Real-Time Water Quality Deployment Report

Rattling Brook Network

August 24th, 2012 to September 27th, 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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2012-08-24 to 2012-09-27

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- Habitat compensation work was ongoing throughout this deployment period in the Forgotten Pond area. Increased siltation and turbidity was encountered at both stations downstream of this work. Though efforts are in effect, a substantial amount of turbidity was intercepted at the end of this deployment period.
- This deployment report describes the water quality events occurring from August 24th to September 27th, 2012 – a period of 33 days.

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.

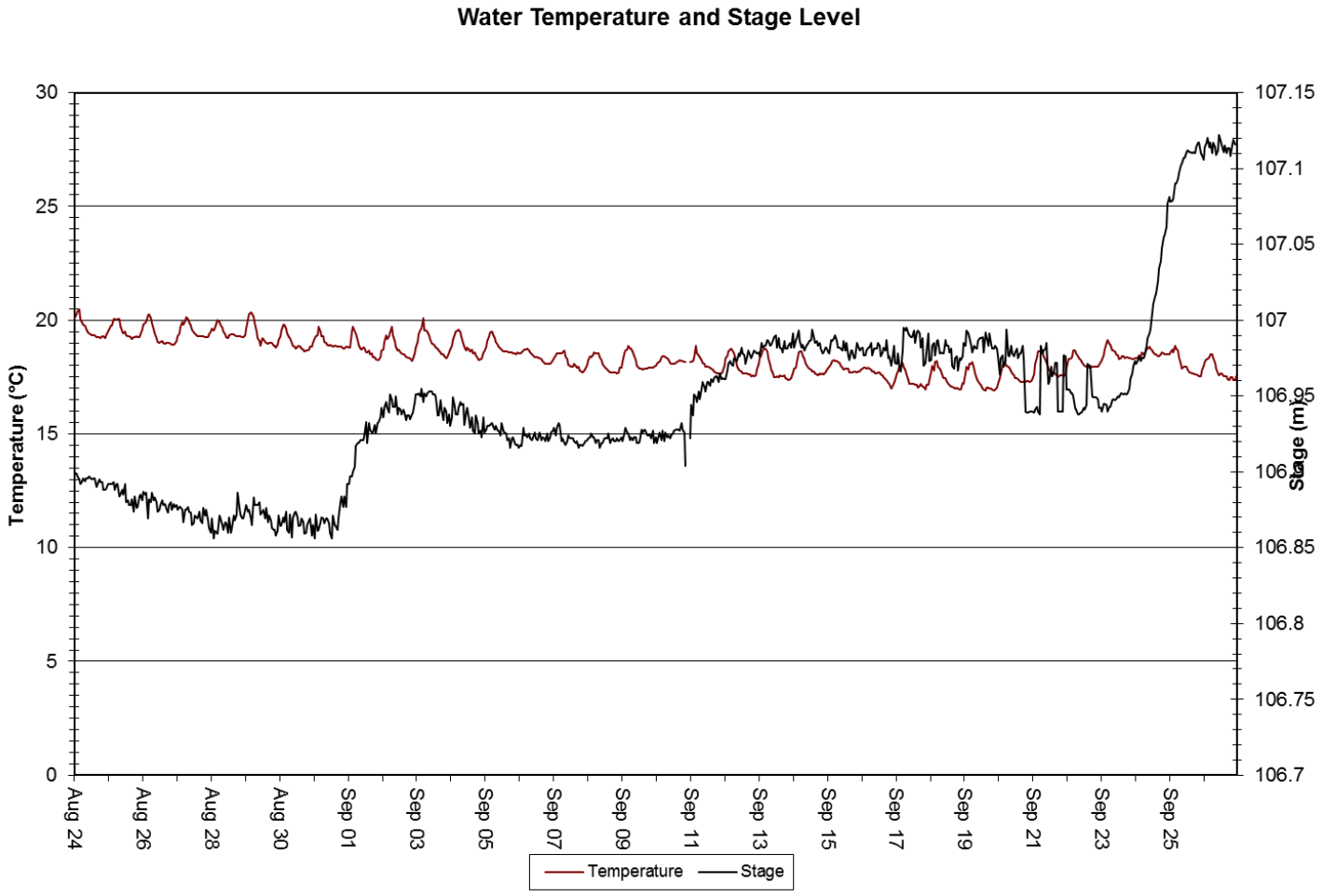
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	August 24th, 2012	Deployment	Excellent	Good	Excellent	Good	Excellent
	September 27th, 2012	Removal	Excellent	Excellent	Good	NA	Excellent
Rattling Brook below Bridge	August 24th, 2012	Deployment	Excellent	Fair	Excellent	Excellent	Good
	September 27th, 2012	Removal	Good	Good	Excellent	Excellent	Good
Rattling Brook below Plant Discharge	August 24th, 2012	Deployment	Excellent	Good	Good	Excellent	Good
	September 27th, 2012	Removal	Excellent	Good	Poor	Excellent	Excellent

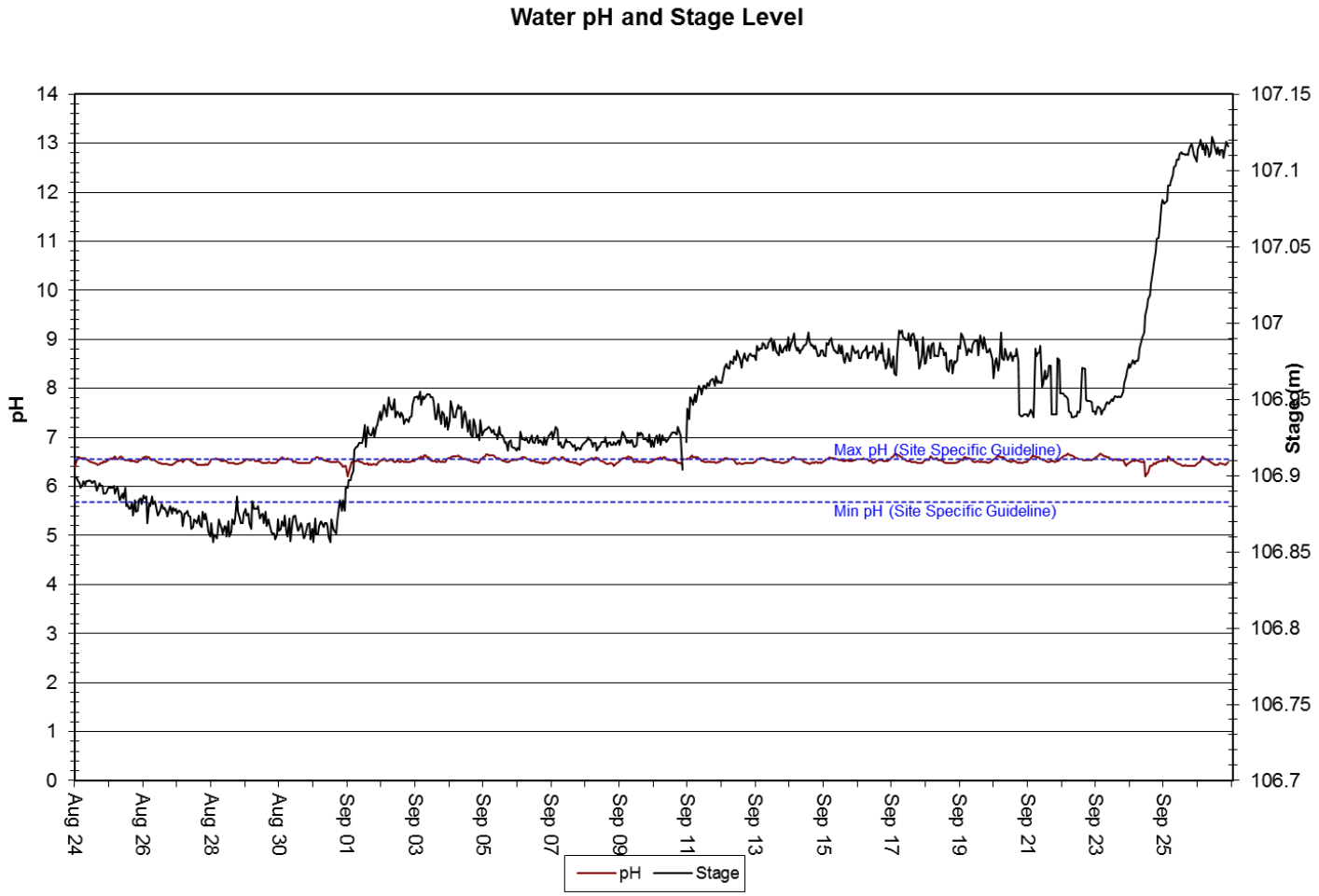
- Most rankings fell between “Excellent” and “Good” with a single instance of “Poor” for specific conductivity at Plant Discharge station during removal. The sensor may have been fouled at the time from inordinate amounts of silt from habitat compensation work upstream.

