Real-Time Water Quality Deployment Report

Leary's Brook at Prince Philip Drive

April 27, 2011 to August 26, 2011

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

Newfoundland Labrador

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2011-04-27 to 2011-08-26

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- This deployment report focuses on 119 days from April 27th to August 26th, 2011.

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
April 27, 2011	Deployment	Excellent	Poor	Good	Excellent	Excellent
June 15, 2011	Removal	Excellent	Good	Good	Good	Poor*
June 15, 2011	Deployment	Fair	Excellent	Excellent	Excellent	Excellent
July 19, 2011	Removal	Fair	Good	Good	Excellent	Poor†
July 19, 2011	Deployment	Excellent	Excellent	Good	Excellent	Poor‡
August 10, 2011	Removal	Good	Excellent	Excellent	Excellent	NA§
August 10, 2011	Deployment	Fair	Excellent	Excellent	Excellent	Good
August 26, 2011	Removal	Good	Excellent	Fair	Excellent	Excellent

* This ranking indicates an obvious indication of fouling where the Field sonde reported 285.9 NTU while the QAQC sonde reported 0.0 NTU. Visually, the water was clear at the time.

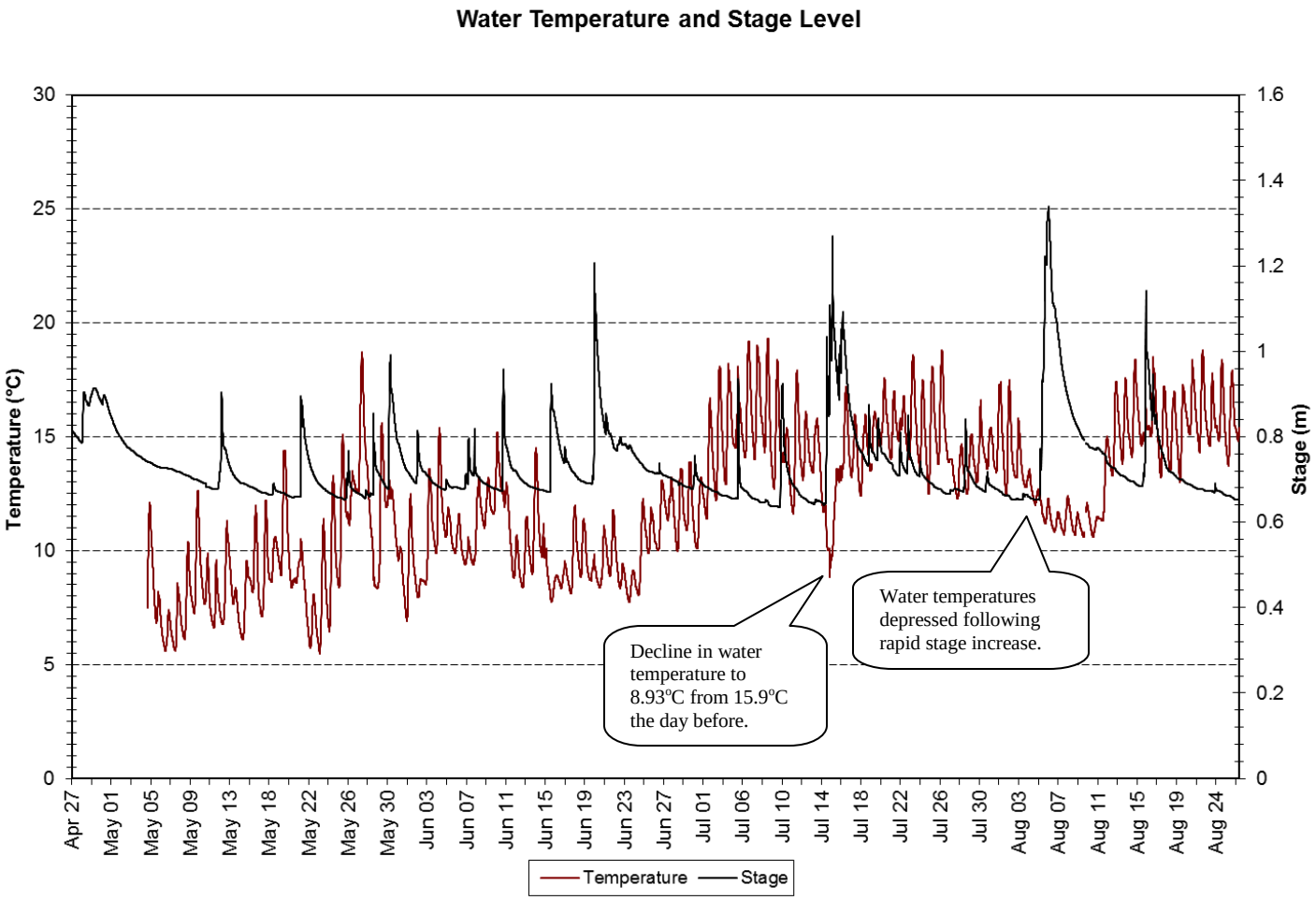
† At removal, the Field sonde reported 412 NTU while the QAQC sonde reported 114.5 NTU.

