Real-Time Water Quality Deployment Report

Leary's Brook at Prince Philip Drive

November 23, 2012 to January 30, 2013

Government of Newfoundland & Labrador

Department of Environment and Conservation

Water Resources Management Division

St. John's, NL, A1B 4J6 Canada

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.

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.
- The deployment period was over two months and hence more fluctuation is expected in turbidity and specific conductance values. The water was highly turbid on the day of deployment. As a result there was high discrepancy between field and QA/QC sonde turbidity values.
- Depending on the degree of difference between each parameter from the Field and QAQC sondes a qualitative rank is assigned (See Table 1). The possible ranks, from most to least desirable, are: Excellent, Good, Fair, Marginal, and Poor.

Table 1: Qualitative QAQC Ranking

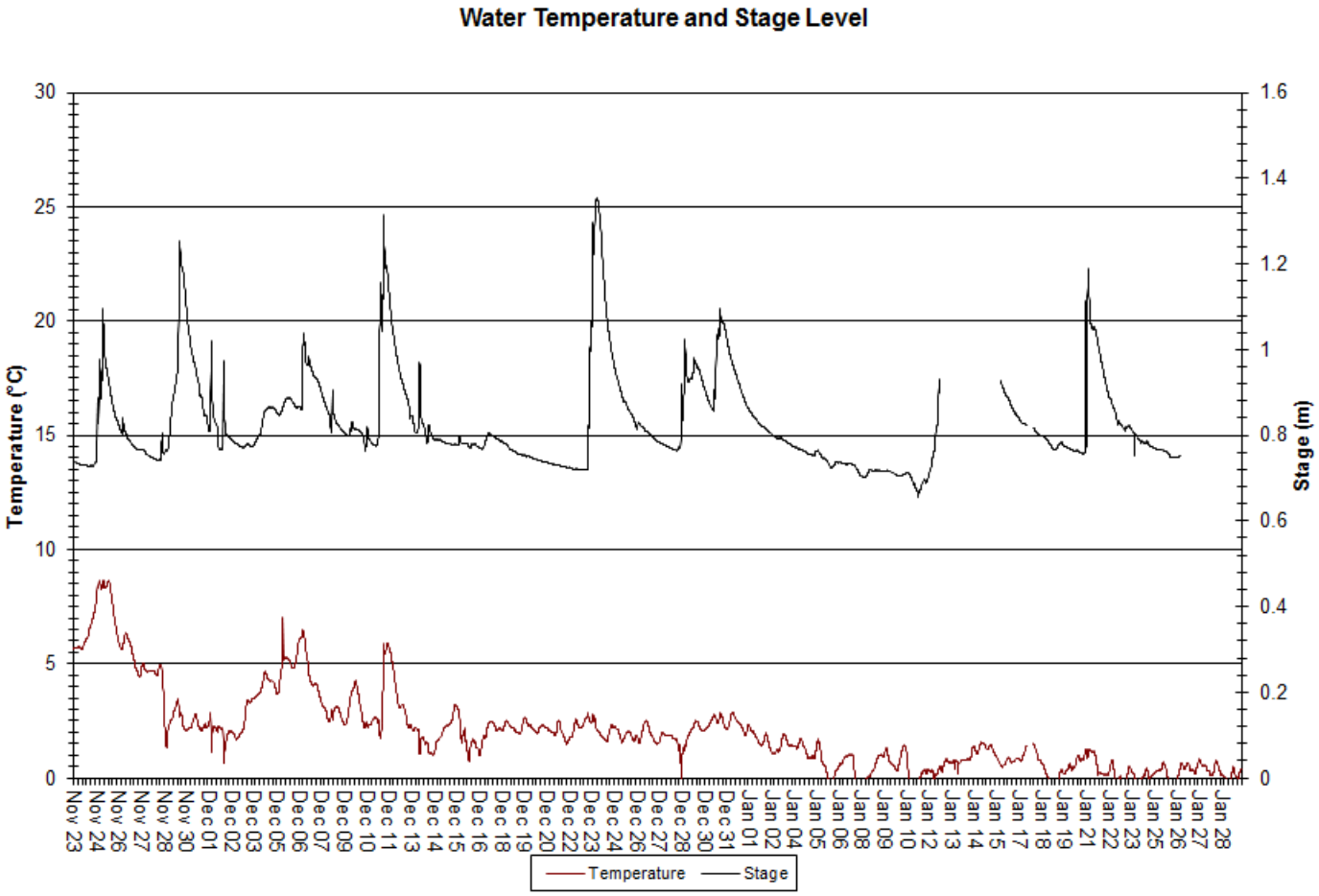
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Leary's Brook at Prince Philip Drive	Nov 23,2012	Deployment	Fair	Fair	Good	Fair	Poor
	Jan 30, 2013	Removal	Excellent	Good	Excellent	N/A	Poor

