Real-Time Water Quality Deployment Report

Leary's Brook at Prince Philip Drive

August 26, 2011 to February 15, 2012

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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General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- This deployment report describes water quality events that occurred from August 26th, 2011 to February 15th, 2012 – a period of 169 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 *in situ*, adjacent to the Field Sonde. 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. A grab sample is also taken for additional confirmation of conditions at deployment and to allow for future modelling studies.
  - At the end of a deployment period, a freshly cleaned and calibrated QAQC Sonde is placed *in situ*, adjacent to the Field Sonde. Values are compared between all parameters and differences are ranked for placement in Table 1.

Table 1: Qualitative QAQC Ranking

Date	Action	Comparison Ranking				
		Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
August 26, 2011	Deployment	Good	Poor	Good	Excellent	Poor*
October 5, 2011	Removal	Excellent	Marginal	Good	Good	Poor†
October 5, 2011	Deployment	Marginal	Excellent	Excellent	Good	Poor‡
November 2, 2011	Removal	Good	Fair	Good	N/A	Excellent
November 2, 2011	Deployment	Excellent	Excellent	Excellent	N/A	Fair
December 14, 2011	Removal	Excellent	Fair	Poor	Excellent	Fair
December 14, 2011	Deployment	Excellent	Poor	Excellent	Fair	Fair
February 15, 2012	Removal	Excellent	Excellent	Poor§	Excellent	Poor**

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* QAQC sonde reported 10.0 NTU while Field sonde reported 68.0 NTU

† QAQC sonde reported 17.4 NTU while Field sonde reported 34.4 NTU

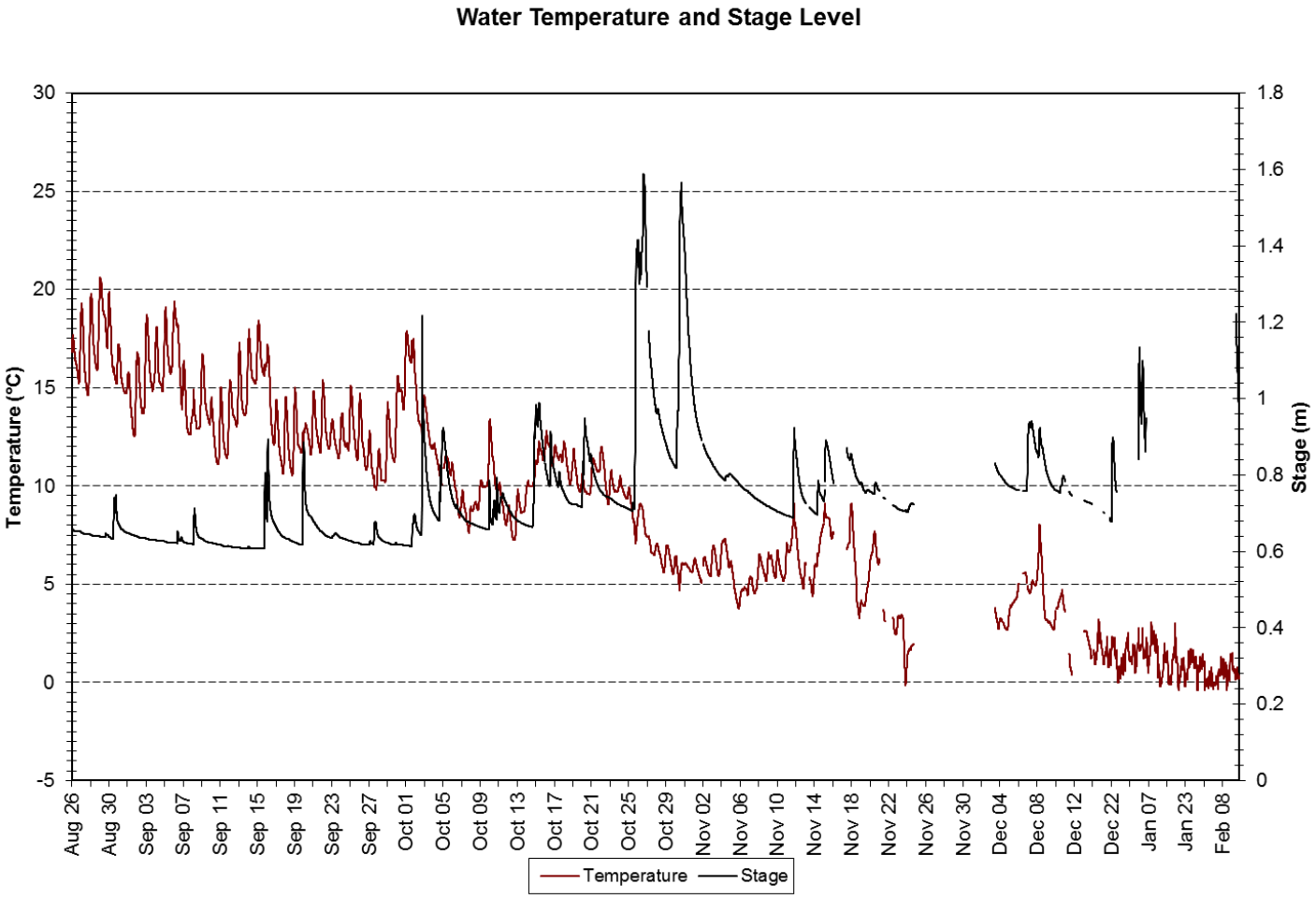
‡ QAQC sonde reported 11.8 NTU while Field sonde reported 22.1 NTU