‡ At deployment, the Field sonde reported 105 NTU while the QAQC sonde reported 486 NTU. A grab sample taken at deployment reported >100 NTU.

§ QAQC ranking not reported. At removal, the Field sonde reported 0.0 NTU while the QAQC sonde reported 99.8 NTU. Visually, the water was clear at the time.

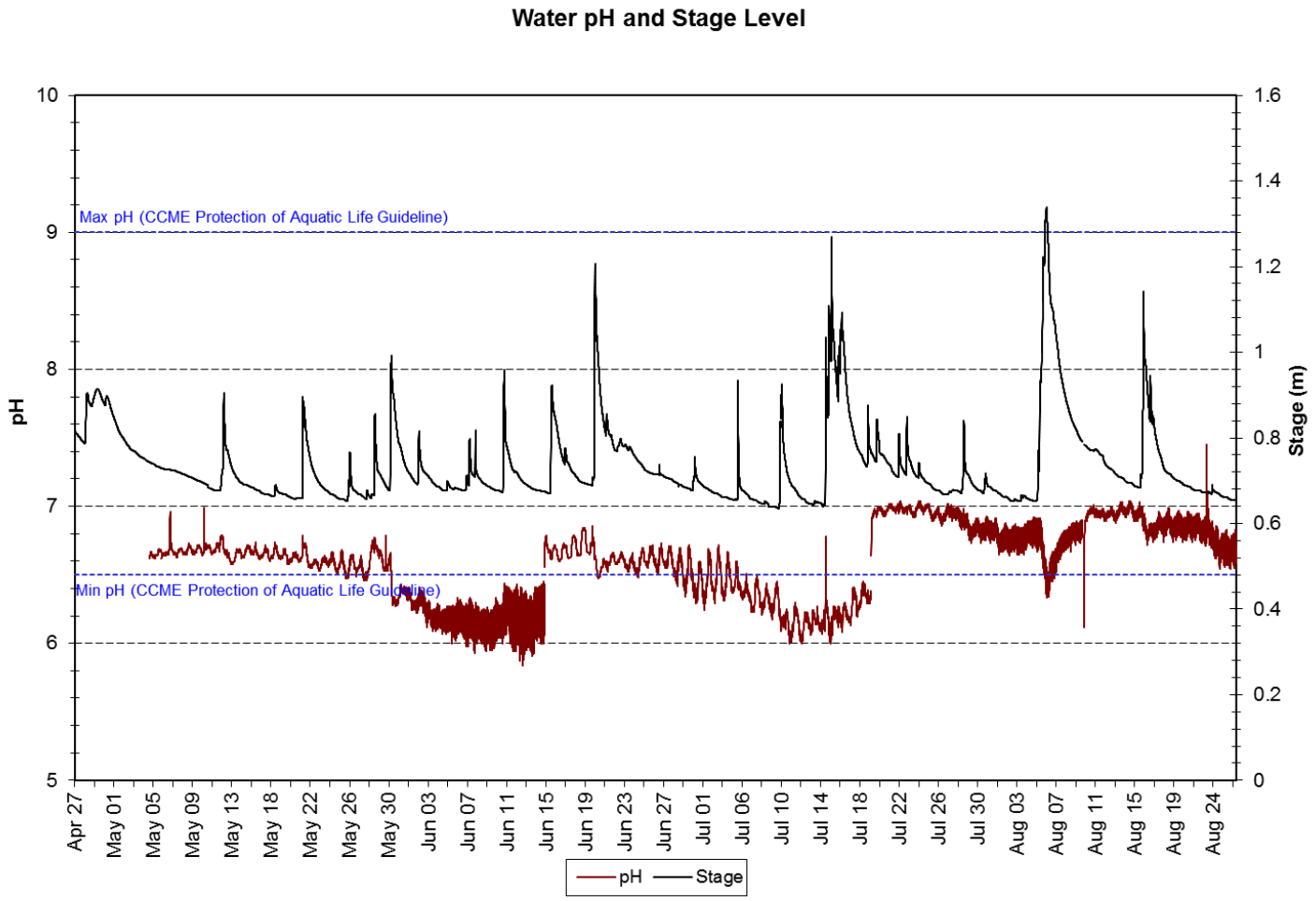
Data Interpretation

