



Real-Time Water Quality Report

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

Annual 2025 Deployment Period



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

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Introduction

The Water Resources Management Division (WRMD) maintain real-time water quality (RTWQ) and water quantity monitoring stations on John Fitzpatrick Pond and Outflow of Unnamed Pond south of Long Pond at the Canada Fluorspar Inc. mine site near St. Lawrence, Newfoundland and Labrador. The purpose of these stations is to monitor the impacts of mining activities on surface water downstream of the Tailings Management Facility and open pit mines.

Canada Fluorspar Inc. (CFI) entered a state of cold idle in 2022, halting all mining and production activities at the site. This status persisted throughout 2023. However, around June 2023, the mine restarted following its acquisition by a new owner with the goal of beginning production at a later date. In April 2023, WRMD assumed responsibility for water quantity monitoring for the network which involves maintaining the datalogger and hydrometric instrumentation (bubbler), periodic water level checks and other related duties.

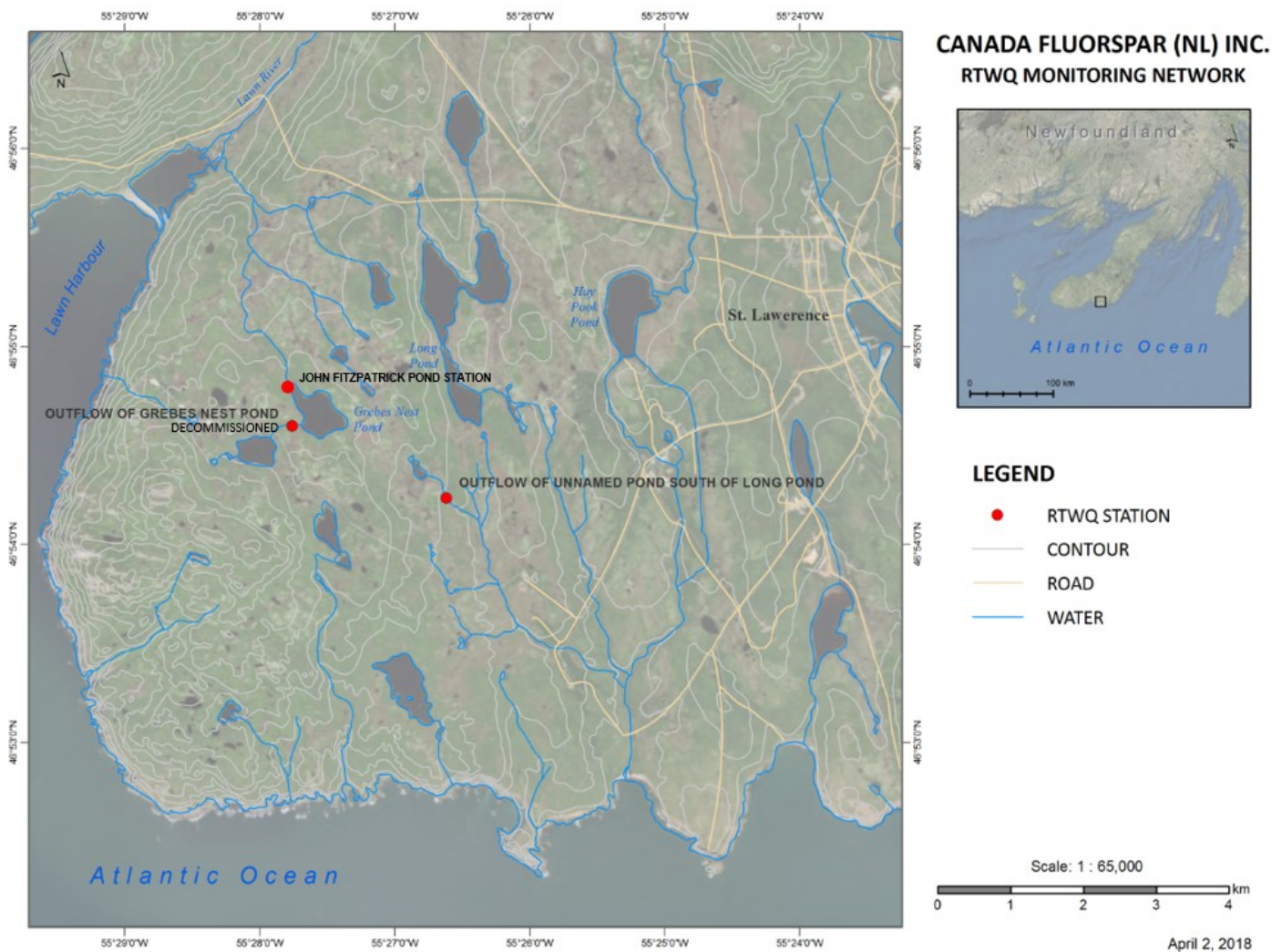


Figure 1: Real-Time Water Quality and Quantity Stations at Canada Fluorspar Inc.

Decommission of Outflow of Grebes Nest Pond

Due to a change in the water supply, it was determined that Outflow to Grebes Nest Pond would not provide adequate, consistent water supply to remain a monitoring station. A replacement station location was selected, and the hut and water quality instrumentation were relocated in May 2022 to John Fitzpatrick Pond, which has consistent water supply and the capability to provide an overview of the water quality conditions.

John Fitzpatrick Pond

John Fitzpatrick Pond RTWQ station was established in May 2022, with water quality instrumentation first deployed in June 2022. The site was selected based on the location and consistent water supply throughout the year. Despite an expected small decrease in water level during the summer, this station provides stable and beneficial water quality data for the monitoring network (Figure 2).

The Real Time station was 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 bordered by the CFI mine on the southwest side (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 2: Real-Time station at John Fitzpatrick Pond. Station hut (left) and the instrument deployed in the pond (right)

Outflow of Unnamed Pond south of Long Pond

Outflow of Unnamed Pond south of Long Pond was established in December 2016 and is located 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, allowing the appropriate mitigation measures to be implemented in a timely manner, reducing any adverse effect on the downstream systems.

The location of Outflow of Unnamed Pond south of Long Pond was selected for its accessibility to the brook and the sufficient pool available to place the water quality and quantity instruments (See Figure 3). The stream originates from a small unnamed pond and meanders through marshland adjacent to 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: **N 46° 54' 14.1" W 55° 26' 37.5"**. The station hut was placed on the west bank approximately 8 meters from the stream (Figure 3).



Figure 3: Real-Time station at Outflow of Unnamed Pond South of Long Pond Station. The hut (left) and the instrument deployed in the brook (right).

Station Setup

Water quality parameters are measured at each station using an EXO 2 multiprobe instrument (Figure 4).



Figure 4: EXO 2 used for monitoring water quality parameters.

Six water parameters are measured at each station, including five water quality parameters (water temperature, dissolved oxygen, pH, turbidity, and specific conductivity), and one water quantity parameter (stage). Additionally, the water quality instrument has the capability to use specific conductivity and water temperature to calculate the total dissolved solids (TDS) present in the brook.

Water quality data is collected on an hourly basis (every 60 minutes) at both stations. Water quantity data is logged at John Fitzpatrick Pond every 5 minutes and at the Outflow of Unnamed Pond every 15 minutes.

The data for both stations is viewable and downloadable online through WRMD's Real Time Water Monitoring webpage located here: [Real Time Water Quality Monitoring Stations - Environment and Climate Change \(gov.nl.ca\)](http://gov.nl.ca)

Data Interpretation

WRMD staff with the Department of Environment, Conservation & Climate Change (ECC) are responsible for maintenance of the real-time water monitoring equipment, as well as grooming, analyzing, and reporting on the water monitoring data recorded at the stations. Performance and data records are interpreted for both stations for the following parameters:

- Water Temperature (°C)
- pH (pH units)
- Specific Conductivity(μS/cm)
- Total Dissolved Solids (g/L)
- Dissolved Oxygen (mg/L)
- Dissolved Oxygen (%Sat)
- Turbidity (NTU)
- Stage (m)

A description of each parameter is outlined in 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.**

The following report discusses the water quality parameters recorded from April 2025 to November 2025. These interpretations aim to point out seasonal trends and any significant issues influencing the water quality parameters.

Quality Assurance and Quality Control

To ensure accurate data collection, water quality instruments are subjected to quality assurance procedures to mitigate any errors caused by biofouling and/or sensor drift. Quality assurance procedures include: (i) a thorough cleaning of the instrument, (ii) replacement of any small sensor parts that are damaged or unsuitable for reuse, and (iii) the calibration of the sensors using standard solutions. Approximately every six weeks, the instrument is removed from the waterbody to undergo quality assurance procedures, while a newly cleaned and calibrated instrument is deployed.

During deployment and removal, a QA/QC Sonde is temporarily deployed adjacent to the Field Sonde. Values for temperature, pH, conductivity, dissolved oxygen, and turbidity are compared between the two instruments. Table 1 below summarizes the deployment periods and comparison rankings for 2025. Additionally, grab samples are collected during deployment to compare pH, turbidity, and specific conductivity values against the field sonde. Grab sample – field sonde performance rankings can be found below in Table 2. Based on the degree of difference between the parameters on the Field Sonde and QA/QC Sonde/grab sample, the water quality data is assigned a performance ranking (i.e. poor, marginal, fair, good, excellent) which can be found in Table 3 below.

For more detailed analyses of a particular time period, date or deployment period, please refer to the individual deployment reports: [Real Time Water Quality Information – Calibration Schedule and Deployment Reports - Environment and Climate Change \(gov.nl.ca\)](#)

Table 1: 2025 Deployment Periods and Field Sonde-QA/QC Sonde Performance Rankings

Station	Date	Action	2025 Deployment Season Comparison Ranking				
			Temperature	pH	Specific Conductivity	Dissolved Oxygen	Turbidity
John Fitzpatrick Pond*	-	Deployment	-	-	-	-	-
	-	Removal	-	-	-	-	-
Outflow to Unnamed Pond south of Long Pond	March 11, 2025	Deployment	Excellent	Excellent	Excellent	Excellent	Excellent
	April 30, 2025	Removal	Excellent	Excellent	Good	Good	Excellent
John Fitzpatrick Pond	April 30, 2025	Deployment	Good	Good	Excellent	Excellent	Excellent
	June 18, 2025	Removal	Excellent	Excellent	Good	Good	Good
Outflow to Unnamed Pond south of Long Pond	April 30, 2025	Deployment	Good	Good	Excellent	Excellent	Excellent
	June 18, 2025	Removal	Good	Excellent	Good	Excellent	Good
John Fitzpatrick Pond	June 18, 2025	Deployment	Excellent	Excellent	Good	Excellent	Excellent
	August 5, 2025	Removal	Excellent	Excellent	Excellent	Excellent	Excellent
Outflow to Unnamed Pond south of Long Pond	June 18, 2025	Deployment	Excellent	Excellent	Excellent	Good	Excellent
	August 5, 2025	Removal	Good	Excellent	Excellent	Excellent	Excellent
John Fitzpatrick Pond	August 5, 2025	Deployment	Excellent	Excellent	Excellent	Excellent	Excellent
	October 1, 2025	Removal	Excellent	Excellent	Excellent	Excellent	Excellent
Outflow to Unnamed Pond south of Long Pond	August 5, 2025	Deployment	Excellent	Excellent	Excellent	Good	Excellent
	October 1, 2025	Removal	Excellent	Excellent	Excellent	Excellent	Excellent
John Fitzpatrick Pond	October 1, 2025	Deployment	Excellent	Excellent	Good	Excellent	Excellent
	November 25, 2025	Removal	Excellent	Good	Excellent	Excellent	Excellent
Outflow to Unnamed Pond south of Long Pond	October 1, 2025	Deployment	Excellent	Excellent	Good	Excellent	Excellent
	November 25, 2025	Removal	Excellent	Excellent	Excellent	Good	Excellent

* John Fitzpatrick Pond was not deployed due to ice conditions. First deployment was April 30th, 2025.

