Real-Time Water Quality Report

Canada Fluorspar (NL) Inc, Real-Time Water Quality Stations

Deployment Period
June 18, 2025 - August 3, 2025

Newfoundland Labrador

Government of Newfoundland & Labrador
Department of Environment, Conservation & Climate Change
Water Resources Management Division

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General

The Water Resources Management Division (WRMD) maintains real-time water quality and water quantity monitoring stations in John Fitzpatrick Pond and on Outflow of Unnamed Pond south of Long Pond, within the site of Canada Fluorspar (NL) Inc, St. Lawrence, Newfoundland & Labrador.

Decommission of Outflow of Grebes Nest Pond

Due to a change in the water supply for Outflow to Grebes Nest Pond station, it was determined that this brook would not provide consistent water supply to remain a monitoring station. Outflow to Grebes Nest station was decommissioned in May 2022. Instrumentation was relocated to John Fitzpatrick Pond (Figure 1).

John Fitzpatrick Pond

The site was selected based on the location and consistent water supply throughout the year. It provides stable and beneficial water quality data for this site (Figure 1).

The Real Time station is established on the northwest bank of John Fitzpatrick Pond, close to the only outflow from the pond. This pond is surrounded by natural habitat on the northeast side, and on the southwest side bordered by the CFI mine (Figure 1). There are two small brooks that periodically flow into this pond. This station monitors the water quality and the stage level of the pond. The instrument is deployed, at a depth of approximately 1.0 meter. The GPS coordinates for this site are as follows: N 46° 54’ 47.95” W 055° 27’ 46.97” (Figure 1).

Figure 1: Real-Time Station at John Fitzpatrick Pond. Station hut (left) and instrument deployed in pond (right)

Outflow of Unnamed Pond south of Long Pond

The Outflow of Unnamed Pond south of Long Pond is established downstream of the Tailings Management Facility (TMF). This station provides near real-time water quality and quantity data to ensure emerging issues associated with the TMF are detected, to allow the appropriate mitigation measures to be implemented in a timely manner, thus reducing any adverse effect on the downstream systems.

The location of Outflow of Unnamed Pond south of Long Pond was selected due to accessibility to the brook and the sufficient pool available to place the water quality and quantity instruments (See Figure 2). The stream originates from a small unnamed pond and meanders through a marsh environment alongside the TMF. The stream is approximately 1.0 to 2.0 meters wide. Where the instrument is deployed, there is a depth of approximately 1.0 to 1.5 meters. The GPS coordinates for this site are as follows: N46° 54' 14.1" W055° 26' 37.5". The station hut was placed on the right bank looking downstream approximately 8 meters from the stream (Figure 2).

Figure 2: Real-Time Water Quality and Quantity Station at Outflow of Unnamed Pond south of Long Pond. Station hut (left) and instrument deployed in brook (right).

Quality Assurance and Quality Control

WRMD staff are responsible for maintenance and calibration of the real-time water quality monitoring equipment, as well as recording and managing the water quality data. As part of the Quality Assurance and Quality Control protocol (QA/QC), an assessment of the reliability of data recorded by an instrument is conducted at the beginning and end of the deployment period. The procedure is based on the approach used by the United States Geological Survey.

During deployment and removal, a QA/QC Sonde is temporarily deployed adjacent to the Field Sonde. Based on the degree of difference between the parameters on the Field Sonde and QA/QC Sonde at deployment and at removal, a qualitative statement is made on the data quality (Table 1). Values for temperature, pH, conductivity, dissolved oxygen, and turbidity are compared between the two instruments (Table 2)**.** Additionally, grab samples are collected during deployment to compare pH, specific conductivity and turbidity values between the field instrument and grab samples (Table 3).

Table 1: Instrument Performance Ranking classifications for deployment and removal

	Rank				
Parameter	**Excellent**	**Good**	**Fair**	**Marginal**	**Poor**
Temperature (°C)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	<+/-1
pH (unit)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Sp. Conductance (µS/cm)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Sp. Conductance > 35 µS/cm (%)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Dissolved Oxygen (mg/L) (% Sat)	<=+/-0.3	>+/-0.3 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Turbidity <40 NTU (NTU)	<=+/-2	>+/-2 to 5	>+/-5 to 8	>+/-8 to 10	>+/-10
Turbidity > 40 NTU (%)	<=+/-5	>+/-5 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20

It's important to note that the temperature sensor on any sonde is crucial. All other parameters can be categorized into subgroups: temperature-dependent, temperature-compensated, and temperature-independent. Due to the temperature sensor's placement on the sonde, the entire sonde must be at a constant temperature before the temperature sensor stabilizes. The values may take some time to reach the appropriate reading; if a reading is taken too soon, it may not accurately represent the conditions of the water body.

Table 2: QA/QC vs. Field Instrument performance rankings

Station	Date	Action	Comparison Ranking				
			Temp	pH	Conductivity	Dissolved Oxygen	Turbidity
John Fitzpatrick	**June 18 2025**	**Deployment**	Excellent	Excellent	Good	Excellent	Excellent
	August 5 2025	**Removal**	Excellent	Excellent	Excellent	Excellent	Excellent
Unnamed Pond	**June 18 2025**	**Deployment**	Excellent	Excellent	Excellent	Good	Excellent
	August 5 2025	**Removal**	Good	Excellent	Excellent	Excellent	Excellent

Hydrometric Data

Water Resources Management Division hydrometric (stage and flow) data is quality controlled on a less frequent basis than water quality data due to differences in protocols. The hydrometric data shown in this report is provisional and has not undergone quality control checks.

Issues or Concerns during the Deployment Period

During this deployment period there was a communication issue with the John Fitzpatrick Pond station. Communication at the station ceased on July 5th, 2025. Both the water quality and water quantity instrumentation stopped transmitting data. The water quality instrument has the capability to log internally; therefore data was collected from July 5th through to the end of the deployment and has been added to the analysis.

John Fitzpatrick Pond

Water Temperature

Water temperatures ranged from 13.32°C to 22.61°C during the deployment period, with an average of 17.8°C. As expected with the seasonal Summer temperatures, the water temperatures increased through the deployment. A natural diurnal pattern was observed, with warmer temperatures during daylight hours and cooler temperatures at night (Figure 3).