§ QAQC sonde reported 589 µS/cm while the Field sonde reported 167 µS/cm. The Field sonde conductivity sensor appears to have been heavily fouled.

** QAQC sonde reported 0.0 NTU while the Field sonde reported 2685 NTU, a clear case of fouling.

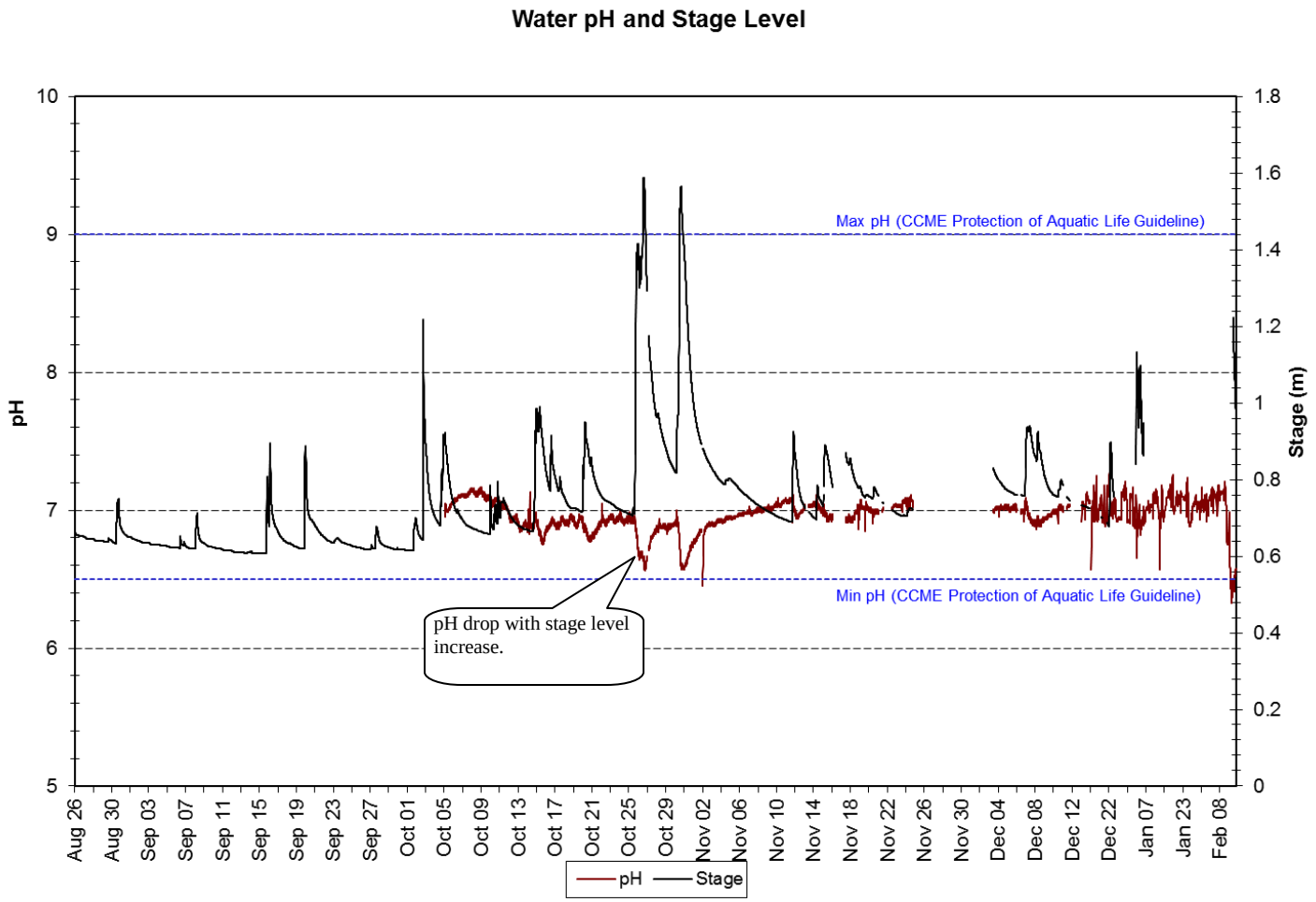
Data Interpretation