Table 2: 2025 Deployment Season Grab Sample-Field Sonde Performance Rankings

Date	Station	2025 Deployment Season Grab Sample Comparison Ranking		
		pH	Specific Conductivity	Turbidity
March 11, 2025 to April 30, 2025	John Fitzpatrick Pond*	*	*	*
	Outflow to Unnamed Pond south of Long Pond	Good	Excellent	Excellent
April 30, 2025 to June 18, 2025	John Fitzpatrick Pond	Good	Excellent	Excellent
	Outflow to Unnamed Pond south of Long Pond	Good	Excellent	Excellent
June 18, 2025 to August 5, 2025	John Fitzpatrick Pond	Excellent	Excellent	Excellent
	Outflow to Unnamed Pond south of Long Pond	Excellent	Marginal	Excellent
August 5, 2025 to October 1, 2025	John Fitzpatrick Pond	Good	Good	Excellent
	Outflow to Unnamed Pond south of Long Pond	Excellent	Good	Excellent
October 1, 2025 to November 25, 2025	John Fitzpatrick Pond	Good	Marginal	Excellent
	Outflow to Unnamed Pond south of Long Pond	Excellent	Good	Excellent

* John Fitzpatrick Pond was not deployed due to ice conditions. First deployment was April 30th, 2025.

Table 3: Instrument Performance Ranking classifications for deployment and removal

Parameter	Rank				
	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

Technical or Structural Issues during the 2025 Season

The initial deployment start date for both Real Time stations differs. Outflow of Unnamed Pond south of Long Pond has been deployed since March 11, 2025. However, due to ice conditions on John Fitzpatrick Pond in March, the instrument could not be deployed. The decision was made to wait until the spring thaw to safely deploy. Therefore, April 30, 2025, was the first deployment of the season for John Fitzpatrick Pond station.

The John Fitzpatrick Pond RTWQ station encountered transmission problems on July 5th, 2025. Due to these issues there is no water quality data available for John Fitzpatrick Pond from July 5th, 2025 to August 5th, 2025. The graphs for John Fitzpatrick Pond will display a gap in the data for that time period.

In the Spring of 2026, the dataloggers that currently transmit raw data from the stations will become obsolete. ECC has provided CFI with quotes for several dataloggers that are compatible with the station infrastructure and can replace the current devices. Once the dataloggers have been purchased by CFI, these upgrades will happen in the summer of 2026.

It should be noted that Water Resources Management Division hydrometric data (stage and flow) 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.

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

Water Temperature

At John Fitzpatrick Pond, water temperature ranged from 4.55°C to 23.2°C while at Outflow of Unnamed Pond south of Long Pond water temperature ranged from -0.01°C to 27.59 °C (Table 4).

Water temperatures at both stations display large diurnal variations (Figure 5). This is typical of shallow water streams and ponds that are highly influenced by diurnal variations in ambient air temperatures (Figure 5). Trends in water temperature corresponded well with trends in air temperatures, displaying increases from June through August and decreases as Fall then Winter sets in.

Table 4: Summary of the 2025 Water Temperature data at CFI Real-Time Stations

	Water Temperature (°C)	
	John Fitzpatrick	Outflow of Unnamed
Min	4.55	-0.01
Max	23.2	27.59
Median	13.53	13.035

