Real-Time Water Quality Deployment Report

Rattling Brook Network
Long Harbour

July 4, 2012 to August 23, 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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2012-07-04 to 2012-08-23

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- On August 8th, 2012, Habitat Rehabilitation work began on Forgotten Pond. This work is taking place below Big Pond station, but above Bridge and Plant Discharge stations. Prior to this work beginning it was understood that downstream effects would be encountered. Some of these effects can be seen in the latter portions of Bridge and Plant Discharge graphs.

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

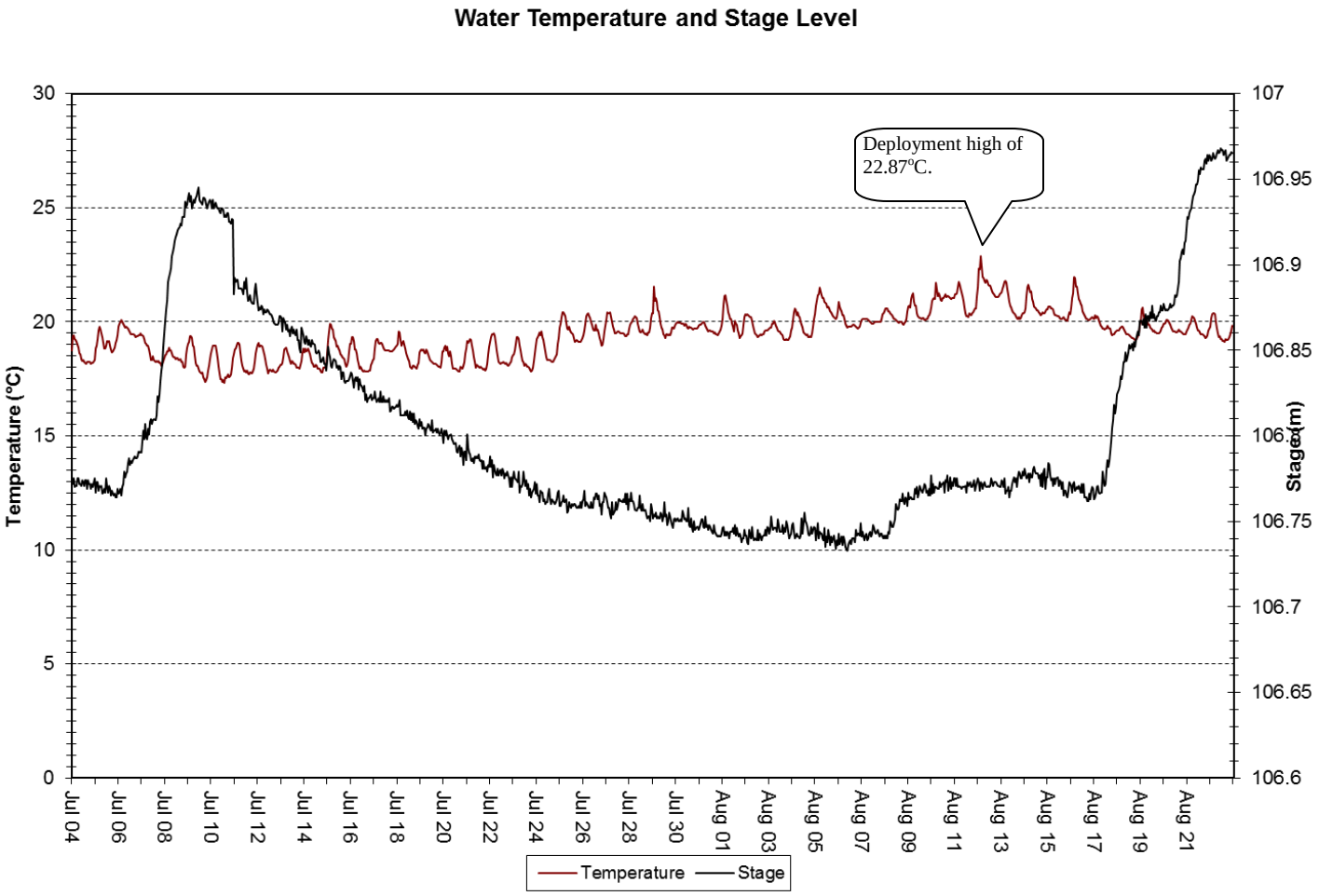
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	July 4, 2012	Deployment	Excellent	Fair	NA	Excellent	Excellent
	August 23, 2012	Removal	Marginal	Fair	Excellent	Excellent	Excellent
Rattling Brook below Bridge	July 4, 2012	Deployment	Excellent	Fair	NA	Excellent	Excellent
	August 23, 2012	Removal	Excellent	Good	Good	Excellent	Good
Rattling Brook below Plant Discharge	July 4, 2012	Deployment	Excellent	Good	NA	Excellent	Excellent
	August 23, 2012	Removal	Excellent	Excellent	Excellent	Excellent	Excellent

- Conductivity QAQC rankings at deployment time were omitted due to a problematic QAQC sensor.

Data Interpretation

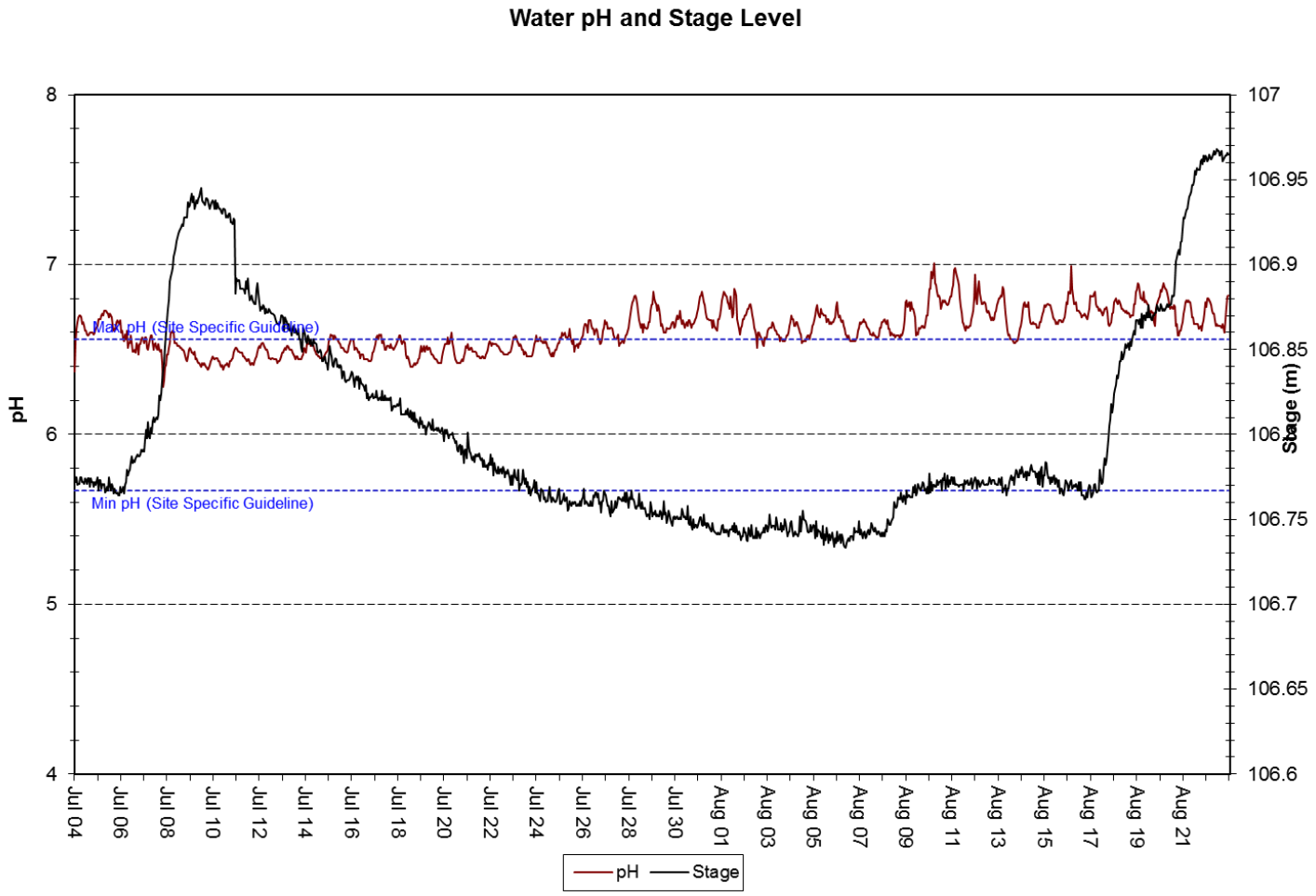
Rattling Brook Big Pond

Figure 1: Water Temperature at Rattling Brook Big Pond from July 4th to August 23rd



