50	106	41	1.63	14	8.0	0.55	3.5	299	60
2010PN010138	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	13-Sep-10	40434	2010	9	13	256	949	89	121	51	1.58	17	8.1	0.55	4.8	359	81
2010PN010191	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	15-Feb-11	40589	2011	2	15	46		2	149	53	3.61	18	7.8	0.59	5.2	408	67
2011PN010048	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	7-Jun-11	40701	2011	6	7	158		134	85	34	1.22	11	7.8	0.74	3.0	251	49
2011PN010070	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**COMPOUND SAMPLE**	**27-Jul-11**	40751	**2011**	**7**	**27**	**208**		**86**	**118**	**49**	**1.33**	**17**	**8.1**	**0.57**	**4.0**	**348**	**73**
2011PN010083	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	13-Sep-11	40799	2011	9	13	256		37	95	35	7.54	10	8.2	0.91	7.8	278	44
2011PN010084	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	13-Sep-11	40799	2011	9	13	256		91	121	51	1.91	19	8.2	0.69	5.5	386	94

	Anomalous Data
	Leap Years
Bold	Compound Sample

Table C2: Water Chemistry for Dissolved Metals Sampled at 'Peel River Above Fort McPherson' (Site O)

Sample Date	Sample No.	Station Number	Station Latitude	Station Longitude	Sample_Type	Serial Date	Year	Month	Day	Julian	Flow	Turbidity	Al DISS	Al TOTAL	Sb DISS	Sb TOTAL	As DISS
											m^3/s	NTU	UG/L	UG/L	UG/L	UG/L	UG/L
19-Jun-06	2006PN010048	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	38887	2006	6	19	170	2040	244	53	2990	0.162	0.273	0.29
17-Aug-06	2006PN010102	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	38946	2006	8	17	229	1300	280	50	3010	0.232	0.243	0.44
5-Feb-07	**2006PN010148**	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**TRIPLICATE SAMPLE**	**39118**	**2007**	**2**	**5**	**36**	**146**	**2**	**9**	**40**	**0.140**	**0.200**	**0.13**
3-Jul-07	**2007PN010050**	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**TRIPLICATE SAMPLE**	**39266**	**2007**	**7**	**3**	**184**	**1120**	**398**	**36**	**5227**	**0.260**	**0.364**	**0.41**
19-Sep-07	2007PN010097	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39344	2007	9	19	262	547	6	127	578	0.177	0.142	0.32
27-Feb-08	2007PN330057	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39505	2008	2	27	58	108	20	125	386	0.241	0.264	0.38
4-Jun-08	2008PN010016	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39603	2008	6	4	156	1300	178	39	3730	0.174	0.299	0.35
27-Aug-08	**2008PN010121**	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**TRIPLICATE SAMPLE**	**39687**	**2008**	**8**	**27**	**240**	**1630**	**370**	**47**	**4290**	**0.280**	**0.331**	**0.53**
17-Feb-09	2008PN010152	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39861	2009	2	17	48	144	8	17	52	0.577	0.667	0.28
15-Apr-09	2009PN010007	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39918	2009	4	15	105	68	2	24	16	0.200	0.396	0.18
4-Jun-09	2009PN010021	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39968	2009	6	4	155	2170	223	54	2020	0.181	0.241	0.33
29-Sep-09	2009PN010081	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40085	2009	9	29	272	1110	61	71	881	0.188	0.183	0.26
1-Mar-10	**2009PN010112**	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**TRIPLICATE SAMPLE**	**40238**	**2010**	**3**	**1**	**60**	**76**	**2**	**10**	**37**	**0.251**	**0.265**	**0.13**
4-May-10	2010PN010016	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40302	2010	5	4	124	2250	258	75	2680	0.274	0.290	0.35
8-Jun-10	2010PN010028	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40337	2010	6	8	159	1050	50	106	777	0.152	0.163	0.31
13-Sep-10	2010PN010138	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40434	2010	9	13	256	949	89	64	878	0.209	0.320	0.33
15-Feb-11	2010PN010191	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40589	2011	2	15	46		2	6	135	0.213	0.466	0.12
7-Jun-11	2011PN010048	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40701	2011	6	7	158		134	53	1580	0.251	0.254	0.45
27-Jul-11	**2011PN010070**	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**TRIPLICATE SAMPLE**	**40751**	**2011**	**7**	**27**	**208**		**86**	**59**	**979**	**0.289**	**0.221**	**0.37**

Sample Date	As TOTAL	BA DISS	BA TOTAL	BE DISS	BE TOTAL	BI DISS	BI TOTAL	B DISS	B TOTAL	Cd DISS	Cd TOTAL	CE DISS	CE TOTAL	Cs DISS	Cs TOTAL	Cr DISS	Cr TOTAL	CO DISS	CO TOTAL
	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
19-Jun-06	2.53	55	206	0.004	0.174	0.004	0.037	7.3	9.9	0.026	0.301	0.098	4.610	0.012	0.442	0.15	5.03	0.07	3.54
17-Aug-06	2.90	65	249	0.008	0.203	0.002	0.033	12.4	16.2	0.032	0.265	0.121	4.120	0.010	0.578	0.19	5.52	0.15	3.56
5-Feb-07	0.19	84	85	0.002	0.004	0.001	0.002	8.1	8.3	0.029	0.041	0.009	0.049	0.005	0.012	0.11	0.26	0.04	0.08
3-Jul-07	5.14	55	325	0.008	0.293	0.002	0.045	13.2	20.0	0.025	0.275	0.125	8.027	0.008	1.043	0.15	9.61	0.18	5.09
19-Sep-07	0.82	77	111	0.010	0.042	0.001	0.008	12.8	13.4	0.043	0.089	0.177	0.999	0.030	0.152	0.26	1.07	0.30	0.91
27-Feb-08	0.52	58	65	0.010	0.025	0.003	0.009	15.9	16.1	0.084	0.316	0.263	0.768	0.029	0.080	0.38	1.03	0.14	0.38
4-Jun-08	4.51	43	275	0.008	0.226	0.002	0.048	9.7	13.2	0.023	0.273	0.147	6.230	0.006	0.615	0.15	7.83	0.24	4.93
27-Aug-08	6.56	62	403	0.005	0.271	0.001	0.047	10.8	15.9	0.033	0.386	0.136	9.687	0.012	0.726	0.15	9.18	0.20	6.29
17-Feb-09	0.31	84	87	0.002	0.004	0.006	0.009	7.8	8.0	0.180	0.249	0.025	0.101	0.006	0.021	0.61	1.24	0.07	0.12
15-Apr-09	0.20	85	78	0.002	0.002	0.002	0.003	8.5	8.5	0.231	0.300	0.035	0.022	0.007	0.005	0.41	0.43	0.07	0.07
4-Jun-09	2.49	50	223	0.008	0.136	0.002	0.025	8.1	9.6	0.032	0.292	0.131	3.450	0.009	0.329	0.15	4.27	0.11	2.72
29-Sep-09	1.31	57	117	0.012	0.071	0.001	0.014	13.1	13.0	0.089	0.202	0.129	1.690	0.006	0.213	0.15	1.61	0.49	1.55
1-Mar-10	0.19	84	87	0.001	0.003	0.001	0.003	8.7	8.9	0.132	0.182	0.012	0.049	0.005	0.011	0.17	0.36	0.04	0.07
4-May-10	3.09	42	280	0.013	0.178	0.002		6.7	9.9	0.141	0.500	0.258	4.310	0.014	0.566	0.24	5.50	0.37	3.86
8-Jun-10	1.10	61	106	0.007	0.054	0.001		7.5	8.8	0.028	0.114	0.157	1.260	0.029	0.199	0.22	1.49	0.14	0.96
13-Sep-10	1.25	74	142	0.008	0.068	0.001		11.7	13.2	0.051	0.224	0.114	1.760	0.013	0.296	0.21	5.64	0.20	1.39
15-Feb-11	0.28	81	89	0.001	0.011	0.002		9.6	10.5	0.073	0.185	0.007	0.307	0.003	0.031	0.15	0.80	0.04	0.22
7-Jun-11	2.43	59	188	0.007	0.113	0.002		8.6	11.7	0.044	0.198	0.148	2.930	0.020	0.516	0.18	3.11	0.10	2.16
27-Jul-11	1.54	72	143	0.006	0.071	0.001		9.5	11.7	0.021	0.107	0.106	1.770	0.019	0.320	0.15	1.93	0.11	1.34

Sample Date	Cu DISS	Cu TOTAL	F DISS	GA DISS	GA TOTAL	Fe DISS	Fe TOTAL	LA DISS	LA TOTAL	Pb DISS	Pb TOTAL	LI DISS	LI TOTAL	MN DISS	Mn TOTAL	MO DISS	MO TOTAL	NI DISS	NI TOTAL
	UG/L	UG/L	MG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
19-Jun-06	0.96	9.05	0.07	0.017	0.743	78	7300	0.04	1.88	0.10	4.24	4.40	9.90	4.13	196.00	1.03	0.90	1.29	11.60
17-Aug-06	2.44	11.50	0.10	0.016	0.797	151	7990	0.05	1.47	0.20	4.09	6.20	11.60	3.48	103.00	1.12	0.98	3.28	14.20
5-Feb-07	**0.40**	**0.84**	**0.07**	**0.002**	**0.009**	**31**	**123**	**0.01**	**0.02**	**0.04**	**0.28**	**5.95**	**5.95**	**8.50**	**11.10**	**1.18**	**1.18**	**1.26**	**1.44**
3-Jul-07	**2.54**	**15.30**	**0.10**	**0.013**	**1.483**	**110**	**12800**	**0.05**	**2.89**	**0.42**	**5.99**	**6.87**	**17.80**	**6.08**	**134.00**	**1.22**	**1.28**	**4.12**	**19.73**
19-Sep-07	1.99	3.52	0.09	0.030	0.160	234	1490	0.07	0.36	0.12	0.73	7.80	8.80	13.30	28.30	1.12	1.14	2.66	5.04
27-Feb-08	2.51	4.77	0.20	0.041	0.122	233	740	0.13	0.35	0.18	0.73	5.70	6.10	9.04	21.30	0.95	0.90	1.64	2.61
4-Jun-08	2.55	14.90	0.10	0.014	1.270	124	11000	0.07	2.36	0.09	6.08	5.30	13.60	14.90	133.00	0.92	1.00	3.72	18.60
27-Aug-08	**1.98**	**19.00**	**0.11**	**0.016**	**1.493**	**114**	**14700**	**0.05**	**3.45**	**0.10**	**7.71**	**7.00**	**16.80**	**6.67**	**146.00**	**1.11**	**1.45**	**2.81**	**22.77**
17-Feb-09	2.56	3.64	0.06	0.006	0.017	57	200	0.02	0.05	68.70	132.00	5.70	5.80	11.70	14.20	1.09	1.13	1.57	1.58
15-Apr-09	3.56	5.83	0.08	0.008	0.005	105	61	0.02	0.01	11.90	8.94	5.60	5.10	10.10	8.69	1.09	0.98	1.34	1.45
4-Jun-09	2.11	8.19	0.07	0.017	0.625	138	5850	0.06	1.37	0.10	3.36	3.70	7.40	3.94	113.00	0.90	0.65	3.02	12.30
29-Sep-09	1.73	4.37	0.08	0.009	0.247	132	2780	0.05	0.60	0.06	1.34	8.20	9.70	17.60	41.30	0.95	1.00	5.91	10.20
1-Mar-10	**0.76**	**1.00**	**0.06**	**0.004**	**0.012**	**23**	**119**	**0.01**	**0.03**	**2.32**	**8.24**	**5.40**	**5.60**	**8.26**	**10.90**	**1.06**	**1.09**	**1.24**	**1.40**
4-May-10	4.43	11.60		0.019	0.751	259	7990	0.12	1.62	0.16	4.80	2.83	7.84	37.00	185.00	0.63	0.68	4.71	16.20
8-Jun-10	1.07	3.55	0.06	0.027	0.216	195	2150	0.07	0.49	0.12	1.22	4.69	6.10	9.10	46.60	0.92	0.89	1.66	4.52
13-Sep-10	1.37	5.25	0.08	0.016	0.263	110	2580	0.05	0.66	0.08	1.77	6.44	8.00	6.46	38.30	1.21	1.17	3.19	7.86
15-Feb-11	1.73	3.95	0.06	0.003	0.044	16	373	0.01	0.15	0.42	4.47	5.70	5.97	7.93	20.60	1.04	1.05	1.50	2.41
7-Jun-11	2.47	7.12	0.07	0.018	0.483	175	4940	0.06	1.11	0.12	3.01	3.96	7.05	5.67	116.00	0.95	0.93	2.58	9.01
27-Jul-11	**1.22**	**4.34**	**0.07**	**0.021**	**0.297**	**123**	**2953**	**0.04**	**0.67**	**0.09**	**1.74**	**5.55**	**7.52**	**4.54**	**58.50**	**1.27**	**1.20**	**1.72**	**5.70**

Sample Date	NB DISS	NB TOTAL	Pt DISS	Pt TOTAL	Rb DISS	Rb TOTAL	SE DISS	SE TOTAL	Ag DISS	Ag TOTAL	SIO2	Sr DISS	Sr TOTAL	Tl DISS	Tl TOTAL	Sn DISS	Sn TOTAL	W DISS	W TOTAL
	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	MG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
19-Jun-06	0.001	0.033	0.001	0.001	0.42	4.74	0.55	0.74	0.002	0.055	2.80	128	157	0.008	0.073	0.005	0.005	0.008	0.006
17-Aug-06	0.001	0.030	0.001	0.001	0.55	7.21	0.63	0.70	0.003	0.074	3.20	146	163	0.010	0.097	0.005	0.005	0.001	0.001
5-Feb-07	**0.001**	**0.001**	**0**	**0**	**0.33**	**0.40**	**0.72**	**0.77**	**0.001**	**0.003**	**3.86**	**208**	**199**	**0.019**	**0.022**	**0.005**	**0.005**	**0.004**	**0.006**
3-Jul-07	**0.002**	**0.128**	**0.001**	**0.001**	**0.57**	**10.37**	**0.55**	**0.93**	**0.001**	**0.091**	**3.17**	**143**	**169**	**0.015**	**0.150**	**0.018**	**0.041**	**0.002**	**0.013**
19-Sep-07	0.001	0.007	0.001	0.001	0.58	1.69	0.65	0.59	0.001	0.008	3.12	200	205	0.007	0.022	0.008	0.008	0.001	0.001
27-Feb-08	0.008	0.020	0.001	0.001	0.97	1.46	0.17	0.33	0.001	0.014	4.02	255	254	0.006	0.009	0.025	0.048	0.007	0.027
4-Jun-08	0.005	0.029	0.001	0.001	0.44	7.73	0.49	0.72	0.003	0.080	2.69	111	136	0.008	0.140	0.005	0.005	0.002	0.003
27-Aug-08	**0.001**	**0.027**	**0**	**0**	**0.51**	**9.44**	**0.65**	**1.04**	**0.002**	**0.120**	**3.26**	**158**	**193**	**0.009**	**0.179**	**0.005**	**0.005**	**0.001**	**0.005**
17-Feb-09	0.001	0.002	0.001	0.001	0.36	0.45	0.91	0.91	0.002	0.007	4.04	181	178	0.007	0.009	1.630	2.410	0.008	0.025
15-Apr-09	0.001	0.001	0.001	0.001	0.39	0.45	0.84	0.76	0.003	0.006	3.88	184	167	0.006	0.005	0.114	0.156	0.008	0.015
4-Jun-09	0.004	0.023	0.001	0.001	0.43	3.96	0.43	0.53	0.004	0.058	2.60	98	105	0.009	0.074	0.009	0.005	0.001	0.003
29-Sep-09	0.001	0.014	0.001	0.001	0.39	2.30	0.61	0.72	0.001	0.018	3.65	162	164	0.007	0.043	0.006	0.005	0.001	0.004
1-Mar-10	**0.001**	**0.001**	**0.001**	**0.001**	**0.31**	**0.38**	**0.79**	**0.81**	**0.001**	**0.002**	**4.04**	**184**	**187**	**0.004**	**0.005**	**1.607**	**1.660**	**0.002**	**0.015**
4-May-10	0.008	0.038	0.001	0.001	0.68	5.77	0.31	0.51	0.007	0.089		72	90	0.012	0.118	0.054	0.012	0.002	0.008
8-Jun-10	0.002	0.011	0.001	0.001	0.58	2.03	0.53	0.60	0.002	0.020	2.99	137	146	0.013	0.034	0.005	0.008	0.001	0.003
13-Sep-10	0.004	0.018	0.001	0.001	0.45	2.80	0.60	0.67	0.002	0.024	3.64	176	182	0.010	0.040	0.005	0.027	0.001	0.006
15-Feb-11	0.001	0.006	0.001	0.001	0.40	0.70	0.77	0.81	0.001	0.007	3.76	184	190	0.004	0.008	0.051	0.111	0.001	0.012
7-Jun-11	0.002	0.015	0.001	0.001	0.77	4.85	0.51	0.68	0.003	0.049	2.65	108	119	0.016	0.075	0.005	0.005	0.001	0.003
27-Jul-11	**0.001**	**0.008**	**0.001**	**0.001**	**0.55**	**3.10**	**0.68**	**0.80**	**0.002**	**0.026**	**3.58**	**164**	**172**	**0.011**	**0.048**	**0.010**	**0.005**	**0.001**	**0.002**

Sample Date	U DISS UG/L	U TOTAL UG/L	V DISS UG/L	V TOTAL UG/L	Y DISS UG/L	Y TOTAL UG/L	Zn DISS UG/L	Zn TOTAL UG/L
19-Jun-06	0.91	1.27	0.31	10.30	0.09	3.52	1.4	46.9
17-Aug-06	1.01	1.33	0.36	11.90	0.23	4.11	2.0	44.6
5-Feb-07	**1.33**	**1.33**	**0.14**	**0.25**	**0.03**	**0.06**	**13.0**	**16.3**
3-Jul-07	**0.96**	**1.48**	**0.33**	**21.03**	**0.21**	**5.97**	**2.9**	**62.7**
19-Sep-07	1.47	1.55	0.49	2.16	0.23	0.97	4.6	15.8
27-Feb-08	0.74	0.77	0.42	1.01	0.13	0.37	4.6	11.0
4-Jun-08	0.76	1.18	0.35	14.90	0.25	5.05	1.4	56.1
27-Aug-08	**1.27**	**1.91**	**0.30**	**19.47**	**0.20**	**7.76**	**2.0**	**80.9**
17-Feb-09	1.38	1.40	0.14	0.28	0.04	0.10	15.5	19.7
15-Apr-09	1.33	1.24	0.22	0.18	0.05	0.04	7.3	12.2
4-Jun-09	0.65	0.90	0.43	8.85	0.22	3.28	1.8	42.3
29-Sep-09	1.11	1.25	0.21	3.22	0.39	2.06	6.1	30.9
1-Mar-10	**1.32**	**1.35**	**0.17**	**0.30**	**0.03**	**0.06**	**5.8**	**6.1**
4-May-10	0.50	0.90	0.46	11.60	0.51	4.52	4.4	59.3
8-Jun-10	1.03	1.13	0.47	3.02	0.13	1.08	2.1	17.2
13-Sep-10	1.30	1.44	0.33	3.53	0.19	1.77	4.5	31.8
15-Feb-11	1.25	1.29	0.12	0.52	0.03	0.20	7.9	19.9
7-Jun-11	0.75	0.97	0.38	7.03	0.19	2.60	1.8	29.3
27-Jul-11	**1.30**	**1.45**	**0.40**	**4.09**	**0.13**	**1.70**	**2.0**	**18.8**

Table C3: Water Chemistry for Total Metals at 'Peel River Above Fort McPherson' (Site O)

Sample Date	Sample No.	Station Number	Station Latitude	Station Longitude	Sample_Type	Serial Date	Year	Month	Day	Julian	Order	Flow	TURBIDITY	Al TOTAL	BA TOTAL	BE TOTAL	Cd TOTAL	Cr TOTAL	CO TOTAL	Cu TOTAL	Fe TOTAL	Pb TOTAL	LI TOTAL	MN TOTAL	MO TOTAL	NI TOTAL	Sr TOTAL	V TOTAL	Zn TOTAL
												m3/s	NTU	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
4-Oct-83	1983PN951241	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	30593	1983	10	4	277	58	332	35		220		1		1	5		1				5		5.3	13
18-Nov-83	1983PN951452	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	30638	1983	11	18	322	59	111	2		100		1		1	2		1				2		0.5	8
13-Jan-84	1983PN951557	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	30694	1984	1	13	13	60	51	2		100		1		1	2		1				2		0	6
5-Mar-84	1983PN951741	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	30746	1984	3	5	65	61	47	1		100		1		1	1		1				2		0	6
2-Aug-84	1984PN950870	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	30896	1984	8	2	215	62	1810	125				1		3	15		5				18		7.5	54
26-Sep-84	1984PN951321	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	30951	1984	9	26	270	63	620	6		100		1		1	2		1				4		0.9	10
17-Nov-84	1984PN951559	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31003	1984	11	17	322	64	119	2		110		1		1	1		1				2		0	5
19-Dec-84	1984PN951682	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31035	1984	12	19	354	65	102	2		100		1		1	1		2				1		0	2
26-Mar-85	1985PN950040	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31132	1985	3	26	85	66	76	1		120		1		1	1		3				1		0.5	3
30-Apr-85	1985PN950127	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31167	1985	4	30	120	67	66	1		100		1		1	1		1				1		0.5	1
3-Jul-85	1985PN950467	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31231	1985	7	3	184	68	1270	34		150		1		1	3		1				4		2.7	10
6-Aug-85	1985PN950590	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31265	1985	8	6	218	69	864	22		120		1		1	3		1				3		1.7	8
19-Nov-85	1985PN950918	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31370	1985	11	19	323	70	122	2		110		1		1	1		3				1		0.5	4
8-Jan-86	1985PN951035	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31420	1986	1	8	8	71	78	1		100		1		1	1		1				1		0.6	3
15-Jun-86	1986PN950323	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31578	1986	6	15	166	72	1430	119		136		1		2	5		3				7		5.9	23
8-Jul-86	1986PN950416	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31601	1986	7	8	189	73	824	59		136		1		1	3		2				4		2.8	8
15-Aug-86	1986PN950593	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31639	1986	8	15	227	74	2480	1210		236		0.8		10	34		7.3				33		41	101
3-Oct-86	1986PN950818	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31688	1986	10	3	276	75	408	14		80		0.1		0.5	1.4		1.6				2.4		0.8	6.3
10-Dec-86	1986PN951138	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31756	1986	12	10	344	76	123	3		90		0.1		0.5	0.5		0.7				1.1		0.5	1.9
10-Feb-87	1986PN951300	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31818	1987	2	10	41	77		2		80		0.1		0.5	0.5		0.7				0.8		0.5	1.7
25-Mar-87	1987PN950014	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31861	1987	3	25	84	78		1		80		0.1		0.5	0.6		0.7				0.9		0.5	1.3
2-Jul-87	1987PN950581	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31960	1987	7	2	183	79		54		80		0.1		0.5	0.8		0.7				1		0.5	0.5
4-Aug-87	1987PN950976	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	31993	1987	8	4	216	80		40		81		0.1		0.5	2.6		1.4				3.1		1.9	7.2
3-Sep-87	1987PN951561	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32023	1987	9	3	246	81		99		153		0.1		1	3.4		0.9				5.8		4.1	18
6-Oct-87	1987PN951912	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32056	1987	10	6	279	82		22		80		0.2		1.1	2.3		0.7				4.8		0.6	7
4-Jan-88	1987PN952332	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32146	1988	1	4	4	83	97	1		99		0.1		0.5	0.7		0.9				1.2		0.5	2.9
21-Apr-88	1988PN950335	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32254	1988	4	21	112	84	85	3		80		0.1		0.5	0.7		1				1.6		0.6	3
15-May-88	1988PN950593	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32278	1988	5	15	136	85	1820	556		361		0.7		9.4	32		9.7				36		16	102
17-May-88	1988PN950594	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32280	1988	5	17	138	86	2080	288		267		0.5		5.5	16		5.5				21		11	64
19-May-88	1988PN950595	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32282	1988	5	19	140	87	2190	168		80		0.1		0.5	3.1		0.7				3		0.7	4.9
24-May-88	1988PN950604	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32287	1988	5	24	145	88	4330	504		413		0.7		6.3	19		8.7				18		19	108
31-May-88	1988PN950741	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32294	1988	5	31	152	89	3780	464		312		0.3		5.9	16		6.1				17		13	50
3-Jun-88	1988PN950746	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32297	1988	6	3	155	90	2980	220		234		0.2		3	12		4.3				9.8		7.9	34
8-Jun-88	1988PN950834	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32302	1988	6	8	160	91	2560	484		244		0.5		6.1	17		9.3				19		18	89
17-Jun-88	1988PN951093	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32311	1988	6	17	169	92	1640	79		211		0.2		2.2	7.2		3				7.4		7.6	23
17-Aug-88	1988PN951937	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32372	1988	8	17	230	93	932	27		80		0.1		0.9	2.4		1.1				4.4		1	8.5
9-Sep-88	1988PN952145	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32395	1988	9	9	253	94	1870	1060		267		0.6		10.5	27		9.8				31		71	71
13-Oct-88	1988PN952731	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32429	1988	10	13	287	95	345	10		85		0.1		0.5	1.1		0.7				2.7		0.8	5
6-Jan-89	1988PN953100	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32514	1989	1	6	6	96	131	3		131		0.1		0.5	0.5		0.7				1.3		0.5	3.9
26-Apr-89	1989PN950276	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32624	1989	4	26	116	97	113	3		80		0.1		0.5	0.7		0.7				1.1		0.5	2.9
19-May-89	1989PN950453	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32647	1989	5	19	139	98	1510	118		155		0.1		1	3.5		0.8				4.5		2.1	13
4-Jun-89	1989PN950606	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32663	1989	6	4	155	99	2350	370		353		0.6		5.4	14		7.3				16		17	55
19-Jul-89	1989PN951431	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32708	1989	7	19	200	100	685	137		150		0.2		2.6	6.9		3.1				9.2		4.7	23
20-Jul-89	1989PN951432	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32709	1989	7	20	201	101	656	79		150		0.1		1.1	3.3		1.4				4.8		3.5	13
3-Oct-89	1989PN952185	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32784	1989	10	3	276	102	527	23		80		0.2		0.7	1.8		0.7				4.2		1.1	9
16-Jan-90	1989PN952728	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32889	1990	1	16	16	103	113	2		116		0.1		0.5	0.5		0.7				1.1		0.5	1.1
5-Apr-90	1990PN950026	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	32968	1990	4	5	95	104	98	1		139		0.1		0.5	0.5		0.7				1.1		0.7	1.5
25-Apr-90	**1990PN950120**	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**TRIPLICATE SAMPLE**	**32988**	**1990**	**4**	**25**	**115**	**107**	**103**	**3**		**102**		**0.1**		**0.5**	**0.6**		**1.9**				**1.6**		**0.5**	**2.7**
6-Jun-90	1990PN950610	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33030	1990	6	6	157	108	2700	342		182		0.1		3.3	7.7		3.7				9.5		7	37
23-Aug-90	1990PN951423	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33108	1990	8	23	235	109	1880	580		216		0.7		9.7	20		9.5				27.9		16.2	89
12-Oct-90	1990PN951763	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33158	1990	10	12	285	110	606	10		80		0.1		0.5	1.2		0.8				2.4		1.1	4.5
23-Jan-91	1990PN952347	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33261	1991	1	23	23	111	128			80		0.1		0.5	0.5		0.8				1		0.5	2
4-Apr-91	1991PN950259	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33332	1991	4	4	94	112	108	2		80		0.1		0.5	0.5		0.7				1.3		0.5	3.2
24-May-91	1991PN951417	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33382	1991	5	24	144	113	2290	214		196		0.4		3.4	11.1		4.1				14.3		5.3	44
10-Jul-91	1991PN952278	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33429	1991	7	10	191	114	852	119		172		0.2		2.1	5.8		2.7				8.3		4.5	21
10-Sep-91	1991PN952826	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33491	1991	9	10	253	115	666			127		0.1		1.4	3		1.5				6.7		1.6	15
16-Oct-91	1991PN953247	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33527	1991	10	16	289	116	300	7		80		0.2		0.6	1.6		1.7				6.8		0.5	19
13-Nov-91	1991PN953466	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33555	1991	11	13	317	117	127	2		98		0.1		0.5	3.1		0.8				2.8		0.5	8
9-Jan-92	1991PN953641	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33612	1992	1	9	9	118	117	2		179		0.1		0.5	0.9		0.7				2.1		0.5	2.8
18-Mar-92	1991PN954000	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33681	1992	3	18	78	119	98	1		139		0.1		0.5	0.8		2.6				0.5		0.5	1.6
16-Apr-92	1992PN950172	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33710	1992	4	16	107	120	92	1		92		0.1		0.5	0.8		0.8				0.6		0.5	3.5
20-May-92	1992PN950405	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33744	1992	5	20	141	121	131	76		93		0.4		2.1	4.1		1.1				9.9		1.6	21
17-Jun-92	1992PN950535	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33772	1992	6	17	169	122	3380	750		323		1.1		6.6	25.4		15.8				31.5		16.2	92
24-Jul-92	1992PN950734	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33809	1992	7	24	206	123	752	169		172		0.1		3.3	6.6		4.1				10.5		4.6	34
14-Aug-92	1992PN950970	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33830	1992	8	14	227	124	657	67		151		0.1		1.8	3.5		2.4				4		2.2	10
18-Sep-92	**1992PN951249**	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**TRIPLICATE SAMPLE**	**33865**	**1992**	**9**	**18**	**262**	**127**	**437**	**10**		**121**		**0.1**		**0.5**	**1.2**		**0.9**				**2.2**		**0.5**	**4.5**
28-Oct-92	1992PN951667	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33905	1992	10	28	302	128	152	3		145		0.1		0.5	0.6		1				1.2		0.5	1.3
24-Nov-92	1992PN951739	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33932	1992	11	24	329	129	117	2		116		0.1		0.5	0.5		0.7				0.5		0.5	1.1
7-Jan-93	1992PN951878	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33976	1993	1	7	7	130	81	2		80		0.1		0.5	0.5		1.8				1.2		0.5	1.7
28-Jan-93	1992PN951970	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	33997	1993	1	28	28	131	75			80		0.1		0.5	1.1		1.6				1.5		0.5	4.8
23-Feb-93	1992PN952106	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34023	1993	2	23	54	132	75	1		154		0.1		0.5	0.5		1.1				1.1		0.5	1.5
31-Mar-93	1993PN957001	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34059	1993	3	31	90	133	88	1	61	84	0.05	0.2	0.9	0.1	2.6	221	1.3	8.1	9	1	1	167	0.2	18
20-Apr-93	1993PN957008	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34079	1993	4	20	110	134	97	1	62	80	0.05	0.1	0.3	0.1	0.3	78.2	0.2	7.6	6.6	1	0.6	162	0.2	1.2
30-Jun-93	**1993PN957071**	**NW10MC0001**	**67.13.14.016**	**134.56.44.016**	**TRIPLICATE SAMPLE**	**34150**	**1993**	**6**	**30**	**181**	**138**	**1070**	**130**	**2430**	**170**	**0**	**1**	**4**	**2**	**6**	**5803**	**3**	**14**	**88**	**1**	**7**	**156**	**8**	**31**
24-Aug-93	1993PN957113	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34205	1993	8	24	236	139	512	48	1050	113	0.07	0.2	1.9	0.7	2.6	1680	1.9	12.6	19.7	1.3	2.7	185	4.3	8.3
28-Sep-93	1993PN957185	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34240	1993	9	28	271	140	614	13	365	83	0.05	0.1	0.5	0.5	1.5	767	0.3	10.5	18.8	1	2.9	174	1.3	6.7
26-Oct-93	1993PN957198	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34268	1993	10	26	299	141	218	3	54	87	0.05	0.1	0.3	0.1	0.6	143	0.4	8.9	20.8	1.1	1.3	185	0.3	1.7
2-Dec-93	1993PN957249	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34305	1993	12	2	336	142	130	1	25	97	0.05	0.1	0.4	0.2	2.1	90.1	0.2	11.6	23.8	1.4	1.2	202	0.2	4.1

Table C3: Water Chemistry for Total Metals at 'Peel River Above Fort McPherson' (Site O)

Sample Date	Sample No.	Station Number	Station Latitude	Station Longitude	Sample_Type	Serial Date	Year	Month	Day	Julian	Order	Flow	TURBIDITY	Al TOTAL	BA TOTAL	BE TOTAL	Cd TOTAL	Cr TOTAL	CO TOTAL	Cu TOTAL	Fe TOTAL	Pb TOTAL	LI TOTAL	MN TOTAL	MO TOTAL	NI TOTAL	Sr TOTAL	V TOTAL	Zn TOTAL
												m3/s	NTU	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
21-Dec-93	1993PN957255	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34324	1993	12	21	355	143	122	2	26	87	0.05	0.4	0.6	0.2	3.3	80.1	6	9.9	12.8	1.2	1.4	189	0.2	9.2
25-Jan-94	1993PN957291	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34359	1994	1	25	25	144	98	2	26	88	0.05	0.1	0.3	0.1	2.1	84.3	0.4	9.8	11.7	1	1	181	0.2	5.7
25-Feb-94	1993PN957321	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34390	1994	2	25	56	145	75	1	33	85	0.05	0.1	0.2	0.1	0.7	67.2	2.9	8.6	9.9	1	0.7	173	0.2	1.6
24-Mar-94	1993PN957342	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34417	1994	3	24	83	146	64	1	11	83	0.05	0.1	0.2	0.1	0.4	44.4	0.4	8.4	6.8	1	0.6	170	0.1	1.5
27-Apr-94	1994PN957050	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34451	1994	4	27	117	147	75	1	25	83	0.05	0.1	0.2	0.1	0.8	77.2	0.2	8.6	7.2	0.9	0.9	166	0.1	4.1
31-May-94	1994PN957081	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34485	1994	5	31	151	148	1460	164	1980	128	0.15	0.5	2.7	2.1	6.5	3990	2.8	12.3	122	0.1	6.3	193	4.8	24
28-Jun-94	1994PN957132	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34513	1994	6	28	179	149	2990	383	5630	143	0.4	1.7	10.2	6	22.7	1780	8.5	26	245	1.6	20	126	22.7	78
25-Aug-94	1994PN957167	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34571	1994	8	25	237	150	913	100	1960	142	0.13	0.3	3.4	1.7	6.6	3960	2.4	16	47	1.2	6.8	163	7.4	23
22-Sep-94	1994PN957244	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34599	1994	9	22	265	151	600	29	236	86	0.05	0.1	0.6	0.5	1.7	678	0.3	12	22	0.9	3.1	182	0.8	6.6
24-Oct-94	1994PN957271	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34631	1994	10	24	297	152	236	4	75	78	0.05	0.1	0.4	0.3	2.1	261	0.2	9	26	1	2.4	155	0.3	6.2
24-Nov-94	1994PN957294	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34662	1994	11	24	328	153	143	2	34	96	0.05	0.1	0.3	0.1	1.4	84	1.1	12	15	1.1	1.4	199	0.2	141
20-Dec-94	1994PN957311	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	34688	1994	12	20	354	156	121	1	104	88	0.05	0.1	0.27	0.2	0.73	240	0.2	10	19	0.97	1.2	184	0.5	2.2
25-Jan-95	1994PN957323	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34724	1995	1	25	25	157	94	2	33	87	0.05	0.1	0.2	0.1	0.2	91	0.2	8.9	11	1	0.9	177	0.2	1.4
27-Feb-95	1994PN957345	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34757	1995	2	27	58	158	82	2	29	85	0.05	0.1	0.2	0.1	0.5	85	0.2	9.2	9.6	1.1	0.7	173	0.2	1.4
22-Mar-95	1994PN957354	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34780	1995	3	22	81	159	78	1	44	83	0.05	0.1	0.2	0.1	0.4	97	0.2	8.8	12	1	0.7	167	0.2	1.2
26-Apr-95	1995PN957372	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34815	1995	4	26	116	160	112	1	39	74	0.05	0.1	0.2	0.1	0.3	90	0.2	7.6	9.4	0.8	0.9	147	0.1	1.2
29-May-95	1995PN957398	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34848	1995	5	29	149	161	1550	156	5020	235	0.28	1.3	8.6	4.3	16.8	13200	6.4	19	113	1.3	17	103	16.8	54
26-Jun-95	1995PN957442	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	34876	1995	6	26	177	164	1560	713	19967	74	1	5	30	15	58	59833	23	57	298	3	49	149	54	171
29-Aug-95	1995PN957518	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34940	1995	8	29	241	166	857	40	696	96	0.06	0.1	1.2	1	3.1	1660	1.1	11	27	0.6	4.9	160	2.5	14
25-Sep-95	1995PN957549	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34967	1995	9	25	268	167	868	34	846	99	0.07	0.2	1.2	0.9	3.2	1630	0.5	15	27	1	5	164	3.2	14
24-Oct-95	1995PN957568	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	34996	1995	10	24	297	168	304	4	35	81	0.05	0.1	0.2	0.2	0.5	57	0.2	12	10	1	2	185	0.2	1.2
24-Nov-95	1995PN957585	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35027	1995	11	24	328	169	165	3	48	86	0.05	0.1	0.2	0.3	0.6	134	0.2	9.4	16	1.2	1.7	189	0.3	1.8
17-Jan-96	1995PN957603	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35081	1996	1	17	17	170	92	2	44	86	0.05	0.1	0.3	0.2	0.7	110	0.2	7.4	11	1.1	1.2	174	0.3	15
28-Mar-96	1995PN957634	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35152	1996	3	28	87	171	82	2	24	85	0.05	0.1	0.2	0.2	0.8	74	0.4	7.2	8.2	1	0.9	170	0.2	22
29-May-96	1996PN667680	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	35214	1996	5	29	150	174	4470	683	9427	328	0.56	2.9	17	9.4	31	26767	14	24	327	2.13	33	116	37	147
25-Jun-96	1996PN667722	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35241	1996	6	25	177	175	1200	113	2230	164	0.15	0.6	4.1	2.1	7.6	5260	3.5	10	64	1.1	8.5	123	8.7	26
27-Aug-96	1996PN667762	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35304	1996	8	27	240	176	1460	264	4450	184	0.29	1.3	7.7	4.7	15.4	12500	5.8	17.4	129	1.3	16.3	159	17	62
15-Oct-96	1996PN667827	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35353	1996	10	15	289	177	303	4	83	73	0.05	0.1	0.3	0.3	1.1	251	0.2	7.5	31	0.9	2.9	148	0.4	4.1
13-Jan-97	1996PN957841	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35443	1997	1	13	13	178	95	2	23	82	0.05	0.1	0.2	0.1	0.7	66.8	0.3	6.7	8.8	1	1	177	0.2	21
15-Apr-97	1997PN667856	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35535	1997	4	15	105	179	70	2	34	82	0.05	0.2	1.1	0.1	2.3	86.3	0.2	7.9	8.9	1	1.8	168	0.2	6.7
11-Aug-97	1997PN667921	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35653	1997	8	11	223	180	1290	196	2320	157	0.16	0.8	4.4	2.6	9.7	6100	4.2	14	59	1.4	11.2	151	9.4	35
9-Oct-97	1997PN667963	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35712	1997	10	9	282	181	536	17	470	90	0.05	0.2	1	0.7	2.6	1210	0.8	9.3	32	1	4.2	166	1.9	7.2
11-Mar-98	1997PN667986	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	35865	1998	3	11	70	182	88	1	41	82	0.05	0.1	0.3	0.2	1	118	0.2	6.7	11.2	1	1.2	166	0.1	36
14-Jun-00	2000PNF17624	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	36691	2000	6	14	166	200	3260	548	8997	219	0.487	2.633	15	8.47	26	20400	14	26	310	2.00	27	140	32	113
23-Aug-00	2000PNF17750	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	36761	2000	8	23	236	201	1520	54	1050	88	0.080	0.300	1.80	1.20	4.60	2670	1.50	7.80	39	1.10	5.70	151	4.20	16
11-Jan-01	2000PNG17801	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	36902	2001	1	11	11	202	140	4	54	82	0.050	0.100	0.60	0.20	2.40	148	0.20	5.40	12	1.00	1.30	173	0.20	177
11-Jun-01	2001PNG17027	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	37053	2001	6	11	162	203	5180	1340	12800	371	0.690	5.200	23	14	39	38900	21.20	26.40	435	2.60	44	133	48	198
23-Aug-01	2001PNG17174	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	37126	2001	8	23	235	206	720	28	686	98	0.057	0.100	1.10	0.80	2.10	1363	0.93	7.93	25	1.83	2.40	184	3.23	8.1
9-Jan-02	2001PNG17221	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	37265	2002	1	9	9	207	104		25	79	0.050	0.200	0.20	0.20	1.30	84	1.10	6.60	7.80	1.10	1.30	176	0.20	43
18-Apr-02	2002PNH17252	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	37364	2002	4	18	108	212	88			82	0.002	0.058	0.06	0.08	0.43	82	1.60	4.40	10	1.12	1.38	171	0.15	15
6-Jun-02	2002PNH17271	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	37413	2002	6	6	157	213	1660			416	0.364	0.411	13	8.05	24.90	2	10.70	21.60	213	1.41	28	141	20	89
29-Jul-02	2002PNG17326	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	37466	2002	7	29	211	210	1780			204	0.180	0.193	4.79	3.27	8.25	7003	3.96	11	113	1.11	11	181	9.26	36
7-Jan-03	2002PNG17404	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	37628	2003	1	7	7	211	190			95	0.002	0.135	0.47	0.08	0.99	110	0.33	7.03	14	1.38	1.67	213	0.25	32.4
11-Jun-03	2003PN010037	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	37783	2003	6	11	162	216	1530	229	3823	247	0.231	5.557	6.73	4.18	11	9333	4.66	11	186	1.03	15	144	15	59
12-Sep-03	2003PN010143	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	37876	2003	9	12	255	217	998	23	418	94	0.029	0.622	0.79	0.63	1.80	1050	0.44	7.10	23	1.26	4.35	180	1.72	9.8
12-Jan-04	2003PN010176	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	37998	2004	1	12	12	218	131	4	48	92	0.007	0.074	0.59	0.10	0.34	178	1.40	6.00	15	1.37	1.22	196	0.34	36
10-Jun-04	2004PN010039	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	38148	2004	6	10	162	221	1910	187	2863	253	0.173	0.303	5.42	3.57	10	7730	4.95	9.60	161	0.95	12	147	11	51
12-Aug-04	2004PN010130	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	38211	2004	8	12	225	222	499	275	3250	276	0.185	0.253	6.25	3.43	11.00	8500	4.45	14	132	1.59	13	201	13	48
23-Feb-05	2004PN010234	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	38406	2005	2	23	54	223	95	2	16	85	0.001	0.040	0.29	0.05	0.92	77	0.25	5.30	9.52	1.07	0.90	174	0.22	7.7
20-Apr-05	2005PN010004	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	38462	2005	4	20	110	224	135	1	12	81	0.001	0.029	0.26	0.03	0.32	59	1.05	5.30	7.05	1.09	0.72	170	0.11	8.1
10-Jun-05	2005PN010047	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	38513	2005	6	10	161	225	3520	942	12700	726	0.732	0.877	24.70	11.80	34.90	28300	14	25	476	3.47	44	165	62.10	166
9-Sep-05	2005PN010163	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	38604	2005	9	9	252	228	518	29	501	99	0.031	0.150	1.02	0.64	2.67	1137	0.59	7.57	20	1.20	3.63	190	1.93	10
19-Jun-06	2006PN010048	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	38887	2006	6	19	170	230	2040	244	2990	206	0.174	0.301	5.03	3.54	9.05	7300	4.24	9.90	196	0.90	12	157	10	46.9
17-Aug-06	2006PN010102	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	38946	2006	8	17	229	231	1300	280	3010	249	0.203	0.265	5.52	3.56	11.50	7990	4.09	12	103	0.98	14	163	12	45
5-Feb-07	2006PN010148	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	39118	2007	2	5	36	234	146	2	40	85	0.004	0.041	0.26	0.08	0.84	123	0.28	5.95	11	1.18	1.44	199	0.25	16
3-Jul-07	2007PN010050	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	39266	2007	7	3	184	237	1120	398	5227	325	0.293	0.275	9.61	5.09	15	12800	5.99	18	134	1.28	20	169	21	63
19-Sep-07	2007PN010097	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39344	2007	9	19	262	238	547	6	578	111	0.042	0.089	1.07	0.91	3.52	1490	0.73	8.80	28	1.14	5.04	205	2.16	16
27-Feb-08	2007PN330057	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39505	2008	2	27	58	239	108	20	386	65	0.025	0.316	1.03	0.38	4.77	740	0.73	6.10	21	0.90	2.61	254	1.01	11
4-Jun-08	2008PN010016	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39603	2008	6	4	156	240	1300	178	3730	275	0.226	0.273	7.83	4.93	15	11000	6.08	14	133	1.00	19	136	15	56
27-Aug-08	2008PN010121	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	39687	2008	8	27	240	243	1630	370	4290	403	0.271	0.386	9.18	6.29	19	14700	7.71	17	146	1.45	23	193	19	81
17-Feb-09	2008PN010152	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39861	2009	2	17	48	244	144	8	52	87	0.004	0.249	1.24	0.12	3.64	200	132	5.80	14	1.13	1.58	178	0.28	20
15-Apr-09	2009PN010007	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39918	2009	4	15	105	245	68	2	16	78	0.002	0.300	0.43	0.07	5.83	61	8.94	5.10	8.69	0.98	1.45	167	0.18	12
4-Jun-09	2009PN010021	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	39968	2009	6	4	155	246	2170	223	2020	223	0.136	0.292	4.27	2.72	8.19	5850	3.36	7.40	113	0.65	12	105	8.85	42
29-Sep-09	2009PN010081	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40085	2009	9	29	272	247	1110	61	881	117	0.071	0.202	1.61	1.55	4.37	2780	1.34	9.70	41	1.00	10	164	3.22	31
1-Mar-10	2009PN010112	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	40238	2010	3	1	60	250	76	2	37	87	0.003	0.182	0.36	0.07	1.00	119	8.24	5.60	11	1.09	1.40	187	0.30	6.1
4-May-10	2010PN010016	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40302	2010	5	4	124	251	2250	258	2680	280	0.178	0.500	5.50	3.86	12	7990	4.80	7.84	185	0.68	16	90	12	59
8-Jun-10	2010PN010028	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40337	2010	6	8	159	252	1050	50	777	106	0.054	0.114	1.49	0.96	3.55	2150	1.22	6.10	47	0.89	4.52	146	3.02	17
13-Sep-10	2010PN010138	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40434	2010	9	13	256	253	949	89	878	142	0.068	0.224	5.64	1.39	5.25	2580	1.77	8.00	38	1.17	7.86	182	3.53	32
15-Feb-11	2010PN010191	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40589	2011	2	15	46	254		2	135	89	0.011	0.185	0.80	0.22	3.95	373	4.47	5.97	21	1.05	2.41	190	0.52	20
7-Jun-11	2011PN010048	NW10MC0001	67.13.14.016	134.56.44.016	DISCRETE SAMPLE	40701	2011	6	7	158	255		134	1580	188	0.113	0.198	3.11	2.16	7.12	4940	3.01	7.05	116	0.93	9.01	119	7.03	29
27-Jul-11	2011PN010070	NW10MC0001	67.13.14.016	134.56.44.016	TRIPLICATE SAMPLE	40751	2011	7	27	208	258		86	979	143	0.071	0.107	1.93	1.34	4.34	2953	1.74	7.52	59	1.20	5.70	172	4.09	19