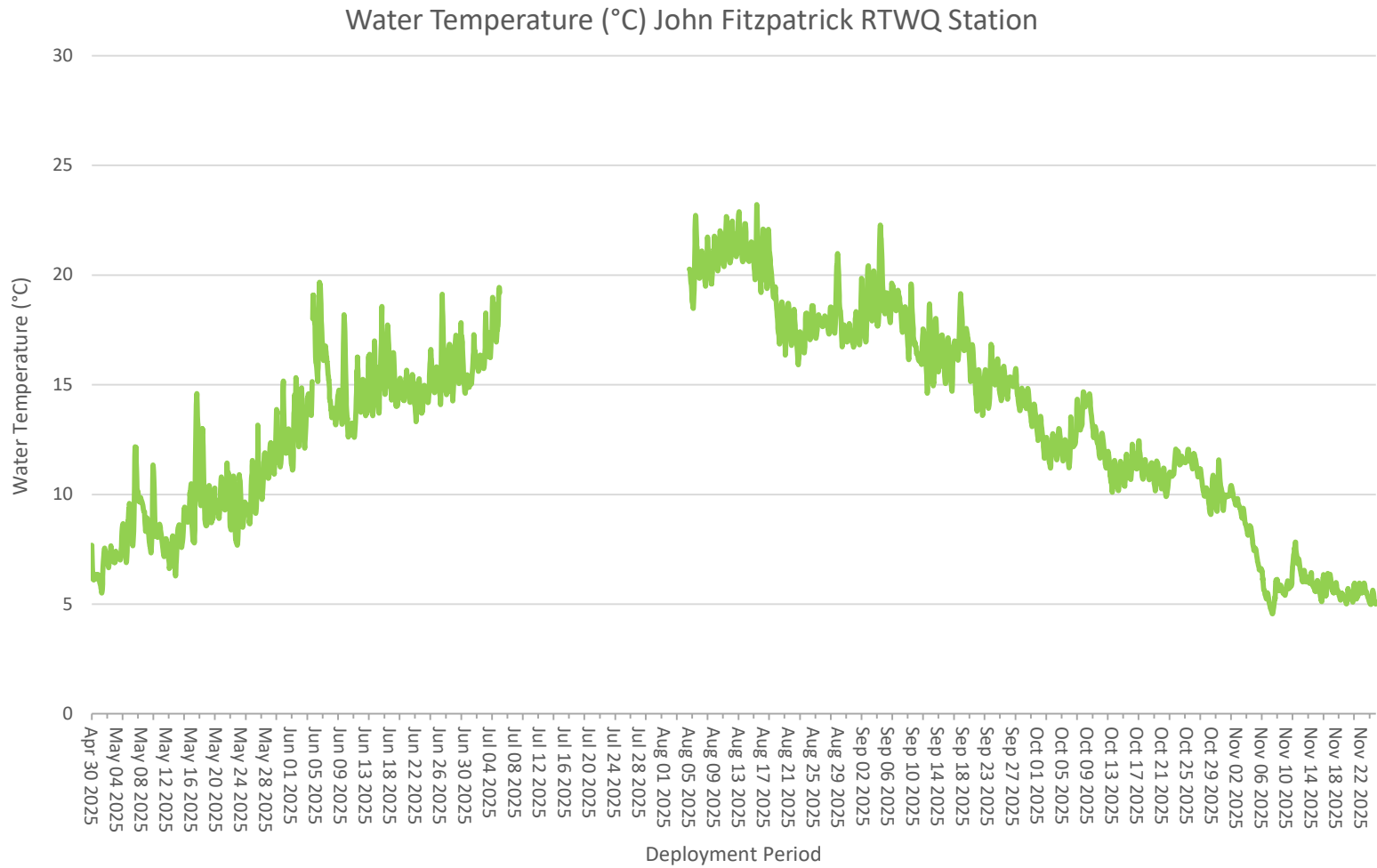


Figure 5: Water temperature (°C) recorded at John Fitzpatrick Pond RTWQ station

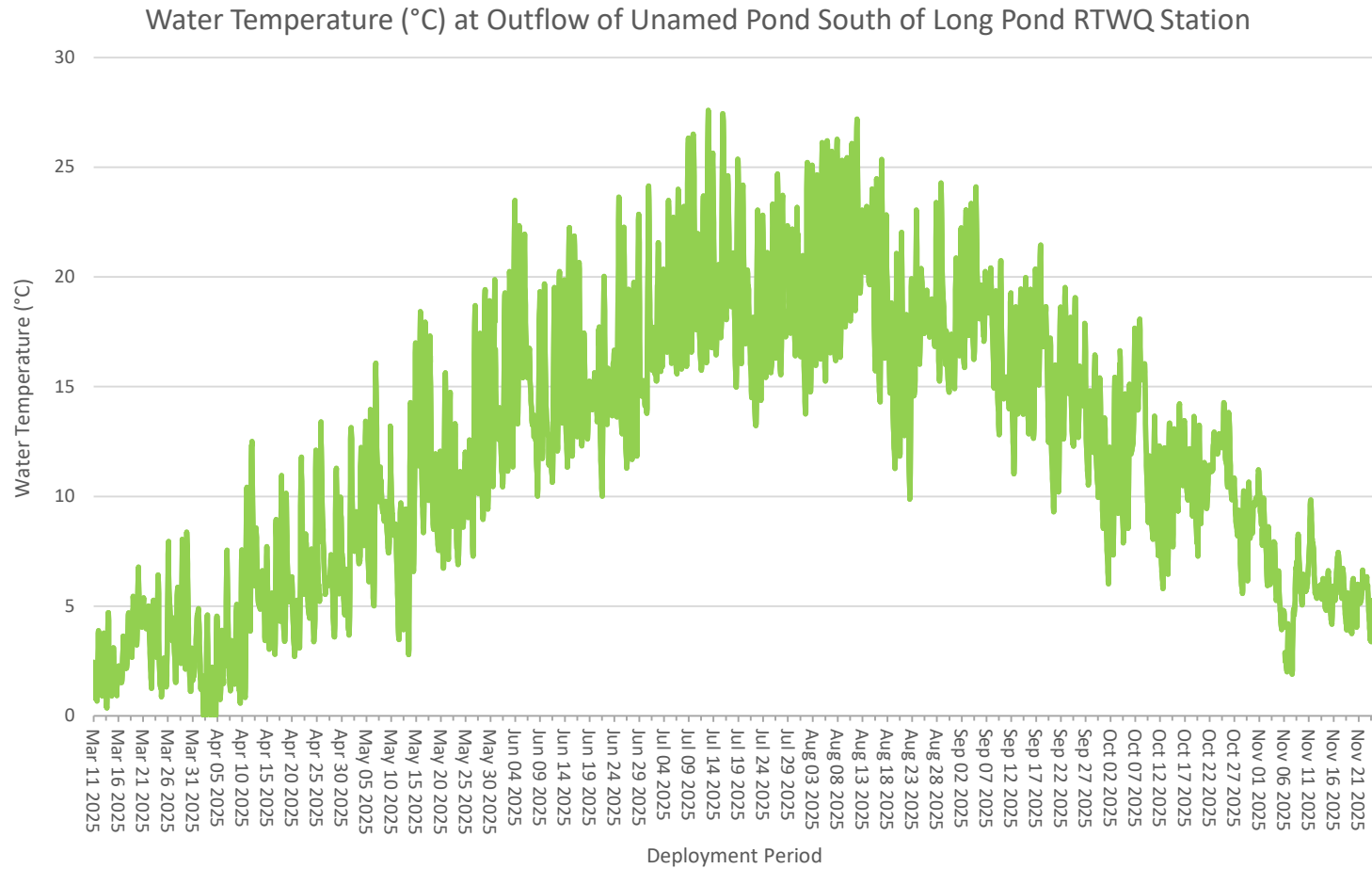


Figure 6: Water temperature (°C) recorded at Outflow of Unnamed RTWQ station

pH

John Fitzpatrick Pond pH ranged from 7.06 to 8.85 pH units while at the Outflow of Unnamed Pond South of Long Pond station, the pH ranged from 6.96 to 8.21 pH units (Table 4). The Outflow of Unnamed typically experiences larger fluctuations due to it being a small brook that is easily influenced by environmental factors. John Fitzpatrick Pond had a median of 8.18 pH units which is slightly higher than the 2024 median of 8.05 (see Appendix II), which can likely be related to pumping of the open pit mines flowing into the pond. The 2025 median of 7.86 pH units at Outflow of Unnamed was very similar to the 2024 median of 7.7.

pH at both stations was relatively consistent throughout the deployment season, remaining within the CCME Guidelines for the Protection of Aquatic Life of 6.5 – 9.0 pH units. There were several incidences where pH dipped down below background levels which can often be attributed to an increase in stage levels (Figure 8/9). Stage increases are typically the result of precipitation events.

Table 5: Summary of 2025 pH data at CFI Real-Time Stations

	pH (pH units)	
	John Fitzpatrick	Outflow of Unnamed
Min	7.06	6.96
Max	8.85	8.21
Median	8.18	7.85

Water pH and Stage Level (m) at John Fitzpatrick RTWQ Station

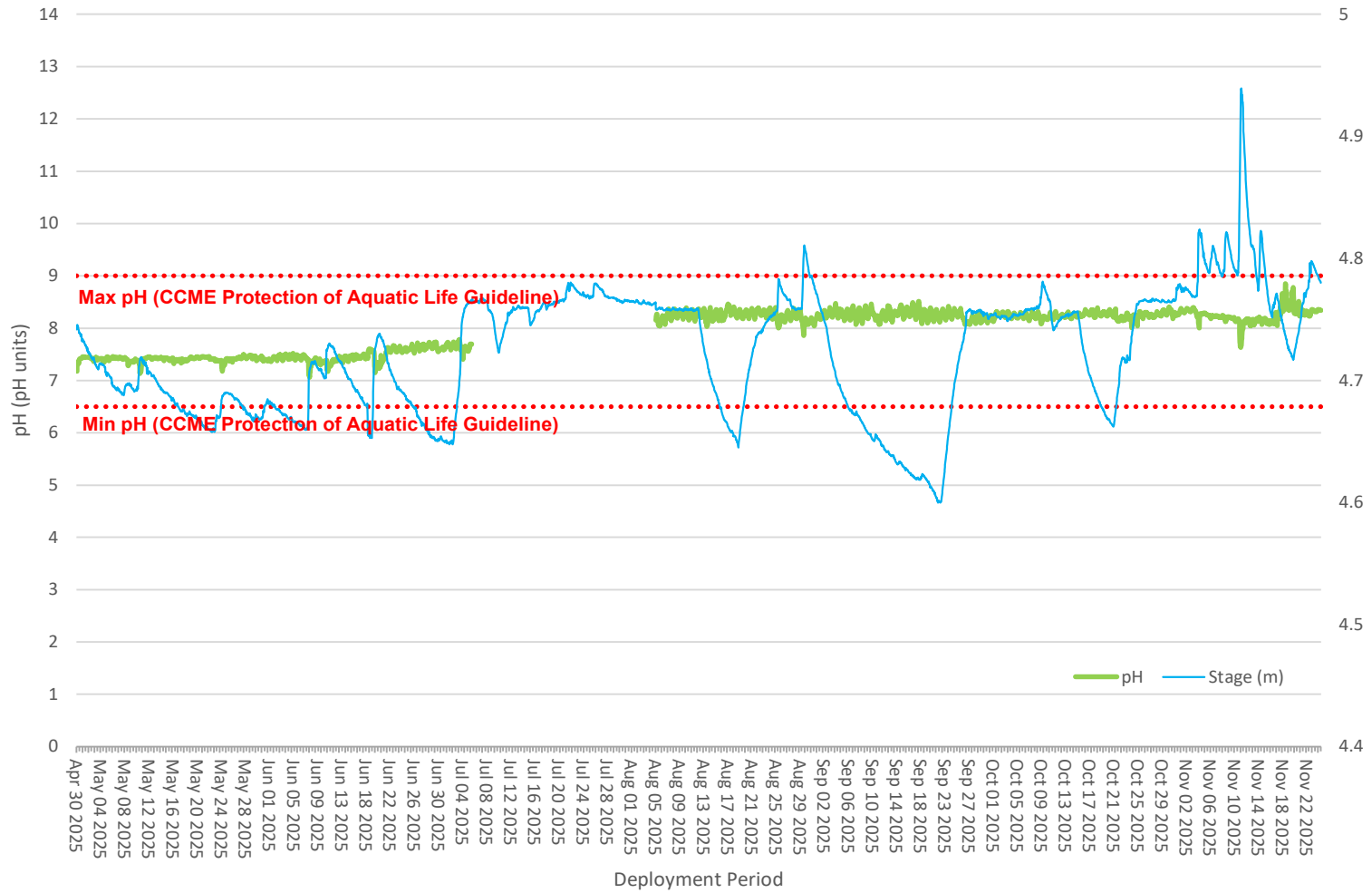


Figure 7: pH and Stage Level (m) recorded at John Fitzpatrick Pond RTWQ Station

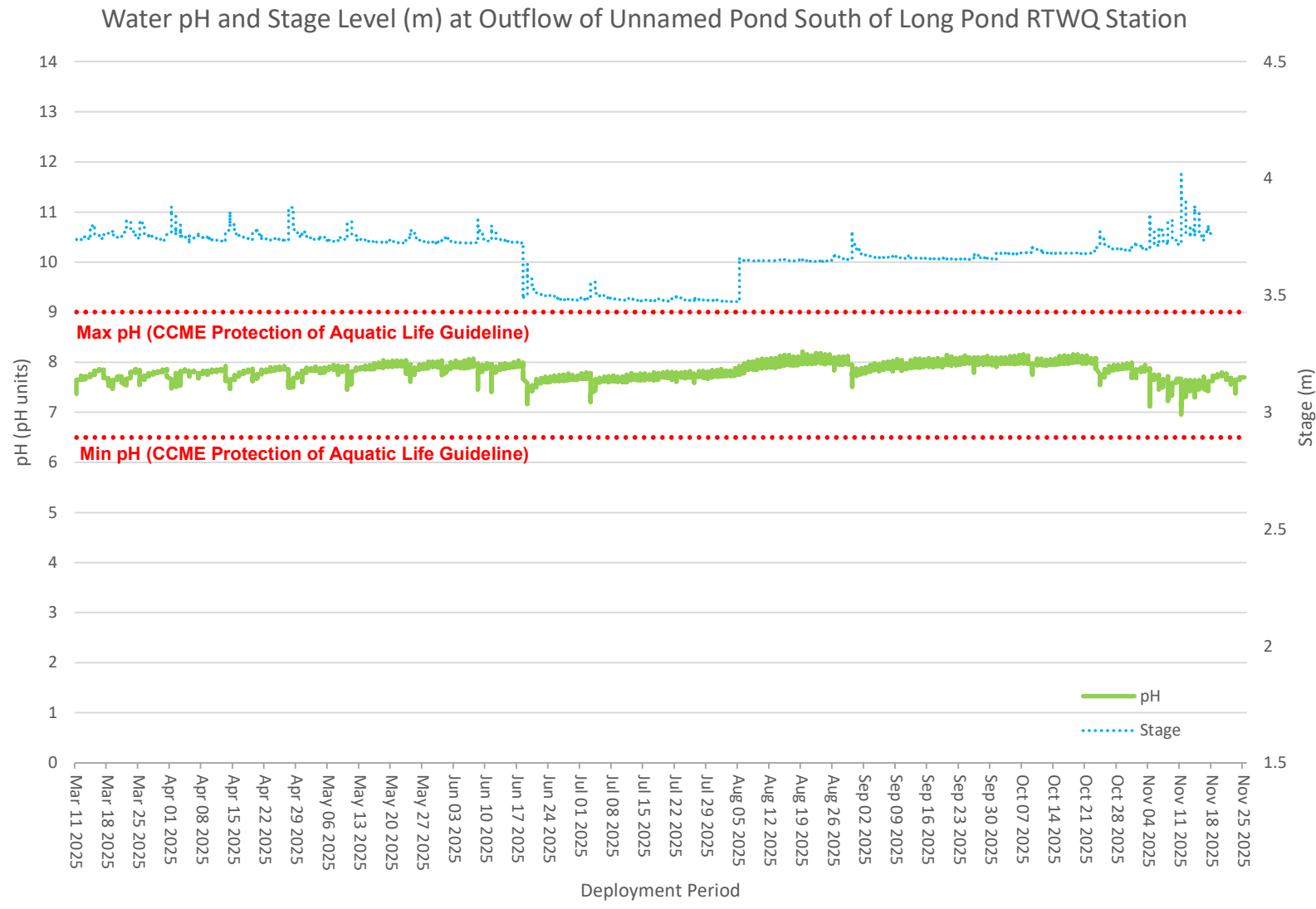


Figure 9: pH and Stage (m) recorded at Outflow of Unnamed Pond South of Long Pond RTWQ Station

Specific Conductivity

During the 2025 deployment season, conductivity levels ranged from 100.35 $\mu\text{S}/\text{cm}$ to 251.37 $\mu\text{S}/\text{cm}$ at John Fitzpatrick Pond and, 135.96 $\mu\text{S}/\text{cm}$ to 365.42 $\mu\text{S}/\text{cm}$ at Outflow of Unnamed Pond south of Long Pond (see Table 5). There is a direct relationship between conductivity and stage. Generally during rainfall events, the additional water dilutes the minerals and material present in the water column, lowering the conductivity levels. However, if sediment or materials from the surrounding environment are flushed into the brook, conductivity levels may rise.

