Real-Time Water Quality Deployment Report

Rattling Brook Network

March 30, 2012 to May 10, 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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2012-03-30 to 2012-05-10

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- Rattling Brook Big Pond station was not deployed during this deployment due to unfavorable ice conditions.
- pH values recorded at Plant Discharge station were above expected values, indicating a loss of calibration. pH was not assessed in this report. The sensor will be assessed during regular maintenance to determine if a replacement is necessary.

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
Rattling Brook Big Pond	Instrument not deployed due to unfavourable ice conditions						
Rattling Brook below Bridge	March 30, 2012	Deployment	Good	Good	Excellent	Good	Excellent
	May 10, 2012	Removal	Excellent	Excellent	Marginal	Excellent	Poor*
Rattling Brook below Plant Discharge	March 30, 2012	Deployment	Excellent	Good	Excellent	Excellent	Poor†
	May 10, 2012	Removal	Good	Fair	Fair	Excellent	Excellent

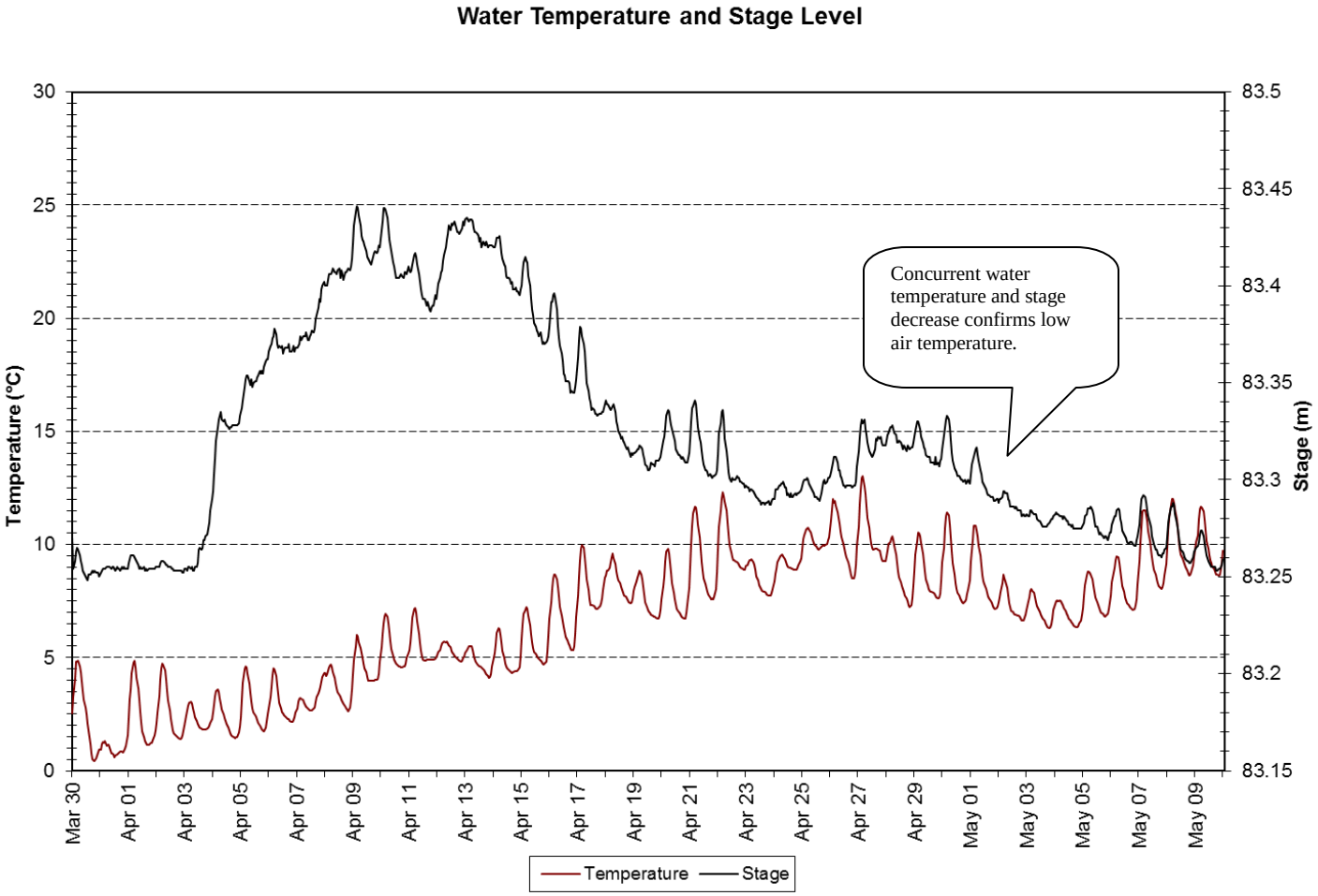
* Field Sonde reported turbidity of 88.0 NTU while the QAQC Sonde reported 1.1 NTU. The water was mostly clear at the time.

† QAQC Sonde reported turbidity of 20.2 NTU while the Field Sonde reported 0.2 NTU. The water was mostly clear at the time.