Data Interpretation

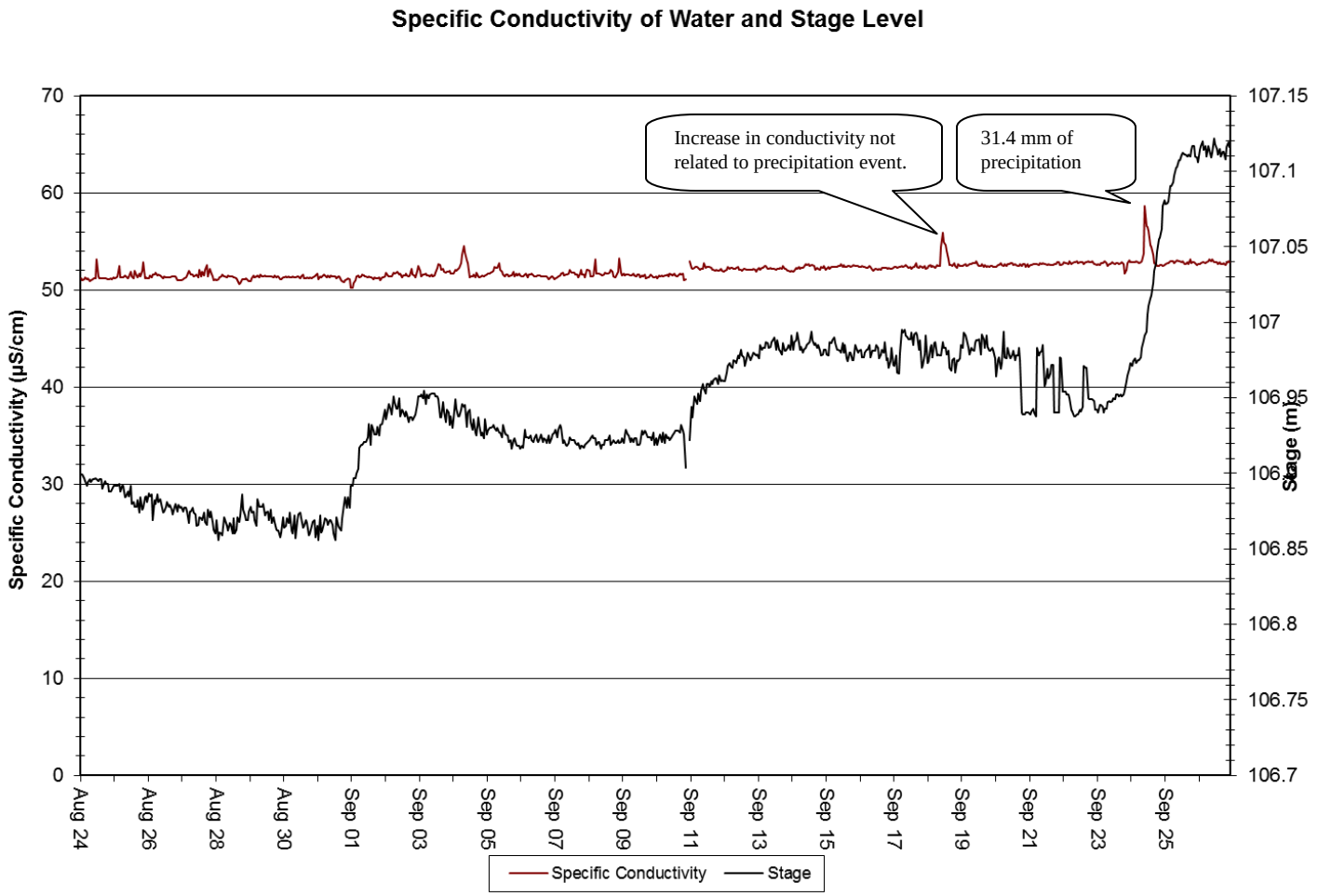
Rattling Brook Big Pond



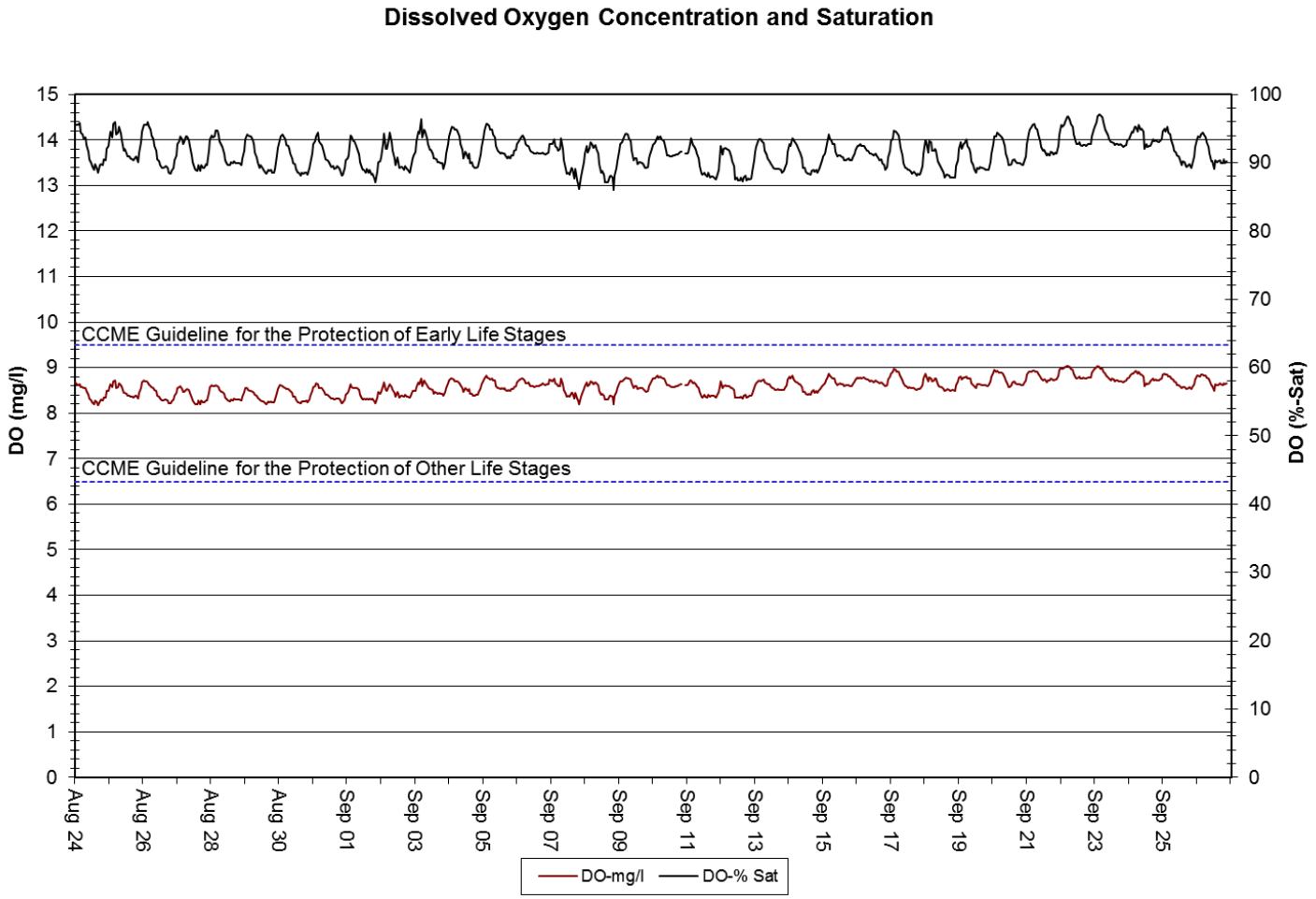
- Water temperature fell consistently over the course of this deployment period from a high of 20.46°C to a minimum of 16.91°C (median value: 18.37°C).



