Real-Time Water Quality Deployment Report

Rattling Brook Network

March 31, 2011 to April 28, 2011

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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2011-03-31 to 2011-04-28

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- Rattling Brook Big Pond has been temporarily removed due to ice and will be redeployed once conditions allow.

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 **Error! Reference source not found.**). 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 **Error! Reference source not found.**.

Table 1: Qualitative QAQC Rankings

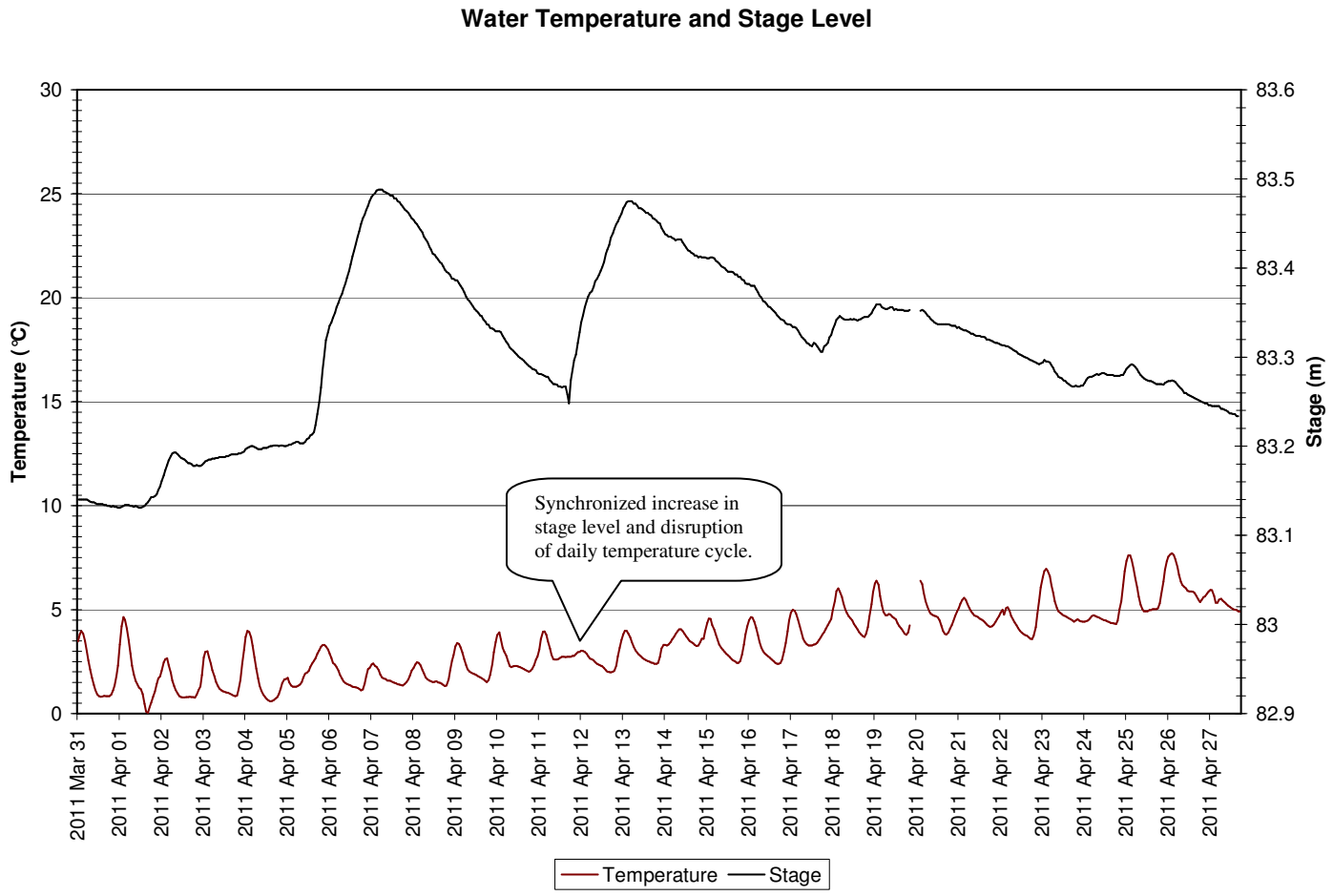
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	Instrument removed due to ice conditions						
Rattling Brook below Bridge	March 31, 2011	Deployment	Excellent	Fair	Excellent	Good	Excellent
	April 28, 2011	Removal	Excellent	Good	Excellent	Excellent	Excellent
Rattling Brook below Plant Discharge	March 31, 2011	Deployment	Good	Good	Fair	Good	Excellent
	April 28, 2011	Removal	Good	Excellent	Fair	Excellent	Poor

- QAQC rankings fall mostly within the “Excellent” and “Good” indicator with a few instances of “Fair” and one “Poor” ranking. There are many possible reasons for rankings less than “Good” including: insufficient time for QAQC instrument equilibration and/or loss of calibration in the Field Sonde.