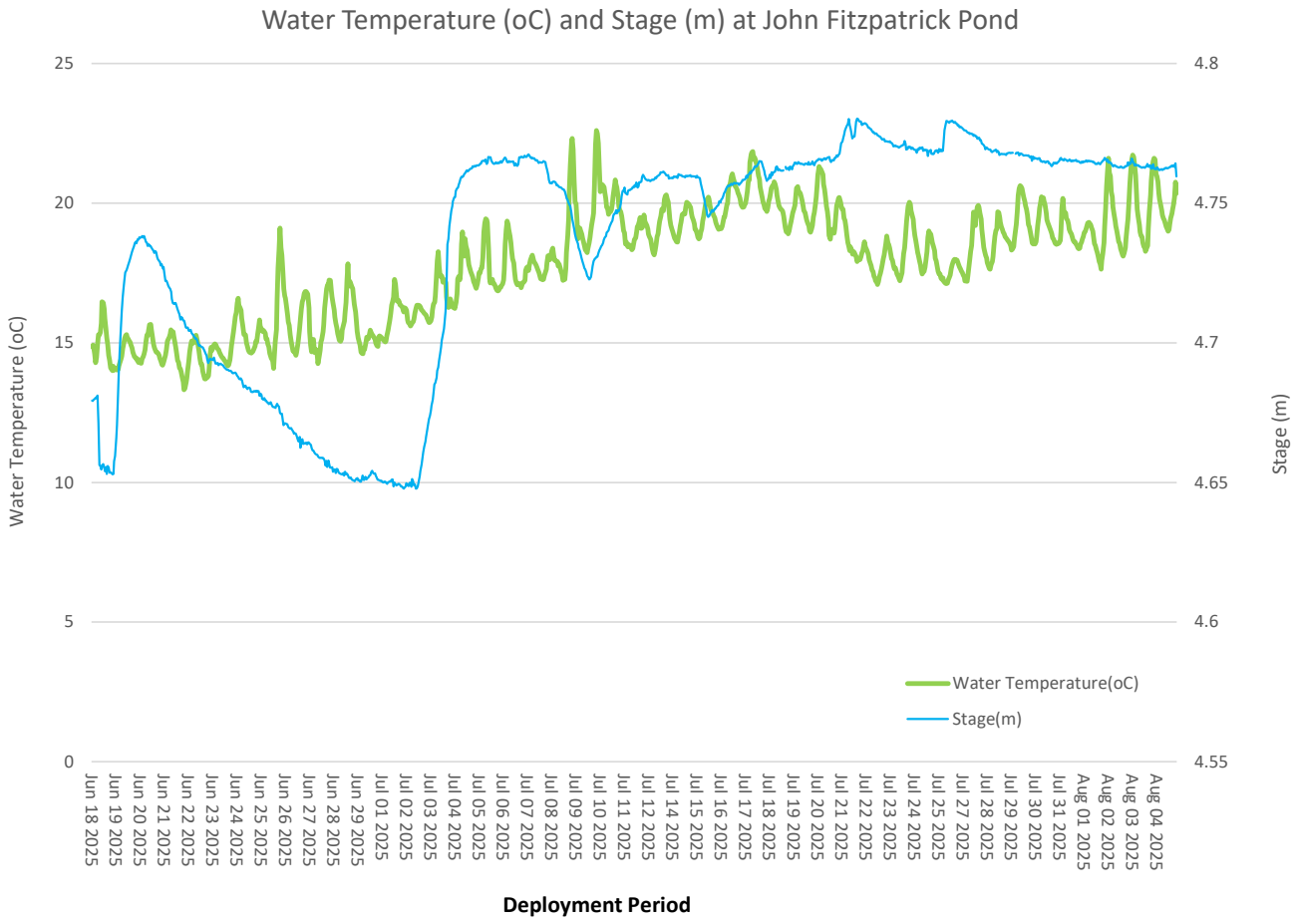

Figure 3: Water temperature at John Fitzpatrick Pond RTWQ Station (°C)

pH

Throughout the deployment period, pH values ranged from 7.15 to 8.25 with an average of 7.8 (Figure 4). The pH levels remained stable and consistent, with only minor fluctuations attributed to precipitation events.

A pH sensor measures the acidity or alkalinity of a water body. pH is a critical parameter because it influences the solubility of minerals and chemicals, the availability of nutrients, and the biological processes that occur in aquatic ecosystems. Most aquatic organisms have a preferred pH range for optimal growth and survival, and deviations from this range can have significant ecological implications. The pH data at John Fitzpatrick Pond remained within the Canadian Council of Ministers of the Environment (CCME) guidelines of 6.5-9.0 pH units for the protection of aquatic life for the duration of the deployment period (Figure 4).

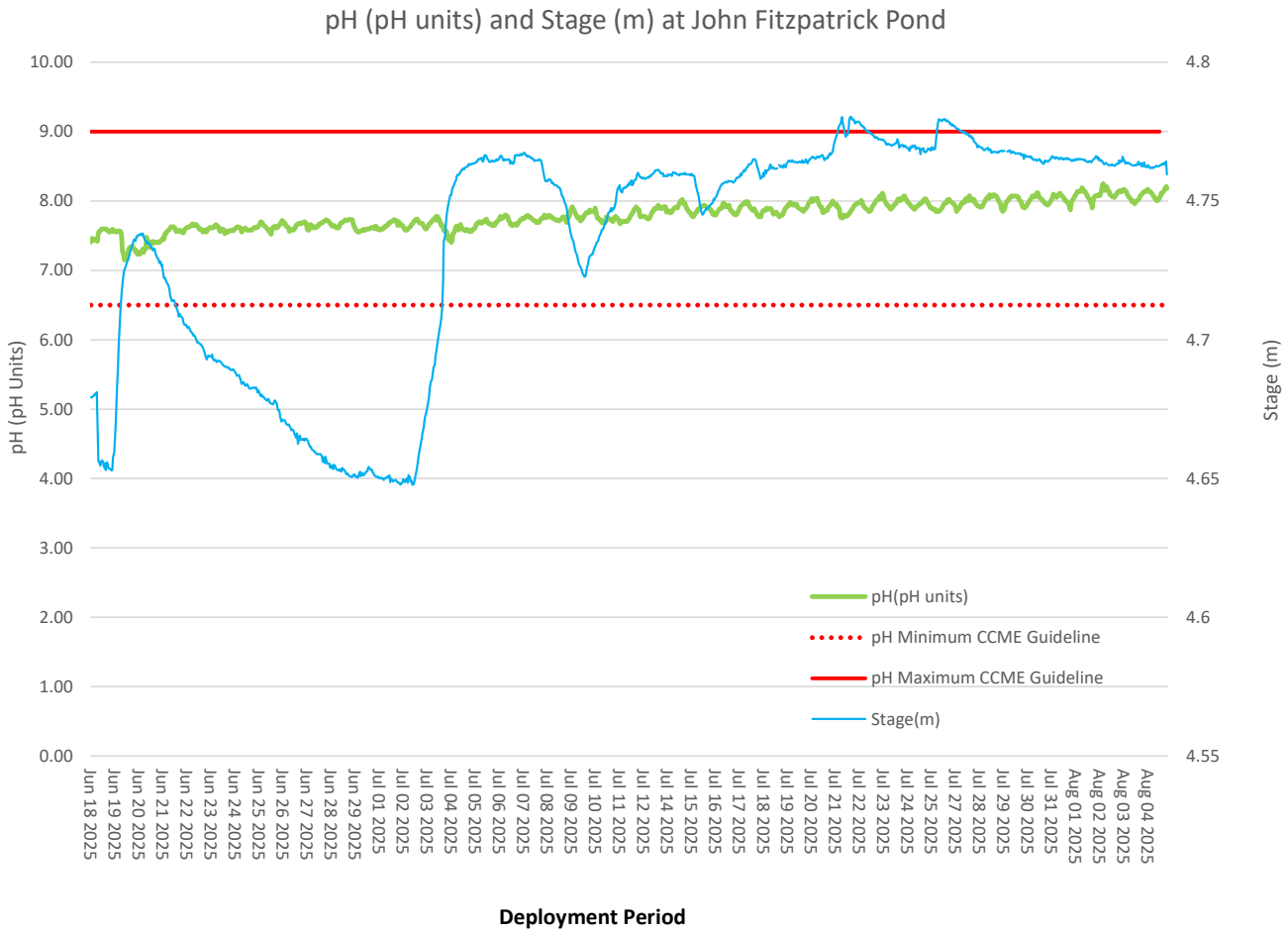

Figure 4: pH (pH units) values at John Fitzpatrick Pond RTWQ Station

Specific Conductivity

The specific conductivity levels were within 102.17 µS/cm and 188.9 µS/cm during this deployment period, with an average of 142.2 µS/cm (Figure 5). Conductivity remained relatively consistent across the deployment period. Dips in conductivity levels are generally the result of a precipitation event. The rain dilutes the water column for a short period of time, which reduces the concentration of any suspended particles or diluted salts. Spikes in conductivity levels can likely be attributed to pumping of the open pits.

Specific conductivity is commonly used as an indicator of the concentration of dissolved ions in water. These ions can include electrolytes like salts, acids, and bases. The higher the concentration of dissolved ions, the higher the specific conductivity of the water.