Data Interpretation

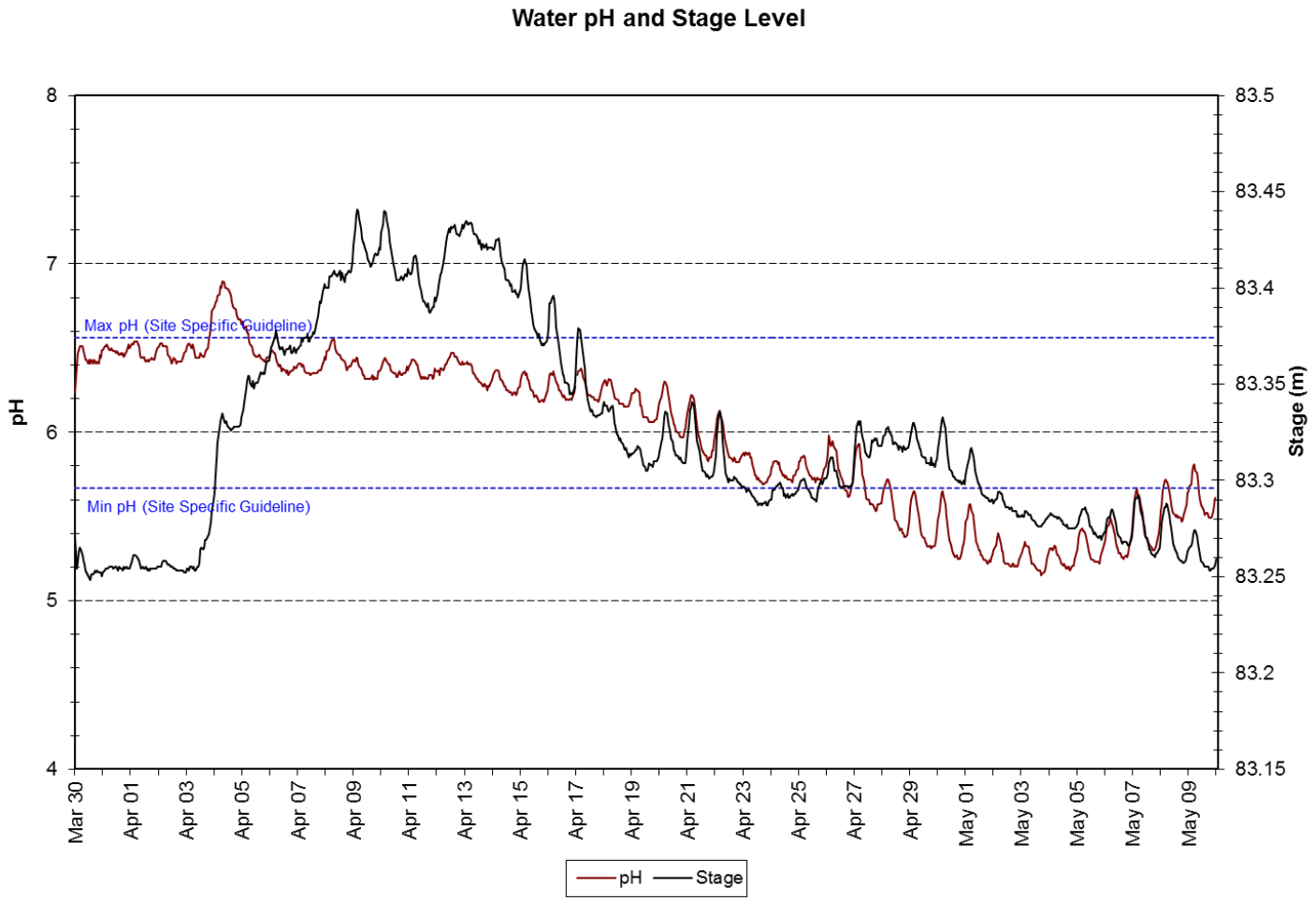
Rattling Brook below Bridge

Figure 1: Water Temperature at Rattling Brook below Bridge from March 30 to May 10, 2012