Data Interpretation

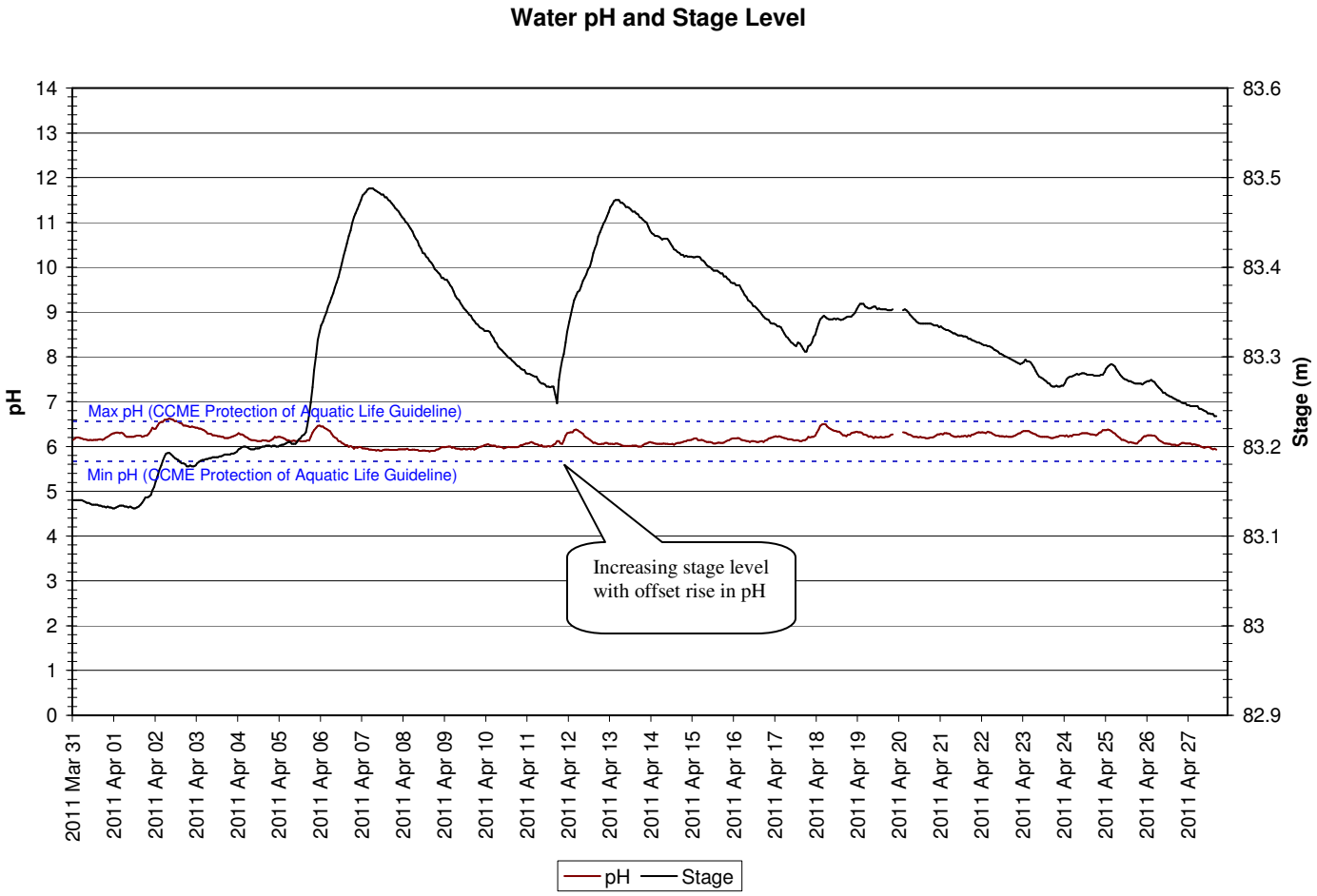
Rattling Brook below Bridge

Figure 1: Water Temperature at Rattling Brook below Bridge Station from March 31st to April 28th, 2011



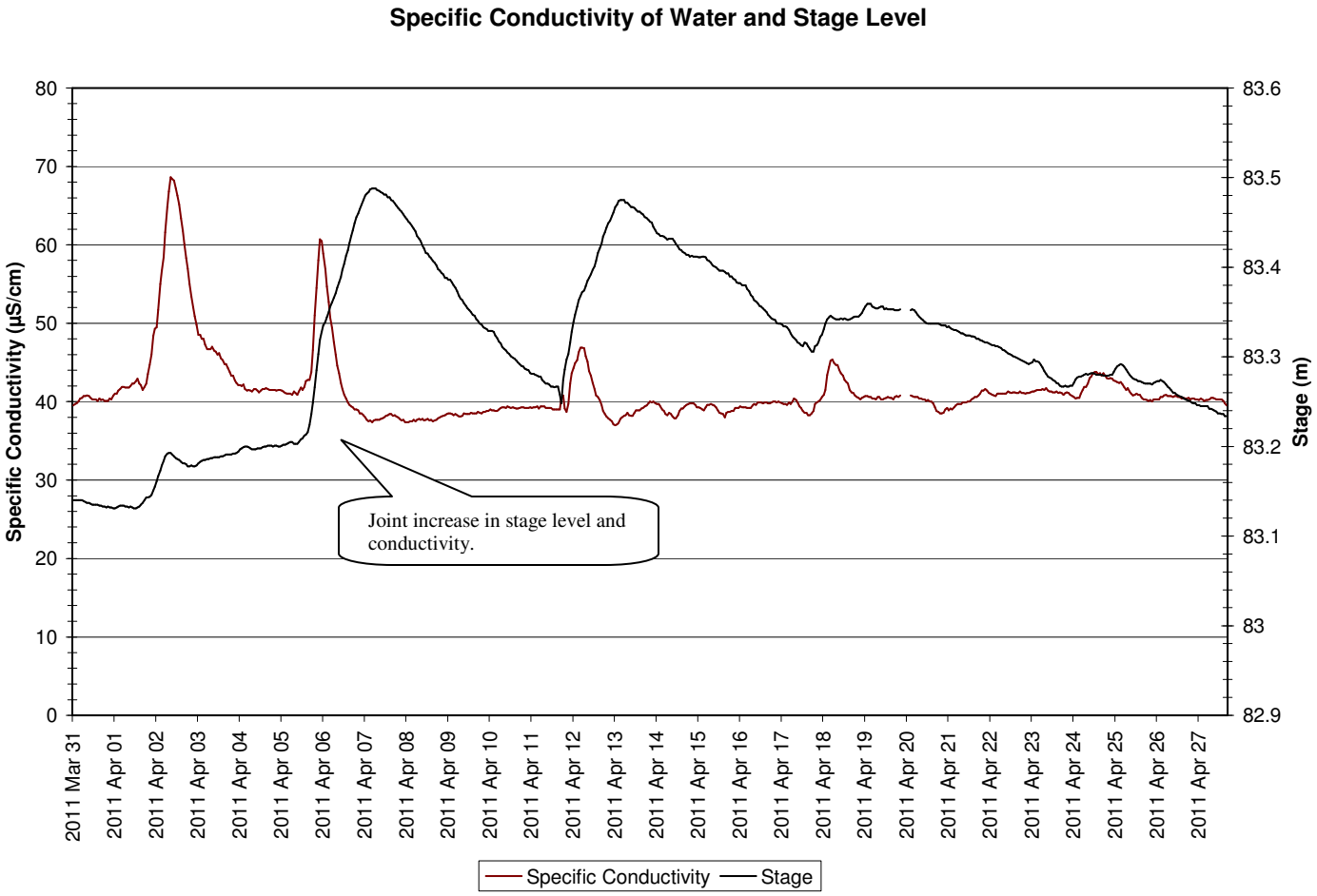
- Significant increases in water temperature are observed through early spring. A low of 0.02°C was recorded on April 1st, with the highest temperature of 7.70°C recorded on April 26th. A deployment median of 3.28°C was calculated.