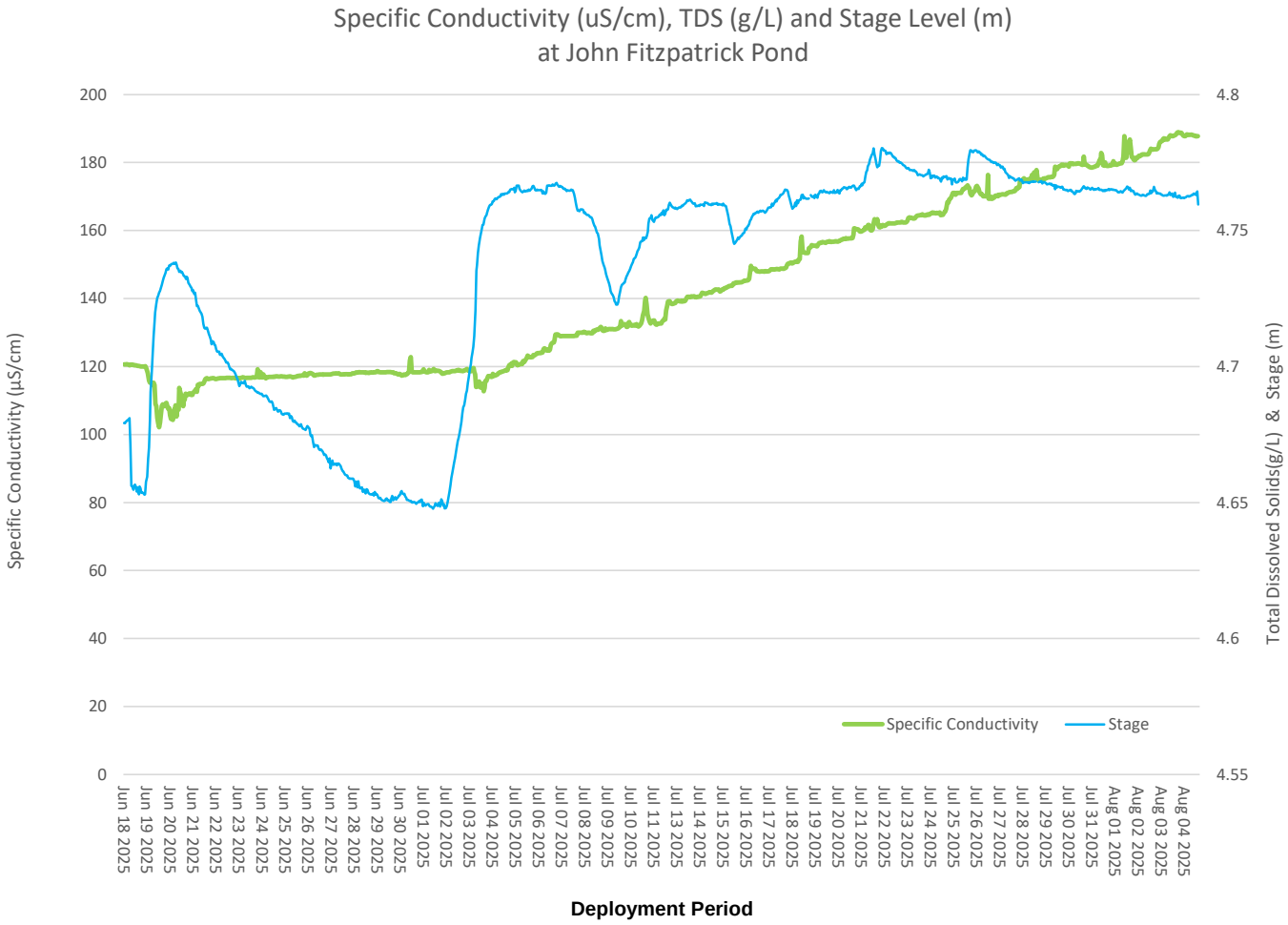

Figure 5: Specific conductivity (µS/cm) values at John Fitzpatrick Pond RTWQ Station

Dissolved Oxygen

Throughout the deployment, dissolved oxygen (DO) concentrations ranged from 8.84 mg/L to 10.54 mg/L, with corresponding DO percent saturation levels varying from 93.1% to 113.1% (Figure 6). All values remained above the CCME Guidelines for the Protection of Aquatic Life throughout the deployment. DO concentrations decreased slightly towards the end of the deployment period as expected due to increasing water temperatures.

The DO probe measures oxygen directly dissolved in the water in milligrams per liter (mg/L). The instrument then calculates percent saturation (% Sat), considering the water temperature. Dissolved oxygen levels can vary based on factors such as temperature, pressure, and the presence of other dissolved substances. Warmer water tends to hold less dissolved oxygen than cooler water. Additionally, the presence of organic matter, pollutants, and certain chemical reactions can influence dissolved oxygen levels**.**

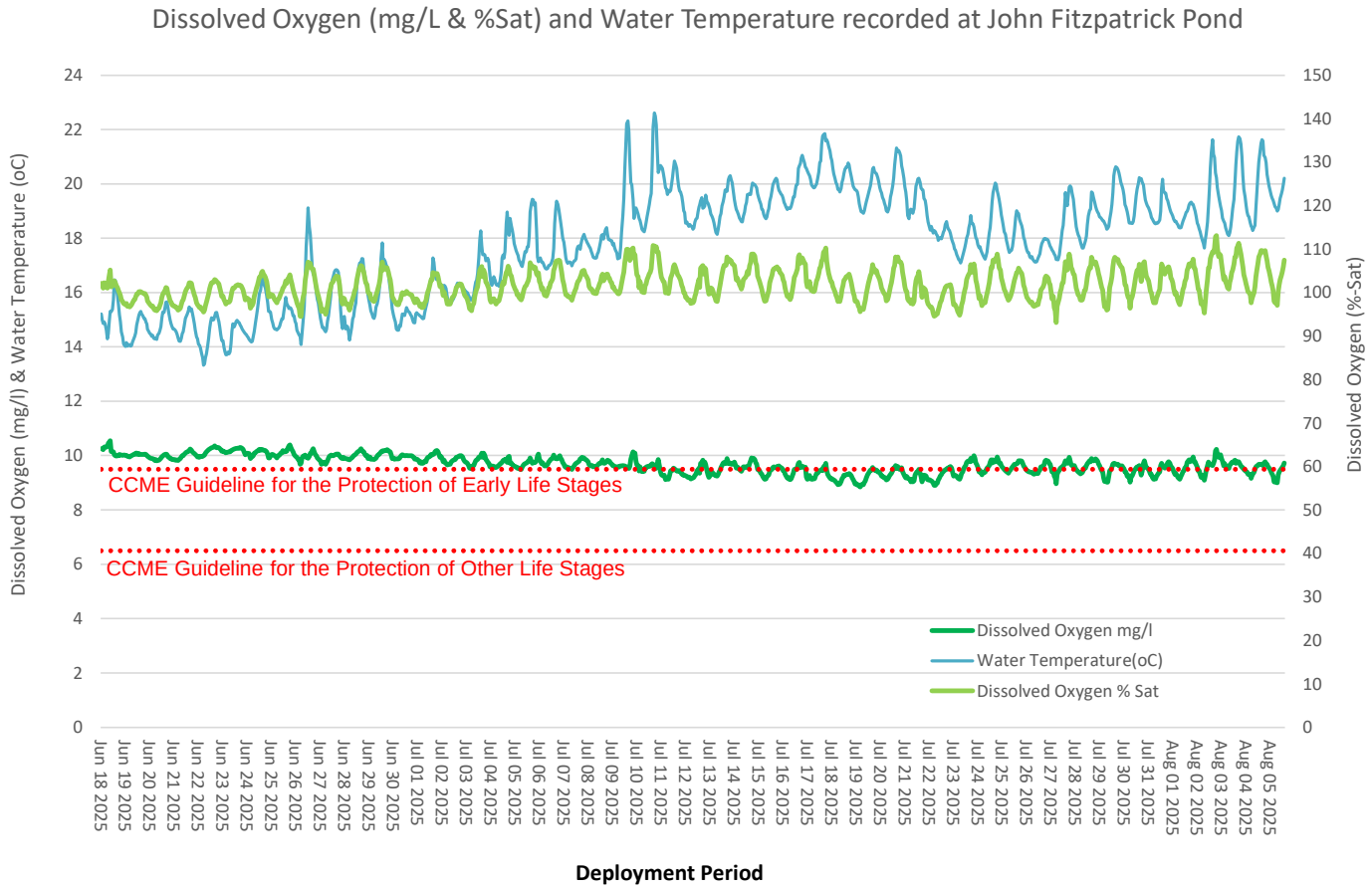

Figure 6: Dissolved Oxygen (mg/L & Percent Saturation) values and Water Temperature (°C) at John Fitzpatrick Pond RTWQ Station

Turbidity

Turbidity levels during the deployment ranged between 0.0 NTU and 149.67 NTU, with an average of 2.9 NTU. During a site visit to this station, it was noted that the pond is extremely clear with a rocky bottom made up of large rocks (Figure 1). Turbidity remained consistently low throughout the deployment period. Small spikes can be attributed to precipitation events, which can increase run-off and disturb sediment on the waterbed, temporarily increasing turbidity. A large increase July 11-13 may indicate fouling of the sensor for a few days before values returned to background levels.