Table C4: Particle Size of Entrained Sediment in the Peel River (Site O)						
ANALYTE	UNITS	DL	Sample Date			
			Jul-02	Jun-03	Jul-07	Aug-07
% Moisture	%	0.1	35	31	47	35
% Sand	%	1	8	20	6	9
% Silt	%	1	62	46	43	41
% Clay	%	1	30	34	51	50

Table C5: Low level analysis for Polynuclear Aromatic Hydrocarbon (PAH) Compounds and Alkylated PAH's in Entrained Sediment Sampled at Site O on the Peel River					
ANALYTE	UNITS	DL	Sample Date		
			Jun-07	Jul-07	Aug-07
Benzo(b&k)fluoranthene	mg/kg	0.003	0.05	0.049	0.094
Benzo(ghi)perylene	mg/kg	0.003	0.11	0.086	0.29
Biphenyl	mg/kg	0.003	0.02	0.031	0.021
C2 sub'd B(a)A/chrysene	mg/kg	0.012	0.13	0.1	0.18
C2 sub'd B(b&k)F/B(a)P	mg/kg	0.012	0.11	0.12	0.18
C2 sub'd biphenyl	mg/kg	0.012	0.05	0.07	0.04
C2 sub'd dibenzothiophene	mg/kg	0.012	0.09	0.13	0.09
C2 sub'd fluorene	mg/kg	0.012	0.13	0.19	0.13
C2 sub'd naphthalene	mg/kg	0.012	0.74	1.1	0.68
C2 sub'd phenanthrene	mg/kg	0.012	0.35	0.59	0.35
C3 sub'd dibenzothiophene	mg/kg	0.012	0.14	0.15	0.13
C3 sub'd naphthalene	mg/kg	0.012	0.53	0.99	0.54
C3 sub'd phenanthrene	mg/kg	0.012	0.27	0.45	0.27
C4 sub'd dibenzothiophene	mg/kg	0.012	0.12	0.15	0.03
C4 sub'd naphthalene	mg/kg	0.012	0.43	0.61	0.45
C4 sub'd phenanthrene	mg/kg	0.012	0.31	0.5	0.29
Dibenzothiophene	mg/kg	0.003	0.032	0.05	0.032
Indeno(c,d-123)pyrene	mg/kg	0.003	0.017	0.014	0.058
Methyl acenaphthene	mg/kg	0.012	0.07	0.07	0.09
Methyl B(a)A/chrysene	mg/kg	0.012	0.13	0.12	0.19
Methyl B(b&k)F/B(a)P	mg/kg	0.012	0.21	0.16	0.29
Methyl biphenyl	mg/kg	0.012	0.04	0.06	0.04
Methyl dibenzothiophene	mg/kg	0.012	0.08	0.13	0.08
Methyl fluoranthene/pyrene	mg/kg	0.012	0.15	0.22	0.17
Methyl fluorene	mg/kg	0.012	0.08	0.1	0.09
Methyl naphthalene	mg/kg	0.003	0.45	0.65	0.37
Methyl phenanthrene	mg/kg	0.012	0.39	0.66	0.4
2-Fluorobiphenyl	%		78	75	80
Nitrobenzene d5	%		77	38	51
p-Terphenyl d14	%		85	67	107

Table C6: Pesticide and Herbicide Content in Entrained Sediment Sampled at Site O in the Peel River

ANALYTE	UNITS	DL	CCME		Sample Date							
			PEL	ISQG	Jul-02	Jun-03	Aug-04	Jun-05	Aug-06	Jun-07	Jul-07	Aug-07
2,4,5-T	mg/kg	variable				<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
2,4,5-TP	mg/kg	0.005				<0.005						
2,4-D	mg/kg	0.005			<0.005	<0.005	0.004	<0.005	<0.005	<0.005	<0.005	<0.005
2,4-D d5	%	0.0001					130	87	64	73	111	139
Bromoxynil	mg/kg	variable			<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Clopyralid	mg/kg	variable				<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Dicamba	mg/kg	variable			<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Diclofop-methyl	mg/kg	variable			<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Fluazifop-p-butyl	mg/kg	variable					<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
MCPA	mg/kg	variable			<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Mecoprop	mg/kg	variable			<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Picloram	mg/kg	variable			<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Treflan d14	%	0.0001					47	70	48	68	80	109
Triallate	mg/kg	variable			<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Triclopyr	mg/kg	variable					<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Trifluralin	mg/kg	variable			<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
alpha-BHC	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg	variable	0.0089	0.0045	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg	variable	0.0067	0.0029	<0.001	<0.001	<0.001	***<0.005***	***<0.005***	***<0.005***	***<0.005***	***<0.005***
Endosulfan I	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg	variable	0.0624	0.0027	<0.001	<0.001	<0.001	***<0.005***	***<0.005***	***<0.005***	***<0.005***	***<0.005***
gamma-BHC (Lindane)	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg	variable	0.0027	0.0006	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg	variable			<0.002	<0.001	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005
Mirex	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Nonachlor	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005		<0.005
o,p'-DDT	mg/kg	variable					<0.01					
Oxychlordane	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005		<0.005
p,p'-DDD	mg/kg	variable	0.0085	0.0035	<0.001	<0.001	<0.001	***<0.005***	***<0.005***	***<0.005***	***<0.005***	***<0.005***
p,p'-DDE	mg/kg	variable	0.0068	0.0014	<0.001	<0.001	<0.001	***<0.005***	***<0.005***	***<0.005***	***<0.005***	***<0.005***
p,p'-DDT	mg/kg	variable	0.0048	0.0012	<0.001	<0.001	<0.001	***<0.005***	***<0.005***	***<0.005***	***<0.005***	***<0.005***
Quintozine (PCNB)	mg/kg	variable			<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005
Toxaphene	mg/kg	variable	0.0001			***<0.01***	***<0.005***					
trans-Chlordane	mg/kg	variable	0.0089	0.0045	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005

DL> CCME
Probable Effects Level (PEL) ***0.5***
Interim Sediment Quality Guideline (ISQG) ***0.5***

Table C7: Polychlorinated Biphenyls (PCB's) in Centrifugate Sediment Collected at 'Peel River Above Fort McPherson' (Site O)

ANALYTE	UNITS	Jun-07	Jul-07	Aug-07	Mean
PCB 43/52	mg/kg	0.053	0.220	0.050	0.108
PCB 44	mg/kg	0.072	0.180	0.048	0.100
PCB 48/49	mg/kg	0.025	0.110	0.026	0.054
PCB 18	mg/kg	0.036	0.033	0.020	0.030
PCB 70	mg/kg	0.037	0.052	0.019	0.036
PCB 90/101	mg/kg	0.018	0.028	0.015	0.020
PCB 64	mg/kg	0.023	0.057	0.014	0.031
PCB 31	mg/kg	0.026	0.048	0.013	0.029
PCB 95	mg/kg	0.021	0.048	0.013	0.027
PCB 110	mg/kg	0.023	0.024	0.010	0.019
PCB 71	mg/kg	0.012	0.028	0.009	0.016
PCB 28	mg/kg	0.022	0.043	0.009	0.025
PCB 21/20/33	mg/kg	0.016	0.025	0.008	0.016
PCB 59/42	mg/kg	0.011	0.031	0.007	0.016
PCB 45	mg/kg	0.013	0.028	0.007	0.016
PCB 66	mg/kg	0.010	0.031	0.006	0.016
PCB 138	mg/kg	0.013	0.029	***<0.0016***	0.015
PCB 53	mg/kg	0.010	0.023	0.006	0.013
PCB 118	mg/kg	0.023	0.010	0.005	0.013
PCB 16	mg/kg	0.008	0.021	0.006	0.012
PCB 153/168	mg/kg	0.006	0.023	0.005	0.012
PCB 22	mg/kg	0.009	0.017	0.004	0.010
PCB 56	mg/kg	0.010	0.013	0.005	0.009
PCB 17	mg/kg	0.011	0.012	***<0.0033***	0.009
PCB 147/149	mg/kg	0.0099	***<0.003***	0.01	0.008
PCB 105	mg/kg	0.011	0.0063	***<0.0006***	0.006
PCB 37	mg/kg	0.004	0.009	0.004	0.006
PCB 74	mg/kg	0.004	0.011	***<0.0008***	0.005
PCB 180	mg/kg	0.01	***<0.0022***	***<0.0017***	0.005
PCB 60	mg/kg	0.004	0.007	0.002	0.004
PCB 84/89	mg/kg	0.006	***<0.0031***	0.003	0.004
PCB 160/163	mg/kg	0.0032	0.0047	***<0.0011***	0.003
PCB 156	mg/kg	0.0022	***<0.0015***	***<0.0015***	0.002
PCB 40/68	mg/kg	***<0.0007***	0.0031	***<0.0005***	0.001
13C12 PCB 126	%	61	35	70	55
13C12 PCB 205	%	42	80	69	64
13C12 PCB 77	%	40	74	69	61
13C12 PCB 81	%	33	56	69	53
13C12 PCB 209	%	4	55	65	41
13C12 PCB 157	%	52	60	64	59
13C12 PCB 169	%	46	46	63	52
13C12 PCB 123	%	45	98	62	68
13C12 PCB 118	%	45	117	61	74
13C12 PCB 114	%	46	103	61	70
13C12 PCB 156	%	48	57	61	55
13C12 PCB 167	%	45	65	60	57
13C12 PCB 105	%	51	108	59	73
13C12 PCB 206	%	46	40	57	48
13C12 PCB 189	%	45	52	53	50
13C12 PCB 37	%	46	52	51	50
13C12 PCB 155	%	4	47	37	29
13C12 PCB 54	%	21	31	31	28
13C12 PCB 15	%	27	33	30	30
13C12 PCB 4	%	28	13	29	23
13C12 PCB 1	%	0	9	25	11
PCB 127	µg/kg	<0.70	<4.4	<1.1	
PCB 126	µg/kg	<0.80	<4.4	<1.6	
PCB 80	µg/kg	<0.90	<1.1	<0.80	
PCB 166	µg/kg	<1.0	<1.2	<1.1	
PCB 35	µg/kg	<1.0	<1.3	<2.0	
PCB 36	µg/kg	<1.0	<1.3	<1.8	
PCB 39	µg/kg	<1.0	<1.2	<1.8	
PCB 157	µg/kg	<1.1	<1.4	<1.4	
PCB 169	µg/kg	<1.1	<1.6	<1.6	
PCB 38	µg/kg	<1.1	<1.3	<1.9	
PCB 57	µg/kg	<1.1	<1.2	<0.90	
PCB 58/67	µg/kg	<1.1	<1.3	<1.0	
PCB 63/76	µg/kg	<1.1	<1.1	<0.90	
PCB 77	µg/kg	<1.1	<1.1	<1.5	
PCB 79	µg/kg	<1.1	<1.2	<0.90	
PCB 128/162	µg/kg	<1.2	<1.8	<1.3	
PCB 167	µg/kg	<1.2	<1.4	<1.5	
PCB 55	µg/kg	<1.2	<1.4	<1.1	
PCB 72	µg/kg	<1.2	<1.1	<0.90	
PCB 78	µg/kg	<1.2	<1.2	<1.0	
PCB 164	µg/kg	<1.3	<1.4	<1.2	
PCB 25	µg/kg	<1.3	<1.5	<2.4	
PCB 29	µg/kg	<1.3	<1.5	<2.5	
PCB 61	µg/kg	<1.3	<1.4	<1.1	

Table C7: Polychlorinated Biphenyls (PCB's) in Centrifugate Sediment Collected at 'Peel River Above Fort McPherson' (Site O)

ANALYTE	UNITS	Jun-07	Jul-07	Aug-07	Mean
PCB 81	µg/kg	<1.3	<1.4	<1.4	
PCB 137	µg/kg	<1.4	<1.8	<1.4	
PCB 26	µg/kg	<1.4	<1.6	<2.4	
PCB 34	µg/kg	<1.4	<1.7	<2.5	
PCB 189	µg/kg	<1.5	<1.6	<2.2	
PCB 23	µg/kg	<1.5	<1.7	<2.8	
PCB 141	µg/kg	<1.6	6.5	<1.4	
PCB 191	µg/kg	<1.6	<2.0	<1.5	
PCB 201/204	µg/kg	<1.8	<1.3	<1.5	
PCB 170	µg/kg	<1.9	<1.9	<1.8	
PCB 11	µg/kg	<10	<7.1	<8.7	
PCB 5	µg/kg	<10	<8.2	<9.5	
PCB 184	µg/kg	<11	<2.6	<1.0	
PCB 188	µg/kg	<11	<3.2	<1.9	
PCB 159	µg/kg	<15	<1.4	<1.5	
PCB 158/129	µg/kg	<18	<1.7	<1.6	
PCB 155	µg/kg	<19	<3.1	<2.3	
PCB 206	µg/kg	<2.0	<3.3	<3.6	
PCB 111/117	µg/kg	<2.1	<1.8	<1.2	
PCB 112	µg/kg	<2.1	<2.0	<1.0	
PCB 82	µg/kg	<2.1	<2.1	<1.1	
PCB 115	µg/kg	<2.2	<1.8	<1.1	
PCB 172	µg/kg	<2.2	<3.0	<2.1	
PCB 124	µg/kg	<2.3	<2.0	<1.3	
PCB 145	µg/kg	<2.3	<2.7	<1.5	
PCB 150	µg/kg	<2.3	<4.0	<1.6	
PCB 106	µg/kg	<2.4	<1.9	<1.4	
PCB 113	µg/kg	<2.4	<2.5	<1.2	
PCB 114	µg/kg	<2.4	<2.5	<1.8	
PCB 154	µg/kg	<2.4	<2.5	<1.4	
PCB 165	µg/kg	<2.4	<2.8	<1.6	
PCB 194	µg/kg	<2.5	<2.2	<2.2	
PCB 195	µg/kg	<2.5	<1.8	<2.2	
PCB 96	µg/kg	<2.5	<1.8	<1.1	
PCB 122	µg/kg	<2.6	<2.4	<1.4	
PCB 123/107/109	µg/kg	<2.6	<2.4	<1.9	
PCB 205	µg/kg	<2.6	<2.0	<2.4	
PCB 75/65/62	µg/kg	<2.7	<2.5	<1.9	
PCB 102	µg/kg	<2.8	<2.6	<1.4	
PCB 103	µg/kg	<2.8	<2.1	<1.3	
PCB 69	µg/kg	<2.8	<2.4	<1.9	
PCB 88/121	µg/kg	<2.8	<2.7	<1.3	
PCB 108/86/125	µg/kg	<2.9	<2.4	<1.3	
PCB 116	µg/kg	<2.9	<2.0	<1.4	
PCB 32	µg/kg	<2.9	14	<2.2	
PCB 73	µg/kg	<2.9	<2.6	<1.9	
PCB 83/119	µg/kg	<2.9	<4.4	<1.3	
PCB 130	µg/kg	<22	<2.0	<2.3	
PCB 179	µg/kg	<22	<1.0	<0.70	
PCB 209	µg/kg	<22	<2.2	<2.4	
PCB 136	µg/kg	<23	12	<1.8	
PCB 152	µg/kg	<23	<5.0	<1.9	
PCB 161	µg/kg	<23	<2.8	<2.1	
PCB 146	µg/kg	<28	<3.0	<2.2	
PCB 139/143	µg/kg	<3.0	<3.3	<2.1	
PCB 47	µg/kg	<3.0	15	5.4	
PCB 99	µg/kg	<3.0	<4.1	<1.5	
PCB 132	µg/kg	<3.1	17	4.6	
PCB 134	µg/kg	<3.1	<3.8	<2.4	
PCB 94	µg/kg	<3.1	<2.7	<1.6	
PCB 131/142/133	µg/kg	<3.2	<3.7	<2.3	
PCB 27	µg/kg	<3.3	<3.5	<2.3	
PCB 93	µg/kg	<3.3	<3.5	<1.8	
PCB 97	µg/kg	<3.3	<2.5	<1.5	
PCB 104	µg/kg	<3.4	<3.4	<3.6	
PCB 85	µg/kg	<3.4	<2.9	<1.5	
PCB 87	µg/kg	<3.4	11	<1.6	
PCB 51	µg/kg	<3.6	<3.4	<2.3	
PCB 200	µg/kg	<3.7	<1.7	<1.6	
PCB 24	µg/kg	<3.7	<3.8	<2.7	
PCB 30	µg/kg	<3.7	<3.4	<2.7	
PCB 98	µg/kg	<3.7	<2.9	<1.6	
PCB 140	µg/kg	<3.8	<3.1	<2.3	
PCB 197	µg/kg	<3.8	<1.8	<1.6	
PCB 92	µg/kg	<3.8	<4.8	<4.0	
PCB 148	µg/kg	<32	<3.9	<2.7	
PCB 144	µg/kg	<33	<3.8	<2.8	
PCB 151	µg/kg	<35	7.1	<2.3	
PCB 135	µg/kg	<38	<4.1	<2.9	

Table C7: Polychlorinated Biphenyls (PCB's) in Centrifugate Sediment Collected at 'Peel River Above Fort McPherson' (Site O)

ANALYTE	UNITS	Jun-07	Jul-07	Aug-07	Mean
PCB 100	µg/kg	<4.0	<2.4	<1.3	
PCB 41	µg/kg	<4.0	15	<2.9	
PCB 54	µg/kg	<4.0	<3.5	<3.2	
PCB 91	µg/kg	<4.0	<4.9	<3.6	
PCB 120	µg/kg	<4.1	<3.6	<2.0	
PCB 46	µg/kg	<4.2	<4.0	<2.7	
PCB 202	µg/kg	<4.3	<1.9	<2.3	
PCB 203/196	µg/kg	<4.5	<2.7	<2.1	
PCB 199	µg/kg	<4.7	<3.4	<2.4	
PCB 19	µg/kg	<4.8	<6.0	<5.2	
PCB 50	µg/kg	<4.8	<4.0	<3.1	
PCB 198	µg/kg	<5.1	<2.1	<2.1	
PCB 2	µg/kg	<5.7	<5.0	<2.2	
PCB 3	µg/kg	<6.0	<4.6	<2.4	
PCB 193	µg/kg	<6.4	<1.2	<0.70	
PCB 176	µg/kg	<6.6	<1.1	<0.70	
PCB 190	µg/kg	<6.7	<1.0	<0.80	
PCB 208	µg/kg	<6.8	<2.3	<2.8	
PCB 15	µg/kg	<6.9	<7.0	<9.5	
PCB 186	µg/kg	<6.9	<1.0	<0.80	
PCB 207	µg/kg	<7.1	<2.0	<2.1	
PCB 192	µg/kg	<7.3	<1.3	<0.80	
PCB 183	µg/kg	<8.0	<1.3	<0.90	
PCB 187	µg/kg	<8.0	<1.4	<0.90	
PCB 13	µg/kg	<8.1	<6.7	<8.3	
PCB 175/182	µg/kg	<8.1	<1.4	<0.90	
PCB 174	µg/kg	<8.2	<1.5	<0.90	
PCB 8	µg/kg	<8.2	<6.7	<7.8	
PCB 4/10	µg/kg	<8.3	<37	<8.8	
PCB 171	µg/kg	<8.7	<1.7	<0.90	
PCB 185	µg/kg	<8.8	<1.8	<1.0	
PCB 14	µg/kg	<8.9	<7.0	<8.5	
PCB 181	µg/kg	<8.9	<1.5	<1.0	
PCB 12	µg/kg	<9.0	<7.5	<9.5	
PCB 178	µg/kg	<9.0	<1.5	<0.90	
PCB 9	µg/kg	<9.0	<7.4	<7.9	
PCB 173	µg/kg	<9.3	<1.9	<1.1	
PCB 6	µg/kg	<9.5	<7.3	<8.4	
PCB 177	µg/kg	<9.6	<1.5	<1.1	
PCB 7	µg/kg	<9.9	<7.4	<8.3	
PCB 1	µg/kg	N/A	<11	<2.3	

Table C8:Total Nitrogen at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample Date	Sample No.	Serial Date	Year	Month	Day	Julian Day	Flow	TURBIDITY	Total Nitrogen
							m3/s	NTU	mg/L
Jul-79	1979PN951864	29061	1979	7	25	206	1900	86	0.43
Oct-79	1979PN952846	29132	1979	10	4	277	759	39	0.35
Jan-80	1979PN954356	29243	1980	1	23	23	64	2	0.21
Jul-80	1980PN951748	29411	1980	7	9	191	957	124	0.43
Aug-80	1980PN952452	29445	1980	8	12	225	1030	34	0.32
Sep-80	1980PN952998	29480	1980	9	16	260	664	11	0.27
Oct-80	1980PN953554	29515	1980	10	21	295	238	3	0.23
Mar-81	1981PN950173	29671	1981	3	26	85	62	1	0.23
Apr-81	1981PN950412	29698	1981	4	22	112	58	1	0.21
Aug-81	1981PN952329	29809	1981	8	11	223	1060	53	0.96
Jul-81	1981PN952985	29775	1981	7	8	189	2600	9	0.72
Sep-81	1981PN953217	29850	1981	9	21	264	701	12	0.20
Dec-81	1981PN954271	29927	1981	12	7	341	139	1	0.23
Jan-82	1981PN954588	29971	1982	1	20	20	80	1	0.23
Apr-82	1982PN950225	30048	1982	4	7	97	59	1	0.22
May-82	1982PN950653	30081	1982	5	10	130	69	4	0.18
Jun-82	1982PN951109	30131	1982	6	29	180	1440	83	0.56
Aug-82	1982PN951454	30172	1982	8	9	221	1050	46	0.37
Feb-83	1982PN952631	30363	1983	2	16	47	72	1	0.33
Mar-83	1983PN950140	30398	1983	3	23	82	69	1	0.21
May-83	1983PN950327	30440	1983	5	4	124	122	20	0.30
Jul-83	1983PN950809	30520	1983	7	23	204	830	23	0.20
Oct-83	1983PN951241	30593	1983	10	4	277	332	35	0.30
Nov-83	1983PN951452	30638	1983	11	18	322	111	2	0.18
Jan-84	1983PN951557	30694	1984	1	13	13	51	2	0.17
Mar-84	1983PN951741	30746	1984	3	5	65	47	1	0.24
Aug-84	1984PN950870	30896	1984	8	2	215	1810	125	0.71
Sep-84	1984PN951321	30951	1984	9	26	270	620	6	0.21
Nov-84	1984PN951559	31003	1984	11	17	322	119	2	0.21
Dec-84	1984PN951682	31035	1984	12	19	354	102	2	0.20
Mar-85	1985PN950040	31132	1985	3	26	85	76	1	0.24
Apr-85	1985PN950127	31167	1985	4	30	120	66	1	0.18
Jul-85	1985PN950467	31231	1985	7	3	184	1270	34	0.28
Aug-85	1985PN950590	31265	1985	8	6	218	864	22	0.23
Nov-85	1985PN950918	31370	1985	11	19	323	122	2	0.20
Jan-86	1985PN951035	31420	1986	1	8	8	78	1	0.21
Jun-86	1986PN950323	31578	1986	6	15	166	1430	119	0.56
Jul-86	1986PN950416	31601	1986	7	8	189	824	59	0.20
Aug-86	1986PN950593	31639	1986	8	15	227	2480	1210	3.71
Oct-86	1986PN950818	31688	1986	10	3	276	408	14	0.17
Dec-86	1986PN951138	31756	1986	12	10	344	123	3	0.19
Feb-87	1986PN951300	31818	1987	2	10	41		2	0.22
Mar-87	1987PN950014	31861	1987	3	25	84		1	0.21
Jul-87	1987PN950581	31960	1987	7	2	183		54	0.25
Aug-87	1987PN950976	31993	1987	8	4	216		40	0.26
Sep-87	1987PN951561	32023	1987	9	3	246		99	0.48
Oct-87	1987PN951912	32056	1987	10	6	279		22	0.24
Jan-88	1987PN952332	32146	1988	1	4	4	97	1	0.19
Apr-88	1988PN950335	32254	1988	4	21	112	85	3	0.20

Table C8:Total Nitrogen at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample Date	Sample No.	Serial Date	Year	Month	Day	Julian Day	Flow	TURBIDITY	Total Nitrogen
							m3/s	NTU	mg/L
May-88	1988PN950593	32278	1988	5	15	136	1820	556	1.99
May-88	1988PN950594	32280	1988	5	17	138	2080	288	1.08
May-88	1988PN950595	32282	1988	5	19	140	2190	168	1.00
May-88	1988PN950604	32287	1988	5	24	145	4330	504	2.08
May-88	1988PN950741	32294	1988	5	31	152	3780	464	1.46
Jun-88	1988PN950746	32297	1988	6	3	155	2980	220	0.82
Jun-88	1988PN950834	32302	1988	6	8	160	2560	484	1.34
Jun-88	1988PN951093	32311	1988	6	17	169	1640	79	0.39
Aug-88	1988PN951937	32372	1988	8	17	230	932	27	0.22
Sep-88	1988PN952145	32395	1988	9	9	253	1870	1060	2.14
Oct-88	1988PN952731	32429	1988	10	13	287	345	10	0.20
Jan-89	1988PN953100	32514	1989	1	6	6	131	3	0.19
Apr-89	1989PN950276	32624	1989	4	26	116	113	3	0.19
May-89	1989PN950453	32647	1989	5	19	139	1510	118	0.58
Jun-89	1989PN950606	32663	1989	6	4	155	2350	370	1.15
Jul-89	1989PN951431	32708	1989	7	19	200	685	137	0.49
Jul-89	1989PN951432	32709	1989	7	20	201	656	79	0.33
Oct-89	1989PN952185	32784	1989	10	3	276	527	23	0.22
Jan-90	1989PN952728	32889	1990	1	16	16	113	2	0.19
Apr-90	1990PN950026	32968	1990	4	5	95	98	1	0.19
Apr-90	1990PN950120	32988	1990	4	25	115	103	3	0.18
Jun-90	1990PN950610	33030	1990	6	6	157	2700	342	0.28
Aug-90	1990PN951423	33108	1990	8	23	235	1880	580	1.64
Oct-90	1990PN951763	33158	1990	10	12	285	606	10	0.19
Apr-91	1991PN950259	33332	1991	4	4	94	108	2	0.21
May-91	1991PN951417	33382	1991	5	24	144	2290	214	0.74
Jul-91	1991PN952278	33429	1991	7	10	191	852	119	0.38
Oct-91	1991PN953247	33527	1991	10	16	289	300	7	0.18
Nov-91	1991PN953466	33555	1991	11	13	317	127	2	0.18
Jan-92	1991PN953641	33612	1992	1	9	9	117	2	0.21
Mar-92	1991PN954000	33681	1992	3	18	78	98	1	0.22
Apr-92	1992PN950172	33710	1992	4	16	107	92	1	0.20
May-92	1992PN950405	33744	1992	5	20	141	131	76	0.33
Jun-92	1992PN950535	33772	1992	6	17	169	3380	750	1.62
Jul-92	1992PN950734	33809	1992	7	24	206	752	169	0.51
Aug-92	1992PN950970	33830	1992	8	14	227	657	67	0.33
Sep-92	1992PN951249	33865	1992	9	18	262	437	10	0.13
Oct-92	1992PN951667	33905	1992	10	28	302	152	3	0.17
Nov-92	1992PN951739	33932	1992	11	24	329	117	2	0.20
Jan-93	1992PN951878	33976	1993	1	7	7	81	2	0.20
Feb-93	1992PN952106	34023	1993	2	23	54	75	1	0.22
Jun-93	1993PN957071	34150	1993	6	30	181	1070	130	0.26
Aug-93	1993PN957113	34205	1993	8	24	236	512	48	0.36
Sep-93	1993PN957185	34240	1993	9	28	271	614	13	0.22
Oct-93	1993PN957198	34268	1993	10	26	299	218	3	0.29
Dec-93	1993PN957249	34305	1993	12	2	336	130	1	0.31
Dec-93	1993PN957255	34324	1993	12	21	355	122	2	0.57
Feb-94	1993PN957321	34390	1994	2	25	56	75	1	0.24
Mar-94	1993PN957342	34417	1994	3	24	83	64	1	0.25

Table C8:Total Nitrogen at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample Date	**Sample No.**	**Serial Date**	**Year**	**Month**	**Day**	**Julian Day**	**Flow**	**TURBIDITY**	**Total Nitrogen**
							m3/s	**NTU**	**mg/L**
Apr-94	1994PN957050	34451	1994	4	27	117	75	1	0.24
May-94	1994PN957081	34485	1994	5	31	151	1460	164	0.60
Jun-94	1994PN957132	34513	1994	6	28	179	2990	383	1.06
Aug-94	1994PN957167	34571	1994	8	25	237	913	100	0.39
Oct-94	1994PN957271	34631	1994	10	24	297	236	4	0.40
Nov-94	1994PN957294	34662	1994	11	24	328	143	2	0.32
Dec-94	1994PN957311	34688	1994	12	20	354	121	1	0.24
Jan-95	1994PN957323	34724	1995	1	25	25	94	2	0.25
Feb-95	1994PN957345	34757	1995	2	27	58	82	2	0.27
Mar-95	1994PN957354	34780	1995	3	22	81	78	1	0.30
Apr-95	1995PN957372	34815	1995	4	26	116	112	1	0.34
May-95	1995PN957398	34848	1995	5	29	149	1550	156	0.96
Jun-95	1995PN957442	34876	1995	6	26	177	1560	713	1.99
Jul-95	1995PN957481	34904	1995	7	24	205	2120	14	
Aug-95	1995PN957518	34940	1995	8	29	241	857	40	0.33
Sep-95	1995PN957549	34967	1995	9	25	268	868	34	0.29
Oct-95	1995PN957568	34996	1995	10	24	297	304	4	0.43
Nov-95	1995PN957585	35027	1995	11	24	328	165	3	0.24
Jan-96	1995PN957603	35081	1996	1	17	17	92	2	0.28
Mar-96	1995PN957634	35152	1996	3	28	87	82	2	0.51
May-96	1996PN667680	35214	1996	5	29	150	4470	683	1.87
Jun-96	1996PN667722	35241	1996	6	25	177	1200	113	0.85
Aug-96	1996PN667762	35304	1996	8	27	240	1460	264	0.65
Oct-96	1996PN667827	35353	1996	10	15	289	303	4	0.65
Jan-97	1996PN957841	35443	1997	1	13	13	95	2	0.24
Apr-97	1997PN667856	35535	1997	4	15	105	70	2	0.23
Aug-97	1997PN667921	35653	1997	8	11	223	1290	196	0.53
Oct-97	1997PN667963	35712	1997	10	9	282	536	17	0.26
Mar-98	1997PN667986	35865	1998	3	11	70	88	1	0.25
Jun-00	2000PNF17624	36691	2000	6	14	166	3260	548	1.33
Aug-00	2000PNF17750	36761	2000	8	23	236	1520	54	0.50
Jan-01	2000PNG17801	36902	2001	1	11	11	140	4	0.21
Jun-01	2001PNG17027	37053	2001	6	11	162	5180	1340	0.53
Aug-01	2001PNG17174	37126	2001	8	23	235	720	28	0.26
Jun-03	2003PN010037	37783	2003	6	11	162	1530	229	0.53
Sep-03	2003PN010143	37876	2003	9	12	255	998	23	0.15
Jan-04	2003PN010176	37998	2004	1	12	12	131	4	0.28
Jun-04	2004PN010039	38148	2004	6	10	162	1910	187	0.14
Aug-04	2004PN010130	38211	2004	8	12	225	499	275	0.91
Feb-05	2004PN010234	38406	2005	2	23	54	95	2	0.13
Apr-05	2005PN010004	38462	2005	4	20	110	135	1	0.20
Jun-05	2005PN010047	38513	2005	6	10	161	3520	942	2.01
Sep-05	2005PN010163	38604	2005	9	9	252	518	29	0.24
Aug-05	2005PN010164	38587	2005	8	23	235	514	1	0.07
Jun-06	2006PN010048	38887	2006	6	19	170	2040	244	0.43
Aug-06	2006PN010102	38946	2006	8	17	229	1300	280	1.13
Feb-07	2006PN010148	39118	2007	2	5	36			0.28
Jul-07	2007PN010050	39266	2007	7	3	184	1120	398	1.12
Sep-07	2007PN010097	39344	2007	9	19	262	547	6	0.18

Table C8:Total Nitrogen at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample Date	Sample No.	Serial Date	Year	Month	Day	Julian Day	Flow	TURBIDITY	Total Nitrogen
							m3/s	NTU	mg/L
Feb-08	2007PN330057	39505	2008	2	27	58	108	20	0.54
Jun-08	2008PN010016	39603	2008	6	4	156	1300	178	0.58
Aug-08	2008PN010121	39687	2008	8	27	240	1630	370	1.14
Feb-09	2008PN010152	39861	2009	2	17	48	144	8	0.36
Apr-09	2009PN010007	39918	2009	4	15	105	68	2	0.42
Jun-09	2009PN010021	39968	2009	6	4	155	2170	223	0.95
Sep-09	2009PN010081	40085	2009	9	29	272	1110	61	0.39
Mar-10	2009PN010112	40238	2010	3	1	60	76	2	0.22
May-10	2010PN010016	40302	2010	5	4	124	2250	258	1.16
Jun-10	2010PN010028	40337	2010	6	8	159	1050	50	0.32
Sep-10	2010PN010138	40434	2010	9	13	256	949	89	0.50
Feb-11	2010PN010191	40589	2011	2	15	46		2	0.27
Jun-11	2011PN010048	40701	2011	6	7	158		134	0.82
Jul-11	2011PN010070	40751	2011	7	27	208		86	0.54
Sep-11	2011PN010084	40799	2011	9	13	256		64	0.38
Station Number NW10MC0001; 67.13.14.016N, 134.56.44.016W									

Table C9: Dissolved Organic Carbon (DOC) at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample Date	Sample No.	Serial	Year	Month	Day	Julian	Flow	TURBIDITY	DOC
							m3/s	NTU	MG/L
Jul-79	1993PN957044	29061	1979	7	25	206	1900	86	5.0
Oct-79	1989PN952185	29132	1979	10	4	277	759	39	3.0
Jan-80	1971PN950149	29243	1980	1	23	23	64	2	1.0
Jul-80	1989PN952728	29411	1980	7	9	191	957	124	3.0
Aug-80	1991PN954000	29445	1980	8	12	225	1030	34	4.0
Sep-80	1990PN950026	29480	1980	9	16	260	664	11	3.0
Oct-80	1986PN950323	29515	1980	10	21	295	238	3	2.0
Jul-81	1993PN957255	29775	1981	7	8	189	2600	9	5.5
Aug-81		29809	1981	8	11	223	1060	53	3.4
Sep-81	1986PN950416	29850	1981	9	21	264	701	12	2.0
Dec-81	1988PN950593	29927	1981	12	7	341	139	1	2.5
Jan-82	1971PN953965	29971	1982	1	20	20	80	1	1.1
Apr-82		30048	1982	4	7	97	59	1	1.1
May-82		30081	1982	5	10	130	69	4	1.5
Jun-82	1993PN957001	30131	1982	6	29	180	1440	83	4.8
Aug-82	1992PN950734	30172	1982	8	9	221	1050	46	4.1
Feb-83	1971PN956604	30363	1983	2	16	47	72	1	1.2
Mar-83	1991PN951417	30398	1983	3	23	82	69	1	3.6
May-83	1972PN950255	30440	1983	5	4	124	122	20	1.2
Jul-83	1983PN951452	30520	1983	7	23	204	830	23	1.8
Oct-83	1989PN950453	30593	1983	10	4	277	332	35	2.8
Jan-84	1969PN950133	30694	1984	1	13	13	51	2	0.8
Mar-84	1960PN950007	30746	1984	3	5	65	47	1	0.3
Aug-84	1994PN957294	30896	1984	8	2	215	1810	125	6.3
Sep-84	1990PN950120	30951	1984	9	26	270	620	6	3.2
Nov-84	1983PN951557	31003	1984	11	17	322	119	2	1.8
Dec-84	1970PN952342	31035	1984	12	19	354	102	2	0.9
Mar-85	1960PN953223	31132	1985	3	26	85	76	1	0.6
Apr-85	1960PN953113	31167	1985	4	30	120	66	1	0.5
Jul-85	1984PN951682	31231	1985	7	3	184	1270	34	1.9
Aug-85	1986PN951300	31265	1985	8	6	218	864	22	2.2
Nov-85	1982PN950225	31370	1985	11	19	323	122	2	1.7
Jan-86	1971PN954697	31420	1986	1	8	8	78	1	1.1
Jun-86	1994PN957310	31578	1986	6	15	166	1430	119	6.4
Jul-86	1987PN950014	31601	1986	7	8	189	824	59	2.2
Aug-86	1992PN951667	31639	1986	8	15	227	2480	1210	4.5
Oct-86	1988PN950834	31688	1986	10	3	276	408	14	2.6
Dec-86	1973PN950625	31756	1986	12	10	344	123	3	1.4
Jan-88	1973PN950988	32146	1988	1	4	4	97	1	1.4
Apr-88	1971PN950148	32254	1988	4	21	112	85	3	1.0
May-88	1995PN957549	32278	1988	5	15	136	1820	556	8.1
May-88	1996PN957841	32280	1988	5	17	138	2080	288	10.3
May-88	1996PN667679	32282	1988	5	19	140	2190	168	8.9
May-88	1997PN667963	32287	1988	5	24	145	4330	504	13.7
May-88	1996PN667722	32294	1988	5	31	152	3780	464	9.4
Jun-88	1996PN667680	32297	1988	6	3	155	2980	220	8.9
Jun-88	1993PN957249	32302	1988	6	8	160	2560	484	5.4
Jun-88	1987PN950976	32311	1988	6	17	169	1640	79	2.3
Aug-88	1992PN951247	32372	1988	8	17	230	932	27	4.3

Table C9: Dissolved Organic Carbon (DOC) at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample Date	Sample No.	Serial	Year	Month	Day	Julian	Flow	TURBIDITY	DOC
							m3/s	NTU	MG/L
Sep-88	1995PN957442	32395	1988	9	9	253	1870	1060	7.7
Oct-88	1990PN951423	32429	1988	10	13	287	345	10	3.4
Jan-89	1972PN950686	32514	1989	1	6	6	131	3	1.3
Apr-89		32624	1989	4	26	116	113	3	1.1
May-89	1996PN667762	32647	1989	5	19	139	1510	118	9.5
Jun-89		32663	1989	6	4	155	2350	370	6.7
Jul-89	1991PN950259	32708	1989	7	19	200	685	137	3.5
Jul-89	1991PN953247	32709	1989	7	20	201	656	79	3.7
Oct-89	1992PN950535	32784	1989	10	3	276	527	23	4.0
Jan-90	1980PN952452	32889	1990	1	16	16	113	2	1.4
Apr-90	1973PN950322	32968	1990	4	5	95	98	1	1.3
Apr-90	1971PN950143	32988	1990	4	25	115	103	3	1.1
Jun-90	1992PN951970	33030	1990	6	6	157	2700	342	4.6
Aug-90	1994PN957345	33108	1990	8	23	235	1880	580	6.7
Oct-90	1985PN951035	33158	1990	10	12	285	606	10	2.0
Apr-91	1980PN953554	33332	1991	4	4	94	108	2	1.5
May-91	1995PN957634	33382	1991	5	24	144	2290	214	8.6
Jul-91	1987PN950581	33429	1991	7	10	191	852	119	2.3
Oct-91	1993PN957071	33527	1991	10	16	289	300	7	5.1
Nov-91	1988PN950746	33555	1991	11	13	317	127	2	2.5
Jan-92	1981PN954271	33612	1992	1	9	9	117	2	1.6
Mar-92	1981PN950173	33681	1992	3	18	78	98	1	1.5
Apr-92	1972PN950256	33710	1992	4	16	107	92	1	1.2
May-92	1985PN950590	33744	1992	5	20	141	131	76	1.9
Jun-92	1992PN951248	33772	1992	6	17	169	3380	750	4.4
Jul-92	1988PN952731	33809	1992	7	24	206	752	169	2.7
Aug-92	1985PN950918	33830	1992	8	14	227	657	67	1.9
Sep-92	1983PN951241	33865	1992	9	18	262	437	10	1.7
Oct-92	1981PN953217	33905	1992	10	28	302	152	3	1.6
Nov-92	1981PN950412	33932	1992	11	24	329	117	2	1.5
Jan-93	1980PN952998	33976	1993	1	7	7	81	2	1.5
Feb-93	1979PN951864	34023	1993	2	23	54	75	1	1.4
Mar-93	1981PN952329	34059	1993	3	31	90	88	1	1.6
Apr-93	1996PN667827	34079	1993	4	20	110	97	1	9.9
Jun-93	1992PN950405	34130	1993	6	10	161	3450	800	4.0
Jun-93	1985PN950467	34150	1993	6	30	181	1070	130	1.8
Aug-93	1988PN950335	34205	1993	8	24	236	512	48	2.4
Sep-93	1989PN950276	34240	1993	9	28	271	614	13	2.7
Oct-93	1988PN950594	34268	1993	10	26	299	218	3	2.5
Dec-93	1987PN951561	34305	1993	12	2	336	130	1	2.4
Dec-93	1988PN953100	34324	1993	12	21	355	122	2	2.7
Feb-94	1987PN951912	34390	1994	2	25	56	75	1	2.4
Mar-94	1982PN950653	34417	1994	3	24	83	64	1	1.7
Apr-94	1982PN951109	34451	1994	4	27	117	75	1	1.7
May-94	1993PN957291	34485	1994	5	31	151	1460	164	5.5
Jun-94	1995PN957568	34513	1994	6	28	179	2990	383	8.4
Aug-94		34571	1994	8	25	237	913	100	4.4
Oct-94	1993PN957008	34631	1994	10	24	297	236	4	4.8
Nov-94	1987PN952332	34662	1994	11	24	328	143	2	2.4

Table C9: Dissolved Organic Carbon (DOC) at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample Date	Sample No.	Serial	Year	Month	Day	Julian	Flow	TURBIDITY	DOC
							m3/s	NTU	MG/L
Dec-94	1979PN954356	34688	1994	12	20	354	121	1	1.5
Jan-95	1980PN951748	34724	1995	1	25	25	94	2	1.4
Feb-95	1973PN950117	34757	1995	2	27	58	82	2	1.3
Mar-95	1972PN950257	34780	1995	3	22	81	78	1	1.2
Apr-95	1973PN950169	34815	1995	4	26	116	112	1	1.3
May-95	1997PN667856	34848	1995	5	29	149	1550	156	10.5
Jun-95	1994PN957244	34876	1995	6	26	177	1560	713	6.0
Jul-95	1990PN950118	34904	1995	7	24	205	2120	14	3.1
Aug-95	1990PN950610	34940	1995	8	29	241	857	40	3.4
Sep-95	1993PN957321	34967	1995	9	25	268	868	34	5.5
Oct-95	1991PN953641	34996	1995	10	24	297	304	4	3.9
Nov-95	1988PN950595	35027	1995	11	24	328	165	3	2.5
Jan-96	1983PN951741	35081	1996	1	17	17	92	2	1.8
Mar-96	1971PN952426	35152	1996	3	28	87	82	2	1.0
May-96	1995PN957603	35214	1996	5	29	150	4470	683	8.4
Jun-96	1993PN957185	35241	1996	6	25	177	1200	113	5.4
Aug-96	1993PN957113	35304	1996	8	27	240	1460	264	5.2
Oct-96	1994PN957323	35353	1996	10	15	289	303	4	6.7
Jan-97	1982PN952631	35443	1997	1	13	13	95	2	1.7
Apr-97	1984PN950870	35535	1997	4	15	105	70	2	1.8
Aug-97	1993PN957068	35653	1997	8	11	223	1290	196	5.0
Oct-97	1991PN953466	35712	1997	10	9	282	536	17	3.8
Mar-98	1984PN951321	35865	1998	3	11	70	88	1	1.8
Oct-98	1989PN950606	36076	1998	10	8	281	466	10	2.9
Jun-00	1992PN951739	36691	2000	6	14	166	3260	548	4.7
Aug-00	1995PN957585	36761	2000	8	23	236	1520	54	8.4
Jan-01	1991PN952278	36902	2001	1	11	11	140	4	3.6
Jun-01	1994PN957050	37053	2001	6	11	162	5180	1340	5.6
Aug-01	1983PN950327	37126	2001	8	23	235	720	28	1.7
Jun-03	1990PN952347	37783	2003	6	11	162	1530	229	3.5
Sep-03	1996PN667678	37876	2003	9	12	255	998	23	8.6
Jan-04	1997PN667921	37998	2004	1	12	12	131	4	11.8
Jun-04	1997PN667986	38148	2004	6	10	162	1910	187	15.6
Aug-04	1998PN667175	38211	2004	8	12	225	499	275	24.6
Feb-05	1960PN953350	38406	2005	2	23	54	95	2	0.6
Apr-05	1960PN953664	38462	2005	4	20	110	135	1	0.7
Jun-05	1995PN957481	38513	2005	6	10	161	3520	942	7.8
Aug-05	1969PN952582	38587	2005	8	23	235	514	1	0.8
Sep-05	1989PN951431	38604	2005	9	9	252	518	29	2.7
Jun-06	1986PN950593	38887	2006	6	19	170	2040	244	2.0
Aug-06	1994PN957354	38946	2006	8	17	229	1300	280	6.9
Feb-07	1998PN667107	39118	2007	2	5	36	146	2	13.5
Jul-07	1995PN957440	39266	2007	7	3	184	1120	398	7.3
Sep-07	1984PN951559	39344	2007	9	19	262	547	6	1.8
Feb-08		39505	2008	2	27	58	108	20	5.1
Jun-08	1995PN957518	39603	2008	6	4	156	1300	178	8.0
Aug-08	1993PN957198	39687	2008	8	27	240	1630	370	5.5
Feb-09	1972PN950304	39861	2009	2	17	48	144	8	1.2
Apr-09	1986PN951138	39918	2009	4	15	105	68	2	2.1

Table C9: Dissolved Organic Carbon (DOC) at Peel River Above Fort McPherson (Site O) in the Peel River

Sample Date	Sample No.	Serial	Year	Month	Day	Julian	Flow	TURBIDITY	DOC
							m3/s	NTU	MG/L
Jun-09	1994PN957311	39968	2009	6	4	155	2170	223	6.6
Sep-09	1994PN957132	40085	2009	9	29	272	1110	61	5.7
Mar-10	1986PN950818	40238	2010	3	1	60	76	2	1.2
May-10	1998PN667105	40302	2010	5	4	124	2250	258	16.0
Jun-10	1988PN950741	40337	2010	6	8	159	1050	50	2.5
Sep-10	1992PN951878	40434	2010	9	13	256	949	89	4.5
Station Number NW10MC0001; 67.13.14.016N, 134.56.44.016W									