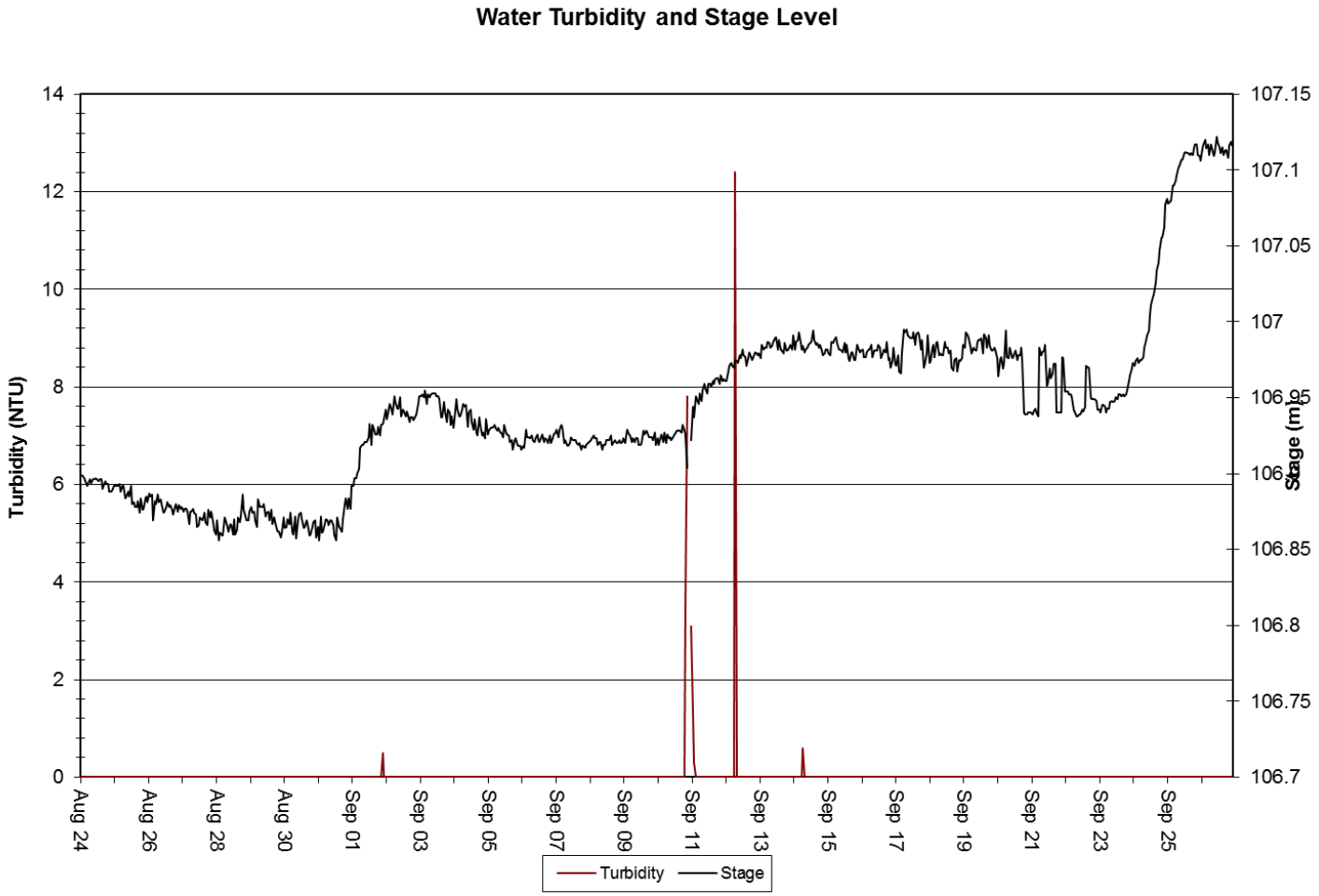
- No major trend up or down was observed in pH values at Big Pond station this month. Values ranged from 6.68 to 6.21 with a median value of 6.21. As such, more than 50% of the pH values recorded fell within the Site Specific Guideline for the Rattling Brook station. Notably, however, values remained near the upper limit of the Guidelines for the entire deployment period.



- Specific conductivity increased slightly over the deployment period from a low of 50.2 µS/cm to a high of 58.6 µS/cm (median value: 52.0 µS/cm). A few incidences of conductivity spikes were observed during the deployment period that may be related to precipitation.

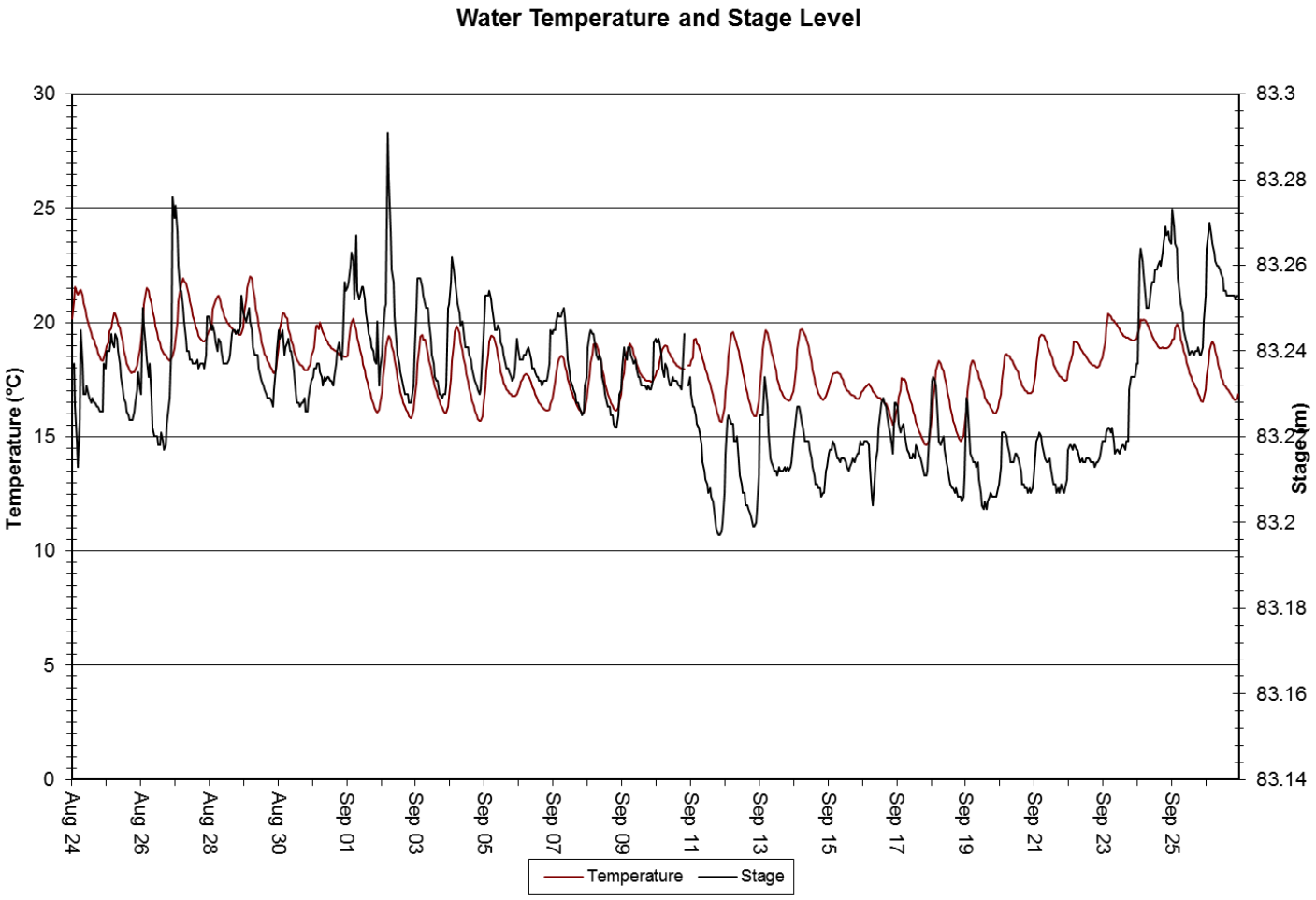


- A slow and steady rise in dissolved oxygen concentration is apparent from August 24th to September 27th, as expected, due to the gentle decline in water temperature. Values fell between 8.17 mg/l and 9.04 mg/l during this time period (median value: 8.60 mg/l). All values were found to be below the CCME Guideline for the protection of early life stage cold water biota. This is a common occurrence during the latter parts of the summer season when water temperatures are still elevated.

