Real-Time Water Quality Deployment Report

Leary's Brook at Prince Philip Drive

May 11th, 2010 to June 16th, 2010

Newfoundland Labrador

Government of Newfoundland & Labrador
Department of Environment and Conservation
Water Resources Management Division
St. John's, NL, A1B 4J6 Canada

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NF02ZM0178 – Leary's Brook at Prince Philip Drive
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General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- This deployment period begins on May 11th, 2010 and ends on June 16th, 2010; a period of 35 days.

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.

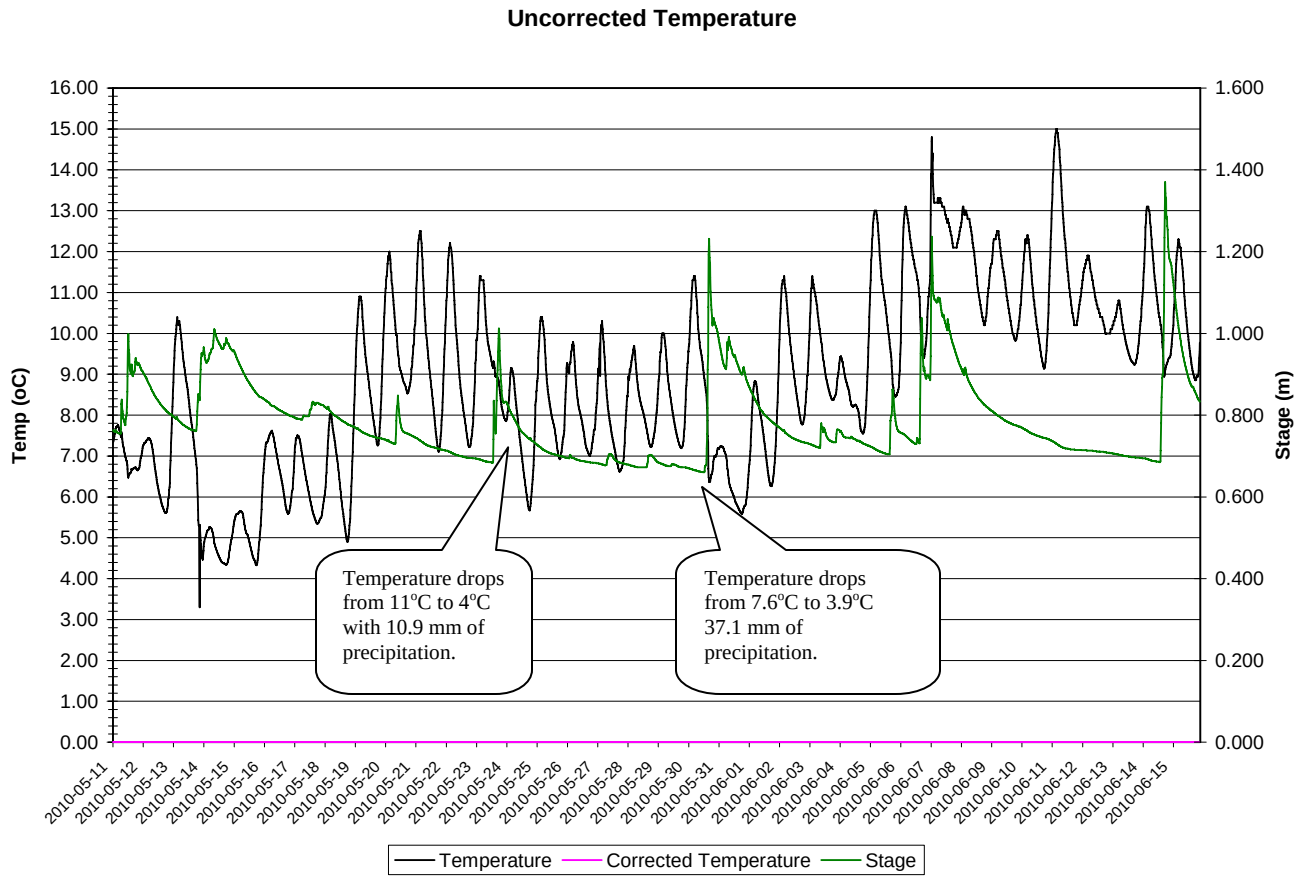
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Leary's Brook at Prince Philip Drive	May 11th, 2010	Deployment	Good	Good	Marginal	Excellent	Excellent
	June 16th, 2010	Removal	NA	NA	NA	NA	NA

- NOTE: The rankings for deployment are based entirely on Field Sonde to QAQC Sonde comparisons. A grab sample was not taken at deployment.
- NOTE: During removal, the Field Sonde could not be successfully connected. Corrections and rankings could not be computed for this deployment report. All data presented is raw.