Table C10: Total Phosphorus at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample No.	**Sample Date**	**Serial**	**Year**	**Month**	**Day**	**Julian**	**Flow**	**TURBIDITY**	**TOTAL P**
							m3/s	**NTU**	**MG/L**
1979PN951864	Jul-79	29061	1979	7	25	206	1900	86	0.15
1979PN952846	Oct-79	29132	1979	10	4	277	759	39	0.076
1979PN954356	Jan-80	29243	1980	1	23	23	64	2	0.008
1980PN951748	Jul-80	29411	1980	7	9	191	957	124	0.15
1980PN952452	Aug-80	29445	1980	8	12	225	1030	34	0.098
1980PN952998	Sep-80	29480	1980	9	16	260	664	11	0.022
1980PN953554	Oct-80	29515	1980	10	21	295	238	3	0.011
1981PN950173	Mar-81	29671	1981	3	26	85	62	1	0.005
1981PN950412	Apr-81	29698	1981	4	22	112	58	1	0.012
1981PN952329	Aug-81	29809	1981	8	11	223	1060	53	0.092
1981PN953217	Sep-81	29850	1981	9	21	264	701	12	0.38
1981PN954271	Dec-81	29927	1981	12	7	341	139	1	0.008
1981PN954588	Jan-82	29971	1982	1	20	20	80	1	0.006
1982PN950225	Apr-82	30048	1982	4	7	97	59	1	0.006
1982PN950653	May-82	30081	1982	5	10	130	69	4	0.020
1982PN951109	Jun-82	30131	1982	6	29	180	1440	83	0.17
1982PN951454	Aug-82	30172	1982	8	9	221	1050	46	0.10
1982PN952631	Feb-83	30363	1983	2	16	47	72	1	0.008
1983PN950140	Mar-83	30398	1983	3	23	82	69	1	0.007
1983PN950327	May-83	30440	1983	5	4	124	122	20	0.032
1983PN950809	Jul-83	30520	1983	7	23	204	830	23	0.039
1983PN951241	Oct-83	30593	1983	10	4	277	332	35	0.072
1983PN951452	Nov-83	30638	1983	11	18	322	111	2	0.005
1983PN951557	Jan-84	30694	1984	1	13	13	51	2	0.018
1983PN951741	Mar-84	30746	1984	3	5	65	47	1	0.005
1984PN950870	Aug-84	30896	1984	8	2	215	1810	125	0.39
1984PN951321	Sep-84	30951	1984	9	26	270	620	6	0.042
1984PN951559	Nov-84	31003	1984	11	17	322	119	2	0.017
1984PN951682	Dec-84	31035	1984	12	19	354	102	2	0.003
1985PN950040	Mar-85	31132	1985	3	26	85	76	1	0.017
1985PN950127	Apr-85	31167	1985	4	30	120	66	1	0.020
1985PN950467	Jul-85	31231	1985	7	3	184	1270	34	0.085
1985PN950590	Aug-85	31265	1985	8	6	218	864	22	0.049
1985PN950918	Nov-85	31370	1985	11	19	323	122	2	0.023
1985PN951035	Jan-86	31420	1986	1	8	8	78	1	0.003
1986PN950323	Jun-86	31578	1986	6	15	166	1430	119	0.18
1986PN951138	Dec-86	31756	1986	12	10	344	123	3	0.025
1987PN952332	Jan-88	32146	1988	1	4	4	97	1	0.008
1988PN950335	Apr-88	32254	1988	4	21	112	85	3	0.021
1988PN950593	May-88	32278	1988	5	15	136	1820	556	0.81
1988PN950594	May-88	32280	1988	5	17	138	2080	288	0.50
1988PN950595	May-88	32282	1988	5	19	140	2190	168	0.40
1988PN950604	May-88	32287	1988	5	24	145	4330	504	0.90
1988PN950741	May-88	32294	1988	5	31	152	3780	464	0.77
1988PN950746	Jun-88	32297	1988	6	3	155	2980	220	0.33
1988PN950834	Jun-88	32302	1988	6	8	160	2560	484	0.92
1988PN951093	Jun-88	32311	1988	6	17	169	1640	79	0.12
1988PN951937	Aug-88	32372	1988	8	17	230	932	27	0.055
1988PN952145	Sep-88	32395	1988	9	9	253	1870	1060	1.07

Table C10: Total Phosphorus at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample No.	Sample Date	Serial	Year	Month	Day	Julian	Flow	TURBIDITY	TOTAL P
							m3/s	NTU	MG/L
1988PN952731	Oct-88	32429	1988	10	13	287	345	10	0.028
1988PN953100	Jan-89	32514	1989	1	6	6	131	3	0.013
1989PN950276	Apr-89	32624	1989	4	26	116	113	3	0.008
1989PN950453	May-89	32647	1989	5	19	139	1510	118	0.12
1989PN950606	Jun-89	32663	1989	6	4	155	2350	370	0.80
1989PN951431	Jul-89	32708	1989	7	19	200	685	137	0.19
1989PN951432	Jul-89	32709	1989	7	20	201	656	79	0.11
1989PN952185	Oct-89	32784	1989	10	3	276	527	23	0.028
1989PN952728	Jan-90	32889	1990	1	16	16	113	2	0.005
1990PN950026	Apr-90	32968	1990	4	5	95	98	1	0.002
1990PN950120	Apr-90	32988	1990	4	25	115	103	3	0.008
1990PN950610	Jun-90	33030	1990	6	6	157	2700	342	0.39
1990PN951423	Aug-90	33108	1990	8	23	235	1880	580	0.52
1990PN951763	Oct-90	33158	1990	10	12	285	606	10	0.031
1991PN950259	Apr-91	33332	1991	4	4	94	108	2	0.007
1991PN951417	May-91	33382	1991	5	24	144	2290	214	0.21
1991PN952278	Jul-91	33429	1991	7	10	191	852	119	0.14
1991PN953247	Oct-91	33527	1991	10	16	289	300	7	0.008
1991PN953466	Nov-91	33555	1991	11	13	317	127	2	0.003
1991PN953641	Jan-92	33612	1992	1	9	9	117	2	0.012
1991PN954000	Mar-92	33681	1992	3	18	78	98	1	0.008
1992PN950172	Apr-92	33710	1992	4	16	107	92	1	0.002
1992PN950535	Jun-92	33772	1992	6	17	169	3380	750	1.04
1992PN950734	Jul-92	33809	1992	7	24	206	752	169	0.20
1992PN950970	Aug-92	33830	1992	8	14	227	657	67	0.082
1992PN951249	Sep-92	33865	1992	9	18	262	437	10	0.020
1992PN951667	Oct-92	33905	1992	10	28	302	152	3	0.010
1992PN951739	Nov-92	33932	1992	11	24	329	117	2	0.006
1992PN951878	Jan-93	33976	1993	1	7	7	81	2	0.002
1992PN952106	Feb-93	34023	1993	2	23	54	75	1	0.002
1993PN957001	Mar-93	34059	1993	3	31	90	88	1	0.003
1993PN957008	Apr-93	34079	1993	4	20	110	97	1	0.005
1993PN957044	Jun-93	34130	1993	6	10	161	3450	800	0.83
1993PN957071	Jun-93	34150	1993	6	30	181	1070	130	0.16
1993PN957113	Aug-93	34205	1993	8	24	236	512	48	0.052
1993PN957185	Sep-93	34240	1993	9	28	271	614	13	0.036
1993PN957198	Oct-93	34268	1993	10	26	299	218	3	0.039
1993PN957249	Dec-93	34305	1993	12	2	336	130	1	0.004
1993PN957255	Dec-93	34324	1993	12	21	355	122	2	0.010
1993PN957291	Jan-94	34359	1994	1	25	25	98	2	0.008
1993PN957321	Feb-94	34390	1994	2	25	56	75	1	0.003
1993PN957342	Mar-94	34417	1994	3	24	83	64	1	0.004
1994PN957050	Apr-94	34451	1994	4	27	117	75	1	0.004
1994PN957081	May-94	34485	1994	5	31	151	1460	164	0.15
1994PN957132	Jun-94	34513	1994	6	28	179	2990	383	1.36
1994PN957167	Aug-94	34571	1994	8	25	237	913	100	0.13
1994PN957244	Sep-94	34599	1994	9	22	265	600	29	0.024
1994PN957271	Oct-94	34631	1994	10	24	297	236	4	0.015
1994PN957294	Nov-94	34662	1994	11	24	328	143	2	0.006

Table C10: Total Phosphorus at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample No.	Sample Date	Serial	Year	Month	Day	Julian	Flow	TURBIDITY	TOTAL P
							m3/s	NTU	MG/L
1994PN957311	Dec-94	34688	1994	12	20	354	121	1	0.011
1994PN957323	Jan-95	34724	1995	1	25	25	94	2	0.009
1994PN957345	Feb-95	34757	1995	2	27	58	82	2	0.004
1994PN957354	Mar-95	34780	1995	3	22	81	78	1	0.010
1995PN957372	Apr-95	34815	1995	4	26	116	112	1	0.011
1995PN957398	May-95	34848	1995	5	29	149	1550	156	0.44
1995PN957442	Jun-95	34876	1995	6	26	177	1560	713	0.26
1995PN957518	Aug-95	34940	1995	8	29	241	857	40	0.059
1995PN957549	Sep-95	34967	1995	9	25	268	868	34	0.077
1995PN957568	Oct-95	34996	1995	10	24	297	304	4	0.010
1995PN957585	Nov-95	35027	1995	11	24	328	165	3	0.009
1995PN957603	Jan-96	35081	1996	1	17	17	92	2	0.20
1995PN957634	Mar-96	35152	1996	3	28	87	82	2	0.007
1996PN667680	May-96	35214	1996	5	29	150	4470	683	0.87
1996PN667722	Jun-96	35241	1996	6	25	177	1200	113	0.20
1996PN667762	Aug-96	35304	1996	8	27	240	1460	264	0.40
1996PN667827	Oct-96	35353	1996	10	15	289	303	4	0.010
1996PN957841	Jan-97	35443	1997	1	13	13	95	2	0.007
1997PN667856	Apr-97	35535	1997	4	15	105	70	2	0.013
1997PN667921	Aug-97	35653	1997	8	11	223	1290	196	0.34
1997PN667963	Oct-97	35712	1997	10	9	282	536	17	0.042
1997PN667986	Mar-98	35865	1998	3	11	70	88	1	0.012
1998PN667107	Aug-98	36018	1998	8	11	223	543	38	0.086
1998PN667175	Oct-98	36076	1998	10	8	281	466	10	0.023
1998PN667217	Jan-99	36178	1999	1	18	18	101	5	0.010
1999PN017282	Jun-99	36313	1999	6	2	153	1500	320	0.57
1999PN017436	Aug-99	36395	1999	8	23	235	978	197	0.49
1999PN247538	Oct-99	36461	1999	10	28	301	354	21	0.048
1999PN237547	Jan-00	36535	2000	1	10	10	104	2	0.061
1999PN237586	Mar-00	36615	2000	3	30	90	79	4	0.022
2000PNF17624	Jun-00	36691	2000	6	14	166	3260	548	1.25
2000PNF17750	Aug-00	36761	2000	8	23	236	1520	54	0.093
2000PNG17801	Jan-01	36902	2001	1	11	11	140	4	0.022
2001PNG17027	Jun-01	37053	2001	6	11	162	5180	1340	1.14
2001PNG17174	Aug-01	37126	2001	8	23	235	720	28	0.067
2003PN010037	Jun-03	37783	2003	6	11	162	1530	229	0.56
2003PN010143	Sep-03	37876	2003	9	12	255	998	23	0.058
2003PN010176	Jan-04	37998	2004	1	12	12	131	4	0.010
2004PN010039	Jun-04	38148	2004	6	10	162	1910	187	0.31
2004PN010130	Aug-04	38211	2004	8	12	225	499	275	0.68
2005PN010004	Apr-05	38462	2005	4	20	110	135	1	0.010
2005PN010047	Jun-05	38513	2005	6	10	161	3520	942	1.88
2005PN010163	Sep-05	38604	2005	9	9	252	518	29	0.070
2006PN010048	Jun-06	38887	2006	6	19	170	2040	244	0.39
2006PN010102	Aug-06	38946	2006	8	17	229	1300	280	0.33
2006PN010148	Feb-07	39118	2007	2	5	36	146	2	0.010
2007PN010050	Jul-07	39266	2007	7	3	184	1120	398	0.59
2007PN010097	Sep-07	39344	2007	9	19	262	547	6	0.10
2008PN010016	Jun-08	39603	2008	6	4	156	1300	178	0.32

Table C10: Total Phosphorus at Peel River Above Fort McPherson (Site O) in the Peel River									
Sample No.	**Sample Date**	**Serial**	**Year**	**Month**	**Day**	**Julian**	**Flow**	**TURBIDITY**	**TOTAL P**
							m3/s	**NTU**	**MG/L**
2008PN010121	Aug-08	39687	2008	8	27	240	1630	370	0.49
2008PN010152	Feb-09	39861	2009	2	17	48	144	8	0.020
2009PN010007	Apr-09	39918	2009	4	15	105	68	2	0.010
2009PN010021	Jun-09	39968	2009	6	4	155	2170	223	0.28
2009PN010081	Sep-09	40085	2009	9	29	272	1110	61	0.060
2009PN010112	Mar-10	40238	2010	3	1	60	76	2	0.013
2010PN010016	May-10	40302	2010	5	4	124	2250	258	0.38
2010PN010028	Jun-10	40337	2010	6	8	159	1050	50	0.070
2010PN010138	Sep-10	40434	2010	9	13	256	949	89	0.11
Station Number NW10MC0001; 67.13.14.016N, 134.56.44.016W									

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)							
PCODE	**ANALYTE**	**UNIT**	**RESULTS**				
			7/29/2002	**6/26/2003**	**8/26/2004**	**6/16/2005**	**8/16/2006**
EPA PAHs	Acenaphthene	ug/L	<0.00001	<0.005	<0.005	**0.007**	<0.00001
EPA PAHs	Acenaphthylene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Anthracene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Benzo(a)anthracene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Benzo(a)pyrene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Benzo(b)fluoranthene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Benzo(g,h,i)perylene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Benzo(k)fluoranthene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Chrysene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Dibenzo(a,h)anthracene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Fluoranthene	ug/L	<0.00001	<0.005	<0.005	**0.007**	<0.00001
EPA PAHs	Fluorene	ug/L	<0.00001	<0.005	<0.005	**0.009**	<0.00001
EPA PAHs	Indeno(1,2,3-cd)pyrene	ug/L	<0.00001	<0.005	<0.005	<0.005	<0.00001
EPA PAHs	Methyl naphthalenes	ug/L	<0.00001	<0.005	**0.02**	**0.026**	**0.00001**
EPA PAHs	Naphthalene	ug/L	<0.00001	<0.005	**0.017**	**0.036**	<0.00001
EPA PAHs	Phenanthrene	ug/L	<0.00001	<0.005	<0.005	**0.023**	**0.00001**
EPA PAHs	Pyrene	ug/L	<0.00001	<0.005	<0.005	**0.006**	<0.00001
Herb Screen GC/MS	2,4,5-T	mg/L		<0.0001	<0.000005	<0.00001	<0.0001
Herb Screen GC/MS	2,4,5-TP	mg/L		<0.0001			
Herb Screen GC/MS	2,4-D	mg/L	<0.0001	<0.0001	<0.000005	<0.00001	<0.0001
Herb Screen GC/MS	Bromoxynil	mg/L	<0.0001	<0.0001		<0.00001	<0.0001
Herb Screen GC/MS	Clopyralid	mg/L		<0.0001		<0.00001	<0.0001
Herb Screen GC/MS	Dicamba	mg/L	<0.0001	<0.0001		<0.00001	<0.0001
Herb Screen GC/MS	Diclofop-methyl	mg/L	<0.0001	<0.0001		<0.00001	<0.0001
Herb Screen GC/MS	Fluazifop-p-butyl	mg/L				<0.00001	<0.0001
Herb Screen GC/MS	MCPA	mg/L	<0.0001	<0.0001	<0.000005	<0.00001	<0.0001
Herb Screen GC/MS	Mecoprop	mg/L	<0.0001	<0.0001		<0.00001	<0.0001
Herb Screen GC/MS	Picloram	mg/L	<0.0001	<0.0001		<0.00001	<0.0001
Herb Screen GC/MS	Triallate	mg/L	<0.0001	<0.0001		<0.00001	<0.0001
Herb Screen GC/MS	Triclopyr	mg/L				<0.00001	<0.0001
Herb Screen GC/MS	Trifluralin	mg/L	<0.0001	<0.0001		<0.00001	<0.0001
OC Screen GC/ECD	Aldrin	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	alpha-BHC	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	beta-BHC	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	cis-Chlordane	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Dieldrin	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Endosulfan I	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Endosulfan II	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Endrin	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	gamma-BHC (Lindane)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Heptachlor	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Hexachlorobenzene	mg/L		<0.0001			
OC Screen GC/ECD	Methoxychlor	mg/L	<0.0002	<0.0002	<0.0001	<0.0002	<0.0002
OC Screen GC/ECD	Mirex	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Nonachlor	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Oxychlordane	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	p,p'-DDD	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	p,p'-DDE	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)

PCODE	ANALYTE	UNIT	RESULTS				
			7/29/2002	6/26/2003	8/26/2004	6/16/2005	8/16/2006
OC Screen GC/ECD	p,p'-DDT	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Quintozine (PCNB)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
OC Screen GC/ECD	Toxaphene	mg/L		<0.001			
OC Screen GC/ECD	trans-Chlordane	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
PCBs	All Aroclors	mg/L	<0.00005				
PCBs	Aroclor 1016	mg/L			<0.00005	<0.00005	<0.00001
PCBs	Aroclor 1221	mg/L			<0.00005	<0.00005	<0.00001
PCBs	Aroclor 1232	mg/L			<0.00005	<0.00005	<0.00001
PCBs	Aroclor 1242	mg/L			<0.00005	<0.00005	<0.00001
PCBs	Aroclor 1248	mg/L			<0.00005	<0.00005	<0.00001
PCBs	Aroclor 1254	mg/L			<0.00005	<0.00005	<0.00001
PCBs	Aroclor 1260	mg/L			<0.00005	<0.00005	<0.00001
PCBs	Aroclor 1262	mg/L			<0.00005	<0.00005	<0.00001
PCBs	Aroclor 1268	mg/L			<0.00005	<0.00005	<0.00001
PCBs	Total PCBs	mg/L		<0.00005	<0.00005	<0.00005	<0.00005
EPA PAHs	2-Fluorobiphenyl	%			39	64	64
EPA PAHs	Nitrobenzene d5	%			45	62	72
EPA PAHs	p-Terphenyl d14	%			82	50	107
Herb Screen GC/MS	2,4-D d5	%			50	41	94
Herb Screen GC/MS	Treflan d14	%			94	74	108
PCBs	Decachlorobiphenyl	%			93	78	86

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)

DATE	PCODE	ANALYTE	RESULT	UNIT
6/20/2007	EPA PAHs	2-Fluorobiphenyl	56	%
6/20/2007	EPA PAHs	2-Fluorobiphenyl	64	%
6/20/2007	EPA PAHs	2-Fluorobiphenyl	67	%
6/20/2007	EPA PAHs	2-Fluorobiphenyl	74	%
6/20/2007	EPA PAHs	Nitrobenzene d5	54	%
6/20/2007	EPA PAHs	Nitrobenzene d5	68	%
6/20/2007	EPA PAHs	Nitrobenzene d5	73	%
6/20/2007	EPA PAHs	Nitrobenzene d5	83	%
6/20/2007	EPA PAHs	p-Terphenyl d14	61	%
6/20/2007	EPA PAHs	p-Terphenyl d14	71	%
6/20/2007	EPA PAHs	p-Terphenyl d14	73	%
6/20/2007	EPA PAHs	p-Terphenyl d14	76	%
6/20/2007	Herb Screen GC/MS	2,4-D d5	49	%
6/20/2007	Herb Screen GC/MS	Treflan d14	52	%
6/20/2007	PAHs & Alkylated PAHs	2-Fluorobiphenyl	50	%
6/20/2007	PAHs & Alkylated PAHs	2-Fluorobiphenyl	53	%
6/20/2007	PAHs & Alkylated PAHs	2-Fluorobiphenyl	57	%
6/20/2007	PAHs & Alkylated PAHs	2-Fluorobiphenyl	63	%
6/20/2007	PAHs & Alkylated PAHs	Nitrobenzene d5	47	%
6/20/2007	PAHs & Alkylated PAHs	Nitrobenzene d5	56	%
6/20/2007	PAHs & Alkylated PAHs	Nitrobenzene d5	60	%
6/20/2007	PAHs & Alkylated PAHs	Nitrobenzene d5	68	%
6/20/2007	PAHs & Alkylated PAHs	p-Terphenyl d14	71	%
6/20/2007	PAHs & Alkylated PAHs	p-Terphenyl d14	81	%
6/20/2007	PAHs & Alkylated PAHs	p-Terphenyl d14	85	%
6/20/2007	PAHs & Alkylated PAHs	p-Terphenyl d14	86	%
6/20/2007	PCBs	Decachlorobiphenyl	71	%
6/20/2007	EPA PAHs	Acenaphthene	<0.003	ug/L
6/20/2007	EPA PAHs	Acenaphthene	<0.003	ug/L
6/20/2007	EPA PAHs	Acenaphthene	<0.003	ug/L
6/20/2007	EPA PAHs	Acenaphthene	<0.003	ug/L
6/20/2007	EPA PAHs	Acenaphthylene	<0.003	ug/L
6/20/2007	EPA PAHs	Acenaphthylene	<0.003	ug/L
6/20/2007	EPA PAHs	Acenaphthylene	<0.003	ug/L
6/20/2007	EPA PAHs	Acenaphthylene	<0.003	ug/L
6/20/2007	EPA PAHs	Anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(a)anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(a)anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(a)anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(a)anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(a)pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(a)pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(a)pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(a)pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(b)fluoranthene	<0.003	ug/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
6/20/2007	EPA PAHs	Benzo(b)fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(b)fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(b)fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(g,h,i)perylene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(g,h,i)perylene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(g,h,i)perylene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(g,h,i)perylene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(k)fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(k)fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(k)fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Benzo(k)fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Chrysene	<0.003	ug/L
6/20/2007	EPA PAHs	Chrysene	<0.003	ug/L
6/20/2007	EPA PAHs	Chrysene	<0.003	ug/L
6/20/2007	EPA PAHs	Chrysene	<0.003	ug/L
6/20/2007	EPA PAHs	Dibenzo(a,h)anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Dibenzo(a,h)anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Dibenzo(a,h)anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Dibenzo(a,h)anthracene	<0.003	ug/L
6/20/2007	EPA PAHs	Fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Fluoranthene	<0.003	ug/L
6/20/2007	EPA PAHs	Fluorene	<0.003	ug/L
6/20/2007	EPA PAHs	Fluorene	<0.003	ug/L
6/20/2007	EPA PAHs	Fluorene	<0.003	ug/L
6/20/2007	EPA PAHs	Fluorene	<0.003	ug/L
6/20/2007	EPA PAHs	Indeno(1,2,3-cd)pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Indeno(1,2,3-cd)pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Indeno(1,2,3-cd)pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Indeno(1,2,3-cd)pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Methyl naphthalenes	0.007	ug/L
6/20/2007	EPA PAHs	Methyl naphthalenes	0.009	ug/L
6/20/2007	EPA PAHs	Methyl naphthalenes	<0.003	ug/L
6/20/2007	EPA PAHs	Methyl naphthalenes	<0.003	ug/L
6/20/2007	EPA PAHs	Naphthalene	0.010	ug/L
6/20/2007	EPA PAHs	Naphthalene	0.013	ug/L
6/20/2007	EPA PAHs	Naphthalene	<0.003	ug/L
6/20/2007	EPA PAHs	Naphthalene	<0.003	ug/L
6/20/2007	EPA PAHs	Phenanthrene	<0.003	ug/L
6/20/2007	EPA PAHs	Phenanthrene	<0.003	ug/L
6/20/2007	EPA PAHs	Phenanthrene	<0.003	ug/L
6/20/2007	EPA PAHs	Phenanthrene	<0.003	ug/L
6/20/2007	EPA PAHs	Pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Pyrene	<0.003	ug/L
6/20/2007	EPA PAHs	Pyrene	<0.003	ug/L
6/20/2007	Herb Screen GC/MS	2,4,5-T	<0.002	ug/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	**PCODE**	**ANALYTE**	**RESULT**	**UNIT**
6/20/2007	Herb Screen GC/MS	2,4-D	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Bromoxynil	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Clopyralid	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Dicamba	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Diclofop-methyl	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Fluazifop-p-butyl	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	MCPA	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Mecoprop	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Picloram	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Triallate	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Triclopyr	<0.002	ug/L
6/20/2007	Herb Screen GC/MS	Trifluralin	<0.002	ug/L
6/20/2007	OC Screen GC/ECD	Aldrin	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	alpha-BHC	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	beta-BHC	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	cis-Chlordane	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	Dieldrin	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	Endosulfan I	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	Endosulfan II	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	Endrin	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	gamma-BHC (Lindane)	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	Heptachlor	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	Methoxychlor	<0.0002	mg/L
6/20/2007	OC Screen GC/ECD	Mirex	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	Nonachlor	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	Oxychlordane	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	p,p'-DDD	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	p,p'-DDE	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	p,p'-DDT	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	Quintozine (PCNB)	<0.0001	mg/L
6/20/2007	OC Screen GC/ECD	trans-Chlordane	<0.0001	mg/L
6/20/2007	PAHs & Alkylated PAHs	Acenaphthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Acenaphthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Acenaphthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Acenaphthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Acenaphthylene	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Acenaphthylene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Acenaphthylene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Acenaphthylene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(a)anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(a)anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(a)anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(a)anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(a)pyrene	<0.001	ug/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
6/20/2007	PAHs & Alkylated PAHs	Benzo(a)pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(a)pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(a)pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(b)fluoranthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(b)fluoranthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(b)fluoranthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(b)fluoranthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(ghi)perylene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(ghi)perylene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(ghi)perylene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(ghi)perylene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(k)fluoranthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(k)fluoranthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(k)fluoranthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Benzo(k)fluoranthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Biphenyl	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Biphenyl	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Biphenyl	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Biphenyl	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd B(a)A/chrysene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd B(a)A/chrysene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd B(a)A/chrysene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd B(a)A/chrysene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd B(b&k)F/B(a)P	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd B(b&k)F/B(a)P	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd B(b&k)F/B(a)P	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd B(b&k)F/B(a)P	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd biphenyl	0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd biphenyl	0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd biphenyl	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd biphenyl	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd fluorene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd fluorene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd fluorene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd fluorene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd naphthalene	0.007	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd naphthalene	0.008	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd naphthalene	0.011	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd naphthalene	0.012	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C2 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd dibenzothiophene	<0.004	ug/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd naphthalene	0.006	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd naphthalene	0.013	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd naphthalene	0.013	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd naphthalene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C3 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd naphthalene	0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd naphthalene	0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd naphthalene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd naphthalene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	C4 sub'd phenanthrene/anth.	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Chrysene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Chrysene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Chrysene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Chrysene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Dibenzo(a,h)anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Dibenzo(a,h)anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Dibenzo(a,h)anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Dibenzo(a,h)anthracene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Dibenzothiophene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Dibenzothiophene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Dibenzothiophene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Dibenzothiophene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Fluoranthene	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Fluoranthene	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Fluoranthene	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Fluoranthene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Fluorene	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Fluorene	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Fluorene	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Fluorene	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Indeno(c,d-123)pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Indeno(c,d-123)pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Indeno(c,d-123)pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Indeno(c,d-123)pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl acenaphthene	<0.004	ug/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
6/20/2007	PAHs & Alkylated PAHs	Methyl acenaphthene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl acenaphthene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl acenaphthene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl B(a)A/chrysene	0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl B(a)A/chrysene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl B(a)A/chrysene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl B(a)A/chrysene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl B(b&k)F/B(a)P	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl B(b&k)F/B(a)P	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl B(b&k)F/B(a)P	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl B(b&k)F/B(a)P	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl biphenyl	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl biphenyl	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl biphenyl	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl biphenyl	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl dibenzothiophene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl fluoranthene/pyrene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl fluoranthene/pyrene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl fluoranthene/pyrene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl fluoranthene/pyrene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl fluorene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl fluorene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl fluorene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl fluorene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl naphthalene	0.002	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl naphthalene	0.005	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl naphthalene	0.008	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl naphthalene	0.011	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl phenanthrene/anthracene	0.005	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl phenanthrene/anthracene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl phenanthrene/anthracene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Methyl phenanthrene/anthracene	<0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Naphthalene	0.004	ug/L
6/20/2007	PAHs & Alkylated PAHs	Naphthalene	0.005	ug/L
6/20/2007	PAHs & Alkylated PAHs	Naphthalene	0.012	ug/L
6/20/2007	PAHs & Alkylated PAHs	Naphthalene	0.014	ug/L
6/20/2007	PAHs & Alkylated PAHs	Phenanthrene	0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Phenanthrene	0.002	ug/L
6/20/2007	PAHs & Alkylated PAHs	Phenanthrene	0.002	ug/L
6/20/2007	PAHs & Alkylated PAHs	Phenanthrene	0.002	ug/L
6/20/2007	PAHs & Alkylated PAHs	Pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Pyrene	<0.001	ug/L
6/20/2007	PAHs & Alkylated PAHs	Pyrene	<0.001	ug/L
6/20/2007	PCBs	Aroclor 1016	<0.00001	mg/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
6/20/2007	PCBs	Aroclor 1221	<0.00001	mg/L
6/20/2007	PCBs	Aroclor 1232	<0.00001	mg/L
6/20/2007	PCBs	Aroclor 1242	<0.00001	mg/L
6/20/2007	PCBs	Aroclor 1248	<0.00001	mg/L
6/20/2007	PCBs	Aroclor 1254	<0.00001	mg/L
6/20/2007	PCBs	Aroclor 1260	<0.00001	mg/L
6/20/2007	PCBs	Aroclor 1262	<0.00001	mg/L
6/20/2007	PCBs	Aroclor 1268	<0.00001	mg/L
6/20/2007	PCBs	Total PCBs	<0.00005	mg/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
7/11/2007	EPA PAHs	2-Fluorobiphenyl	77	%
7/11/2007	EPA PAHs	Nitrobenzene d5	34	%
7/11/2007	EPA PAHs	p-Terphenyl d14	69	%
7/11/2007	Herb Screen GC/MS	2,4-D d5	85	%
7/11/2007	Herb Screen GC/MS	2,4-D d5	58	%
7/11/2007	Herb Screen GC/MS	2,4-D d5	58	%
7/11/2007	Herb Screen GC/MS	2,4-D d5	73	%
7/11/2007	Herb Screen GC/MS	Treflan d14	113	%
7/11/2007	Herb Screen GC/MS	Treflan d14	146	%
7/11/2007	Herb Screen GC/MS	Treflan d14	147	%
7/11/2007	Herb Screen GC/MS	Treflan d14	134	%
7/11/2007	PAHs & Alkylated PAHs	2-Fluorobiphenyl	73	%
7/11/2007	PAHs & Alkylated PAHs	Nitrobenzene d5	73	%
7/11/2007	PAHs & Alkylated PAHs	p-Terphenyl d14	69	%
7/11/2007	PCBs	Decachlorobiphenyl	80	%
7/11/2007	EPA PAHs	Acenaphthene	0.004	ug/L
7/11/2007	EPA PAHs	Acenaphthylene	<0.003	ug/L
7/11/2007	EPA PAHs	Anthracene	<0.003	ug/L
7/11/2007	EPA PAHs	Benzo(a)anthracene	0.011	ug/L
7/11/2007	EPA PAHs	Benzo(a)pyrene	0.003	ug/L
7/11/2007	EPA PAHs	Benzo(b)fluoranthene	0.010	ug/L
7/11/2007	EPA PAHs	Benzo(g,h,i)perylene	0.014	ug/L
7/11/2007	EPA PAHs	Benzo(k)fluoranthene	<0.003	ug/L
7/11/2007	EPA PAHs	Chrysene	0.007	ug/L
7/11/2007	EPA PAHs	Dibenzo(a,h)anthracene	<0.003	ug/L
7/11/2007	EPA PAHs	Fluoranthene	0.009	ug/L
7/11/2007	EPA PAHs	Fluorene	0.010	ug/L
7/11/2007	EPA PAHs	Indeno(1,2,3-cd)pyrene	<0.003	ug/L
7/11/2007	EPA PAHs	Methyl naphthalenes	0.15	ug/L
7/11/2007	EPA PAHs	Naphthalene	0.034	ug/L
7/11/2007	EPA PAHs	Phenanthrene	0.055	ug/L
7/11/2007	EPA PAHs	Pyrene	0.015	ug/L
7/11/2007	Herb Screen GC/MS	2,4,5-T	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	2,4,5-T	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	2,4,5-T	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	2,4,5-T	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	2,4-D	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	2,4-D	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	2,4-D	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	2,4-D	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	Bromoxynil	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Bromoxynil	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Bromoxynil	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Bromoxynil	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Clopyralid	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Clopyralid	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Clopyralid	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Clopyralid	<0.0001	mg/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
7/11/2007	Herb Screen GC/MS	Dicamba	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Dicamba	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Dicamba	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Dicamba	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Diclofop-methyl	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Diclofop-methyl	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Diclofop-methyl	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Diclofop-methyl	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Fluazifop-p-butyl	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Fluazifop-p-butyl	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Fluazifop-p-butyl	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Fluazifop-p-butyl	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	MCPA	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	MCPA	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	MCPA	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	MCPA	<0.000002	mg/L
7/11/2007	Herb Screen GC/MS	Mecoprop	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Mecoprop	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Mecoprop	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Mecoprop	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Picloram	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Picloram	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Picloram	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Picloram	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Triallate	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Triallate	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Triallate	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Triallate	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Triclopyr	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Triclopyr	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Triclopyr	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Triclopyr	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Trifluralin	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Trifluralin	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Trifluralin	<0.0001	mg/L
7/11/2007	Herb Screen GC/MS	Trifluralin	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	Aldrin	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	alpha-BHC	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	beta-BHC	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	cis-Chlordane	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	Dieldrin	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	Endosulfan I	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	Endosulfan II	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	Endrin	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	gamma-BHC (Lindane)	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	Heptachlor	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	Methoxychlor	<0.0002	mg/L
7/11/2007	OC Screen GC/ECD	Mirex	<0.0001	mg/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
7/11/2007	OC Screen GC/ECD	Nonachlor	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	Oxychlordane	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	p,p'-DDD	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	p,p'-DDE	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	p,p'-DDT	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	Quintozine (PCNB)	<0.0001	mg/L
7/11/2007	OC Screen GC/ECD	trans-Chlordane	<0.0001	mg/L
7/11/2007	PAHs & Alkylated PAHs	Acenaphthene	0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Acenaphthylene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Anthracene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Benzo(a)anthracene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Benzo(a)pyrene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Benzo(b)fluoranthene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Benzo(ghi)perylene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Benzo(k)fluoranthene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Biphenyl	0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	C2 sub'd B(a)A/chrysene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	C2 sub'd B(b&k)F/B(a)P	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	C2 sub'd biphenyl	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	C2 sub'd dibenzothiophene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	C2 sub'd fluorene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	C2 sub'd naphthalene	0.007	ug/L
7/11/2007	PAHs & Alkylated PAHs	C2 sub'd phenanthrene/anth.	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	C3 sub'd dibenzothiophene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	C3 sub'd naphthalene	0.013	ug/L
7/11/2007	PAHs & Alkylated PAHs	C3 sub'd phenanthrene/anth.	0.006	ug/L
7/11/2007	PAHs & Alkylated PAHs	C4 sub'd dibenzothiophene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	C4 sub'd naphthalene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	C4 sub'd phenanthrene/anth.	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	Chrysene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Dibenzo(a,h)anthracene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Dibenzothiophene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Fluoranthene	0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Fluorene	0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Indeno(c,d-123)pyrene	<0.001	ug/L
7/11/2007	PAHs & Alkylated PAHs	Methyl acenaphthene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	Methyl B(a)A/chrysene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	Methyl B(b&k)F/B(a)P	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	Methyl biphenyl	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	Methyl dibenzothiophene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	Methyl fluoranthene/pyrene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	Methyl fluorene	<0.004	ug/L
7/11/2007	PAHs & Alkylated PAHs	Methyl naphthalene	0.008	ug/L
7/11/2007	PAHs & Alkylated PAHs	Methyl phenanthrene/anthracene	0.007	ug/L
7/11/2007	PAHs & Alkylated PAHs	Naphthalene	0.006	ug/L
7/11/2007	PAHs & Alkylated PAHs	Phenanthrene	0.002	ug/L
7/11/2007	PAHs & Alkylated PAHs	Pyrene	0.001	ug/L
7/11/2007	PCBs	Aroclor 1016	<0.00001	mg/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)

DATE	PCODE	ANALYTE	RESULT	UNIT
7/11/2007	PCBs	Aroclor 1221	<0.00001	mg/L
7/11/2007	PCBs	Aroclor 1232	<0.00001	mg/L
7/11/2007	PCBs	Aroclor 1242	<0.00001	mg/L
7/11/2007	PCBs	Aroclor 1248	<0.00001	mg/L
7/11/2007	PCBs	Aroclor 1254	<0.00001	mg/L
7/11/2007	PCBs	Aroclor 1260	<0.00001	mg/L
7/11/2007	PCBs	Aroclor 1262	<0.00001	mg/L
7/11/2007	PCBs	Aroclor 1268	<0.00001	mg/L
7/11/2007	PCBs	Total PCBs	<0.00005	mg/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
8/22/2007	EPA PAHs	2-Fluorobiphenyl	63	%
8/22/2007	EPA PAHs	Nitrobenzene d5	56	%
8/22/2007	EPA PAHs	p-Terphenyl d14	105	%
8/22/2007	Herb Screen GC/MS	2,4-D d5	39	%
8/22/2007	Herb Screen GC/MS	Treflan d14	60	%
8/22/2007	PAHs & Alkylated PAHs	2-Fluorobiphenyl	63	%
8/22/2007	PAHs & Alkylated PAHs	Nitrobenzene d5	56	%
8/22/2007	PAHs & Alkylated PAHs	p-Terphenyl d14	105	%
8/22/2007	PCBs	Decachlorobiphenyl	95	%
8/22/2007	PCBs	Decachlorobiphenyl	94	%
8/22/2007	PCBs	Decachlorobiphenyl	92	%
8/22/2007	EPA PAHs	Acenaphthene	0.001	ug/L
8/22/2007	EPA PAHs	Acenaphthylene	<0.001	ug/L
8/22/2007	EPA PAHs	Anthracene	<0.001	ug/L
8/22/2007	EPA PAHs	Benzo(a)anthracene	<0.001	ug/L
8/22/2007	EPA PAHs	Benzo(a)pyrene	<0.001	ug/L
8/22/2007	EPA PAHs	Benzo(b)fluoranthene	<0.001	ug/L
8/22/2007	EPA PAHs	Benzo(g,h,i)perylene	<0.001	ug/L
8/22/2007	EPA PAHs	Benzo(k)fluoranthene	<0.001	ug/L
8/22/2007	EPA PAHs	Chrysene	<0.001	ug/L
8/22/2007	EPA PAHs	Dibenzo(a,h)anthracene	<0.001	ug/L
8/22/2007	EPA PAHs	Fluoranthene	0.001	ug/L
8/22/2007	EPA PAHs	Fluorene	0.001	ug/L
8/22/2007	EPA PAHs	Indeno(1,2,3-cd)pyrene	<0.001	ug/L
8/22/2007	EPA PAHs	Methyl naphthalenes	0.005	ug/L
8/22/2007	EPA PAHs	Naphthalene	0.003	ug/L
8/22/2007	EPA PAHs	Phenanthrene	0.003	ug/L
8/22/2007	EPA PAHs	Pyrene	0.001	ug/L
8/22/2007	Herb Screen GC/MS	2,4,5-T	<0.000002	mg/L
8/22/2007	Herb Screen GC/MS	2,4-D	<0.000002	mg/L
8/22/2007	Herb Screen GC/MS	Bromoxynil	<0.0001	mg/L
8/22/2007	Herb Screen GC/MS	Clopyralid	<0.0001	mg/L
8/22/2007	Herb Screen GC/MS	Dicamba	<0.0001	mg/L
8/22/2007	Herb Screen GC/MS	Diclofop-methyl	<0.0001	mg/L
8/22/2007	Herb Screen GC/MS	Fluazifop-p-butyl	<0.0001	mg/L
8/22/2007	Herb Screen GC/MS	MCPA	<0.000002	mg/L
8/22/2007	Herb Screen GC/MS	Mecoprop	<0.0001	mg/L
8/22/2007	Herb Screen GC/MS	Picloram	<0.0001	mg/L
8/22/2007	Herb Screen GC/MS	Triallate	<0.0001	mg/L
8/22/2007	Herb Screen GC/MS	Triclopyr	<0.0001	mg/L
8/22/2007	Herb Screen GC/MS	Trifluralin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Aldrin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Aldrin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Aldrin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	alpha-BHC	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	alpha-BHC	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	alpha-BHC	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	beta-BHC	<0.0001	mg/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
8/22/2007	OC Screen GC/ECD	beta-BHC	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	beta-BHC	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	cis-Chlordane	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	cis-Chlordane	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	cis-Chlordane	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Dieldrin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Dieldrin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Dieldrin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Endosulfan I	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Endosulfan I	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Endosulfan I	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Endosulfan II	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Endosulfan II	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Endosulfan II	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Endrin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Endrin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Endrin	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	gamma-BHC (Lindane)	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	gamma-BHC (Lindane)	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	gamma-BHC (Lindane)	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Heptachlor	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Heptachlor	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Heptachlor	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Methoxychlor	<0.0002	mg/L
8/22/2007	OC Screen GC/ECD	Methoxychlor	<0.0002	mg/L
8/22/2007	OC Screen GC/ECD	Methoxychlor	<0.0002	mg/L
8/22/2007	OC Screen GC/ECD	Mirex	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Mirex	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Mirex	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Nonachlor	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Nonachlor	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Nonachlor	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Oxychlordane	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Oxychlordane	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Oxychlordane	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	p,p'-DDD	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	p,p'-DDD	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	p,p'-DDD	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	p,p'-DDE	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	p,p'-DDE	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	p,p'-DDE	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	p,p'-DDT	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	p,p'-DDT	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	p,p'-DDT	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Quintozine (PCNB)	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Quintozine (PCNB)	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	Quintozine (PCNB)	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	trans-Chlordane	<0.0001	mg/L

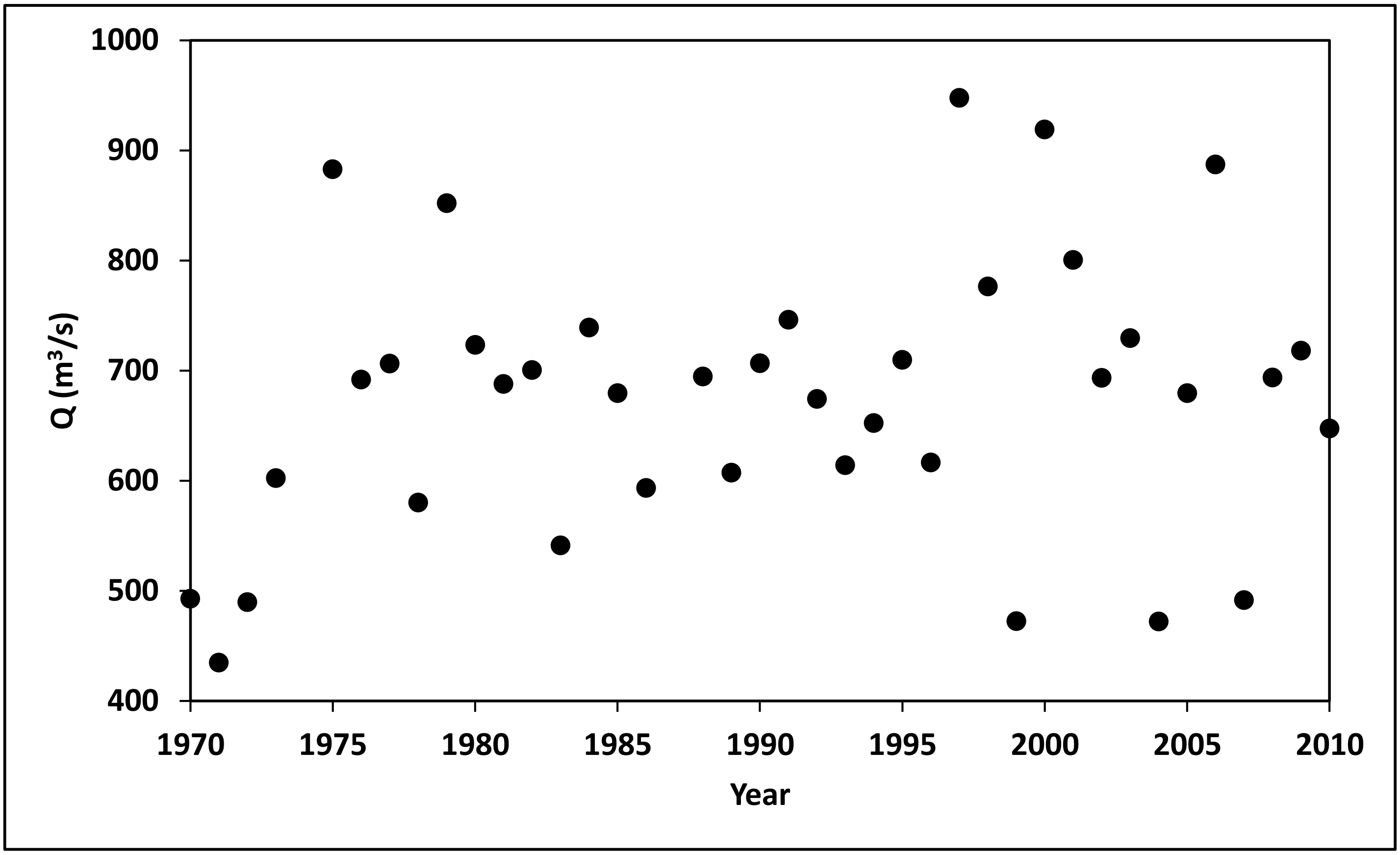
Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)				
DATE	PCODE	ANALYTE	RESULT	UNIT
8/22/2007	OC Screen GC/ECD	trans-Chlordane	<0.0001	mg/L
8/22/2007	OC Screen GC/ECD	trans-Chlordane	<0.0001	mg/L
8/22/2007	PAHs & Alkylated PAHs	Acenaphthene	0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Acenaphthylene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Anthracene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Benzo(a)anthracene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Benzo(a)pyrene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Benzo(b)fluoranthene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Benzo(ghi)perylene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Benzo(k)fluoranthene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Biphenyl	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	C2 sub'd B(a)A/chrysene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	C2 sub'd B(b&k)F/B(a)P	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	C2 sub'd biphenyl	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	C2 sub'd dibenzothiophene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	C2 sub'd fluorene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	C2 sub'd naphthalene	0.008	ug/L
8/22/2007	PAHs & Alkylated PAHs	C2 sub'd phenanthrene/anth.	0.006	ug/L
8/22/2007	PAHs & Alkylated PAHs	C3 sub'd dibenzothiophene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	C3 sub'd naphthalene	0.011	ug/L
8/22/2007	PAHs & Alkylated PAHs	C3 sub'd phenanthrene/anth.	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	C4 sub'd dibenzothiophene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	C4 sub'd naphthalene	0.010	ug/L
8/22/2007	PAHs & Alkylated PAHs	C4 sub'd phenanthrene/anth.	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	Chrysene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Dibenzo(a,h)anthracene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Dibenzothiophene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Fluoranthene	0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Fluorene	0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Indeno(c,d-123)pyrene	<0.001	ug/L
8/22/2007	PAHs & Alkylated PAHs	Methyl acenaphthene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	Methyl B(a)A/chrysene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	Methyl B(b&k)F/B(a)P	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	Methyl biphenyl	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	Methyl dibenzothiophene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	Methyl fluoranthene/pyrene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	Methyl fluorene	<0.004	ug/L
8/22/2007	PAHs & Alkylated PAHs	Methyl naphthalene	0.005	ug/L
8/22/2007	PAHs & Alkylated PAHs	Methyl phenanthrene/anthracene	0.007	ug/L
8/22/2007	PAHs & Alkylated PAHs	Naphthalene	0.003	ug/L
8/22/2007	PAHs & Alkylated PAHs	Phenanthrene	0.003	ug/L
8/22/2007	PAHs & Alkylated PAHs	Pyrene	0.001	ug/L
8/22/2007	PCBs	Aroclor 1016	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1016	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1016	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1221	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1221	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1221	<0.00001	mg/L