Specific conductivity recorded at John Fitzpatrick Pond had a median of 195.5 $\mu\text{S}/\text{cm}$, the same as the 2024 median of 195.3 $\mu\text{S}/\text{cm}$. Conductivity overall displayed a relatively constant trend. Many of the dips and increases in the data can be attributed to precipitation events and the pumping of the open pit mines into John Fitzpatrick Pond.

Specific conductivity recorded at Outflow of Unnamed Pond south of Long Pond had a 2025 median of 276.8 $\mu\text{S}/\text{cm}$, which is comparable to the 2024 median of 243.23 $\mu\text{S}/\text{cm}$. This station is located downstream from the Tailings Management Facility so typically any leaks from the TMF will cause noticeable increases in the conductivity levels. The fluctuations in conductivity observed throughout 2025 likely stem from precipitation events leading to increases in water levels. Significant drops coincide with spikes in water levels, followed by a gradual return of conductivity levels to their baseline (refer to Figure 11).

Table 6. Summary of 2025 specific conductivity data at the CFI Real-Time Stations

	Specific Conductivity ($\mu\text{S}/\text{cm}$)	
	John Fitzpatrick	Outflow of Unnamed
Min	100.35	135.96
Max	251.37	365.42
Median	195.5	276.85

Specific Conductivity ($\mu\text{S}/\text{cm}$) and Stage Level (m) at John Fitzpatrick RTWQ Station

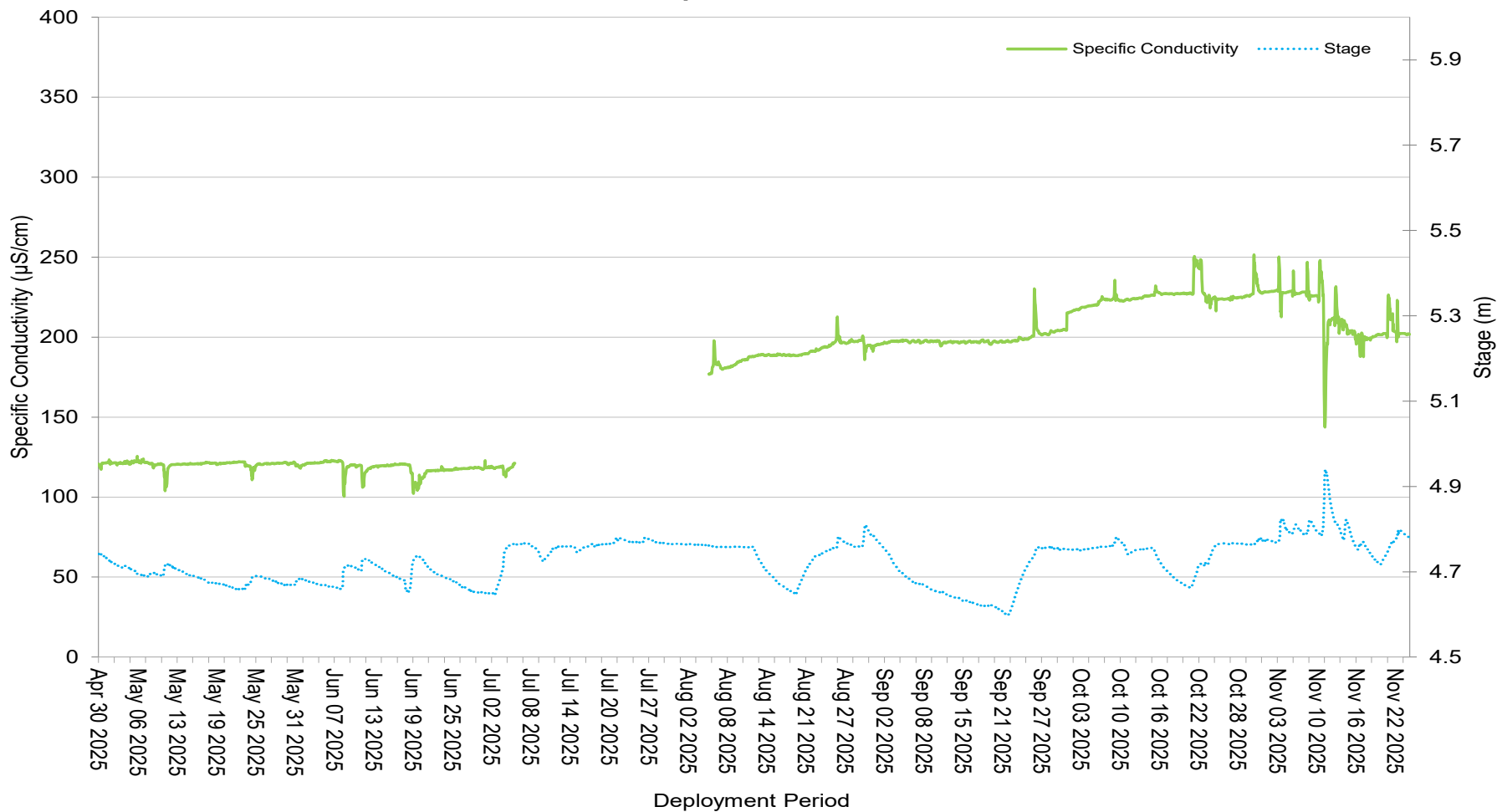


Figure 10: Specific conductivity ($\mu\text{S}/\text{cm}$) recorded at John Fitzpatrick Pond Real-Time Station

Specific Conductivity ($\mu\text{S}/\text{cm}$) and Stage Level (m) at Outflow of Unnamed Pond South of Long Pond RTWQ Station

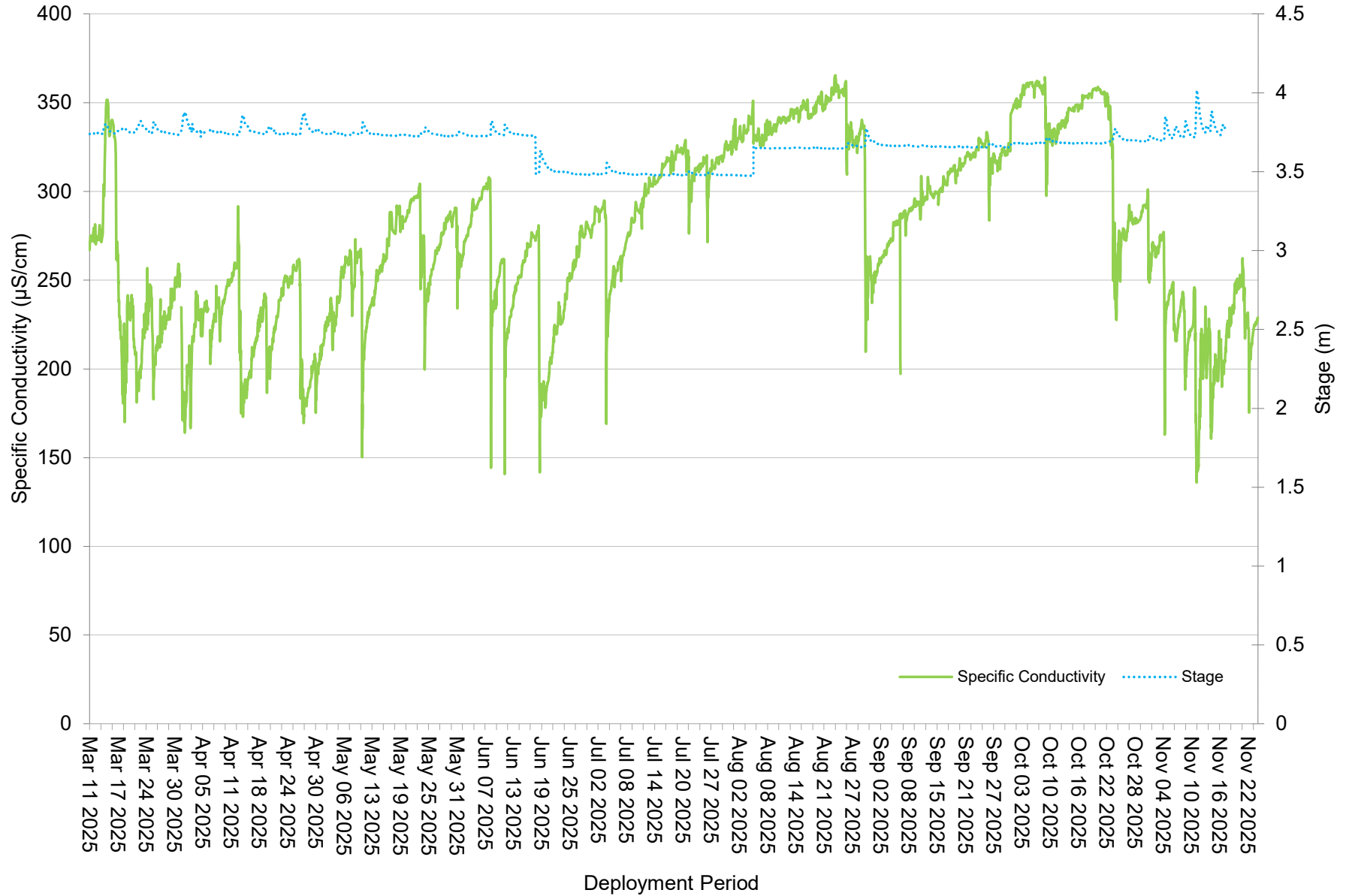


Figure 11: Specific conductivity ($\mu\text{S}/\text{cm}$) at the Outflow of Unnamed Pond South of Long Pond Real-Time Station

Dissolved Oxygen (DO)

Over the 2025 annual deployment period, the dissolved oxygen concentrations ranged from 8.64mg/L to 12.92mg/L at John Fitzpatrick Pond, with percent saturation levels ranging between 92.9% to 117.4%. Outflow of Unnamed Pond south of Long Pond dissolved oxygen concentrations ranged from 7.68 mg/L to 15.19 mg/L and percent saturation ranged from 82.7 % to 109.7 % (see Table 6). DO for both stations remained above the CCME Guideline for the Protection of Other Life Stages of Aquatic Life (6.5 mg/L) throughout the year and close to or above the Guideline for the Protection of Early Life Stages (9.5 mg/L) for a portion of the year.