Data Interpretation

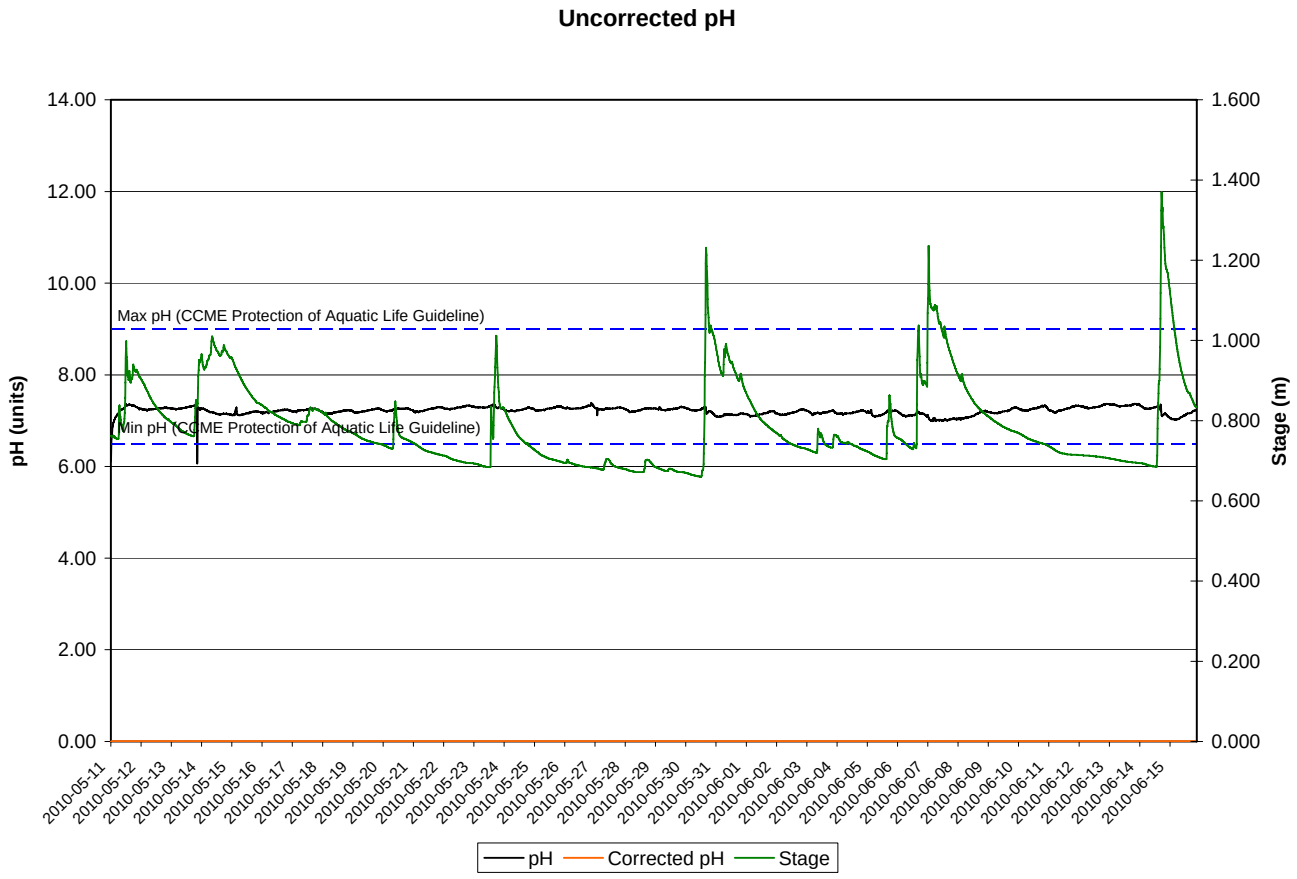
- A warming trend is observed as expected for this deployment period and mirrors the warming trend depicted in the Appendix. The range in water temperature was from 3.30°C to 15.00°C for the 35 day interval.
- On two occasions cool temperatures and precipitation caused a notable drop in water temperature and increase in stage level.