Turbidity sensors use light scattering or absorption principles to quantify the degree of cloudiness in the water. Turbidity is caused by suspended particles, such as silt, clay, organic matter, and plankton, that scatter and absorb light.

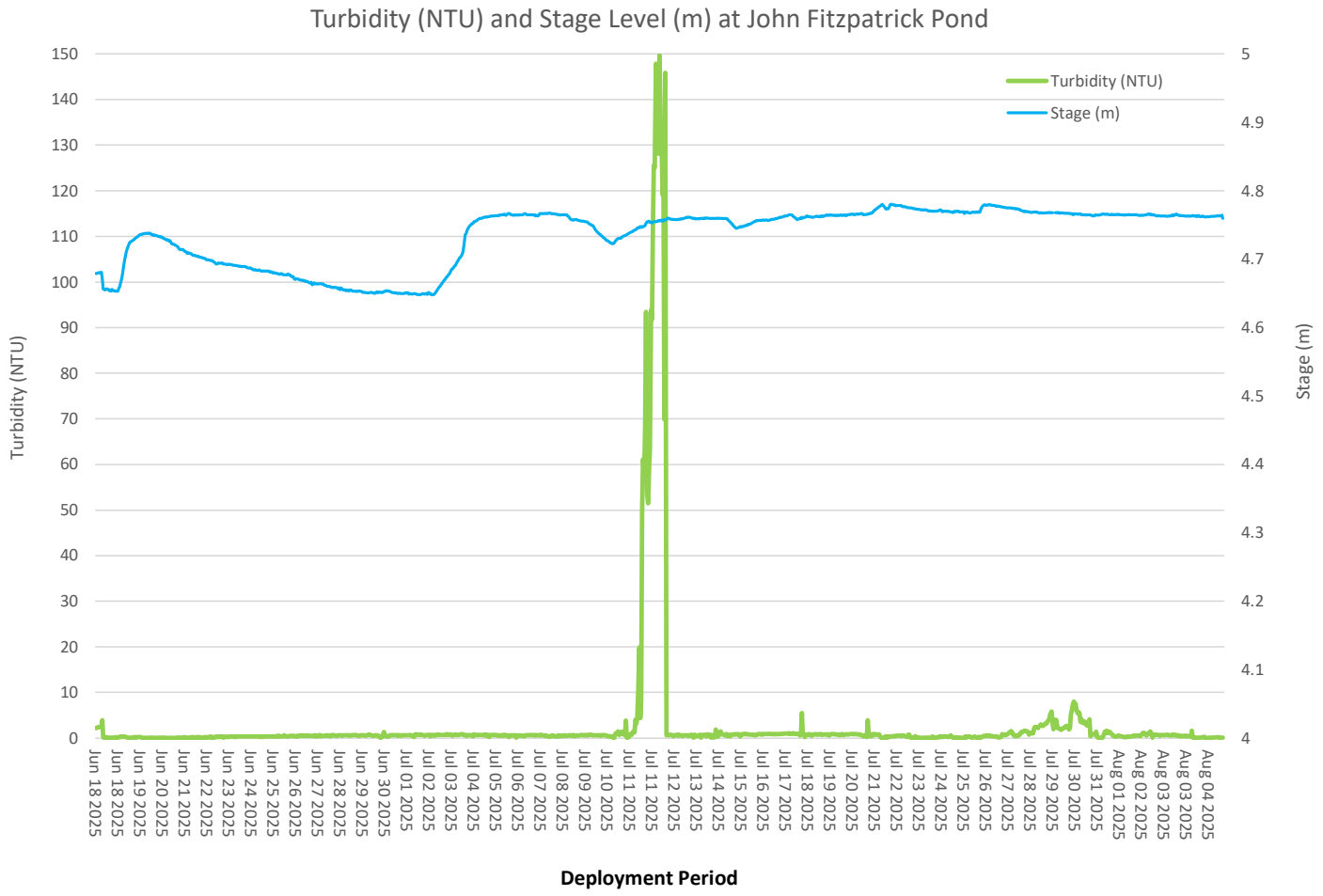

Figure 7: Turbidity (NTU) values at John Fitzpatrick Pond RTWQ Station

Stage Level

Stage is an estimation of water level at the station and can account for variations in water quality parameters (e.g., specific conductivity, dissolved oxygen, turbidity). The stage ranged between 4.64m and 4.76m for the period of record.

Significant peaks in stage align with total precipitation events, as indicated in Figure 8. Total Precipitation data were obtained from Environment Canada's St. Lawrence weather station. Precipitation had a daily average maximum of 44.4 mm on June 19th, 2025. With several other smaller events throughout deployment.

Water Resources Management Division hydrometric data is quality controlled on a less frequent basis than water quality data due to differences in protocols. The hydrometric data shown in this report is provisional and has not undergone quality control checks.

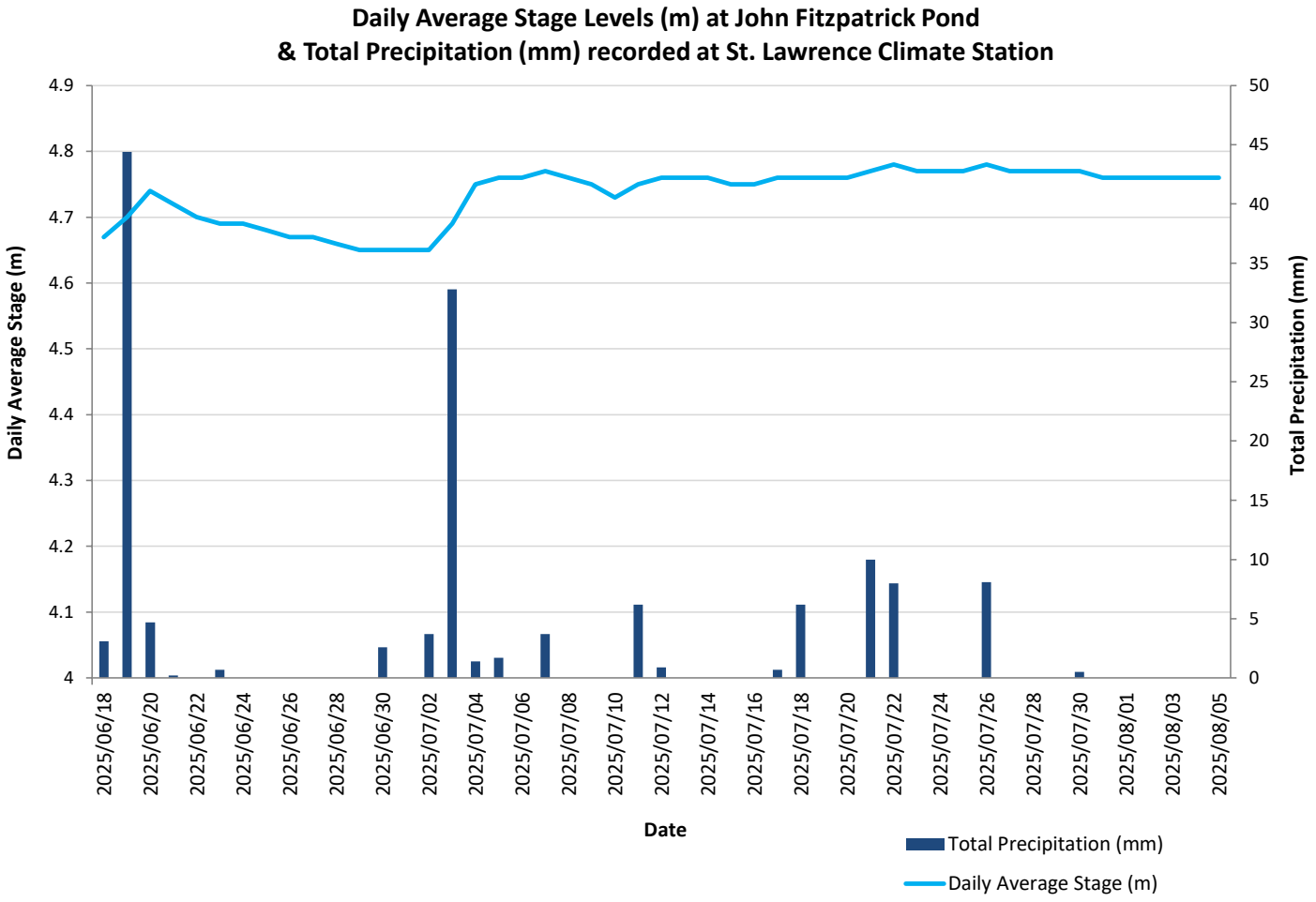

Figure 8: Stage values at John Fitzpatrick Pond RTWQ Station and total precipitation.