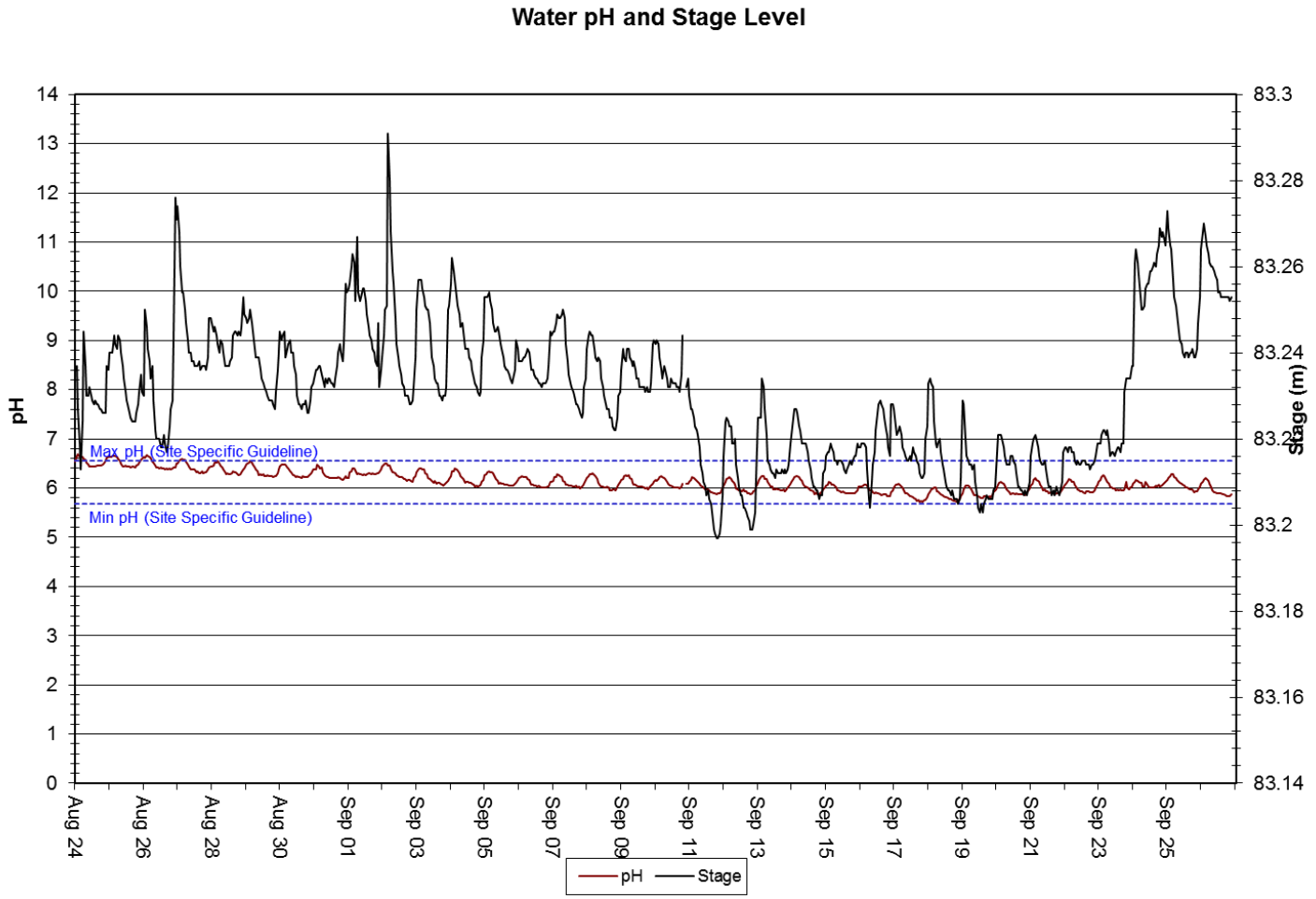


- Most turbidity values were low during this time period and fell between 0.0 NTU and 12.4 NTU (median value: 0.0 NTU). A few instances of turbidity occurred in early-mid September during Hurricane Lesley where rainfall and wave action likely stirred up some sediment. Values quickly fell to background levels, however.

