Real-Time Water Quality Deployment Report

Leary's Brook at Prince Philip Drive

August 7, 2012 to October 12, 2012

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

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2012-08-07 to 2012-10-12

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- A problem with the Dissolved Oxygen and pH sensors rendered the first half of DO and pH data invalid.

Maintenance and Calibration of Instrument

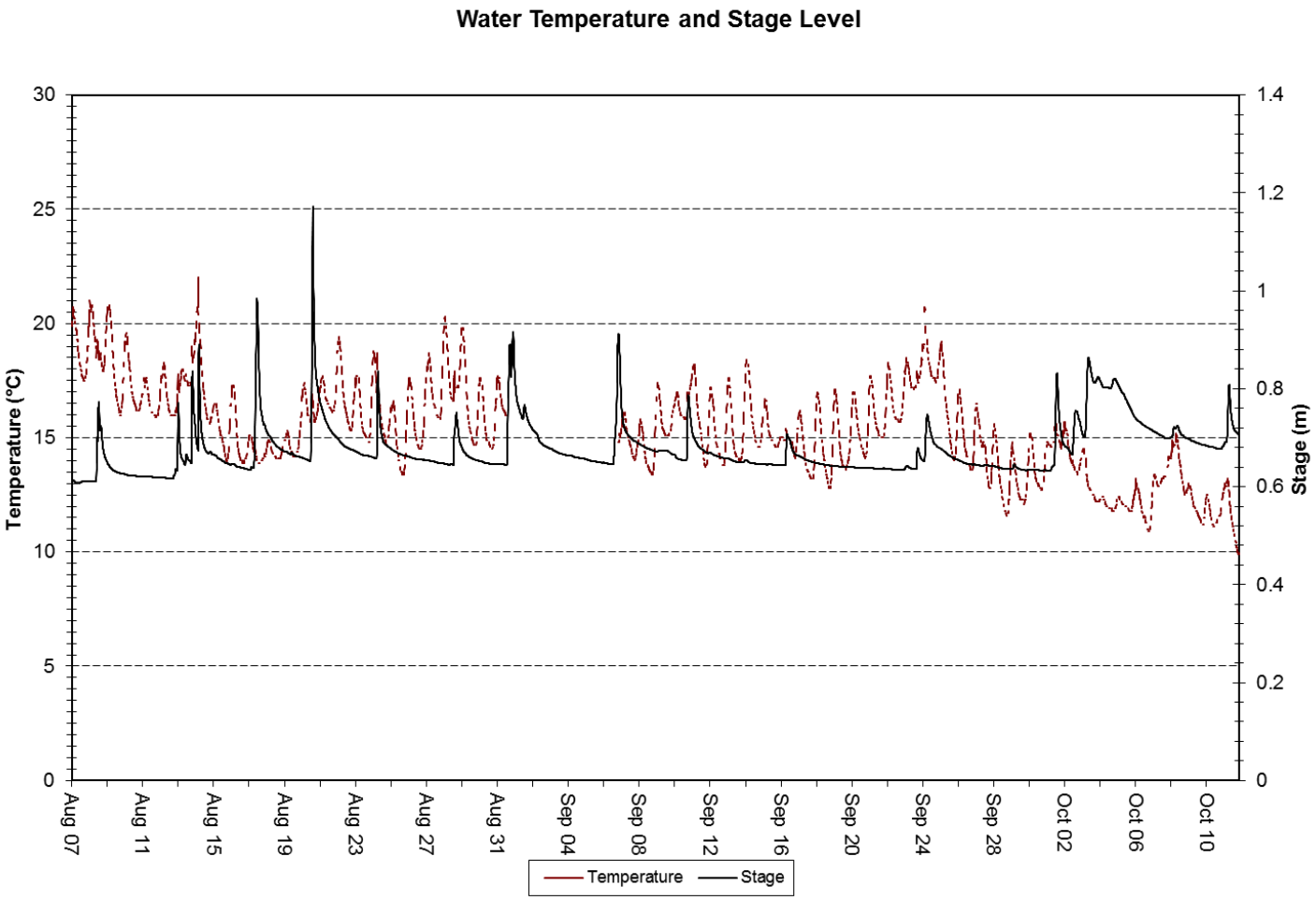
- As part of the Quality Assurance and Quality Control protocol (QAQC), an assessment of the reliability of data recorded by an instrument is made at the beginning and end of the deployment period. The procedure is based on the approach used by the United States Geological Survey.
  - Upon deployment, 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