- During deployment an increased error margin due to the difference in field and QA/QC sonde turbidity values resulted to its "Poor" ranking. All the remaining parameters ranked from "Good" to "Fair"
- Field sonde turbidity reading was high at removal. This can be due to the calibration drift / bio-fouling and also due to high turbidity values throughout the deployment period which resulted in a "Poor" ranking.
- The hand-held unit did not read any value from the QA/QC DO sensor at the time of removal. Thus it was not possible to rank DO at removal.
- The maximum, minimum, median and mean for Temperature, pH, Specific Conductivity, Dissolved Oxygen and Turbidity is shown below in table 2.

Table 2: Parameter Statistics during deployment period

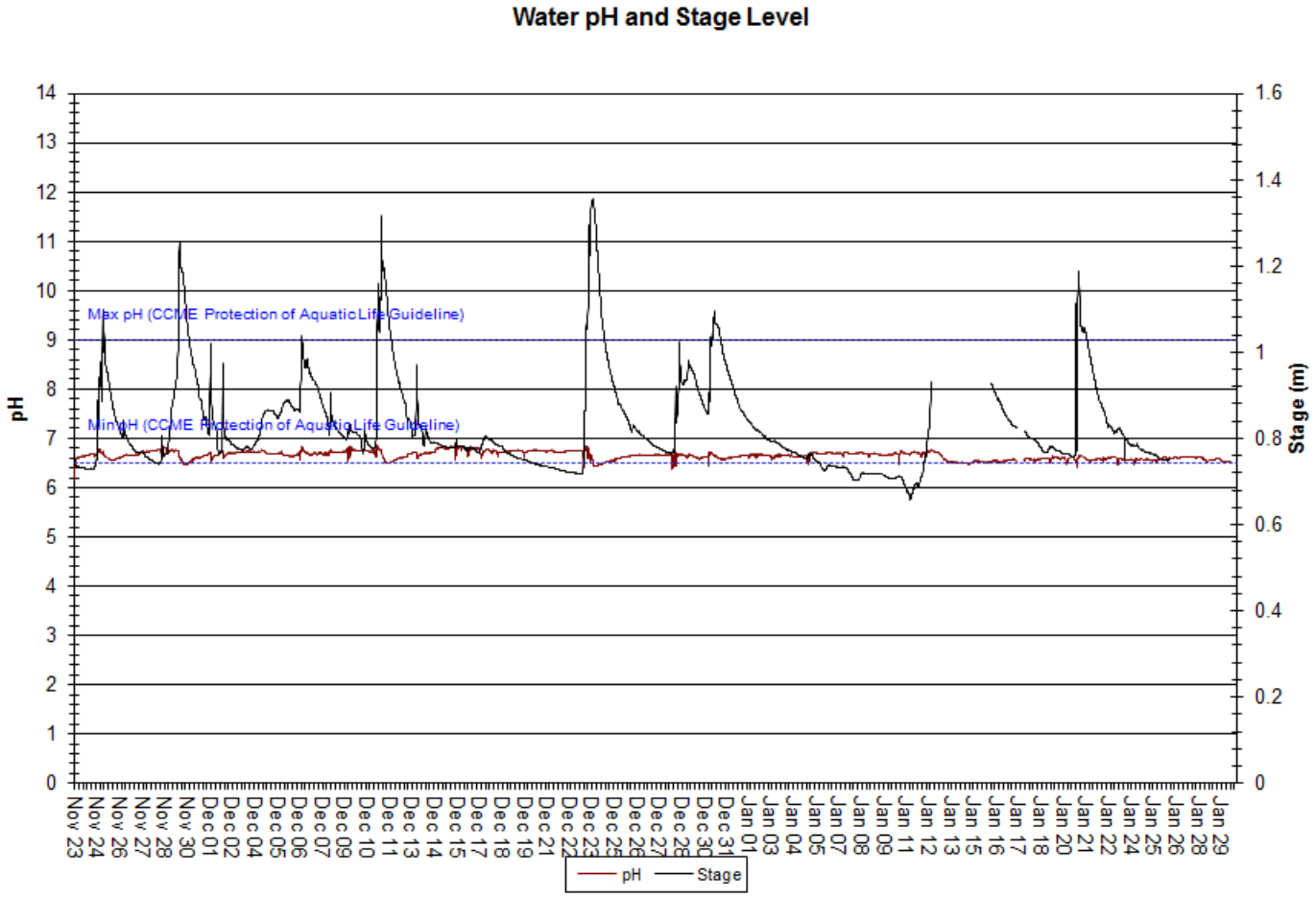
Parameter	Max	Min	Median	Mean
Temperature('C)	8.66	-0.40	1.81	2.02
pH	6.87	6.16	6.65	6.65
Specific Cond (µS/cm)	9925.9	178.2	597.0	780.1
TDS (g/ml)	6.3500	0.0004	0.3820	0.4992
Dissolved Oxygen (%-Sat)	98.5	78.4	94.5	94.0
Dissolved Oxygen (mg/l)	14.17	11.01	13.15	13.05
Turbidity (NTU)	1335.0	0.0	6.4	135.2
Stage (m)	1.36	0.66	0.79	0.83
Flow (m)	4.84	0.30	0.75	0.97

