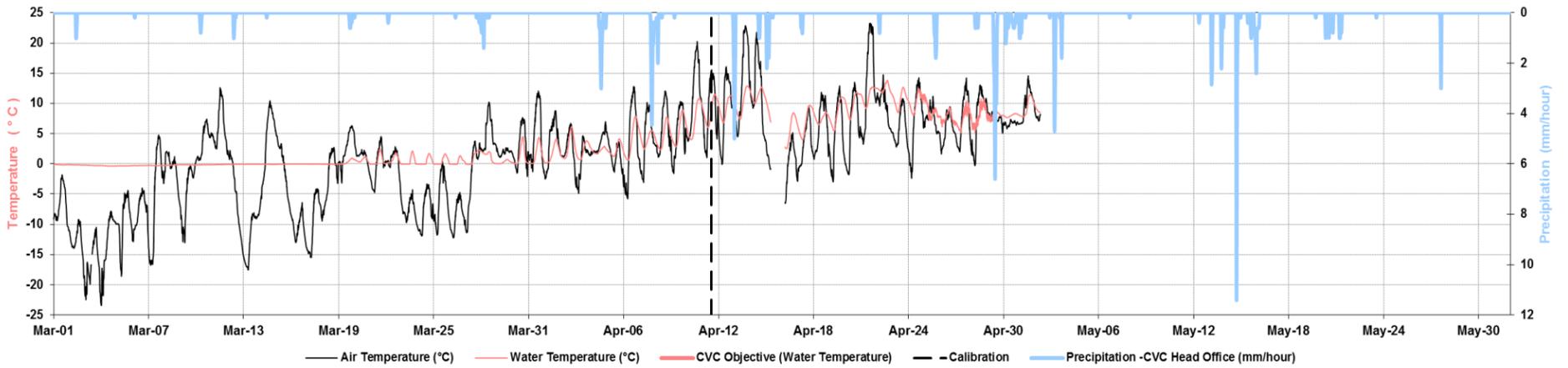


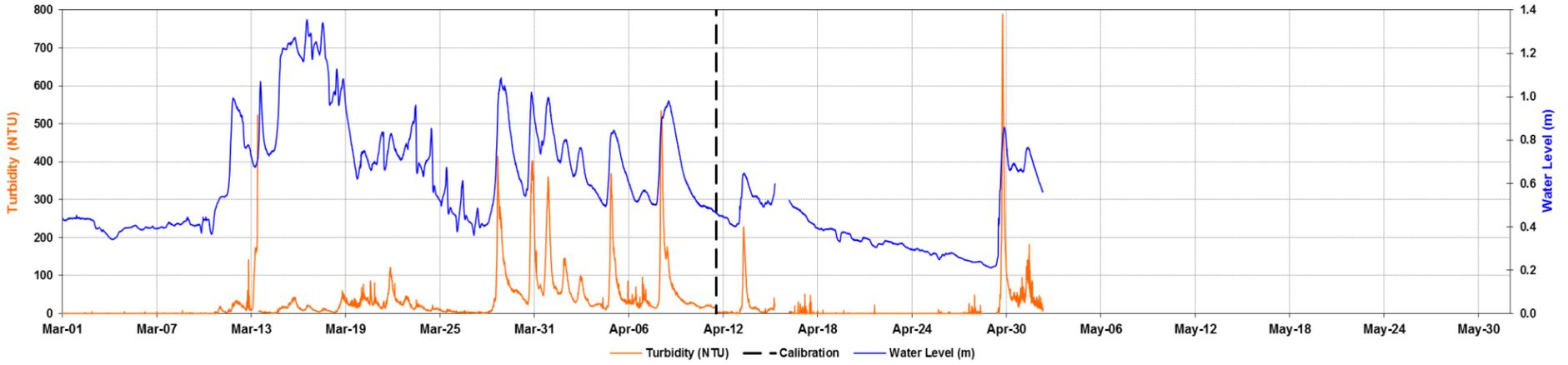
Real-Time Water Quality: Spring 2014

Levi Creek at Derry Road

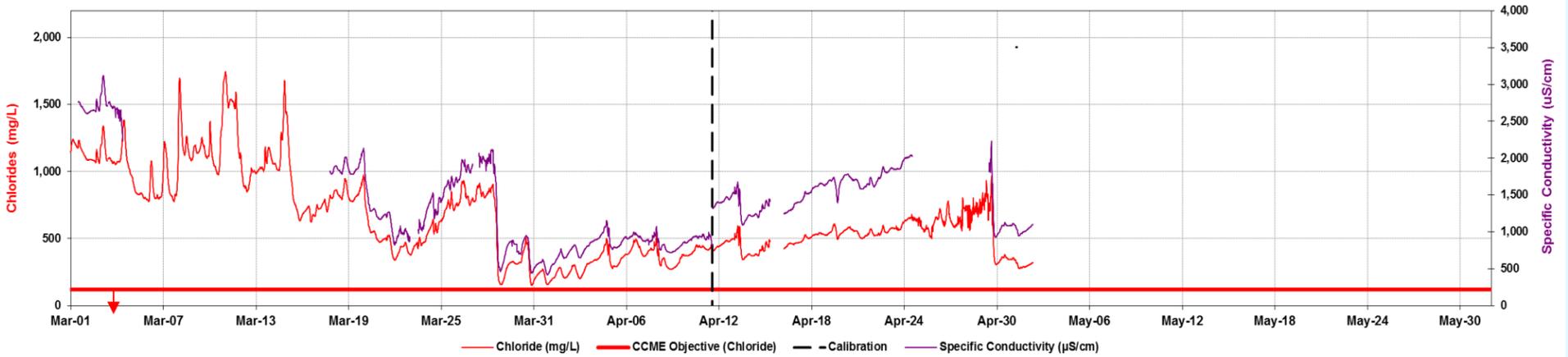
Water Temperature, Air Temperature, and Precipitation



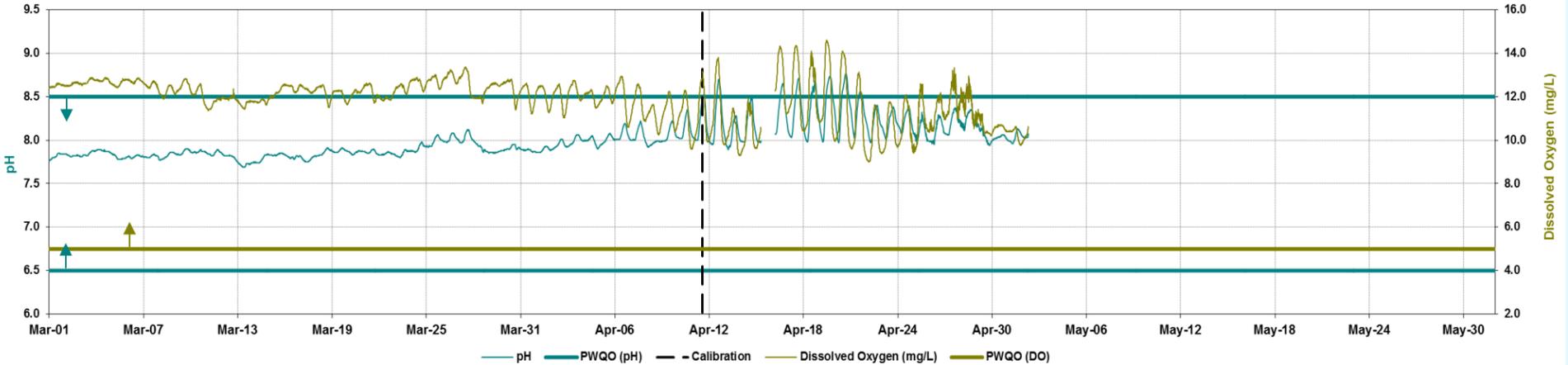
Turbidity and Water Level



Chloride and Specific Conductivity



pH and Dissolved Oxygen



↑ ↓ Coloured arrows indicate whether the given parameter should be above or below the indicated Water Quality Objective. Objective may be off-scale for some graphs.

Seasonal Exceedance of Water Quality Objectives

	Water Temperature			Dissolved Oxygen		pH		Chloride
	Cold	Mixed	Warm	Cold	Warm	Lower limit	Upper limit	Upper limit
Objective/Guideline	26 °C	28 °C	30 °C	5 mg/L	4 mg/L	6.5	8.5	120 mg/L
Number of Days	0	0	0	0	0	0	8	63
Percent of Readings	0.00	0.00	0.00	0.0	0.00	0.00	3.75	100.00

Water Temperature

Aquatic organisms, especially fish, are sensitive to extreme highs in river water temperature. If the water temperature exceeds CVC's maximum objective, fish will suffer. CVC has set an absolute maximum water temperature objective of no greater than 28 °C for mixed water streams such as Levi Creek.

Water Level

The water level at each site is essential to translate parameter concentrations to loadings. Water level also allows us to determine when a rain event has occurred and how fast the water level increased, and returned to normal during and after a storm, respectively.