Figure 2: pH at Rattling Brook below Bridge Station from March 31st to April 28th, 2011



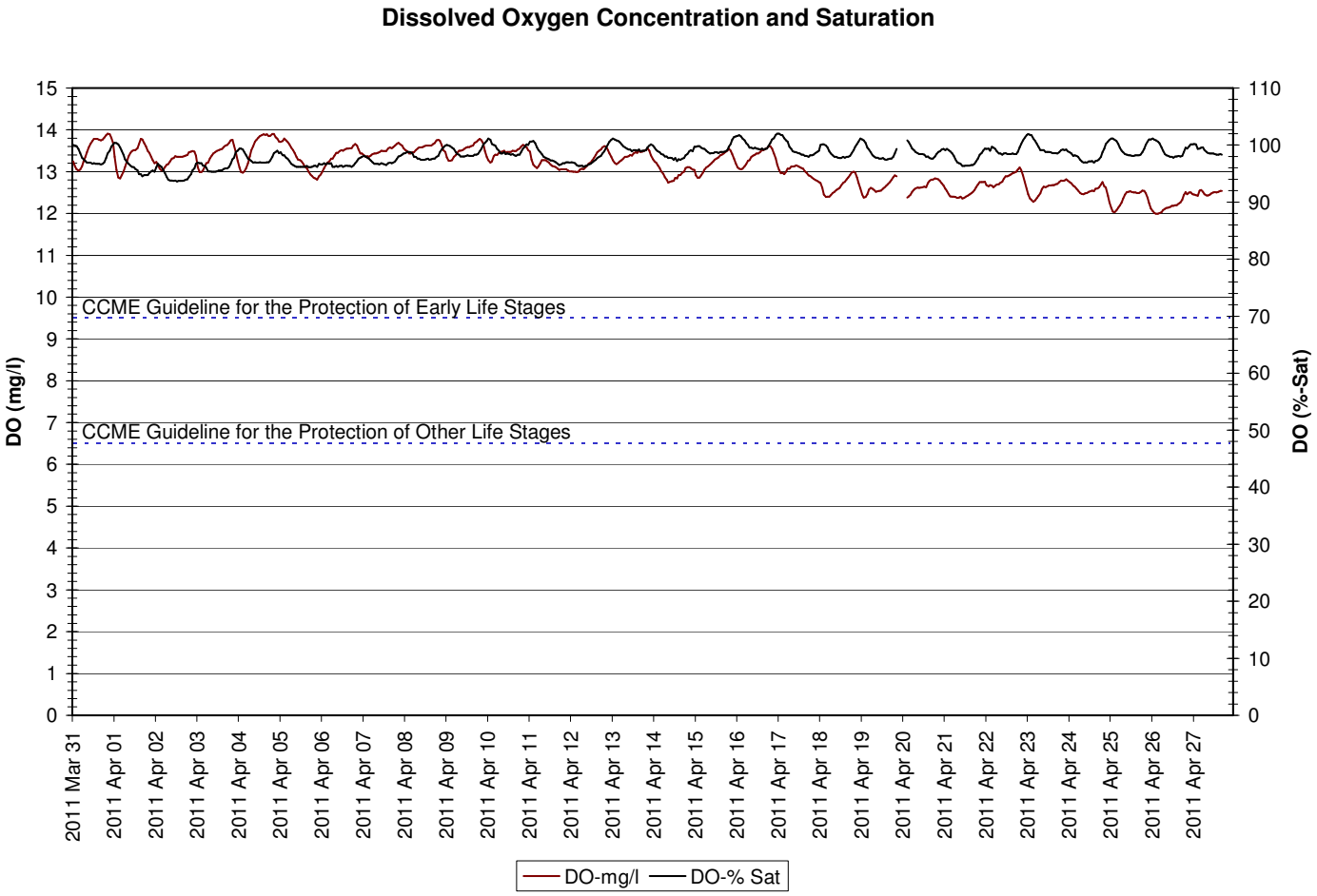
- pH at Bridge station depicted a net-zero change over the month. Although there were fluctuations throughout the deployment, each increase was generally followed by a decrease.
- pH fell almost entirely within the Site Specific Guidelines for Rattling Brook with a max value of 6.62 and a min value of 5.89 (median = 6.17). The high value occurred over a five hour period late on April 2, after 10 mm of precipitation.