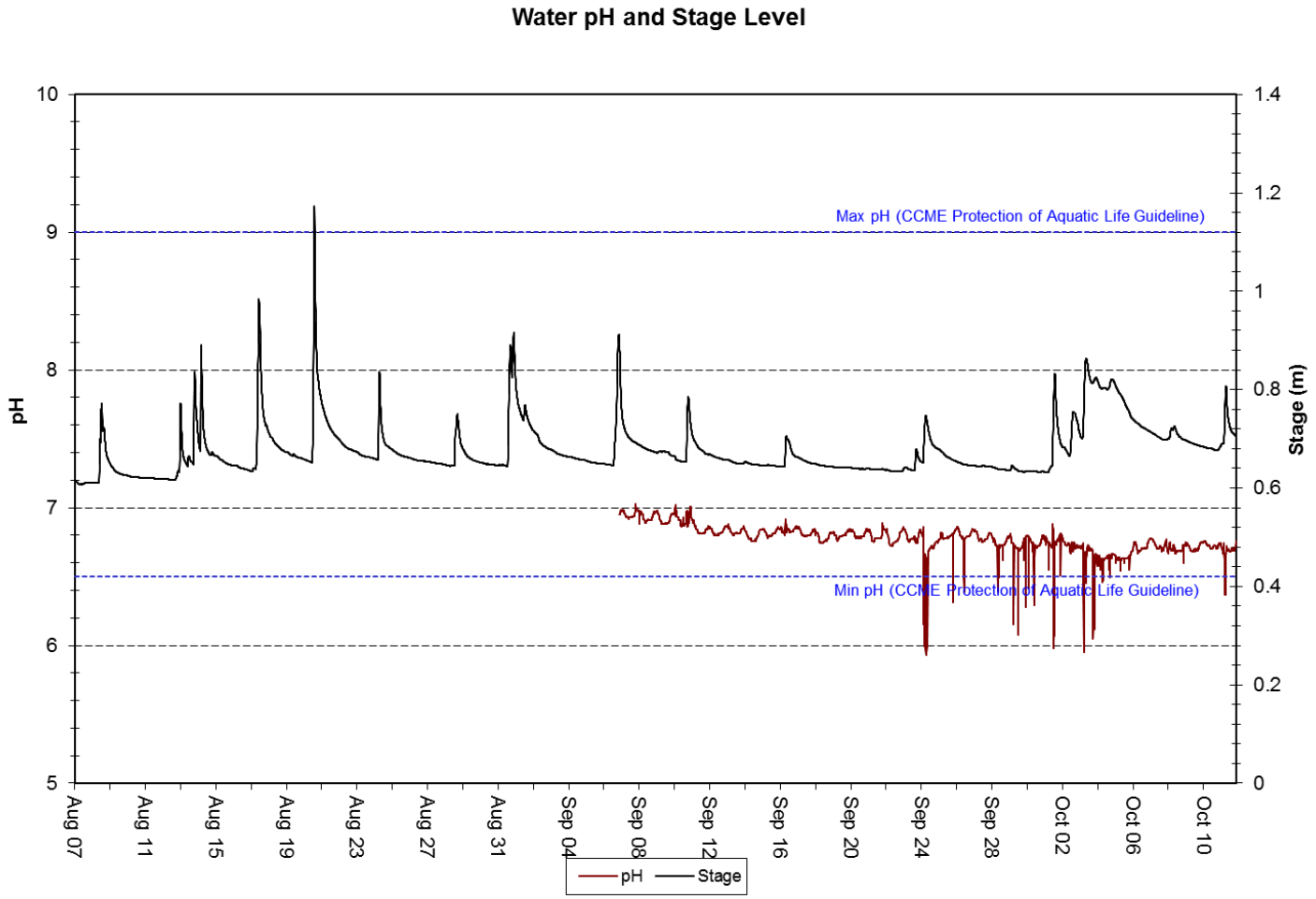
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Leary's Brook at Prince Philip Drive	August 7, 2012	Deployment	Fair	Excellent	Excellent	NA	Excellent
	October 12, 2012	Removal	Excellent	NA	Good	Good	Excellent

- A fault in the Field sonde DO sensor resulted in poor oxygen readings during the first part of the deployment period. The instrument was replaced mid-way through the deployment period.
- The QAQC sonde pH sensor read unusually low at deployment and was not useful for QAQC ranking.