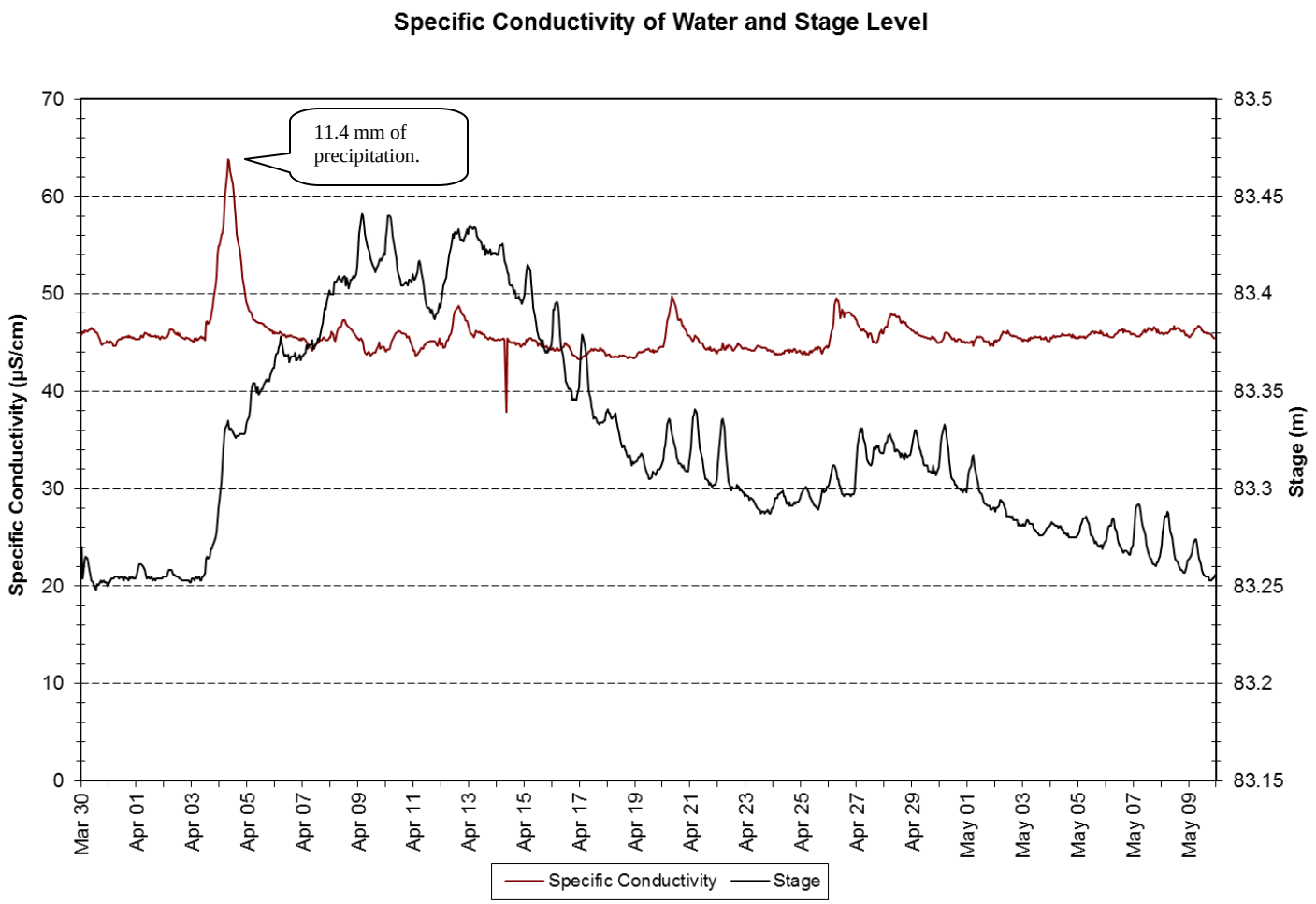
- Water temperature showed a steady upward trend until late April during a series of cool days. Water temperature ranged from 0.43°C to 13.02°C (median value: 7.14°C).

Figure 2: pH at Rattling Brook below Bridge from March 30 to May 10, 2012



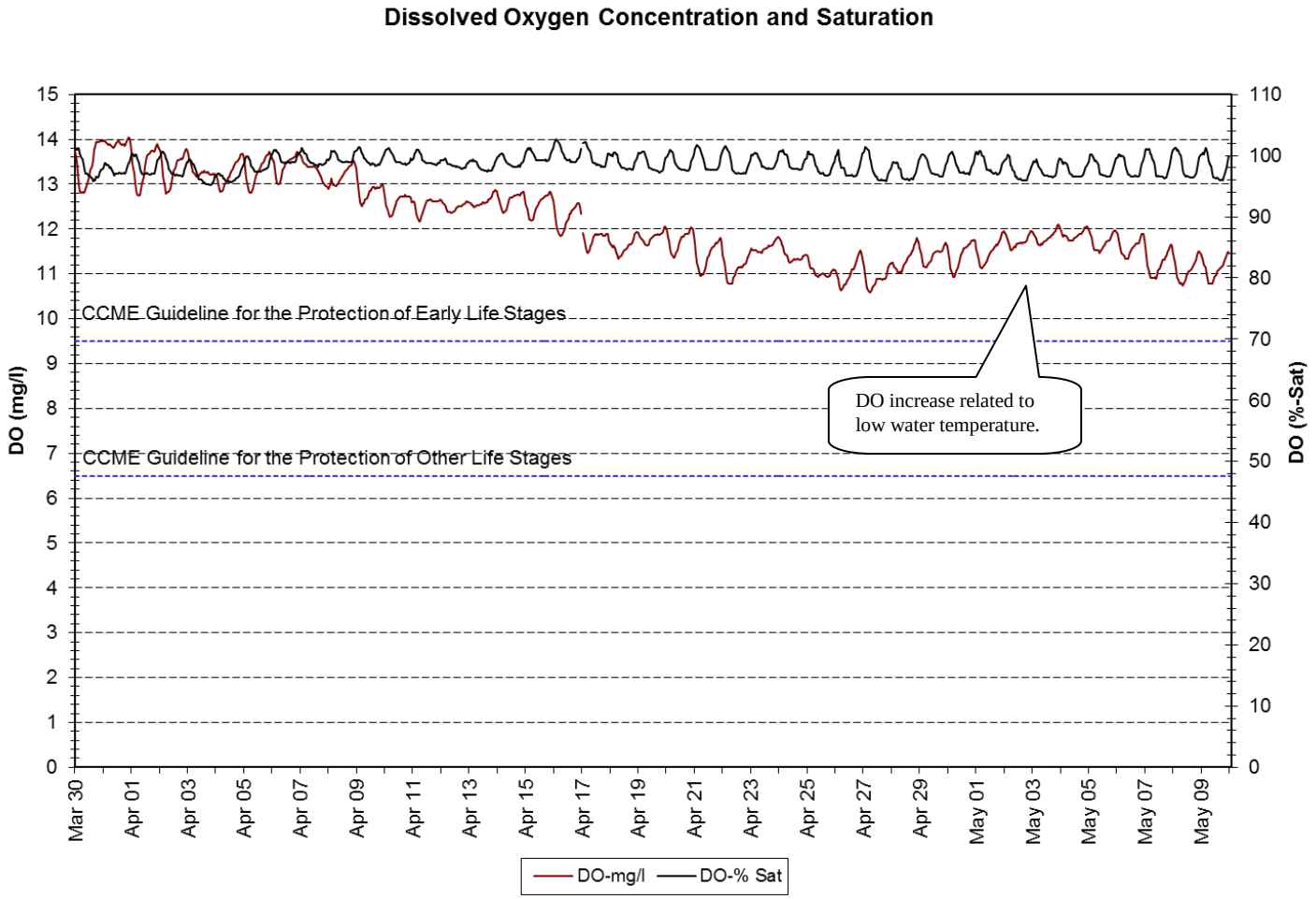
- pH indicated a downward trend over the course of this deployment period from a high of 6.90 to a low of 5.15 (median value: 6.17).
- Upon initial inspection of Figure 2, it appeared that pH was faulty and showing unreasonable values, however the data was ranked as “Excellent” at removal time. This trend may be a normal characteristic of warming spring temperatures as biofilms mature and begin to influence pH levels.