Data Interpretation

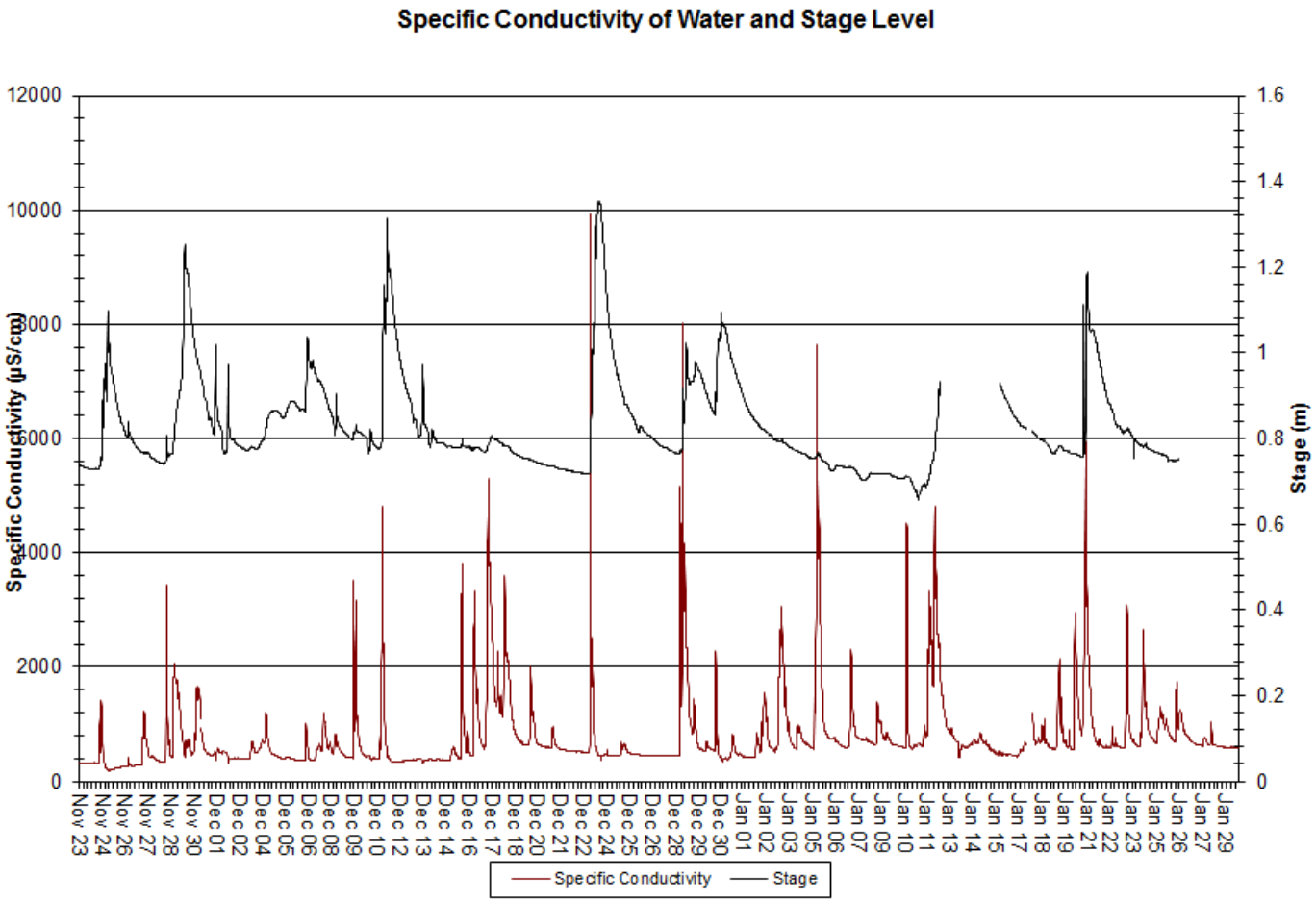


- Overall, an expected decrease in water temperature was observed at Leary's Brook from late