Figure 3: Specific Conductivity at Rattling Brook below Bridge Station from March 31st to April 28th, 2011



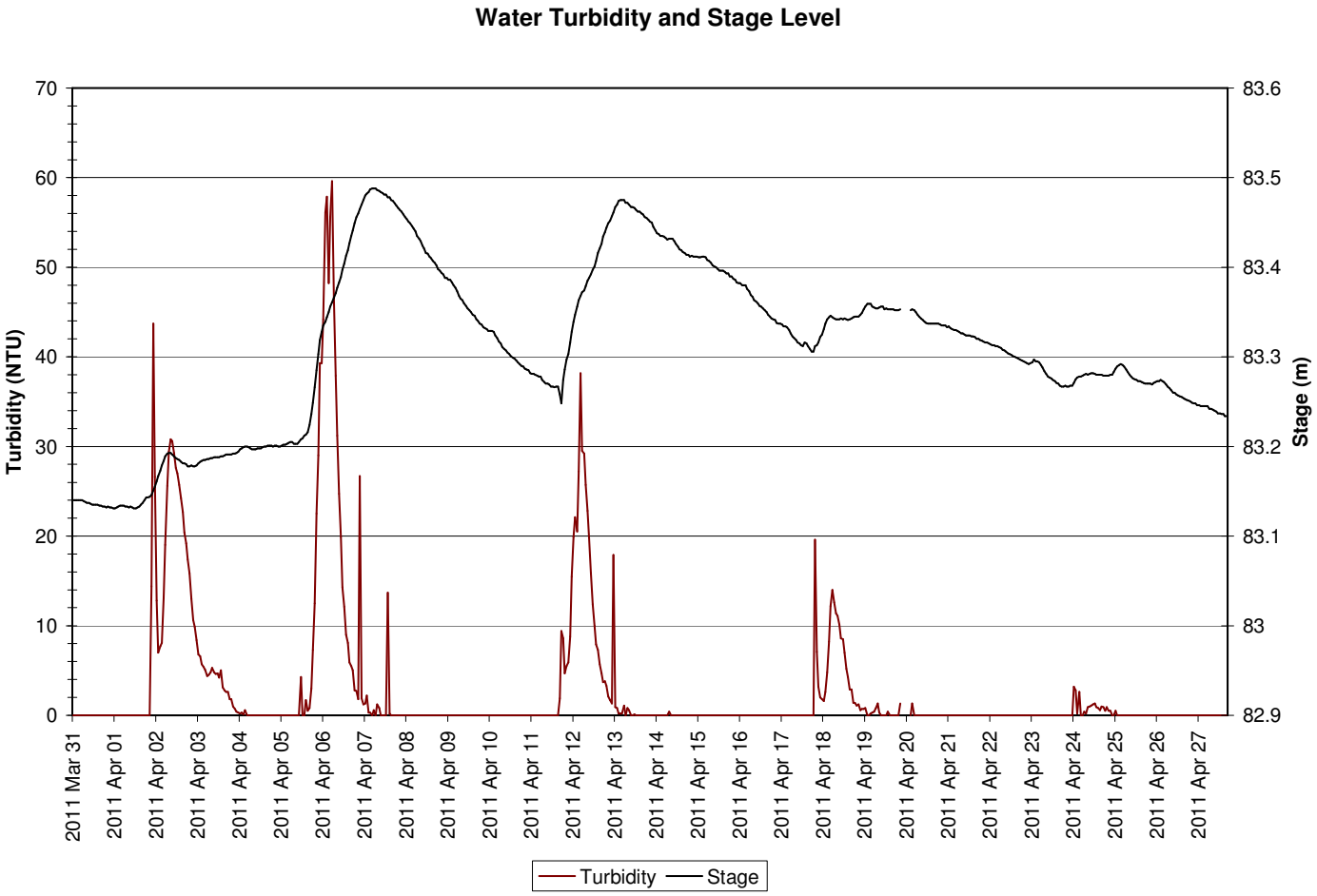
- Specific conductivity showed a high degree of variation representative of runoff following the winter season. During the winter, there is a build-up of ice-control materials (typically rock salt) on the sides of roadways and near drainage ditches. As water runs over these surfaces, salt is deposited in the river, increasing conductivity dramatically as it is washed away. These fluctuations almost always occur with stage level increases.
- Conductivity ranged from 37.0 to 68.6 µS/cm for the month with a median of 40.4 µS/cm.

Figure 4: Dissolved Oxygen at Rattling Brook below Bridge Station from March 31st to April 28th, 2011