Figure 3: Specific Conductivity at Rattling Brook below Bridge from March 30 to May 10, 2012



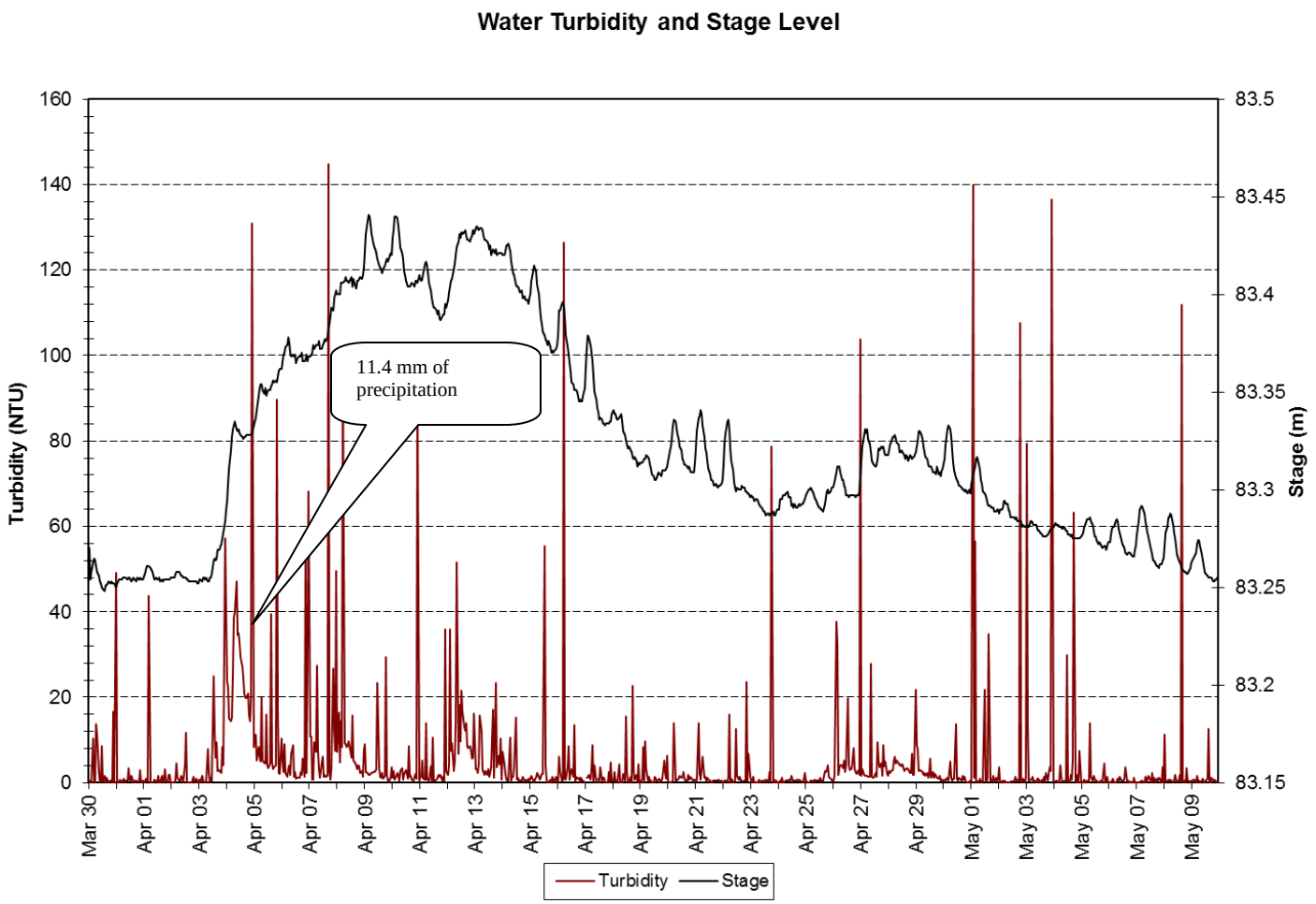
- One particular peak in conductivity was notable during the deployment period from March 30th to May 10th. Values fell between 37.9 to 63.8 µS/cm (median value: 45.4 µS/cm). The high point was reached on April 4 at 5:30pm. In the 24 hours before this time 11.4 mm of precipitation was recorded.

