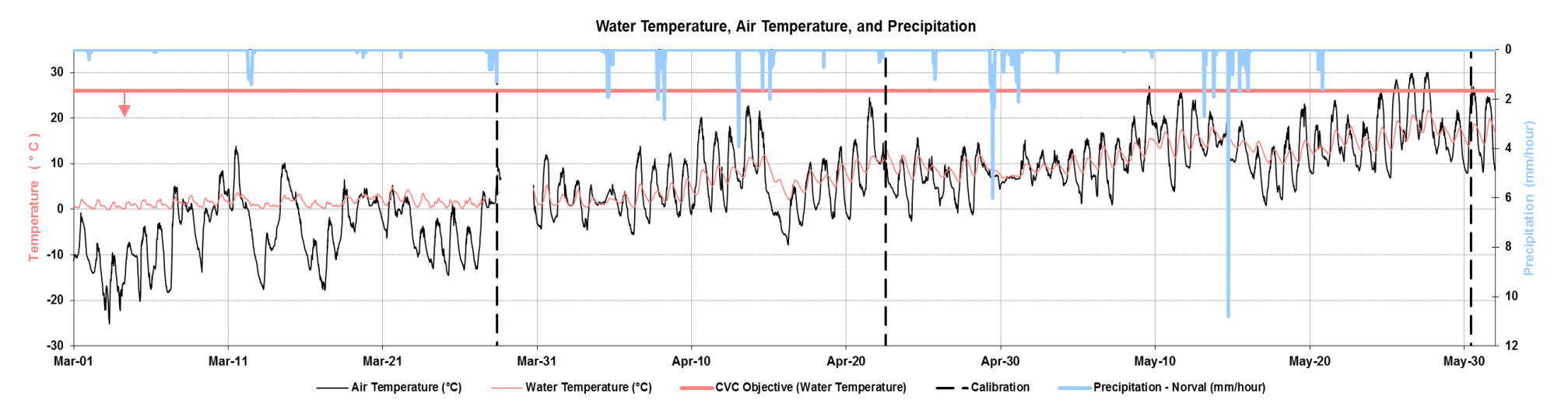
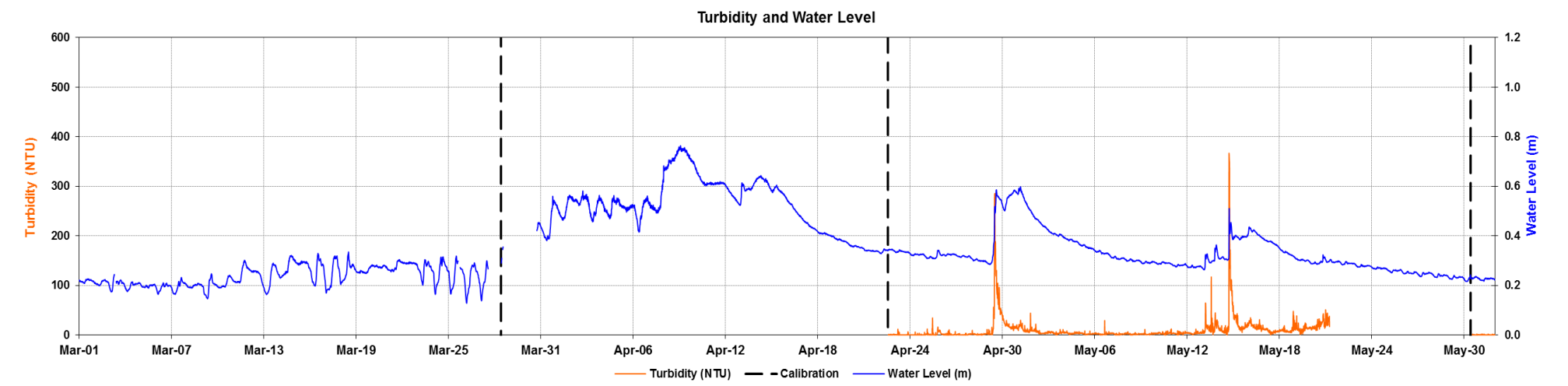