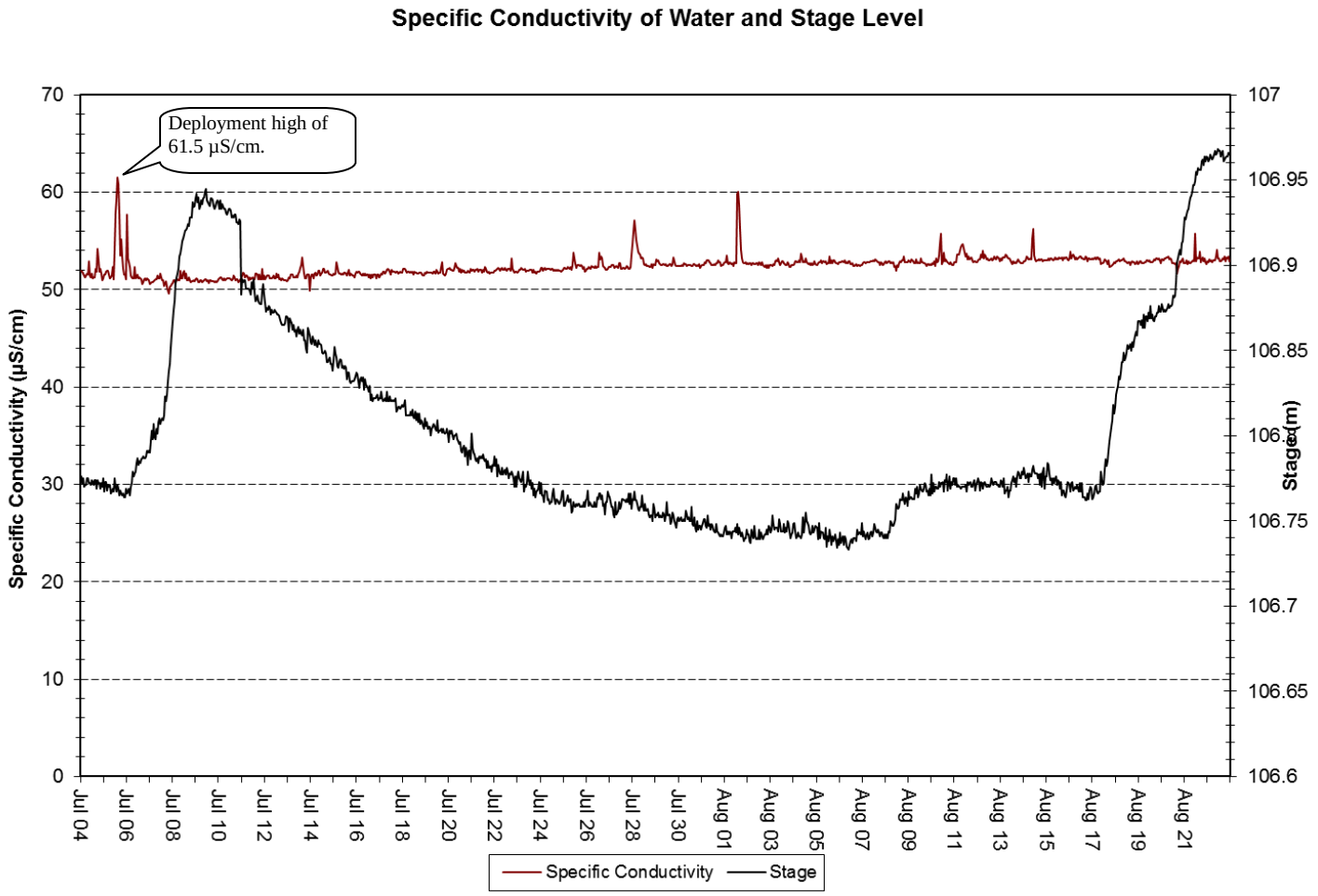
- Water temperature increased from a low of 17.32°C in July to a high of 22.87°C in August with a median value of 19.50°C. Water temperature appears to have peaked for the year on August 12th at 2:30pm, daily temperatures remain unseasonably high.

Figure 2: pH at Rattling Brook Big Pond from July 4th to August 23rd



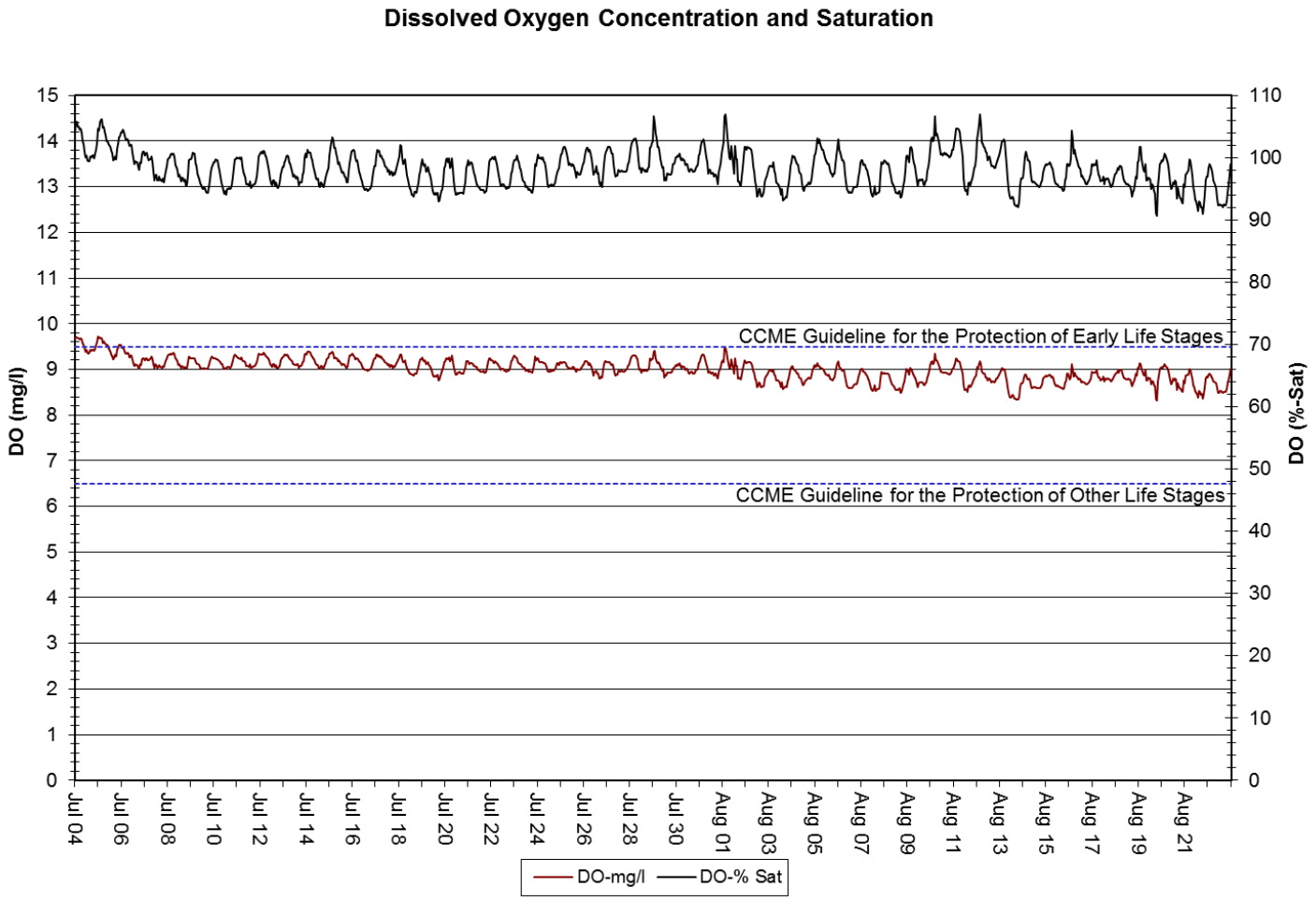
- A slight rise in pH is observed over this deployment period from a low of 6.28 to 7.01 with a median value of 6.60. No particular relationship between pH and stage level is observed during the deployment period.
- Values tended to be higher than the Site Specific Guidelines during the deployment period. For the same time period last year, the median pH value was 6.31. This may be due to a lower stage level in 2012 versus 2011 – (2011: 106.81 m, 2012: 106.77 m).