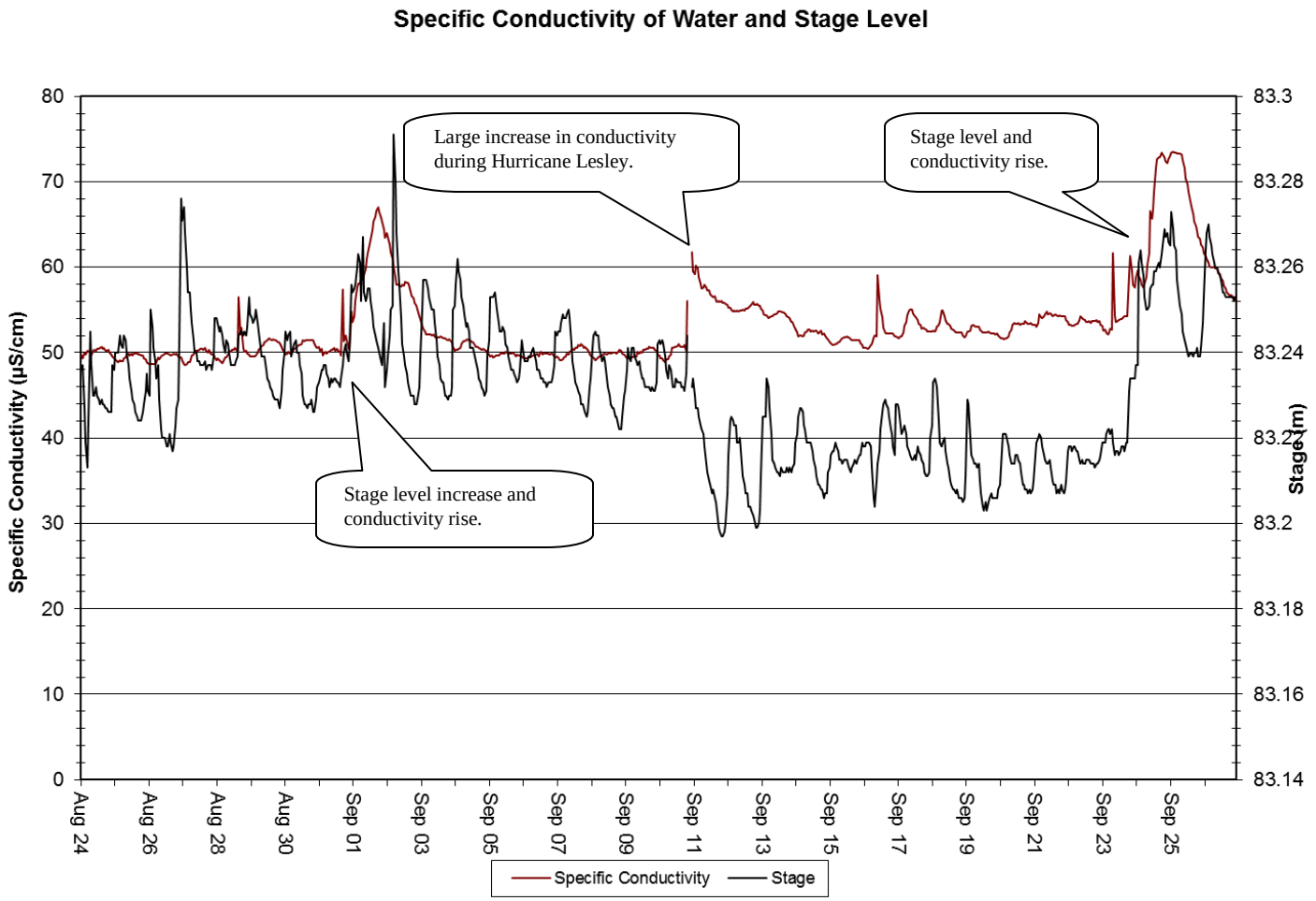
Rattling Brook below Bridge



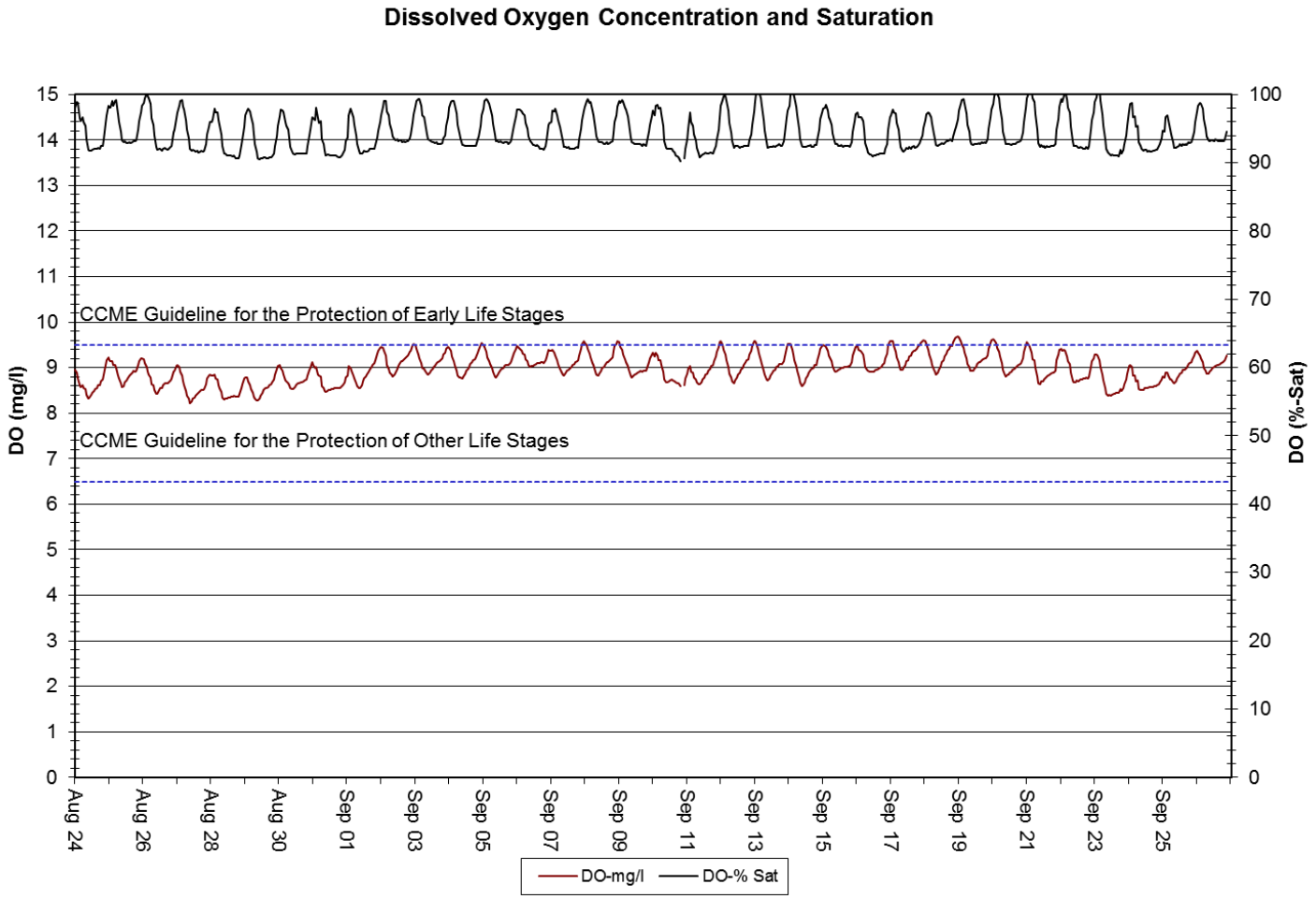
- A decline in water temperature towards mid-September was followed by a rebound towards the end of the month; as such, there was very little net change in temperature over the deployment period. Temperature values fell between 22.01^{o}C and 14.64^{o}C with a median value of 18.14^{o}C.



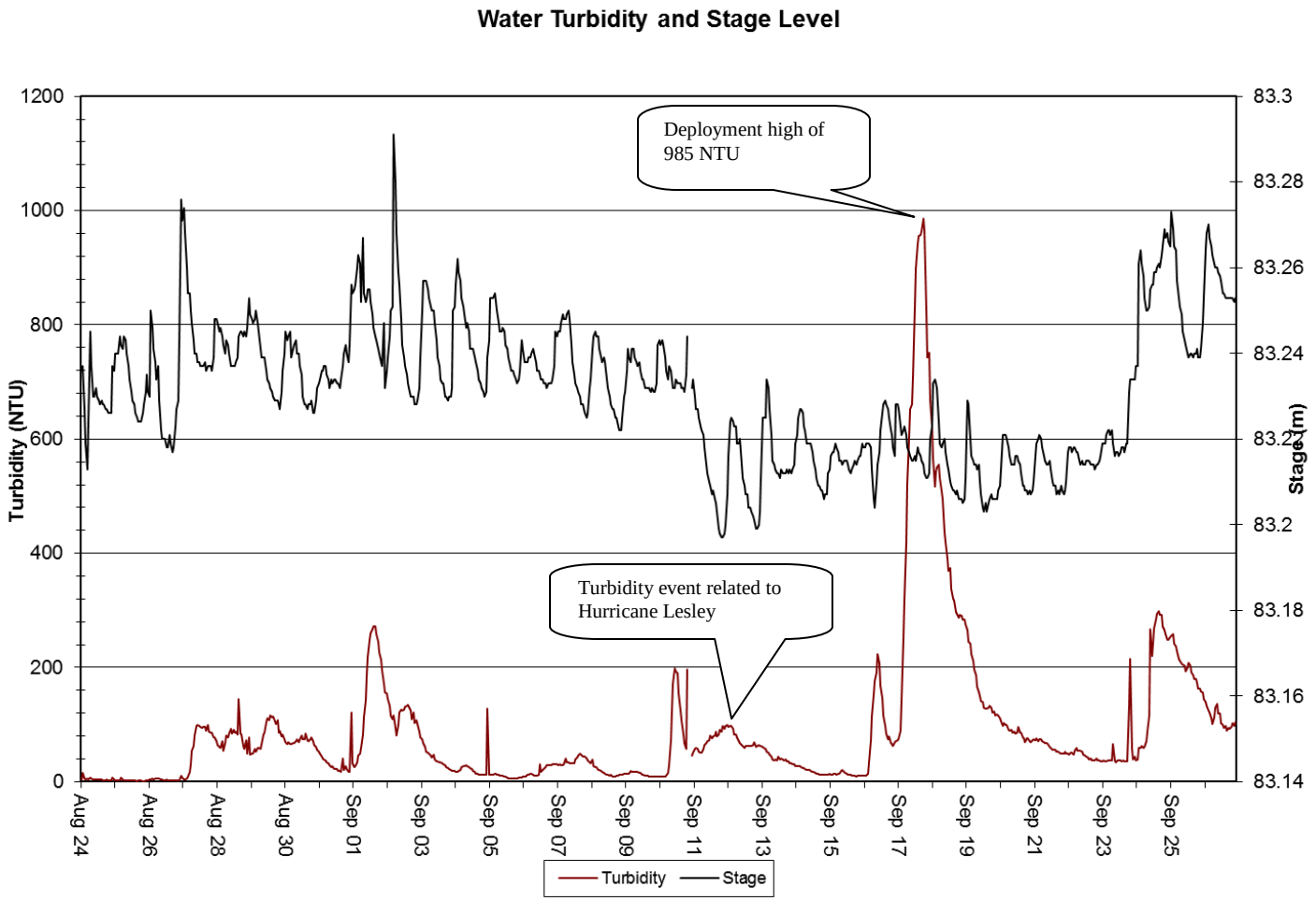
- pH values fell between 5.72 and 6.69 (median value: 6.10). Only 6.54% of pH values were found to fall outside the Site Specific Guidelines of 5.67 – 6.56. No major shifts in pH were noticed over this deployment period.



- An increase in conductivity was observed during this deployment period, likely as a result of habitat compensation work upstream at Forgotten Pond. Normally, conductivity tends to spike rapidly during perturbations and returns to baseline levels within a day or so. Those peaks illustrated above tend to rise relatively slowly and remain elevated for several days at a time.
- Conductivity fell between 48.5 µS/cm and 73.5 µS/cm with a median value of 51.9 µS/cm. Conductivity is expected to decline as compensation work is completed, but will likely remain somewhat elevated compared to pre-compensation work due to the substrate disturbance in Forgotten Pond.