Dissolved oxygen levels exhibited natural daily fluctuations at both locations due to changes in temperature and the photosynthetic activity of aquatic organisms regarding CO₂. The patterns observed in DO align with the inverse relationship with water temperature; colder water tends to hold more dissolved oxygen compared to warmer water.

Table 7. Summary of 2025 Dissolved oxygen data at Canada Fluorspar Inc. Real-Time Stations

	John Fitzpatrick Dissolved Oxygen		Unnamed Pond Dissolved Oxygen	
	mg/L	%Sat	mg/L	%Sat
Min	8.64	92.9	7.68	82.7
Max	12.92	117.4	15.19	109.7
Median	10.69	101.4	10.64	99.7

DISSOLVED OXYGEN CONCENTRATION (MG/L) AND %SAT AT JOHN FITZPATRICK RTWQ STATION

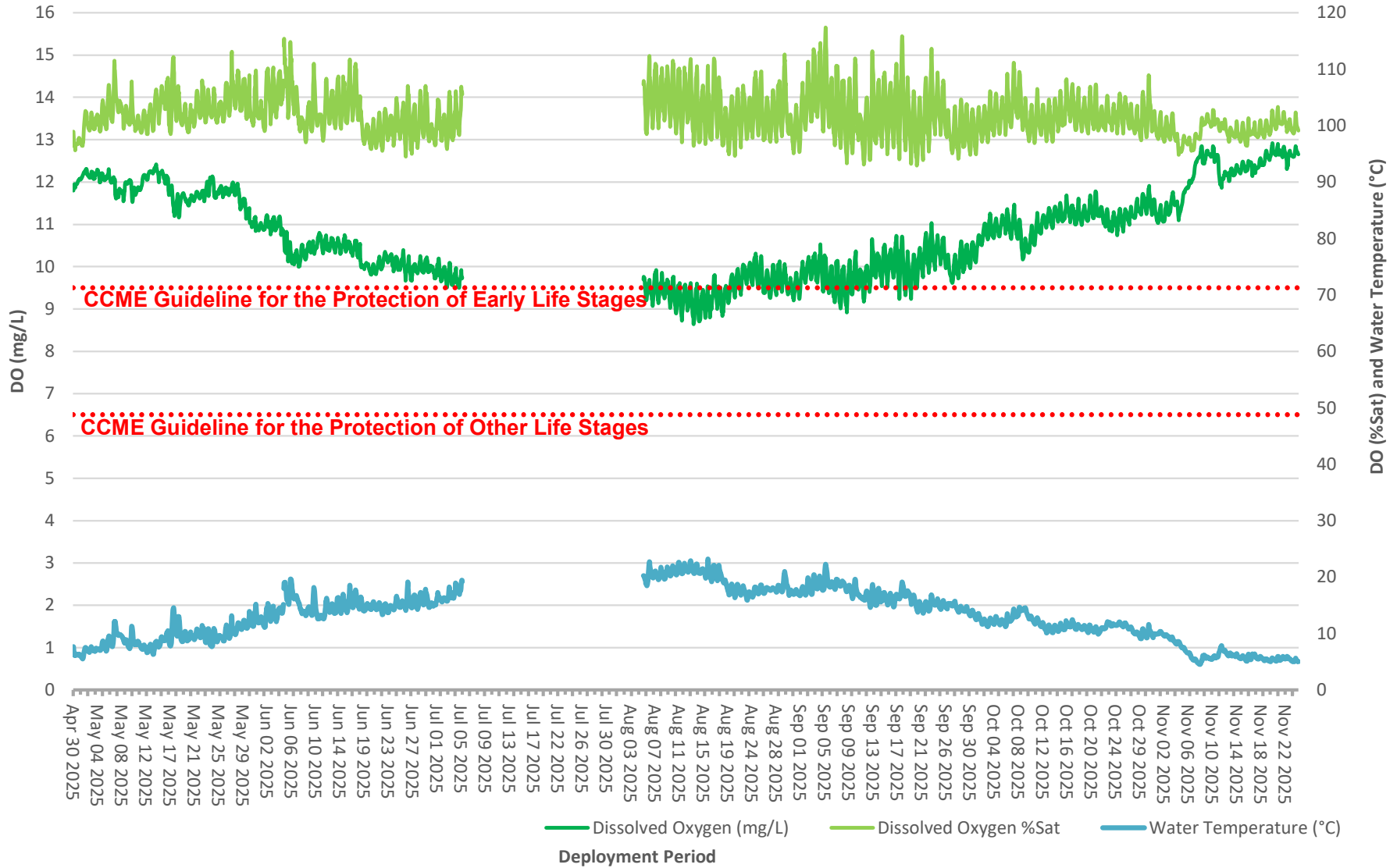


Figure 12: Dissolved Oxygen (%Sat and mg/l) and Water Temperature (°C) at John Fitzpatrick Pond Real-Time Station

DISSOLVED OXYGEN CONCENTRATION (MG/L) AND %SAT AT OUTFLOW OF UNNAMED POND SOUTH OF LOND POND RTWQ STATION

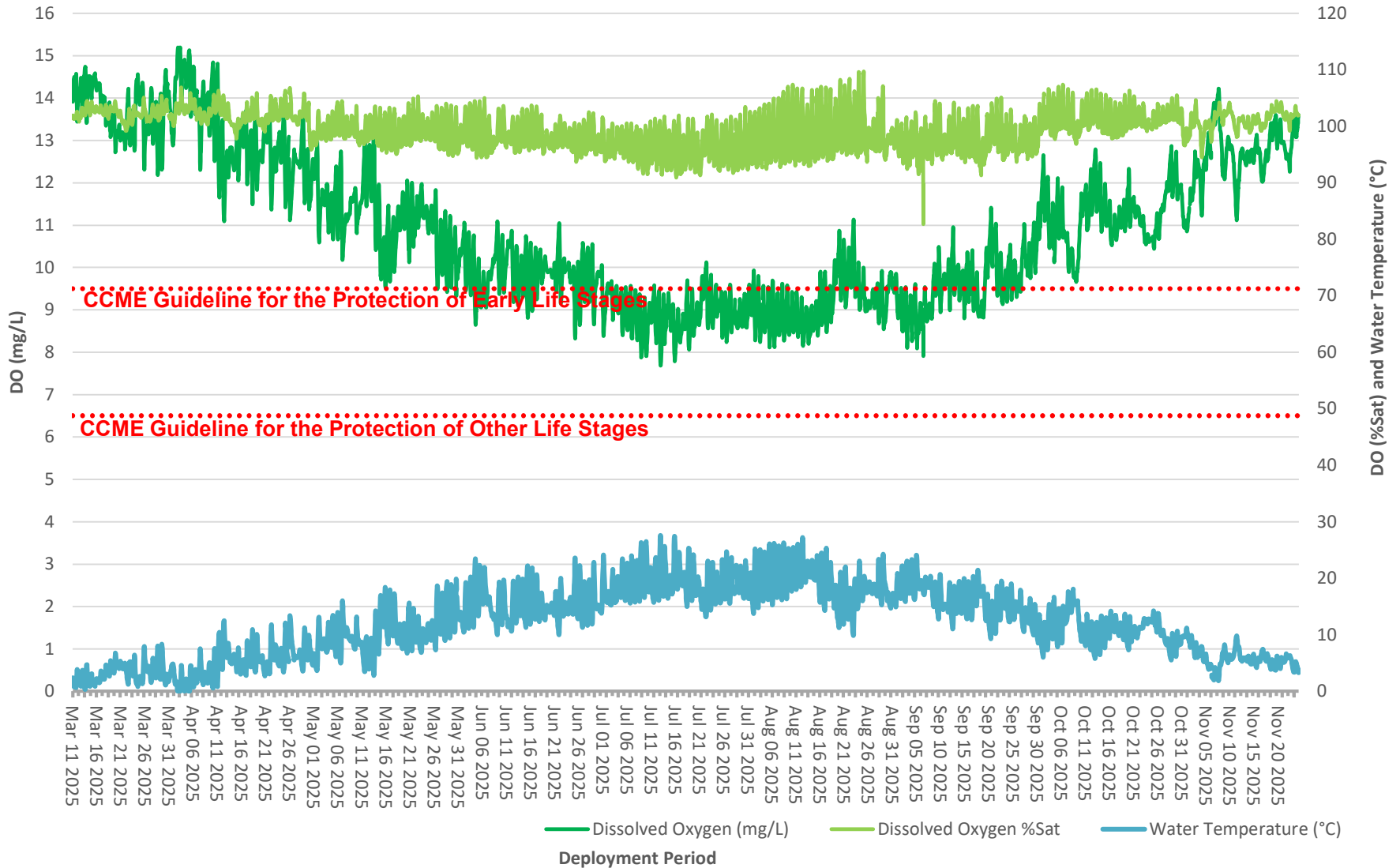


Figure 13: Dissolved Oxygen (%Sat and mg/l) and Water Temperature (°C) at Outflow of Unnamed Real-Time Station

Turbidity

Turbidity levels during the deployment ranged from 0.0 NTU to 36.2 NTU at John Fitzpatrick Pond and 0.1 NTU to 56.8 NTU at Outflow of Unnamed Pond south of Long Pond. Median values were low at 0.55 NTU and 1.9 NTU, respectively.

A sharp increase in turbidity occurred at Outflow of Unnamed at the start of the deployment year, however, the values dropped and stayed below 20 NTU for the remainder of the deployment.

Spikes in the data are typically a result of precipitation events that could result in increased sediment entering the water column from run-off, or disturbed sediment in the water column. Turbidity returned to background values shortly after spikes.