Figure 3: Specific Conductivity at Rattling Brook Big Pond from July 4th to August 23rd



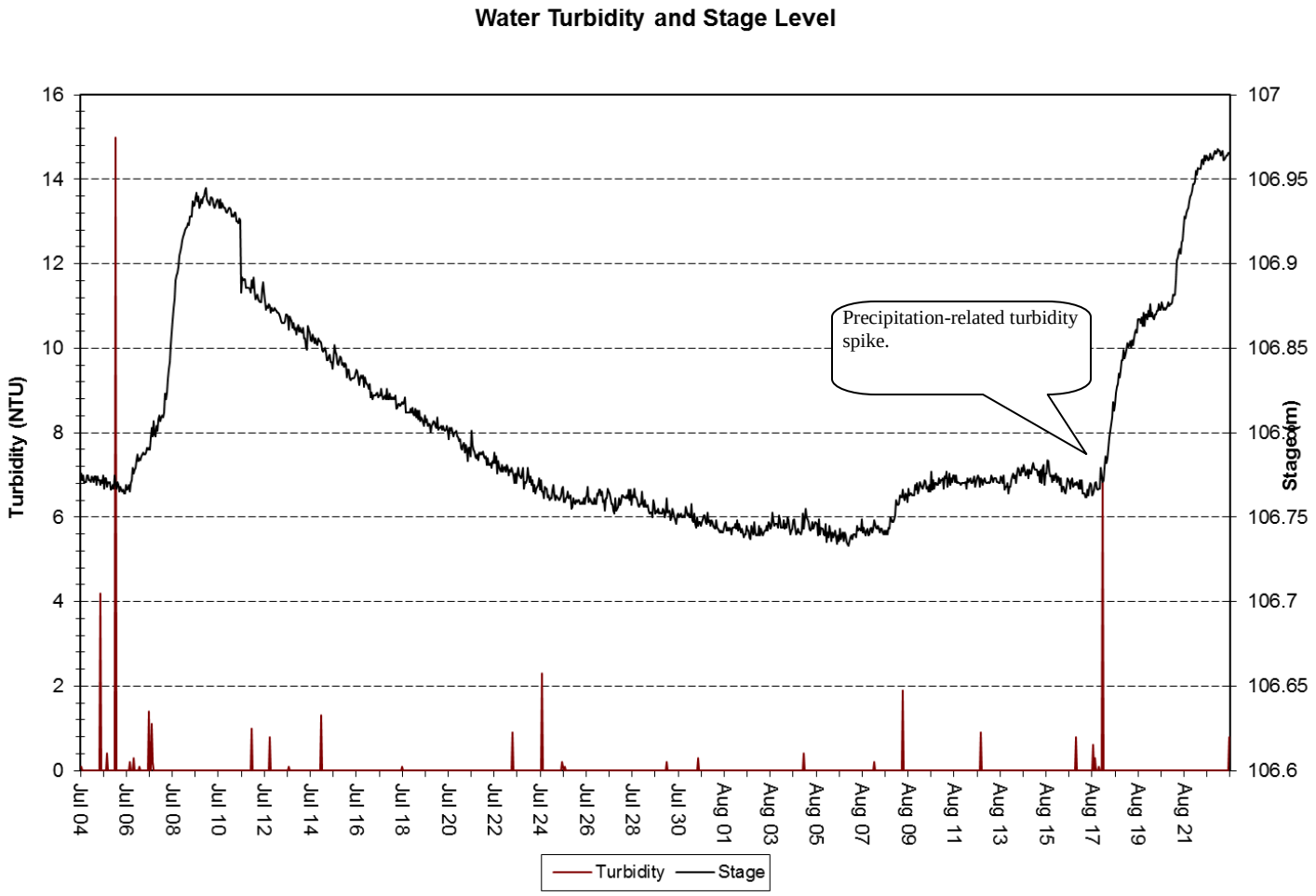
- A slow and steady increase in conductivity is observed from July 4th to August 23rd. Values fell between 49.6 µS/cm to 61.5 µS/cm with a median value of 52.5 µS/cm. Three days of precipitation in early July resulted in the deployment peak.

Figure 4: Dissolved Oxygen at Rattling Brook Big Pond from July 4th to August 23rd



- Dissolved oxygen concentration remained below the CCME Guideline of 9.5 mg/l for the Protection of early Life Stage cold water biota for the majority of this deployment period with no major upward or downward trends. At no time did oxygen concentrations fall below the critical CCME Guideline of 6.5 mg/l.
- Values ranged from 8.31 mg/l to 9.72 mg/l with a median value of 9.01 mg/l.

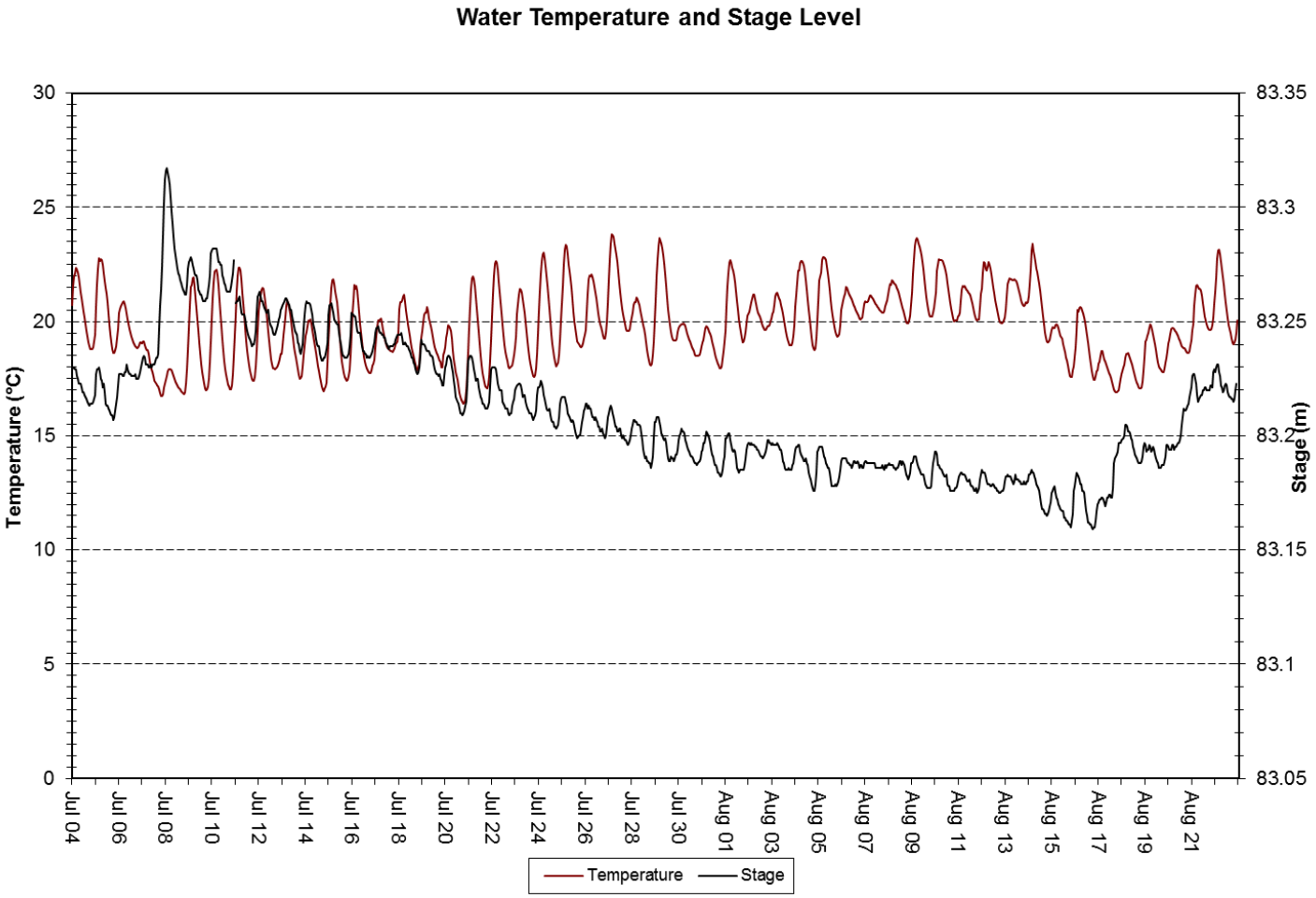
Figure 5: Turbidity at Rattling Brook Big Pond from July 4th to August 23rd



- During this deployment period, turbidity ranged from 0.0 NTU to 15.0 NTU with a median value of 0.0 NTU. On August 17 a small turbidity spike was associated with a stage level increase due to precipitation.