Table C11: Organic Scan of Centrifugate Water Collected at Fort McPherson Above Peel River (Site O)

DATE	PCODE	ANALYTE	RESULT	UNIT
8/22/2007	PCBs	Aroclor 1232	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1232	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1232	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1242	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1242	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1242	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1248	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1248	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1248	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1254	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1254	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1254	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1260	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1260	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1260	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1262	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1262	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1262	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1268	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1268	<0.00001	mg/L
8/22/2007	PCBs	Aroclor 1268	<0.00001	mg/L
8/22/2007	PCBs	Total PCBs	<0.00005	mg/L
8/22/2007	PCBs	Total PCBs	<0.00005	mg/L
8/22/2007	PCBs	Total PCBs	<0.00005	mg/L

APPENDIX D

HYDROLOGY DATA AND FIGURES



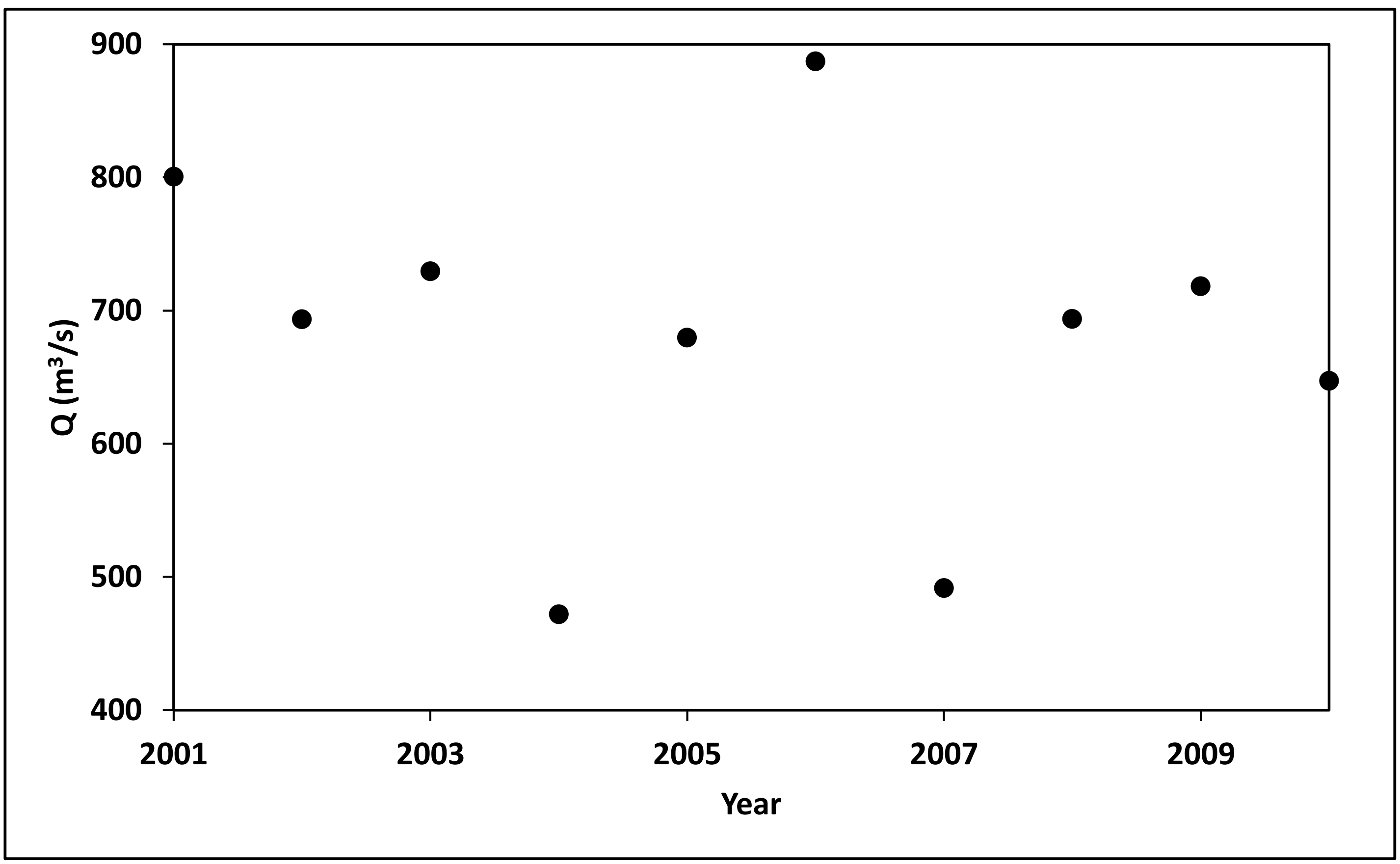
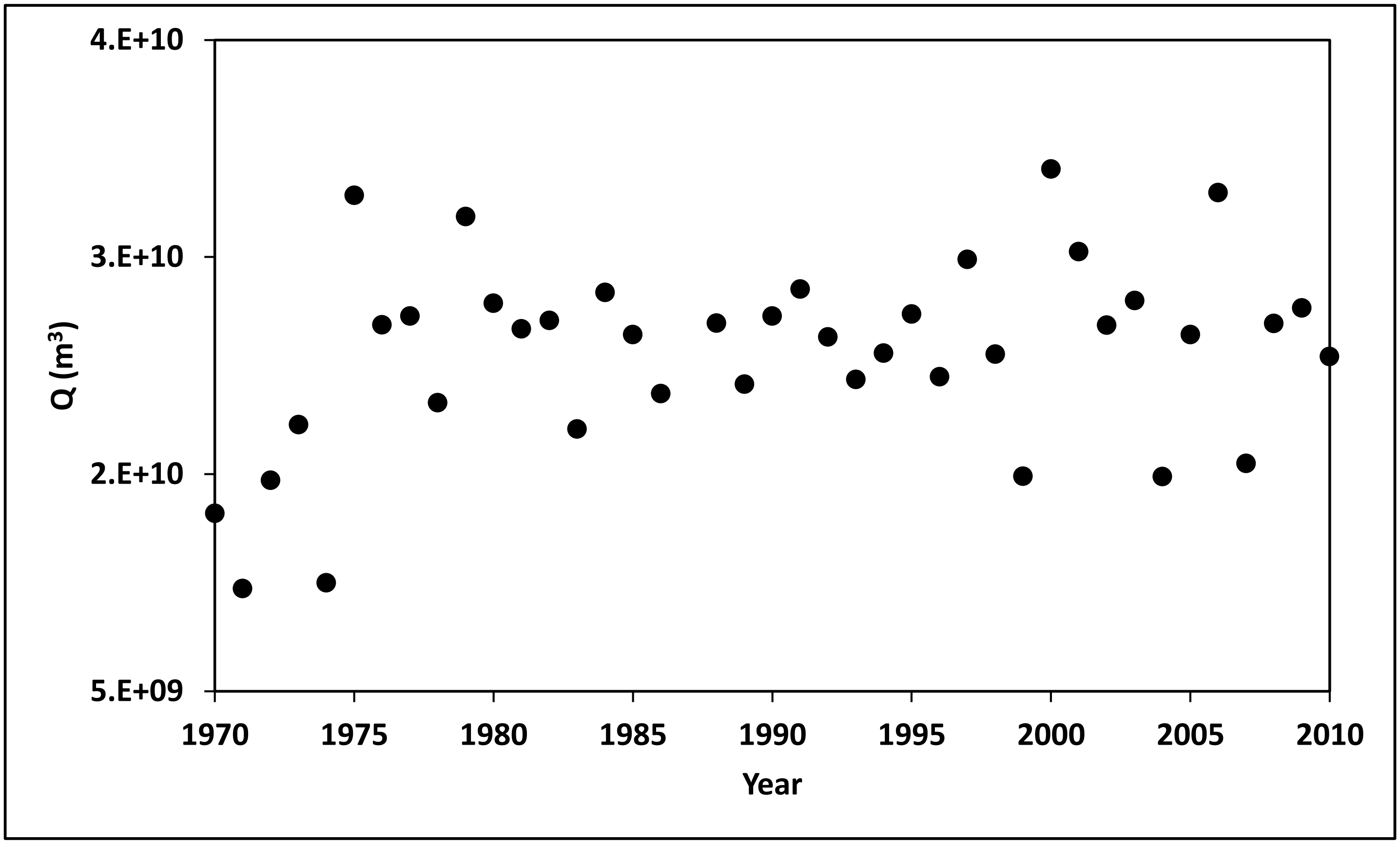


Figure D- 1 : Mean Annual Flow Rate



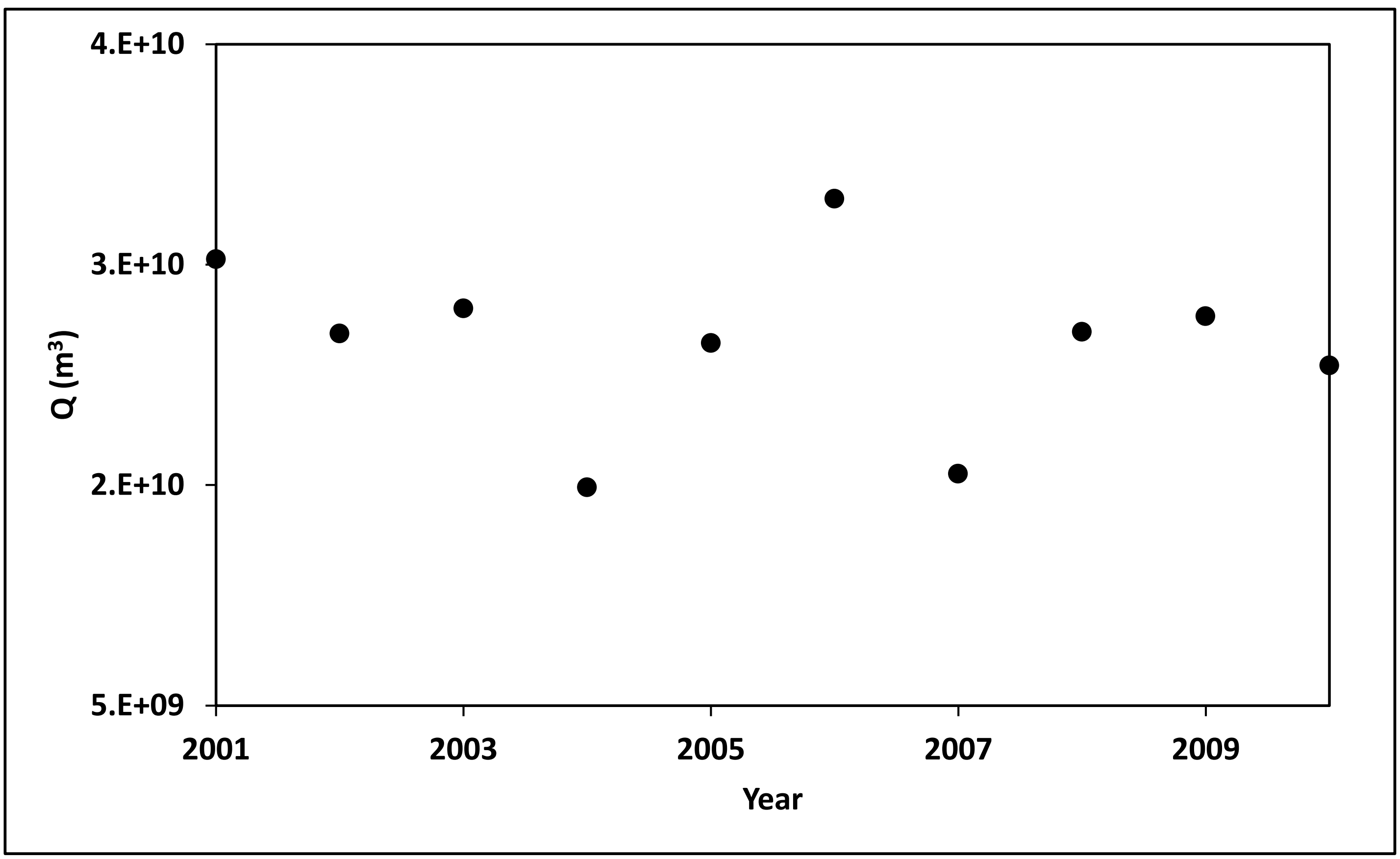
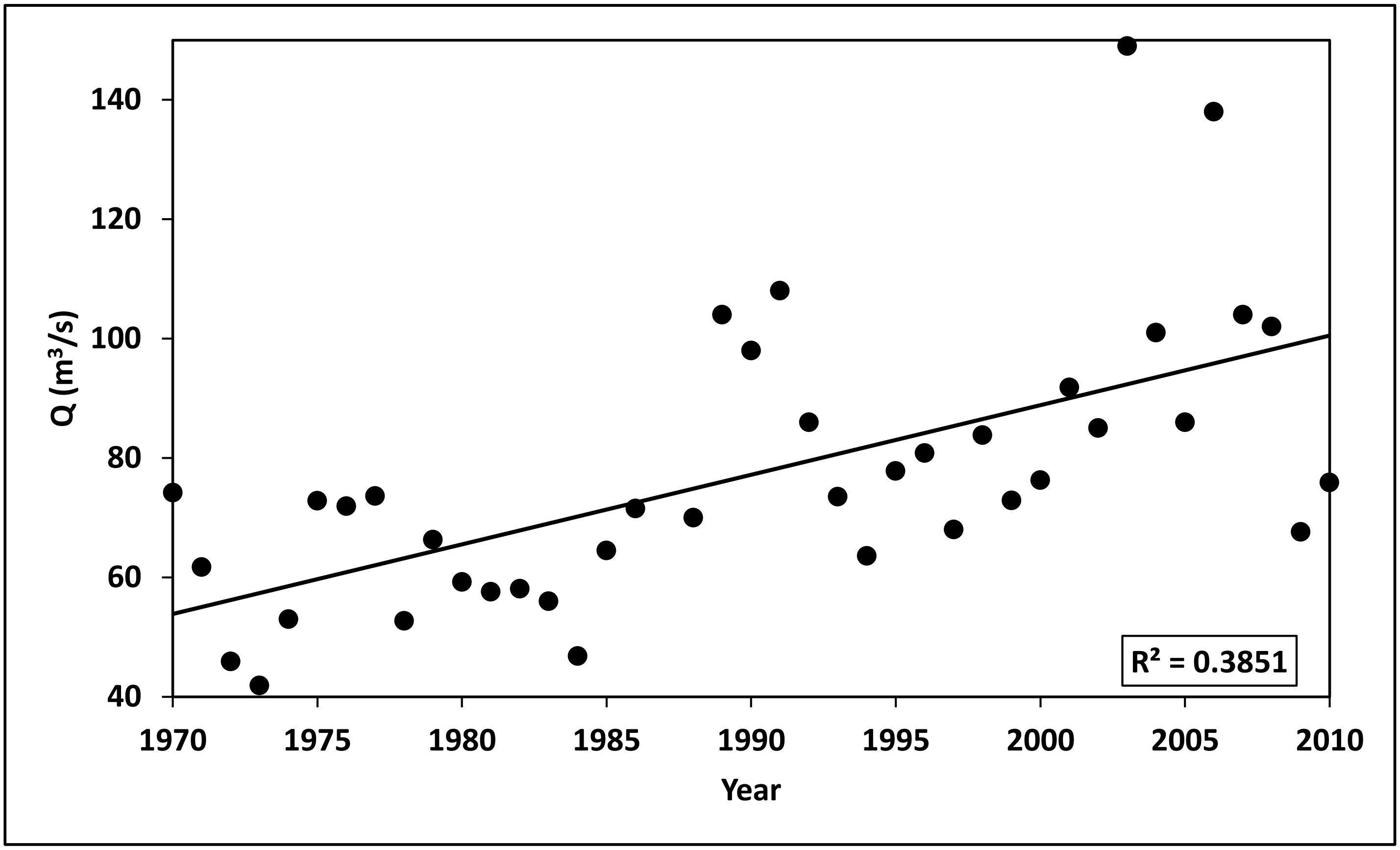


Figure D- 2: Total Annual Flow

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec



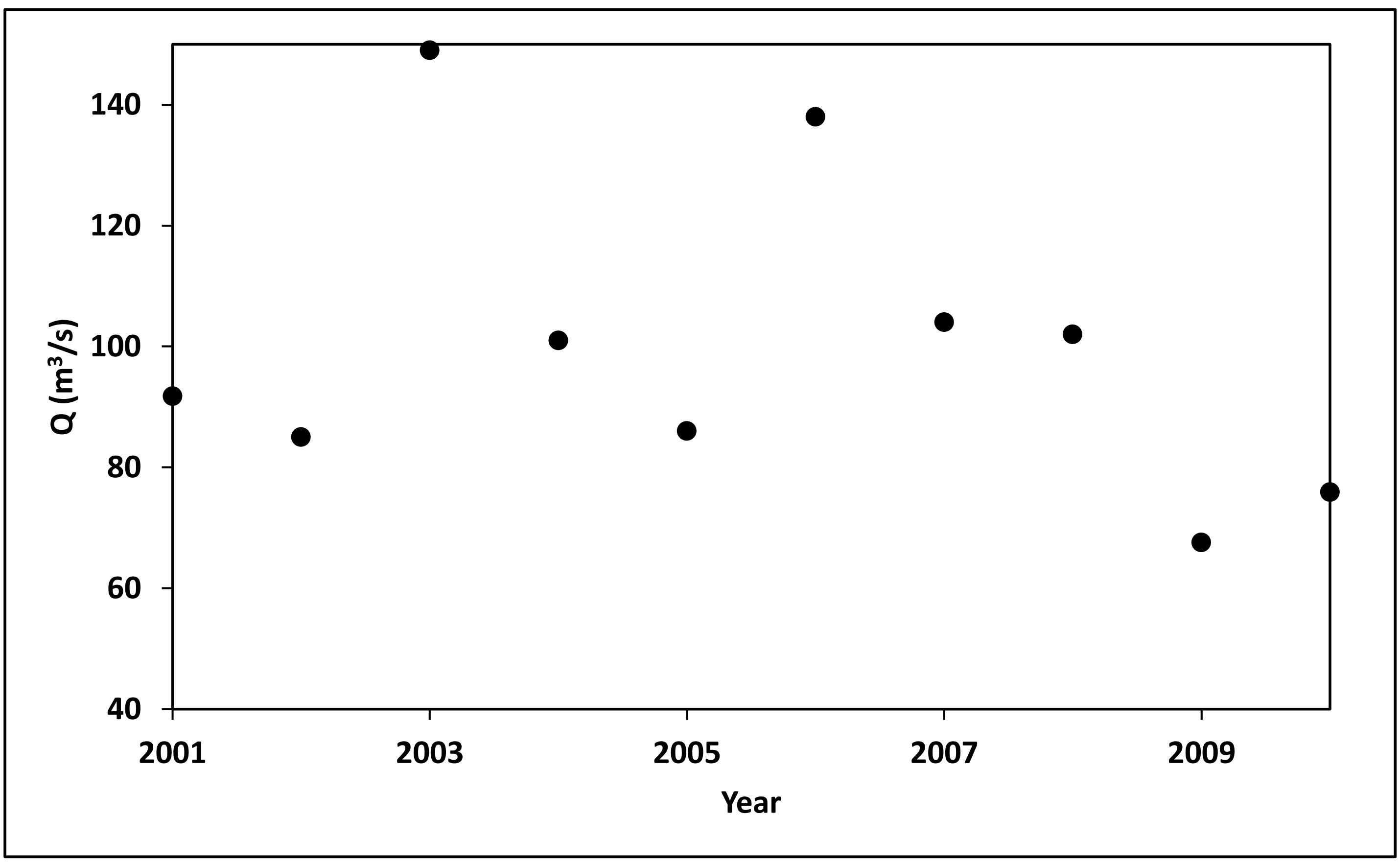
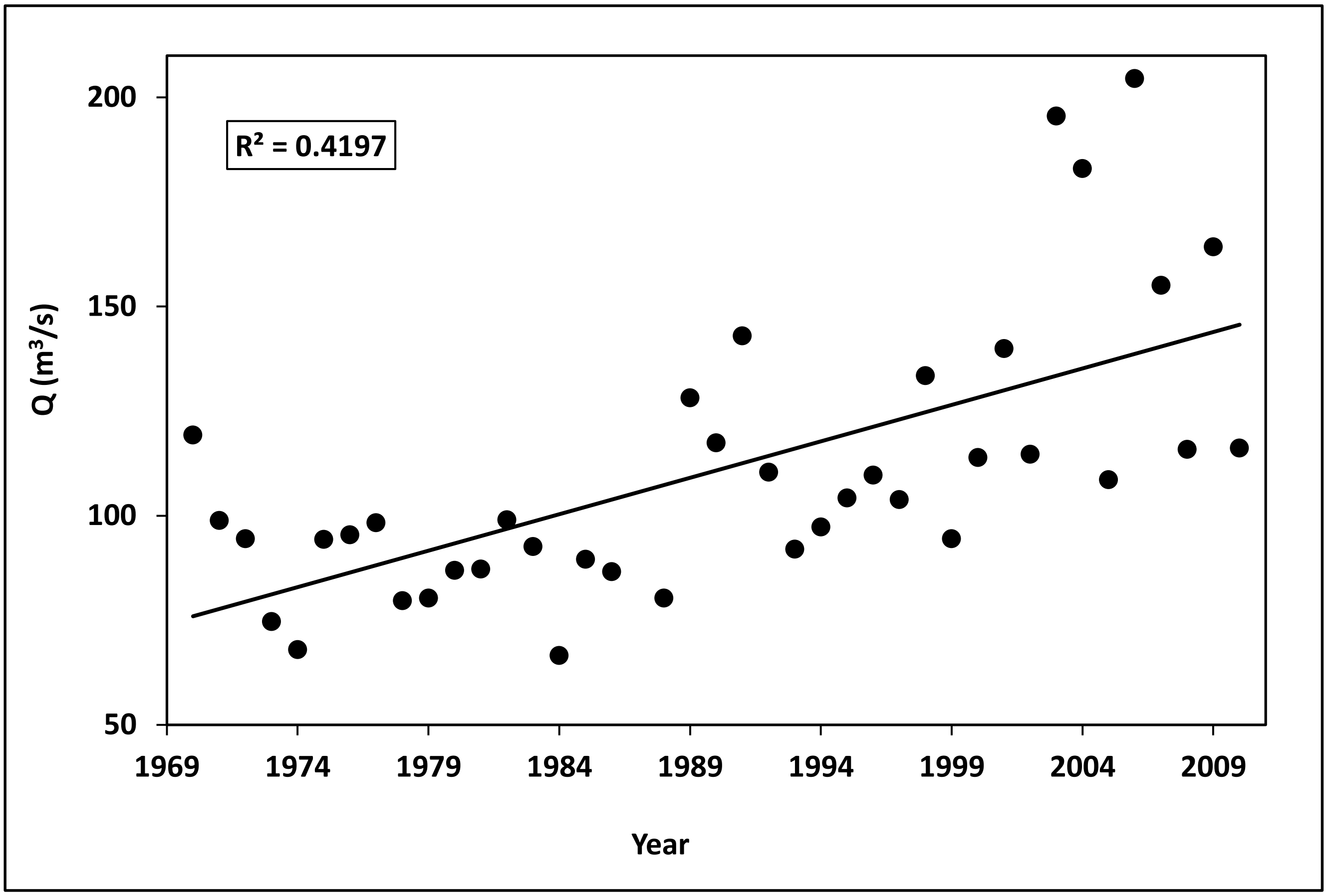


Figure D- 3: Annual Daily Minimum Flow Rate



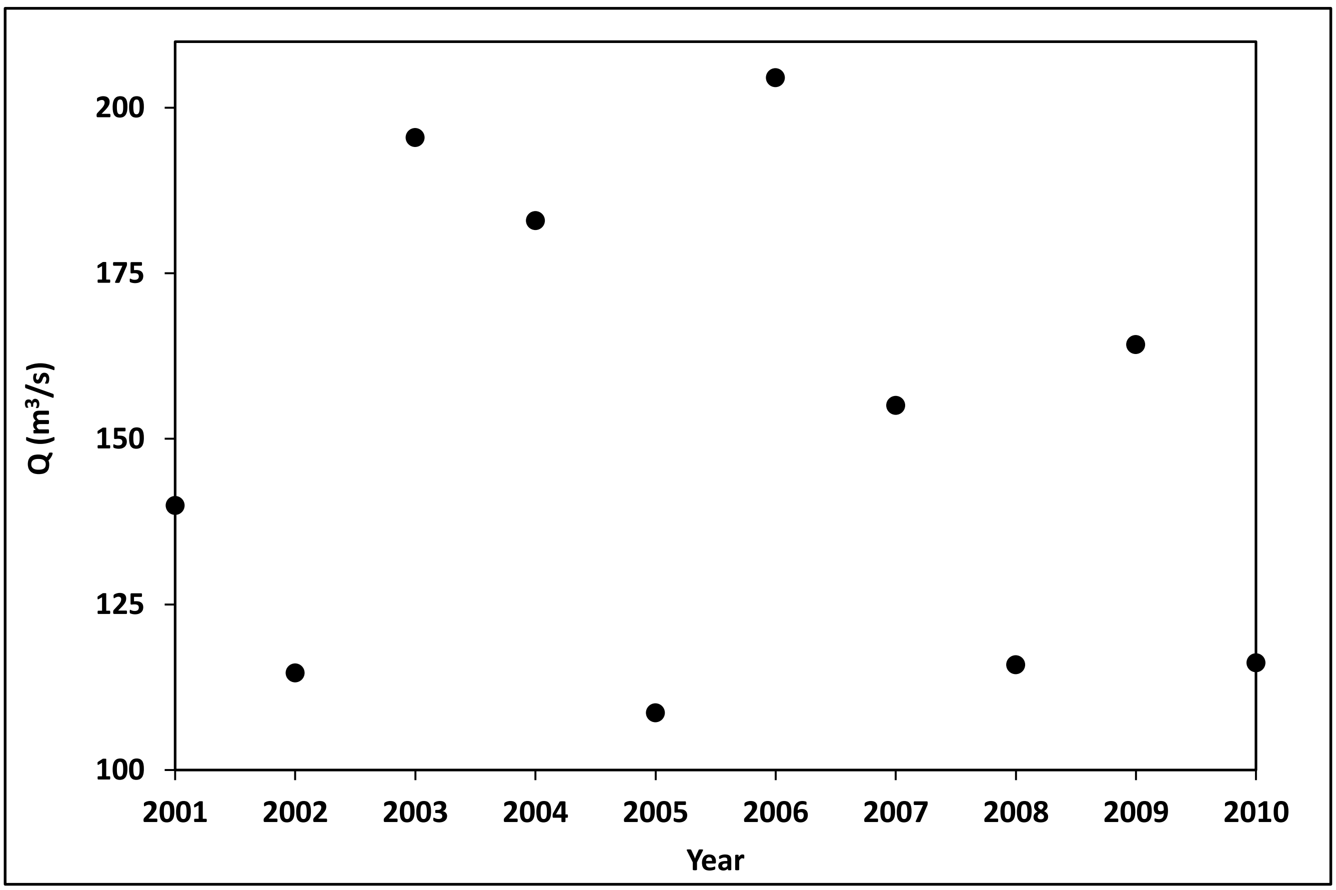
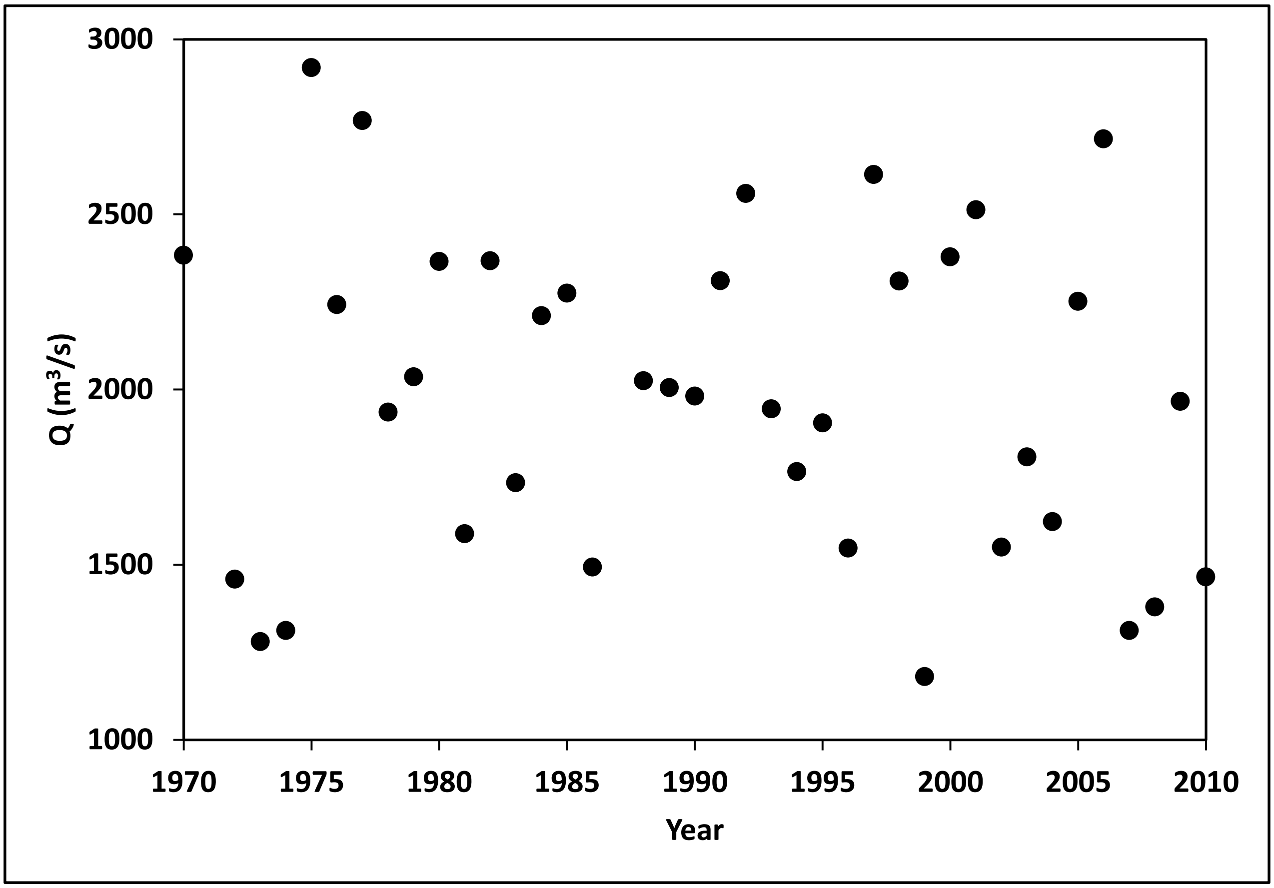


Figure D-4: Mean Winter Base Flow Rate

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec



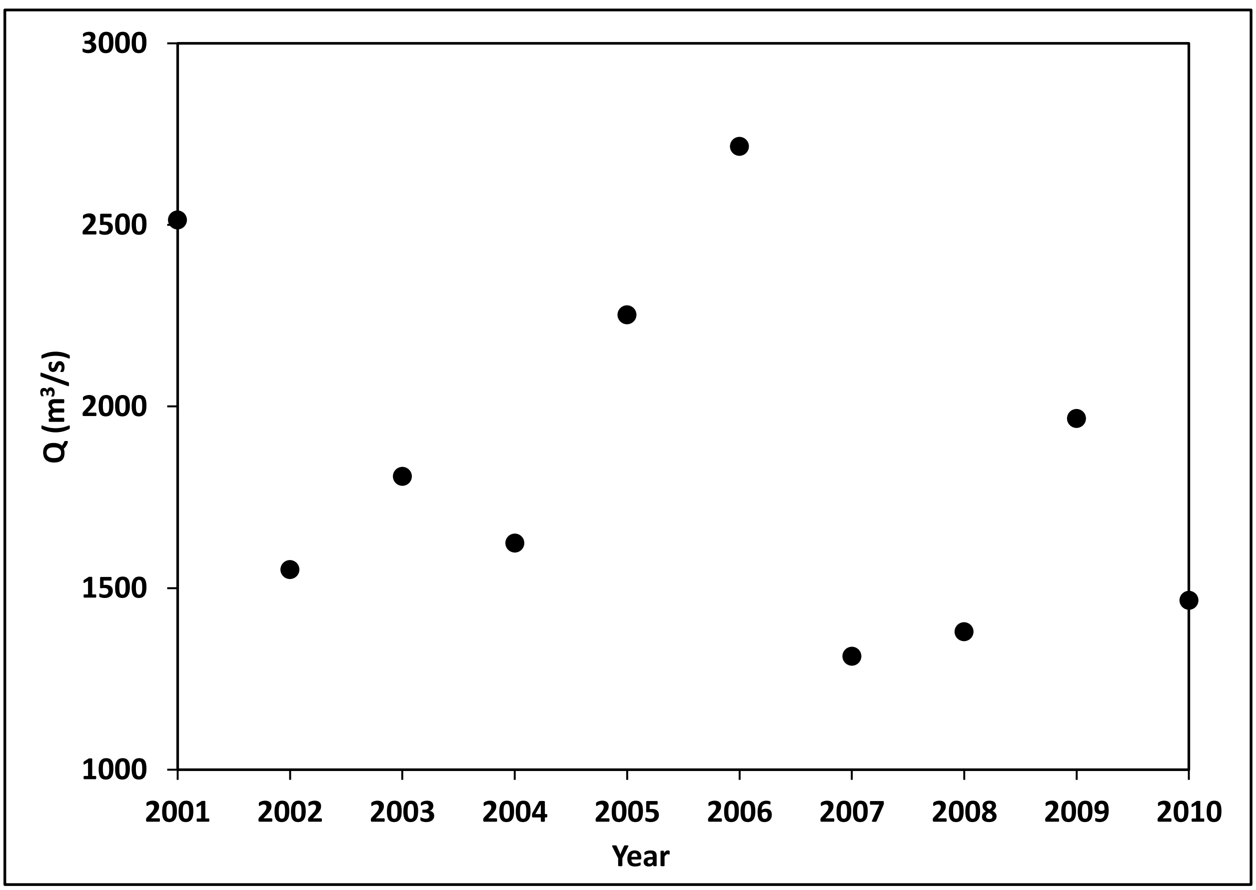


Figure D-5: Mean Spring Freshet Flow Rate

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

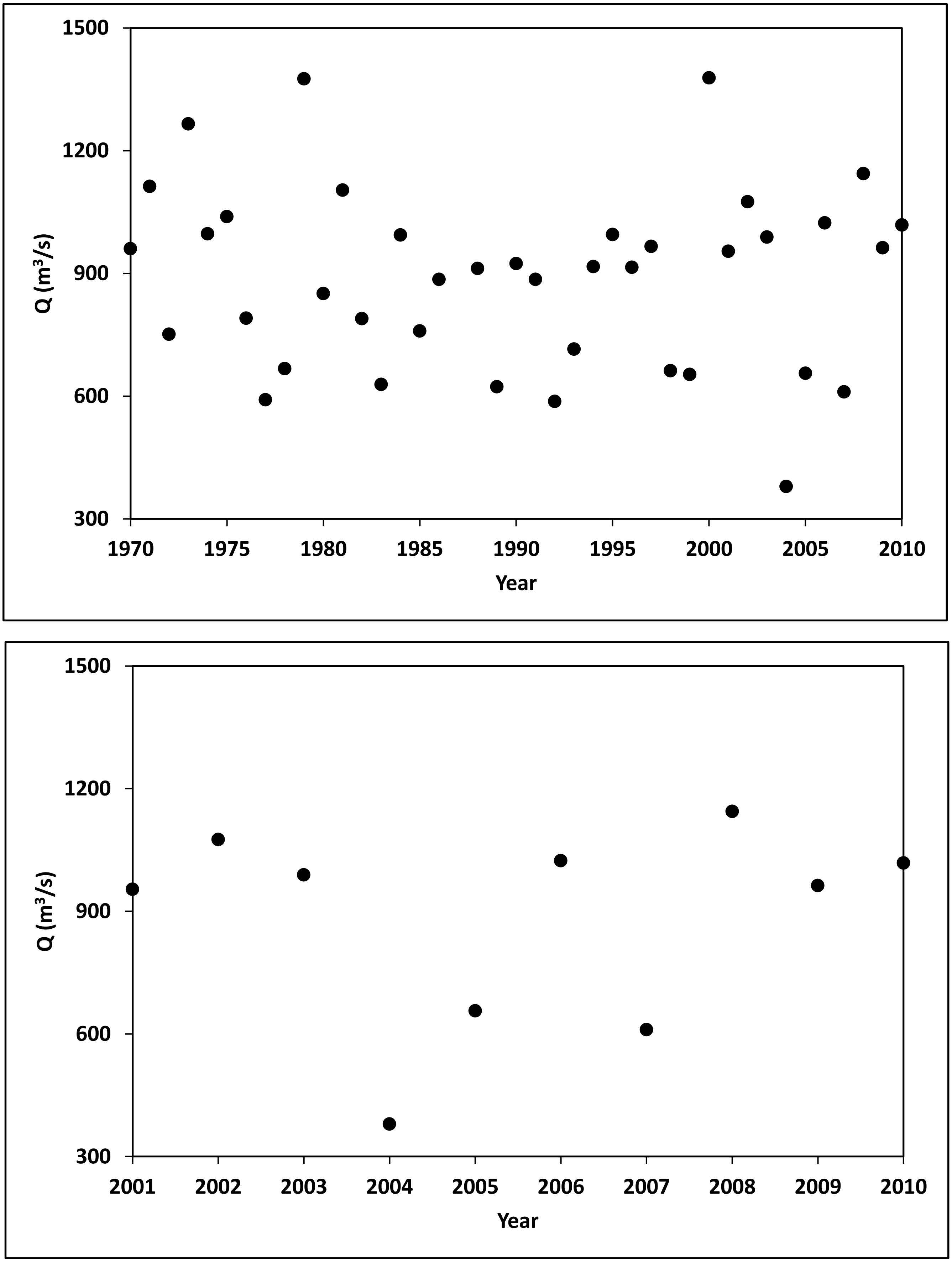
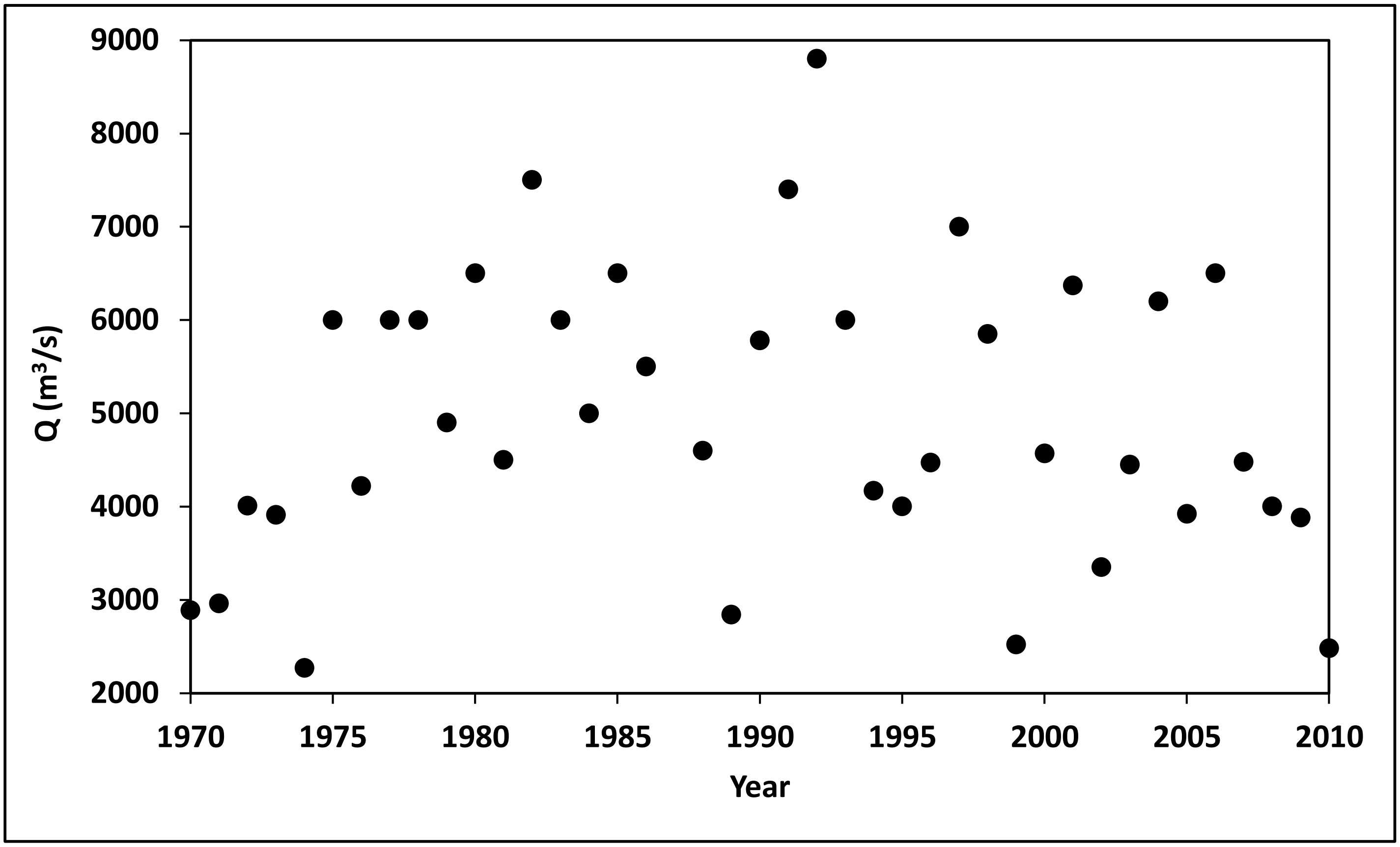