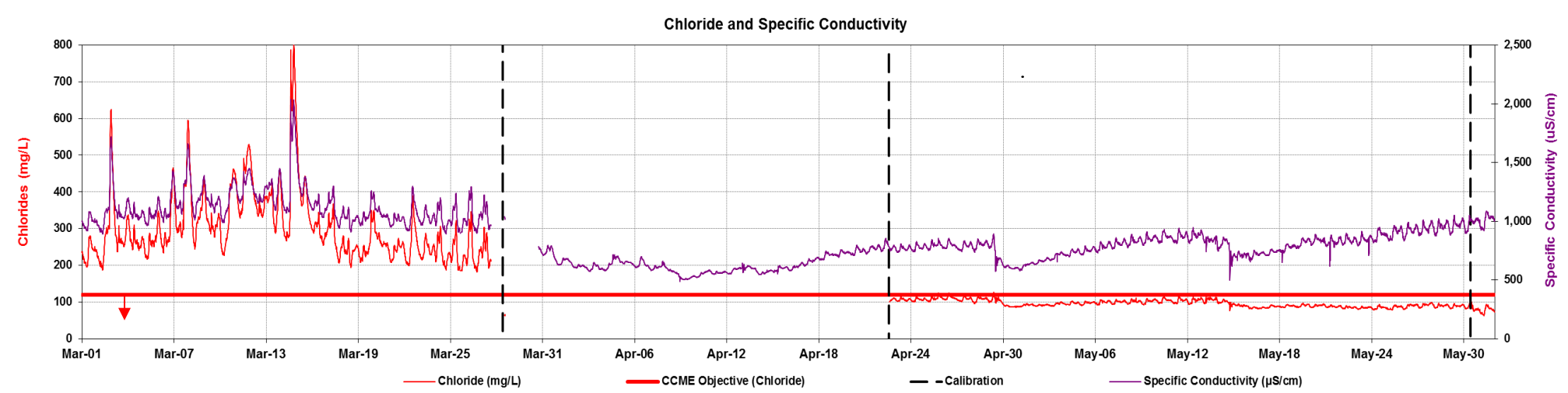
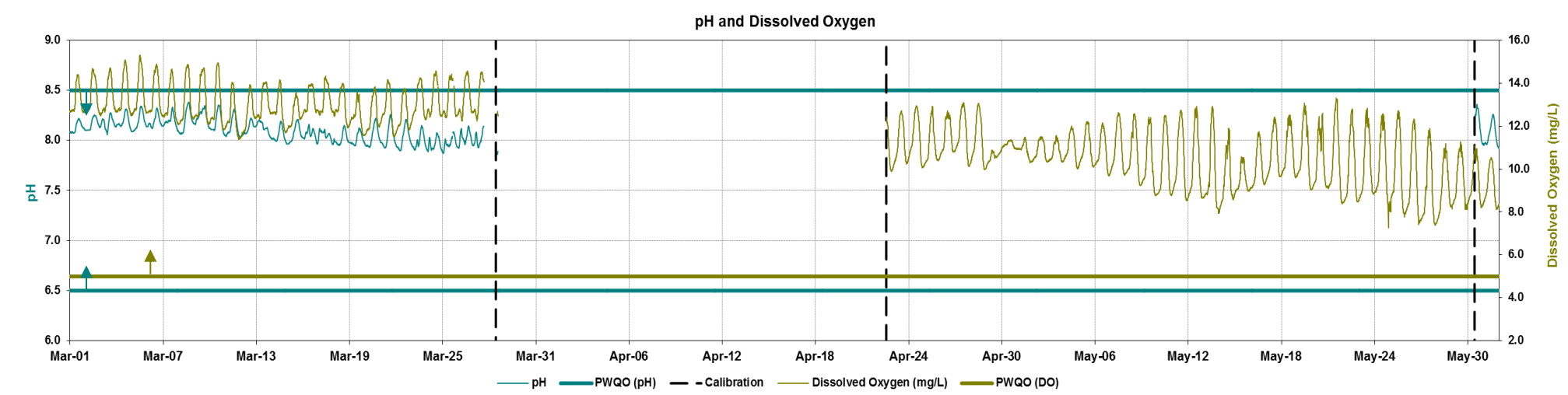
Real-Time Water Quality: Spring 2014