November to late January.

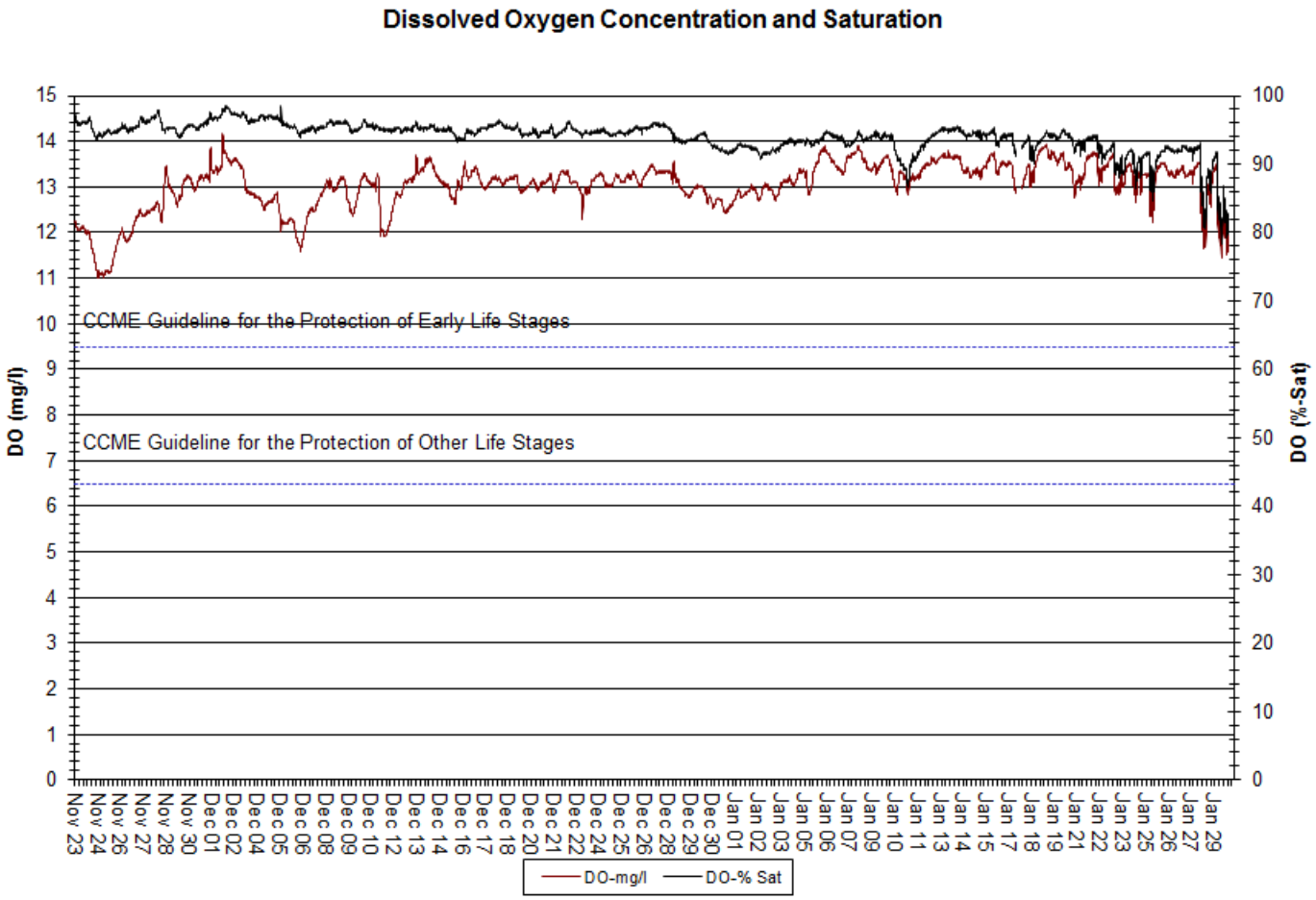
- Water temperature ranged from -0.4^{o}C to 8.66^{o}C (median value: 1.81^{o}C).