Figure 4: Dissolved Oxygen at Rattling Brook below Bridge from March 30 to May 10, 2012



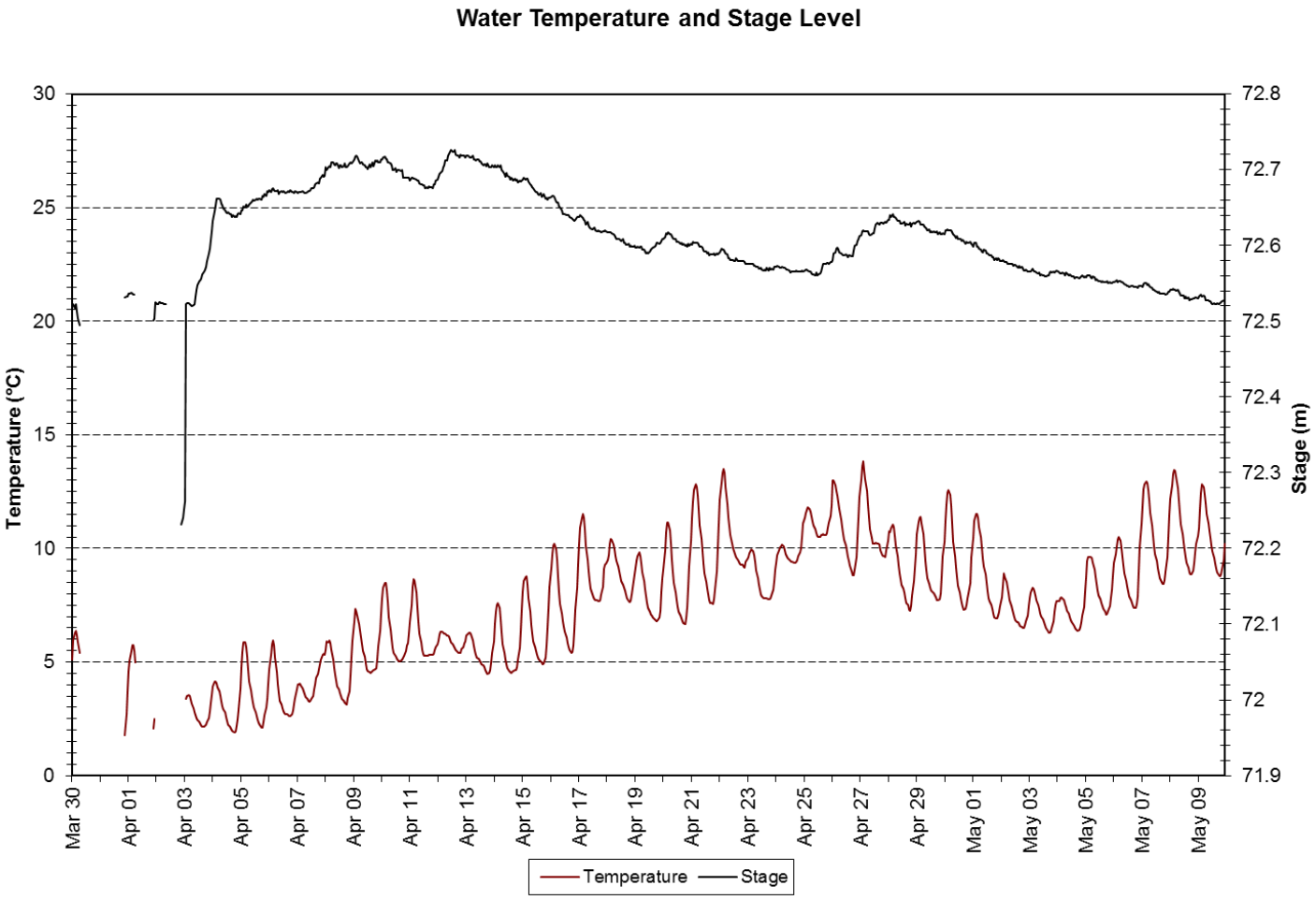
- Increasing water temperature began to drive dissolved oxygen concentrations toward their summer low values. At this time, oxygen concentrations were found to remain above the CCME Guidelines for the Protection of Early and Other life stage cold water biota.
- Concentrations fell between 10.59 to 14.04 mg/l (median value: 11.87 mg/l).

