APPENDIX A

Greater Victoria Drinking Water Quality
2024 Annual Report

Parks, Recreation & Environmental Services Department | Environmental Protection

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Greater Victoria Drinking Water Quality
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BACKGROUND

This report provides the annual overview of the Capital Regional District (CRD) Water Quality Monitoring Program and 2024 water quality results within the Greater Victoria Drinking Water System (GVDWS) and its individual system components (see Map 1). The results indicate that Greater Victoria's drinking water continues to be of good quality and is safe to drink.

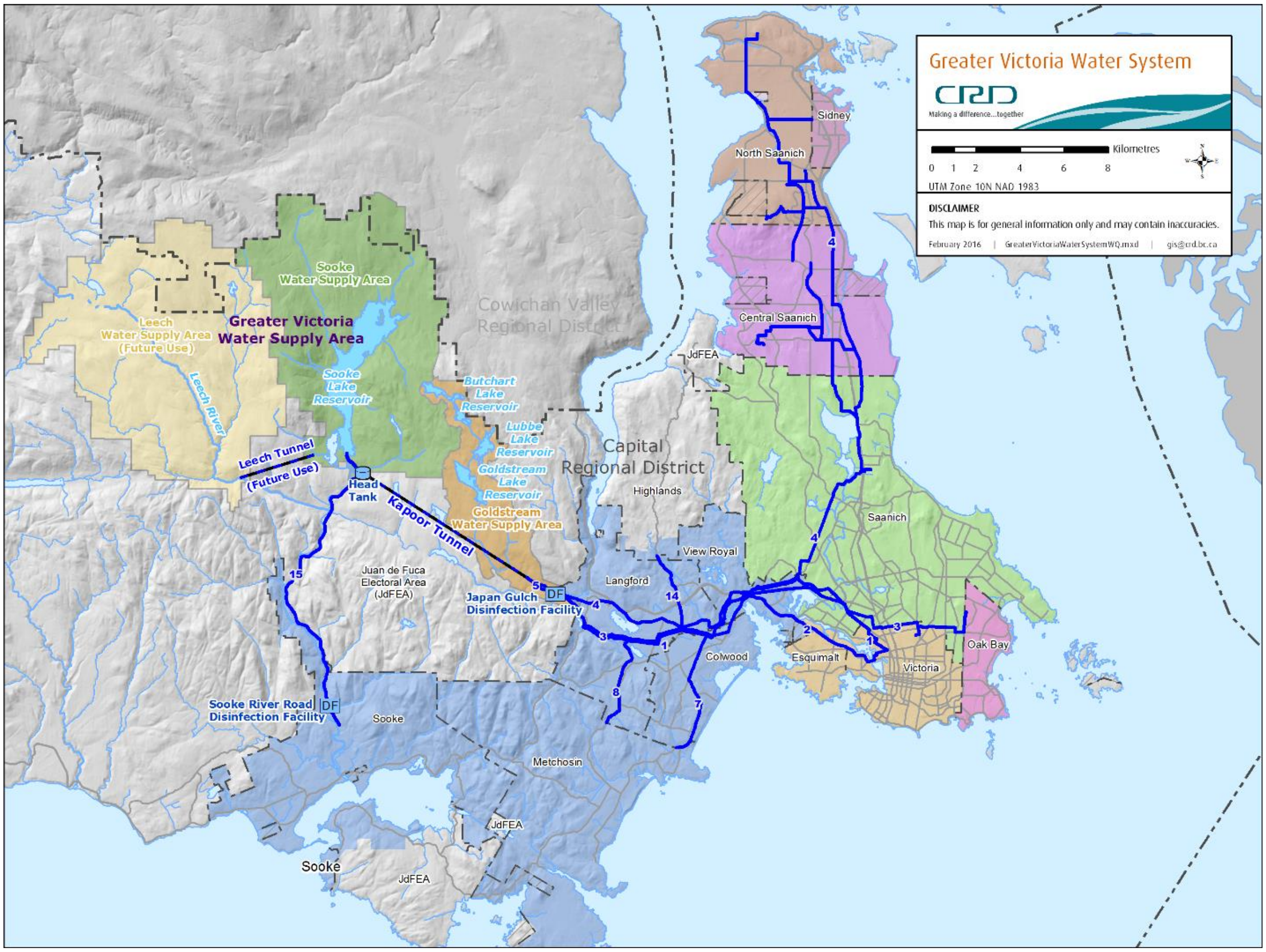
The monitoring program is designed to meet the requirements of the provincial regulatory framework, which is defined by the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation*, and to follow the federal guidelines for drinking water quality.