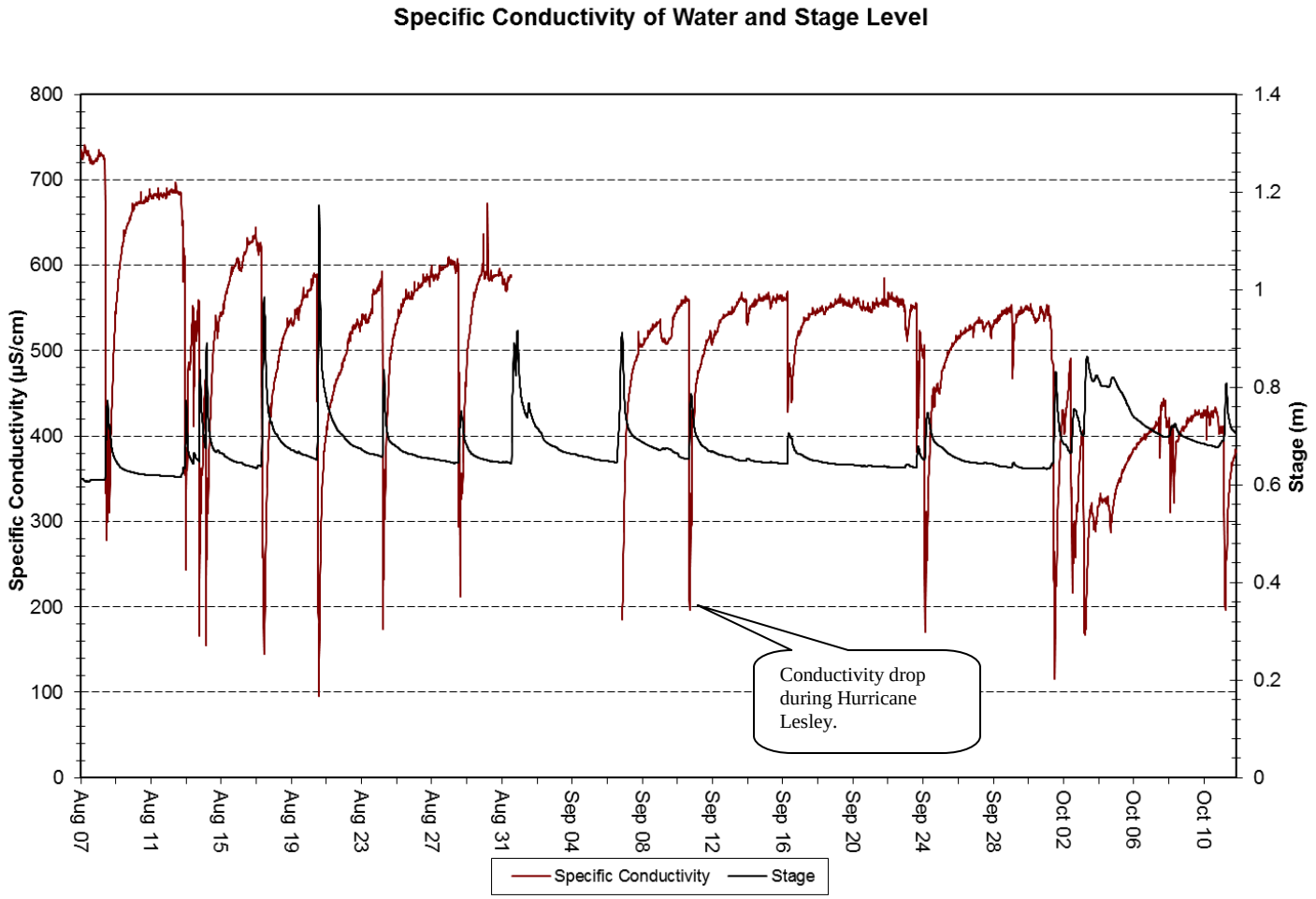
Data Interpretation



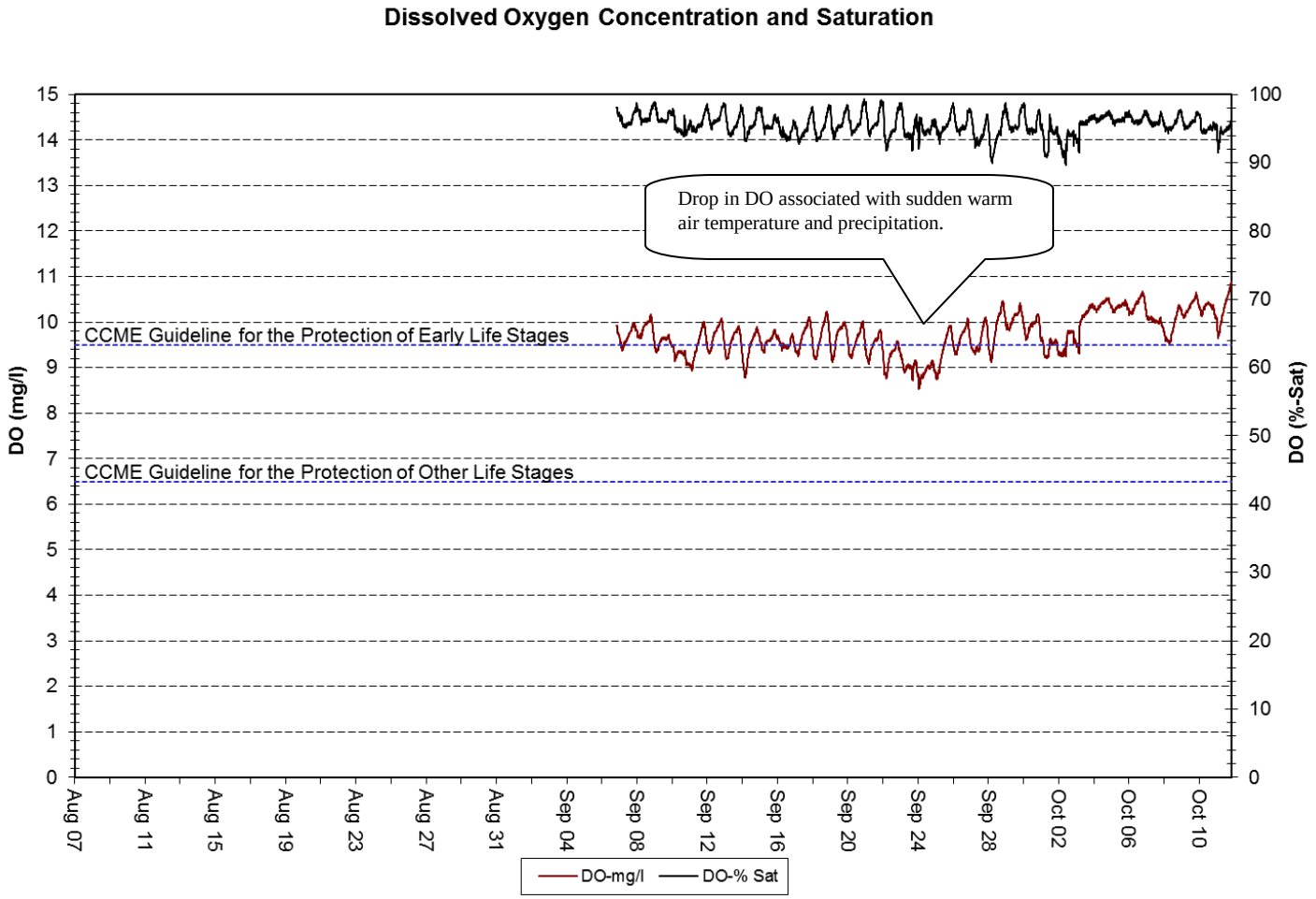
- Overall, a decline in water temperature is evident at Leary's Brook from early August to mid-October, as expected. Water temperature ranged from 22.00°C to 9.89°C (median value: 15.20°C).