Figure 1



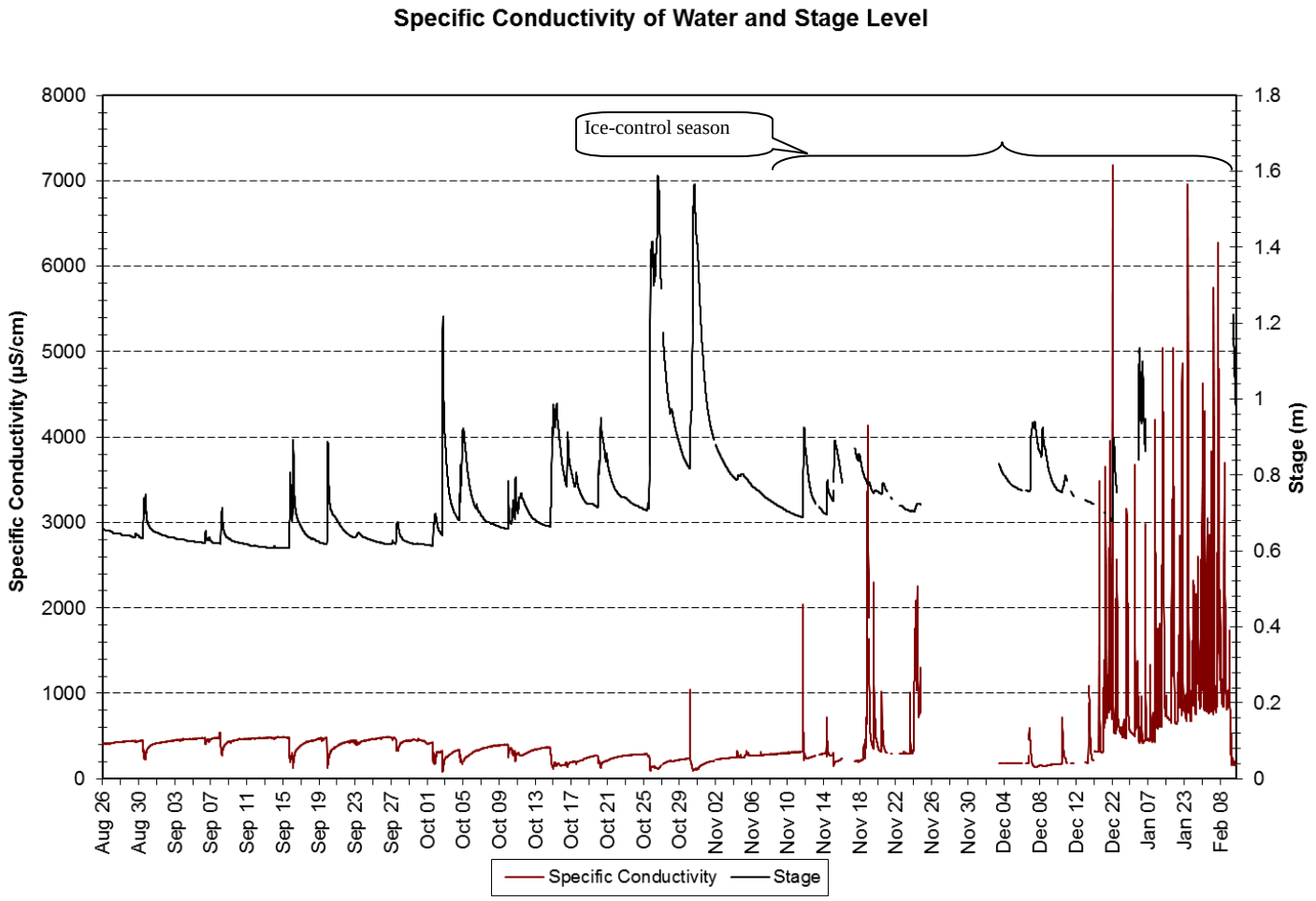
- In late August the water temperature was at a maximum of 20.6°C. Over the next several months, water temperatures cooled to normal winter temperatures. The minimum value was found to be slightly below freezing temperature of -0.42°C.