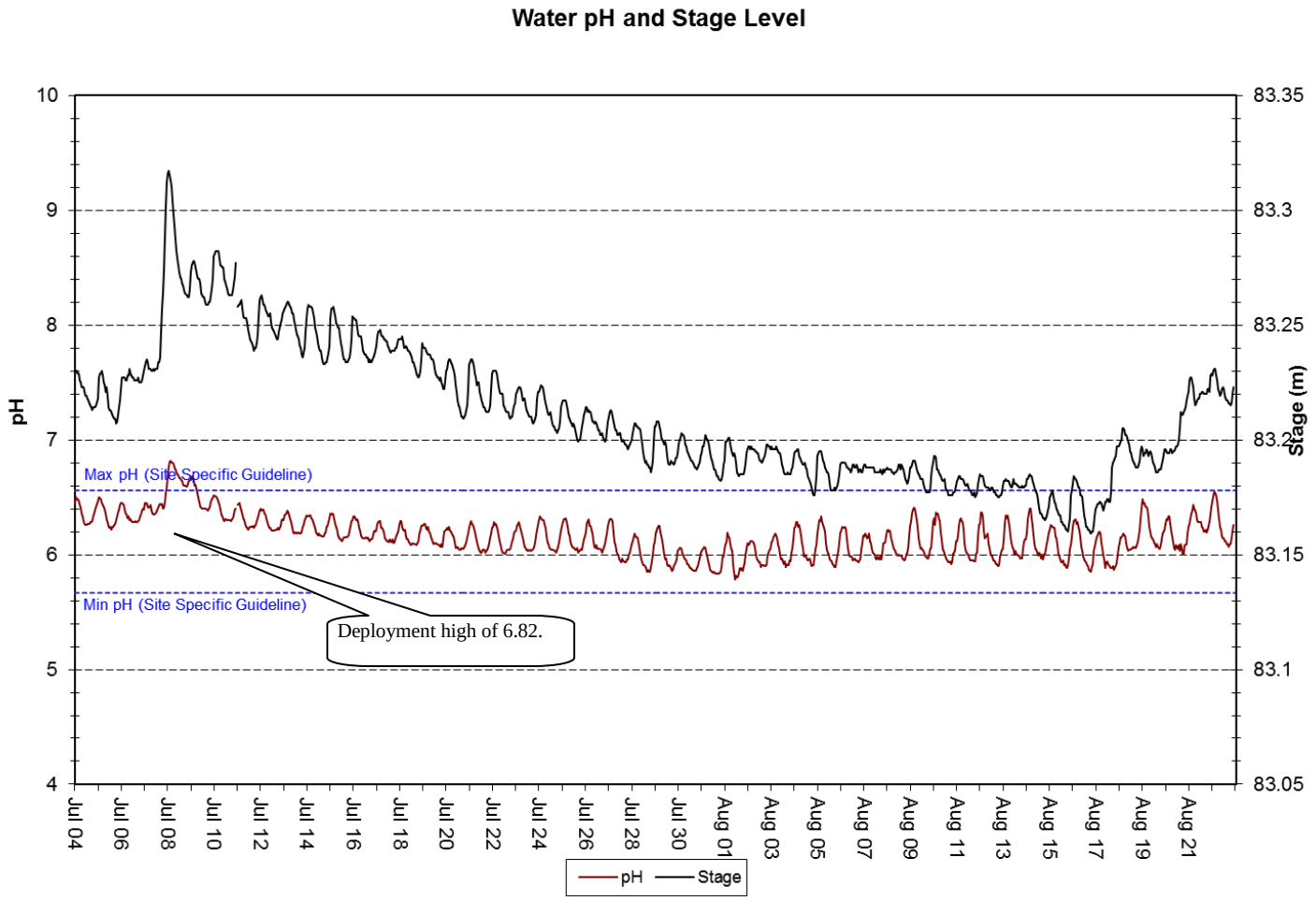
Rattling Brook below Bridge

Figure 6: Water Temperature at Rattling Brook below Bridge from July 4th to August 23rd



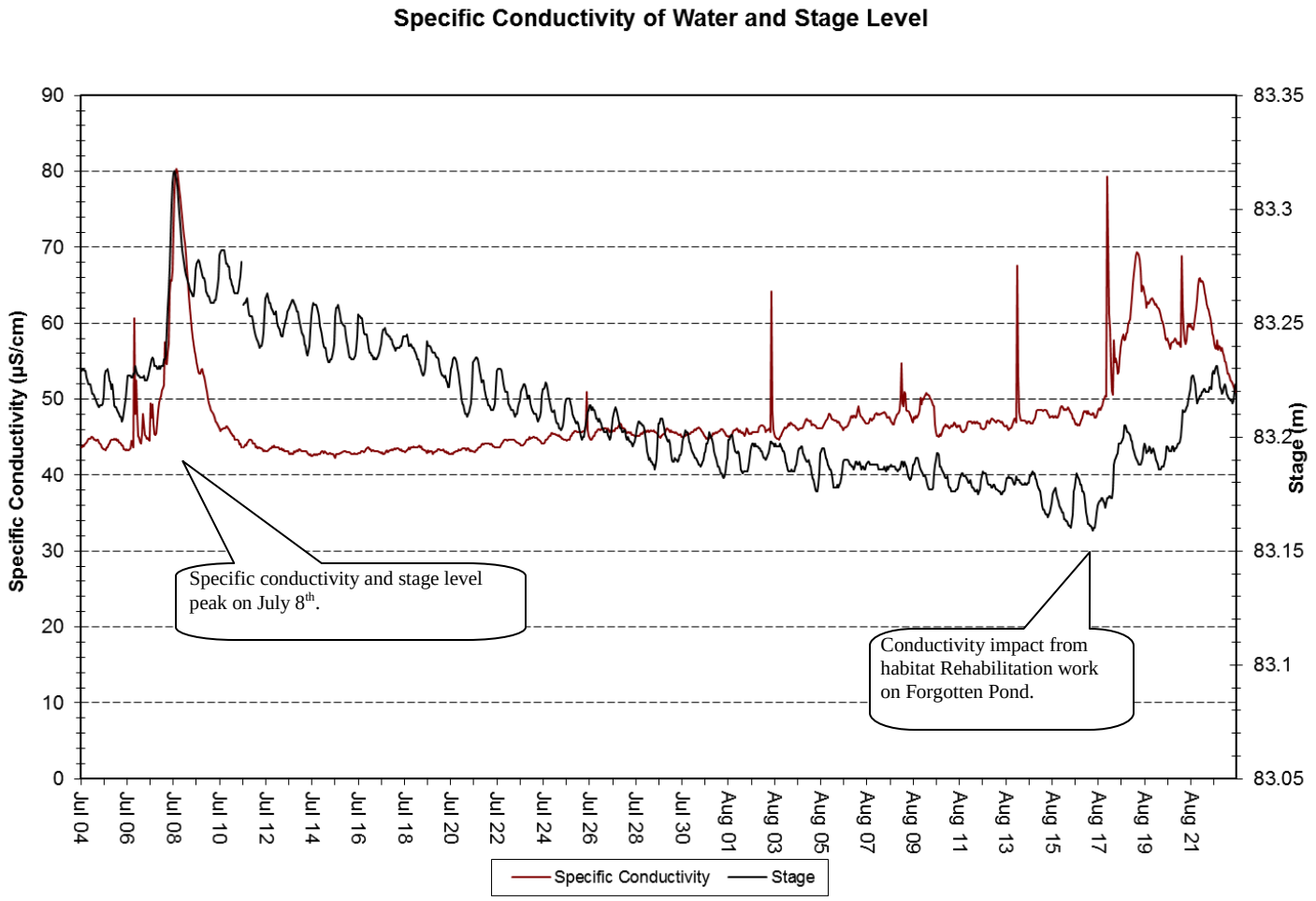
- Water temperature generally increased during this deployment period, however, values did appear to peak in mid-August. Values fell between 16.41°C to 23.82°C with a median value of 19.82°C.