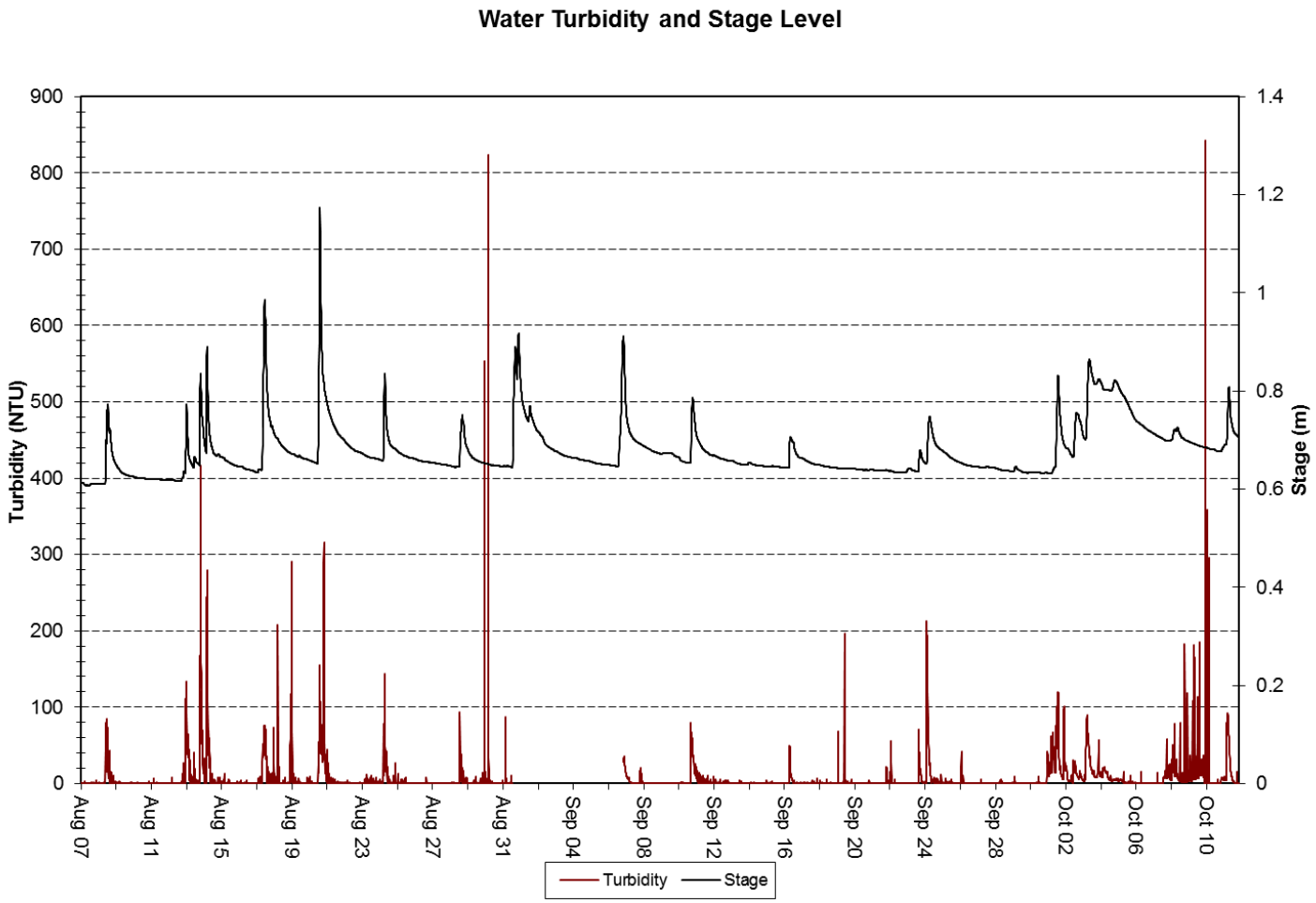
- The pH data from the first half of the deployment period has been removed due to a pH sensor failure. Following the first half of the deployment period, a decline in pH values is evident. A range of 5.93 to 7.03 with a median of 6.78.
- A series of rapid and sharp drops in pH was observed between September 24th and October 4th; the cause of which is uncertain. During this time frame, no appreciable amount of precipitation was observed.



- Over the course of this deployment period, conductivity tended to decline from a high of 741 µS/cm to a low of 95.7 µS/cm (median: 544 µS/cm).
- As illustrated in the figure above, all large declines in conductivity are associated with rapid stage level rises. This is a result of storm water discharge diluting the relatively concentrated Leary's Brook river channel. Once the precipitation ceases and stage level returns to normal, so does conductivity.
    - On September 11th, Hurricane Lesley made landfall in Newfoundland, bringing moderately heavy rain and winds. The conductivity drop resulting from this storm is outlined above.



- The first half of DO values were removed from the deployment report due to a sensor failure.
- In the latter half of the deployment period, dissolved oxygen increased to levels above the CCME Guideline for the Protection of Early Life Stage cold water biota. At no point did values fall below the Guideline for the Protection of Other Life Stage biota.
- Concentrations ranged from 8.52 mg/l to 10.88 mg/l (median value: 9.71 mg/l).