Table 8. Summary for 2025 Turbidity data at CFI Real-Time stations

	Turbidity (NTU)	
	John Fitzpatrick	Outflow of Unnamed
Min	0.0	0.1
Max	36.2	56.8
Median	0.55	1.9

Turbidity (NTU) and Stage (m) at John Fitzpatrick RTWQ Station

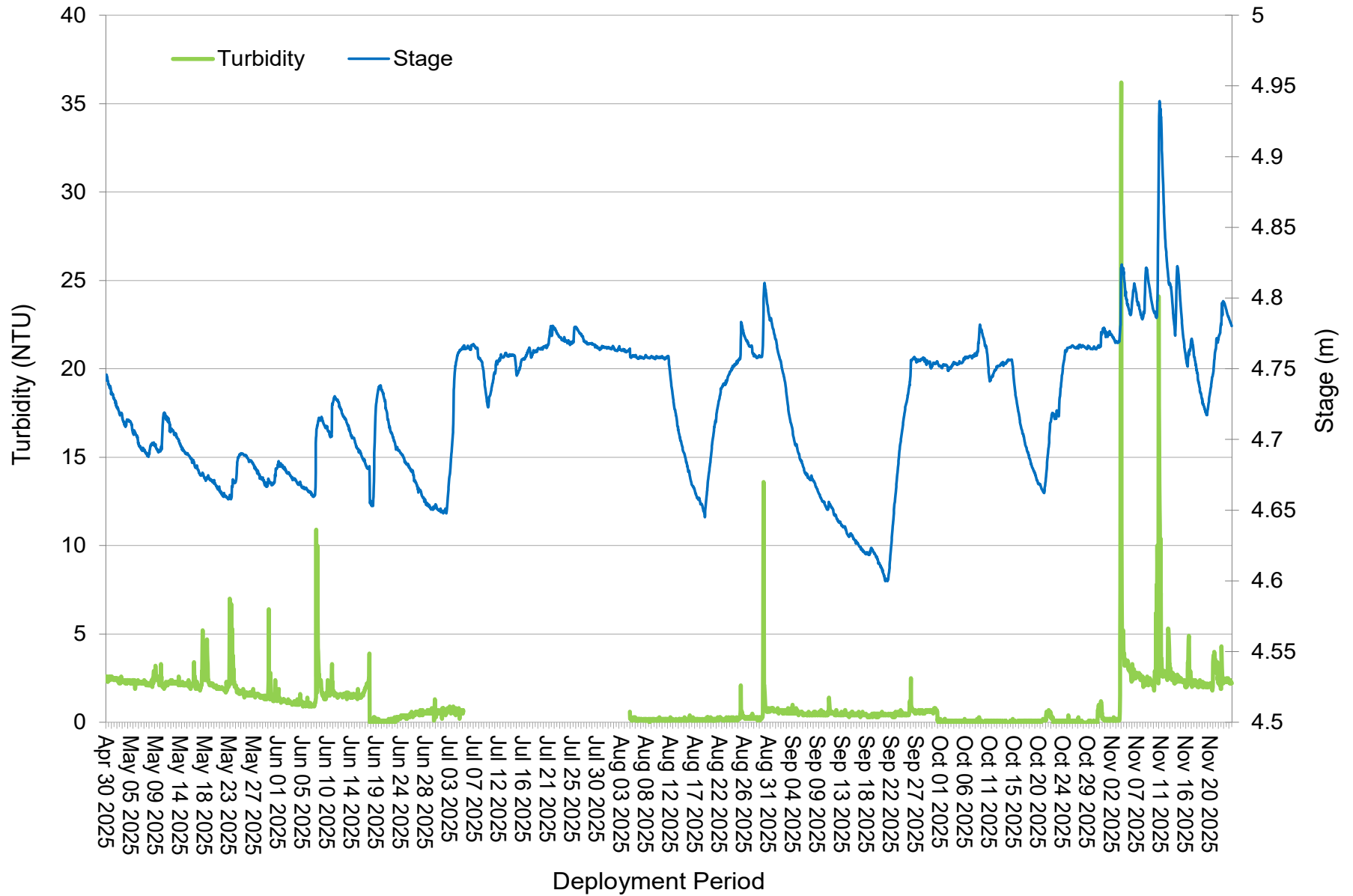


Figure 14: Turbidity (NTU) measurements record at John Fitzpatrick Pond Real-Time Station

Turbidity (NTU) and Stage (m) at Outflow of Unnamed Pond South of Lond Pond RTWQ Station

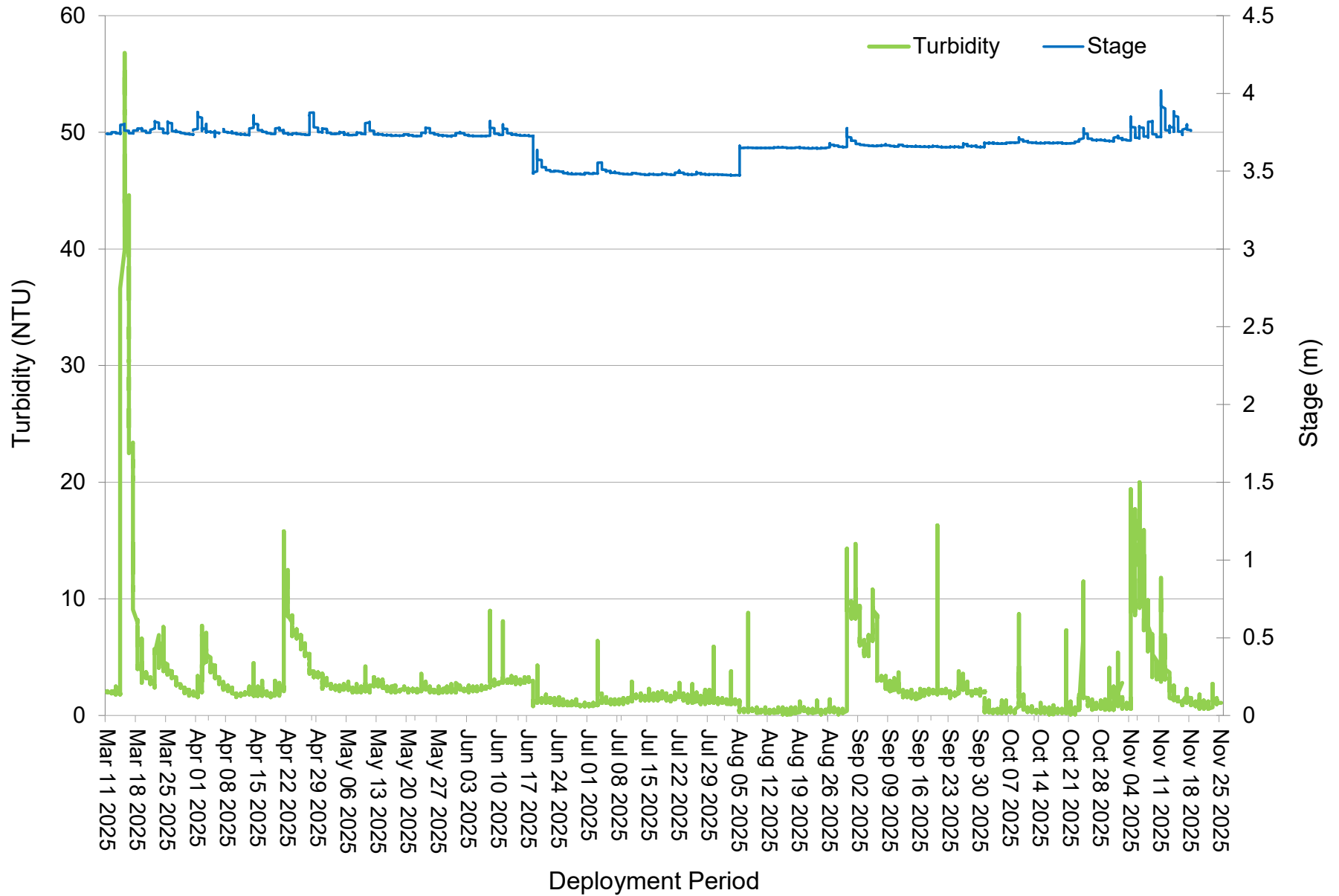


Figure 15: Turbidity (NTU) values at Outflow of Unnamed Pond South of Long Pond Real Time Station

Total Precipitation & Daily Averaged Stage Data

Stage is important as it provides an estimation of water level at the station and can explain some of the fluctuations that are occurring in relation to other parameters (i.e. Specific Conductivity, DO, turbidity). Stage will increase naturally during rainfall events (Figure 16) and during any surrounding snow or ice melt as runoff collects in the brooks. Hourly precipitation data was obtained from Environment Canada’s St. Lawrence weather station. Although the stations are not on the same river, there is only a short distance between them. Both sites had similar peaks in stage during the rainfall events (Figure 17). The highest daily precipitation of 93.4mm recorded was on November 11, 2025.

Stage recorded at Outflow of Unnamed Pond south of Long Pond indicates a dip in the stage level during mid deployment. This can indicate an adjustment may be needed on the bubbler. This data was kept in the analysis for 2025 as it still displays change and movement in the level.

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.

Table 9. Summary of 2025 Stage data at CFI Real-Time stations

	Stage (m)	
	John Fitzpatrick	Outflow of Unnamed
Min	4.59	3.474
Max	4.94	4.01
Median	4.73	3.69

Stage (m) Recorded at John Fitzpatrick Pond with the
Daily Precipitation (mm) recorded at the St. Lawrence Environment Canada Weather Station

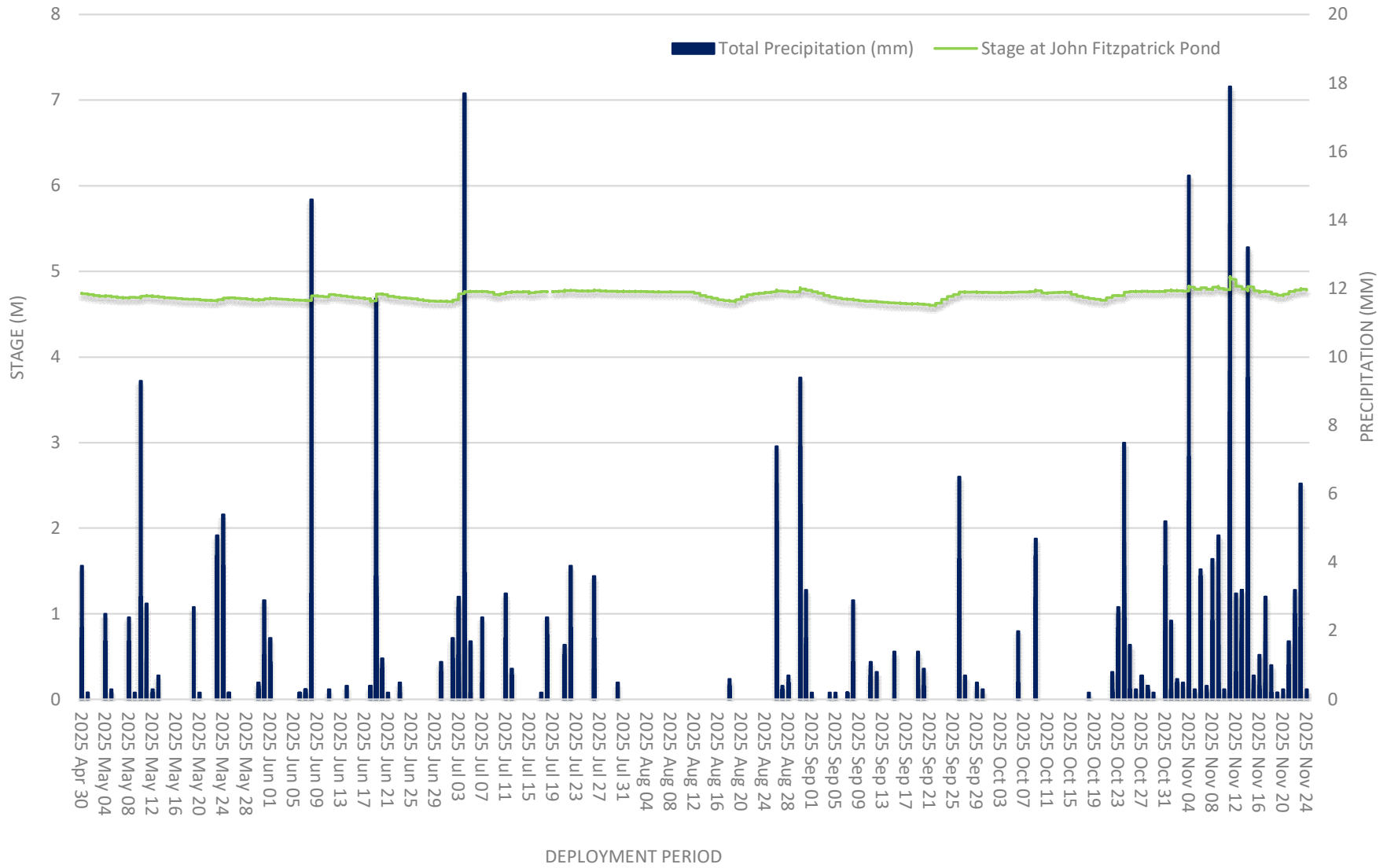


Figure 16: 2025 Stage data recorded at John Fitzpatrick Pond Station (m)