Figure D-6: Mean Summer Recession Flow Rate

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec



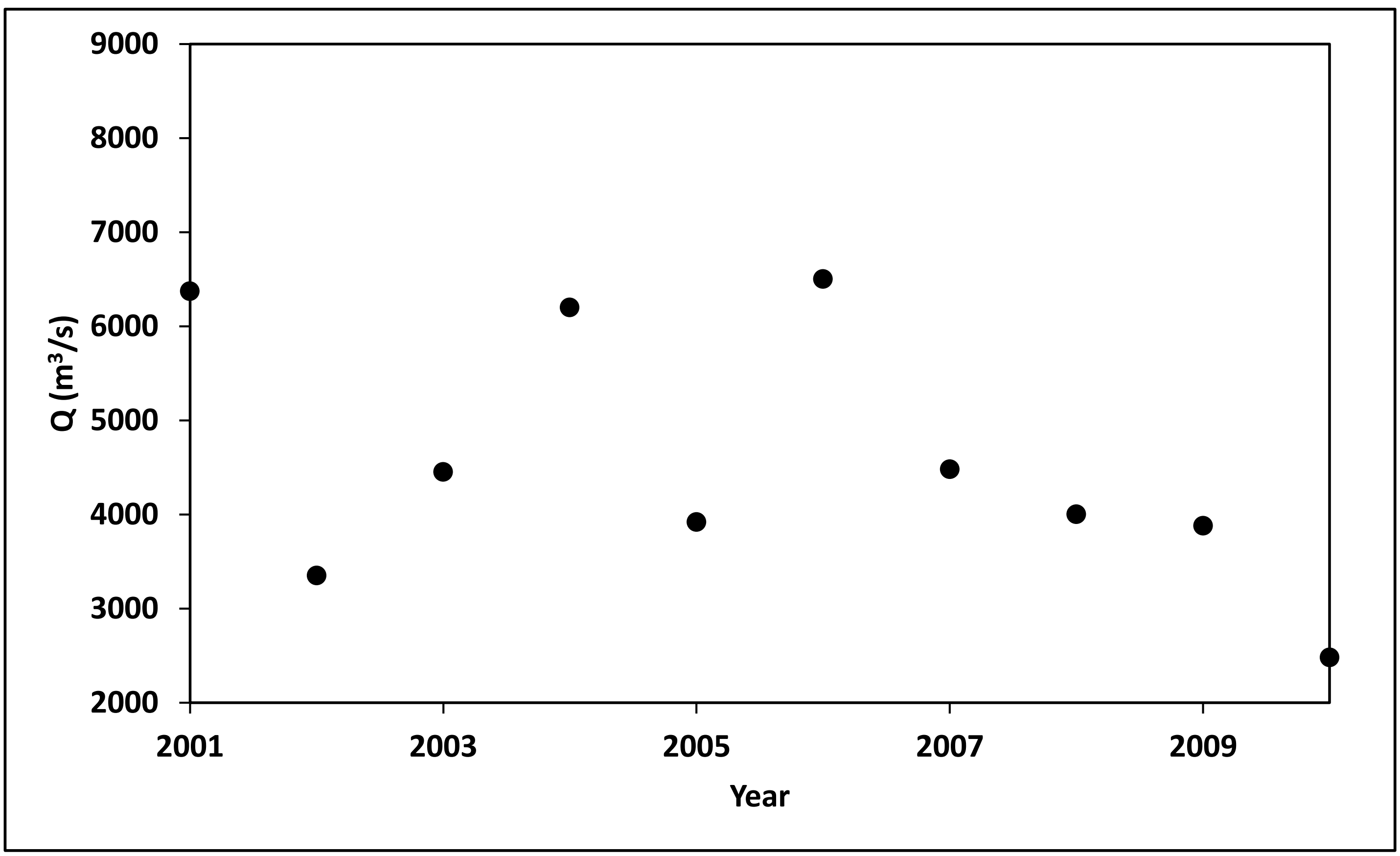


Figure D- 7: Annual Daily Maximum Flow Rate

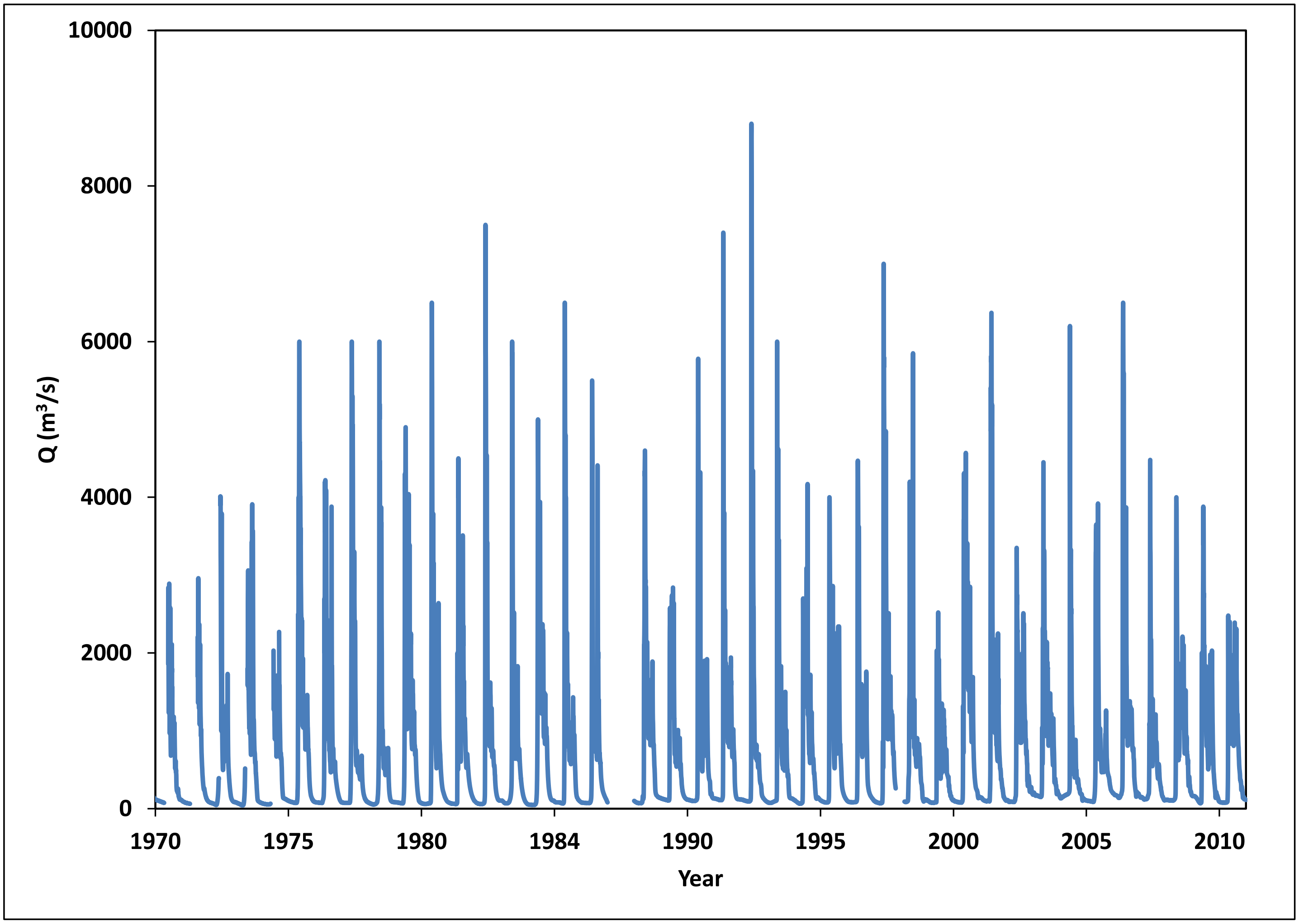


Figure D-8: Daily Flow Rates in the Peel River at Site O

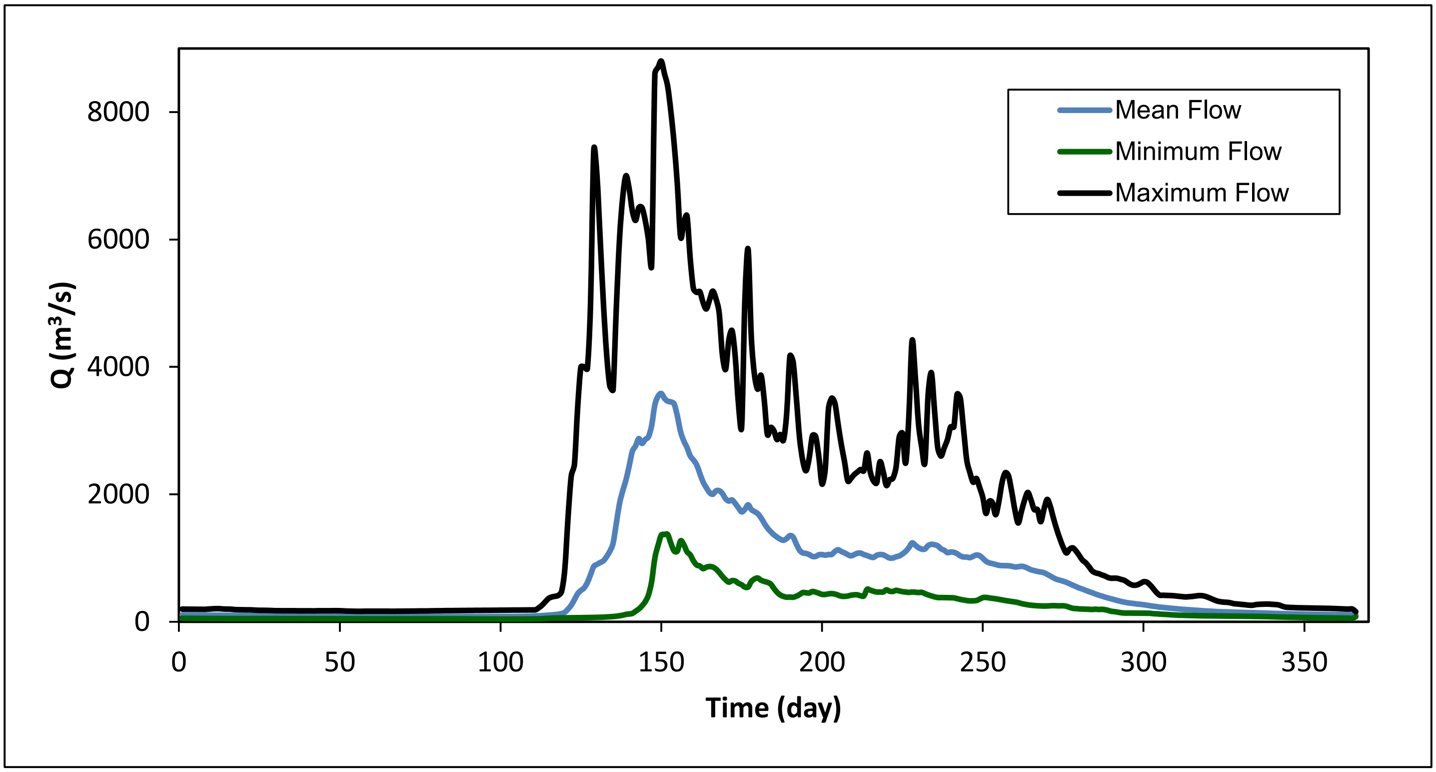


Figure D-9 Daily Flow Record for Minimum, Mean, and Maximum Flow Rates

G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

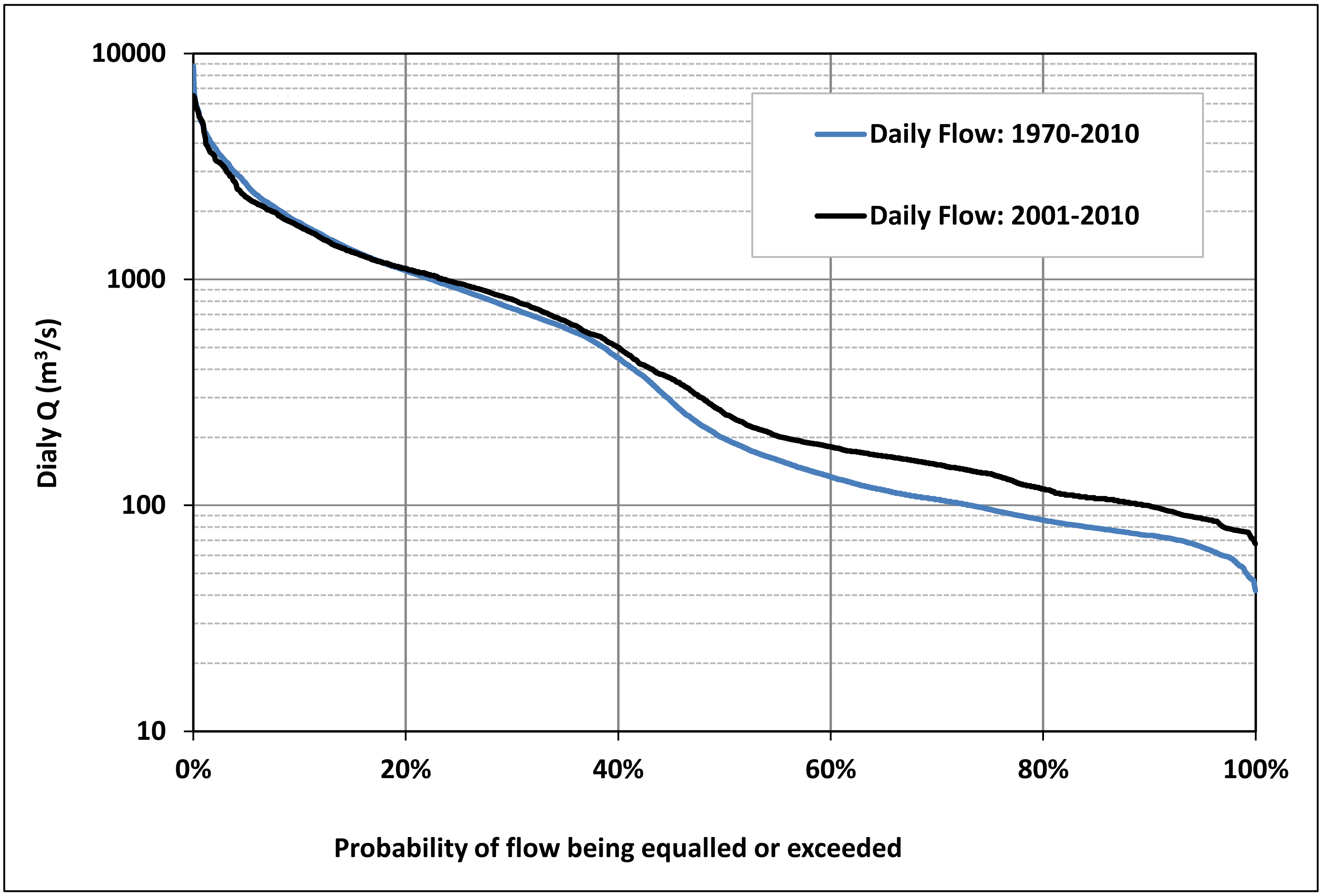


Figure D-10 : Flow Duration Curve

Table D-1: Daily Average Flow Rates (m^3/s) at the Site 'Peel River above Fort McPherson' (10MC002: 67°14'33" N, 134°53'20" W)

JULIAN DAY	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1		119	103	90	83	69	101	85	79	79	82	71	84	97	103	56	90	82		99	133	116	130	118	85	114	109	104	110		114	112	147	108	191	152	104	199	161	110	162	90
2		118	101	89	82	69	101	85	79	79	82	70	84	96	103	55	89	82		98	133	115	130	118	84	114	109	103	108		113	109	145	109	195	148	104	198	161	110	162	90
3		118	101	88	82	69	100	84	79	79	82	70	83	95	103	54	88	81		97	132	115	130	118	84	113	108	102	107		112	107	144	111	194	148	104	198	161	111	162	90
4		117	100	87	82	68	100	84	79	79	82	70	83	94	103	54	88	80		97	132	115	130	117	83	113	107	101	106		110	107	144	112	191	145	103	197	159	111	162	90
5		116	99	86	82	68	99	83	79	78	82	70	82	93	103	54	88	80		96	131	114	130	117	83	112	106	100	105		109	108	144	111	188	142	103	197	158	111	162	89
6		116	98	86	81	68	99	83	78	78	82	69	82	92	103	53	87	79		95	131	114	129	117	82	112	106	99	104		108	108	143	110	188	140	103	196	156	111	162	88
7		115	96	85	81	67	98	83	78	77	82	69	81	91	103	53	86	79		94	131	114	129	117	81	111	105	99	102		107	108	143	110	190	139	102	196	154	111	162	87
8		114	95	84	80	67	98	82	78	77	82	68	80	90	103	53	86	78		93	130	114	129	117	81	110	104	98	100		106	106	142	107	195	136	102	195	153	111	162	86
9		114	95	84	80	67	97	82	78	77	82	68	80	89	103	52	85	78		93	130	114	129	117	80	109	104	97	99		105	105	141	104	199	135	102	194	151	112	162	85
10		113	93	84	80	67	97	82	78	75	82	68	79	88	103	52	85	78		92	130	114	129	117	80	108	103	96	97		105	104	140	102	202	134	101	193	148	112	162	84
11		113	92	83	79	66	96	81	78	75	82	67	79	87	103	52	85	77		91	129	113	129	116	80	108	102	95	96		104	102	140	102	205	132	101	192	148	112	161	84
12		112	93	82	79	66	96	81	78	74	82	67	78	86	103	52	84	77		91	129	113	129	116	79	107	101	94	96		104	101	139	102	206	131	101	190	147	111	161	83
13		112	92	82	78	66	95	81	78	74	82	66	78	85	102	51	84	77		90	129	113	129	116	79	107	101	94	95		103	98	140	103	204	134	100	188	145	111	161	83
14		111	92	81	78	65	95	81	78	74	82	66	77	84	101	51	84	76		89	128	113	129	116	78	106	100	93	94		103	97	139	105	200	138	100	187	143	111	161	83
15		111	92	80	78	65	94	80	78	72	82	66	77	84	100	51	83	76		88	128	113	129	116	78	105	100	93	95		102	96	139	107	199	141	100	187	142	111	160	82
16		110	91	80	77	65	94	80	78	72	82	65	76	83	100	51	83	76		88	127	113	129	116	78	104	99	92	95		102	96	138	107	198	144	100	186	142	109	160	82
17		110	90	80	77	65	93	80	77	72	82	65	76	82	99	51	82	76		87	127	113	129	116	77	104	99	92	96		102	95	139	106	193	134	100	185	141	109	160	82
18		110	90	79	76	64	93	80	77	71	82	65	75	81	98	50	82	76		87	127	113	129	116	77	103	98	91	96		101	94	139	105	190	133	100	184	141	109	160	82
19		109	90	79	76	64	92	80	77	71	82	64	75	80	97	50	82	76		86	127	113	128	115	77	103	97	91	96		101	95	140	105	189	135	100	182	143	108	160	81
20		109	89	79	75	64	92	80	77	71	81	64	74	80	97	50	82	76		85	126	112	128	115	76	102	97	90	95		101	95	141	104	188	135	100	182	145	108	160	81
21		108	89	78	75	63	92	80	77	69	81	64	74	79	96	50	81	76		85	126	112	128	115	76	102	96	89	94		101	94	140	104	187	135	100	182	145	108	159	81
22		108	88	78	75	63	91	79	77	69	80	64	74	78	95	50	81	76		84	126	112	128	115	76	101	96	89	94		99	93	140	104	187	134	100	182	145	109	159	80
23		108	88	77	74	63	91	79	77	69	80	64	73	77	94	50	80	76		84	126	112	128	115	76	100	95	88	92		98	93	140	102	185	134	100	179	146	109	159	80
24		107	87	77	74	63	91	79	75	68	80	63	73	76	94	50	80	76		83	125	111	128	114	75	99	95	88	90		97	92	139	100	182	137	100	176	146	111	158	80
25		107	87	77	73	62	90	79	75	68	80	63	72	76	93	50	80	76		83	125	111	128	114	75	99	94	87	89		96	92	137	98	180	138	100	176	147	112	158	80
26		107	86	77	73	62	90	79	75	68	79	63	72	75	92	50	80	76		82	125	111	127	114	75	98	94	87	88		96	92	135	98	180	139	100	175	147	112	158	80
27		106	86	76	73	62	90	79	75	68	79	62	72	74	91	50	80	76		82	124	110	127	114	75	97	93	87	87		97	92	132	96	179	140	100	174	147	113	157	79
28		106	85	76	72	62	90	79	75	67	79	62	71	74	90	50	80	75		81	124	110	127	113	75	96	93	86	87		97	93	130	94	178	138	100	174	147	113	157	79
29		106	85	76	72	61	90	79	75	67	79	62	71	73	89	50	80	75		81	124	110	127	113	75	95	92	86	86		95	93	130	92	176	139	99	174	147	111	156	79
30		105	84	75	71	61	89	79	75	67	79	62	70	72	88	50	80	75		80	123	110	126	113	74	95	92	86	85		93	92	130	91	173	140	99	174	147	110	156	79
31		105	84	75	71	61	89	78	75	65	79	62	70	72	87	50	80	75		80	123	109	126	113	74	94	91	86	84		92	93	130	89	170	141	99	174	147	109	156	79
32		105	84	75	71	61	89	78	74	65	79	62	70	71	85	50	80	75		79	123	109	126	112	74	93	91	85	83		91	93	129	87	167	142	99	173	147	109	155	79
33		104	83	75	70	61	88	78	74	65	79	61	70	71	84	49	80	75		79	123	108	125	112	74	93	91	85	83		91	94	128	86	165	143	98	173	147	108	155	79
34		104	83	74	70	61	88	78	74	65	79	61	69	70	83	49	80	75		78	122	108	125	112	74	92	90	85	84		91	93	127	86	165	144	98	173	147	108	154	79
35		104	82	74	69	60	88	78	74	64	79	61	69	70	82	49	80	74		78	122	108	124	111	74	91	90	85	83		90	93	125	86	165	145	99	173	147	108	154	78
36		103	82	73	69	60	88	78	74	64	79	61	69	69	81	49	80	74		78	122	108	124	111	74	90	89	84	83		90	91	122	86	165	145	99	173	146	107	154	78
37		103	81	73	69	60	87	78	74	64	78	61	68	69	80	49	80	74		77	122	107	123	111	74	90	89	84	83		89	90	120	87	166	146	98	172	146	107	153	78
38		103	81	73	68	60	87	78	74	62	78	60	68	68	79	49	80	74		77	121	107	123	110	74	89	88	84	83		88	91	118	87	168	147	98	172	145	107	152	78
39		102	80	73	68	60	87	78	74	62	78	60	68	68	78	49	80	74		76	121	107	122	110	74	88	88	84	84		87	91	118	86	169	148	98	172	144	107	151	78
40		102	80	72	67	60	86	78	74	61	78	60	68	67	77	49	80	74		76	121	106	122	110	74	87	88	84	83		86	90	117	86	169	149	98	172	143	106	150	78
41		102	79	72	67	59	86	78	74	61	78	60	67	67	76	48	80	74		76	121	106	122	109	74	87	87	84	83		86	90	117	87	169	150	98	172	142	106	149	78
42		101	79	72	67	59	86	78	74	61	77	60	67	67	76	48	80	74		75	120	106	121	109	74	86	87	83	83		85	90	116	88	170	150	97	171	139	106	148	78
43		101	78	71	66	59	86	77	74	61	77	60	67	66	75	48	80	74		75	120	106	121	109	74	85	86	83	83		84	89	115	88	173	151	97	171	137	105	147	78
44		101	78	71	66	58	86	77	74	60	77	60	66	66	74	48	80	74		75	120	105	121	108	74	84	86	83	83		82	88	115	88	173	152	97	171	137	105	146	77
45		100	78	71	65	58	85	77	74	60	77	60	66	65	74	48	80	74		74	120	105	121	108	74	84	86	83	82		80	87	113	89	173	153	97	170	136	106	145	77
46		100	77	70	65	58	85	77	74	60	77	60	66	65	73	48	80	74		74	119	105	120	108	74	83	85	83	82		80	88	112	90	173	153	97	170	135	106	145	77
47		99	77	70	65	58	85	77	74	60	77	60	66	65	72	48	80	74		74	119	104	120	107	74	82	85	83	81		80	88	111	91	173	154	96	170	134	107	144	77
48		99	76	70	64	58	84	77	74	60	77	60	65	64	71	48	80	74		74	119	104	120	107	74	81	85	83	81		81	88	110	91	174	154	96	170	133	107	144	77
49		99	76	69	64	58	84	77	74	60	77	59	65	64	71	48	80	74		73	118	104	120	106	74	80	85	82	79		81	87	109	91	174	155	96	170	133	106	141	77
50		99	75	69	63	57	84	77	74	60	76	59	65	65	70	48	80	74		73	118	103	120	106	74	80	84	82	79		81	86	108	91	173	155	96	169	133	106	140	77
51		98	75	69	63	57	84	77	74	58	76	59	65	64	70	48	80	74		73	118	103	120	105	74	79	84	82	79		81	86	108	90	171	156	96	168	132	106	139	77
52		98	75	69	62	57	83	77	74	58	76	59	64	64	70	48	80	73		72	117	103	119	105	74	78	84	82	78		81	87	108	90	168	156	95	167	132	106	136	77
53		97	74	68	62	57	83	77	74	58	76	59	64	63	69	48	80	73		72	117	103	119	105	75	78	83	82	78		81	87	107	90	167	157	95	167	131	107	135	77
54		97	74	68	61	57	83	77	74	58	76	59	64	63	69	48	80	73		72	117	102	119	104	75	77	83	82	77		80	85	107	90	166	158	95	166	130	107	133	76
55		97	74	68	61	57	82	77	74	57	76	59	64	63	69	48	80	73		72	117	102	119	104	75	76	83	82	76		80	84	107	90	164	158	95	165	129	107	132	76
56		96	74	67	61	57	82	76	74	57	76	59	64	62	69	48	80	73		72	116	102	118	104	75	75	83	82	76		79	83	107	90	164	159	95	164	127	108	130	76
57		96	73	67	60	57	82	76	74	57	75	59	64	62	69	47	80	73		72	116	102	118	103	75	75	82	82	76		79	84	106	90	165	159	94	164	125	108	129	76
58		96	73	67	60	56	82	76	74	57	75	59	64	62	68	47	80	73		72	116	102	118	103	76	74	82	82	76		79	84	105	90	166	160	94	163	123	108	127	76
59		95	73	66	60	56	82	76	74	57	75	59	64	62	68	47	80	72		71	116	101	117	103	76	74	82	82	76		79	84	104	90	166	160	94	162	121	109	126	76
60		95	73	66	59	56	81	76	74	55	75	59	63	62	68	47	80	72		71	115	101	117	102	76	72	81	82	76	90	78	85	102	90	166		94	160	120	109	125	76

Table D-1: Daily Average Flow Rates (m^3/s) at the Site 'Peel River above Fort McPherson' (10MC002: 67°14'33" N, 134°53'20" W)

JULIAN DAY	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
61		95	73	66	59	56	81	76	74	55	75	59	63	61	68	47	80	72		71	115	101	116	102	77	72	81	81	76	90	78	85	101	89	166	161	94	159	119	109	123	77
62		94	72	65	58	56	81	76	74	55	74	59	63	61	68	47	80	72		71	114	101	115	102	77	71	81	81	75	90	77	84	101	89	166	162	93	158	118	109	121	77
63		94	72	65	58	56	80	75	74	55	74	59	63	61	68	47	80	72		71	114	100	115	101	77	71	81	81	74	90	77	84	101	89	166	163	93	157	118	109	120	77
64		93	72	65	58	56	80	75	74	54	74	59	63	61	68	47	80	72		71	114	100	114	101	78	70	80	81	74	90	77	84	101	89	166	164	93	156	118	108	119	77
65		93	72	65	57	56	80	75	74	54	74	59	63	60	68	47	79	72		71	114	100	114	101	78	70	80	81	74	89	77	84	101	89	166	164	93	155	118	106	117	77
66		93	71	64	57	55	80	75	74	54	74	60	63	60	68	47	79	72		70	113	100	114	100	78	69	80	81	74	89	77	84	102	89	165	165	93	154	117	106	115	78
67		93	71	64	56	55	79	75	74	54	74	60	63	60	68	47	79	72		70	113	100	113	100	78	69	80	81	74	89	77	84	102	88	165	165	92	153	118	106	114	78
68		92	71	63	56	55	79	75	74	54	74	60	63	60	68	47	79	72		70	113	100	113	100	79	69	80	81	74	89	77	84	102	88	164	166	92	151	118	107	113	79
69		92	71	63	56	55	79	75	74	54	73	60	63	60	68	47	78	72		70	113	99	112	100	79	68	79	81	74	89	77	84	102	88	164	166	92	149	117	107	111	79
70		92	71	63	55	55	78	75	74	54	73	60	63	60	68	47	78	72		70	112	99	112	100	79	68	79	81	73	88	76	84	101	89	164	167	92	148	117	107	109	79
71		91	70	62	55	55	78	75	74	53	73	60	62	60	68	47	78	72		70	112	99	111	99	80	67	79	81	73	87	76	83	101	89	163	167	92	147	117	107	107	79
72		91	70	62	54	54	78	75	74	53	73	60	62	60	68	47	78	72		70	112	99	111	99	80	67	79	81	73	86	75	83	101	88	163	168	91	145	117	107	106	79
73		90	70	61	54	54	78	75	74	53	73	60	62	60	68	47	78	72		70	112	99	111	99	80	67	79	81	72	85	75	83	100	88	163	168	91	143	117	107	105	79
74		90	70	61	52	54	78	75	74	53	73	60	62	60	68	47	78	72		70	112	99	110	99	81	66	79	81	72	85	75	83	99	88	162	169	91	142	118	108	103	79
75		90	69	61	51	54	77	74	74	53	72	60	62	60	68	47	78	72		70	111	99	110	98	81	66	78	81	72	85	75	83	99	88	162	170	91	141	119	108	101	78
76		90	69	60	51	54	77	74	74	53	72	61	62	59	68	47	78	72		70	111	98	110	98	82	66	78	81	73	85	75	82	98	88	161	170	91	139	120	108	99	78
77		89	69	60	51	54	77	74	74	53	72	61	62	59	68	47	77	72		70	111	98	110	98	82	65	78	81	73	84	75	82	98	88	160	170	90	139	120	108	98	77
78		89	69	59	50	54	77	74	74	53	72	61	62	59	68	47	77	72		70	111	98	110	98	83	65	78	81	73	84	75	82	98	88	160	171	90	139	121	108	96	77
79		88	69	59	50	54	76	74	74	54	72	61	62	59	68	47	77	72		70	111	98	110	97	83	65	78	81	72	84	75	81	98	88	159	172	90	138	121	108	94	77
80		88	68	58	50	54	76	74	74	54	71	62	62	59	69	47	77	72		70	110	98	109	97	84	65	78	82	71	84	75	81	97	88	159	173	90	138	121	108	93	78
81		88	68	58	49	54	76	74	74	54	71	63	62	59	69	47	76	72		70	110	98	109	97	84	65	78	82	71	84	75	80	97	87	158	173	90	138	122	107	91	78
82		87	68	57	49	54	75	74	74	54	71	63	62	59	69	47	76	72		70	110	98	109	96	85	64	78	82	71	84	75	78	97	87	158	174	89	138	122	107	90	78
83		87	68	57	48	54	75	74	74	54	71	63	62	58	69	47	76	72		70	110	98	109	96	85	64	78	82	71	85	75	78	96	87	157	175	89	138	123	106	88	77
84		87	67	56	48	54	75	73	74	54	71	63	62	58	70	47	76	72		70	109	98	109	96	86	64	78	82	71	86	75	78	96	87	157	175	89	139	123	106	87	77
85		86	67	56	48	54	75	73	74	55	71	63	62	58	70	47	76	72		70	109	98	109	96	86	64	78	82	71	88	75	79	95	87	156	175	89	139	123	105	86	77
86		86	67	55	47	53	75	73	74	55	71	63	61	58	70	47	76	72		70	109	98	109	96	87	64	78	82	70	88	75	79	95	86	156	176	89	139	122	105	84	77
87		86	67	55	47	53	74	73	74	55	70	64	61	58	70	47	76	72		70	109	98	108	95	87	64	78	82	70	88	75	79	95	86	156	176	88	138	122	104	83	76
88		85	67	54	46	53	74	73	74	55	70	64	61	58	70	47	75	72		70	108	98	108	95	88	64	78	82	70	89	76	79	94	86	155	177	88	138	123	104	82	76
89		85	66	54	46	53	74	73	74	55	70	64	61	58	70	47	74	72		70	108	98	108	95	88	64	78	82	70	89	76	78	94	86	154	177	88	138	122	104	80	76
90		84	66	54	45	53	73	73	74	55	70	65	61	58	70	47	74	72		70	108	98	108	94	88	64	78	82	70	89	75	79	94	86	154	178	88	139	122	103	79	76
91		84	66	53	45	53	73	73	74	57	70	65	61	58	70	48	73	72		70	107	98	108	94	89	64	78	82	70	89	74	79	94	85	153	178	88	140	121	103	77	76
92		84	66	52	45	53	73	73	74	57	70	65	61	58	70	48	73	72		70	107	98	108	94	89	64	78	82	70	89	73	80	94	85	153	179	87	141	121	103	76	76
93		84	65	52	45	53	73	73	74	57	70	65	61	58	71	48	72	72		70	107	98	108	94	90	64	78	82	70	89	73	80	94	85	153	179	87	142	121	103	76	77
94		83	65	52	44	53	73	73	74	57	69	66	61	58	71	48	72	72		70	106	98	108	94	90	64	78	82	69	89	73	81	95	85	153	179	87	144	122	102	75	77
95		83	65	51	44	53	73	73	74	57	69	66	60	59	71	48	71	72		70	106	98	108	94	91	64	79	82	68	89	74	81	95	85	153	180	87	145	123	102	75	77
96		82	65	51	44	54	73	72	74	58	69	66	60	59	71	48	71	72		70	106	98	108	93	91	64	79	82	68	89	75	81	95	85	152	180	87	146	124	102	74	77
97		82	65	50	43	54	73	72	74	58	69	66	60	59	72	49	70	72		71	106	98	108	93	92	64	79	82	68	89	75	81	94	85	152	180	86	147	124	103	73	78
98		82	64	50	43	54	73	72	74	58	69	66	60	59	72	49	70	72		71	105	98	108	93	92	64	79	82	68	90	75	81	94	85	152	181	86	149	124	104	73	78
99		81	64	49	43	54	73	72	74	60	68	66	60	59	73	49	70	72		71	105	99	108	93	92	64	79	82	68	90	76	81	94	85	151	181	86	151	124	105	72	78
100		81	64	49	43	54	73	72	74	60	68	66	60	59	73	50	69	72		71	105	99	109	93	93	65	80	82	69	91	76	80	95	85	151	182	87	153	124	106	71	79
101		81	64	48	42	54	73	75	74	60	68	66	60	59	74	50	68	72		71	105	99	109	93	93	65	80	82	69	92	76	80	96	85	151	182	89	154	125	107	70	79
102		80	63	48	42	54	73	79	74	60	68	66	60	59	74	51	68	72		71	105	99	109	93	94	65	80	82	70	93	76	79	97	85	150	183	92	157	125	107	69	79
103		80	63	47	42	54	73	82	74	61	68	67	60	59	75	52	68	72		71	105	99	109	92	94	65	80	82	70	95	76	78	98	85	150	183	98	160	126	107	68	80
104		80	63	47	43	54	73	86	74	61	67	67	60	59	76	53	67	72		72	105	99	109	92	94	66	80	82	70	96	76	78	99	86	149	184	102	163	128	108	68	80
105		79	63	46	43	54	73	90	75	62	67	67	59	59	77	54	67	72		72	104	100	109	92	95	66	81	82	70	97	76	77	100	86	150	184	104	165	129	108	68	80
106		79	63	46	43	54	73	93	75	63	67	67	59	59	78	55	67	72		73	104	100	110	92	95	67	81	82	71	98	75	77	101	86	150	184	110	167	130	108	69	82
107		79	62	46	43	55	73	97	75	64	67	67	59	59	79	57	66	72		74	104	100	110	92	96	67	82	82	71	103	75	77	102	87	151	185	115	170	131	109	70	84
108		78	62	47	43	55	73	100	75	65	67	67	59	60	80	58	66	72		75	104	100	111	92	96	68	83	82	71	113	76	77	104	88	151	186	121	171	132	110	70	85
109		78	62	48	44	55	73	104	75	65	67	67	59	60	82	60	66	72		77	104	100	112	92	97	68	84	82	72	129	77	77	104	90	152	186	129	173	133	112	71	86
110		78	62	49	45	56	73	107	75	66	66	67	59	60	84	62	65	72		79	104	101	112	92	97	69	85	82	72	154	78	77	104	92	154	186	135	174	136	113	71	87
111		77		51	45	56	73	110	75	67	67	67	58	60	85	64	65	72		81	104	101	113	92	98	70	87	82	72	190	80	77	103	94	155	187	141	175	139	113	71	87
112		77		52	46	57	73	114	77	67	67	67	58	60	88	66	65	72		85	104	102	115	92	98	70	90	82	72	223	82	77	103	96	156	187	147	177	143	113	72	92
113		77		54	48	57	73	118	77	69	68	67	58	60	90	69	65	72		90	105	102	117	92	98	71	94	83	72	263	83	76	102	98	158	187	157	178	146	114	72	105
114		76		57	51	58	74	121	79	69	69	67	58	60	92	73	65	72		96	106	103	119	92	99	72	99	83	72	318	83	76	102	100	158	188	167	180	151	115	72	127
115		76		60	54	58	74	125	82	71	71	67	58	61	95	77	65	72		103	109	103	121	92	99	73	103	83	72	368	84	77	101	102	158	188	180	182	156	117	73	163
116		75		63	57	60	77	127	85	71	74	67	58	61	98	81	65	72		112	113	104	124	92	99	74	112	83	73	390	84	78	101	104	163	189	190	185	160	118	74	213
117		75		68	62	60	79	136	93	72	77	68	58	61	101	86	65	72		121	120	104	128	92	99	75	122	83	74	400	84	79	102	106	171	190	210	190	164	119	76	267
118		75		72	68	61	85	142	105	73	83	68	59	61	104	93	65	72		132	136	105	131	92	100	77	143	84	76	415	85	80	103	111	179	191	223	196	167	120	81	336
119		75		77	74	62	88	147	119	74	91	68	60	61	107	103	66	72		153	166	105	136	92	100	80	170	84	78	425	86	81	103	119	202	192	250	201	170	122	98	478
120		74		82	78	63	93	159	142	75	98	69	61	62	110	115	66	73		158	230	106	141	92	100	84	310	84	86	441	87	84	102	129	239	193	275	205	171	123	140	829

Table D-1: Daily Average Flow Rates (m^3/s) at the Site 'Peel River above Fort McPherson' (10MC002: 67°14'33" N, 134°53'20" W)

JULIAN DAY	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
121				88	90		102	170	167	77	106	70	62	62	113	130	66	73		159	490	106	147	92	101	95	600	85	97	461	87	85	101	137	285	194	308	209	173	125	230	1640
122				93	99		108	198	192	79	118	71	64	63	116	145	67	74		165	1010	107	157	92	101	122	1100	85	115	506	87	87	101	141	410	195	360	213	176	128	419	2290
123				101	111		119	227	227	82	130	72	66	63	119	165	68	74		163	2020	107	172	92	101	163	2000	85	137	648	87	90	100	145	737	196	378	216	179	131	853	2480
124				108	123		130	269	266	85	144	73	68	64	122	185	68	74		150	2260	108	250	92	102	250	3370	86	168	1100	85	93	100	148	1040	198	480	220	181	134	1670	2250
125				116	136		147	311	326	89	161	74	70	64	126	210	69	75		136	2370	109	400	93	102	390	4000	86	227	1300	84	96	100	150	1040	199	768	224	184	138	2000	2010
126				125	150		170	402	396	93	181	76	75	65	130	245	70	76		126	2460	110	800	93	103	640	4000	86	455	1400	84	101	100	154	915	200	1320	229	186	143	1900	1790
127				134	165		224	566	467	101	210	78	100	66	135	290	73	78		124	2530	111	2500	93	103	1020	3970	87	777	1420	84	108	100	160	771	202	2090	238	190	151	1620	1600
128				144	184		249	850	566	108	241	81	400	67	140	340	76	80		134	2580	112	5000	93	104	1900	3820	87	861	1450	83	116	97	169	654	204	2860	251	194	160	1400	1490
129				155	204		274	1200	708	114	283	88	1500	68	145	400	80	82		144	2480	113	7400	94	106	2700	3630	88	780	1490	81	132	94	186	587	207	3140	265	204	169	1300	1430
130				168	227		345	2000	850	125	340	100	1800	69	151	480	85	84		147	2360	115	7000	96	110	2620	3400	88	671	1850	83	167	92	230	573	210	3290	285	221	188	1320	1380
131				181	255		504	2700	1000	133	411	150	2000	71	157	580	97	86		158	2190	118	6000	97	121	2400	3200	90	589	2600	81	232	92	323	607	213	3310	334	254	237	1490	1320
132				196	289		971	2400	1200	147	510	200	1900	73	164	700	110	89		212	2010	121	5000	98	146	2160	3020	91	539	3400	81	335	94	452	746	217	3550	457	312	366	1790	1270
133				214	337		1500	2200	1500	159	623	300	1600	76	172	850	152	91		306	1870	125	4040	99	183	1980	2900	93	525	4200	91	640	99	625	1590	222	3600	722	421	558	1960	1230
134				232	385		2300	2000	1900	170	793	450	1300	78	180	1050	215	95		503	1750	130	3380	100	260	1820	2800	96	564	3700	127	1180	107	935	2280	227	3630	1590	567	827	2000	1260
135				255	453		2500	2100	2300	184	1000	650	1100	82	189	1300	305	99		1200	1660	136	2980	101	760	1680	2720	100	1140	3120	285	1320	124	1100	2320	235	3640	2850	818	1180	1970	1550
136				282	515		2350	3000	3000	201	1300	900	900	87	199	1650	445	104		1820	1580	147	3360	103	4200	1530	2690	105	2080	2730	1390	1210	149	1400	2200	246	3650	4910	1040	1640	1870	1970
137				311			2250	3600	4000	227	1900	1400	700	95	210	2200	680	109		2100	1530	167	3440	106	6000	1440	2780	111	4260	2860	2000	1030	182	2000	2080	270	3640	5700	1100	2250	1780	2190
138				345			2200	4200	5000	249	2400	2000	500	103	222	2800	1080	115		2080	1500	177	3390	110	5600	1400	2770	118	6660	3030	2030	886	212	2700	2110	360	3620	6100	1090	2970	1720	2120
139				385			2400	4090	5700	275	4200	2700	1000	116	235	3500	1800	122		2130	1510	220	3470	116	4400	1460	2220	130	7000	3140	1780	778	235	3350	2280	1000	3600	6400	1080	3300	1770	2130
140				385			2800	3900	6000	311	4300	3700	2000	130	250	4400	3000	133		2190	1590	420	3580	122	3400	1580	1790	150	6800	3480	1600	720	262	3200	2840	3800	3580	6500	1070	3700	2020	2200
141				385			4000	3550	5800	354	4250	4500	3000	154	270	5000	5500	142		2270	1740	800	3800	131	2800	1720	1530	185	5700	3570	1410	717	309	3100	3640	6200	3550	6450	1100	4000	2340	2360
142				391			3900	3760	5500	416	4200	5600	4000	192	300	4800	6300	165		2380	1890	1650	3800	170	2550	1950	1360	250	5670	3680	1250	1300	386	2960	4450	4360	3480	6000	1260	3950	2700	2320
143							3500	4220	4800	476	4250	6200	4500	360	340	4700	6500	200		2580	1960	2500	3110	220	2450	2000	1200	390	5800	3640	1230	2670	500	2720	3940	3950	3400	5600	1490	3900	2930	2400
144							3050	3500	4000	538	4100	6500	4000	770	400	4400	6400	250		3350	2040	3280	2290	285	2380	1940	1040	500	5210	3540	1630	3700	909	2630	2740	3200	3350	5000	1830	3760	3240	2220
145							3000	3290	3590	637	4000	6300	4180	1300	500	4100	6100	315		4330	2070	3900	1880	430	2350	1860	999	750	5080	3300	1920	3720	1800	2740	2130	3000	3280	5100	2850	3500	3880	1950
146							3300	3650	3770	750	4050	6000	3490	2000	700	3900	5500	420		4280	1910	4450	1690	850	2340	1750	1240	1300	4700	3020	1910	3300	2510	2490	1850	2950	3100	5400	4250	3350	3770	1660
147							3800	3550	4220	861	4300	5600	2770	3500	1000	3600	5000	630		4450	1630	5090	1630	3000	2450	1630	1380	3500	4340	2960	1720	3600	3220	2440	1850	2990	2970	5600	4480	3150	3390	1460
148							4600	3240	5000	1000	4600	5200	2400	5000	1500	3400	4700	1000		4490	1390	5580	1710	8600	3000	1530	1370	4400	4070	3130	1740	4310	4300	2410	2470	3050	2870	5500	3570	2950	3760	1350
149							5200	3090	5300	1200	4850	4700	2260	6000	3500	3100	4300	1500		4600	1340	5780	1780	8700	3380	1490	1550	4440	3870	3350	1730	3930	5410	2270	3070	3100	2820	5240	3340	2700	3700	1340
150							5800	3130	4950	1500	4900	4200	2200	7500	5000	2900	4000	2100		4370	1360	5530	1840	8800	4300	1470	1630	4470	3790	3270	1810	2670	5230	2290	3320	3200	2850	4560	3290	2500	3290	1370
151							6000	2760	4860	1800	4500	3800	2200	7400	6000	2700	4300	3000		4050	1420	5090	1970	8600	4620	1460	1580	4440	3640	2940	1690	2040	4850	2210	3300	3260	2660	3820	3160	2350	2870	1370
152							5800	2680	4930	2200	4000	3300	2220	7000	5700	2550	4700	4400		3780	2670	4670	2160	8400	3850	1480	1410	4400	3730	2640	1600	2330	5050	2140	3240	3330	2500	3380	2650	2200	2720	1370
153							5500	3500	4810	4500	3800	2880	2120	6000	5800	2400	4800	5500		3420	2680	4170	2450	8000	3130	1840	1230	4200	2810	2720	1500	3060	5570	2020	3150	3280	2370	3070	2310	2030	2760	1400
154							5000	4090	4600	6000	3300	2350	2060	5800	5850	2230	4600	5400		3130	2740	3790	2550	7500	2880	2230	1110	4000	1950	3650	1450	3990	5810	2030	3000	3190	2320	3250	2190	1750	2460	1420
155							4800	3820	4160	5900	2900	2520	1940	5600	5500	2140	4200	5200		2980	2350	3360	2260	6860	2840	2100	1110	3750	1490	3060	1480	4180	5800	1970	2850	2930	2320	3560	2110	1470	2170	1360
156							4700	3310	3720	5000	2800	2850	1710	5400	5000	1980	3800	5000		2900	1990	2970	1910	6040	2940	1830	1280	3500	1330	2280	1700	3830	5740	1700	2530	2630	2240	3150	2010	1300	2070	1270
157							4700	2840	3340	5200	2580	2970	1720	5000	4000	1740	3900	4800		2940	2060	2700	1710	4990	3080	1660	1220	3050	1310	1840	2450	3460	6270	1660	2190	2500	2140	2850	1960	1230	2080	1210
158							4600	2440	3040	5000	2240	2820	2670	4330	3300	1520	4000	4600		2820	2700	2520	1670	4200	3010	1720	1100	2740	1530	1570	2520	3450	6370	1670	1980	2570	2030	2480	2060	1210	2100	1140
159							4400	2190	2950	4400	2000	2950	3240	3690	2970	1430	3900	4220		2770	2470	2260	1690	3760	2970	2030	1110	2140	1900	1420	2040	3740	5700	1610	1930	2410	2240	2140	2170	1170	2070	1050
160							4300	2090	2750	4210	1860	3120	2890	3390	2610	1460	3550	3810		2560	2400	2040	1710	3340	3270	2170	1230	1820	2020	1330	1590	4080	5230	1590	2170	2280	3920	1910	2120	1080	2020	956
161				4010		2030	4200	2220	2600	4460	1750	3520	2430	3330	2220	1620	2660	3200		2610	2530	1870	1640	2880	3450	2250	1260	1620	2030	1250	1380	4080	5170	1540	2280	2140	3520	1750	1840	975	1930	891
162				3900		1800	4100	2430	2450	3860	1660	3790	2190	3150	1930	2220	1900	2700		2850	2360	1830	1570	2460	2930	2090	1320	1610	2000	1250	1370	4040	5180	1530	2200	1910	2820	1720	1480	905	1700	875
163				3930		1480	4000	2180	2210	2990	1580	3520	1900	2970	1770	3000	1480	2300		2660	2010	1800	1640	2260	2360	1870	1380	2330	1840	1220	1430	3930	5010	1570	2150	1680	2360	1840	1220	864	1610	834
164				3980		1300	4000	1840	1990	2370	1520	2850	1630	2930	1660	3300	1260	1810		2400	1790	1690	1870	2010	2050	1720	1350	3620	1700	1230	1640	3720	4910	1730	2010	1510	2120	2030	1070	862	1560	857
165				4010		1270	3800	1540	1850	2210	1640	2220	1430	3120	1770	3160	1170	1570		2140	1660	1570	1860	1940	1910	1630	1410	3470	1720	1250	1850	3550	5050	1780	1710	1380	1990	2180	986	867	1480	940
166				3540		1300	3600	1280	1780	2060	1610	1960	1270	3440	1830	3000	1140	1430		1890	1780	1490	1700	2160	1780	1560	1620	2860	3440	1130	1920	3260	5190	1820	1410	1330	1870	2250	981	859	1420	1070
167				3250		1290	3400	1090	1790	2140	1410	2690	1150	4540	1780	3260	1150	1420		1760	2620	1480	1580	2560	1630	1450	1610	2430	4550	1020	1880	3110	5070	1820	1200	1300	1700	2220	975	828	1700	1140
168				3100		1290	3500	954	1810	2360	1250	3160	1040	4480	1790	3540	1150	1460		1680	2840	1690	1590	3000	1510	1330	1390	2120	4850	965	1790	3250	4820	1830	1100	1260	1540	2140	994	775	1720	1090
169				2840		1370	3600	895	1820	2100	1110	2950	937	3840	2070	3940	1200	1510		1640	2690	2290	1690	3380	1430	1310	1320	1860	4160	932	1630	3640	4190	1820	1120	1200	1440	2090	960	713	1760	1060
170				2530	1800	1490	3400	954	1810	1740	1020	2690	845	3250	2510	3620	1360	1560		1660	2300	2440	1810	3260	1380	1480	1700	1630	3550	920	1520	3960	3330	1730	1180	1140	1310	2040	891	660	1650	1280
171				2140	1650	1680	3100	1110	1770	1920	1060	2430	753	2780	2320	2890	1620	1640		1670	1970	2320	1830	3440	1350	1680	2860	1460	3240	1020	1470	4420	2720	1760	1230	1070	1220	2030	819	622	1510	1420
172				1840	1580	1670	2900	1410	2650	2790	1190	2370	684	2810	2070	2400	2080	1700		1540	1730	2360	1780	4340	1280	1710	2580	1320	3100	1150	1320	4570	2390	1840	1220	1050	1140	1990	749	646	1410	1300
173				1660	1760	1440	2800	1800	2910	3290	1380	2130	640	3290	1910	2090	2260	1750		1450	1520	2270	1780	3910	1180	1850	1920	1220	2910	1180	1130	4160	2240	1700	1220	1060	1080	1810	677	681	1390	1140
174				1390	2210	1230	2700	2420	3300	3240	1570	1720	604	3420	1980	1800	2180	1630		1440	1350	1990	1800	3280	1080	2460	1450	1170	2660	1140	1040	3400	2150	1490	1160	1040	1010	1720	626	720	1360	1030
175				1140	2660	1130	2560	2400	3030	2860	1670	1410	603	3060	2320	1580	2030	1500		1430	1210	1800	1820	2940	962	3010	1180	1170	2450	1930	987	2910	2100	1390	1080	996	951	1680	581	750	1330	942
176		1860		997	2810	1070	2510	2120	2710	2670	1800	1240	803	2570	2520	1480	1920	1290		1330	1270	2520	1800	2800	874	3090	1240	1210	2420	5050	929	2700	1980	1310	990	950	888	1620	545	722	1320	900
177		2630		1040	2970	1010	2450	1930	2530	3500	1830	1150	959	2110	2280	1410	1780	1270		1230	2550	4320	1690	2580	818	2680	1560	1200	2310	5850	868	2460	1730	1180	936	921	834	1490	546	687	1350	963
178		2840		1280	3060	951	2240	1780	2360	3870	1690	1090	934	1780	1920	1380	1610	1500		1600	2590	3440	1600	2460	820	2700	1940	1160	1960	4470	816	2180	1480	1100	959	898	783	1560	632	664	1490	1130
179		2700		2000	3030	915	2140	1580	2140	3870	1580	1060	944	1570	1680	1330	1490	1600		2140	2640	2570	1510	2590	928	2990	1830	1100	1630	3220	764	1930	1310	1100	1060	868	731	2390	968	672	1610	1270
180		2360		3370	2460	892	2290	1440	1850	3610	1570	1000	1070	1440	1500	1720	1360	1320		2130	2290	1990	1440	2360	1080	2870	1700	1060	1430	2360	699	1800	1190	1070	1100	819	687	3650	1410	693	1620	1480