Outflow of Unnamed Pond south of Long Pond

Water Temperature

Water temperature ranged from 10ºC to 27.59ºC during the deployment period, with an average of 17.95°C (Figure 9). Temperature steadily increased throughout the deployment period which would be expected with the seasonal transition from spring into summer.

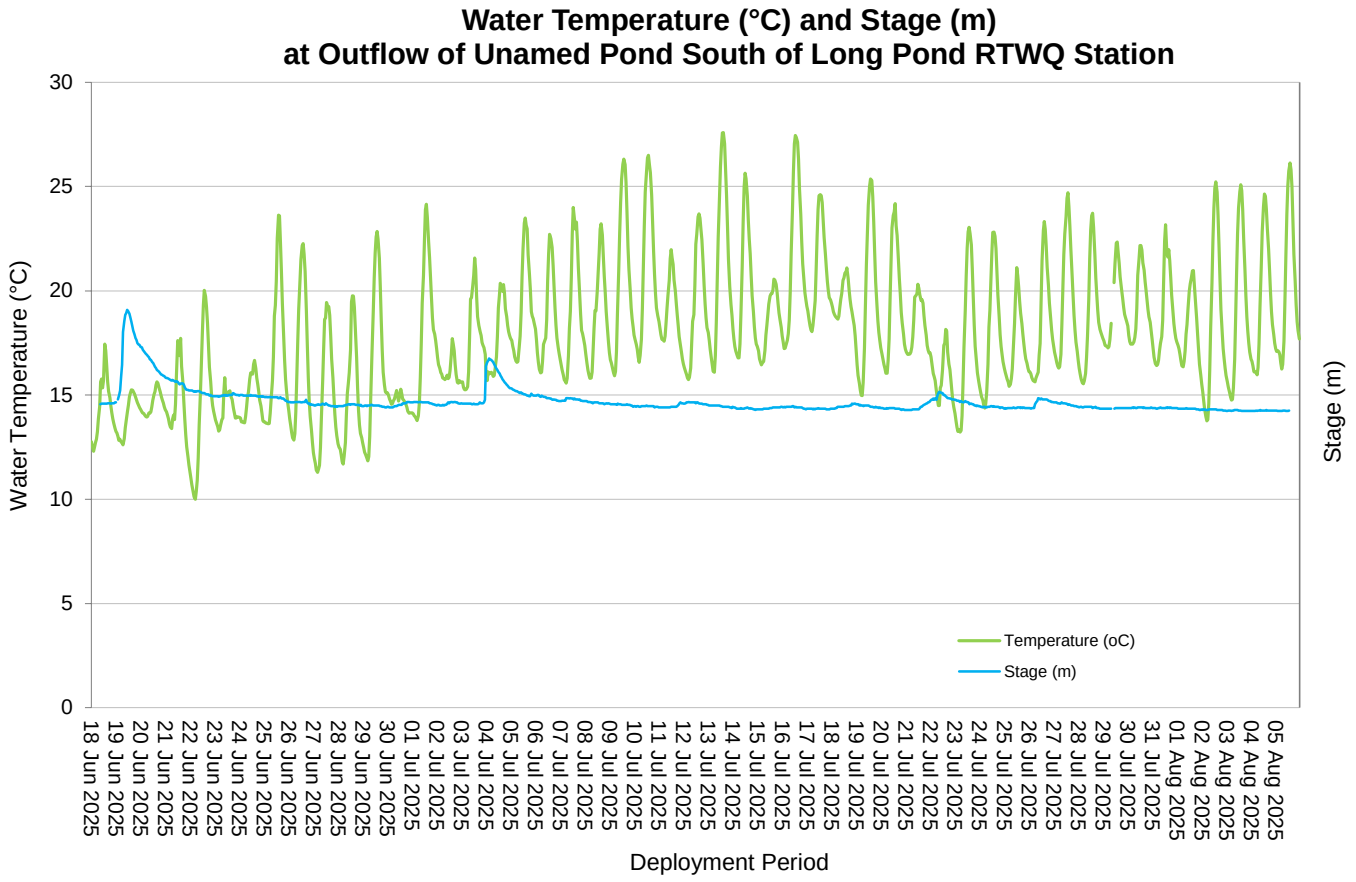

Figure 9: Water temperature (°C) values at Outflow of Unnamed Pond south of Long Pond RTWQ station

pH

Throughout this deployment period, pH values ranged within 7.2 pH units and 8 pH units with an average of 7.7 pH units (Figure 10), remaining within the Canadian Council of Ministers of the Environment (CCME) Guidelines for aquatic life of 6.5-9.0 pH units.

pH responds with dips during the slight increases in stage. After these small decreases, pH does return to background levels after each event. Overall, the pH data was consistent across deployment.