Stage (m) Recorded at Outflow of Unnamed Pond south of Long Pond & Total Precipitation (mm) recorded at St. Lawrence Climate Station.

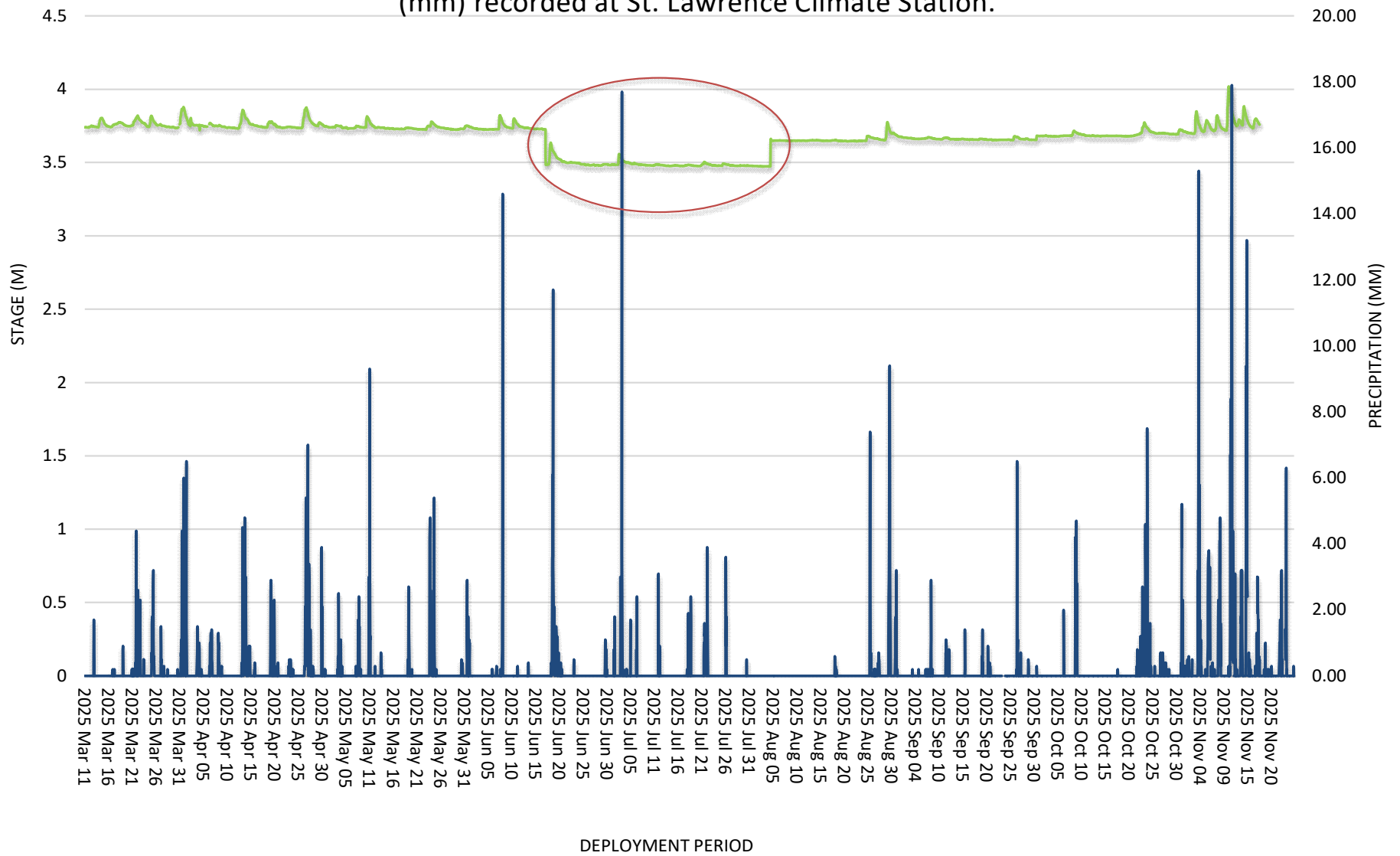


Figure 17: 2025 Stage data recorded at Outflow of Unnamed Pond south of Long Pond Station (m)

Daily Precipitation (mm) Recorded at Environment Canada Climate Station located in St. Lawrence

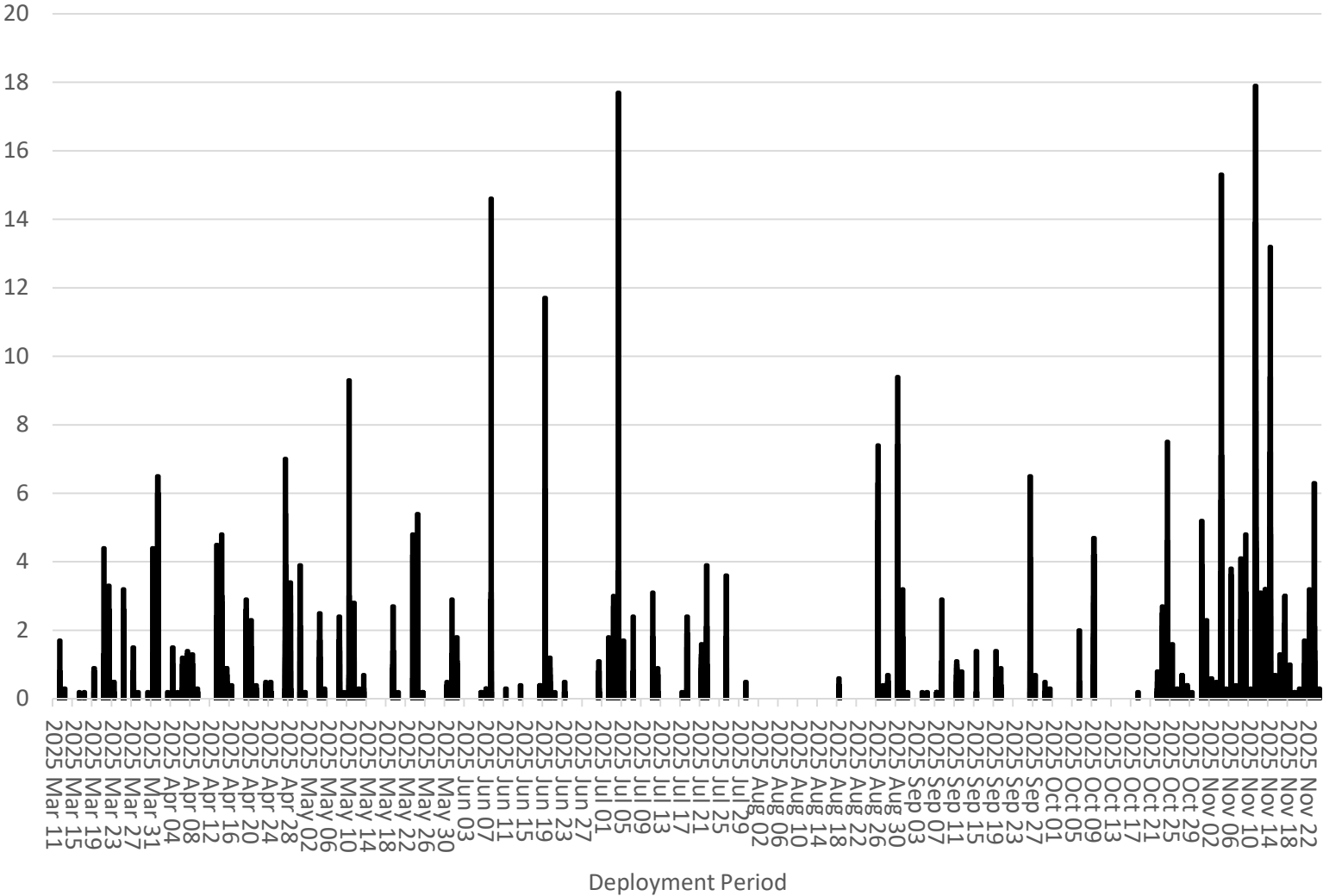


Figure 18: 2025 Daily Precipitation (mm) from St. Lawrence Weather Station

Conclusion

Water quality monitoring for the Canada Fluorspar Inc. network was deployed at John Fitzpatrick Pond and Outflow to Unnamed Pond south of Long Pond from April 30th, 2025 to November 24th, 2025, respectively. The deployment season continued until November 2025 when it was determined best to remove the instruments due to forecasted weather conditions. The instruments were not deployed during the winter season but will be redeployed as soon as the ice thaws in Spring 2026.

As with many brooks and streams, precipitation and runoff influence the water quality within a water body. Catchment areas for Outflow of Unnamed Pond south of Long Pond and John Fitzpatrick Pond are impacted by anthropogenic changes from adjacent mining activity. The health of a brook can be determined by how quickly it returns to its background data level after a water quality event.

Throughout deployment, water temperatures followed the expected seasonal trend of increasing during the summer and decreasing into the fall. pH at both stations remained relatively consistent across deployments. Specific conductivity fluctuated with stage increases at Outflow of Unnamed, while conductivity at John Fitzpatrick Pond remained low and consistent, which would be expected of a pond.