Figure 7: pH at Rattling Brook below Bridge from July 4th to August 23rd



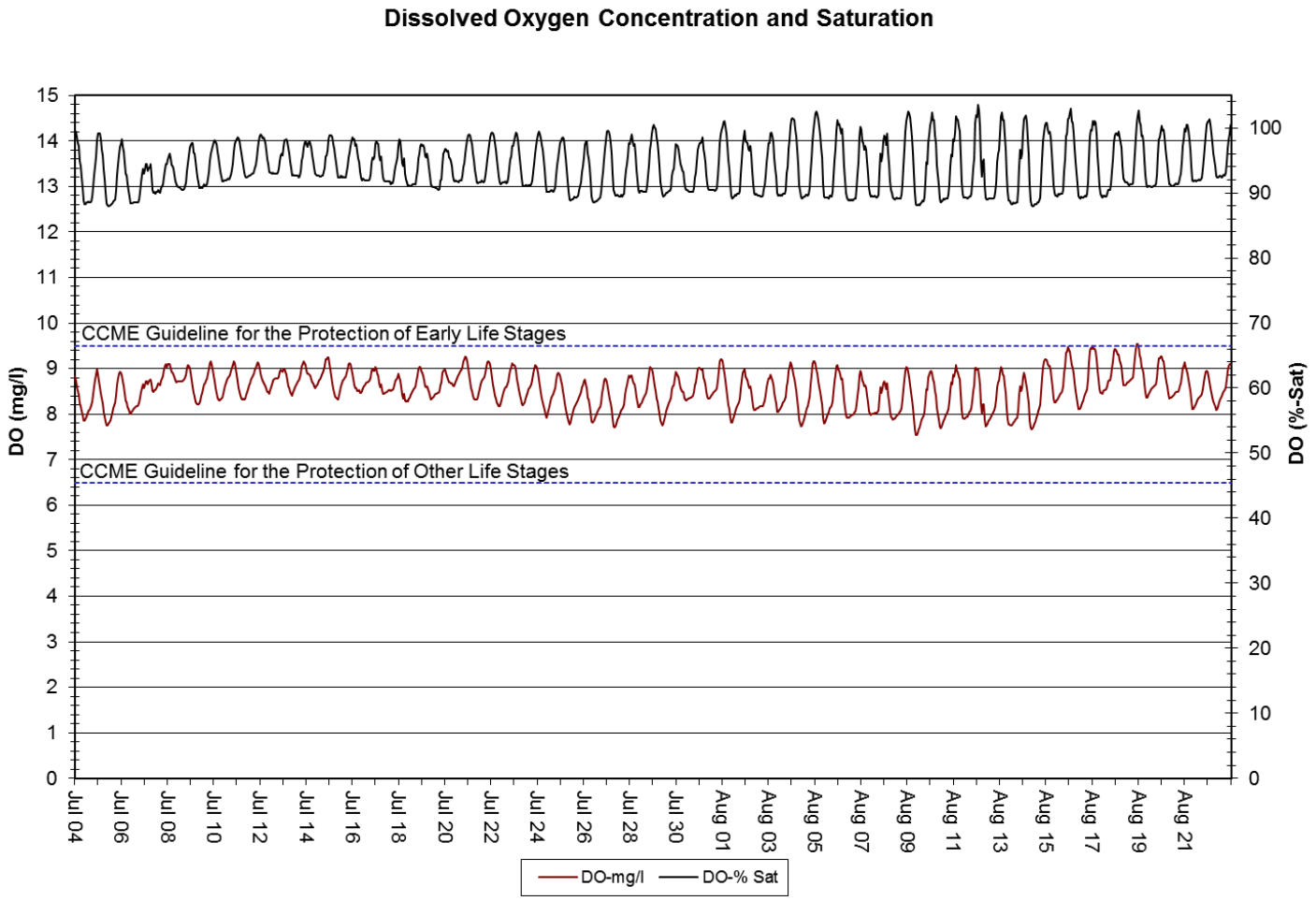
- pH values tended to fall between the Site Specific Guidelines of 5.67 – 6.56 during this deployment period. pH also tended to show a slight decline over this time frame from a high of 6.82 to 5.78 (median value: 6.15).
- Three days of precipitation in early July led to a stage level increase and a peak in pH on July 8th.
- A slight increase in pH towards the end of the deployment may be the result of habitat rehabilitation efforts upstream at Forgotten Pond.

Figure 8: Specific Conductivity at Rattling Brook below Bridge from July 4th to August 23rd



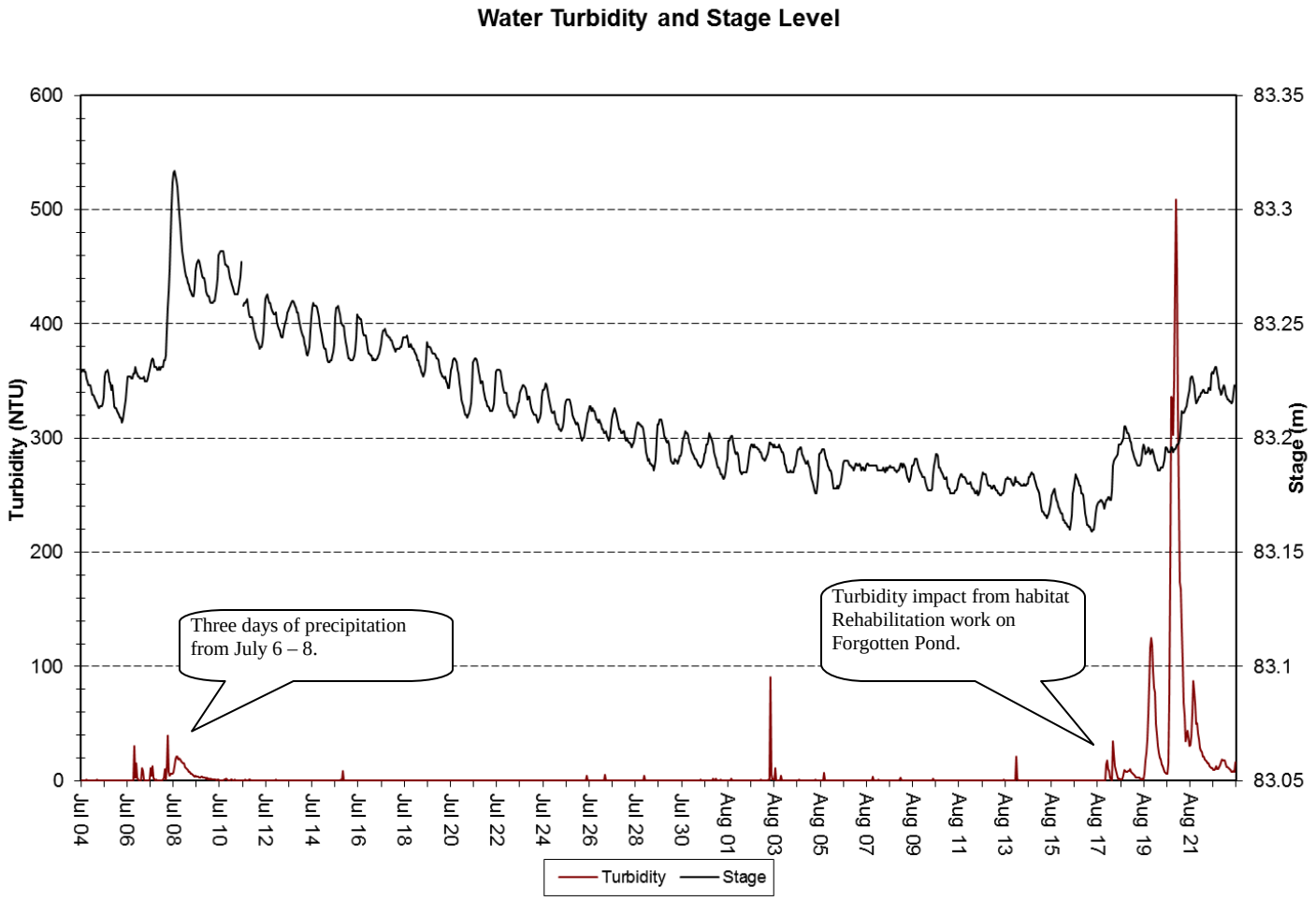
- Specific conductivity consistently increased over the course of this deployment period from a low of 42.3 µS/cm to 80.3 µS/cm (median value: 45.9 µS/cm).
- Conductivity values began to show impact from upstream pond rehabilitation work around August 17th and 18th and will likely continue until work is completed by September 30th.

Figure 9: Dissolved Oxygen at Rattling Brook below Bridge from July 4th to August 23rd



- Dissolved oxygen concentrations consistently fell below the CCME Guideline of 9.5 mg/l for the Protection of Early Life Stage cold water biota. DO concentrations ranged from 7.54 mg/l to 9.54 mg/l with a median of 8.57 mg/l. At no time did DO drop below the critical guideline of 6.5 mg/l.
- Towards the end of the deployment period, dissolved oxygen concentrations increased slightly due to precipitation, stage level increase and habitat rehabilitation efforts upstream.