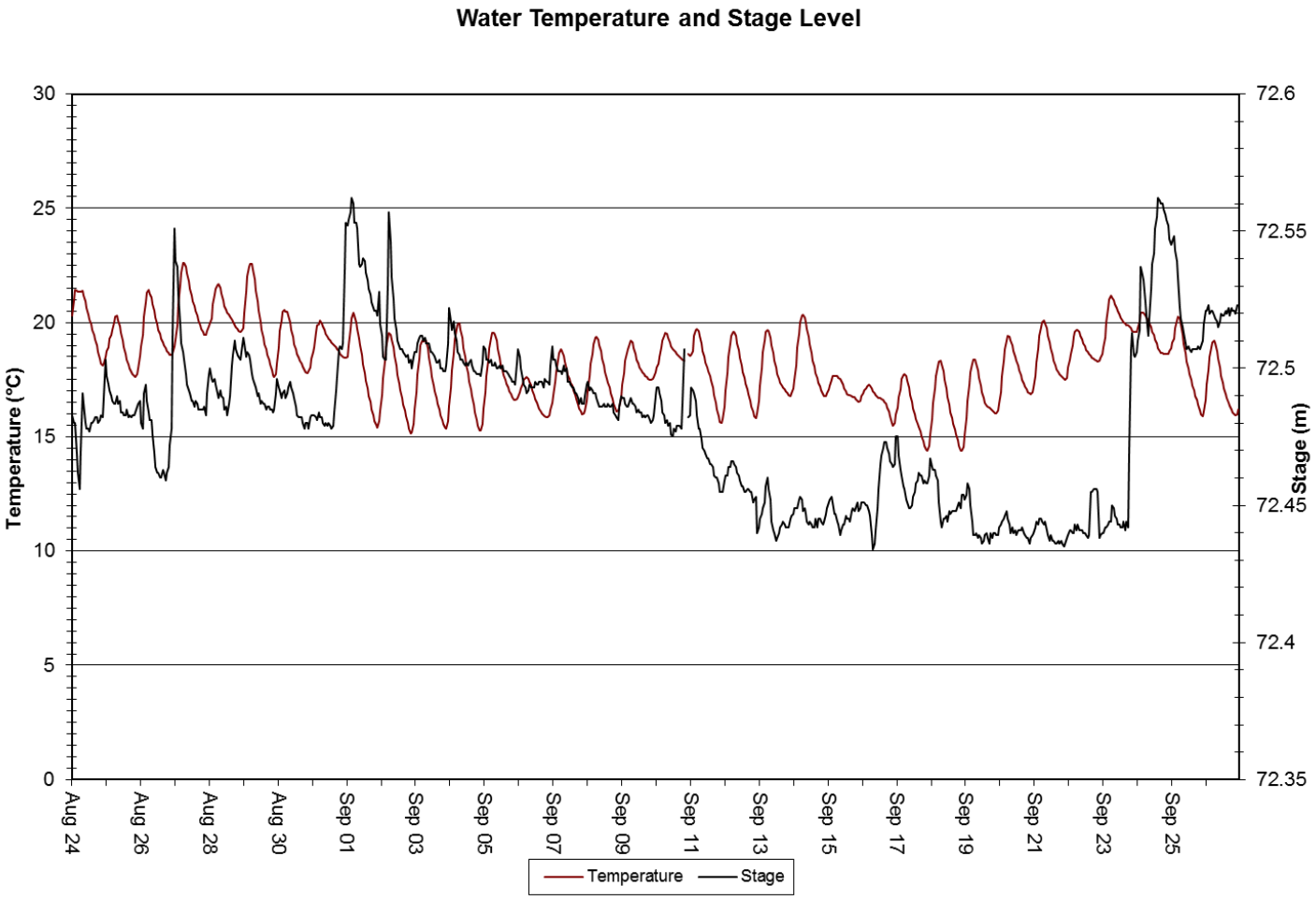


- A slight upward trend in DO concentration appears to be evident during this month's deployment. DO ranged from 8.22 mg/l to 9.69 mg/l (median value: 8.97 mg/l). All values were above the CCME Guideline for the protection of Other Life Stage cold water biota, but mostly below the guideline for Early Life Stages.

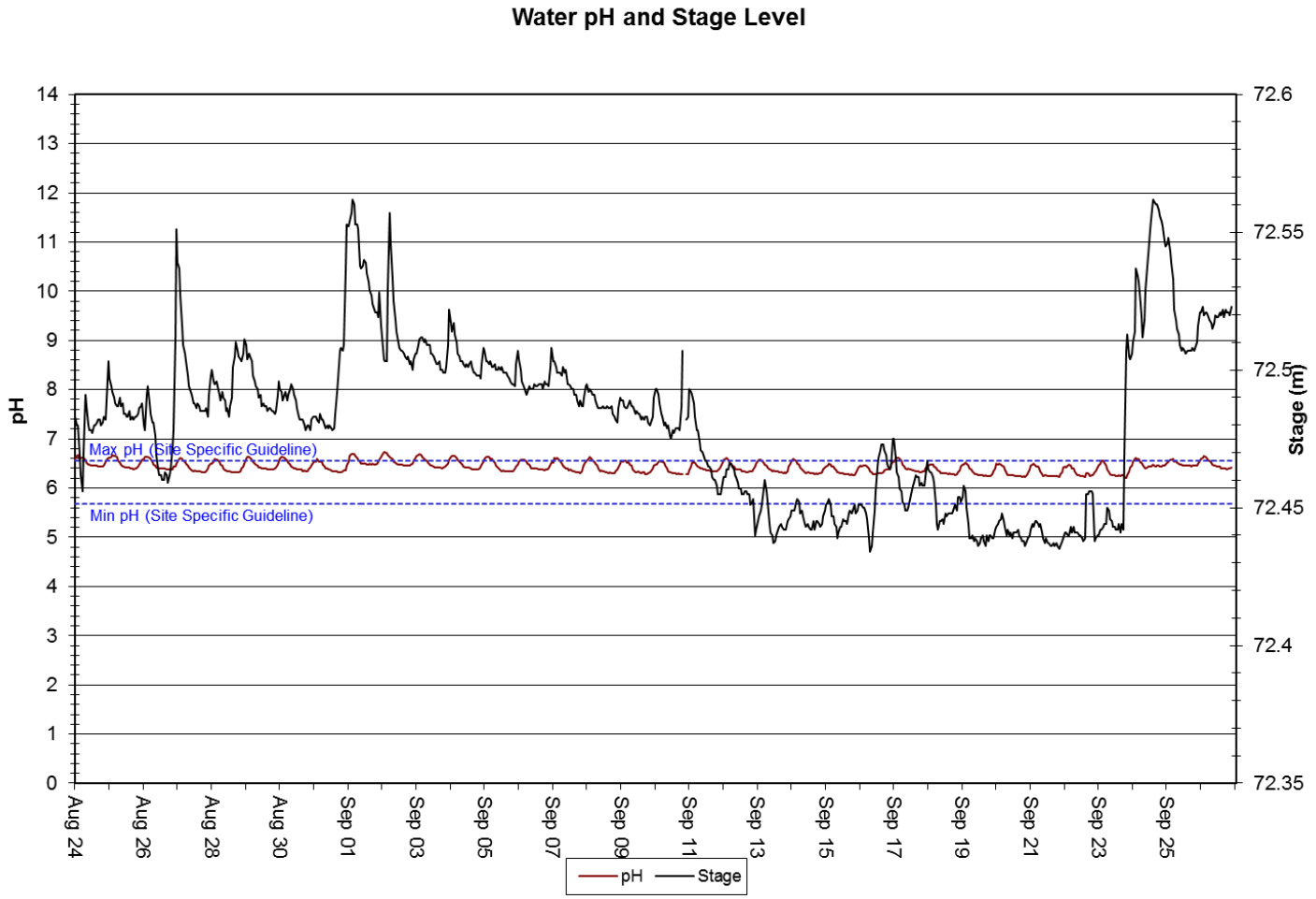


- Turbidity was clearly above normal levels throughout the duration of the habitat compensation work at Forgotten Pond. 33.4% of turbidity values were above the turbidity alert threshold of 55 NTU (This accounts for 143 alerts out of a total 814 turbidity values).
- Turbidity values ranged from 1.1 NTU to 985 NTU with a median value of 53.2 NTU.