Figure 2



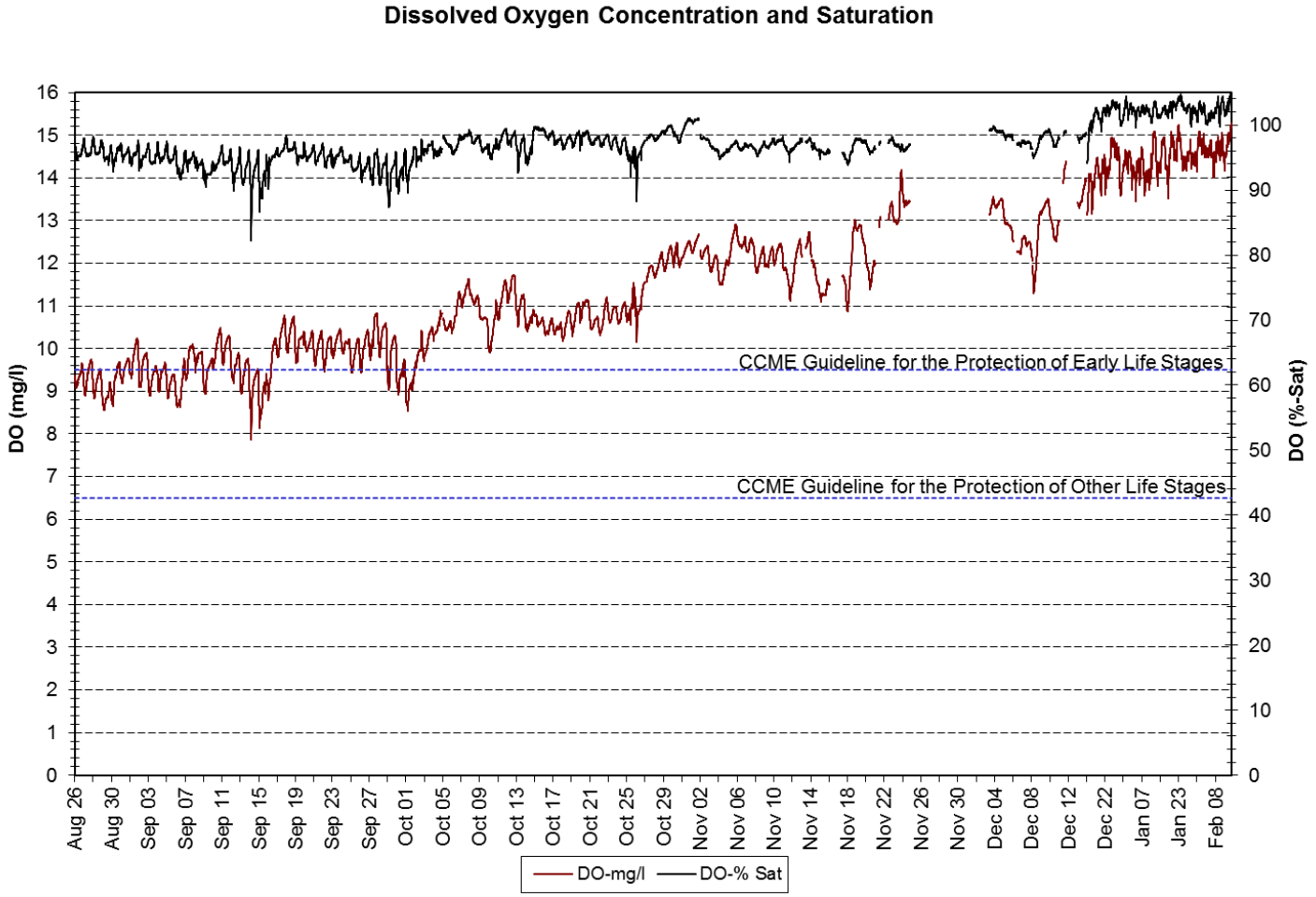
- pH levels at Leary's Brook typically fell within the CCME Guidelines for the Protection of Aquatic Life. Values ranged from 6.33 to 7.28 with a median value of 6.97.
- Two instances of pH drop and stage level increase were identified in the graph above. At this time more than 60mm of precipitation was recorded in a few days.