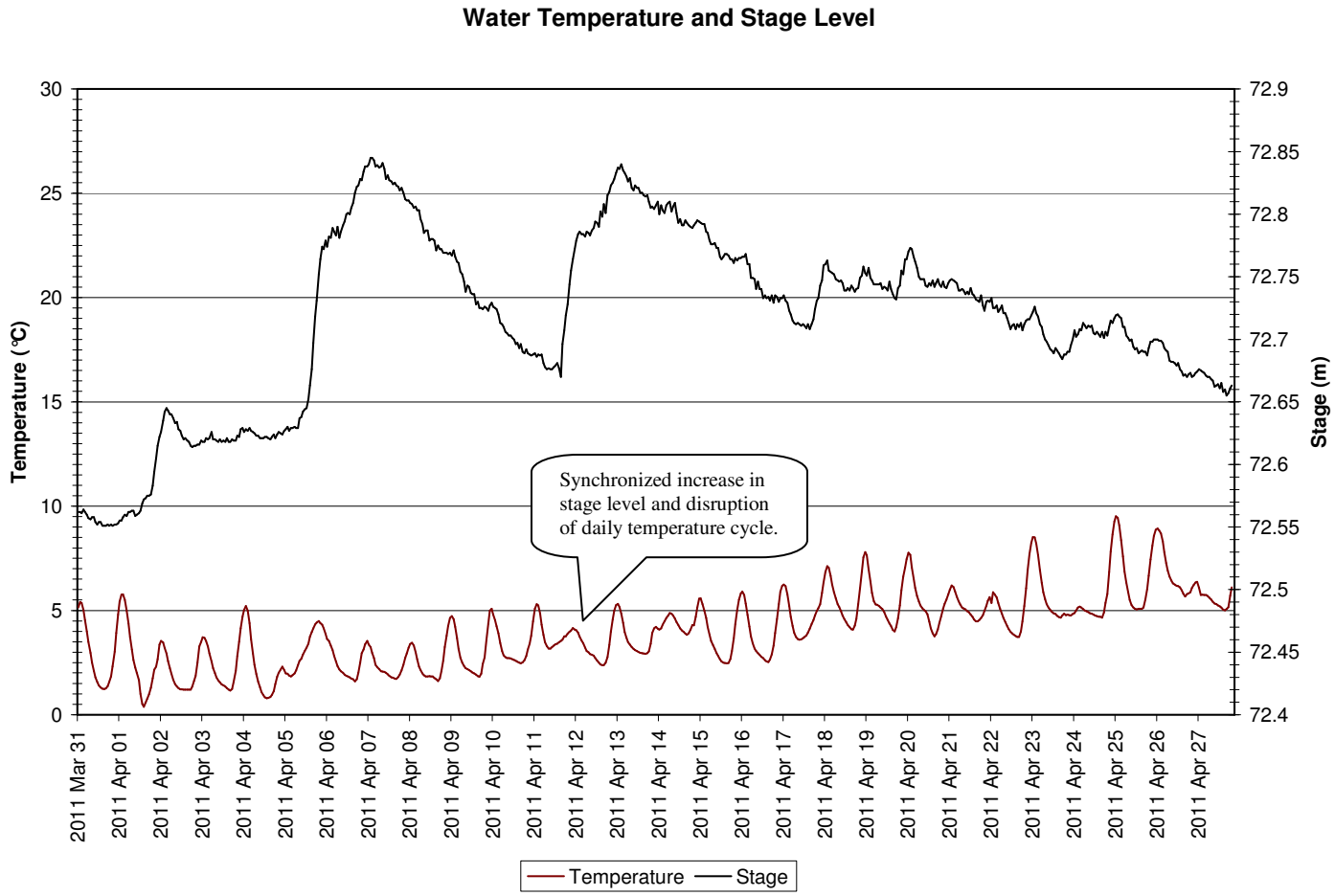
- Oxygen saturation remained stable while the concentration began to drop over the month, as is expected with a rise in water temperature. All values were found to be far above the CCME Guidelines for all life stages of cold-water biota (Max: 13.91 mg/l, Min: 11.99 mg/l, Median: 13.11 mg/l).

Figure 5: Turbidity at Rattling Brook below Bridge Station from March 31st to April 28th, 2011

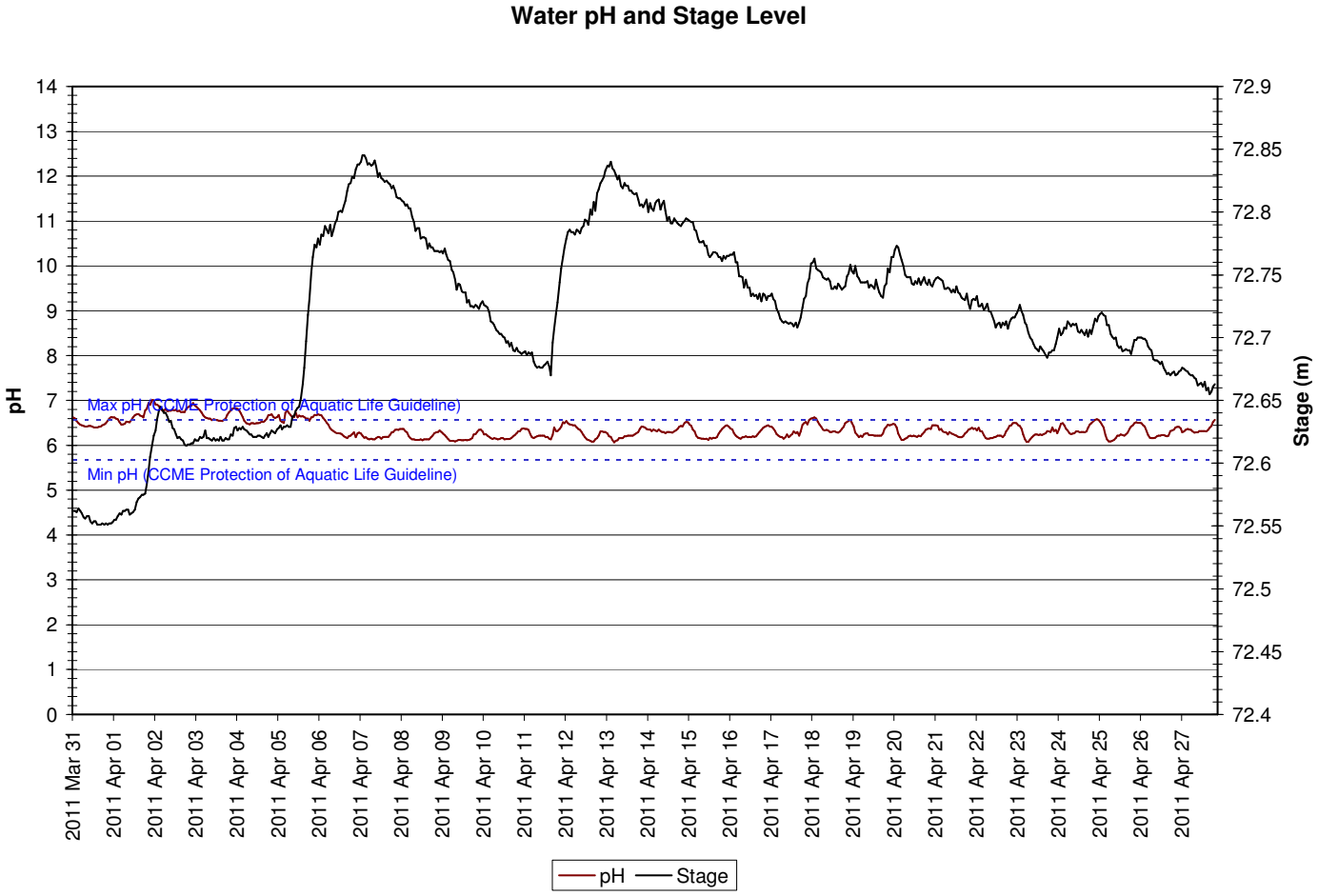


- Five turbidity events were recorded during this deployment period and each was associated with precipitation-induced stage level increases.
- Turbidity ranged from 0.0 NTU to 59.6 NTU (median = 0.0 NTU). Most values were quite low for the month and those turbidity spikes recorded are expected during precipitation events.