Table D-1: Daily Average Flow Rates (m^3/s) at the Site 'Peel River above Fort McPherson' (10MC002: 67°14'33" N, 134°53'20" W)

JULIAN DAY	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
181		1910		3790	1940	949	2450	1390	1670	3680	1620	957	1370	1400	1420	2280	1230	1350		1930	1860	1640	1380	2010	1070	2470	1520	995	1300	1810	653	1760	1110	1020	1150	781	658	3870	1230	717	1830	1530
182		1590		3490	1680	1210	2210	1340	1760	3440	1650	925	1640	1430	1420	2240	1150	1220		1790	1590	1420	1260	1790	1030	2220	1270	1130	1260	1460	634	1920	1080	959	1120	750	643	3330	1140	760	1800	1630
183		1430		2830	1580	1490	1940	1270	1980	2870	1680	892	2370	1340	1300	1950	1170	1110		1600	1420	1250	1140	1700	1020	2070	1050	1270	1230	1250	619	2120	1100	907	1030	710	632	2940	1090	828	1510	1780
184		1330		2160	1530	1500	1790	1230	2320	2430	1810	872	3050	1320	1160	1860	1270	1030		1400	1280	1130	1050	1670	1040	1880	915	1210	1130	1100	593	2200	1150	896	960	660	631	2440	1120	1120	1250	1720
185		1230		1730	1530	1350	1940	1160	2410	2280	2180	868	3000	1470	1060	2050	1430	1000		1250	1150	1030	1020	1630	1070	1700	818	1030	1090	1020	526	2030	1140	924	931	618	644	2060	1080	1130	1080	1680
186		1380		1450	1500	1160	2420	1110	2320	2100	2350	900	2860	1440	984	1770	1600	960		1210	1150	943	1030	1580	1140	1530	752	902	1080	990	463	1840	1140	921	948	584	673	1870	975	1150	983	1670
187		1550		1220	1390	1120	2170	1100	2100	1880	2150	885	2940	1270	913	1420	1510	930		1180	1070	885	968	1490	1160	1360	709	829	1110	938	421	1780	1180	939	1600	553	777	1820	882	1860	932	1580
188		1650		1050	1350	1280	1970	1280	1700	1620	2310	870	2850	1130	862	1340	1340	880		1160	934	837	913	1390	1120	1780	671	791	1100	901	398	1820	1340	1000	2140	537	984	1690	819	1730	902	1450
189		2200		917	1280	1250	1870	1260	1530	1400	3270	1030	2600	1200	814	1300	1250	824		1140	844	799	899	1280	1070	2810	634	764	1060	920	386	2150	1790	1010	1880	549	1030	1530	845	1370	870	1320
190		2890		816	1240	1220	1710	1210	1420	1250	3920	1060	2290	1220	761	1250	1170	770		1100	777	762	862	1160	1410	4170	599	743	996	934	388	2950	2110	940	1640	558	983	1400	924	1130	825	1190
191		2790		748	1190	1310	1530	1110	1300	1140	4040	957	2010	1250	709	1240	1040	735		1070	728	737	852	1050	1830	4080	571	742	949	887	385	3410	2050	865	1870	561	923	1270	926	1100	801	1080
192		2370		702	1110	1370	1370	991	1130	1060	3520	879	1780	1210	672	1230	926	734		1050	694	735	898	954	1730	2880	552	796	909	821	401	2820	1890	845	1890	584	890	1160	890	1330	820	1010
193		1850		651	1050	1350	1290	892	1020	983	2890	873	1590	1190	656	1220	848	789		1010	707	734	929	880	1450	2100	542	941	955	782	427	2210	1720	955	1680	596	842	1080	871	1370	963	932
194		1490		603	1030	1330	1200	850	850	915	2530	1060	1470	1190	641	1230	796	878		984	736	706	921	853	1230	1610	530	1060	975	789	458	1960	1550	1450	1640	592	788	1010	852	1400	1140	861
195		1260		558	1060	1280	1120	850	793	864	2370	1230	1500	1190	660	1260	791	893		985	752	682	880	850	1080	1330	521	1070	918	1130	455	2060	1460	1530	1810	565	746	948	842	1460	1250	832
196		1110		521	1170	1170	1060	838	682	821	2180	1110	1560	1010	686	1290	824	846		1000	757	668	838	821	948	1200	518	1010	893	1400	452	2570	1370	1340	1850	524	709	916	818	1540	1290	829
197		991		504	1160	1040	1180	799	654	784	1900	956	1430	862	683	1330	808	829		975	734	645	929	810	877	1230	520	984	914	1250	475	2920	1280	1180	1880	488	686	909	780	1570	1270	806
198		966		496	1040	915	1550	756	617	807	1880	862	1260	923	647	1410	792	855		920	716	621	1160	827	822	1450	543	1060	891	1060	510	2910	1220	1120	1820	465	673	913	773	1390	1490	853
199		1110		496	974	813	1930	745	592	994	2230	805	1170	1160	649	1530	790	842		901	711	602	1210	805	763	1550	632	1500	944	934	496	2590	1170	1050	1810	448	675	931	854	1190	1470	964
200		1350		504	966	739	1930	770	580	1010	2160	764	1330	1430	704	1710	806	806		996	685	578	1110	770	714	1590	783	1600	958	859	463	2100	1120	991	1800	430	669	923	999	1090	1270	1070
201		1330		527	963	697	1600	767	566	906	2400	721	1860	1530	731	2100	872	756		1130	656	549	1020	740	681	1500	834	1350	929	801	450	1730	1070	909	1810	429	662	884	1010	1090	1100	1110
202		1160		595	977	668	1310	736	555	807	3340	677	2760	1460	730	2370	894	730		1110	625	527	1020	725	653	1350	901	1150	941	746	574	1550	1040	856	1630	438	661	842	985	1060	976	1040
203		1250		631	1150	711	1140	725	552	739	3390	638	3510	1290	761	2120	859	749		1050	596	509	1200	730	644	1200	1010	1010	1030	701	696	1670	1000	847	1400	442	659	808	911	1040	886	961
204		2580		631	2020	971	1060	719	569	705	2730	612	3430	1050	830	1980	796	916		1150	586	492	1210	750	636	1120	1350	913	1050	689	671	1940	973	899	1220	435	637	813	832	1070	826	1170
205		2230		765	2830	1140	1040	697	592	694	2200	600	3100	862	874	1810	733	1140		1320	615	482	1140	760	611	1090	2120	840	1460	704	670	2030	981	920	1110	418	608	896	765	1180	771	1280
206		1550		892	2280	1180	1090	665	637	705	1900	579	2780	820	858	1670	683	1130		1470	618	478	1050	752	586	1020	1960	788	2220	719	992	1860	982	908	1050	401	575	969	711	1340	721	1420
207		1210		835	1610	1460	1130	637	705	793	1730	551	2420	804	841	1560	639	1050		1650	611	498	973	729	572	944	1750	757	2510	738	1350	1590	1010	1010	1000	399	546	1090	667	1390	680	1740
208		1030		750	1250	1710	1160	617	745	787	1590	532	2150	799	846	1460	617	1050		1640	601	556	908	697	563	874	1860	739	2210	735	1330	1520	1070	1080	959	404	521	1060	651	1370	653	1990
209		923		685	1060		1210	603	748	719	1440	518	2090	839	843	1350	626	1100		1500	585	625	867	673	560	823	2250	714	1800	724	1160	2090	1670	1130	912	417	503	964	674	1310	621	1990
210		835		629	957		1250	600	739	657	1520	549	2310	976	805	1670	653	1350		1340	585	872	815	646	558	795	2060	686	1500	742	1050	2220	2170	1280	873	423	484	1020	741	1200	584	1880
211		759		600	920		1370	589	725	612	1770	616	2350	969	757	2130	671	1550		1200	623	1030	790	651	561	766	1690	673	1370	790	989	2230	2030	1780	843	423	466	1270	773	1150	548	1840
212		705		600	878		1430	564	705	580	2190	648	2050	936	772	2290	659	1330		1100	655	957	813	720	568	737	1410	664	1320	793	948	2220	1800	1990	823	408	483	1210	749	1340	521	2390
213		680		620	816		1320	541	677	549	2250	831	1790	957	855	2200	643	1130		1050	629	1140	859	768	558	709	1200	668	1290	752	879	2370	1670	1770	808	406	579	1070	733	1600	504	2220
214		685		646	762		1170	518	646	527	2060	1180	1680	1040	851	2080	666	947		1020	586	1710	922	756	547	694	1070	728	1200	709	796	2650	1620	1490	832	509	573	984	738	1560	531	1840
215		702		671	728		1120	496	617	515	2120	1190	1550	1340	824	1810	860	837		1020	554	1790	994	803	538	707	1010	776	1100	672	726	2350	1570	1280	892	693	564	999	736	1430	559	1600
216		699		714	705		1110	479	597	527	2210	1350	1450	1620	809	1530	999	762		997	539	1690	1250	795	532	737	1040	801	1040	640	672	2050	1500	1140	952	766	571	1100	741	1300	595	1380
217		711	1700	1030	691		1100	467	580	555	2180	2130	1480	1530	820	1320	938	696		965	539	1460	1600	765	519	727	1100	809	1050	617	624	2080	1380	1070	958	825	574	1260	754	1250	640	1180
218		770	2210	1130	790		1090	467	564	586	2160	2510	1640	1470	885	1150	864	656		930	682	1300	1380	793	511	708	1220	831	1070	601	579	1990	1250	1050	938	884	579	1240	790	1160	656	1060
219		818	1950	980	1010		1080	467	544	603	2110	2360	1640	1450	886	1030	806	654		907	979	1300	1420	820	547	678	1360	1050	1150	589	541	1720	1150	1040	940	853	590	1180	839	1250	628	1050
220		813	1600	841	1040		1060	501	527	614	2140	2140	1480	1330	837	978	743	646		888	992	1290	1440	790	576	652	1370	1210	1280	577	505	1650	1070	981	984	778	624	1130	891	1410	587	1040
221		799	1360	739	1160		1040	578	513	617	2230	1830	1310	1180	788	958	687	627		870	883	1200	1360	738	700	635	1290	1220	1340	566	480	1670	1030	959	1010	697	661	1100	1210	1350	560	1080
222		776	1530	691	1610		1030	637	507	671	2250	1500	1170	1050	759	931	640	663		849	800	1140	1310	688	904	614	1170	1310	1370	556	476	1610	1000	1030	1000	628	680	1120	1200	1340	568	1250
223		827	2420	714	2220		1080	640	493	753	1980	1250	1060	943	736	916	609	703		819	794	1070	1240	648	940	593	1040	1240	1290	543	519	1480	966	1170	967	573	703	1240	1070	1650	587	1280
224		1350	2900	793	2390		1130	603	484	745	1710	1090	1040	881	773	913	591	688		814	755	1000	1160	620	893	585	938	1160	1250	537	566	1360	924	1350	1000	532	697	1240	957	2030	652	1190
225		2080	2960	833	2220		1180	722	473	691	1510	1030	1080	842	1660	983	582	657		865	686	938	1110	617	829	591	873	1130	1190	619	578	1280	881	1550	1040	499	659	1150	857	2180	760	1120
226		2110	2490	796	2250		1230	2460	467	634	1340	1010	1090	820	1830	1250	579	704		990	636	893	1040	635	768	699	823	1190	1160	671	588	1240	855	1660	975	470	624	1130	776	2210	794	1200
227		1750	2040	736	3090		1170	3220	464	589	1220	955	1070	823	1500	1490	571	2480		1020	603	847	1090	657	721	1100	778	1190	1160	674	603	1250	820	1700	923	461	593	1290	712	2020	795	1200
228		1800	1800	694	3430		1110	3880	467	552	1140	910	1030	790	1220	1490	573	4410		969	587	796	1140	661	684	1720	752	1130	1240	672	644	1530	814	1900	962	489	569	1340	676	1760	804	1120
229		1440	1780	688	2890		1050	3340	464	538	1080	947	1050	750	1030	1360	619	3850		947	586	748	1120	641	653	1630	743	1100	1460	667	919	2360	882	2120	969	497	552	1300	711	1540	836	1030
230		1460	1740	688	2280		991	2590	459	527	1020	1160	1090	738	923	1220	646	3110		932	577	709	1260	623	623	1480	730	1120	1470	656	1090	2850	853	2420	933	481	535	1310	783	1450	894	949
231		1560	1630	699	1850		934	2040	462	507	954	1650	1120	792	875	1110	654	2740		905	558	680	1580	621	601	1360	712	1130	1550	679	1190	2510	821	2510	923	463	522	1340	809	1410	1130	910
232		1420	1530	739	1970		875	1700	487	490	903	1850	1160	1000	846	1020	669	2380		877	544	677	1750	624	585	1260	707	1140	1680	833	1270	2100	798	2500	1010	442	521	1380	859	1390	1320	1210
233		1200	1400	886	3570		818	1790	507	470	863	1860	1120	1190	806	945	669	2070		829	594	754	1940	633	569	1170	715	1200	1700	906	1190	1800	776	2370	1160	422	526	1370	841	1500	1320	2210
234		1070	1290	1110	3910		759	1830	507	456	835	2230	1060	1290	755	893	642	1960		855	738	1270	1810	674	550	1090	736	1290	1530	869	1050	1670	748	2210	1370	406	523	1260	844	1590	1390	2310
235		1030	1760	1070	3310		855	1720	496	442	813	2600	1010	1280	712	861	624	1930		1010	848	1880	1590	700	533	1020	767	1370	1340	803	978	1590	720	2100	1480	391	514	1150	844	1510	1430	2070
236		994	2370	943	2730		954	1530	481	433	804	2640	990	1210	679	841	607	2010		1220	1010	1900	1640	684	512	957	776	1390	1200	739	1040	1520	697	2130	1430	381	499	1070	820	1400	1310	1900
237		957	2260	858	2600		1050	1310	470	430	787	2450	959	1110	655	831	595	1900		1400	1010	1670	1580	653	495	913	772	1340	1100	693	1150	1490	677	2300	1330	380	484	1040	773	1300	1160	1750
238		943	1850	813	2730	2270	1150	1140	462	450	768	2260	916	1010	633	838	619	1670		1360	909	1420	1470	615	488	936	772	1260	1040	667	1130	1480	657	2380	1240	379	475	1030	717	1220	1070	1650
239		915	1550	830	2860	1980	1250	1020	456	496	764	2060	866	911	627	1080	645	1460		1310	811	1220	1440	576	495	931	800	1300	1020	656	1050	1440	642	2310	1150	378	469	1040	667	1200	1110	1640
240		881	1380	847	3060	1760	1340	934	450	572	764	1760	818	838	636	1370	657	1340		1270	732	1100	1370	550	581	893	854	1460	1030	648	1060	1410	631	2170	1070	377	469	1140	626	1630	1730	1570

Table D-1: Daily Average Flow Rates (m^3/s) at the Site 'Peel River above Fort McPherson' (10MC002: 67°14'33" N, 134°53'20" W)

JULIAN DAY	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
241		841	1280	903	3060	1570	1290	861	447	648	766	1500	778	776	656	1470	663	1290		1180	671	1020	1240	534	741	856	857	1550	1060	644	1050	1490	620	1980	1010	375	501	1290	589	2100	1980	1460
242		793	1190	917	3570	1460	1240	799	442	770	769	1330	746	729	671	1440	654	1260		1090	630	967	1140	525	840	859	843	1480	1210	643	990	1500	615	1780	957	363	559	1310	559	1980	1780	1360
243		759	1120	929	3510	1570	1190	753	436	762	786	1210	725	689	678	1340	637	1310		1030	597	928	1050	534	878	931	893	1360	1260	652	936	1460	613	1590	913	351	595	1250	535	1740	1600	1320
244		753	1080	937	3030	1580	1140	716	433	682	1250	1130	703	665	669	1160	627	1400		1020	573	905	978	576	876	1150	1280	1290	1190	643	896	1390	610	1460	884	342	590	1200	517	1510	1620	1240
245		801	1160	903	2540	1410	1080	697	425	609	1650	1060	676	658	667	1090	622	1340		1080	569	888	936	621	855	1240	1980	1260	1110	642	891	1280	626	1380	850	333	572	1180	496	1320	1920	1230
246		869	1400	957	2150	1270	1030	722	422	558	1630	986	649	689	664	1000	632	1210		1190	595	864	890	646	878	1160	2340	1230	1030	637	919	1170	809	1340	857	328	565	1180	474	1180	1950	1200
247		940	1830	951	1870	1180	1140	736	422	515	1500	923	626	732	688	953	720	1090		1330	618	853	845	666	1130	1060	2190	1220	965	626	909	1080	1910	1340	978	329	568	1170	456	1080	1800	1180
248		1060	2050	1130	1640	1110	1240	739	419	487	1380	887	602	753	743	943	1060	1000		1500	608	848	816	686	1450	1010	2040	1260	942	615	868	1020	2250	1310	1150	333	571	1180	442	1000	1610	1180
249		1140	2110	1330	1440	1070	1190	731	411	464	1430	877	579	754	767	973	1120	935		1670	588	841	783	700	1500	956	1910	1300	927	605	822	961	2000	1250	1220	355	564	1200	431	936	1450	1210
250		1140	1950	1250	1290	1010	1140	731	402	453	1470	862	556	755	755	1020	1040	877		1630	619	857	753	698	1370	896	1740	1430	892	597	797	915	1670	1190	1220	379	548	1160	420	881	1320	1190
251		1170	1700	1150	1180	951	1080	773	394	456	1410	844	538	753	727	1020	953	823		1560	636	959	703	682	1200	850	1600	1440	881	589	783	880	1430	1120	1180	382	531	1100	410	831	1210	1130
252		1180	1490	1040	1130	895	1030	767	391	462	1290	819	525	750	698	971	883	779		1890	628	1220	680	655	1070	835	1550	1320	973	592	763	855	1340	1070	1120	374	518	1050	401	790	1120	1070
253		1120	1360	946	1130	844	1110	731	379	487	1170	791	523	748	668	928	845	742		1870	612	1380	666	625	967	822	1610	1190	1120	602	725	883	1590	1050	1060	367	526	1140	390	756	1040	1020
254		1020	1270	898	1140	787	1190	688	377	549	1070	761	567	746	638	910	862	708		1600	594	1320	661	603	909	805	1680	1100	1210	632	693	1000	1670	1090	1020	361	541	1220	385	728	981	982
255		920	1210	875	1140	745	1270	648	377	578	996	740	619	744	619	958	983	696		1390	584	1190	663	569	869	780	1890	1040	1180	681	680	1070	1480	1120	998	352	562	1250	385	708	932	958
256		855	1170	852	1110	711	1230	626	374	578	938	724	634	742	600	1030	1270	715		1240	606	1080	691	541	835	748	2190	995	1150	725	672	1050	1300	1130	977	343	594	1280	402	707	900	949
257		900	1120	841	1060	680	1190	620	377	552	891	716	639	741	580	1040	1430	710		1160	693	1010	762	521	816	713	2340	973	1170	774	650	1000	1170	1100	949	333	682	1270	463	735	915	932
258		951	1090	847	1010	657	1330	617	385	527	857	704	652	713	567	985	1390	683		1130	804	994	829	500	810	687	2290	960	1170	820	620	964	1080	1050	924	326	777	1240	505	803	998	900
259		1070	1030	929	946	646	1460	606	411	513	835	698	667	677	548	942	1260	661		1100	848	962	885	488	882	662	2040	955	1130	831	597	923	1010	1000	903	318	850	1200	515	962	1040	869
260		1100	971	1180	900	685	1380	592	436	527	832	664	674	645	534	916	1130	650		1060	904	999	888	469	932	642	1750	929	1070	824	581	915	945	955	878	311	900	1130	526	1090	1050	846
261		1080	932	1550	861	716	1310	592	445	535	918	640	674	627	518	914	1100	641		997	907	1350	870	450	926	622	1550	910	1020	807	577	979	888	910	845	301	914	1060	532	1150	1120	824
262		1100	974	1730	821	714	1230	600	450	549	1070	620	671	609	502	925	1180	630		935	848	1360	912	437	913	614	1380	889	960	791	575	1050	841	878	814	286	951	999	547	1150	1520	805
263		1030	1020	1610	787	702	1170	603	450	586	1160	598	669	593	490	902	1180	619		888	776	1230	925	421	981	614	1240	888	902	773	565	1090	804	866	780	276	955	943	563	1120	1910	797
264		946	994	1360	759	677	1100	583	447	637	1220	575	701	579	476	882	1090	603		849	703	1120	965	404	1010	608	1130	951	851	746	577	1070	771	881	756	267	923	897	572	1090	2030	786
265		886	926	1160	736	660	1050	555	453	651	1250	555	695	569	462	832	1000	586		812	639	1040	1020	389	956	600	1050	1190	822	721	635	1010	742	888	728	260	909	854	568	1100	1910	762
266		810	861	1010	716	660	1040	527	453	646	1210	532	680	560	450	783	951	579		787	587	999	1010	376	894	605	973	1750	795	699	686	956	716	866	699	255	971	821	562	1170	1760	731
267		759	801	883	714	648	1010	504	439	648	1120	512	664	552	438	733	880	597		797	548	1020	964	360	834	624	914	1760	762	686	725	1140	693	826	678	251	1030	795	554	1410	1630	702
268		691	753	782	716	646	977	498	433	640	1040	496	650	545	426	684	824	595		826	518	1190	931	356	773	644	868	1510	738	680	758	1570	677	782	665	249	1060	785	548	1520	1520	673
269		623	714	705	711	646	946	501	430	637	964	480	630	540	412	634	774	567		823	500	1760	879	348	713	639	836	1330	716	668	759	1690	662	740	636	247	1120	777	528	1430	1410	654
270		566	688	654	691	640	915	493	445	680	909	464	608	553	400	620	751	539		796	508	1920	833	342	656	625	813	1210	697	654	754	1500	646	710	606	248	1210	766	500	1290	1290	632
271		527	663	623	668	623	864	479	476	694	865	450	592	559	390	590	774	515		764	533	1810	798	335	614	602	809	1100	691	651	739	1310	627	693	584	251	1260	752	477	1170	1200	608
272		518	640	586	640	592	796	470	501	702	827	436	577	552	380	560	794	488		735	554	1620	773	330	588	582	809	1010	701	659	696	1180	607	692	565	253	1190	741	461	1070	1110	579
273	575	515	617	555	617	555	759	476	535	736	805	420	563	544	370	535	863	464		705	574	1450	754	326	558	564	824	934	721	659	648	1080	591	700	556	251	1110	746	442	992	1050	556
274	561	510	592	538	600	541	762	541	583	779	807	408	546	536	360	512	931	444		678	577	1300	747	321	532	543	829	872	736	638	602	1010	572	724	577	250	1030	769	417	931	977	542
275	552	521	569	513	586	510	739	592	648	756	806	395	537	519	350	493	947	428		651	553	1170	736	320	511	508	806	826	730	604	552	943	561	748	710	251	957	784	398	872	905	528
276	535	538	549	504	580	473	728	603	680	699	801	382	518	507	340	468	900	408		617	527	1080	709	319	499	481	778	777	719	573	487	873	543	736	994	243	878	779	387	814	841	514
277	518	580	532	484	592	419	722	595	640	637	759	372	505	484	332	448	838	395		584	497	989	678	318	499	465	750	715	693	548	455	811	524	712	1140	226	806	760	372	776	789	505
278	507	614	518	467	606	379	714	564	580	580	736	360	495	458	323	427	786	383		558	469	911	650	317	493	450	722	640	661	529	450	765	511	690	1160	211	739	740	361	772	749	495
279	501	589	496	450	597	348	688	518	527	532	710	350	480	431	314	407	732	373		540	447	847	624	315	471	447	694	600	632	510	448	736	508	661	1110	207	682	730	358	810	717	488
280	487	535	470	436	572	323	660	481	487	467	690	340	465	431	305	392	679	362		530	428	784	607	312	446	449	669	550	604	495	446	700	508	627	1040	202	646	753	350	832	681	477
281	479	507	450	419	544	300	640	464	453	425	705	330	453	426	298	376	629	352		515	411	723	601	305	424	456	648	500	566	466	444	660	512	599	967	200	637	774	342	912	647	468
282	473	473	433	402	504	278	603	453	425	382	711	320	440	386	289	360	596	343		495	404	680	591	300	408	461	626	455	536	431	440	630	508	571	904	198	625	749	330	926	616	454
283	467	481	419	388	470	261	566	439	399	354	688	312	428	364	282	347	576	335		465	397	652	571	293	407	451	605	420	509	415	436	605	500	568	846	196	600	706	322	866	569	446
284	459	498	408	374	447	244	532	428	377	331	704	304	420	348	274	333	550	328		445	387	634	535	285	408	435	584	390	488	403	432	580	490	574	799	193	580	666	316	774	524	425
285	447	464	394	360	450	229	498	416	351	306	756	296	407	330	267	319	521	320		410	375	606	450	275	417	417	563	368	470	385	429	555	476	439	769	197	560	644	315	727	510	398
286	439	447	379	345	433	215	467	399	337	283	756	288	400	317	260	306	490	309		380	358	567	385	265	434	402	542	347	455	365	426	530	461	352	742	193	540	639	309	740	486	381
287	428	430	362	334	419	201	436	388	323	266	736	280	390	301	254	296	469	302		345	333	525	350	257	444	387	522	332	430	350	423	510	443	350	708	195	520	639	301	721	470	373
288	416	371	351	323	405	190	405	379	309	249	718	274	382	290	248	283	440	294		315	314	508	320	231	435	368	497	317	415	340	420	495	418	345	660	190	500	630	297	696	460	365
289	405	328	340	311	391	178	385	374	297	235	688	268	372	279	242	273	404	288		290	305	490	300	217	421	359	483	303	400	336	418	475	377	340	613	189	490	605	292	694	450	367
290	394	292	328	300	374	164	365	365	286	224	651	262	365	269	236	263	376	278		265	296	472	280	205	411	357	455	295	390	330	416	460	370	338	572	188	480	563	289	683	440	372
291	385	272	317	289	360	159	345	357	272	212	623	257	355	259	229	254	350	272		248	287	457	265	197	403	336	425	289	375	323	414	445	380	310	511	187	475	516	284	685	420	367
292	371	258	306	278	340	150	328	348	263	201	595	252	348	250	224	247	326	267		235	278	445	250	189	392	315	400	281	365	321	410	430	382	300	420	187	470	445	281	680	410	352
293	354	247	297	268	323	142	311	340	255	193	566	246	340	243	218	239	302	260		225	269	434	238	182	376	300	380	275	350	318	400	415	384	290	365	186	465	407	275	665	390	350
294	323	242	289	256	309	137	297	334	246	184	541	242	333	233	213	231	282	255		216	260	422	227	178	323	280	355	269	340	316	395	400	380	288	350	186	460	395	265	650	380	348
295	320	230	279	249	292	137	283	326	238	176	515	238	327	226	207	223	264	250		208	253	412	216	173	300	265	337	262	330	314	395	390	375	290	332	185	455	383	255	618	370	354
296	326	229	272	238	269	137	272	320	232	170	490	233	319	219	202	216	249	245		203	247	402	207	170	275	250	320	257	320	310	400	380	370	330	341	185	450	368	242	586	360	348
297	331	229	266	230	252	136	261	314	224	161	467	229	311	212	198	210	235	240		199	242	395	200	166	252	236	304	251	312	302	405	370	360	400	358	184	445	356	234	573	340	335
298	297	228	260	221	238	136	249	306	215	156	447	226	304	205	193	202	222	236		195	236	388	192	162	234	224	295	246	305	295	410	360	350	415	365	184	442	345	235	579	328	322
299	311	225	253	213	224	135	241	300	210	150	428	222	299	200	187	197	212	232		191	230	383	185	160	218	212	284	240	298	280	405	350	340	425	374	183	440	334	231	602	316	314
300	309	222	249	206	210	135	232	294	204	144	411	219	291	194	183	191	202	228		187	224	378	178	157	203	199	277	235	290	270	385	340	330	423	378	183	438	321	225	628	310	299

Table D-1: Daily Average Flow Rates (m^3/s) at the Site 'Peel River above Fort McPherson' (10MC002: 67°14'33" N, 134°53'20" W)																																										
JULIAN DAY	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
301	306	222	244	198	193	134	224	286	198	139	391	216	285	188	177	185	192	225		184	219	373	173	154	191	188	270	230	282	247	354	330	320	421	385	186	434	310	220	622	300	270
302	294	224	242	190	181	133	215	280	193	133	374	213	280	183	174	180	185	222		181	214	370	168	152	180	178	263	225	275	240	317	322	310	418	385	182	427	302	215	580	290	245
303	283	225	249	183	164	133	207	273	187	127	360	210	274	178	169	175	178	219		179	210	368	163	150	173	169	256	221	268	230	289	314	300	415	380	180	422	293	210	521	280	239
304	269	219	257	176	153	133	201	266	184	125	343	207	268	174	165	170	172	216		177	206	366	159	149	166	162	251	218	260	224	282	306	293	405	383	179	420	283	205	461	270	237
305	255	206	260	169	139	132	195	261	181	121	328	205	264	169	162	166	167	212		175	201	364	155	148	159	153	245	215		196	293	300	281	400	369	172	418	274	196	409	260	236
306	249	205	261	162	130	132	190	255	176	118	311	201	259	165	157	162	162	208		173	197	362	151	147	153	147	240	211		176	304	293	268	390	365	165	416	266	189	374	250	251
307	244	217	256	155	122	131	184	249	173	115	300	197	253	161	154	158	158	205		171	193	360	149	146	148	140	236	208		157	305	286	261	380	356	156	414	258	188	342	240	273
308	241	230	251	152	116	131	178	244	167	112	283	194	249	157	151	154	154	203		170	190	357	145	144	145	136	231	205		141	301	280	262	370	350	147	412	250	178	315	225	281
309	235	246	244	148	108	130	173	238	164	109	275	190	244	153	147	151	151	200		169	187	354	142	142	143	133	227	202		132	287	274	264	360	341	132	410	242	173	298	215	282
310	232	257	240	144	106	130	167	232	161	106	261	187	239	150	145	147	148	198		167	184	348	140	140	141	130	222	199		128	270	269	266	350	322	120	405	234	170	290	204	267
311	227	255	232	140	105	129	164	227	159	103	252	184	235	147	142	144	145	195		166	181	337	137	138	140	128	219	196		124	254	265	265	335	308	111	400	227	167	302	181	253
312	224	242	225	137	103	129	161	221	153	102	241	181	230	144	138	141	141	193		165	178	321	135	136	139	127	215	193		120	239	262	255	320	298	106	395	221	164	330	164	249
313	220	229	219	134	102	128	159	216	150	101	229	178	225	141	135	138	139	190		164	176	295	133	135	138	127	211	190		118	222	258	245	305	297	104	390	217	161	369	146	251
314	215	224	214	131	100	128	156	212	147	99	221	175	222	138	133	136	138	187		163	173	270	131	133	138	128	208	187		116	214	256	235	290	300	102	380	212	159	393	137	247
315	211	218	209	128	99	127	153	207	144	98	212	172	218	135	129	133	137	184		162	170	242	129	132	137	128	203	185		114	218	254	234	270	302	101	375	203	157	397	147	237
316	208	199	204	125	97	127	150	203	142	96	201	170	213	132	126	130	136	182		161	168	220	128	131	137	129	200	183		111	221	250	222	250	297	109	370	196	155	403	164	226
317	204	178	200	122	96	126	147	198	139	95	193	167	209	130	124	128	134	179		160	166	209	127	130	136	130	198	180		108	222	248	214	235	292	117	360	182	155	410	168	219
318	201	173	192	120	95	126	144	193	136	94	184	164	205	127	121	126	133	177		159	163	198	126	128	136	131	194	178		104	220	246	207	225	280	119	350	166	151	410	167	204
319	198	164	188	119	95	125	142	189	136	93	178	161	201	125	118	124	131	174		158	161	190	126	127	135	132	190	176		100	213	244	196	220	257	123	340	155	151	402	175	195
320	195	162	184	116	93	125	139	184	130	93	170	158	198	123	116	122	129	172		157	159	184	125	126	135	134	187	173		98	208	242	187	218	238	125	335	153	151	385	193	187
321	193	162	180	114	93	124	138	180	130	92	161	156	195	122	114	120	127	170		156	157	180	125	125	134	136	185	171		96	206	240	183	216	227	126	330	155	150	364	209	178
322	189	156	176	113	92	124	136	176	127	92	156	153	191	119	111	119	124	167		155	155	180	125	124	134	138	182	169		94	203	239	174	215	216	125	320	154	147	342	213	168
323	185	150	172	110	92	123	133	172	125	91	150	150	187	117	108	118	122	165		154	154	184	124	123	134	140	179	167		92	193	238	164	220	205	126	310	159	144	324	213	157
324	184	145	169	108	91	123	130	168	125	91	143	147	184	116	106	116	121	163		154	152	188	124	122	133	141	177	165		92	176	236	157	235	194	130	305	178	141	314	209	143
325	181	141	164	107	90	122	127	164	122	91	139	145	181	114	104	115	119	161		153	150	192	124	121	133	142	174	163		92	164	234	150	242	187	132	300	200	138	308	205	136
326	178	139	161	105	90	122	125	161	119	90	133	143	179	112	102	114	118	158		152	149	196	123	120	133	142	171	162		94	162	232	151	248	185	133	295	212	135	305	200	138
327	175	138	158	103	89	121	122	157	119	90	127	141	175	111	100	113	117	156		152	147	198	123	119	132	143	168	160		98	162	231	152	245	185	130	290	218	132	298	196	142
328	172	136	155	102	88	121	119	153	116	89	122	138	172	109	98	112	115	154		151	146	200	123	118	132	143	165	158		102	160	223	153	243	189	126	285	216	129	281	186	146
329	170	132	153	101	88	120	119	150	116	89	116	136	168	108	96	111	114	152		150	144	201	122	117	132	144	163	156		105	158	219	153	240	200	124	280	209	128	267	177	143
330	168	129	149	100	87	120	119	147	113	88	112	134	166	107	94	110	113	150		150	143	200	122	116	131	144	161	155		109	157	216	151	238	215	124	275	203	127	256	173	137
331	165	125	145	99	86	119	116	144	110	88	108	132	164	107	92	110	112	148		149	142	198	122	115	131	144	158	153		113	157	213	148	236	224	126	270	200	124	245	172	142
332	164	120	142	97	86	119	116	140	110	88	103	130	161	107	90	109	110	146		148	140	194	121	114	131	144	156	152		115	158	210	146	238	228	120	265	197	121	233	174	146
333	161	118	139	96	85	118	113	138	108	88	99	128	157	106	89	109	109	144		147	139	189	121	113	131	143	154	151		116	160	204	143	240	233	118	260	193	119	224	174	148
334	159	116	136	96	84	118	113	134	108	87	96	126	155	106	87	108	108	142		147	138	183	121	112	130	143	152	150		115	163	197	138	260	231	117	255	191	117	219	172	151
335	157	116	136	94	84	117	110	131	105	86	95	124	153	106	86	107	107	140		146	137	176	121	110	130	142	150	148		113	163	187	135	270	226	116	250	190	115	215	170	152
336	155	118	132	93	83	117	108	128	105	86	93	122	151	106	84	107	106	138		146	136	169	120	109	130	141	148	147		111	159	176	134	274	226	116	244	195	112	213	165	149
337	153	122	130	93	82	116	108	126	105	86	92	120	149	106	83	107	105	136		146	134	162	120	108	130	140	147	146		108	153	168	131	276	224	116	242	201	111	214	162	146
338	151	122	127	92	82	116	105	123	102	85	91	119	147	106	81	107	104	134		145	133	157	120	107	129	139	145	145		109	148	161	130	278	221	117	240	201	110	217	162	140
339	150	121	125	91	81	115	105	121	102	85	90	117	144	106	80	107	103	132		145	132	153	120	106	129	138	143	143		110	141	155	129	277	217	113	238	199	109	219	160	131
340	148	120	122	90	81	114	105	119	99	85	89	115	142	106	78	106	102	130		144	131	149	120	105	129	137	140	142		113	135	150	127	274	213	113	236	195	108	221	158	123
341	147	119	121	90	80	114	102	116	99	85	88	113	139	106	77	106	101	128		144	130	147	120	104	128	136	139	140		114	130	145	123	270	206	113	234	193	107	220	156	120
342	145	118	119	89	80	113	102	113	96	85	86	112	137	105	76	106	100	127		143	129	145	120	103	128	135	137	139		114	126	141	121	265	203	112	232	193	106	216	153	120
343	143	117	116	88	79	113	99	111	96	85	86	110	136	105	74	106	99	125		142	128	143	120	102	128	134	135	138		114	124	136	121	247	201	112	230	191	104	210	148	120
344	142	117	115	88	79	112	99	109	93	85	85	108	134	105	73	106	98	123		142	128	142	119	101	128	133	134	137		114	125	134	120	231	199	112	228	189	105	204	144	121
345	141	117	113	87	78	112	99	107	93	84	84	107	132	104	72	105	97	121		142	127	140	119	100	127	132	132	135		114	125	135	118	223	197	111	226	189	106	198	141	122
346	139	118	112	86	78	111	96	105	93	84	83	105	129	104	71	105	96	118		141	126	139	119	99	127	130	130	134		114	125	138	116	220	194	111	224	189	108	191	139	122
347	137	117	110	86	77	111	96	103	93	84	82	104	127	104	70	104	96	117		141	125	138	119	99	127	129	129	133		119	124	139	115	222	192	111	222	189	108	186	136	122
348	136	116	108	86	77	110	93	101	91	84	82	102	125	104	69	104	95	115		140	124	137	119	98	126	128	128	131		118	124	141	113	219	190	110	220	189	109	183	134	122
349	135	114	107	86	77	110	93	99	91	84	81	101	124	104	68	104	94	113		140	124	136	119	97	126	127	126	130		118	123	142	111	210	187	110	219	189	109	181	132	124
350	134	113	106	85	76	109	93	98	91	84	80	100	122	103	67	104	93	111		140	123	135	119	96	125	126	125	129		112	122	144	112	202	185	110	218	191	110	179	127	123
351	133	111	104	85	75	109	93	96	88	83	79	99	119	103	66	103	92	109		139	123	134	119	95	125	125	123	128		111	119	149	113	198	183	109	217	192	110	175	122	122
352	132	110	103	85	75	108	91	94	88	83	78	98	117	103	65	103	91	107		139	122	134	119	95	124	124	122	127		111	118	153	112	194	181	109	216	194	111	172	117	121
353	130	110	102	84	75	108	91	93	88	83	78	96	115	103	64	103	91	104		139	121	133	118	94	123	122	120	126		109	115	156	111	194	179	109	215	193	111	173	111	120
354	130	110	101	84	74	107	91	91	88	82	77	95	113	103	63	102	90	102		138	120	133	118	93	123	121	119	124		108	113	156	110	195	179	108	214	188	112	174	106	120
355	129	109	99	84	74	107	91	91	85	82	76	94	112	103	63	102	90	100		138	120	132	118	93	122	120	118	123		106	112	154	109	197	176	108	213	181	112	174	104	119
356	127	109	99	84	73	106	91	89	85	82	76	93	110	103	62	101	89	97		138	119	132	118	92	121	119	117	122		105	109	151	107	200	174	107	212	175	112	172	103	118
357	126	109	97	84	73	106	88	88	85	82	75	92	108	103	61	101	88	95		137	119	131	118	91	120	118	116	121		107	106	148	105	201	173	107	211	171	113	168	101	118
358	125	110	96	84	72	105	88	87	85	82	75	91	106	103	60	100	88	92		137	118	131	118	91	119	117	114	119		109	107	144	103	199	172	107	210	168	113	165	98	117
359	124	110	96	84	72	105	88	86	84	82	74	90	105	103	60	100	87	90		137	118	131	118	90	118	116	113	117		109	107	141	101	193	171	106	208	168	113	166	96	116
360	124	110	94	83	71	104	88	84	82	82	73	89	104	103	59	100	86	88		137	117	131	118	89	118	115	112	116		109	108	141	101	188	171	106	206	168	113	167	94	116

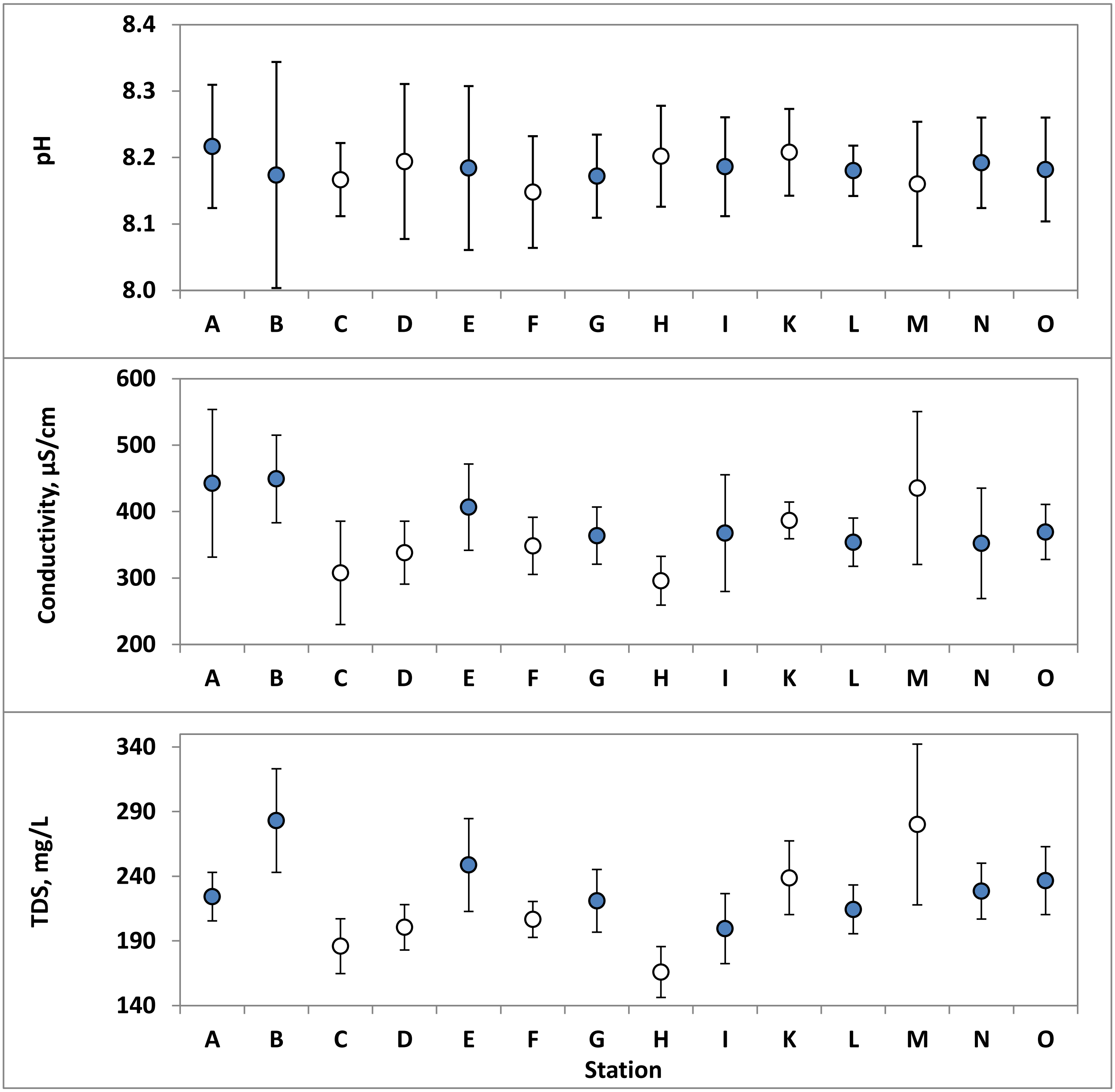
Table D-1: Daily Average Flow Rates (m^3/s) at the Site 'Peel River above Fort McPherson' (10MC002: 67°14'33" N, 134°53'20" W)

JULIAN DAY	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
361	123	109	93	83	71	104	88	84	82	82	73	89	103	103	58	99	86	86		136	117	130	118	89	117	114	110	115		108	110	143	103	183	171	106	204	168	110	165	93	115
362	122	108	93	83	71	103	88	83	82	82	72	88	102	102	58	98	85	85		136	117	130	118	88	116	113	109	114		107	111	145	104	179	168	107	202	167	110	164	93	114
363	121	107	91	83	71	103	85	82	81	82	72	87	100	102	57	97	84	83		136	117	130	118	88	115	112	108	113		115	113	146	106	179	164	107	200	166	110	164	93	113
364	120	106	91	83	70	102	85	81	81	82	71	86	100	102	57	96	84	82		136	116	130	118	87	114	111	107	112		113	114	146	107	182	160	107	200	165	110	163	91	112
365	119	104	90	83	70	102	85	80	79	82	71	86	98	102	56	96	83	80		135	116	130	118	87	114	110	106	111		112	114	146	107	187	156	105	199	163	110	162	90	111
366				83				80				85				94				135				86				109				146				105				159		