Figure 1: Water temperature at Leary's Brook from April 27 to August 26, 2011



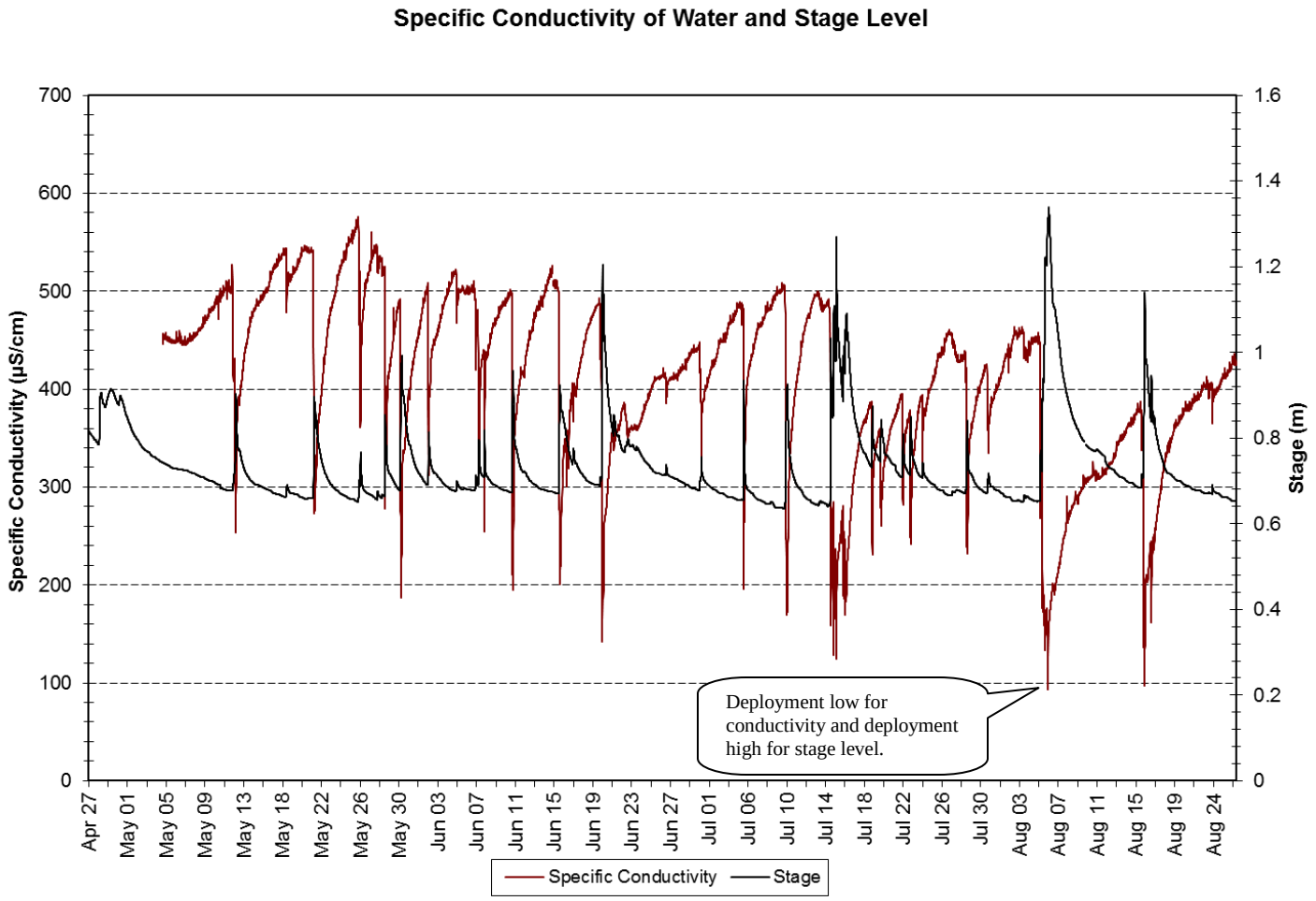
- Water temperature increased consistently over the course of this deployment period from a minimum value of 5.49°C to a maximum value of 19.30°C (median value: 12.20°C).
- Some instances of sharp stage level increase are found with concurrent declines in water temperature, as indicated above.