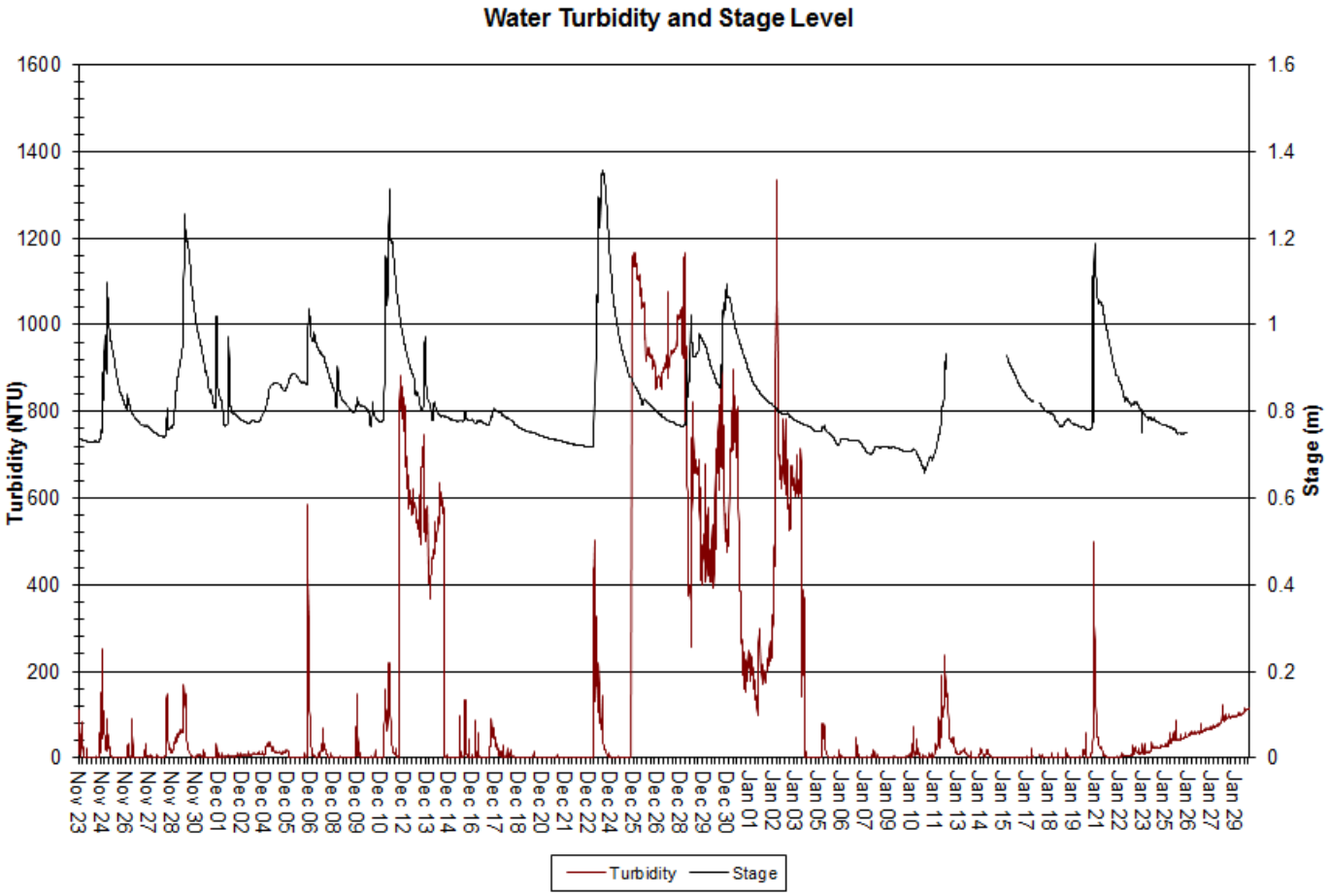
- Generally speaking, NL waters are slightly acidic. As a result the pH values were just above the lower CCME guidelines for Protection of Aquatic Life.
- pH ranged from 6.16 to 6.87 (Median: 6.65).