Lowest Yearly Flow

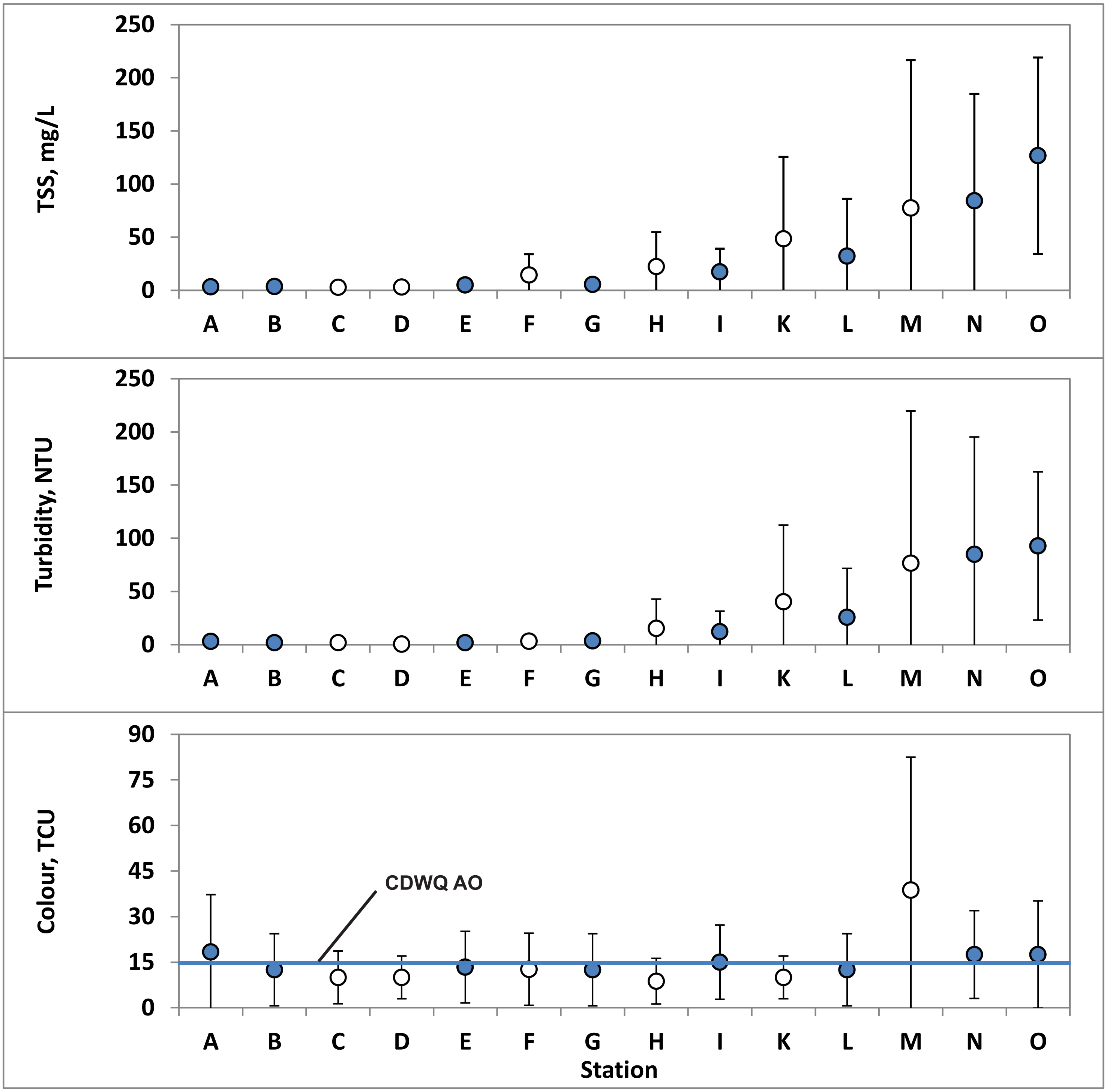
APPENDIX E

WATER-CHEMISTRY DATA AND FIGURES FOR PEEL RIVER WATERSHED



Stantec

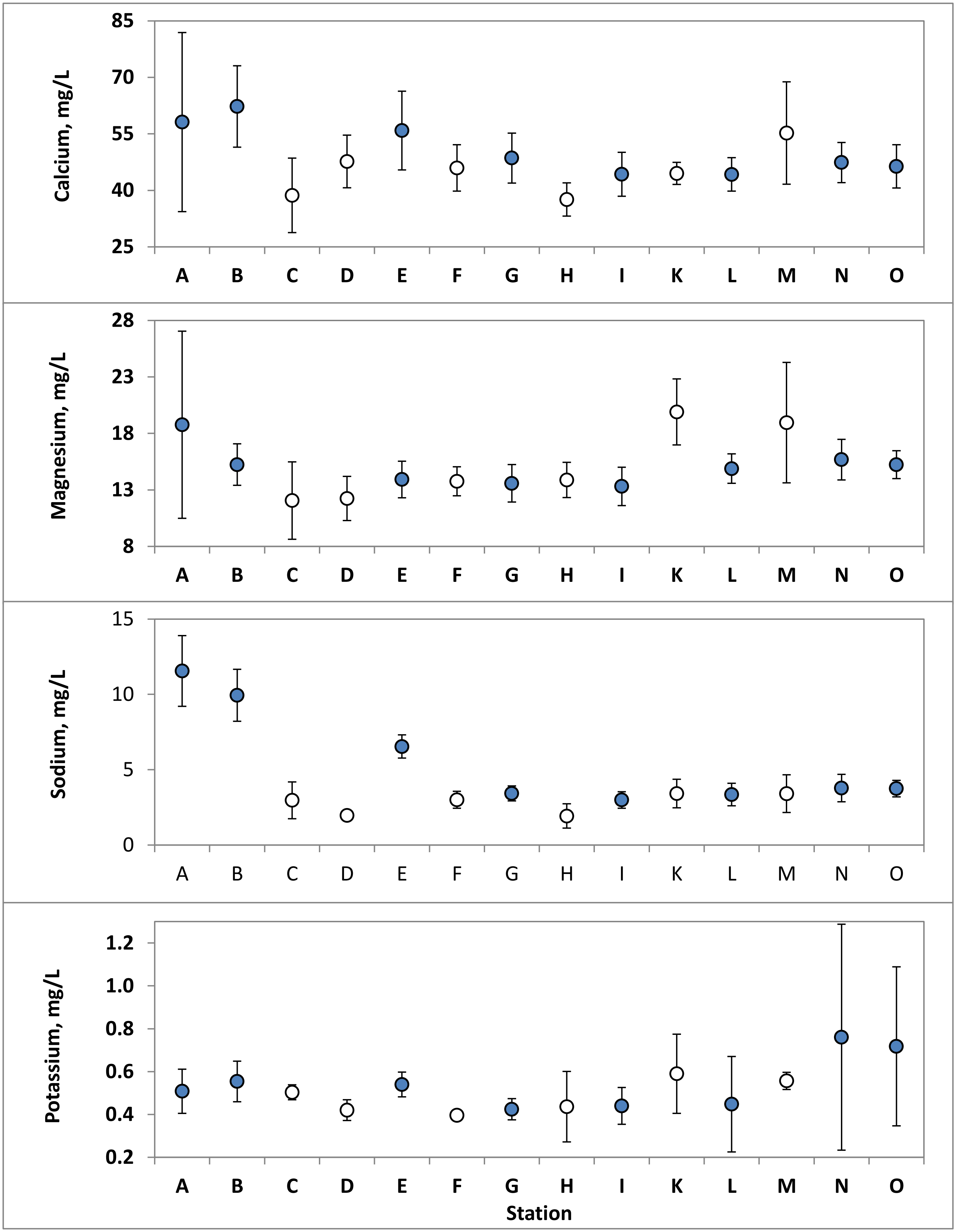
Figure E-1. Conductivity, pH and TDS at the monitoring stations of the Peel River watershed (See Figure 2-1 for station locations)



G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

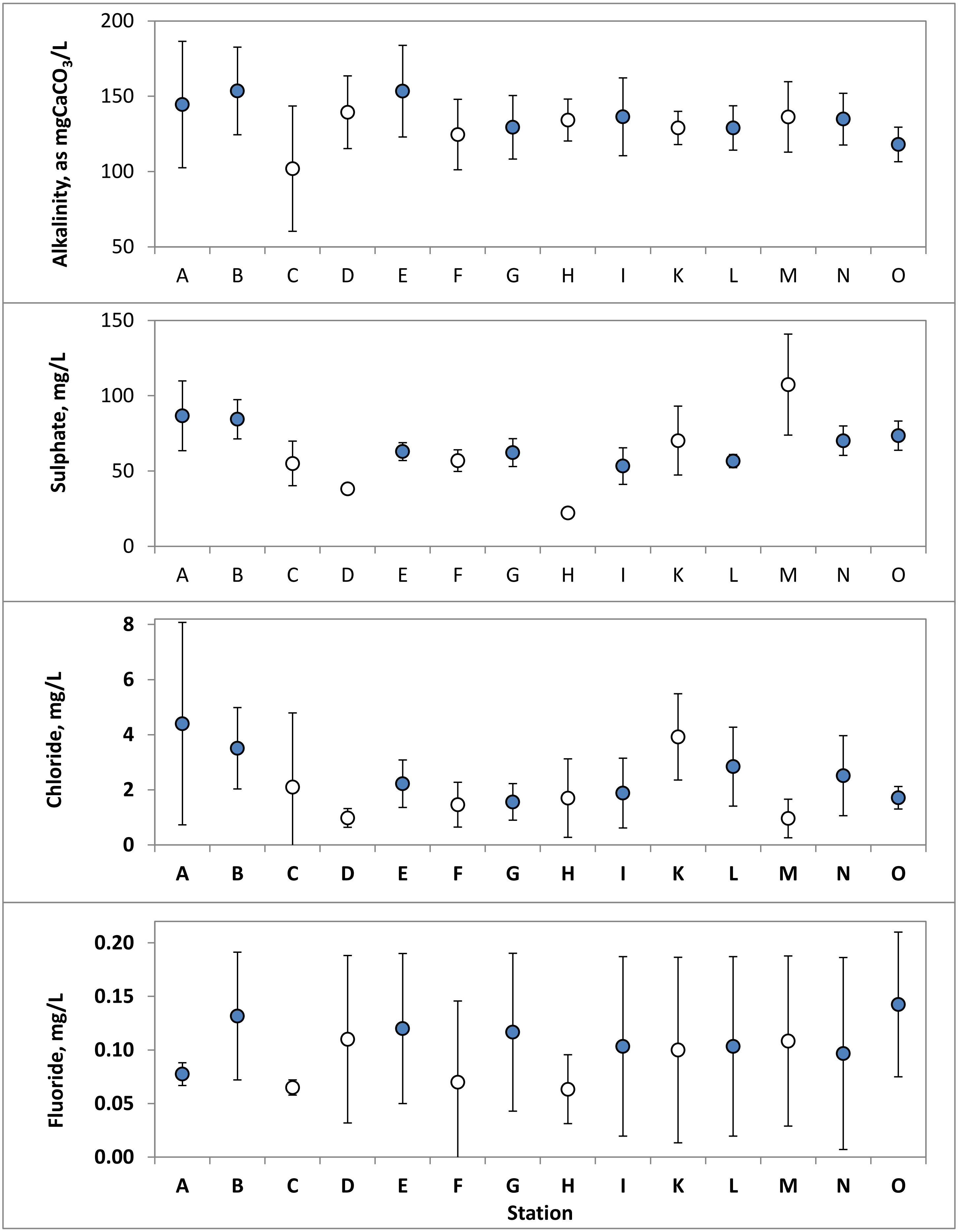
Figure E-2. Colour, Turbitity, and TSS at the monitoring stations of the Peel River watershed (See Figure 2-1 for station locations)



G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Figure E-3. Average concentrations of major cations across the stations of the Peel River watershed (See Figure 2-1 for station locations)

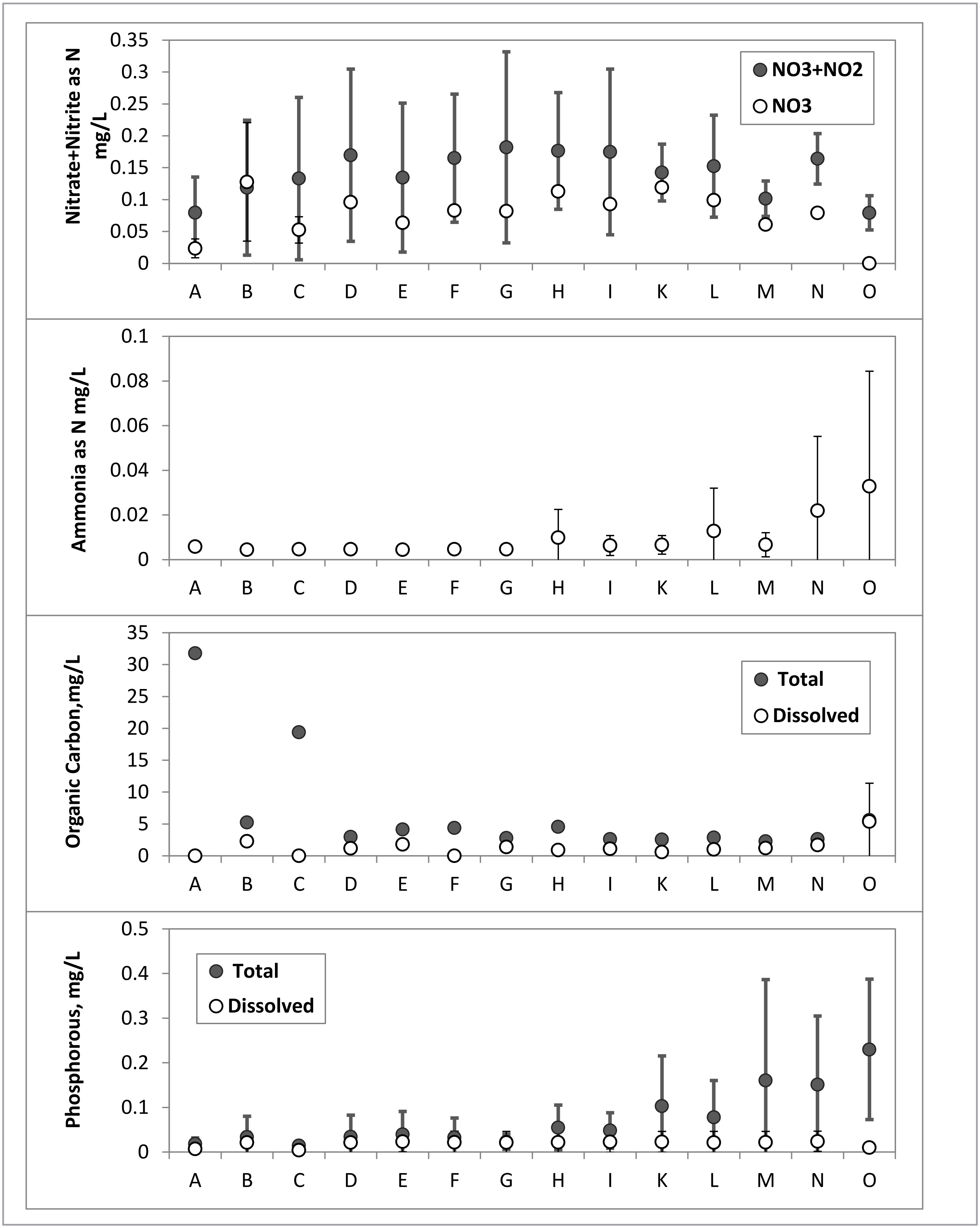
Stantec



G:\GIS_Project_Folder\111440079_Peel River\inDesign\charts

Figure E-4. Average concentrations of major anions across the stations of the Peel River watershed (See Figure 2-1 for station locations)

Stantec



G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Figure E-5. Average concentrations of nutrients at the monitoring stations of the Peel River watershed (See Figure 2-1 for station locations)

Stantec

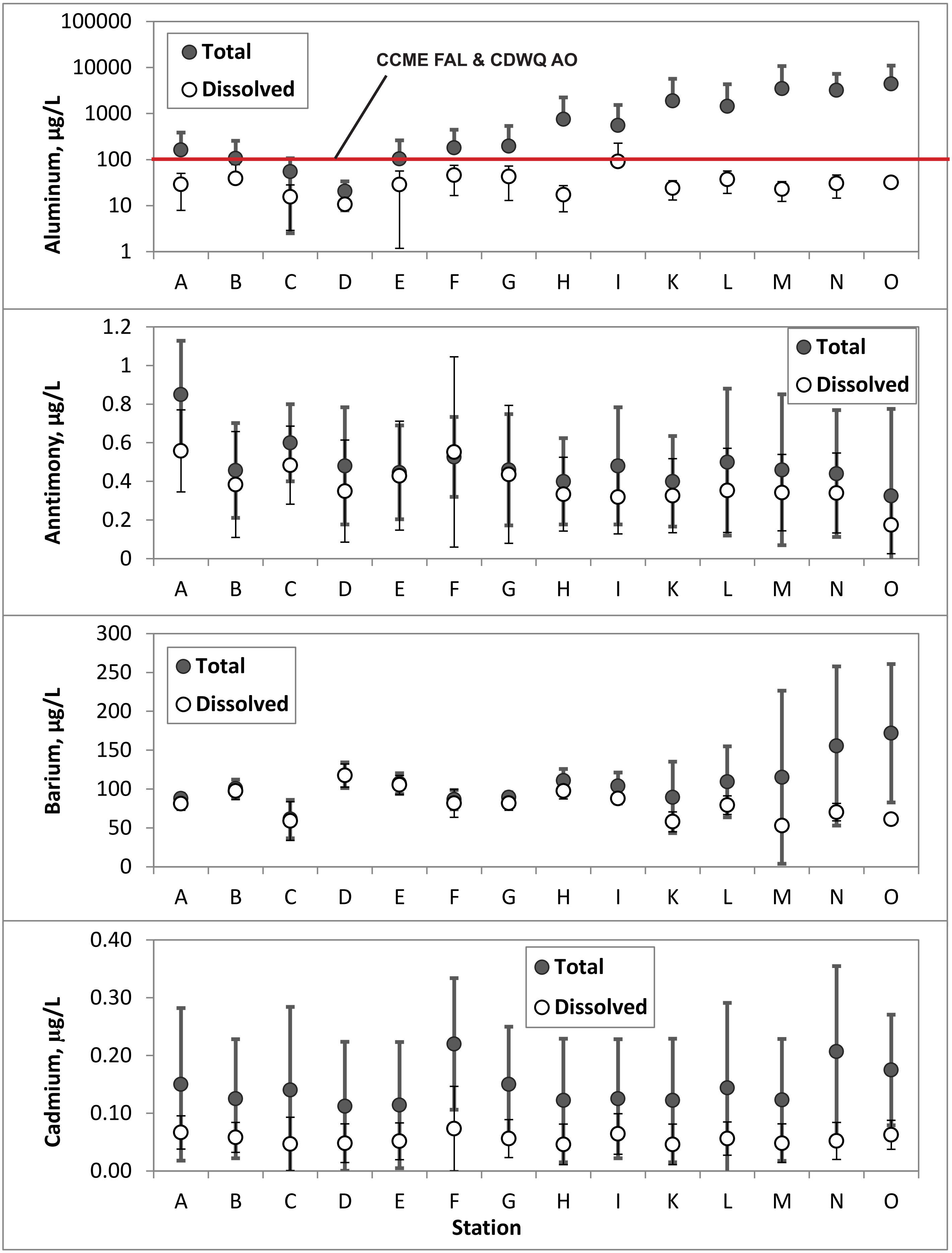


Figure E-6. Average concentrations of Al, Sb, BA, and Cd across the stations of the Peel River watershed (See Figure 2-1 for station locations)

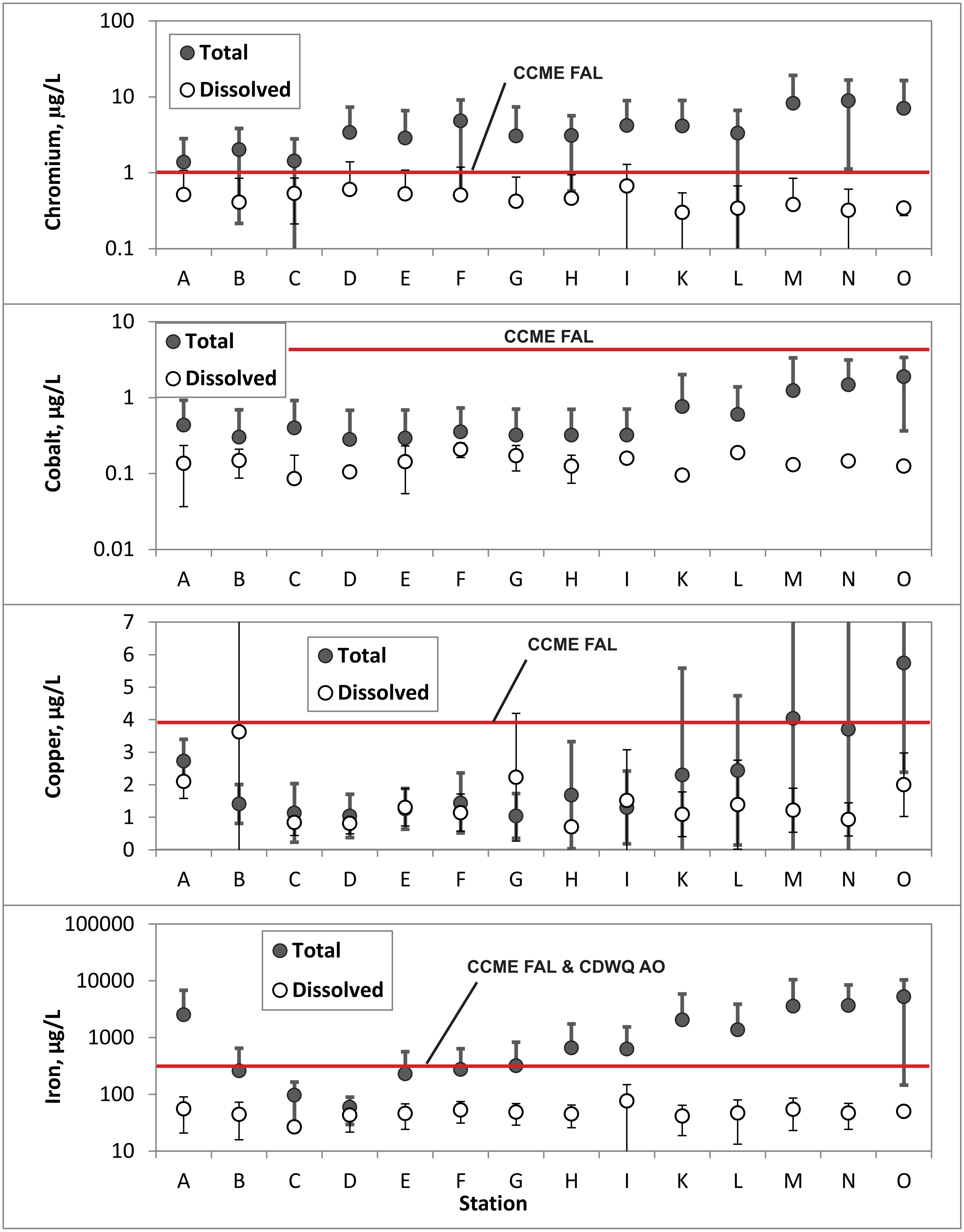
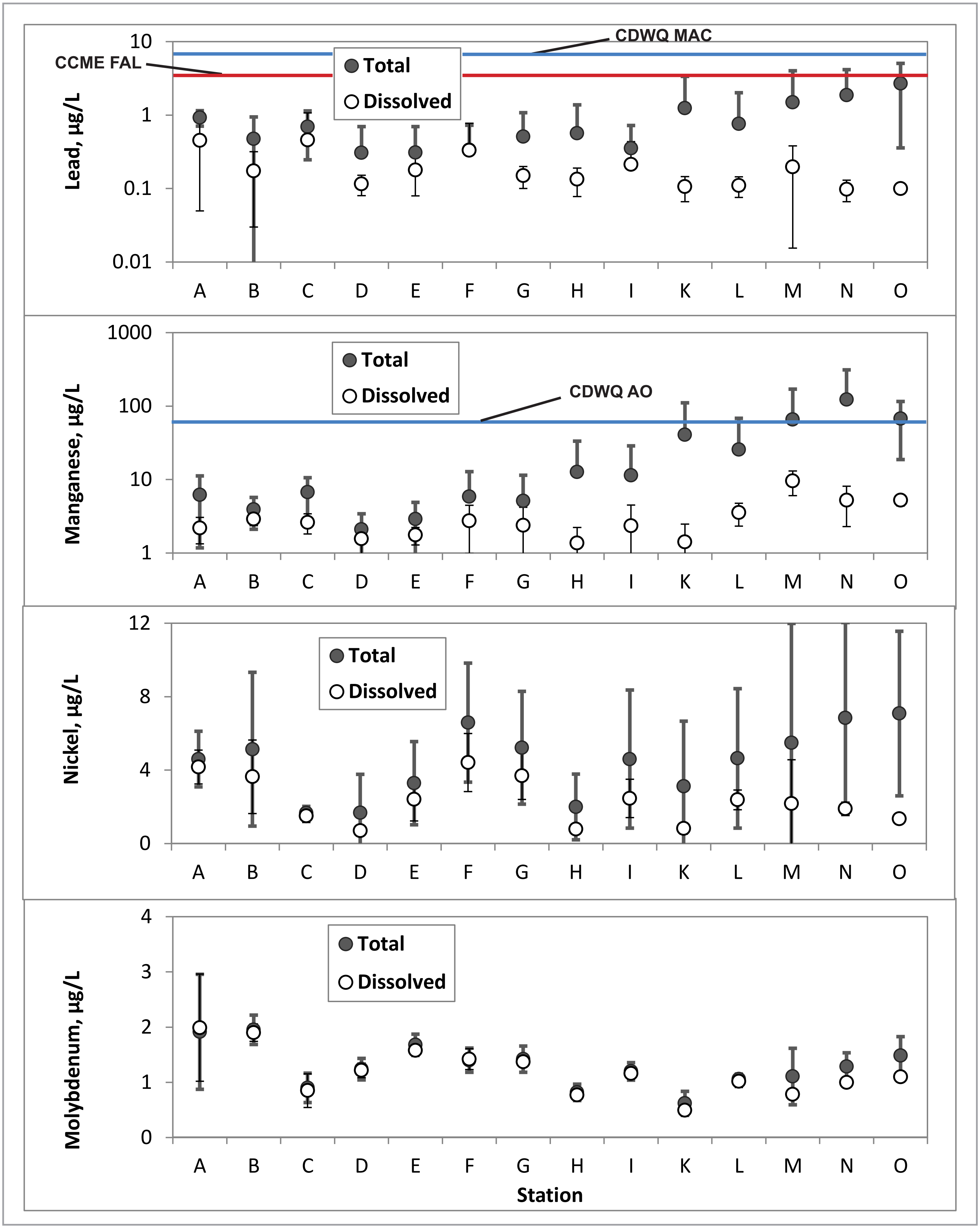


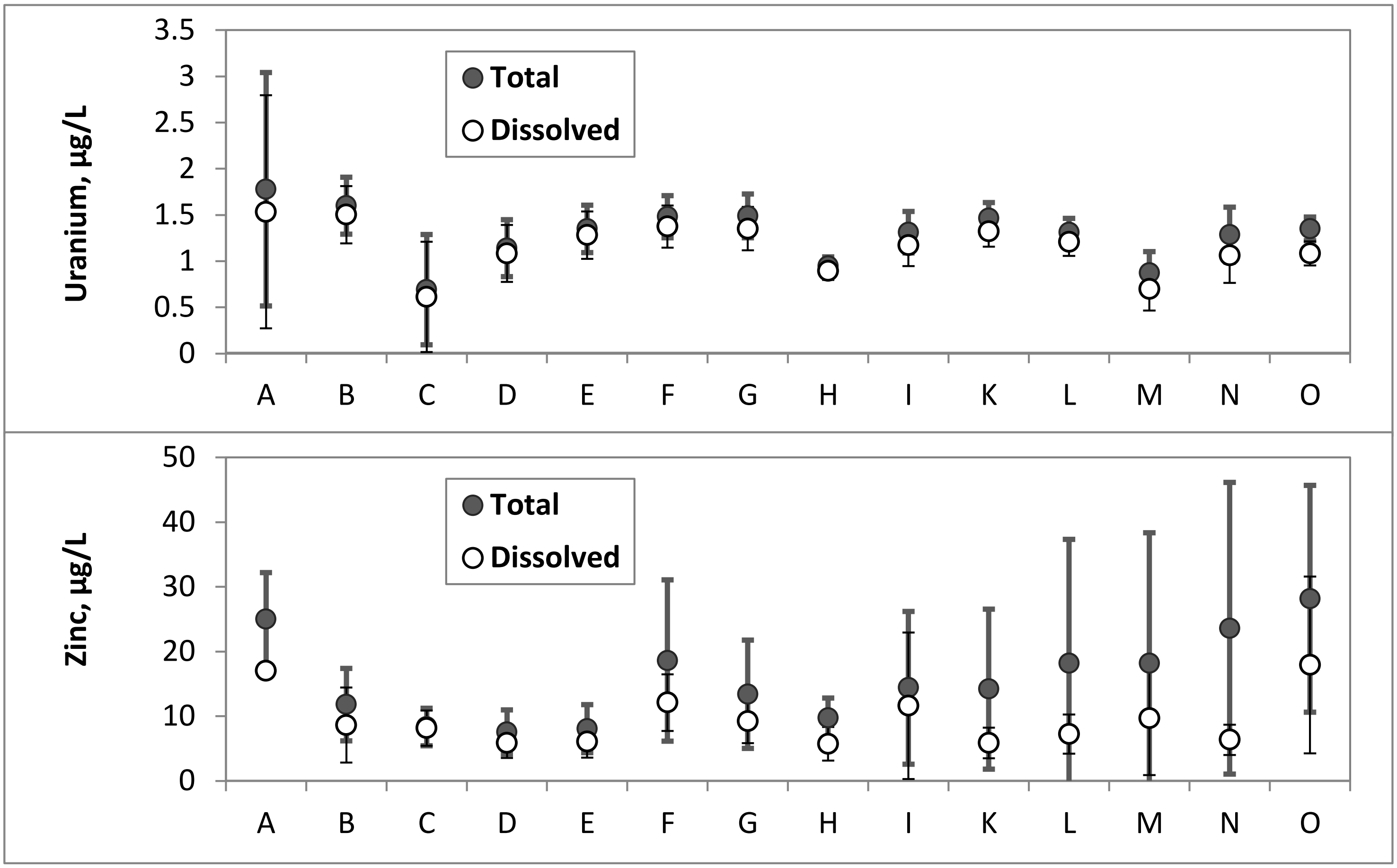
Figure E-7. Average concentrations of Cd, Cu, Co, and Fe across the stations of the Peel River watershed (See Figure 2-1 for station locations)



G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Figure E-8. Average concentrations of Pb, Mn, Mo, and Ni across the stations of the Peel River watershed (See Figure 2-1 for station locations)

Stantec



G:\GIS_Project_Folder\111440079_Peel River\InDesign\charts

Stantec

Figure E-9. Average concentrations of U and Zn across the stations of the Peel River watershed (See Figure 2-1 for station locations)

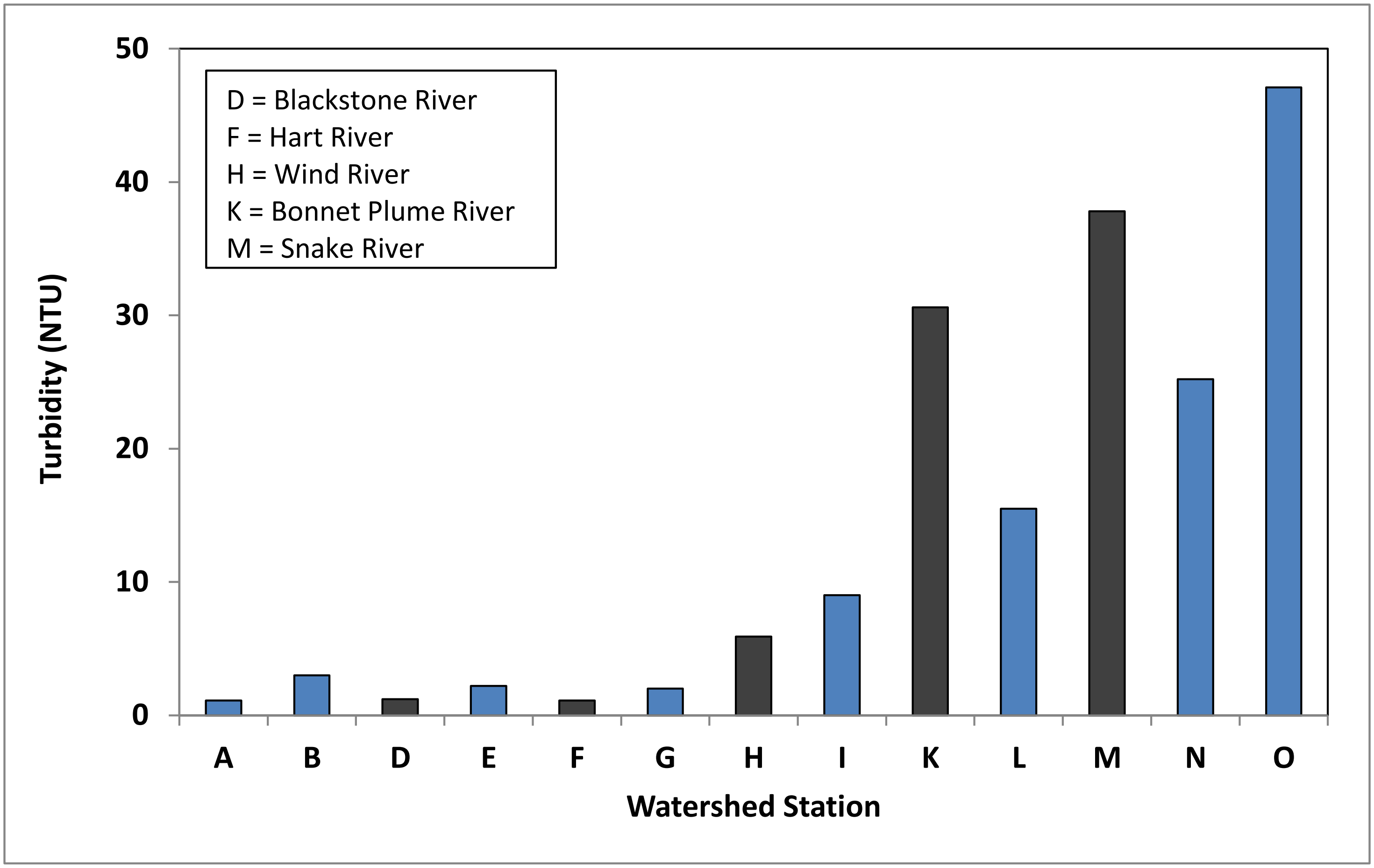


Figure E-10 Turbidity in the Peel River Watershed at a Flow Rate of 936m³/s at Site O
(See Figure 2-1 for station locations)

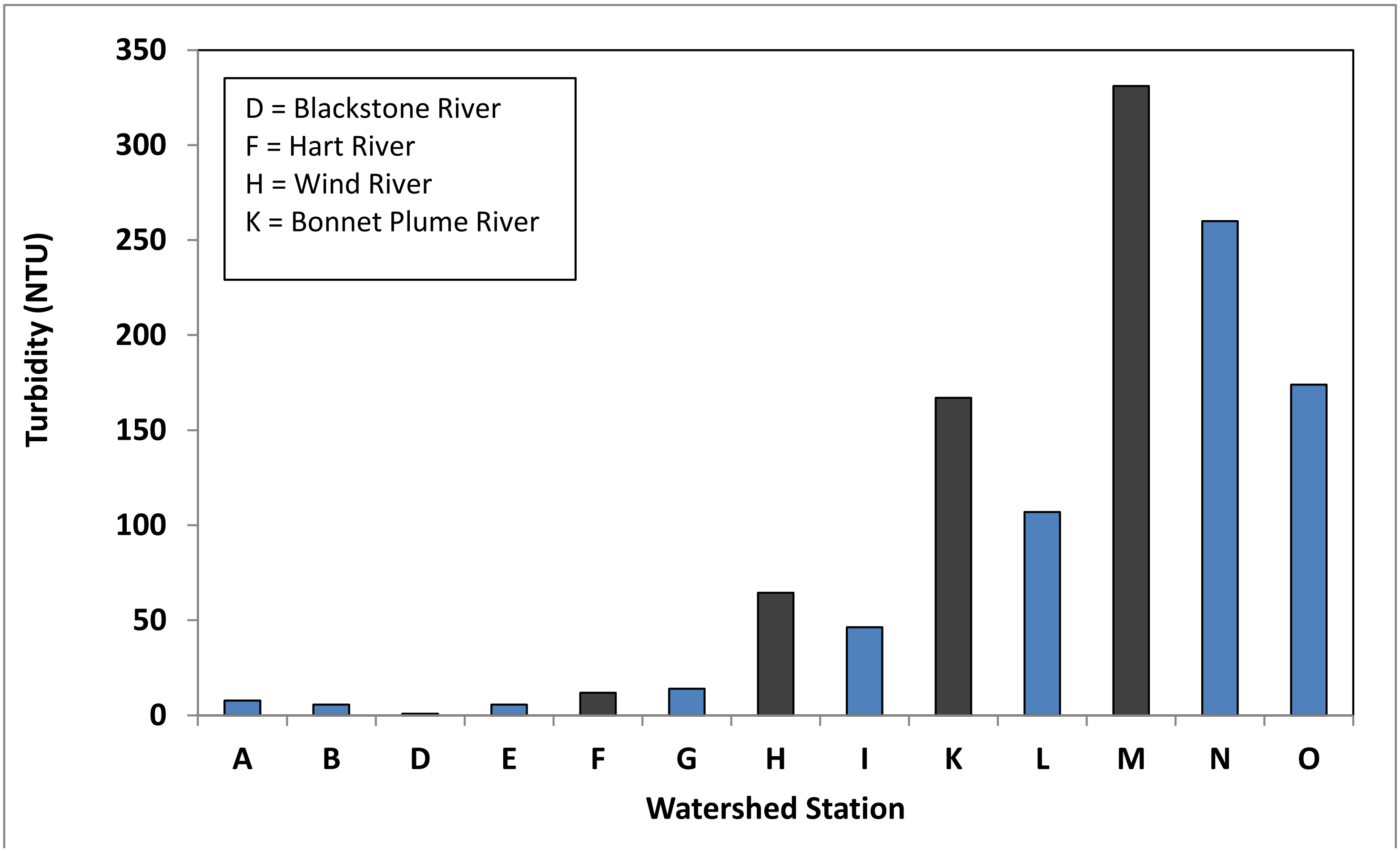


Figure E-11. Turbidity in the Peel River Watershed at a Flow Rate of 1280m³/s at Site O (See Figure 2-1 for station locations)

Table E-1: Peel River Watershed (1999-2005) Water Chemistry

Code	Sampling Location	Date	Physical parameters						Major Ions									Nutrients									
			pH	Cond.	TDS	TSS	Turb.	Colour	Ca	Mg	K	Na	Cl	F	SO4	Hard.	T. Alk.	NH4-N	NO3-N	NO2-N	NO2+NO3-N	DOC	TOC	Orthto-P	P Diss.	P Tot.	Silica
			units	µS/cm	mg/L	mg/L	NTU	TCU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
A	Ogilvie River above Engineer Creek	9-Mar-99	8.26	560	214	4	0	5	85	28	0.6	11.6	8.5	0.1	98	N/D	193	0.0075	N/D	N/D	0.119	N/D	N/D	N/D	N/D	0.0145	N/D
A	Ogilvie River above Engineer Creek	31-Jul-02	8.11	339	213	3	8	40	40	13	0.4	9.2	1.4	0.1	60	155	115	0.005	0.01	N/D	0.04	N/D	N/D	N/D	N/D	0.03	N/D
A	Ogilvie River above Engineer Creek	23-Jun-03	8.28	429	246	3	1	10	50	15	0.5	13.9	3.3	N/D	102	184	126	0.005	0.03	0.009	N/D	N/D	31.8	N/D	0.01	0.01	N/D
B	Ogilvie River above Mouth	31-Jul-02	8.39	384	255	3	6	30	51	15	0.5	8.6	1.5	0.1	75	188	126	0.005	N/D	N/D	0.04	N/D	N/D	N/D	N/D	0.01	N/D
B	Ogilvie River above Mouth	23-Jun-03	8.18	382	236	6	3	10	51	13	0.5	9.2	2.9	N/D	69	179	128	0.005	0.06	0.009	N/D	N/D	10.2	N/D	0.004	0.01	N/D
B	Ogilvie River above Mouth	12-Jul-05	8.22	481	282	3	0	N/D	66	15	0.6	11.0	4.1	0.2	91	227	159	0.005	N/D	N/D	N/D	2.3	3.7	0.002	0.01	0.01	N/D
B	Ogilvie River above Mouth	9-Mar-99	7.9	535	305	3	0	5	75	17	0.5	8.5	3.6	0.1	85		198	0.002	0.2	N/D	0.2	N/D	N/D	N/D	N/D	0.0	N/D
B	Ogilvie River above Mouth	27-Aug-04	8.16	506	340	3	0	5	69	17	0.7	12.4	5.5	N/D	102	324	166	0.005	N/D	N/D	N/D	N/D	1.40	N/D	0.05	0.13	N/D
C	Blackstone River near Champion Lake	9-Mar-99	8.23	397	210	3	1	5	50	16	0.5	4.4	5.2	0.1	45	N/D	150	0.004	N/D	N/D	0.22	N/D	N/D	N/D	N/D	0.02	N/D
C	Blackstone River near Champion Lake	31-Jul-02	8.14	255	170	3	4	20	33	10	0.5	2.1	0.7	0.1	48	125	77	0.005	0.04	N/D	0.04	N/D	N/D	N/D	N/D	0.01	N/D
C	Blackstone River near Champion Lake	23-Jun-03	8.13	271	178	3	1	5	33	10	0.5	2.5	0.4	N/D	72	123	79	0.005	0.07	0.009	N/D	N/D	19.4	N/D	0.004	0.01	N/D
D	Blackstone River above Mouth	9-Mar-99	8.05	409	220	3	0	5	58	15	0.4	2.3	1.5	0.1	35	N/D	177	0.003	N/D	N/D	0.27	N/D	N/D	N/D	N/D	0.01	N/D
D	Blackstone River above Mouth	31-Jul-02	8.36	292	193	3	1	20	42	11	0.4	1.7	0.6	0.1	38	151	117	0.005	N/D	N/D	0.07	N/D	N/D	N/D	N/D	0.02	N/D
D	Blackstone River above Mouth	23-Jun-03	8.19	297	180	4	1	10	41	10	0.4	1.7	0.8	N/D	35	141	120	0.005	0.10	0.009	N/D	N/D	6.4	N/D	0.00	0.01	N/D
D	Blackstone River above Mouth	27-Aug-04	8.13	348	218	3	0	5	49	13	0.5	2.1	1.1	N/D	40	235	146	0.005	N/D	N/D	N/D	N/D	0.8	N/D	0.05	0.12	N/D
D	Blackstone River above Mouth	12-Jul-05	8.24	345	192	3	0	N/D	49	12	0.4	2.1	0.9	0.2	43	173	137	0.005	N/D	N/D	N/D	1.2	1.7	0.002	0.01	0.01	N/D
E	Peel River above Hart River	9-Mar-99	7.97	502	295	3	0	5	71	16	0.5	7.2	2.8	0.1	65	N/D	196	0.002	N/D	N/D	0.22	N/D	N/D	N/D	N/D	0.01	N/D
E	Peel River above Hart River	31-Jul-02	8.22	351	230	10	6	30	48	13	0.5	5.8	1.0	0.1	59	175	124	0.005	N/D	N/D	0.05	N/D	N/D	N/D	N/D	0.03	N/D
E	Peel River above Hart River	27-Aug-04	8.2	429	274	3	0	5	59	15	0.6	7.5	3.2	N/D	71	281	158	0.005	N/D	N/D	N/D	N/D	1.3	N/D	0.05	0.13	N/D
E	Peel River above Hart River	12-Jul-05	8.28	409	240	3	0	N/D	57	13	0.6	6.4	2.3	0.2	64	197	165	0.005	N/D	N/D	N/D	1.8	2.0	0.002	0.01	0.01	N/D
E	Peel River above Hart River	23-Jun-03	8.26	342	204	6	2	10	43	12	0.5	5.8	1.8		56	160	124	0.005	0.06	0.009	N/D	N/D	9.30	N/D	0.00	0.01	N/D
F	Hart River near Hungry Lake	9-Mar-99	8.12	406	215	3	0	5	55	16	0.4	3.0	2.6	0.1	48	N/D	160	0.002	N/D	N/D	0.24	N/D	N/D	N/D	N/D	0.01	N/D
F	Hart River near Hungry Lake	31-Jul-02	8.09	304	215	43	12	30	42	13	0.4	1.5	0.6	0.1	57	157	100	0.006	N/D	N/D	0.09	N/D	N/D	N/D	N/D	0.02	N/D
F	Hart River near Hungry Lake	23-Jun-03	8.21	313	192	6	1	10	39	13	0.4	2.0	0.8	N/D	56	153	108	0.005	0.10	0.009	N/D	N/D	3.4	N/D	0.01	0.01	N/D
F	Hart River near Hungry Lake	27-Aug-04	8.06	377	N/D	N/D	0	5	50	15	0.4	2.6	1.5	N/D	68	244	131	0.005	N/D	N/D	N/D	N/D	0.6	N/D	0.05	0.11	N/D
F	Hart River near Hungry Lake	12-Jul-05	8.26	345	190	3	1	N/D	46	13	0.4	2.1	0.9	0.2	59	170	119	0.005	N/D	N/D	N/D	1.2	1.1	0.002	0.01	0.01	N/D
G	Peel River above Canyon Creek	9-Mar-99	8.07	410	225	3	0	5	55	15	0.4	3.3	2.5	0.1	49	N/D	160	0.002	N/D	N/D	0.29	N/D	N/D	N/D	N/D	0.01	N/D
G	Peel River above Canyon Creek	31-Jul-02	8.16	319	218	13	14	30	44	13	0.4	3.1	0.9	0.1	59	164	108	0.005	N/D	N/D	0.08	N/D	N/D	N/D	N/D	0.03	N/D
G	Peel River above Canyon Creek	23-Jun-03	8.23	323	200	6	2	10	40	11	0.4	3.6	1.2	N/D	72	146	113	0.005	0.08	0.009	N/D	N/D	6.3	N/D	0.00	0.01	N/D
G	Peel River above Canyon Creek	27-Aug-04	8.19	404	260	3	0	5	55	15	0.5	4.2	2.0	N/D	70	263	140	0.005	N/D	N/D	N/D	N/D	0.7	N/D	0.05	0.05	N/D
G	Peel River above Canyon Creek	12-Jul-05	8.21	363	202	3	1	N/D	49	13	0.4	2.9	1.2	0.2	61	177	126	0.006	N/D	N/D	N/D	1.4	1.4	0.002	0.01	0.01	N/D
H	Wind River above Mouth	9-Mar-99	8.14	352	179	3	0	5	43	15	0.4	3.3	4.2	0.1	16	N/D	155	0.002	N/D	N/D	0.24	N/D	N/D	N/D	N/D	0.01	N/D
H	Wind River above Mouth	23-Jun-03	8.21	266	148	10	6	5	31	12	0.4	1.5	0.7	N/D	26	125	117	0.005	0.11	0.009	N/D	N/D	12.3	N/D	0.01	0.01	N/D
H	Wind River above Mouth	27-Aug-04	8.16	307	186	4	2	5	39	14	0.4	1.9	1.5	N/D	23	197	138	0.005	N/D	N/D	N/D	N/D	0.5	N/D	0.05	0.12	N/D
H	Wind River above Mouth	12-Jul-05	8.17	293	142	16	5	N/D	37	13	0.3	1.6	1.0	0.1	23	147	129	0.005	N/D	N/D	N/D	0.9	0.9	0.002	0.01	0.03	N/D
H	Wind River above Mouth	31-Jul-02	8.33	259	178	78	64	20	37	15	0.7	1.4	1.1	0.0	22	154	132	0.03	N/D	N/D	0.11	N/D	N/D	N/D	N/D	0.10	N/D
I	Peel River above Bonnet Plume River	31-Jul-02	8.26	293	198	55	46	30	41	13	0.6	2.4	0.9	0.1	45	155	114	0.014	N/D	N/D	0.08	N/D	N/D	N/D	N/D	0.08	N/D
I	Peel River above Bonnet Plume River	23-Jun-03	8.23	303	178	16	9	20	36	11	0.4	2.9	1.2	N/D	49	135	113	0.005	0.09	0.009	N/D	N/D	6.0	N/D	0.01	0.03	N/D
I	Peel River above Bonnet Plume River	27-Aug-04	8.16	506	236	3	2	5	48	15	0.4	3.4	2.1	N/D	52	235	166	0.005	N/D	N/D	N/D	N/D	0.7	N/D	0.05	0.10	N/D
I	Peel River above Bonnet Plume River	12-Jul-05	8.21	336	170	10	3	N/D	44	13	0.4	2.6	1.2	0.2	46	165	127	0.005	N/D	N/D	N/D	1.1	1.2	0.002	0.01	0.02	N/D
I	Peel River above Bonnet Plume River	9-Mar-99	8.07	400	216	3	0	5	51	15	0.4	3.7	4.0	0.1	75		162	0.003	N/D	N/D	0.27	N/D	N/D	N/D	N/D	0.01	N/D
K	Bonnet Plume River above Mouth	9-Mar-99	8.27	384	204	3	0	5	45	17	0.5	4.4	5.9	0.1	31	N/D	133	0.004	N/D	N/D	0.17	N/D	N/D	N/D	N/D	0.01	N/D
K	Bonnet Plume River above Mouth	31-Jul-02	8.23	353	268	183	167	20	42	19	0.9	2.3	2.5	0.1	73	181	145	0.014	N/D	N/D	0.11	N/D	N/D	N/D	N/D	0.28	N/D
K	Bonnet Plume River above Mouth	23-Jun-03	8.24	368	232	44	31	10	41	19	0.5	2.8	2.7	N/D	76	179	116	0.005	0.12	0.009	N/D	N/D	6.6	N/D	0.01	0.07	N/D
K	Bonnet Plume River above Mouth	27-Aug-04	8.1	412	268	3	3	5	47	20	0.5	4.4	5.3	N/D	81	243	129	0.005	N/D	N/D	N/D	N/D	0.5	N/D	0.05	0.15	N/D
K	Bonnet Plume River above Mouth	12-Jul-05	8.2	417	222	10	2	N/D	48	25	0.5	3.2	3.2	0.2	90	221	122	0.005	N/D	N/D	N/D	0.6	0.6	0.002	0.01	0.01	N/D
L	Peel River above Snake River	9-Mar-99	8.16	395	210	3	0	5	48	16	0.5	4.3	5.2	0.1	52	N/D	150	0.002	N/D	N/D	0.21	N/D	N/D	N/D	N/D	0.02	N/D
L	Peel River above Snake River	31-Jul-02	8.18	309	220	128	107	30	42	14	0.7	2.4	1.9	0.1	53	164	119	0.047	N/D	N/D	0.10	N/D	N/D	N/D	N/D	0.20	N/D
L	Peel River above Snake River	23-Jun-03	8.2	324	196	18	16	10	38	13	0.5	3.1	1.8	N/D	56	147	113	0.005	0.10	0.009	N/D	N/D	6.8	N/D	0.00	0.03	N/D
L	Peel River above Snake River	27-Aug-04	8.13	379	244	6	3	5	48	16	0.1	3.9	3.2	N/D	62	235	137	0.005	N/D	N/D	N/D	N/D	0.6	N/D	0.05	0.12	N/D
L	Peel River above Snake River	12-Jul-05	8.23	362	202	6	3	N/D	46	15	0.5	3.1	2.1	0.2	60	177	126	0.005	N/D	N/D	N/D	1	1.2	0.002	0.01	0.02	N/D
M	Snake River above Mouth	31-Jul-02	8.06	327	245	325	331	40	42	15	0.5	2.1	2.2	0.1	66	167	150	0.016	N/D	N/D	0.08	N/D	N/D	N/D	N/D	0.56	N/D
M	Snake River above Mouth	23-Jun-03	8.13	325	208	38	38	100	42	13	0.6	2.7	0.7	N/D	91	158	101	0.005	0.06	0.009	N/D	N/D	4.9	N/D	0.01	0.09	N/D
M	Snake River above Mouth	27-Aug-04	8.21	473	322	10	7	10	60	21	0.6	3.9	0.5	N/D	115	298	139	0.005	N/D	N/D	N/D	N/D	0.8	N/D	0.05	0.11	N/D
M	Snake River above Mouth	9-Mar-99	8.11	601	364	3	1	5	75	26	0.6	5.3	0.7	0.1	157	N/D	163	0.002	N/D	N/D	0.12	N/D	N/D	N/D	N/D	0.02	N/D
M	Snake River above Mouth	12-Jul-05	8.30	451	262	12	5		57	20	0.5	3.0	0.7	0.2	108	224	129	0.005	N/D	N/D	N/D	1.20	1.20	0.00	0.01	0.03	N/D
N	Peel River above Caribou River	9-Mar-99	8.15	433	230	135	127	5	53	17	0.6	4.9	5.0	0.1	69	N/D	156	0.081	N/D	N/D	0.19	N/D	N/D	N/D	N/D	0.13	N/D
N	Peel River above Caribou River	23-Jun-03	8.15	326	208	28	25	30	41	13	0.5	3.7	1.8	N/D	83	155	110	0.005	0.08	0.009	N/D	N/D	6.0	N/D	0.01	0.06	N/D
N	Peel River above Caribou River	27-Aug-04	8.16	398	264	8	8	5	51	17	0.5	4.2	2.6	N/D	72	253	138	0.005	N/D	N/D	N/D	N/D	0.6	N/D	0.05	0.12	N/D
N	Peel River above Caribou River	12-Jul-05	8.31	383	216	12	4	N/D	49	16	0.5	3.6	1.7	0.2	71	189	128	0.005	N/D	N/D	N/D	1.7	1.3	0.002	0.01	0.03	N/D
N	Peel River above Caribou River	31-Jul-02	8.18	315	223	238	260	30	40	15	1.7	2.5	1.4	0.0	56	161	142	0.01	N/D	N/D	0.09	N/D	N/D	N/D	N/D	0.41	N/D
N1	Caribou River above Mouth	27-Aug-04	8.04	652	474	478	621	200	69	22	1.5	37.0	4.2	N/D	229	337	113	0.044	N/D	N/D	N/D	N/D	10.9	N/D	0.05	0.50	N/D
O	Peel River above Fort McPherson	9-Mar-99	8.18	440	243	3	1	5	58	18	0.5	5.1	4.5	0.1	69		158	0.00	N/D	N/D	0.19	N/D	N/D	N/D	N/D	0.02	N/D
O	Peel River above Fort McPherson	29-Jul-02	8.24	351	270	245	174	30	44	16	1.3	4.1	2.0	0.1	75	174	111	0.110	N/D	N/D	0.09	N/D	N/D	N/D	N/D	0.37	3.73
O	Peel River above Fort McPherson	26-Jun-03	8.13	334	208	78	47	30	40	14	0.6	4.0	1.5	N/D	63	156	110	0.005	0.08	0.01	N/D	N/D	6.30	N/D	0.01	0.14	N/D
O	Peel River above Fort McPherson	27-Aug-04	8.07	419	308	182	182	30	51	17	0.6	5.1	2.7	N/D	83	254	135	0.0	N/D	N/D	N/D	N/D	1.3	N/D	0.1	0.2	N/D
O	Peel River above Fort McPherson	16-Jun-05	8.13	322	208	152	123	N/D	40	14	0.5	2.9	1.1	0.2	60	155	106	0.01	N/D	N/D	0.10	2.50	2.50	N/D	0.01	0.37	N/D
O	Peel River above Fort McPherson	12-Jul-05	8.24	387	230	30	22	N/D	49	16	0.6	3.9	1.7	0.2	76	189	124	0.005	N/D	N/D	0.04	1.5	1.8	0.004	0.01	0.07	N/D
O	Peel River above Fort McPherson	10-Aug-05	8.29	417	240	84	49	5	53	15.2	0.5	4.1	2.0	0.1	83	195	131	0.011	N/D	N/D	0.09	12.3	12.6	0.002	N/D	0.12	3.61

Bolded values represent values that were reported as 'less than the laboratory detection limit"

Values in italics were averaged from triplicats/duplicates

Abbreviations: Cond. - Electrical conductivity; TDS - Total Dissolved Solids; TSS - Total Suspended Solids; Turb. - Turbidity; T.Alk - total Alkalinity (as mg CaCO3/L).