Figure 1: Water Temperature at Leary's Brook from May 11th, to June 16th, 2010



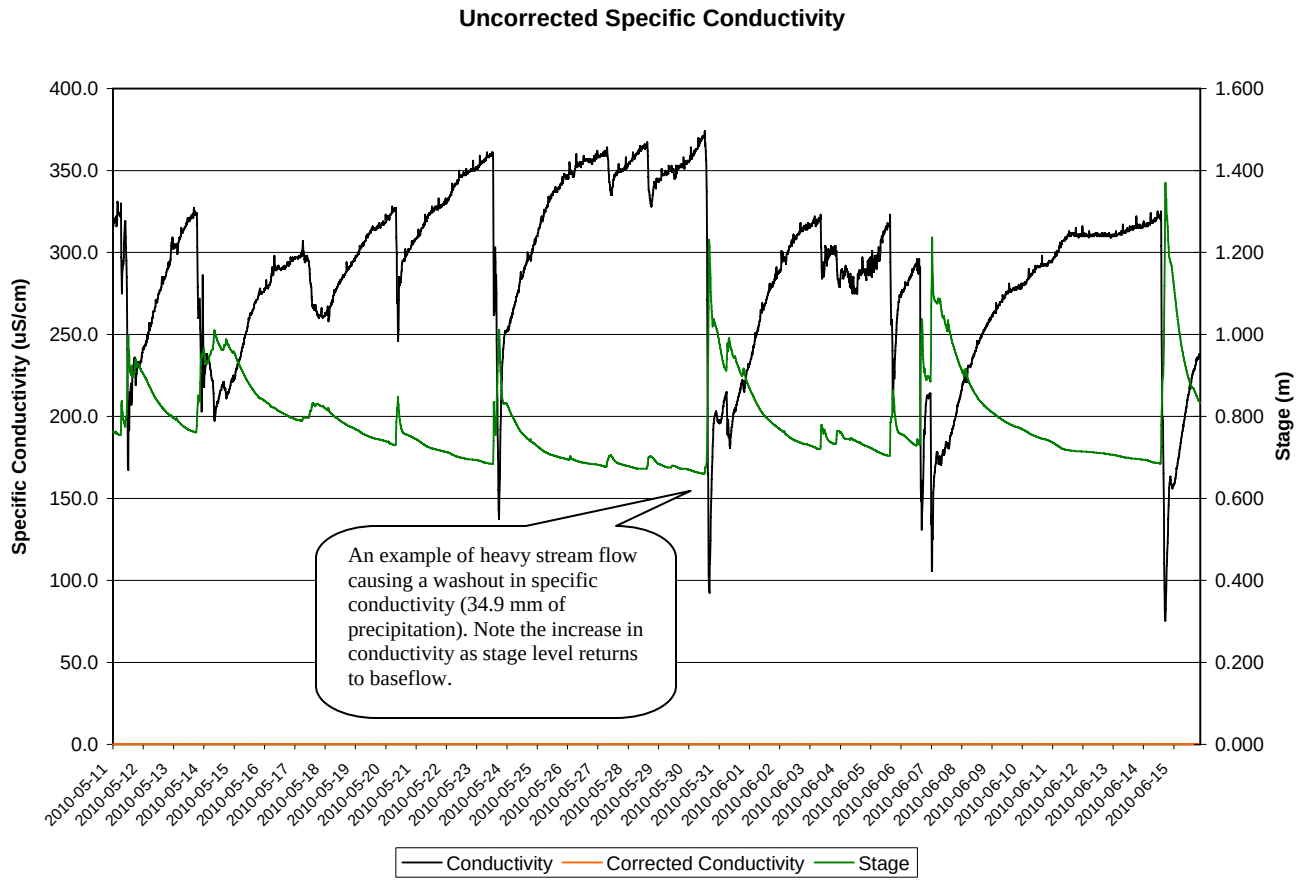
- During this deployment period, pH ranged from 6.07 to 7.39 and was generally within the limits set out by the CCME Guidelines for the Protection of Aquatic Life for most of the deployment period. Two instances of pH lower than the CCME guideline occurred at the beginning of deployment and are likely related to the acclimation period needed for the pH probe to stabilize in the river water.
- There are no notable fluctuations in pH or trends (up or down) observed in the pH record for this deployment period.