Silver Creek at Willow Park Ecology Centre









↑ ↓ 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 ºC	28 ºC	30 ºC	5 mg/L	4 mg/L	6.5	8.5	120 mg/L
Number of Days	0	0	0	0	0	0	0	30
Percent of Readings	0.00	0.00	0.00	0.0	0.00	0.00	0.00	40.56

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 Silver 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, Silver Creek represents a cold 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.

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Water Temperature, Air Temperature, and Daily Precipitation

- Air temperature ranged from -25.12°C to 29.99°C.
- Water temperature ranged from -0.05°C to 21.75°C.
- Air temperature dropped below freezing on 82% of the days measured this spring.
- Water temperature briefly dropped to or below freezing on 11% of the days measured this spring.
- Silver Creek at this location did not remain frozen this winter and early spring because of frequent discharge of warm water from the upstream waste water treatment plant. The creek froze briefly overnight on several occasions, but water temperatures rose above the freezing point every day.
- A total of 171.1 mm of precipitation (snow water equivalent) was recorded* this spring.
- The largest precipitation event this spring saw 28.7 mm of rain fall on April 29th over 8 hours. The average precipitation event was 6.8 mm, and there were 8 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 Norval Water Survey Canada precipitation gauge, less than 1 km from the water quality station, and outside its drainage area.

Water Level and Turbidity

- Water level increased throughout early April with melting snow and precipitation, reaching its peak of 0.764 m on April 8th. It then gradually receded back to ambient levels throughout the spring, increasing only in response to rain events, reaching a low point at the end of the season.
- In late April and early May, turbidity increased in response to rain events, and rapidly dropped down to ambient levels of around 2 NTU.

Chloride and Specific Conductivity

- Chloride ranged from 63 mg/L to 807 mg/L.
- In March, increases in chloride and specific conductivity occurred when road salt was washed into the creek after application, and when temperatures increased allowing salt-rich snow to melt and flow into the creek.
- Chloride values dropped from their peak in March to ambient levels of around 100 mg/L in April as temperatures rose consistently above the freezing point, and road salt was no longer in use.
- Daily fluctuations in chloride and specific conductivity were probably the result of discharge from the upstream waste water treatment plant which is not designed to treat the chloride used in water softeners, common in the upstream municipality of Georgetown.

pH and Dissolved Oxygen

- Dissolved oxygen ranged from 7.26 mg/L to 15.32 mg/L this spring, staying above the 5 mg/L Provincial Water Quality Objective (PWQO) 100% of the time.
- The range of dissolved oxygen values began to increase in May as plants and algae began to grow. This increase in range is often seen in pH as well, and indicates a productive environment.

Quality Control Issues

- Data from all parameters are missing from March 27th to March 30th due to a malfunctioning cable.
- Over the course of the winter, a large amount of debris was caught on the pipe resulting in artificially high turbidity values which were removed. The debris was cleared on March 30th.
- Chloride, pH and dissolved oxygen values from March 28th to April 22nd were also impacted by this debris and were removed.
- pH data from April 22nd to May 30th were also removed due to impact from debris.
- Chloride data from April 22nd to May 30th were increased to compensate for the impact from debris.

Deployment Information

- Deployment Period 1: November 26th, 2013 to March 28th, 2014 (122 days)
- Deployment Period 2: March 28th, 2014 to April 22nd, 2014 (28 days)
- Deployment Period 3: April 22nd, 2014 to May 30th, 2014 (38 days)
- Deployment Period 4: May 30th, 2014 to August 21st, 2014 (83 days)
- Monitoring equipment used:
  - Water quality parameters: Hydrolab DS5X
  - Air temperature: 5600-0025-1 thermistor
  - Water level: OTT Pressure Level Sensor
  - Precipitation: Water Survey Canada, Credit River at Norval.

Figure 1: Debris interference with the sensors on April 22nd.

Questions or Comments?

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