Dissolved Oxygen

Aquatic habitats need sufficient oxygen in water to survive and thrive. DO fluctuates over a diurnal cycle; high during the day and lower during the night, and with temperature (colder water holds more oxygen). Provincial Water Quality Objective for cold water fish is greater than 5 mg/L, and for warm water fish is greater than 4mg/L. In terms of DO, Levi Creek is considered a warm water fish habitat.

Turbidity

Turbidity is a measurement of water clarity. A high turbidity indicates the presence of solids, sediments, or pollutants. Turbidity is used to estimate total suspended solid concentration.

Specific Conductivity

Conductivity measures the ability of water to pass an electrical current. Higher conductivity indicates a higher concentration of salts and other ions in the water.

Chloride

Chlorides are often elevated in highly urbanized areas as a result of road salt application and the drainage of swimming pools, or water softeners. The CCME guideline for chlorides is 120mg/L.

pH

pH level is a measurement of the acidity or alkalinity of water. The pH scale ranges from 0 to 14. Extreme levels of both alkalinity and acidity can be detrimental to aquatic life. The MOE has set a Provincial Water Quality Objective of in between 6.5 and 8.5 units.

Real-Time Water Quality: Spring 2014

Levi Creek at Derry Road

Water Temperature, Air Temperature, and Daily Precipitation

Temperature data are missing from May 2nd onwards and summaries below are, therefore, not comparable to spring data at other stations and for other years.

- Air temperature ranged from -23.43 °C to 23.25 °C. The maximum temperature was observed on April 21st.
- Water temperature ranged from -0.37 °C to 13.81 °C.
- Air temperature dropped below freezing on 67% of the days measured this spring.
- Water temperature dropped to or below freezing on 97% of the days measured this spring.
- The river began to thaw on March 19th, and remained thawed from April 1st onwards.
- A total of 150.8 mm of precipitation was recorded* this spring.
- The largest precipitation event this spring saw 18 mm of rain fall on April 29th over 6 hours. The average precipitation event was 4.3 mm, and there were 5 events this season of 10 mm or more. An event is defined as any amount of precipitation separated by 6 hours or more.

*Measured at the CVC head office climate station, less than 1km from the water quality station, and within its drainage area.

Water Level and Turbidity

- Water level increased throughout March and early April with melting snow and precipitation, reaching its peak of 1.355 m on March 16th. It then gradually receded back to ambient levels throughout the spring, increasing only in response to rain events, reaching its seasonal low of 0.211 m on April 28th.
- In March and early April, turbidity frequently increased in response to inputs from melting snow and precipitation. It gradually receded back to its ambient level of 0 NTU throughout the spring, increasing only in response to rain events.

Chloride and Specific Conductivity

- Chloride ranged from 152 mg/L to 1744 mg/L
- In March, increases in chloride and specific conductivity occurred when road salt was washed into the river after application, and when temperatures increased allowing salt-rich snow to melt and flow into the creek.
- Chloride values dropped from their peak in mid-March to ambient levels in early April as temperatures rose consistently above the freezing point, and road salt was no longer in use.

pH and Dissolved Oxygen

- Dissolved oxygen ranged from 9.01mg/L to 14.6mg/L this spring, staying above the 4mg/L Provincial Water Quality Objective (PWQO) 100% of the time.
- pH ranged from 7.69 to 8.76 this spring, exceeding the upper objective of 8.5 on 8 days in mid-April.
- In mid-April as plants and algae begin to grow, producing oxygen during the day, and consuming it overnight, the range of dissolved oxygen values increased. The growth of plants and algae has a similar impact on pH values.

Quality Control Issues

- Data for all parameters, except precipitation, are missing from May 2nd on. The station was vandalized and data were lost along with the data logger. The station was re-installed on July 15th.
- Specific conductivity data were removed from March 4th to March 17th and from April 24th to April 29th due to the sensor reporting unreasonable values potentially due to interference with ice build up or low water level.
- Data for all parameters, except precipitation, are missing from April 15th to April 16th. The station battery briefly died over night due to cloudy and cold weather.

Deployment Information

- Deployment Period 1: November 13th, 2013 to April 11th, 2014 (149 days)
- Deployment Period 2: April 11th, 2014 to May 2nd, 2014 (21 days)
- Monitoring equipment used:
 - Water quality parameters: Hydrolab DS5X
 - Air temperature: 5600-0025-1 thermistor
 - Water level: OTT Pressure Level Sensor
 - Precipitation: CVC head office climate station

Figure 1: Levi Creek water quality station, looking downstream on April 11th.



Questions or Comments?

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