Figure 2: pH at Leary's Brook from May 11th, to June 16th, 2010



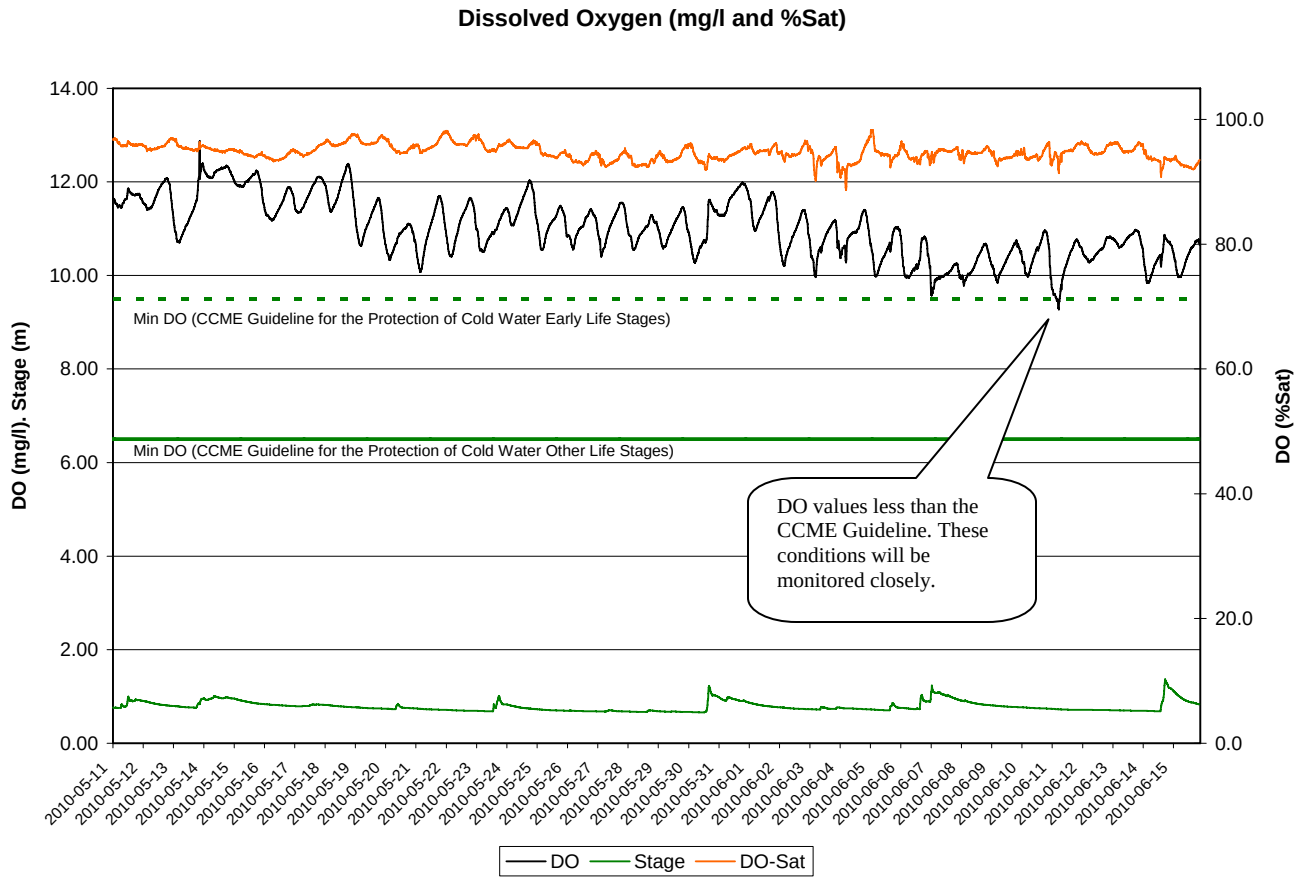
- During this deployment period, specific conductivity values were recorded as low as 75.5 µS/cm to a high of 374.0 µS/cm.
- Specific Conductivity at Leary's Brook is elevated compared to rivers in less developed watersheds. Dissolved compounds and ions are diluted and washed out of the stream system during rain events and stage level increases. During peaks in flow, a concurrent drop in conductivity is also recorded. Following the washout, specific conductivity increases once again to a plateau.