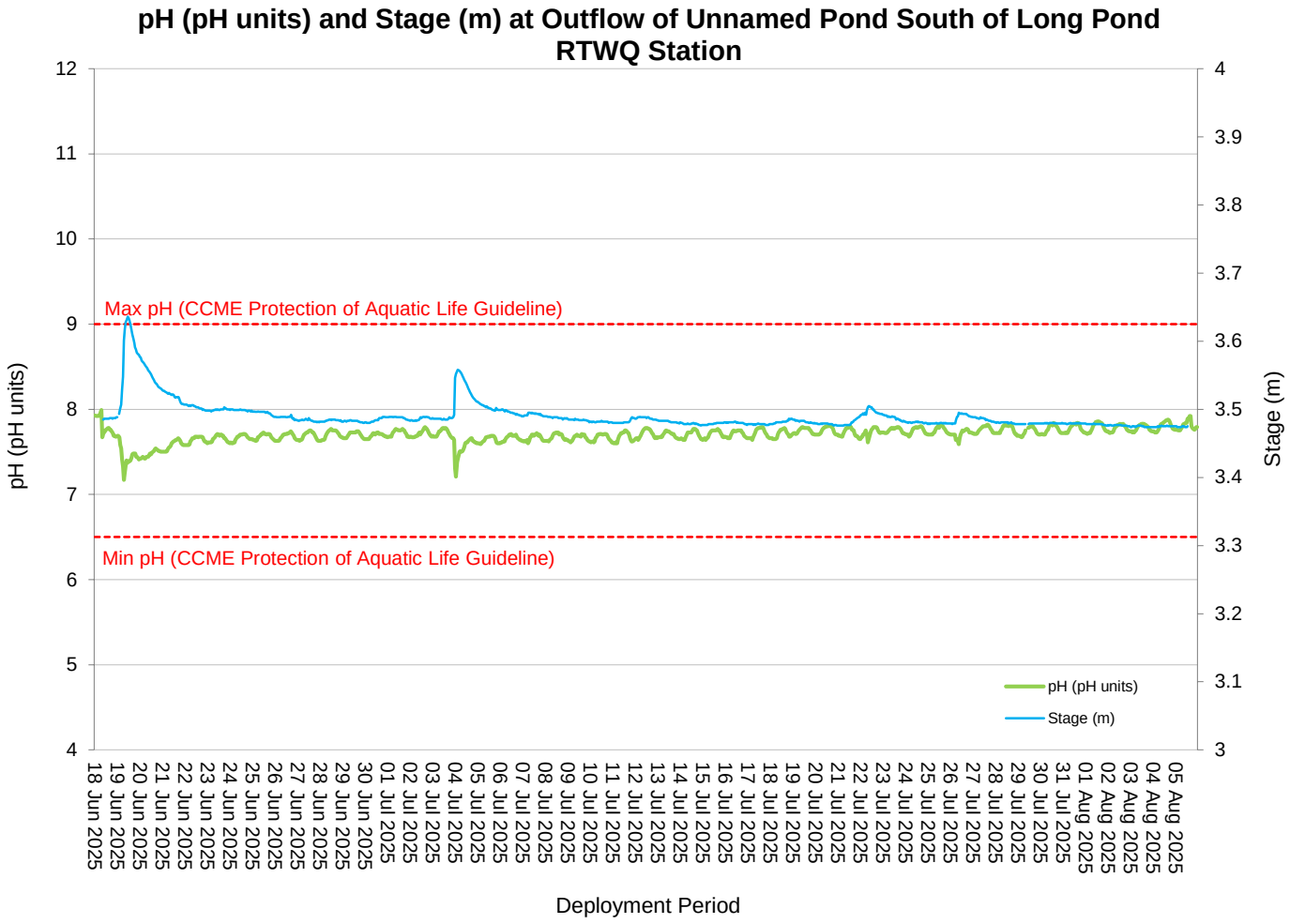

Figure 10: pH (pH units) at Outflow of Unnamed Pond south of Long Pond RTWQ station

Specific Conductivity

Conductivity levels ranged between 141.68 µS/cm and 351.08 µS/cm, with an average of 287 µS/cm during the deployment period.

Variations in water level, as depicted in the graph below, notably influence conductivity data. This is evident as conductivity rises and falls throughout the deployment period (Figure 11). When the water stage rises, generally in response to precipitation events, conductivity tends to decrease as the water body is diluted. However, it usaually returns to normal levels within a few days to weeks.

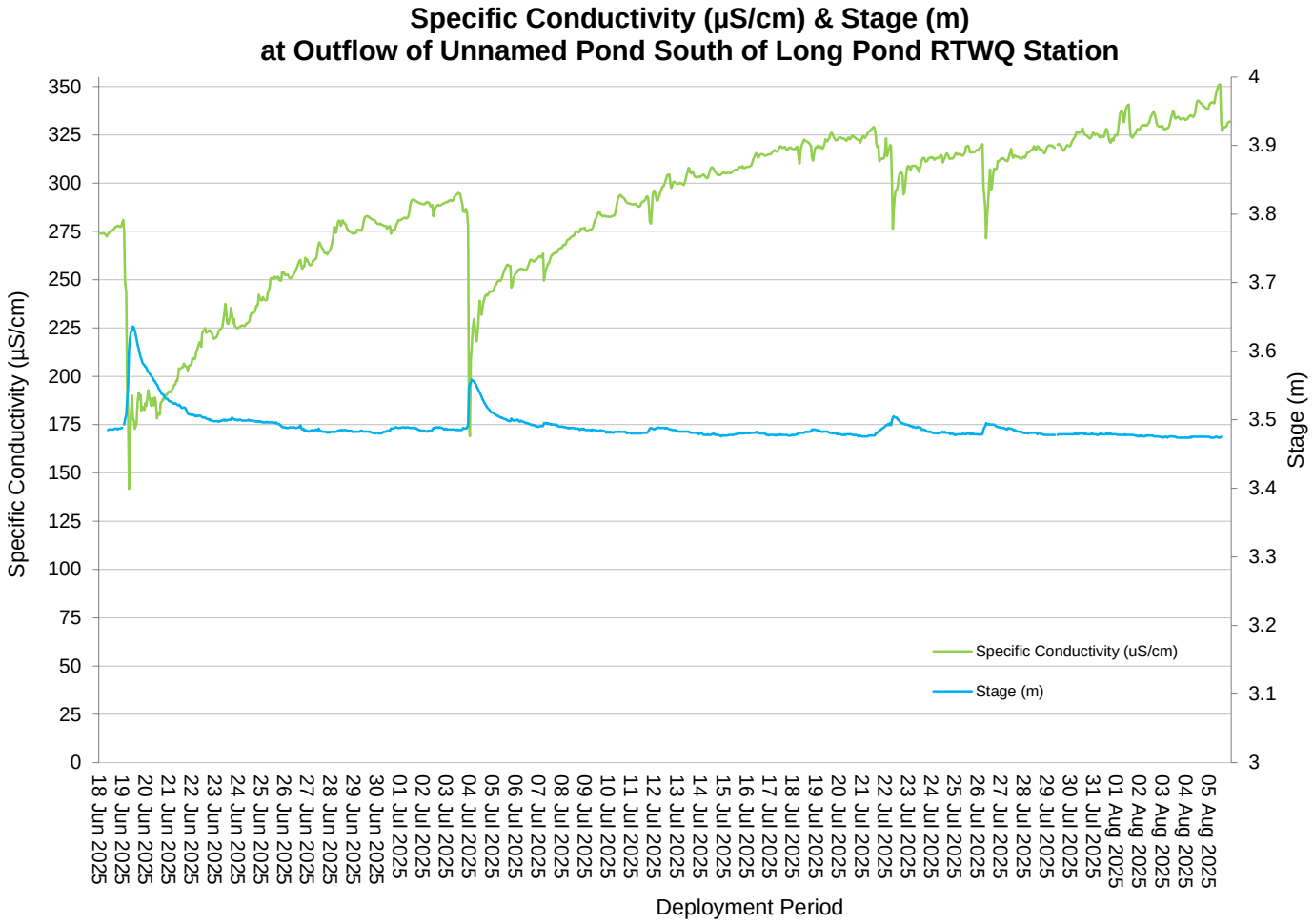

Figure 11: Specific conductivity (µS/cm) at Outflow of Unnamed Pond south of Long Pond RTWQ station

Dissolved Oxygen

During this deployment, dissolved oxygen concentrations ranged from 7.68 mg/L to 11.1 mg/L, with corresponding percent saturation values between 90.9% and 104%. Dissolved oxygen concentration levels remained above the CCME Guideline for the Protection of Aquatic Life other life stages but fell below the guideline for early life stages toward the end of the deployment as the water temperatures increased.

Dissolved oxygen concentrations demonstrate an inverse relationship with water temperature, as depicted in the figure below. When water temperature increases, dissolved oxygen typically decreases (Figure 12).