Figure 3



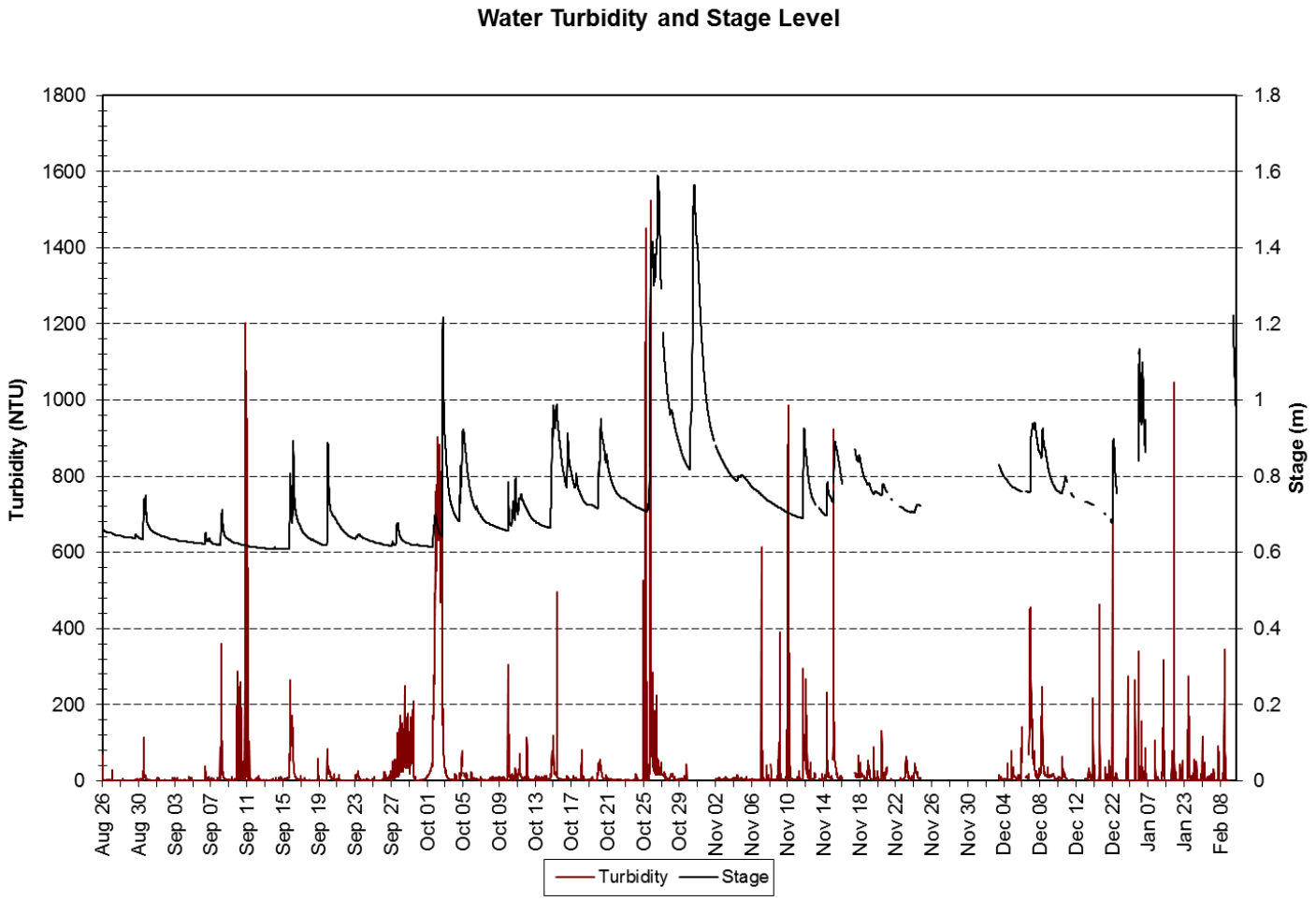
- Around mid-November, specific conductivity shows large, short-duration peaks characteristic of road salt application for ice control. This trend is especially seen from late December onward when freezing temperatures are consistent overnight.
- Conductivity values fell between 79.6 µS/cm and 7185 µS/cm with a median value of 356 µS/cm.

Figure 4



- As water temperature cools, dissolved oxygen concentration increases from a low of 7.86 mg/l to 15.28 mg/l (median value: 11.03 mg/l).
- At no point did oxygen concentrations fall below the lower CCME Guideline of 6.5 mg/l for the Protection of Early Life Stage cold water biota. In Late September, concentrations no longer fell below the less-stringent guideline of 9.5 mg/l for the Protection of Other Life Stage cold water biota.