Table E-1: Peel River Watershed (1999-2005) Water Chemistry

Code	Sampling Location	Date	Dissolved Metals																											
			Al	Sb	As	Ba	Be	Bi	Cd	Cs	Cr	Co	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Rb	Se	Ag	Sr	Tl	Ti	U	V	Zn
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
A	Ogilvie River above Engineer Creek	9-Mar-99	10	0.8	N/D	90	0.1	0.1	0.05	0.01	1.2	0.1	2.7	20	0.4	25.4	2.6	N/D	3.1	3.3	N/D	1.0	0.01	269	0.05	1.00	2.7	0.55	18
A	Ogilvie River above Engineer Creek	31-Jul-02	52	0.4	N/D	79	0.2	N/D	0.10	0.10	0.3	0.20	1.7	89	0.1	10.5	2.8	N/D	1.3	5.1	0.2	1.0	0.10	166	0.10	0.30	1.0	0.20	17
A	Ogilvie River above Engineer Creek	23-Jun-03	26	0.5	1.0	74	0.0	N/D	0.05	0.01	0.1	0.11	1.9	57	0.9	18.1	1.2	0.01	1.6	4.2	0.4	0.7	0.01	217	0.10	0.02	0.9	0.03	16
B	Ogilvie River above Mouth	31-Jul-02	100	0.2	N/D	88	0.2	N/D	0.10	0.10	0.3	0.30	1.4	30	0.1	12.6	3.8	N/D	1.9	6.9	0.3	1.0	0.10	208	0.10	0.30	1.5	0.20	11
B	Ogilvie River above Mouth	23-Jun-03	54	0.5	1.0	84	0.0	N/D	0.06	0.01	0.1	0.14	13.2	30	0.4	13.4	2.5	0.01	1.7	4.1	0.3	0.8	0.01	216	0.10	0.02	1.0	0.03	18
B	Ogilvie River above Mouth	12-Jul-05	21	0.1	0.2	109	0.1	N/D	0.05	0.10	0.4	0.10	1.6	50	0.1	15.0	2.8	0.02	2.1	2.5	0.3	1.2	0.10	242	0.10	0.10	1.7	0.90	5
B	Ogilvie River above Mouth	9-Mar-99	10	0.8	N/D	102	0.1	0.1	0.03	0.0	1.2	0.1	0.9	20	0.1	9.8	2.6	N/D	1.8	2.8	N/D	1.5	0.01	257	0.05	0.79	1.6	0.55	5
B	Ogilvie River above Mouth	27-Aug-04	8	0.3	1.0	103	0.1	N/D	0.05	0.10	0.1	0.10	1.1	88	0.1	13.4	2.8	0.02	2.0	1.9	0.3	1.2	0.10	214	0.10	0.10	1.7	0.30	5
C	Blackstone River near Champion Lake	9-Mar-99	10	0.7	N/D	88	0.1	0.1	0.02	0.01	0.9	0.10	0.4	20	1.2	4.1	3.3	N/D	1.2	1.8	N/D	1.0	0.01	147	0.05	0.46	1.3	0.30	5
C	Blackstone River near Champion Lake	31-Jul-02	30	0.3	N/D	46	0.2	N/D	0.10	0.10	0.3	0.10	1.2	30	0.1	3.1	2.8	N/D	0.7	1.6	0.4	1.0	0.10	148	0.10	0.30	0.3	0.10	10
C	Blackstone River near Champion Lake	23-Jun-03	7	0.5	1.0	43	0.0	N/D	0.02	0.01	0.4	0.06	0.9	30	0.1	3.2	1.7	0.01	0.7	1.1	0.5	0.5	0.01	172	0.10	0.02	0.3	3.31	9
D	Blackstone River above Mouth	9-Mar-99	10	0.6	N/D	131	0.1	0.1	0.01	0.01	2.0	0.10	0.8	20	0.2	3.9	0.8	N/D	1.1	1.1	N/D	1.0	0.01	172	0.05	0.48	1.3	0.80	5
D	Blackstone River above Mouth	31-Jul-02	30	0.1	N/D	102	0.2	N/D	0.10	0.10	0.3	0.10	0.7	30	0.1	4.0	1.6	N/D	1.1	0.7	0.2	1.0	0.10	137	0.10	0.30	0.9	0.30	10
D	Blackstone River above Mouth	23-Jun-03	7	0.6	1.0	101	0.0	N/D	0.03	0.01	0.1	0.12	1.4	39	0.1	3.5	2.4	0.01	1.2	0.7	0.2	0.5	0.01	146	0.10	0.02	0.8	2.15	5
D	Blackstone River above Mouth	27-Aug-04	2	0.3	1.0	130	0.1	N/D	0.05	0.10	0.2	0.10	0.5	76	0.1	3.7	1.3	0.02	1.4	0.4	0.2	0.7	0.10	148	0.10	0.10	1.3	0.60	5
D	Blackstone River above Mouth	12-Jul-05	4	0.1	0.2	123	0.1	N/D	0.05	0.10	0.4	0.10	0.7	50	0.1	4.0	1.7	0.02	1.3	0.6	0.2	0.4	0.10	150	0.10	0.20	1.1	0.80	5
E	Peel River above Hart River	9-Mar-99	10	0.8	N/D	119	0.1	0.1	0.01	0.01	1.5	0.10	0.9	20	0.3	7.8	1.2	N/D	1.5	2.7	N/D	2.0	0.01	243	0.05	0.73	1.5	0.60	5
E	Peel River above Hart River	31-Jul-02	74	0.2	N/D	93	0.2	N/D	0.10	0.10	0.3	0.20	1.7	30	0.1	9.0	2.2	N/D	1.6	4.1	0.3	1.0	0.10	184	0.10	0.30	1.2	0.20	10
E	Peel River above Hart River	27-Aug-04	4	0.5	1.0	108	0.1	N/D	0.05	0.10	0.1	0.10	0.5	76	0.1	8.1	1.6	0.02	1.6	1.1	0.3	0.9	0.10	177	0.10	0.10	1.4	0.10	4
E	Peel River above Hart River	12-Jul-05	23	0.1	0.2	114	0.1	N/D	0.05	0.10	0.4	0.20	1.7	50	0.2	8.8	1.5	0.02	1.7	1.5	0.3	0.8	0.20	191	0.10	0.20	1.4	1.00	5
E	Peel River above Hart River	23-Jun-03	32	0.5	1.0	93	0.0	N/D	0.05	0.01	0.3	0.11	1.8	55	0.1	8.7	2.3	0.01	1.5	2.7	0.3	0.7	0.01	188	0.10	0.02	0.9	3.30	7
F	Hart River near Hungry Lake	9-Mar-99	10	1.3	N/D	107	0.1	0.1	0.01	0.02	1.7	0.10	0.8	20	1.1	6.2	1.1	N/D	1.7	2.8	N/D	1.0	0.01	177	0.05	0.59	1.7	0.70	7
F	Hart River near Hungry Lake	31-Jul-02	88	0.2	N/D	61	0.2	N/D	0.20	0.10	0.3	0.40	1.1	64	0.1	4.6	5.4	N/D	1.3	7.0	0.2	1.0	0.10	150	0.10	0.30	1.4	0.20	18
F	Hart River near Hungry Lake	23-Jun-03	63	0.5	1.0	67	0.0	N/D	0.06	0.01	0.1	0.23	1.8	47	0.2	4.8	2.9	0.01	1.2	5.2	0.3	0.9	0.01	171	0.10	0.02	1.2	3.18	16
F	Hart River near Hungry Lake	27-Aug-04	36	0.2	1.0	81	0.1	N/D	0.05	0.10	0.1	0.20	0.3	78	0.1	5.0	2.0	0.02	1.4	4.4	0.2	1.0	0.10	163	0.10	0.10	1.7	0.10	12
F	Hart River near Hungry Lake	12-Jul-05	51	0.1	0.2	74	0.1	N/D	0.05	0.10	0.3	0.10	1.4	50	0.1	4.3	1.3	0.02	1.3	3.8	0.2	0.8	0.10	159	0.10	0.10	1.4	0.60	11
G	Peel River above Canyon Creek	9-Mar-99	10	0.6	N/D	96	0.1	0.1	0.01	0.01	1.2	0.10	0.5	20	0.2	6.0	0.8	N/D	1.5	2.7	N/D	1.0	0.01	189	0.05	0.41	1.4	0.60	5
G	Peel River above Canyon Creek	31-Jul-02	87	0.3	N/D	71	0.2	N/D	0.10	0.10	0.3	0.30	1.6	51	0.1	6.5	5.1	N/D	1.4	5.7	0.2	1.0	0.10	162	0.10	0.30	1.4	0.20	12
G	Peel River above Canyon Creek	23-Jun-03	53	1.0	1.0	78	0.0	N/D	0.07	0.01	0.1	0.26	4.9	45	0.2	6.7	3.3	0.01	1.4	4.3	0.3	0.8	0.01	185	0.10	0.02	1.1	2.37	13
G	Peel River above Canyon Creek	27-Aug-04	22	0.2	1.0	83	0.1	N/D	0.05	0.10	0.1	0.10	0.5	76	0.1	5.9	1.5	0.02	1.3	2.8	0.2	1.0	0.10	158	0.10	0.10	1.5	0.10	7
G	Peel River above Canyon Creek	12-Jul-05	43	0.1	0.2	80	0.1	N/D	0.05	0.10	0.4	0.10	3.7	50	0.2	5.6	1.2	0.02	1.3	3.0	0.2	0.8	0.10	169	0.10	0.10	1.4	0.60	10
H	Wind River above Mouth	9-Mar-99	10	0.6	N/D	110	0.1	0.1	0.01	0.01	1.3	0.10	0.5	20	0.2	2.9	0.5	N/D	0.7	1.0	N/D	1.0	0.01	82	0.05	0.38	0.9	0.50	5
H	Wind River above Mouth	23-Jun-03	22	0.4	1.0	86	0.0	N/D	0.02	0.01	0.1	0.09	0.9	64	0.1	4.8	2.0	0.01	0.8	0.8	0.3	0.4	0.01	71	0.10	0.02	0.7	3.59	5
H	Wind River above Mouth	27-Aug-04	5	0.3	1.0	103	0.1	N/D	0.05	0.10	0.2	0.10	0.7	62	0.1	1.6	0.6	0.02	0.8	0.3	0.3	0.5	0.10	64	0.10	0.10	1.0	0.10	6
H	Wind River above Mouth	12-Jul-05	20	0.1	0.2	100	0.1	N/D	0.05	0.10	0.4	0.10	0.6	50	0.1	1.9	1.3	0.02	0.8	0.8	0.3	0.3	0.10	64	0.10	0.30	0.9	0.70	3
H	Wind River above Mouth	31-Jul-02	30	0.2	N/D	88	0.2	N/D	0.10	0.10	0.3	0.20	1.0	30	0.1	2.4	2.5	N/D	0.8	1.0	0.3	1.0	0.10	63	0.10	0.30	0.9	0.20	10
I	Peel River above Bonnet Plume River	31-Jul-02	65	0.3	N/D	76	0.2	N/D	0.10	0.10	1.5	0.30	1.4	34	0.1	4.7	3.7	N/D	1.2	4.0	0.2	1.0	0.10	124	0.10	0.30	1.1	0.20	10
I	Peel River above Bonnet Plume River	23-Jun-03	333	0.4	1.0	85	0.0	N/D	0.10	0.01	0.2	0.19	4.2	198	0.6	4.9	5.5	0.01	1.1	3.0	0.4	0.7	0.01	139	0.10	0.84	0.9	2.09	32
I	Peel River above Bonnet Plume River	27-Aug-04	15	0.2	1.0	96	0.1	N/D	0.05	0.10	0.1	0.10	0.4	78	0.1	4.6	1.0	0.02	1.2	1.7	0.3	0.6	0.10	131	0.10	0.10	1.4	0.50	6
I	Peel River above Bonnet Plume River	12-Jul-05	31	0.1	0.3	90	0.1	N/D	0.05	0.10	0.4	0.10	0.9	50	0.1	4.2	1.2	0.02	1.1	2.0	0.3	1.0	0.10	126	0.10	0.20	1.2	0.70	6
I	Peel River above Bonnet Plume River	9-Mar-99	10	0.6	N/D	93	0.1	0.1	0.02	0.01	1.2	0.10	0.7	20	0.2	4.7	0.4	N/D	1.2	1.6	N/D	1.0	0.01	159	0.05	0.51	1.2	0.45	5
K	Bonnet Plume River above Mouth	9-Mar-99	10	0.6	N/D	74	0.1	0.1	0.01	0.01	0.7	0.10	0.3	20	0.2	2.6	0.6	N/D	0.5	1.3	N/D	1.0	0.01	137	0.05	0.62	1.4	0.40	5
K	Bonnet Plume River above Mouth	31-Jul-02	30	0.4	N/D	42	0.2	N/D	0.10	0.10	0.3	0.10	0.8	30	0.1	3.9	3.0	N/D	0.5	0.6	0.3	1.0	0.10	119	0.10	0.30	1.3	0.10	10
K	Bonnet Plume River above Mouth	23-Jun-03	30	0.3	1.0	50	0.0	N/D	0.02	0.01	0.1	0.08	0.8	30	0.1	3.4	2.0	0.01	0.5	0.8	0.3	0.5	0.01	148	0.10	0.02	1.1	0.03	5
K	Bonnet Plume River above Mouth	27-Aug-04	15	0.2	1.0	67	0.1	N/D	0.05	0.10	0.1	0.10	2.0	77	0.1	2.8	0.6	0.02	0.5	0.5	0.4	0.7	0.10	133	0.10	0.10	1.5	0.30	5
K	Bonnet Plume River above Mouth	12-Jul-05	35	0.1	0.2	56	0.1	N/D	0.05	0.10	0.3	0.10	1.6	50	0.1	3.2	0.9	0.02	0.5	0.9	0.3	0.8	0.10	147	0.10	0.10	1.4	0.40	4
L	Peel River above Snake River	9-Mar-99	10	0.7	N/D	89	0.1	0.1	0.02	0.01	0.9	0.10	0.5	20	0.2	4.2	3.3	N/D	1.0	1.9	N/D	1.0	0.01	144	0.05	0.60	1.3	0.40	5
L	Peel River above Snake River	31-Jul-02	61	0.3	N/D	67	0.2	N/D	0.10	0.10	0.3	0.20	3.8	30	0.1	4.1	2.9	N/D	1.0	2.8	0.3	1.0	0.10	116	0.10	0.30	1.2	0.10	11
L	Peel River above Snake River	23-Jun-03	47	0.4	1.0	69	0.0	N/D	0.05	0.01	0.1	0.24	1.0	30	0.1	9.2	5.0	0.01	0.9	2.8	0.3	0.7	0.01	140	0.10	0.02	0.9	0.09	7
L	Peel River above Snake River	27-Aug-04	32	0.3	1.0	94	0.1	N/D	0.06	0.10	0.1	0.30	0.6	103	0.1	4.4	4.5	0.02	1.2	2.7	0.3	0.9	0.10	143	0.10	0.10	1.5	0.10	9
L	Peel River above Snake River	12-Jul-05	37	0.1	0.2	77	0.1	N/D	0.05	0.10	0.3	0.10	1.0	50	0.1	3.9	2.0	0.02	1.0	1.7	0.3	0.5	0.10	133	0.10	0.30	1.2	0.60	4
M	Snake River above Mouth	31-Jul-02	30	0.3	N/D	48	0.2	N/D	0.10	0.10	0.3	0.20	1.3	30	0.1	5.2	9.7	N/D	0.8	1.2	0.3	1.0	0.10	177	0.10	0.30	0.7	0.10	10
M	Snake River above Mouth	23-Jun-03	33	0.4	1.0	52	0.0	N/D	0.03	0.01	0.1	0.15	2.0	76	0.5	4.3	8.4	0.01	0.7	6.4	0.3	0.6	0.01	194	0.10	0.02	0.5	2.21	25
M	Snake River above Mouth	27-Aug-04	13	0.3	1.0	53	0.1	N/D	0.05	0.10	0.1	0.10	0.5	95	0.1	5.0	8.1	0.02	0.8	0.6	0.3	0.9	0.10	235	0.10	0.10	0.8	0.10	4
M	Snake River above Mouth	9-Mar-99	10	0.7	N/D	57	0.1	0.1	0.01	0.01	1.2	0.10	0.6	20	0.2	7.4	15.5	N/D	0.8	1.7	N/D	1.0	0.01	370	0.05	1.54	0.7	0.45	5
M	Snake River above Mouth	12-Jul-05	29	0.1	0.2	54	0.1	N/D	0.05	0.10	0.2	0.10	1.2	50	0.1	5.1	6.5	0.02	0.9	0.8	0.3	1.0	0.10	269	0.10	0.30	0.8	0.40	5
N	Peel River above Caribou River	9-Mar-99	10	0.6	N/D	85	0.1	0.1	0.01	0.01	0.8	0.10	0.6	20	0.1	4.6	1.8	N/D	1.1	1.8	N/D	1.0	0.01	172	0.05	0.67	1.1	0.40	5
N	Peel River above Caribou River	23-Jun-03	52	0.3	1.0	63	0.0	N/D	0.05	0.01	0.1	0.23	1.7	48	0.1	4.8	9.9	0.01	0.9	2.5	0.3	0.7	0.01	153	0.10	0.02	0.8	1.98	7
N	Peel River above Caribou River	27-Aug-04	22	0.2	1.0	76	0.1	N/D	0.05	0.10	0.1	0.10	0.4	81	0.1	4.1	4.8	0.02	1.0	1.7	0.3	0.8	0.10	146	0.10	0.10	1.2	0.10	5
N	Peel River above Caribou River	12-Jul-05	32	0.1	0.2	72	0.1	N/D	0.05	0.10	0.3	0.10	0.8	50	0.1	4.5	4.5	0.02	1.0	1.5	0.4	0.6	0.10	158	0.10	0.10	1.2	0.70	4
N	Peel River above Caribou River	31-Jul-02	36	0.3	N/D	57	0.2	N/D	0.10	0.10	0.3	0.20	1.1	36	0.1	4.8	5.0	N/D	1.0	2.0	0.3	1.0	0.10	128	0.10	0.30	1.0	0.10	10
N1	Caribou River above Mouth	27-Aug-04	24	0.5	1.0	39	0.1	N/D	0.05	0.10	0.1	0.70	3.9	135	0.1	18.4	135.0	0.02	0.8	4.7	0.6	0.7	0.10	170	0.10	1.10	0.8	0.10	4
O	Peel River above Fort McPherson	9-Mar-99	10	0.6	N/D	81	0.1	0.1	0.01	0.01	0.7	0.10	0.6	20	0.2	4.9	6.9	N/D	1.1	1.7	N/D	1.0	0.01	171	0.05	0.71	1.0	0.30	5
O	Peel River above Fort McPherson	29-Jul-02	30	0.4	N/D	52	0.2	N/D	0.10	0.10	0.3	0.20	1.2	50	0.1	5.7	5.6	N/D	1.1	1.6	0.4	1.0	0.10	151	0.10	0.30	1.0	0.20	14
O	Peel River above Fort McPherson	26-Jun-03	26	0.4	1.0	58	0.0	N/D	0.02	0.01	0.1	0.13	1.7	30	0.2	5.3	7.3	0.01	1.0	1.6	0.4	0.6	0.01	154	0.10	0.02	0.8	0.60	6
O	Peel River above Fort McPherson	27-Aug-04	23	0.2	1.0	63	0.1	N/D	0.05	0.1	0.2	0.1	0.8	89	0.1	5.1	5.8	0.0	1.2	0.9	0.4	0.8	0.10	153	0.10	0.10	1.3	0.10	4
O	Peel River above Fort McPherson	16-Jun-05	41	0.1	0.3	59	0.1	N/D	0.05	0.10	0.3	0.10	1.7	50	0.1	4.1	6.2	N/D	1.0	1.5	0.3	0.9	0.10	132	0.10	0.30	0.9	0.50	16
O	Peel River above Fort McPherson	12-Jul-05	23	0.1	0.4	63	0.1	N/D	0.05	0.10	0.4	0.10	1.5	50	0.1	4.8	4.0	0.02	1.1	1.2	0.4	0.6	0.10	156	0.10	0.30	1.2	0.70	3
O	Peel River above Fort McPherson	10-Aug-05	33	0.1	0.6	70	0.1	N/D	0.05	0.10	0.4	0.10	3.4	50	0.1	4.8	5.4	N/D	1.2	1.1	0.4	1.2	0.20	159	0.10	0.30	1.2	0.70	36

Table E-1: Peel River Watershed (1999-2005) Water Chemistry

Code	Sampling Location	Date	Total Metals																										
			Al	Sb	As	Ba	Be	Bi	Cd	Cs	Cr	Co	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Rb	Se	Ag	Sr	Tl	Ti	U	V	Zn
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
A	Ogilvie River above Engineer Creek	9-Mar-99	10	1.2	N/D	92	0.1	0.1	0.05	0.01	0.9	0.1	3.3	25	0.7	23.0	3.2	N/D	3.1	3.0	N/D	1.0	0.02	279	0.05	1.0	3.2	0.5	19
A	Ogilvie River above Engineer Creek	31-Jul-02	417	0.8	N/D	91	2.0	N/D	0.30	0.40	3.0	1.0	2.0	7440	1.0	5.0	12.0	0.05	1.0	6.0	0.9	10.0	0.30	169	0.40	3.0	1.1	2.0	33
A	Ogilvie River above Engineer Creek	23-Jun-03	63	0.6	1.0	81	0.1	N/D	0.10	0.10	0.3	0.2	2.9	104	1.1	18.6	3.4	0.01	1.7	4.8	0.4	1.0	0.10	232	0.10	0.1	1.0	0.4	23
B	Ogilvie River above Mouth	31-Jul-02	366	0.7	N/D	89	2.0	N/D	0.30	0.40	3.0	1.0	2.0	946	1.0	7.0	7.0	0.05	2.0	12.0	0.6	10.0	0.30	196	0.40	3.0	1.5	2.0	20
B	Ogilvie River above Mouth	23-Jun-03	94	0.5	1.0	87	0.1	N/D	0.10	0.10	4.5	0.2	1.8	174	0.2	13.5	3.9	0.01	1.8	6.3	0.4	1.0	0.10	220	0.10	0.4	1.1	0.4	14
B	Ogilvie River above Mouth	12-Jul-05	30	0.1	0.3	113	0.1	N/D	0.10	0.10	0.3	0.1	1.5	50	0.1	15.0	3.0	0.03	2.3	2.8	0.3	1.0	0.10	249	0.10	0.2	1.8	0.4	10
B	Ogilvie River above Mouth	9-Mar-99	10	0.7	N/D	104	0.1	0.1	0.03	0.01	2.0	0.1	0.5	20	1.0	9.2	2.5	N/D	1.6	2.6	N/D	2.0	0.01	268	0.06	0.8	1.8	0.8	5
B	Ogilvie River above Mouth	27-Aug-04	30	0.3	1.0	107	0.1	N/D	0.10	0.10	0.3	0.1	1.3	100	0.1	14.3	3.0	0.02	2.0	2.0	0.3	1.0	0.10	222	0.10	0.1	1.8	1.0	10
C	Blackstone River near Champion Lake	9-Mar-99	10	0.6	N/D	90	0.1	0.1	0.02	0.01	0.5	0.1	0.2	50	0.2	3.9	3.4	N/D	1.1	1.7	N/D	1.0	0.01	145	0.05	0.9	1.4	0.3	5
C	Blackstone River near Champion Lake	31-Jul-02	112	0.8	N/D	47	2.0	N/D	0.30	0.40	3.0	1.0	2.0	174	1.0	3.0	11.0	0.05	1.0	2.0	0.5	10.0	0.30	148	0.40	4.0	0.4	1.0	10
C	Blackstone River near Champion Lake	23-Jun-03	42	0.4	1.0	47	0.1	N/D	0.10	0.10	0.8	0.1	1.2	67	0.9	3.2	5.8	0.01	0.6	1.3	0.5	1.0	0.10	179	0.10	1.0	0.3	3.5	10
D	Blackstone River above Mouth	9-Mar-99	10	0.5	N/D	130	0.1	0.1	0.01	0.01	1.4	0.1	0.2	20	0.1	3.5	0.5	N/D	1.1	1.0	N/D	1.0	0.01	171	0.05	0.4	1.5	0.6	5
D	Blackstone River above Mouth	31-Jul-02	30	0.9	N/D	102	2.0	N/D	0.30	0.40	3.0	1.0	2.0	48	1.0	4.0	3.0	0.05	1.0	1.0	0.5	10.0	0.30	137	0.40	3.0	0.9	1.0	10
D	Blackstone River above Mouth	23-Jun-03	30	0.6	1.0	99	0.1	N/D	0.10	0.10	10.2	0.1	1.3	90	0.2	3.2	3.8	0.01	1.3	5.4	0.3	1.0	0.10	144	0.10	0.9	0.8	3.7	10
D	Blackstone River above Mouth	27-Aug-04	30	0.3	1.0	136	0.1	N/D	0.10	0.10	2.1	0.1	0.8	88	0.1	3.9	1.4	0.02	1.5	0.4	0.2	1.0	0.10	153	0.10	0.1	1.4	0.1	10
D	Blackstone River above Mouth	12-Jul-05	4	0.1	0.2	122	0.1	N/D	0.05	0.10	0.3	0.1	0.9	50	0.1	3.9	1.8	0.02	1.3	0.6	0.2	0.6	0.30	150	0.10	0.1	1.1	0.9	3
E	Peel River above Hart River	9-Mar-99	10	0.7	N/D	120	0.1	0.1	0.02	0.01	1.3	0.1	0.5	20	0.2	7.1	1.0	N/D	1.5	2.4	N/D	1.0	0.01	239	0.05	0.7	1.7	0.5	5
E	Peel River above Hart River	31-Jul-02	381	0.6	N/D	92	2.0	N/D	0.30	0.40	3.0	1.0	2.0	814	1.0	5.0	6.0	0.05	2.0	5.0	0.7	10.0	0.30	172	0.40	3.0	1.3	2.0	12
E	Peel River above Hart River	27-Aug-04	30	0.3	1.0	115	0.1	N/D	0.10	0.10	0.3	0.1	1.1	91	0.1	8.6	1.9	0.02	1.7	1.2	0.3	1.0	0.10	189	0.10	0.1	1.5	0.7	10
E	Peel River above Hart River	12-Jul-05	15	0.1	0.2	115	0.1	N/D	0.05	0.10	0.5	0.1	0.9	50	0.1	9.1	1.8	0.02	1.6	1.5	0.3	0.7	0.10	192	0.10	0.2	1.3	1.1	3
E	Peel River above Hart River	23-Jun-03	79	0.5	1.0	93	0.1	N/D	0.10	0.10	10.8	0.2	1.8	165	0.1	8.8	3.8	0.01	1.6	7.3	0.4	1.0	0.10	181	0.10	0.8	1.0	4.5	10
F	Hart River near Hungry Lake	9-Mar-99	10	0.6	N/D	103	0.1	0.1	0.10	0.02	1.0	0.1	0.7	30	0.4	5.4	0.8	N/D	1.6	2.7	N/D	1.0	0.01	173	0.05	0.5	1.8	0.5	5
F	Hart River near Hungry Lake	31-Jul-02	646	0.6	N/D	82	2.0	N/D	0.40	0.40	3.0	1.0	2.0	902	1.0	3.0	18.0	0.05	1.0	9.0	0.9	10.0	0.30	144	0.40	7.0	1.5	4.0	38
F	Hart River near Hungry Lake	23-Jun-03	129	0.5	1.0	69	0.1	N/D	0.30	0.10	10.5	0.3	2.4	148	0.1	4.9	4.4	0.01	1.4	10.2	0.3	1.0	0.10	173	0.10	0.7	1.3	3.7	25
F	Hart River near Hungry Lake	27-Aug-04	42	0.4	1.0	85	0.1	N/D	0.20	0.10	0.3	0.2	0.3	120	0.1	5.2	2.3	0.02	1.4	4.7	0.2	1.0	0.10	172	0.10	0.1	1.8	0.8	15
F	Hart River near Hungry Lake	12-Jul-05	73	0.1	0.2	78	0.1	N/D	0.20	0.10	0.5	0.1	0.7	106	0.1	4.8	3.5	0.02	1.3	4.3	0.3	1.0	0.10	165	0.10	0.5	1.5	0.4	15
G	Peel River above Canyon Creek	9-Mar-99	10	0.6	N/D	95	0.1	0.1	0.05	0.01	1.0	0.1	0.3	20	1.3	5.4	0.6	N/D	1.5	2.6	N/D	1.0	0.01	187	0.05	0.5	1.7	0.5	5
G	Peel River above Canyon Creek	31-Jul-02	801	0.7	N/D	89	2.0	N/D	0.30	0.40	3.0	1.0	2.0	1220	1.0	3.0	16.0	0.05	1.0	8.0	1.2	10.0	0.30	153	0.40	6.0	1.4	4.0	27
G	Peel River above Canyon Creek	23-Jun-03	93	0.7	1.0	82	0.1	N/D	0.20	0.10	10.5	0.3	1.4	192	0.1	6.9	5.2	0.01	1.5	9.1	0.3	1.0	0.10	186	0.10	0.8	1.2	3.6	15
G	Peel River above Canyon Creek	27-Aug-04	30	0.2	1.0	97	0.1	N/D	0.10	0.10	0.4	0.1	0.5	109	0.1	6.7	1.9	0.02	1.6	3.3	0.2	1.0	0.10	184	0.10	0.1	1.8	1.3	10
G	Peel River above Canyon Creek	12-Jul-05	47	0.1	0.2	83	0.1	N/D	0.10	0.10	0.4	0.1	1.0	51	0.1	5.7	1.9	0.02	1.5	3.1	0.3	1.0	0.10	172	0.10	0.2	1.4	0.3	10
H	Wind River above Mouth	9-Mar-99	10	0.5	N/D	111	0.1	0.1	0.01	0.01	0.9	0.1	0.1	20	0.1	2.4	0.4	N/D	0.6	0.8	N/D	1.0	0.01	80	0.05	0.2	1.0	0.4	5
H	Wind River above Mouth	23-Jun-03	95	0.4	1.0	95	0.1	N/D	0.10	0.10	5.2	0.2	1.2	212	0.2	2.1	5.7	0.01	0.8	2.9	0.5	1.0	0.10	71	0.10	1.6	0.8	4.4	10
H	Wind River above Mouth	27-Aug-04	30	0.3	1.0	104	0.1	N/D	0.10	0.10	2.3	0.1	0.3	92	0.1	1.7	1.1	0.02	0.8	0.3	0.3	1.0	0.10	66	0.10	0.3	1.0	0.1	10
H	Wind River above Mouth	12-Jul-05	229	0.1	0.4	110	0.1	N/D	0.10	0.10	0.8	0.2	3.8	390	0.4	2.3	7.4	0.03	0.9	1.3	1.0	1.0	0.10	61	0.10	4.0	0.9	1.2	10
H	Wind River above Mouth	31-Jul-02	3330	0.6	N/D	136	2.0	N/D	0.30	0.40	6.0	1.0	3.0	2530	2.0	3.0	49.0	0.05	1.0	4.0	5.8	10.0	0.30	65	0.40	38.0	1.0	11.0	13
I	Peel River above Bonnet Plume River	31-Jul-02	2320	0.9	N/D	132	2.0	N/D	0.30	0.40	5.0	1.0	3.0	2240	1.0	3.0	42.0	0.05	1.0	9.0	3.8	10.0	0.30	129	0.40	22.0	1.4	10.0	35
I	Peel River above Bonnet Plume River	23-Jun-03	210	0.5	1.0	93	0.1	N/D	0.10	0.10	12.1	0.3	1.6	411	0.3	5.6	8.2	0.01	1.3	8.4	0.8	1.0	0.10	148	0.10	2.1	1.0	4.3	12
I	Peel River above Bonnet Plume River	27-Aug-04	55	0.3	1.0	109	0.1	N/D	0.10	0.10	2.4	0.1	0.4	170	0.1	5.2	1.9	0.02	1.4	2.0	0.4	1.0	0.10	149	0.10	0.4	1.6	0.2	10
I	Peel River above Bonnet Plume River	12-Jul-05	159	0.1	0.3	95	0.1	N/D	0.10	0.10	0.6	0.1	1.3	284	0.2	4.5	4.7	0.03	1.2	2.3	0.7	1.0	0.10	125	0.10	2.9	1.2	0.8	10
I	Peel River above Bonnet Plume River	9-Mar-99	10	0.6	N/D	91	0.1	0.1	0.03	0.01	0.9	0.1	0.2	20	0.2	4.0	0.1	N/D	1.1	1.3	N/D	1.0	0.01	156	0.05	0.5	1.4	0.4	5
K	Bonnet Plume River above Mouth	9-Mar-99	10	0.6	N/D	73	0.1	0.1	0.01	0.01	0.6	0.1	0.1	20	0.4	2.4	0.5	N/D	0.6	1.2	N/D	1.0	0.01	134	0.05	0.7	1.5	0.3	5
K	Bonnet Plume River above Mouth	31-Jul-02	8660	0.6	N/D	171	2.0	N/D	0.30	1.00	12.0	3.0	8.0	8780	5.0	6.0	164.0	0.05	1.0	9.0	15.2	10.0	0.30	141	0.40	82.0	1.6	24.0	36
K	Bonnet Plume River above Mouth	23-Jun-03	551	0.5	1.0	71	0.1	N/D	0.10	0.10	5.5	0.5	2.2	1083	0.7	4.3	30.4	0.01	0.5	3.9	1.6	1.0	0.10	150	0.10	5.0	1.2	0.8	10
K	Bonnet Plume River above Mouth	27-Aug-04	78	0.2	1.0	71	0.1	N/D	0.10	0.10	2.3	0.1	0.4	170	0.1	3.1	1.7	0.02	0.5	0.5	0.5	1.0	0.10	138	0.10	5.8	1.6	0.1	10
K	Bonnet Plume River above Mouth	12-Jul-05	114	0.1	0.2	61	0.1	N/D	0.10	0.10	0.3	0.1	0.8	168	0.1	3.5	7.7	0.02	0.5	1.0	0.4	1.0	0.10	149	0.10	1.3	1.4	0.3	10
L	Peel River above Snake River	9-Mar-99	10	0.6	N/D	91	0.1	0.1	0.02	0.01	0.6	0.1	0.2	50	0.2	3.6	3.3	N/D	1.0	1.8	N/D	1.0	0.01	140	0.05	0.6	1.3	0.3	5
L	Peel River above Snake River	31-Jul-02	6660	1.1	N/D	190	2.0	N/D	0.40	0.60	8.0	2.0	6.0	5850	3.0	5.0	102.0	0.05	1.0	11.0	9.4	10.0	0.30	141	0.40	49.0	1.5	19.0	52
L	Peel River above Snake River	23-Jun-03	232	0.4	1.0	78	0.1	N/D	0.10	0.10	5.5	0.4	1.7	422	0.2	4.8	11.9	0.01	1.0	5.3	0.8	1.0	0.10	143	0.10	2.2	1.1	4.7	10
L	Peel River above Snake River	27-Aug-04	115	0.3	1.0	96	0.1	N/D	0.10	0.10	2.1	0.3	3.3	262	0.2	4.4	5.8	0.02	1.1	2.8	0.5	1.0	0.10	136	0.10	6.8	1.4	0.2	14
L	Peel River above Snake River	12-Jul-05	163	0.1	0.3	92	0.1	N/D	0.10	0.10	0.4	0.2	1.0	242	0.2	4.1	5.3	0.02	1.2	2.3	0.7	1.0	0.20	146	0.10	1.8	1.3	0.9	10
M	Snake River above Mouth	31-Jul-02	16500	1.1	N/D	314	2.0	N/D	0.30	1.90	26.0	5.0	13.0	15900	6.0	15.0	253.0	0.05	2.0	16.0	26.7	10.0	0.30	248	0.40	91.0	1.2	62.0	54
M	Snake River above Mouth	23-Jun-03	626	0.4	1.0	75	0.1	N/D	0.10	0.20	11.8	0.7	3.7	1262	0.8	6.0	33.4	0.01	0.9	7.7	1.9	1.0	0.10	201	0.10	4.5	0.6	5.7	12
M	Snake River above Mouth	27-Aug-04	112	0.2	1.0	68	0.1	N/D	0.10	0.10	2.0	0.2	1.5	343	0.2	6.0	12.7	0.02	1.0	1.0	0.6	1.0	0.10	282	0.10	1.0	1.0	0.4	10
M	Snake River above Mouth	9-Mar-99	10	0.5	N/D	57	0.1	0.1	0.02	0.01	1.0	0.1	0.3	45	0.2	6.6	15.5	N/D	0.7	1.6	N/D	1.0	0.01	315	0.05	1.7	0.8	0.4	5
M	Snake River above Mouth	12-Jul-05	235	0.1	0.3	62	0.1	N/D	0.10	0.10	0.6	0.2	1.8	450	0.3	5.3	13.9	0.02	1.0	1.2	0.8	1.0	0.10	272	0.10	4.2	0.8	1.0	10
N	Peel River above Caribou River	9-Mar-99	6870	0.7	N/D	255	0.1	0.1	0.40	1.00	10.0	2.3	2.7	5430	2.3	14.8	453.0	N/D	1.7	7.2	N/D	10.0	0.10	200	0.10	137.0	1.7	30.1	22
N	Peel River above Caribou River	23-Jun-03	469	0.5	1.0	82	0.1	N/D	0.10	0.10	12.7	0.7	2.6	937	1.0	5.8	28.1	0.01	1.2	8.8	1.5	1.0	0.10	159	0.10	4.1	0.9	4.8	13
N	Peel River above Caribou River	27-Aug-04	97	0.1	1.0	78	0.1	N/D	0.10	0.10	1.9	0.2	1.1	261	0.1	4.3	7.1	0.02	1.1	1.9	0.5	1.0	0.10	143	0.10	0.6	1.2	0.1	10
N	Peel River above Caribou River	12-Jul-05	241	0.1	0.4	82	0.1	N/D	0.10	0.10	0.6	0.2	1.8	381	0.3	4.8	9.2	0.02	1.1	2.0	0.9	1.0	0.10	155	0.10	3.2	1.2	1.0	10
N	Peel River above Caribou River	31-Jul-02	11800	0.8	N/D	277	2.0	N/D	0.30	1.50	20.0	4.0	10.0	11500	5.0	11.0	167.0	0.05	1.0	14.0	21.1	10.0	0.30	149	0.40	82.0	1.4	45.5	51
N1	Caribou River above Mouth	27-Aug-04	5880	0.2	7.0	435	0.4	N/D	0.30	1.40	13.6	7.0	21.2	13800	8.0	31.1	273.0	0.02	1.8	24.8	13.0	1.0	0.10	184	0.10	10.3	1.5	26.8	70
O	Peel River above Fort McPherson	9-Mar-99	11	0.5	N/D	82	0.1	0.1	0.01	0.01	0.8	0.1	0.2	50	0.2	4.4	7.5	N/D	1.2	1.6	N/D	1.0	0.01	171	0.05	1.0	1.1	0.4	5
O	Peel River above Fort McPherson	29-Jul-02	14200	1.0	N/D	297	2.0	N/D	0.30	1.70	21.0	4.0	10.0	12600	6.0	12.0	122.0	0.01	2.0	13.0	23.5	10.0	0.30	199	0.40	89.0	1.5	48.0	49
O	Peel River above Fort McPherson	26-Jun-03	1070	0.7	1.0	106	0.1	N/D	0.10	0.30	7.5	1.2	5.8	2390	1.3	7.1	46.5	0.01	1.2	7.3	3.1	1.0	0.10	163	0.10	7.7	1.0	8.2	19
O	Peel River above Fort McPherson	27-Aug-04	2105	0.1	3.5	200	0.1	N/D	0.10	0.65	5.0	2.0	7.4	5820	3.6	8.4	37.7	0.02	1.8	7.3	6.8	1.0	0.10	152	0.10	6.7	1.4	9.8	29
O	Peel River above Fort McPherson	16-Jun-05	1920	0.1	2.3	164	0.1	N/D	0.20	0.40	3.8	1.9	6.9	4840	2.7	7.2	94.3	N/D	1.3	7.9	4.3	1.0	0.20	150	0.10	13.8	1.2	8.2	36
O	Peel River above Fort McPherson	12-Jul-05	650	0.1	0.8	92	0.1	N/D	0.10	0.20	1.4	0.6	2.5	1230	0.7	5.8	19.7	0.03	1.3	2.8	2.0	1.0	0.10	161	0.10	6.3	1.3	2.8	10
O	Peel River above Fort McPherson	10-Aug-05	869	0.1	1.5	130	0.1	N/D	0.10	0.30	1.9	1.0	3.7	2360	1.4	6.8	33.7	N/D	1.3	4.6	2.3	1.0	0.10	166	0.10	8.2	1.4	4.0	18