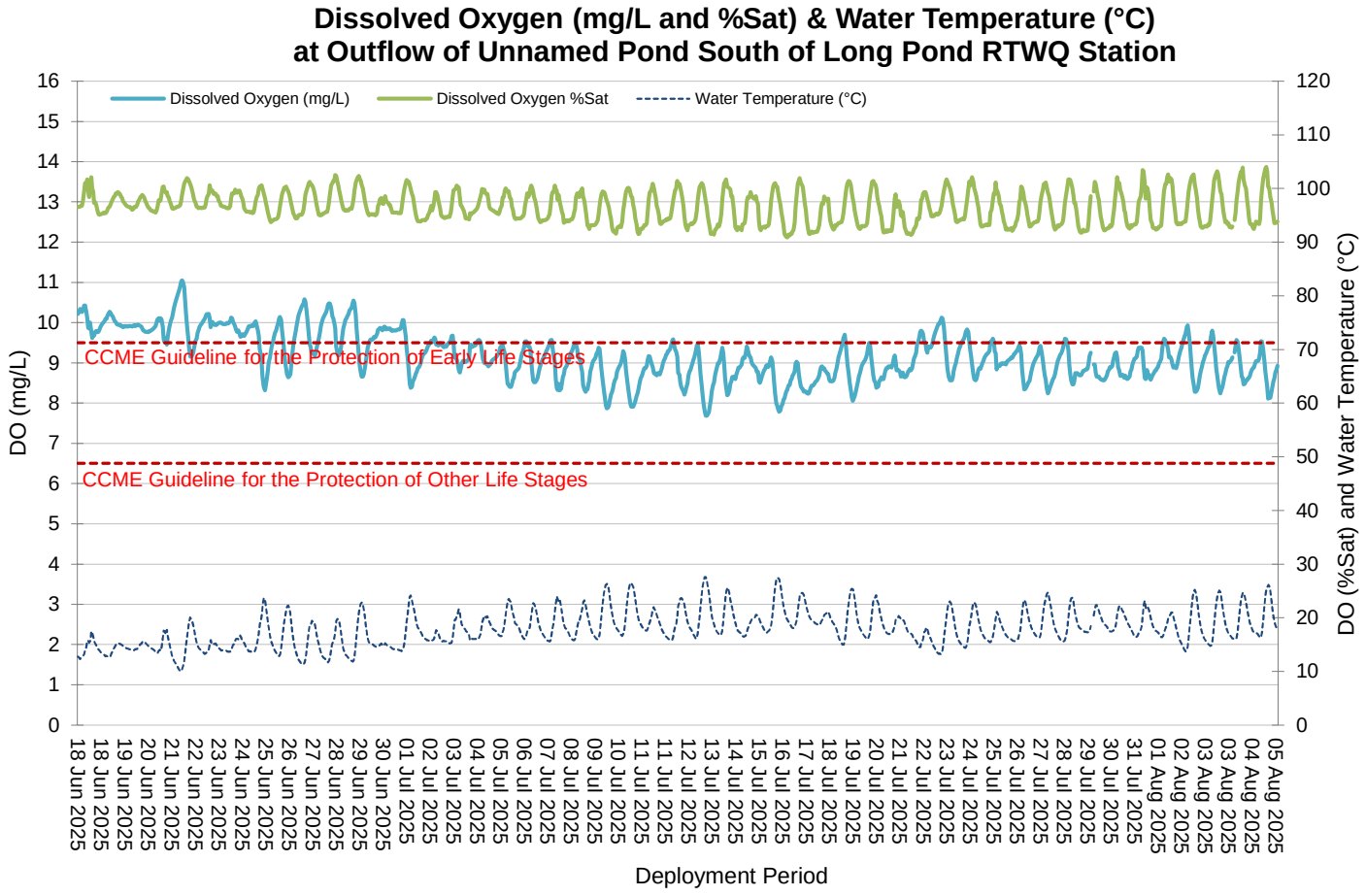

Figure 12: Dissolved Oxygen (%Sat & mg/L) at Outflow of Unnamed Pond south of Long Pond RTWQ station

Turbidity

Turbidity levels during the deployment ranged within 0.4 NTU and 6.4 NTU, with an average of 1.29 NTU (Figure 13). The two larger spikes in June and July correspond with the two stage increases.

The turbidity levels remained low throughout the deployment period. Minor fluctuations in the data can be linked to rises in water level caused by precipitation events (Appendix I).

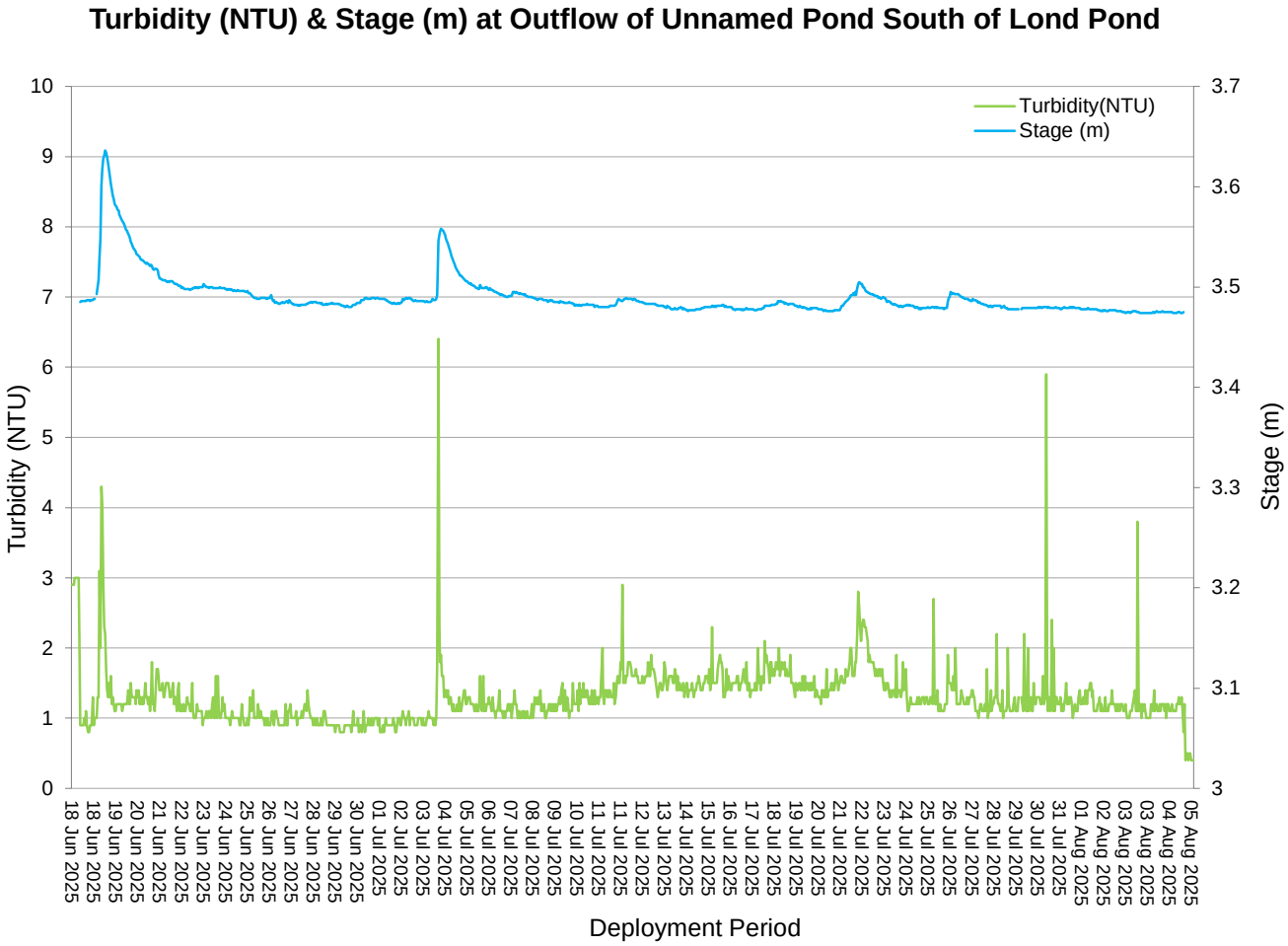

Figure 13: Turbidity (NTU) at Outflow of Unnamed Pond south of Long Pond RTWQ station

Daily Averaged Stage Level and Total Precipitation

Stage is an estimation of water level at the station and can explain fluctuations occurring with other parameters (i.e. Specific Conductivity, DO, turbidity). Stage ranged between 3.47m to 3.72m during the deployment. Large peaks in stage correspond with the total precipitation events as noted on Figure 14. Total Precipitation data was obtained from Environment Canada's St. Lawrence weather station (Appendix I).

Water Resources Management Division hydrometric data is quality controlled on a less frequent basis than water quality data due to differences in protocols. The hydrometric data shown in this report is provisional and has not undergone quality control checks.