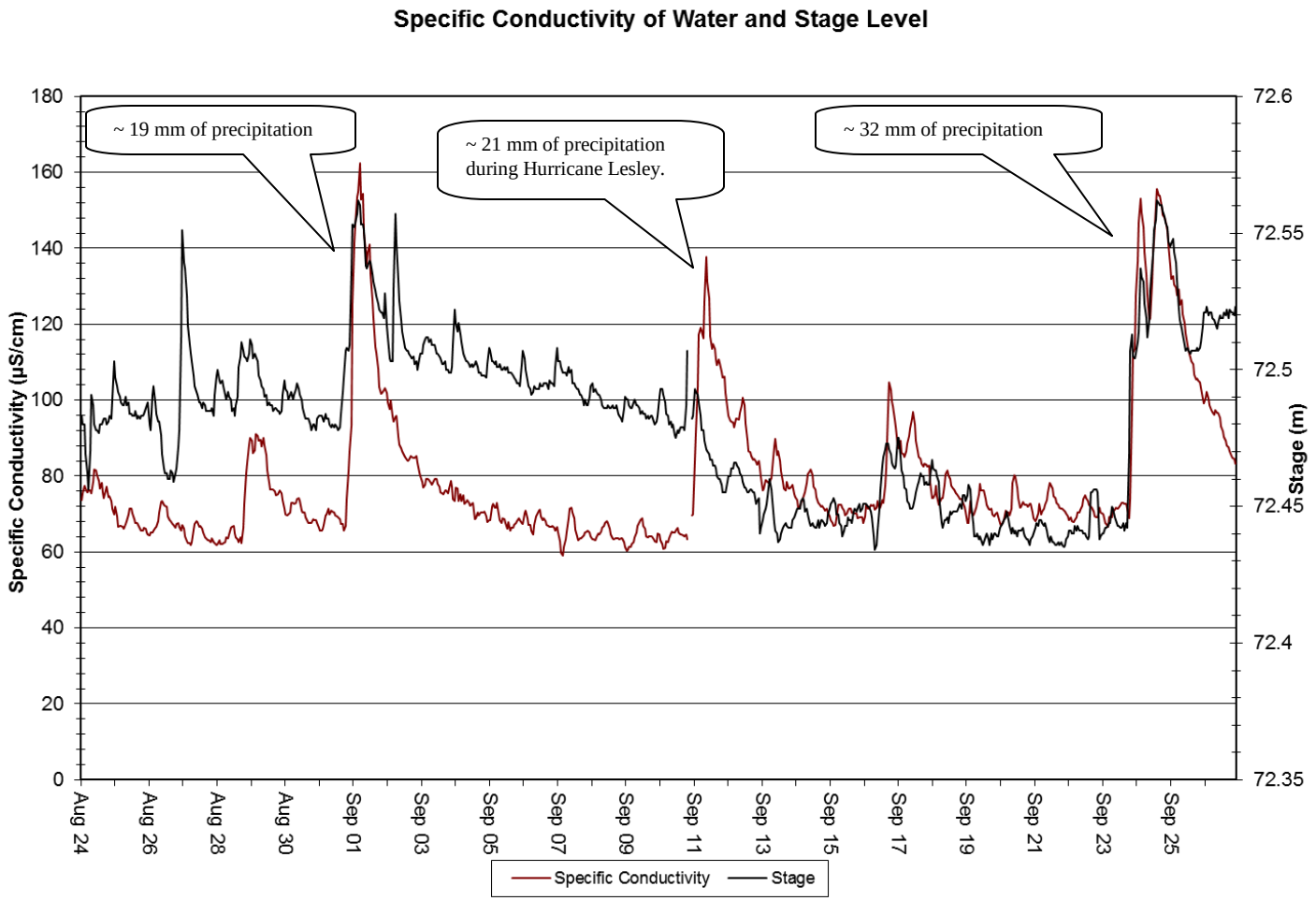
Rattling Brook below Plant Discharge



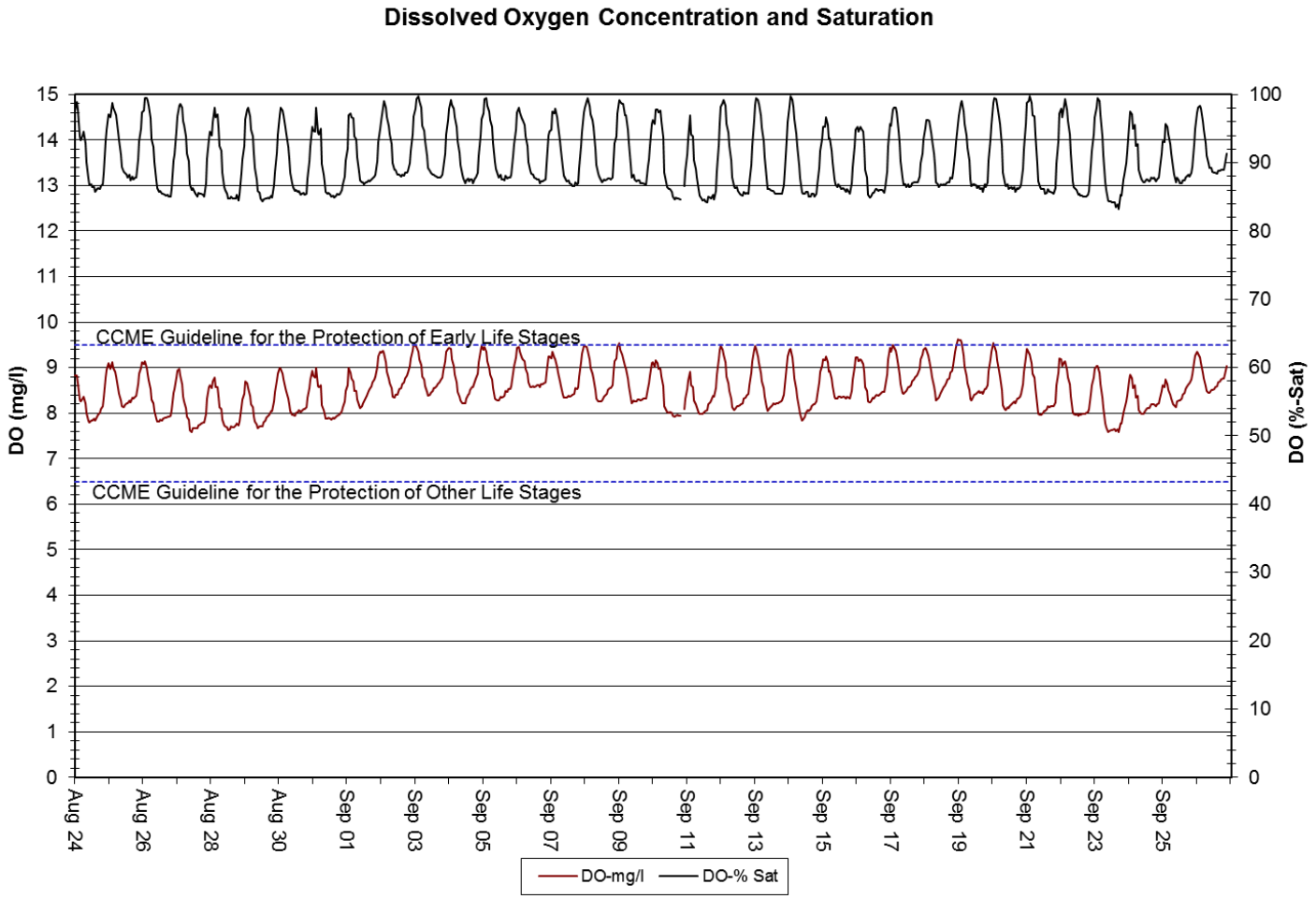
- Little change was observed in water temperature from late August to late September. Values fell between 22.62°C to 14.39°C (median value: 18.31°C).