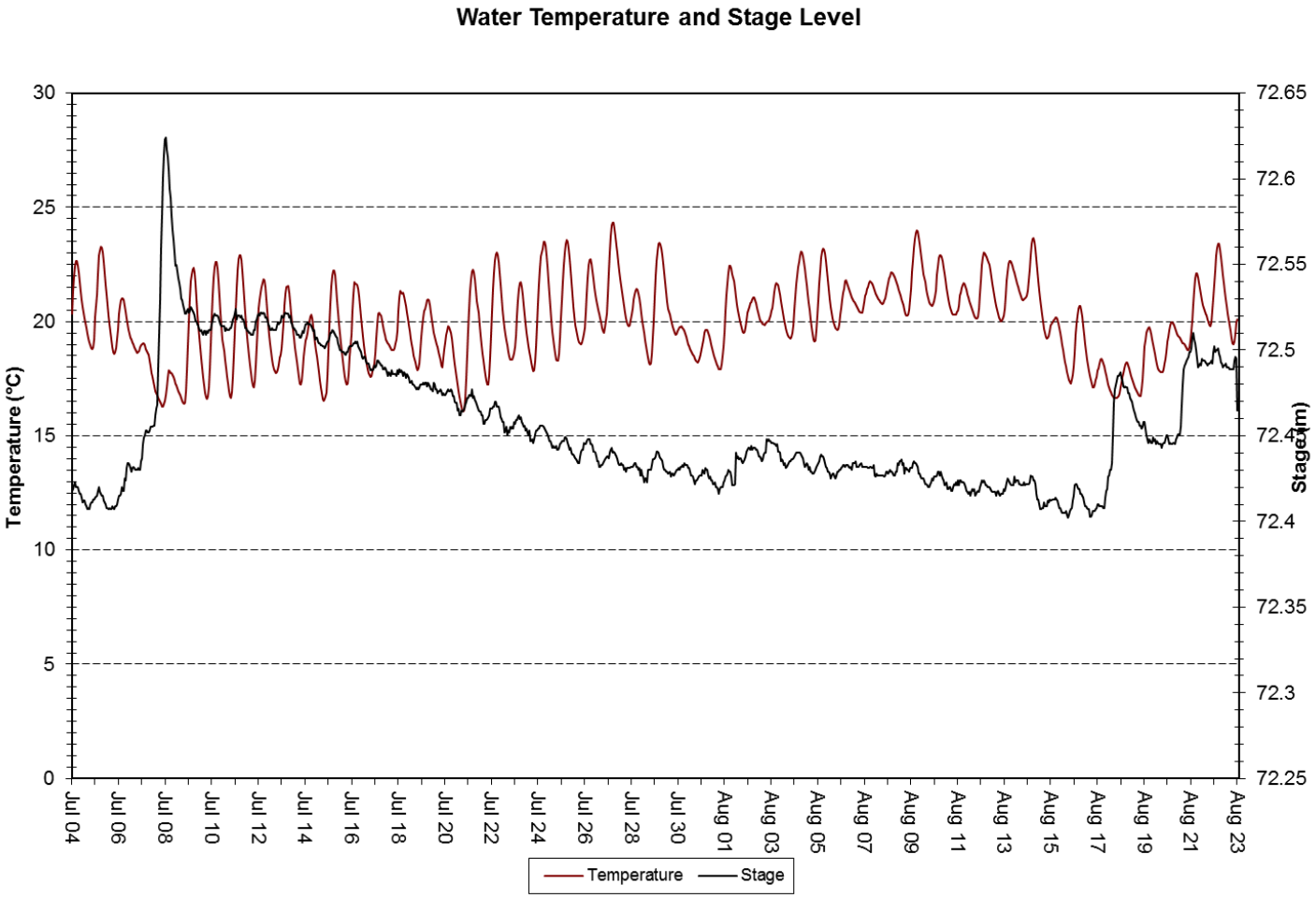
Figure 10: Turbidity at Rattling Brook below Bridge from July 4th to August 23rd



- A small amount of turbidity was detected resulting from three days of precipitation on July 6th to 9th. A larger and more significant volume of turbidity was observed beginning around August 17th in relation to Habitat Rehabilitation work. Higher than normal turbidity levels are expected to last at least until the end of work on September 30th.
- Over the course of this deployment period, turbidity values fell between 0.0 NTU and 509 NTU; still, the median value was found to be 0.0 NTU for the time frame. A total of 30 turbidity alerts were received from July 4th to August 23rd.

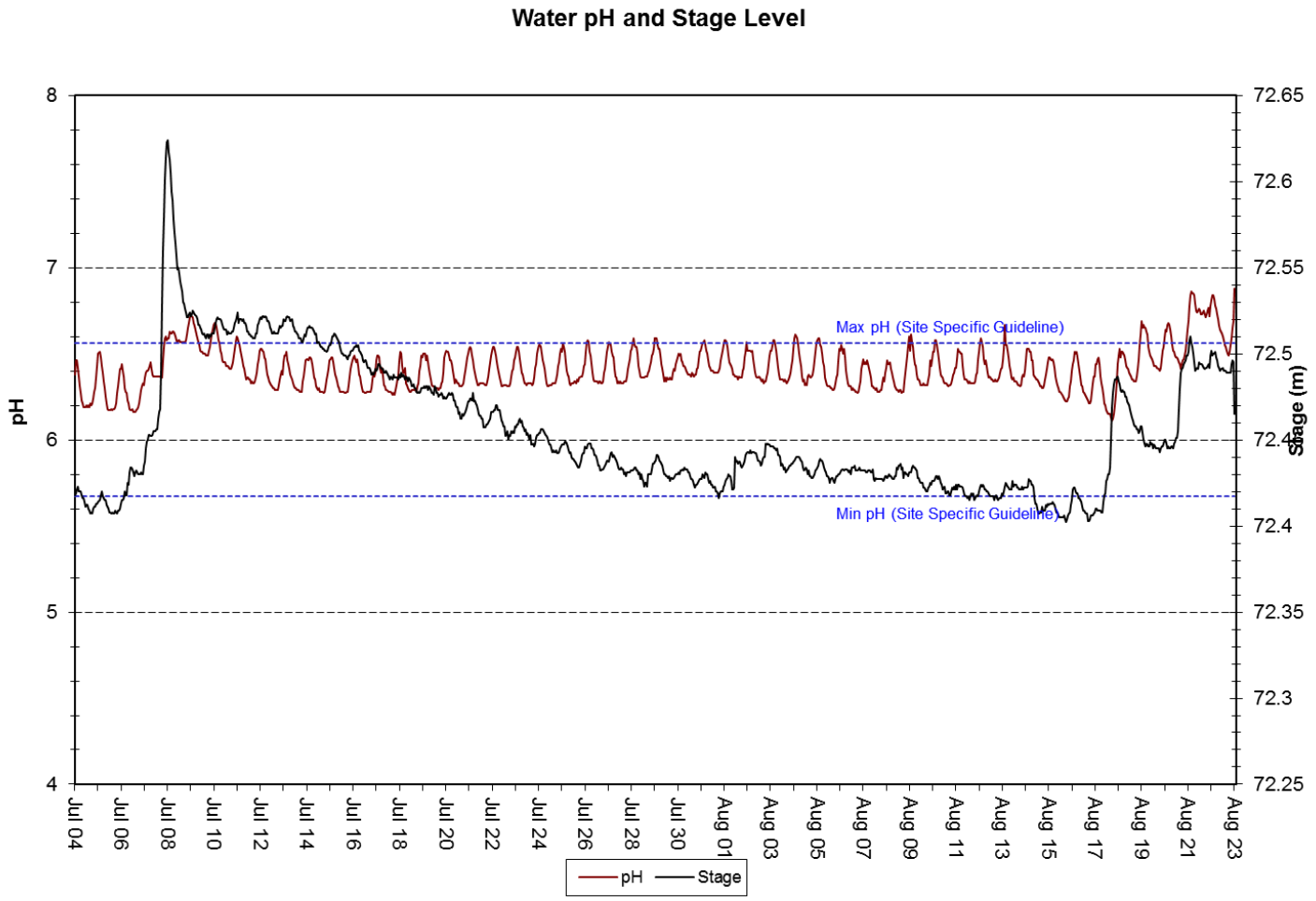
Rattling Brook below Plant Discharge

Figure 11: Water Temperature at Rattling Brook below Plant Discharge from July 4th to August 23rd