Figure 2: pH at Leary's Brook from April 27 to August 26, 2011



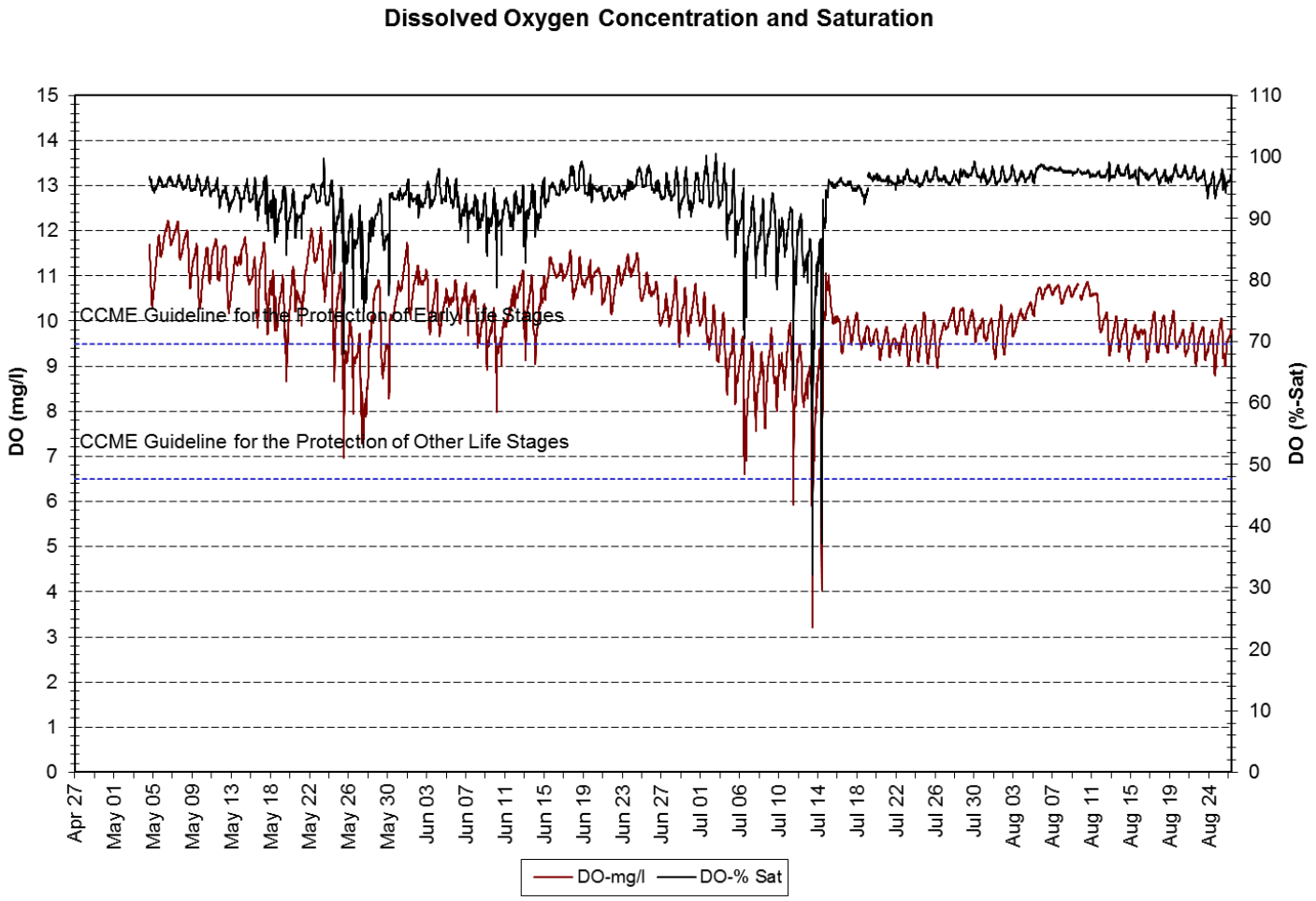
- It is apparent in the graph above that the pH sensor may not be functioning within specifications, despite the successful calibrations during regular maintenance of the instrument. Nevertheless, there does seem to be an overall rise in pH as the summer progresses.
- pH values fell between 5.84 and 7.45 (median value: 6.64) during the reporting period. Typically the pH levels are near the lower end of the CCME Guidelines of 6.5 – 9. This should not necessarily be deemed a problem as eastern waters in Newfoundland are often quite acidic in nature.