- The specific conductance values fluctuated throughout the deployment period. Some of the fluctuation values were high (above 1000 µS/cm) while others were in the mid ranges (200 to 1000 µS/cm).
- The fluctuations were related to a combination of increased stage level, precipitation and runoffs causing road salts flow into the water body.
- Conductivity ranged from 178.2 µs/cm to 9925.9 µs/cm (the median is 597 µs/cm).



- DO values remained stable throughout the deployment period with the exception of the first week of deployment and last week before removal but did not drop below the Guideline for the Protection of Other Life Stage biota or Protection of Early Life Stages. During the same period there was changes in the water temperature
- Concentrations ranged from 11.01 mg/l to 14.17 mg/l (median value: 13.15 mg/l) for DO while 78.4% to 98.5% (median value 94.5%) for percent saturation.



- Many of the turbidity spikes resulted due to increased stage level noted in the above graph. There is a short time lag between the stage level and turbidity spikes. As stage increases in the river, flow rate and velocity tends to increase as well, resulting in a lofting of stream bed sediments. Additionally, road debris and soil particles tend to be washed into the river channel increasing the suspended matter load.
- Some of the turbidity spikes are related to increased precipitation due to a combination of snow and rainfall and snowmelt that followed.
- There were increased drift in turbidity values during the final week of the deployment period due to either calibration drift or bio-fouling.
- Turbidity values ranged between 0.0 NTU and 1335 NTU (median value: 6.4 NTU) during this deployment period.

Conclusions

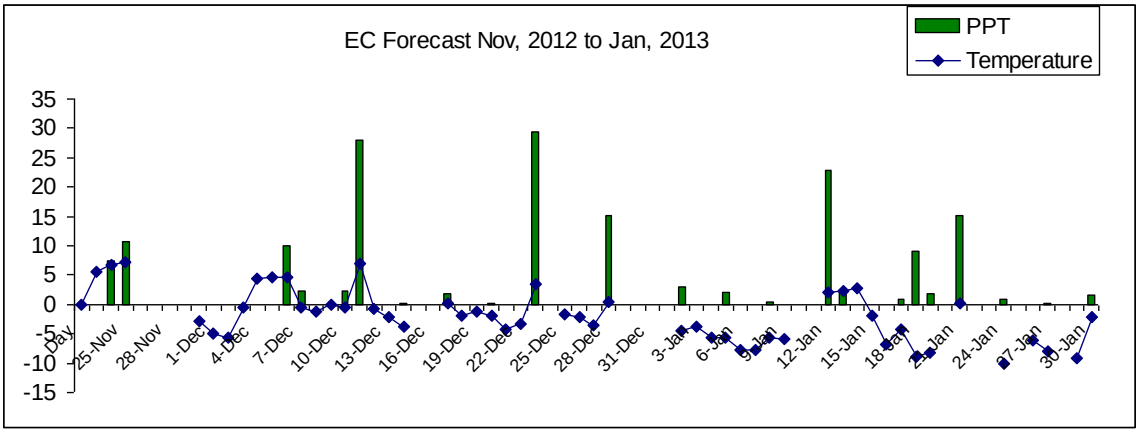
- Increased turbidity spikes were observed through the deployment period. The turbidity values at the removal were questionable and can be the result of calibration drift or bio-fouling.

- Periods of high specific conductance resulted due to increased snowmelt and stage level.

- There were no water quality events throughout the deployment period.

Appendix

The graph below shows the daily temperature and total precipitation taken from Environment Canada for St. John's (Airport Station).



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