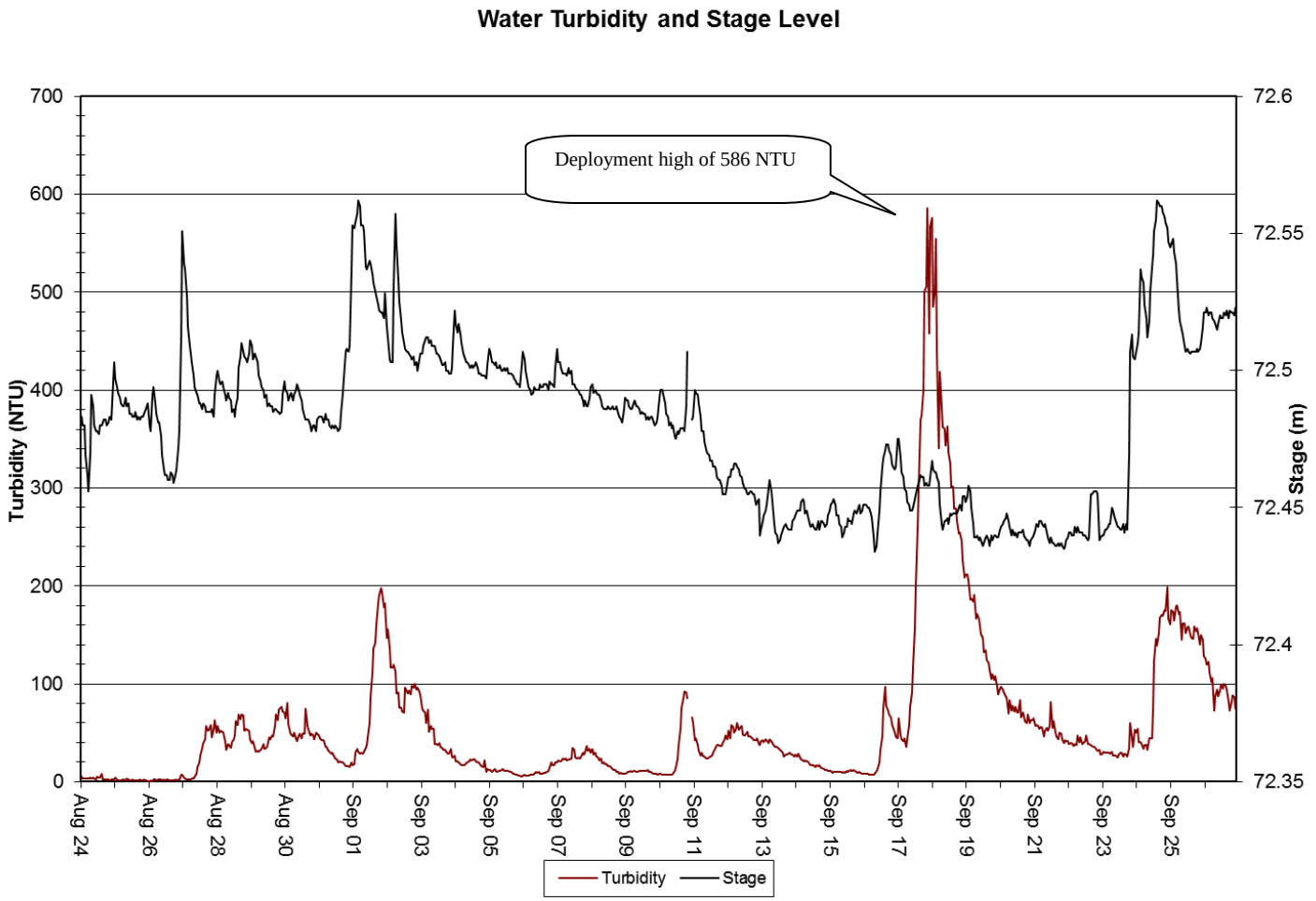
- pH values tended to reside in the upper range of the Site Specific Guidelines. During the deployment, a pH range of 6.73 to 6.21 was recorded (median value: 6.42). No major fluctuations or trends were detected during the deployment period.



- Conductivity at Plant Discharge was tightly linked to stage level and river discharge. Increases in conductivity were associated with increases in stage level as indicated above. This pattern, while normal, is exaggerated more than usual due to the liberation of sediment formerly trapped in the Forgotten Pond basin, upstream. Surges in water flow drives the sediment downstream.
- Values fell between 59.0 µS/cm and 162.4 µS/cm with a median value of 72.5 µS/cm.



- All DO concentrations were found to be above the CCME Guideline for the Protection of Other Life Stage cold water biota, but mostly below the guideline for early life stages. Values ranged from 7.59 mg/l to 9.63 mg/l with a median value of 8.48 mg/l. No major trend were observed that gives cause for concern.

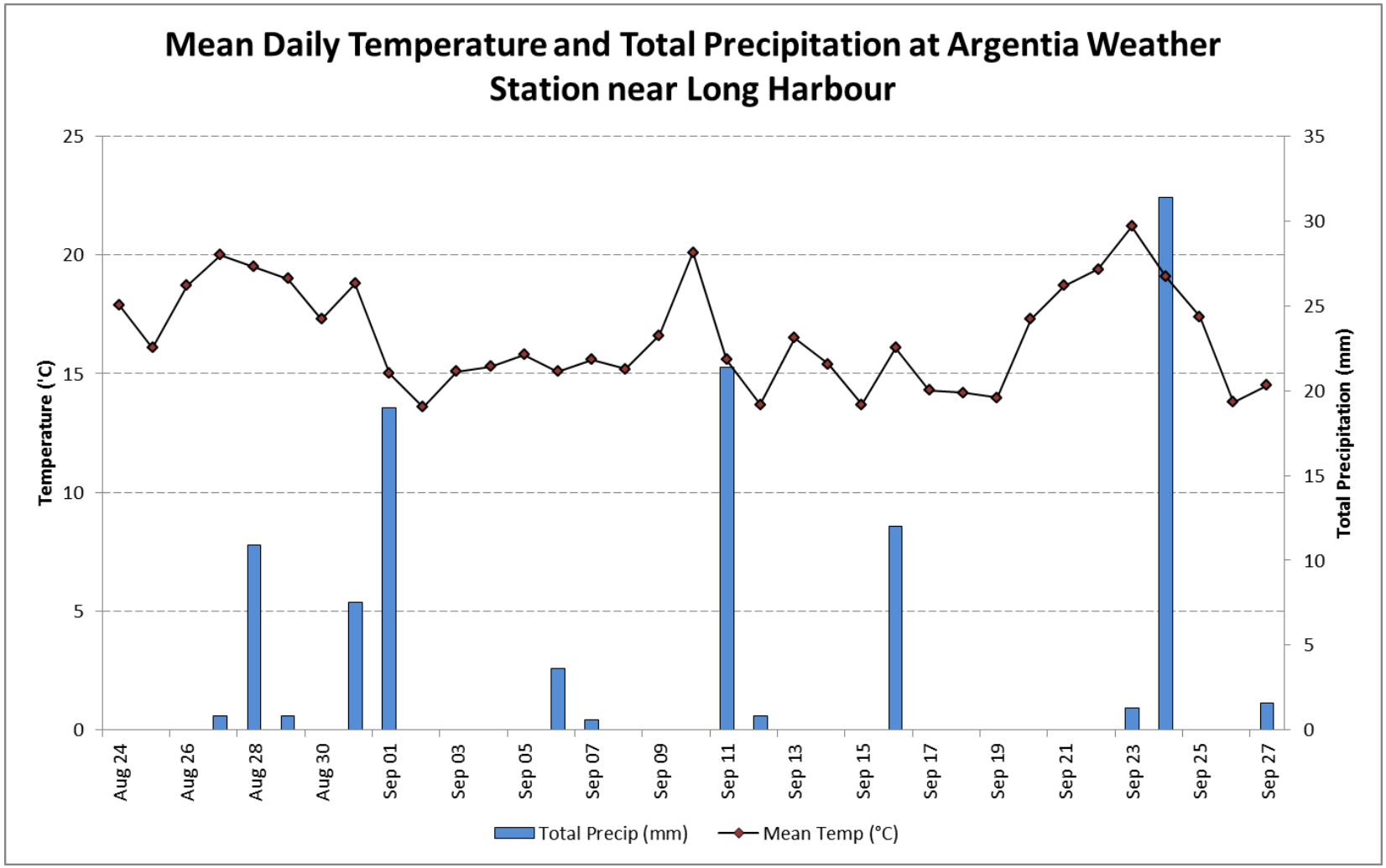


- As expected, turbidity values were found to be very high compared to this time period in previous years. Habitat compensation in Forgotten Pond resulted in the downstream flow of silt-laden water causing numerous turbidity alerts – in all, 44.6% of all turbidity records, or 363 of 816 recordings.
- Turbidity levels ranged between 0.5 NTU and 586 NTU (median value: 35.7 NTU).

Conclusions

- Habitat compensation efforts were initially scheduled to end in late September. However, a delay required the work to continue into early October. It is expected that conductivity and turbidity levels will decline following cessation of the work. It is likely that liberated sediments will be susceptible to resuspension by heavy flows for some time.
- No other major water quality events were evident during the deployment period and most values were otherwise within expected limits.

Appendix



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