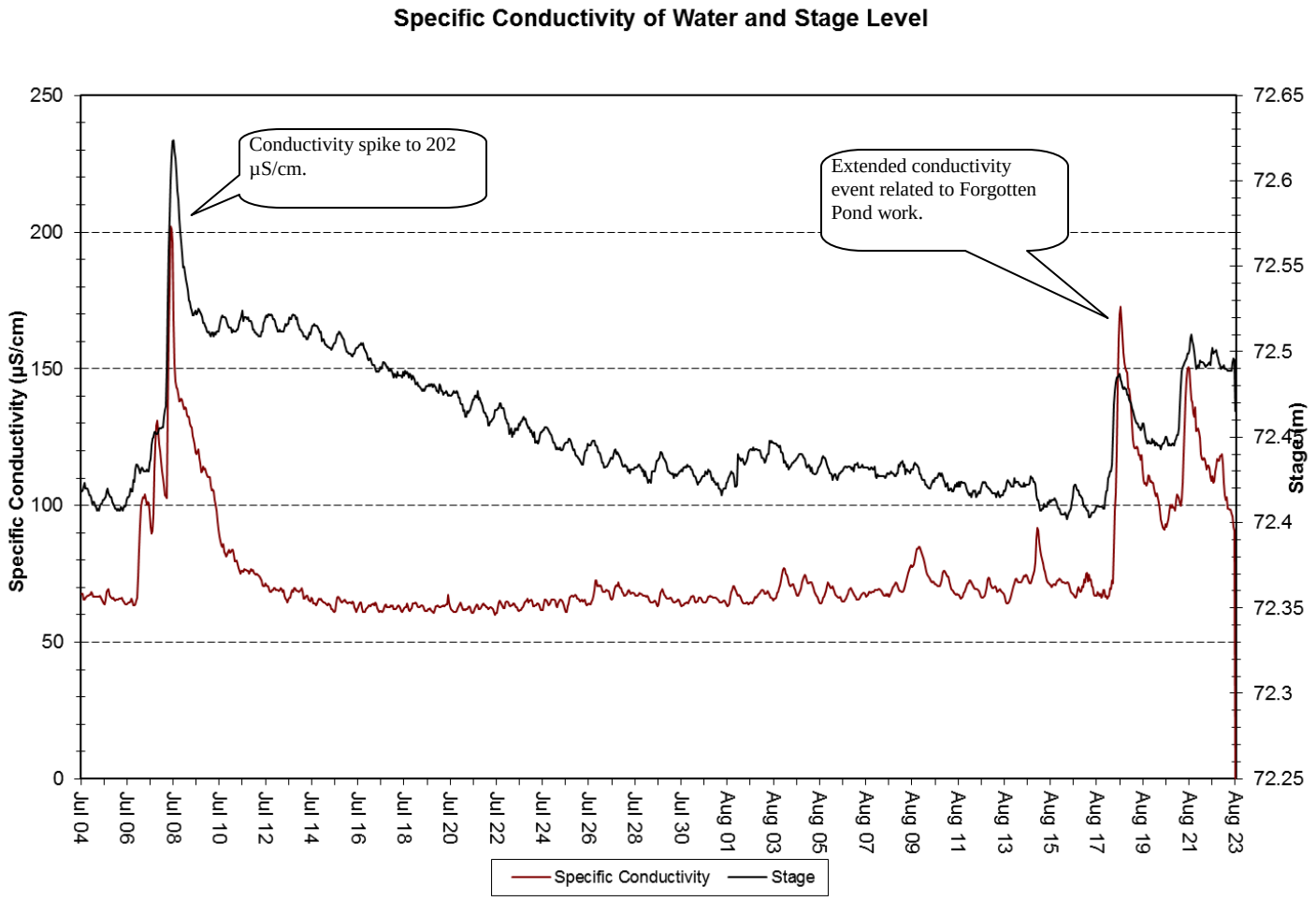
- Water temperature did not change significantly over the course of this deployment period. Values fell between 16.05°C and 24.33°C with a median value of 19.99°C. Temperatures appear to have peaked around August 14th at this station.

Figure 12: pH at Rattling Brook below Plant Discharge from July 4th to August 23rd



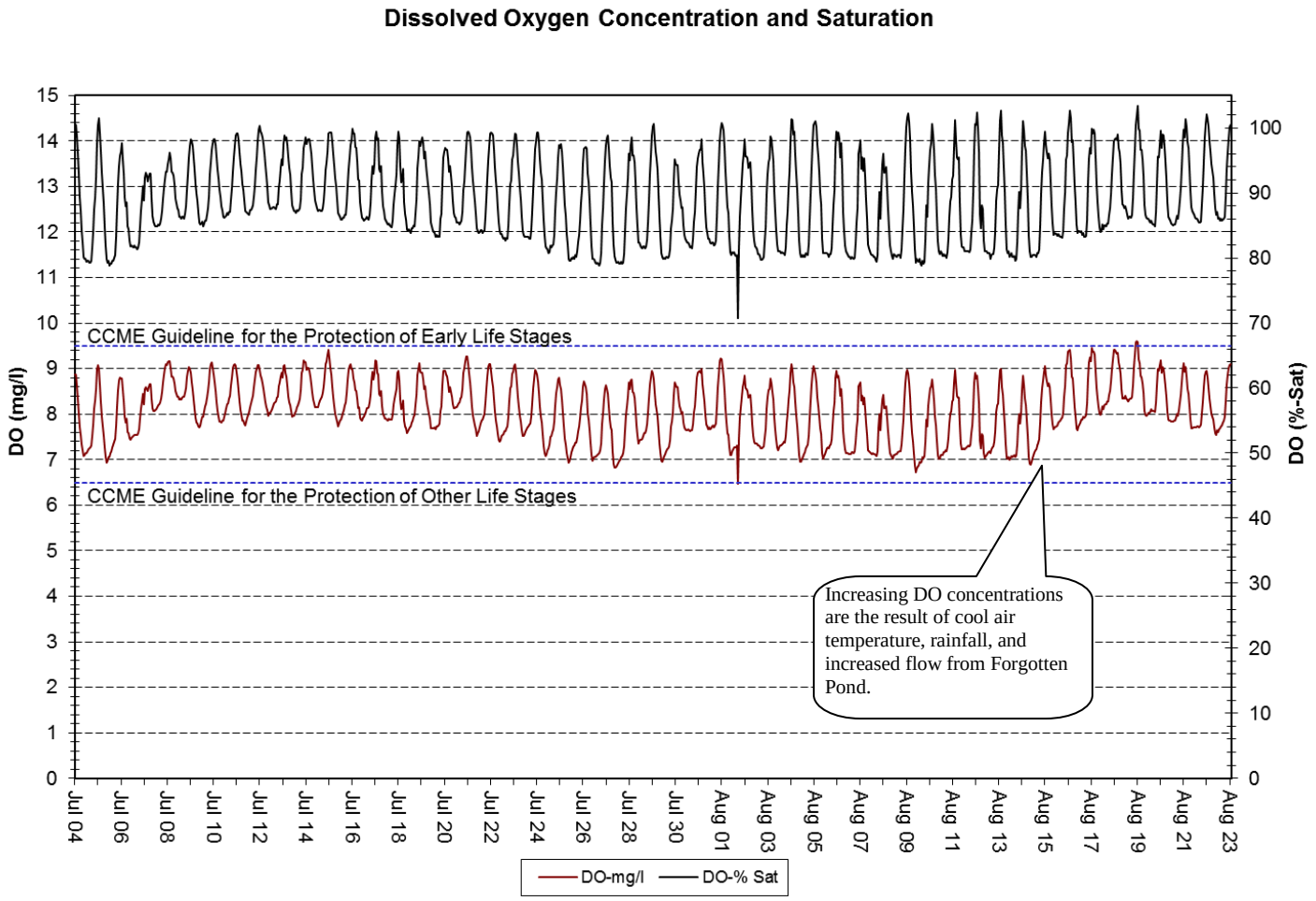
- pH levels fell mostly within the Site Specific guidelines of 5.67 to 6.56 from July 4th to August 23rd. pH values began to increase around August 18th with rehabilitation efforts ongoing at Forgotten Pond.
- For this deployment period, pH ranged from 6.11 to 6.88 (median value: 6.39).