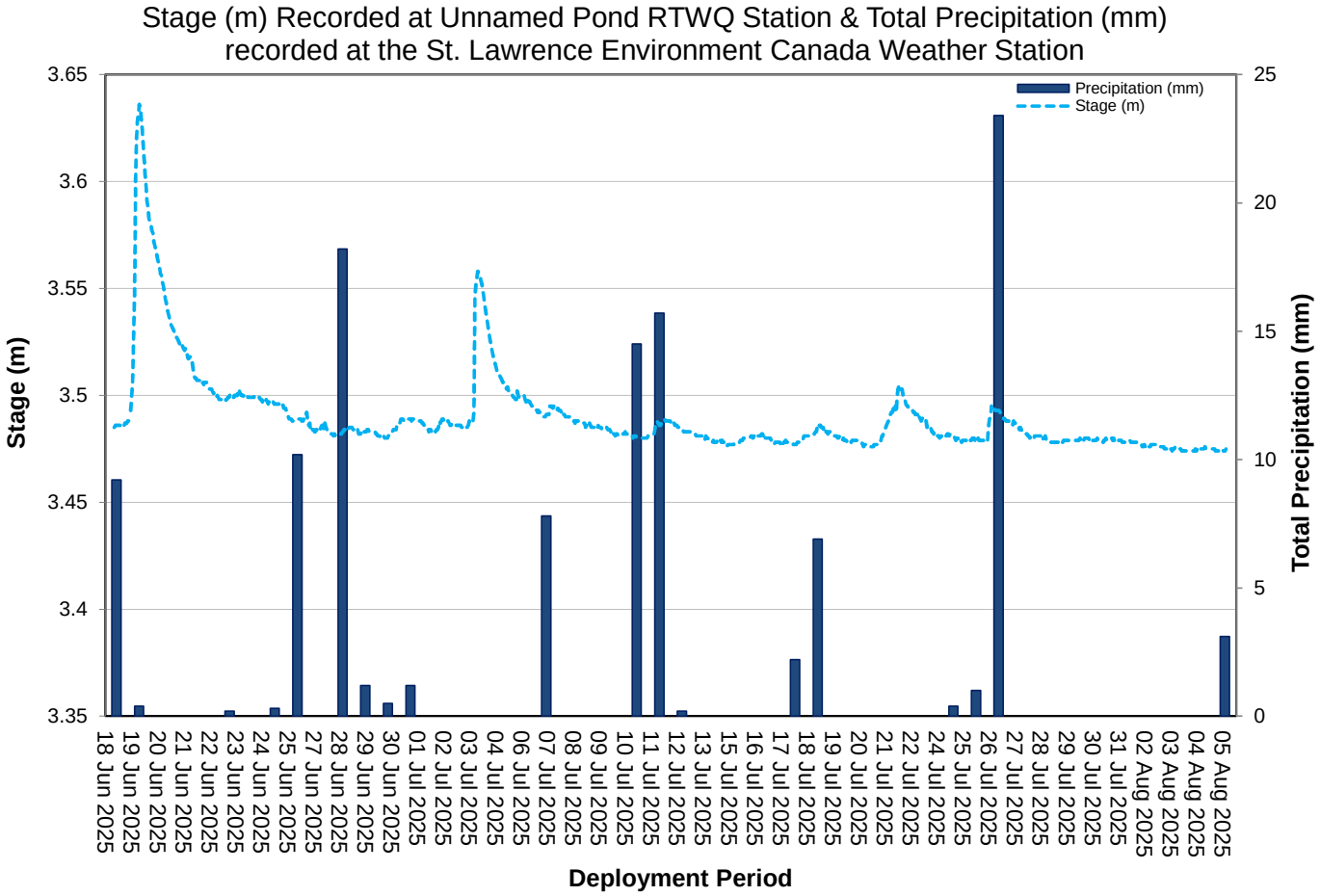

Figure 14: Daily averaged stage values and total precipitation.

APPENDIX I

Total Daily Precipitation recorded at Environment Canada, St. Lawrence Weather Station

Parameter statistics for each RTWQ Station

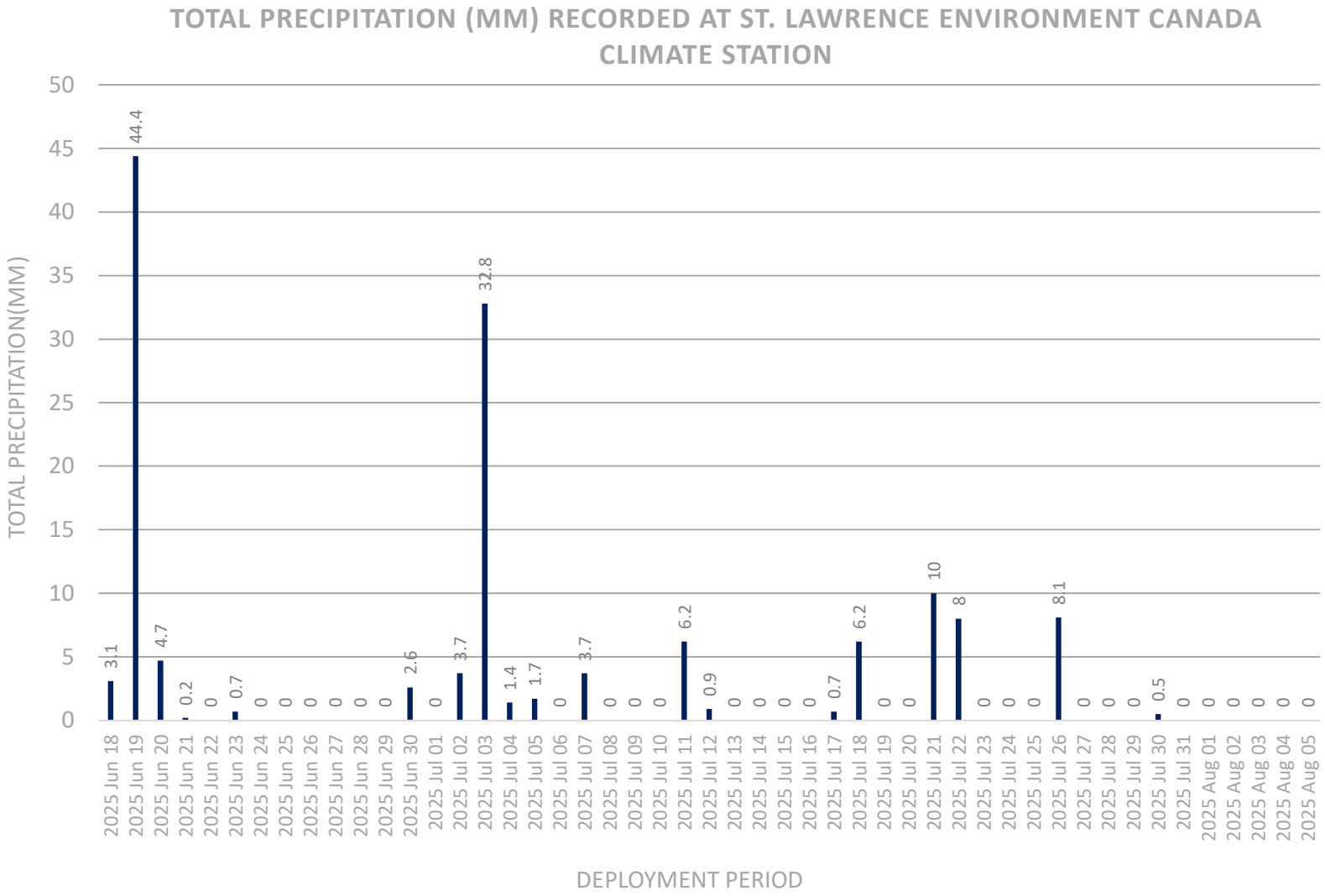

Figure 15: Total Precipitation recorded at the St. Lawrence Environment Canada Weather Station.

Deployment Period Parameter Statistics for CFI RTWQ Stations

Deployment period: June 18th, 2025 to August 5th, 2025

John Fitzpatrick Pond RTWQ Station

Parameter	Max.	Min.	Median	Mean
Temperature(°C)	22.61	13.32	18.15	17.8
pH	8.25	7.15	7.79	7.79
Specific Conductivity (µS/cm)	188.98	102.17	135.2	142.3
TDS (g/mL)	0.11	0.07	0.08	0.1
Dissolved Oxygen (%Sat)	93.1	113.1	101.3	101.7
Dissolved Oxygen (mg/L)	8.84	10.54	9.67	9.7
Turbidity (NTU)	149.67	0.0	0.59	2.9
Stage (m)	4.78	4.64	4.75	4.7

Outflow of Unnamed Pond South of Long Pond RTWQ Station

Parameter	Max.	Min.	Median	Mean
Temperature(°C)	23.49	2.78	11.65	11.89
pH	8.1	7.4	7.9	7.9
Specific Conductivity (µS/cm)	307.96	140.75	216.67	259.3
TDS (g/mL)	0.2	0.09	0.17	0.17
Dissolved Oxygen (%Sat)	105.3	94.4	98.4	98.96
Dissolved Oxygen (mg/L)	13.4	8.65	10.8	10.8
Turbidity (NTU)	9.0	0.8	2.3	2.44
Stage (m)	3.82	3.72	3.73	3.74
Flow	0.042	0.003	0.005	0.0061