Outflow of Unnamed had one significant spike in turbidity in March 2025, however, the remainder of the deployment year, values remained below 20 NTU. Turbidity recorded at John Fitzpatrick Pond stayed below 15 NTU, until the end of the deployment when there were 2 spikes in turbidity. The changes in turbidity at the Real-Time stations corresponded with increasing stage level and are linked to precipitation events within the same time frame.

The water quality parameters displayed expected data for surface water bodies that can be periodically impacted by anthropogenic events.

Path Forward 2026

- The water quality instruments will undergo proficiency testing and evaluation during the winter of 2025-2026. ECC will inform Canada Fluorspar of any instrument performance issues or sensor replacements.
- In the Spring of 2026, the dataloggers that currently transmit raw data from the stations will become obsolete. ECC has provided CFI with quotes for several dataloggers that are compatible with the station infrastructure and can replace the current model. Once the dataloggers have been purchased by CFI, these upgrades will be scheduled for the spring of 2026.
- Additional upgrades needed at the real-time stations: new batteries and solar panels for both stations. Due to the assumed presence of bears in the area, the communication cable will require new steel reinforced conduit for both stations.
- ECC staff will deploy real time water quality instruments in spring 2026, when ice conditions allow and perform regular site visits throughout the 2026 deployment season for calibration and maintenance of the instruments. If necessary, deployment techniques will be evaluated and modified, ensuring secure and suitable conditions for RTWQ monitoring.
- ECC will continue to work on its Automatic Data Retrieval System, to incorporate new capabilities in data management and data display.
- ECC staff will continue monitoring water level, recording water quantity measurements, and maintaining equipment upkeep.
- Ongoing liaison between ECC and Canada Fluorspar to monitor or respond to emerging issues on a proactive basis. Canada Fluorspar will receive deployment reports and an annual report, summarizing the events of the deployment season throughout the year.

APPENDIX I

WATER QUALITY PARAMETER DEFINITIONS

Dissolved Oxygen

The amount of Dissolved Oxygen (DO) (mg/l) in the water is vital to aquatic organisms for their survival. The concentration of DO is affected by such things as water temperature, water depth and flow (e.g., aeration by rapids, riffles etc.), consumption by aerobic organisms, consumption by inorganic chemical reactions, consumption by plants during darkness, and production by plants during the daylight (Allan 2010).

pH

pH is the measure of hydrogen ion activity and affects: (i) the availability of nutrients to aquatic life; (ii) the concentration of biochemical substances dissolved in water; (iii) the efficiency of hemoglobin in the blood of vertebrates; and (iv) the toxicity of pollutants. Changes in pH can be attributed to industrial effluent, saline inflows, precipitation, or aquatic organisms involved in the photosynthetic cycling of CO₂ (Allan 2010).

Specific conductivity

Specific conductivity ($\mu\text{S}/\text{cm}$) is a measure of water's ability to conduct electricity, with values normalized to a water temperature of 25°C. Specific conductance indicates the concentration of dissolved solids (such as salts) in the water, which can affect the growth and reproduction of aquatic life. Specific conductivity is affected by rainfall events, the composition of inflowing tributaries and their associated geology, saline inflow (e.g., road salt), agricultural run-off and industrial inputs (Allan 2010; Swanson and Baldwin 1965).

Stage

Stage (m) is the elevation of the water surface and is often used as a surrogate for the more difficult to measure flow.

Temperature

Essential to the measurement of most water quality parameters, temperature (°C) controls most processes and dynamics of limnology. Water temperature is influenced by such things as ambient air temperature, solar radiation, meteorological events, industrial effluence, wastewater, inflowing tributaries, as well as water body size and depth (Allan 2010; Hach 2006).

Total Dissolved Solids

Total Dissolved Solids (TDS) (g/l) is a measure of alkaline salts dissolved in water or in fine suspension and can affect the growth and reproduction of aquatic life. It is affected by rainfall events, the composition of inflowing tributaries and their associated geology, saline inflow (e.g., road salt), agricultural run-off and industrial inputs (Allan 2010; Swanson and Baldwin 1965).

Turbidity

Turbidity (NTU) is a measure of the translucence of water and indicates the amount of suspended material in the water. Turbidity is caused by any substance that makes water cloudy (e.g., soil erosion, micro-organisms, vegetation, chemicals, etc.) and can correspond to precipitation events, high stage, and floating debris near the sensor (Allan 2010; Hach 2006; Swanson and Baldwin 1965).

APPENDIX II

COMPARISON STATISTICS ACROSS DEPLOYMENTS AT CANADA FLUORSPAR INC

Comparison Statistics from 2019			Comparison Statistics from 2020			Comparison Statistics from 2021			Comparison Statistics from 2022			Comparison Statistics from 2023					
Water Temperature °C			Water Temperature °C			Water Temperature (oC)			Water Temperature (oC)			Water Temperature (oC)					
Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed	
Min	2.41	-0.04	Min	1.93	-0.02	Min	0	-0.01	Min	-0.21	-0.17	Min	0.01	-0.06	Min	0.01	-0.06
Max	22.58	26.88	Max	20.4	27.1	Max	19.2	27.28	Max	25.36	28.49	Max	24.8	28.58	Max	24.8	28.58
Median	9.54	11.62	Median	10.33	12.75	Median	9.78	10.87	Median	13.05	13.16	Median	12.25	11.99	Median	12.25	11.99
pH (pH units)			pH (pH units)			pH(pH units)			pH(pH units)			pH(pH units)					
Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed	
Min	6.21	7.31	Min	7.06	6.66	Min	6.88	6.37	Min	6.59	6.43	Min	7.03	6.78	Min	7.03	6.78
Max	8.13	8.44	Max	8.21	7.87	Max	8.35	8.02	Max	7.85	8.15	Max	8	8.1	Max	8	8.1
Median	7.6	8.01	Median	7.9	7.38	Median	7.76	7.46	Median	7.61	7.71	Median	7.75	7.78	Median	7.75	7.78
Specific Conductivity (µS/cm)			Specific Conductivity (µS/cm)			Specific Conductivity (µS/cm)			Specific Conductivity (µS/cm)			Specific Conductivity (µS/cm)					
Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed	
Min	190.2	182.12	Min	86.16	66.04	Min	144.9	76.08	Min	92.2	70.24	Min	98.4	88.88	Min	98.4	88.88
Max	586.91	507.59	Max	456	221.76	Max	497.95	510.94	Max	165.6	358.74	Max	272.52	365.26	Max	272.52	365.26
Median	344.145	357.94	Median	318.74	154.97	Median	341.1	169.41	Median	155.75	248.88	Median	197.06	242.84	Median	197.06	242.84
Dissolved Oxygen (mg/L)			Dissolved Oxygen (mg/L)			Dissolved Oxygen (mg/L)			Dissolved Oxygen (mg/L)			Dissolved Oxygen (mg/L)					
Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed	
Min	7.36	7.98	Min	9.18	8.04	Min	8.91	7.98	Min	8.2	8.04	Min	8.01	7.44	Min	8.01	7.44
Max	13.27	14.59	Max	13.89	14.94	Max	14.16	14.25	Max	15.4	15.12	Max	15.28	14.9	Max	15.28	14.9
Median	10.41	10.81	Median	10.96	10.38	Median	10.85	10.93	Median	10.92	10.45	Median	11.02	10.58	Median	11.02	10.58
Dissolved Oxygen (%Sat)			Dissolved Oxygen (%Sat)			Dissolved Oxygen (%Sat)			Dissolved Oxygen (%Sat)			Dissolved Oxygen (%Sat)					
Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed	
Min	70.7	90.8	Min	86.1	88	Min	85.8	88.1	Min	89.1	90.9	Min	88.3	89.3	Min	88.3	89.3
Max	131	103.6	Max	116.7	124.1	Max	108.6	118.4	Max	114.7	108.3	Max	114.7	109.8	Max	114.7	109.8
Median	90.6	98.4	Median	97.9	99.3	Median	97.6	98.4	Median	101.3	98.8	Median	99.8	98.2	Median	99.8	98.2
Turbidity (NTU)			Turbidity (NTU)			Turbidity (NTU)			Turbidity (NTU)			Turbidity (NTU)					
Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes/Outflow of Unnamed			Outflow of Grebes		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed		John Fitzpatrick		Outflow of Unnamed	
Min	-0.4	6.5	Min	0.6	3.9	Min	0.8	3.1	Min	0.04	0.3	Min	0.3	0.59	Min	0.3	0.59
Max	3548.1	166	Max	4117.1	280.6	Max	6616	792.5	Max	95.54	202.3	Max	18.5	14.1	Max	18.5	14.1
Median	24.3	48.6	Median	24.35	21.9	Median	12.4	20	Median	1.18	3.8	Median	1.45	2.2	Median	1.45	2.2

Comparison Statistics from 2024			Comparison Statistics from 2025		
	Water Temperature (oC)			Water Temperature (oC)	
	John Fitzpatrick	Outflow of Unnamed		John Fitzpatrick	Outflow of Unnamed
Min	4.05	2.73	Min	4.55	-0.01
Max	24.07	26.7	Max	23.2	27.59
Median	14.79	14.45	Median	13.53	12.31
	pH(pH units)			pH(pH units)	
	John Fitzpatrick	Outflow of Unnamed		John Fitzpatrick	Outflow of Unnamed
Min	7.16	7.65	Min	7.06	6.96
Max	8.49	7.93	Max	8.85	8.21
Median	8.05	7.7	Median	8.18	7.85
	Specific Conductivity (µS/cm)			Specific Conductivity (µS/cm)	
	John Fitzpatrick	Outflow of Unnamed		John Fitzpatrick	Outflow of Unnamed
Min	106.29	209.91	Min	100.35	135.96
Max	224.41	322.77	Max	251.37	365.4
Median	195.35	243.23	Median	195.45	276.85
	Dissolved Oxygen (mg/L)			Dissolved Oxygen (mg/L)	
	John Fitzpatrick	Outflow of Unnamed		John Fitzpatrick	Outflow of Unnamed
Min	8.45	10.5	Min	8.64	7.68
Max	12.82	13.93	Max	12.92	15.19
Median	10.53	10.08	Median	10.69	10.64
	Dissolved Oxygen (%Sat)			Dissolved Oxygen (%Sat)	
	John Fitzpatrick	Outflow of Unnamed		John Fitzpatrick	Outflow of Unnamed
Min	91.5	100	Min	92.9	82.7
Max	119.5	107.7	Max	117.4	109.7
Median	100.8	98.3	Median	101.4	99.7
	Turbidity (NTU)			Turbidity (NTU)	
	John Fitzpatrick	Outflow of Unnamed		John Fitzpatrick	Outflow of Unnamed
Min	0.31	1.3	Min	0	0.1
Max	26.1	116.1	Max	36.2	56.8
Median	1.21	1.6	Median	0.55	1.9