

Real-Time Water Quality Deployment Report Leary's Brook @ Prince Philip Drive

November 19th, 2010 to December 15th, 2010



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General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- After effects of Hurricane Igor on September 21st, 2010 are manifested in stream bank instability. The result is high streambed mobility and sediment transport. Instrument burial in silt and gravel is common and data quality is reduced, especially following rainfall events.
 - A sensor burial occurred on December 3rd during 18.6 mm of precipitation. Conductivity, DO and Turbidity sensors did not produce useful data after this time and data was removed prior to statistical computation.
 - \circ Data following December 3rd has been suppressed from the graphs and discussion below due to inaccuracies.

Maintenance and Calibration of Instrument

- As part of the Quality Assurance and Quality Control protocol (QAQC), an assessment of the reliability of data recorded by an instrument is made at the beginning and end of the deployment period. The procedure is based on the approach used by the United States Geological Survey.
 - Upon deployment, a QA/QC Sonde is temporarily deployed along side the Field Sonde. Values for temperature and dissolved oxygen are compared between the two instruments. A grab sample is taken to compare with the Field Sonde for specific conductivity, pH and turbidity parameters. Based on the degree of difference between parameters recorded by the Field Sonde, QAQC Sonde and grab sample a qualitative statement is made on the data quality in Table 1 upon Deployment.
 - ► At the end of a deployment period, readings are taken in the water body from the Field Sonde before and after a thorough cleaning in order to assess the degree of biofouling. During calibration in the laboratory, an assessment of calibration drift is made and the two error values are combined to give Total Error (T_e). If T_e exceeds a predetermined data correction criterion, a correction based on T_e is applied to the dataset using linear interpolation. Based on the value for T_e, a qualitative statement is also made on the data quality in Table 1 upon Removal.

Station	Date	Action	Comparison Ranking				
			Temperature	рН	Conductivity	Dissolved Oxygen	Turbidity
Leary's Brook at Prince Philip Drive	November 19 th , 2010	Deployment	Excellent	Good	Good	Excellent	Fair
	December 16 th , 2010	Removal	Excellent	Excellent	Poor	Poor	Poor

Data was assessed as "Excellent" upon deployment for Temperature and Dissolved Oxygen and "Good" for pH and Conductivity. Turbidity was ranked only as "Fair" which speaks to a 5.1 NTU difference between the QA and Field sondes upon deployment. It is uncertain which sonde is more correct since the grab sample taken at this time indicates a turbidity of 3.4 NTU.

Data Interpretation

- Water temperature was recorded with a maximum value of 6.67°C and a minimum value of 1.19°C.
- Overall, temperature appears to be mostly stable. Two instances where cool water occurred as stage level rose are recorded.





- pH ranged from 6.55 to 8.19 units with a median value of 6.91 units for this time period, minus data after December 3rd. All values fell within the CCME guidelines for the protection of aquatic life.
- Shown in Figure 3, an unusual spike in pH was recorded on November 27 as pH increased quickly from about 6.9 to a maximum of 8.19. Values as high as this are rare in Leary's Brook and are not expected to occur without a concurrent stage level rise. Such a recording as this suggests a spillage of some alkaline chemical. Unfortunately, this was not detected until after the pH had returned to baseline levels.
 - Automated alerts are being rolled out in many stations across the province. This system alerts Water Resources staff to incidents where water quality parameters exceed a set threshold. Such a pH alert threshold will be devised and applied to this station.



Water pH and Stage Level

Figure 2

Figure 3



Alkaline spike in pH on November 27, 2010

After removal of data following December 3^{rd} 's sensor burial, specific conductivity ranged from 226.0 to 4967.9 μ S/cm with a median value of 269.0 μ S/cm. Such a skewed distribution in values is reflective of ice-control season with road salt application. During snow melt, salt that had built up on road surfaces is quickly washed into the storm water basins and into Leary's Brook.

Figure 4



Specific Conductivity of Water and Stage Level

Since data was compromised following sensor burial on December 3rd, the range in values for DO saturation was calculated to be between 94.6 to 99.7%. The concurrent saturation was calculated to be 11.70 to 13.72 mg/l with a median value of 12.70 mg/l. These levels are above CCME Guidelines for the protection of aquatic life.



Dissolved Oxygen Concentration and Saturation



- From November 19th to December 2nd, values ranged from 0.0 to 172.1 NTU with a median value of 0.0 NTU. Most values were recorded in clear water.
- A few jumps in turbidity were recorded in conjunction with stage and conductivity increases. These jumps were short-term in duration and returned to background shortly thereafter. It is probable that salty runoff from road and parking lot surfaces are responsible for such turbid periods.





Water Turbidity and Stage

Conclusion

- A burial of the multi-parameter sonde on December 3rd had a noticeable impact on all sensors. The affected data was removed prior to analysis.
- An unusual spike in pH to a value of 8.19 was encountered on November 27th, 2010. Such alkaline pH levels are not common in this stream system and the lack of concurrent stage level rises indicates that some form of spillage is likely to have occurred.
 - A pH alert threshold will be activated at Leary's Brook station to signal Water Resources staff to significant changes in pH level. This will ensure that a prompt response is taken and potential pollutants are identified.

Appendix



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