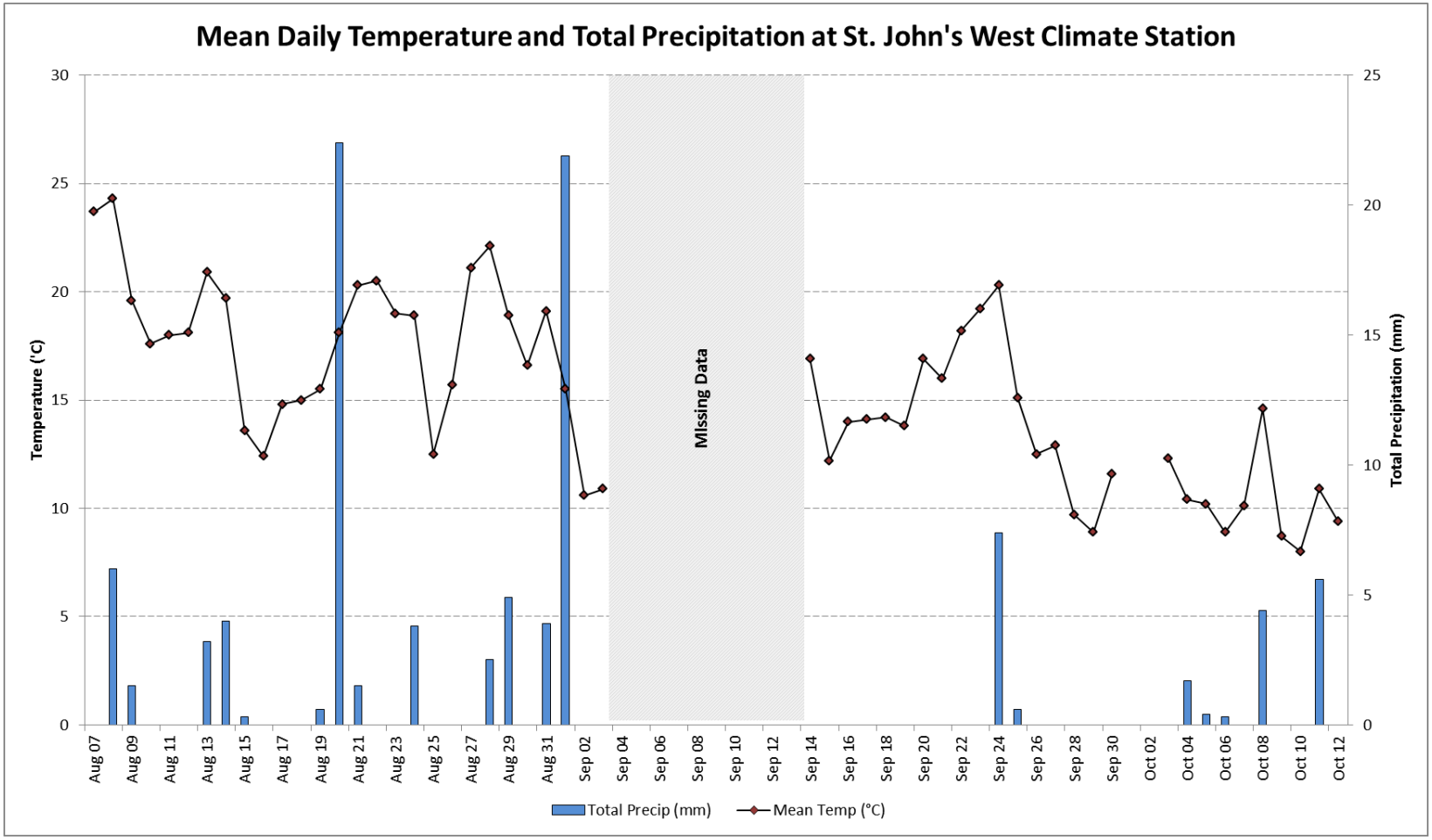


- Turbidity spikes tend to be clustered with stage level increases. As stage increases in the river, flow rate and velocity tends to increase as well, resulting in a lofting of stream bed sediments. Additionally, road debris and soil particles tend to be washed into the river channel increasing the suspended matter load.
- Turbidity fell between 0.0 NTU and 824 NTU (median value: 0.0 NTU) during this deployment period.

Conclusions

- A DO sensor failure and pH sensor calibration drift required the replacement of the instrument halfway through the deployment period. At this time, the instrument was also moved 1 m upstream to a pool in order to avoid the possibility of the probes becoming beached in low water levels.
- A number of unusually sharp pH drops near the end of the deployment period were identified and couldn't be associated with any known events. pH will be monitored closely to identify any additional fluctuations.

Appendix



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