Figure 3: Conductivity at Leary's Brook from April 27 to August 26, 2011



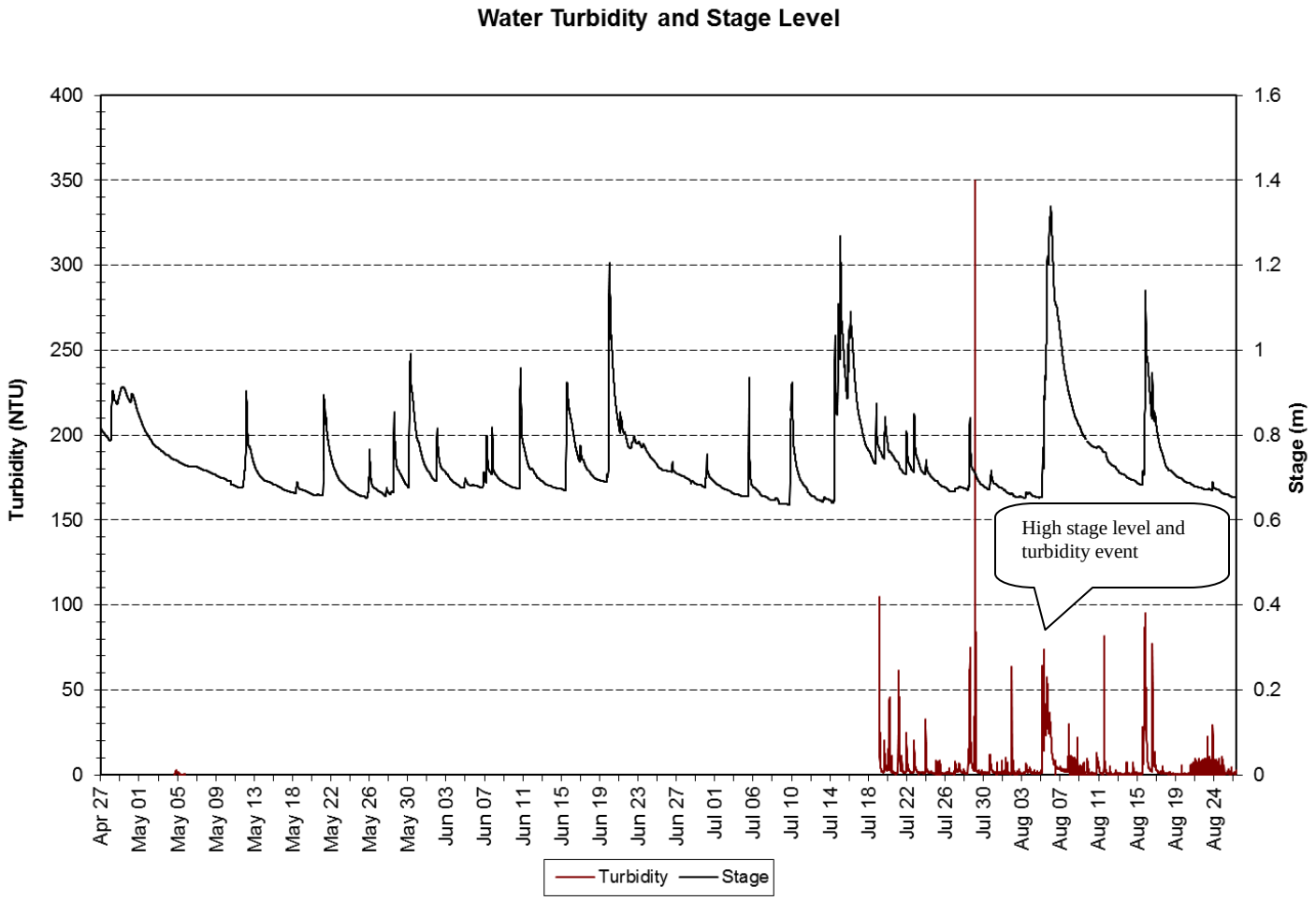
- Specific conductivity depicts a consistent downward trend over the course of the deployment period. This trend is typical over the summer months as spring thaw flushes road salt out of the watershed and salt levels decline.
- Conductivity levels are normally lowest just after a rainfall when stage level is at its highest. At this time, the baseflow of Leary's Brook is dilute from high volumes of storm water discharge. Conductivity rebounds as stage level declines ones again.
- Over the course of this deployment period, conductivity ranged from 92.8 µS/cm to 576 µS/cm (median value: 426 µS/cm).

Figure 4: Dissolved Oxygen at Leary's Brook from April 27 to August 26, 2011



- Dissolved oxygen displays highly variable concentrations. Values range from 3.22 mg/l to 12.22 mg/l (median value: 10.12 mg/l). Because of the highly variable nature of dissolved oxygen at this time, it is difficult to determine if the concentration values are accurate. It should be noted, however, that the DO readings rebounded quickly on July 14th during a high flow. It is difficult to determine if sensor burial or actual water conditions are responsible for the erratic oxygen concentrations.
- While it is not uncommon for concentrations to fall below the CCME Guideline for the Protection of Early Life Stage cold water biota in the summer (when warm water temperatures are consistent), it is unusual for concentrations to fall below the Guideline for the Protection of Other Life Stage cold water biota. This will be monitored closely.