Figure 5: Turbidity at Rattling Brook below Bridge from March 30 to May 10, 2012



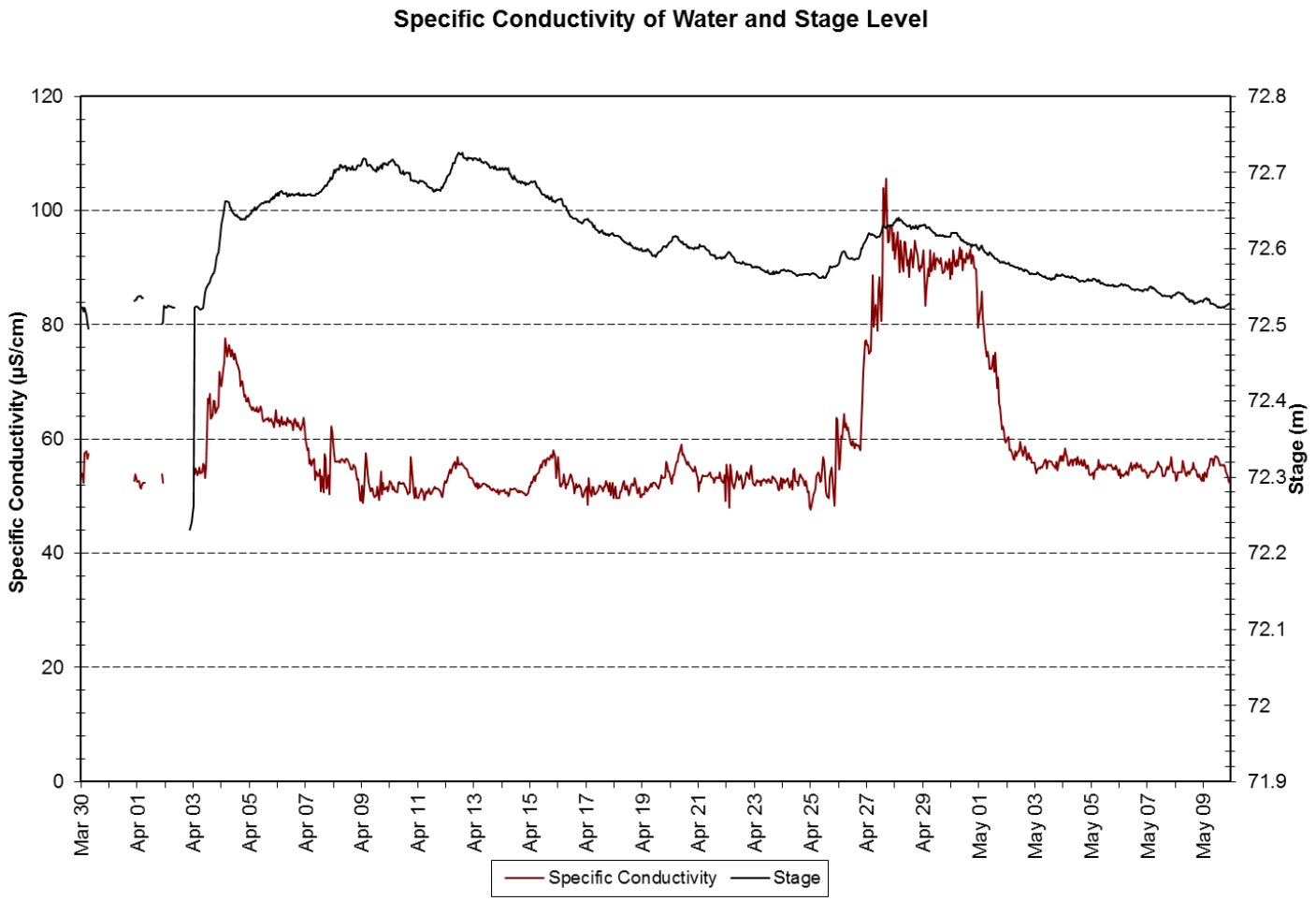
- During this deployment period, turbidity fell between 0.0 NTU and 144.8 NTU (median value: 1.1 NTU).
- A few notable turbidity peaks were identified and associated with precipitation. The frequent occurrence of high turbidity peaks may be indicative of turbulent flow or streambed mobility from spring runoff. It is likely that such high peaks will taper off as spring progresses. This will be monitored closely.

Figure 6: Water Temperature at Rattling Brook below Plant Discharge from March 30 to May 10, 2012



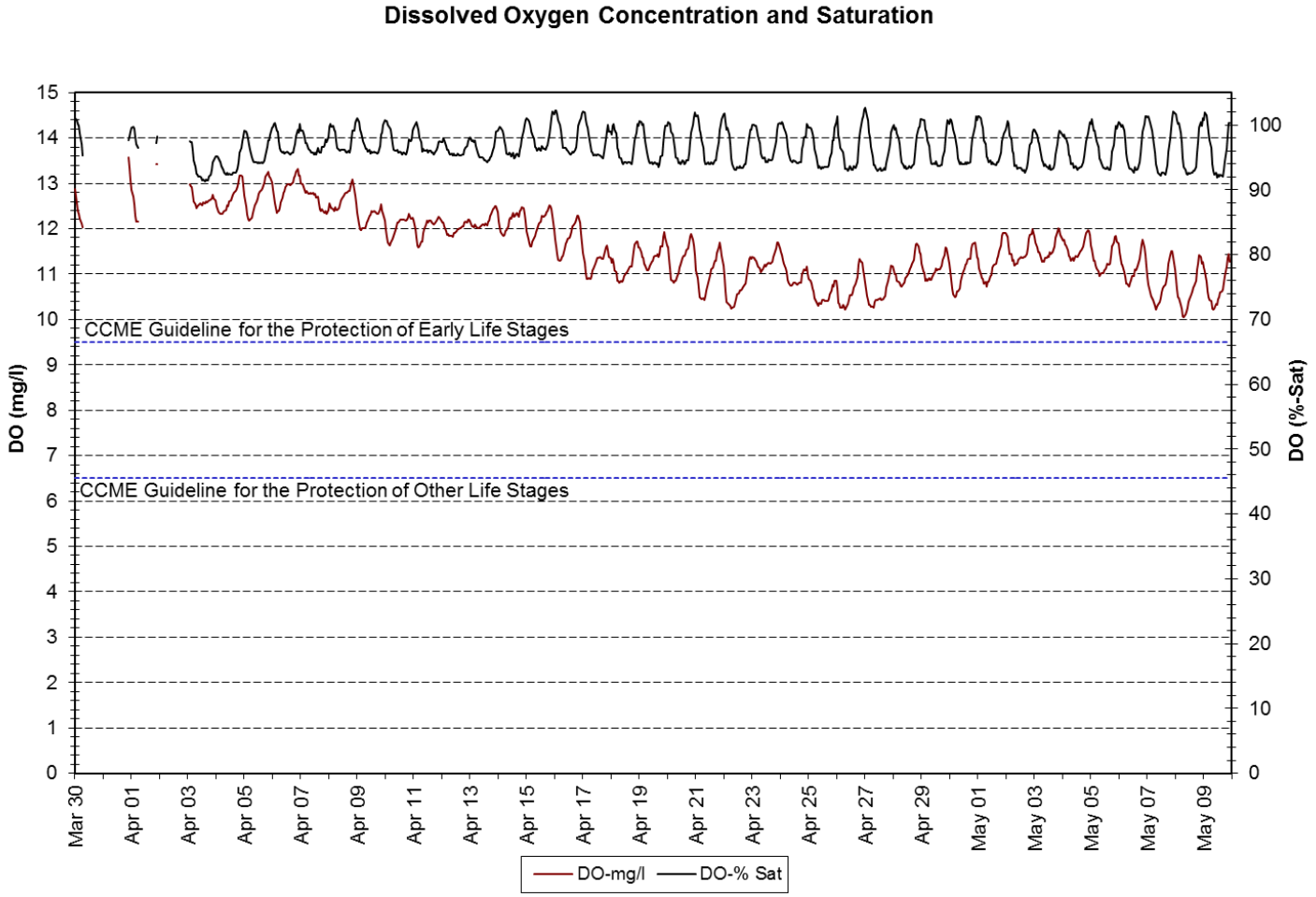
- Water temperature at Plant Discharge station was found to be slightly warmer (~0.5^{o}C) than upstream at Bridge station. Values fell between 1.78^{o}C and 13.85^{o}C with a median value of 7.74^{o}C.