Figure 5

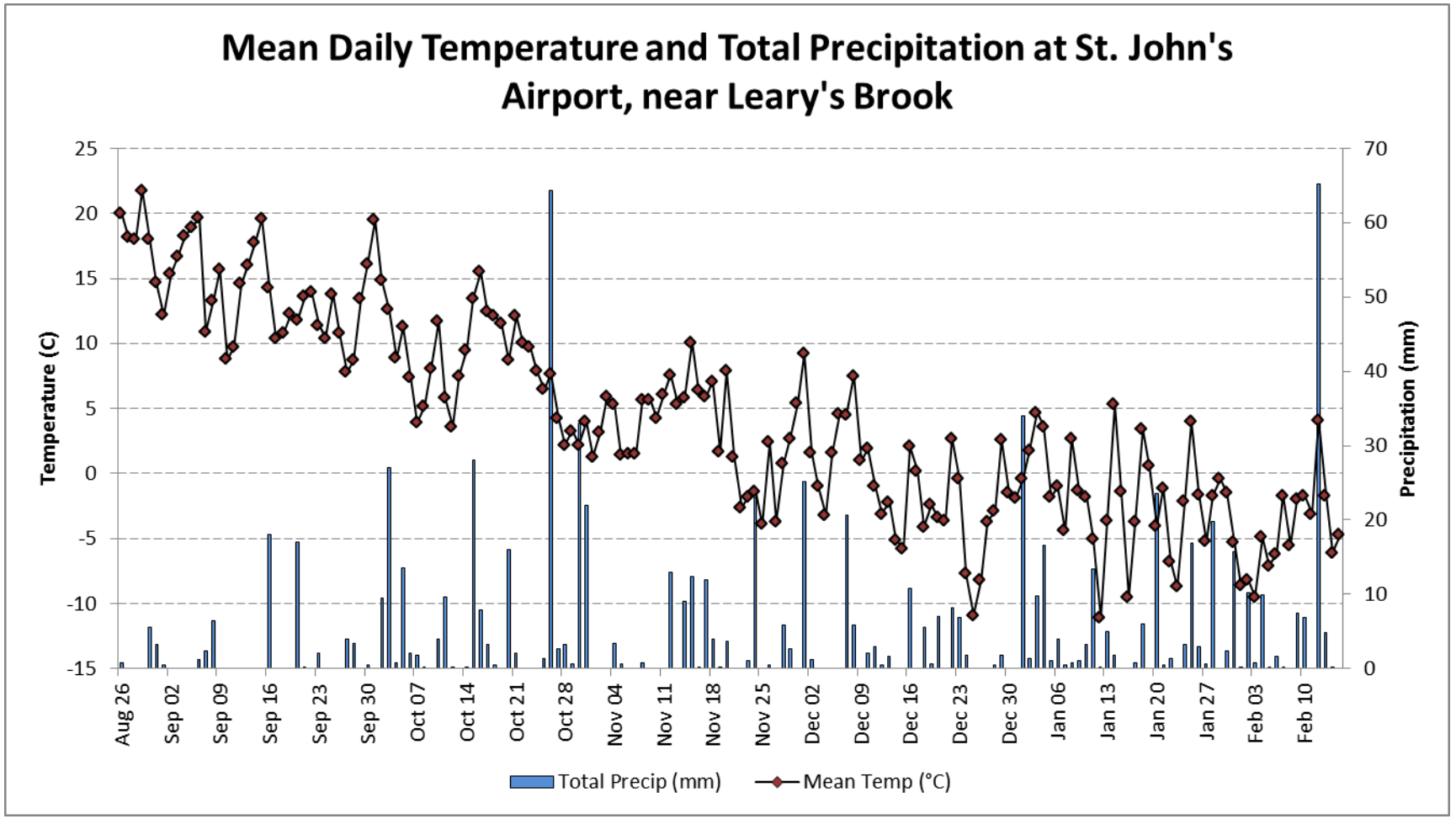


- Turbidity ranged from 0.0 NTU to 1523.9 NTU (median value: 3.1 NTU). Some periods of notable turbidity spikes are present and often occurred with stage level peaks – indicating a period of heavy rain and siltation in the river. Turbidity was found to be highly variable in late December through February when road salt application tends to influence turbidity more than regular silt particles.

Conclusions

- Some issues with inaccurate pH records were found and resolved early in the deployment interval of this report resulting in a gap from late August to early October.
- Some communications issues were experienced with Leary's Brook station from late November onwards. Some water quality gaps were filled using data logged internally on the Field Sonde. During these times, however, no replacement water level data was available.

Appendix



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