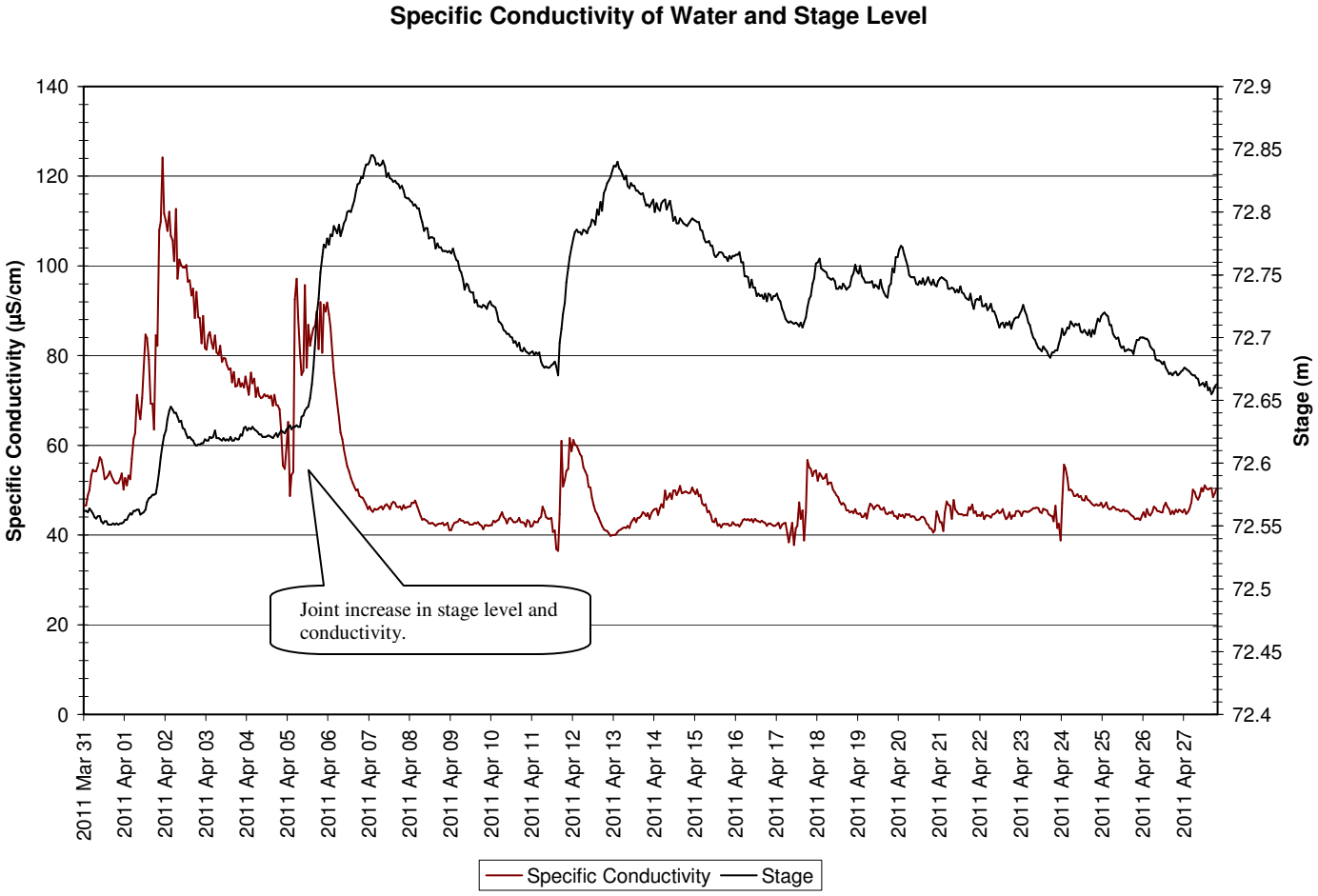
Rattling Brook below Plant Discharge



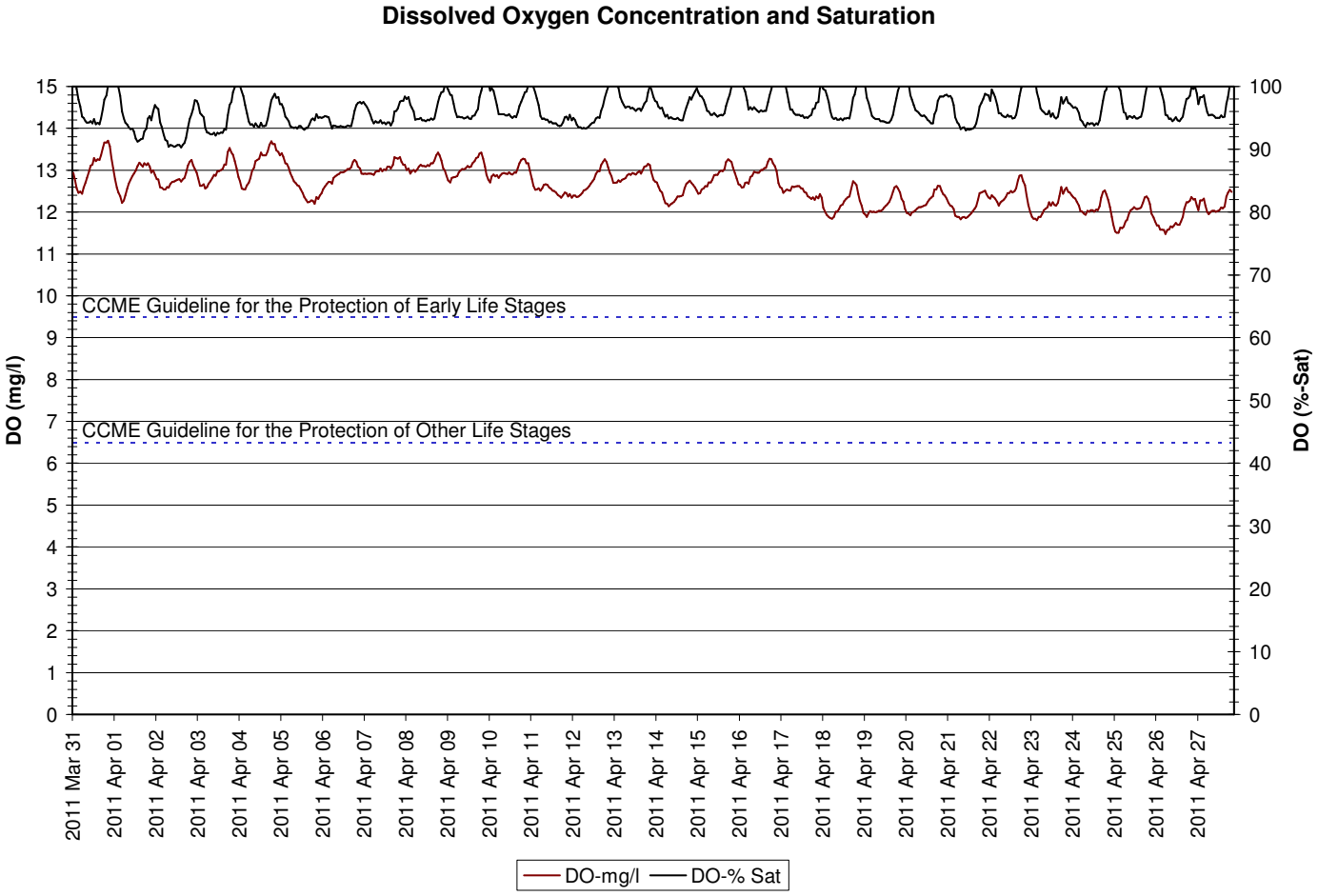
- An increasing trend in water temperature is recognized for the deployment period. Temperatures ranged from 0.38 to 9.51°C with a median value of 4.02°C.



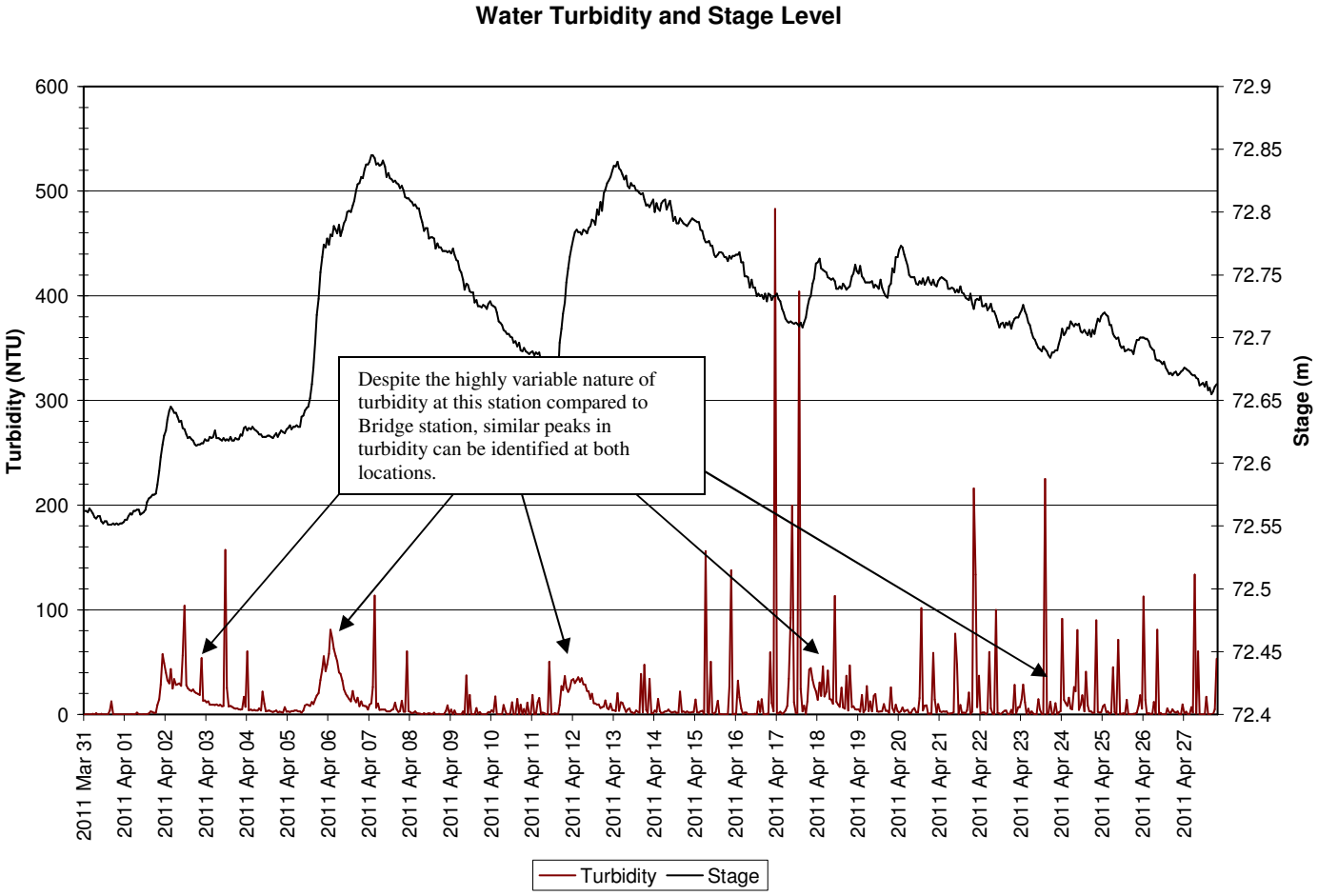
- All pH values were found to be above the Site Specific Guideline lower limit of 5.67. In total, 109 instances of pH values exceeding the upper SSG were found. This corresponds to 16.3% of all readings for the deployment period.
- pH values ranged from 6.07 to 7.01 with a median value of 6.31.