Figure 7: Specific Conductivity at Rattling Brook below Plant Discharge from March 30 to May 10, 2012



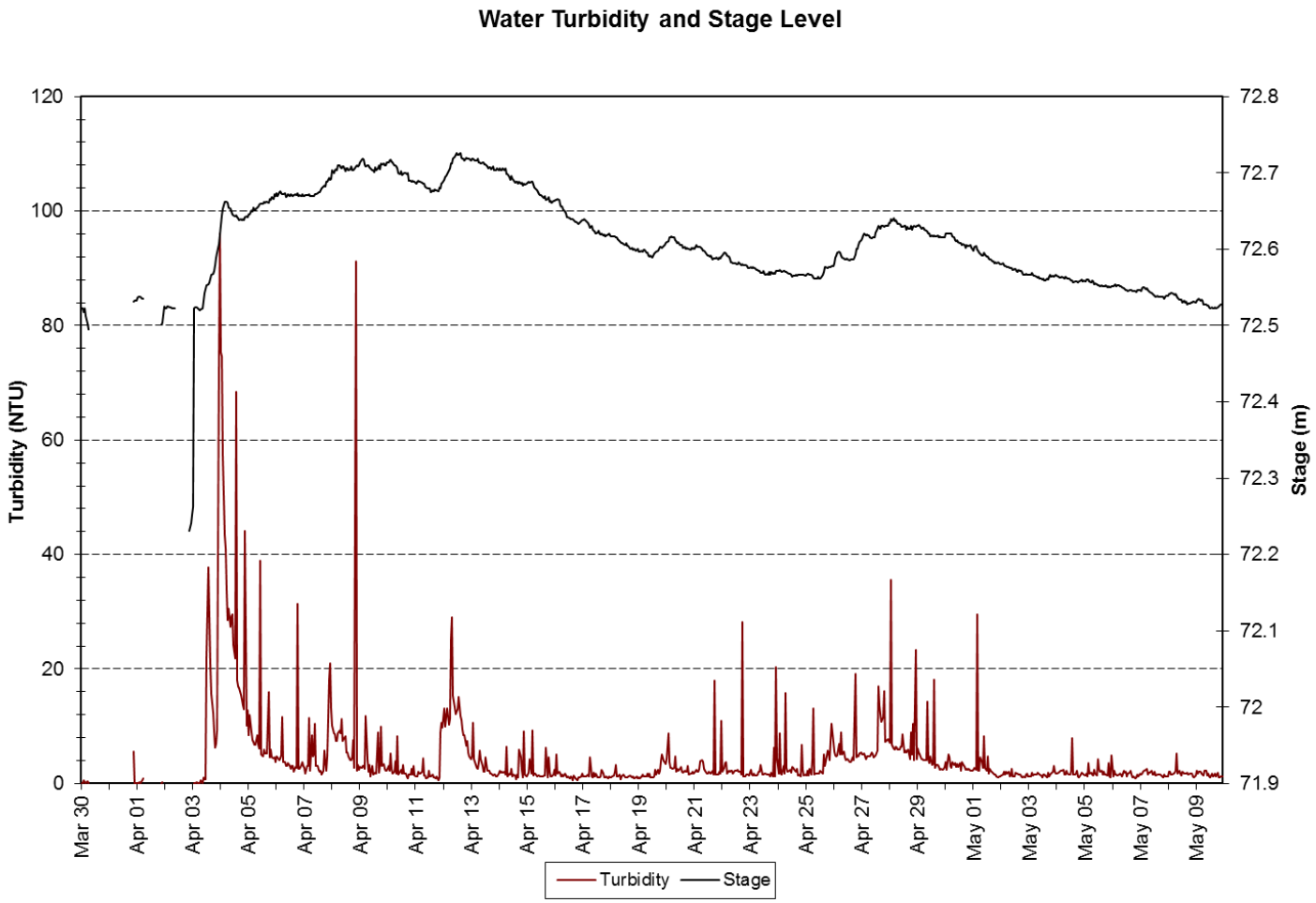
- A very large peak in conductivity was found from April 27th to about May 1st before values returned to lower levels. Warm temperatures and consistent precipitation during these days was the driving force behind this increase in conductivity.