Figure 13: Specific Conductivity at Rattling Brook below Plant Discharge from July 4th to August 23rd



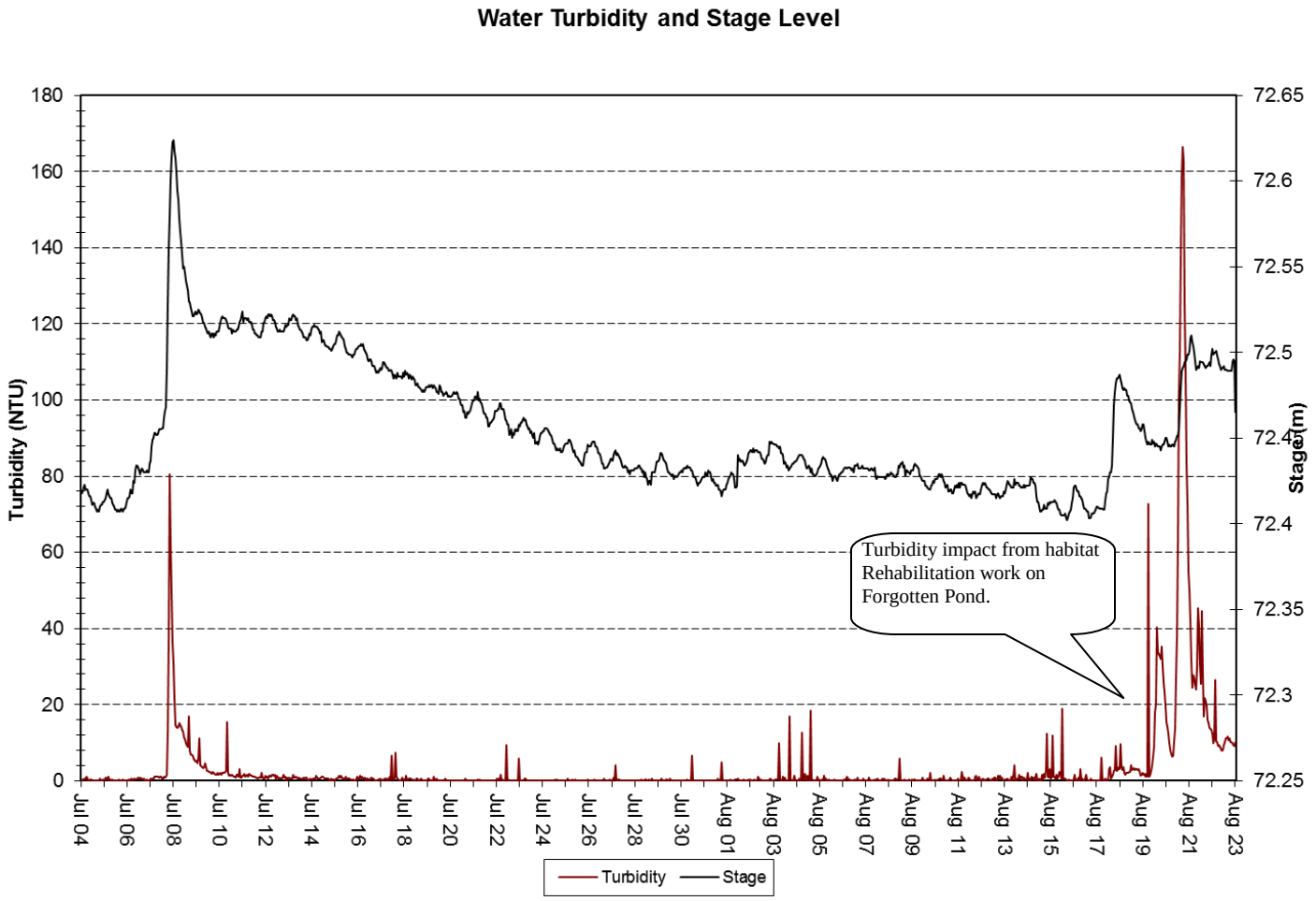
- Two major conductivity events mark the this deployment at Plant Discharge station: one related to precipitation from July 6th to 8th and another related to habitat rehabilitation work upstream at Forgotten Pond beginning around August 17th.Over the course of this deployment period, conductivity fell between 59.9 µS/cm to 202 µS/cm with a median value of 67.9 µS/cm.

Figure 14: Dissolved Oxygen at Rattling Brook below Plant Discharge from July 4th to August 23rd



- Dissolved Oxygen at Plant Discharge station remained between the CCME Guidelines of 9.5 mg/l and 6.5 mg/l for most of the deployment period, falling between 6.46 mg/l and 9.61 mg/l with a median value of 8.06 mg/l.
- A slight rise in DO was observed around August 15th due to a cooling air temperature, precipitation, and increased flow from habitat work on Forgotten Pond upstream.

Figure 15: Turbidity at Rattling Brook below Plant Discharge from July 4th to August 23rd

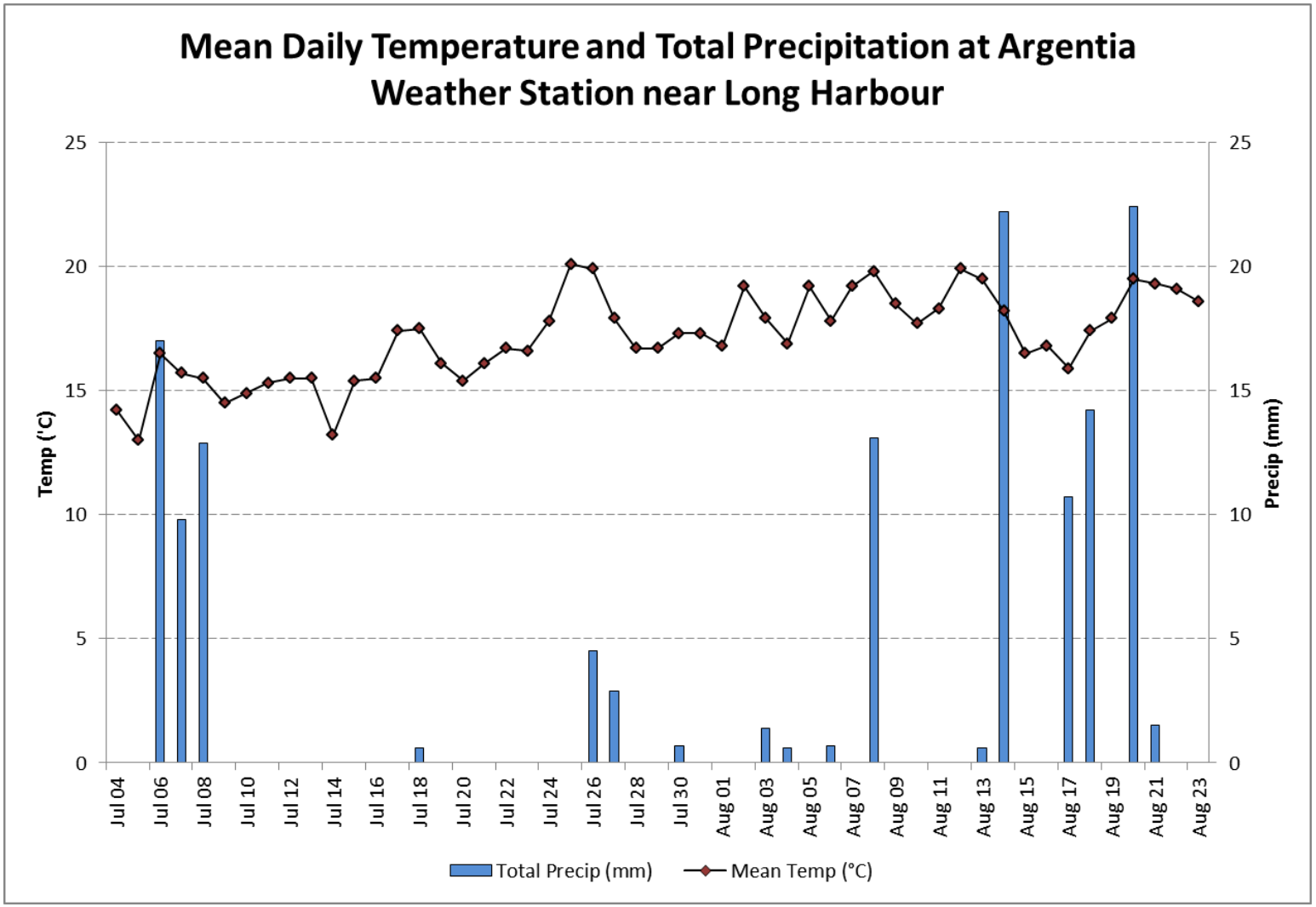


- A precipitation-related turbidity event occurred from July 7th to the end of July 10th due to precipitation from July 6th to 8th. The other event, ongoing, is the result of habitat rehabilitation work at Forgotten Pond. This work is expected to continue until September 30th, at the latest.
- During the deployment period, turbidity ranged from 0.0 NTU to 166.5 NTU with a mean value of 0.3 NTU. A total of 22 turbidity alerts were received from July 4th to August 23rd.

Conclusions

- No major water quality events were observed in the initial parts of the deployment period. Habitat Rehabilitation work beginning in mid-August, however, has resulted in some notable changes in water quality in terms of pH, conductivity, dissolved oxygen, and turbidity. This work is expected to continue until September 30th.

Appendix



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