Figure 5: Turbidity at Leary's Brook from April 27 to August 26, 2011

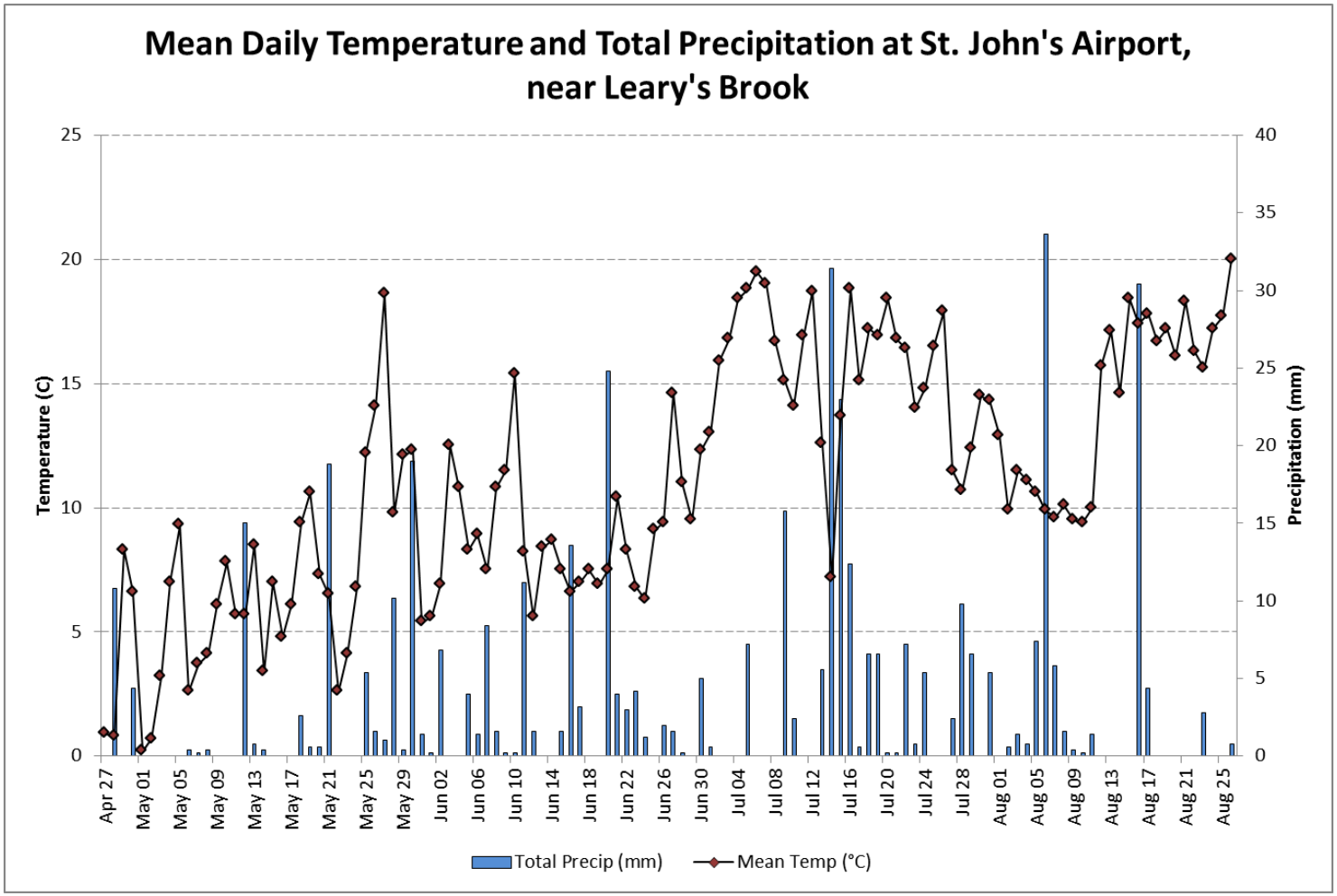


- High sediment loads resulting from in-stream excavations have made it challenging to produce useful turbidity readings. Silt in Leary's Brook tends to cling to surfaces of the water quality sonde rendering accurate measurements of turbidity impossible. A swath of turbidity data from May 6th to July 19th was removed from the deployment report.
- In the remaining data, turbidity levels fell between 0.0 NTU and 350.2 NTU (median value: 1.2 NTU).

Conclusions

- Problems with turbidity measurement are persistent, especially because of in-stream excavations related to efforts to shore up the banks of Leary's Brook upstream. Silt deposition on the measurement surfaces of the probes are challenging. Some success was met with altered placement of the sonde within the river, but a highly variable stream depth precludes a deployment suspended above the stream bed.
- The pH probe at this station appears to be losing calibration soon after deployment and may need advanced maintenance or replacement, if necessary.
- These issues will be monitored and addressed as appropriate.

Appendix



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