Figure 8: Dissolved Oxygen at Rattling Brook below Plant Discharge from March 30 to May 10, 2012



- Dissolved oxygen concentrations fell from a high of 13.58 mg/l to a low of 10.05 mg/l during this deployment period (median value: 11.47). At this time, all DO values were found to be above the CCME Guidelines for the Protection of Early and Other life stage cold water biota. A downward trend suggests that the Guideline of 9.5 mg/l will be passed sometime in June should warm air temperatures persist.
- A slight increase in DO values was recorded in early May as a result of cool air temperatures.

Figure 9: Turbidity at Rattling Brook below Plant Discharge from March 30 to May 10, 2012

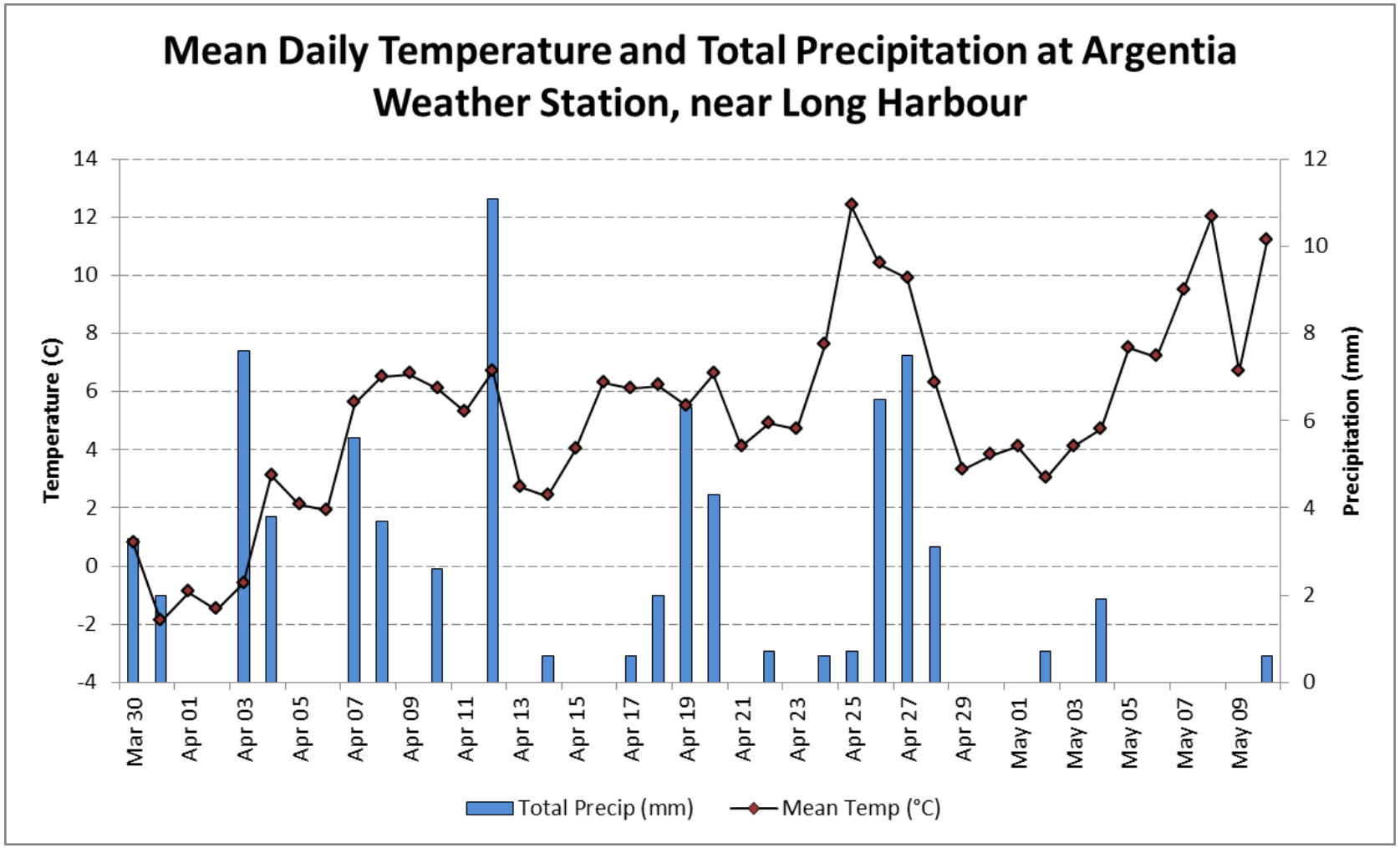


- Turbidity levels were found to be highly variable in early to mid-April – during spring freshet. Towards late April and May, lower stage (and flow) coincided with a general decrease in turbidity. A small increase in turbidity was observed between April 26th and May 1st during warm temperatures and precipitation.
- Values ranged from 0.0 NTU to 96.0 NTU were recorded during this deployment interval and showed a median value of 2.2 NTU.

Conclusions

- Transmission issues at Plant Discharge station were resolved early in the deployment. pH sensor issues were consistently high throughout the month – a sensor report is likely required.
- Most fluctuations and trends in parameters fit within the normal variation seen during spring freshet. At this time of year, as water temperatures increase, pH, conductivity, and turbidity levels vary with heavy flow rates.

Appendix



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