Figure 3: Specific Conductivity at Leary's Brook from May 11th, to June 16th, 2010



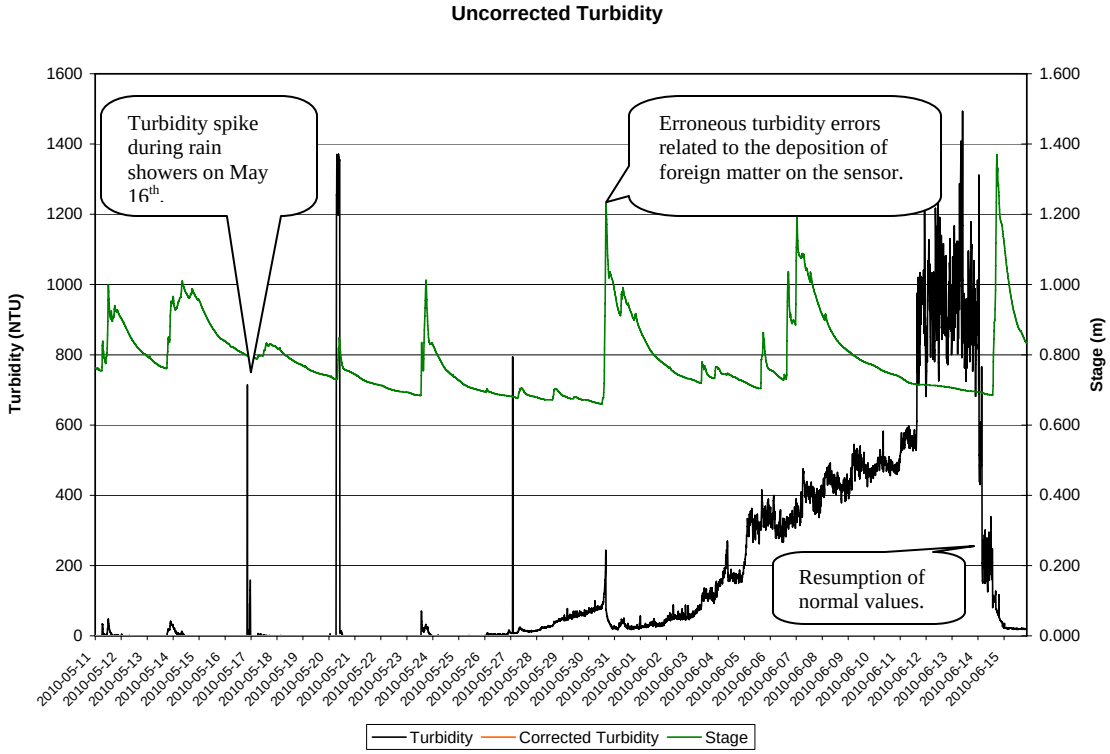
- During this deployment period, the saturation of dissolved oxygen in Leary's Brook reached a maximum of 98.3% and a low of 88.7%. Values of 100% are commonplace in other river systems; however, complete saturation of dissolved oxygen was not attained at this location in Leary's Brook for the deployment. It is possible that chemical and/or biological oxygen demand (COD and BOD, respectively) is responsible for reducing the amount of oxygen available in the water body. Despite the fact that saturation values do not generally approach 100%, there is no marked downward trend.
- A downward trend in the concentration of dissolved oxygen is noted. Since this is directly proportional to the water temperature, this is expected. There are instances of DO values less than the CCME Guideline for the protection of early life stage cold-water biota. These values occurred for two hours during the warm, sunny afternoon of June 11th when biological activity would have been high and oxygen concentrations at a low point (due to warm water). Such conditions will be monitored closely.

Figure 4: Dissolved Oxygen at Leary's Brook from May 11th, to June 16th, 2010



- For this deployment period, Leary's Brook exhibited typical fluctuations for this urban stream: low turbidity with short-term, very high peaks related to precipitation and runoff.
- Later in the deployment period, a heavy rainfall on May 30th – 31st (34.9 mm) resulted in the deposition of debris on the turbidity sensor windows and caused inaccurate and inflated turbidity readings.
- A subsequent heavy rainfall on June 15th (36.0 mm) appears to have dislodged some of the fouling causing a resumption of normal values.
- At the end of deployment, it was found that the automated sensor wiper was non-functional. It is unclear whether fouling caused the wiper to cease functioning or if the non-functional wiper allowed the fouling to occur.