- Like Bridge station upstream, conductivity events tended to occur in conjunction with stage level increases. This suggests that salts are being washed into the river channel as water levels rise due to precipitation events.
- Conductivity values ranged from 36.5 to 124.2 µS/cm with a median value of 45.9 µS/cm.



- DO concentrations began to decline during this deployment period, as expected, with increasing water temperatures. Saturation, however, was mostly stable with no major trends except for regular daily oscillations.
- All values were far above the CCME Guidelines for the Protection of Aquatic Life.

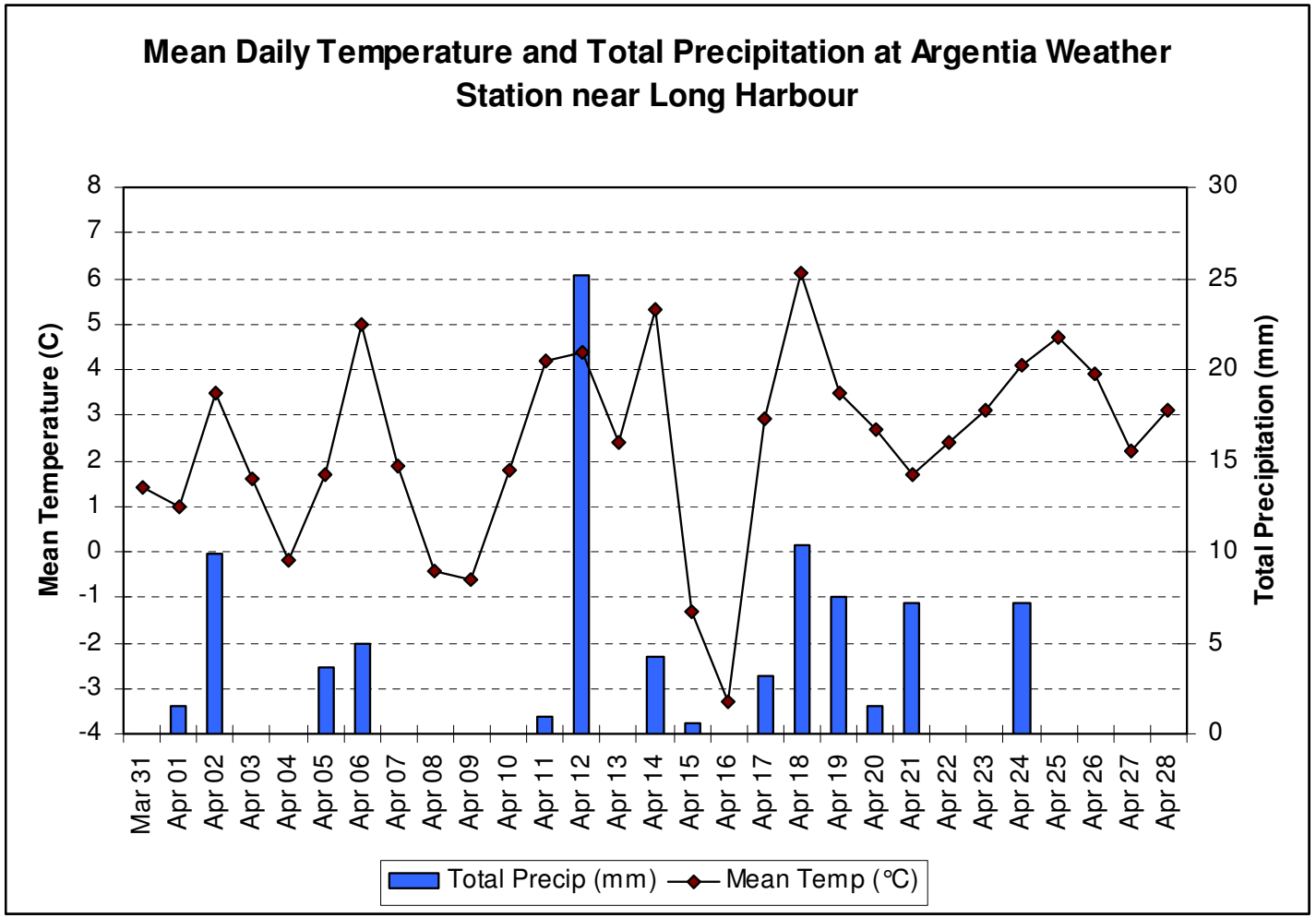


- A total of 57 turbidity notifications were received during this deployment period indicating high values. It is believed that these notifications were largely unrelated to actual stream conditions but instead were influenced by the location of the Hydrolab during this deployment period. In this particular stretch of Rattling Brook, a significant amount of filamentous vegetation is present. This material tends to wave and flag in the current and may be responsible for occasionally blocking the turbidity sensor.
- Recorded values ranged from 0.0 to 483.0 NTU with a median of 3.5 NTU. Despite the highly variable turbidity values at Discharge station, similar turbidity events are also evident at Bridge station (as indicated in the above figure).

Conclusions

- Ice conditions at Big Pond have since cleared and the station will be re-deployed during the next scheduled maintenance and calibration trip.
- Parameters at Bridge and Plant Discharge stations appear to be within expected ranges and no obvious water quality problems are evident.
- Turbidity conditions at Plant Discharge station should be remedied through modification of the deployment method during the next re-deployment.

Appendix



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