Figure 5: Turbidity at Leary's Brook from May 11th, to June 16th, 2010

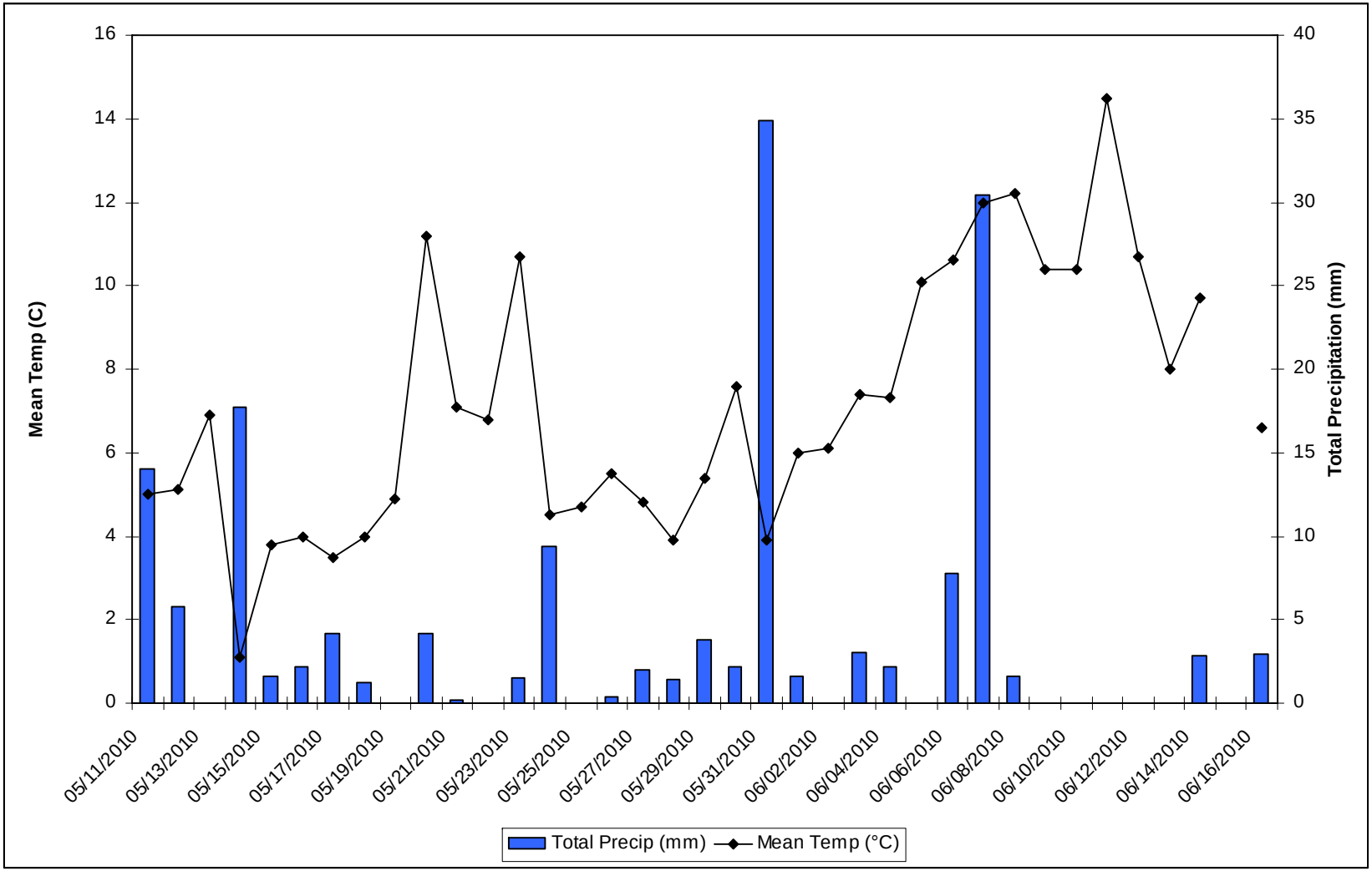


Conclusions

- Significant trends identified in this deployment include:
    - Increasing water temperature (seasonal trend)
    - Decreasing DO concentration (seasonal trend)
- Significant events identified in this deployment include:
    - A two hour period of DO concentrations less than the CCME Guideline for the protection of early life stage cold water biota.
- Due to the malfunction of the turbidity probe on this instrument, repairs will be made and a replacement Hydrolab will be deployed for the next interval.

Appendix

Figure 6: Mean Temperature and Total Precipitation at St. John's Airport from May 11th to June 16th, 2010



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