The approximately 11,000 hectares of the Sooke and Goldstream watersheds comprise the source of our regional drinking water supply area. Water flows from the reservoirs to the Sooke and Goldstream water treatment plants and then through large-diameter transmission mains and a number of storage reservoirs into eight different distribution systems, which in turn deliver drinking water to the consumers. The monitoring program covers the entire system to anticipate any issues (i.e., source water monitoring), ensure treatment is effective (i.e., monitoring at the treatment facilities), and confirm a safe conveyance of the treated water to customers (i.e., transmission and distribution system monitoring). It also enables CRD staff to address any concerns or questions by the general public. The program adopts a multiple-lines-of-evidence approach (biological, chemical and physical) to ensure all aspects of water quality are considered. The program is comprehensive, collecting approximately 6,000 samples and conducting approximately 60,000 individual analyses annually. The results are discussed with Island Health, which oversees compliance with drinking water standards, and with CRD operations and municipal staff, who rely on the information to properly operate and maintain the system components.

The source water reservoirs, with established and intact ecosystems, provide raw water of good water quality that can be utilized unfiltered for the preparation of potable water. Water quality monitoring in the watersheds serves several purposes: 1) to verify that the CRD continues to comply with the criteria for an unfiltered surface water source; 2) to understand the quality of the water flowing into the reservoirs; 3) to ensure that staff are aware of the presence and absence of water quality-relevant organisms, including specific pathogens in the lakes, prior to any treatment; 4) to confirm that the water quality parameters remain within the effectivity range of the disinfection treatment; and 5) to detect any taste and odour or other aesthetic concerns that could then pass through the system.

This annual water quality report separates the water system components that are the CRD's responsibility from system components that are the responsibility of the municipalities. The CRD provides water quality sampling and testing services for compliance purposes to all municipal water systems. Each water distribution system was assessed for compliance with the regulatory requirements. This annual report contains the compliance summary for the CRD and municipal water distribution systems in the GVDWS.

Map 1. Greater Victoria Drinking Water System



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List of Acronyms and Units of Measurement

<	Less than
≤	Less than or equal to
=	Equal to
>	Greater than
°C	Degrees Celsius
µg/L	Micrograms per litre
µS/cm	Microsiemens per centimeter
AC pipe	Asbestos Cement pipe
AO	Aesthetic Objective
BCWWA	British Columbia Water and Wastewater Association
$CaCO_3$	Calcium Carbonate
CALA	Canadian Association for Laboratory Accreditation
CCC	Cross Connection Control Program
CFU	Colony-Forming Units
Cl_2	Chlorine
Cm	Centimeter
cm_2	Square centimeter
CRD	Capital Regional District
CT	Concentration x Contact Time
CWWA	Canadian Water and Wastewater Association
DI	Ductile Iron
E. coli	Escherichia coli
GVDWS	Greater Victoria Drinking Water System
ha	Hectares
HAA/HAA5	Haloacetic acid
HPC	Heterotrophic Plate Count
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
km	Kilometers
m^3	Cubic Meter
M	Million
MAC	Maximum Acceptable Concentration
Median	Middle point of all values
mg/L	Milligrams per litre
mJ	Millijoules
mL	Milliliters
mm	Millimeters
ND	Not Detected
NDMA	Nitrosodimethylamine
ng/L	Nanograms per litre
NTU	Nephelometric Turbidity Unit
NU	Natural Units
PFAS	Per- and Polyfluoroalkyl Substances
pH	potential of Hydrogen
PRV	Pressure Regulating Valve
PVC	Polymerizing Vinyl Chloride
QA	Quality Assurance
QC	Quality Control
SCADA	Supervisory Control and Data Acquisition
SOL	Sooke Lake Reservoir
TC	Total Coliform Bacteria
TCU	True Colour Units
TTHM	Total Trihalomethane
USEPA	United States Environmental Protection Agency
UV	Ultraviolet

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1.0 INTRODUCTION

This report is the annual overview of the results from water quality samples collected in 2024 from the Greater Victoria Drinking Water System (GVDWS) (see Map 1). The report summarizes data from the Capital Regional District (CRD) owned and operated water infrastructure that includes the source reservoirs, the Regional Transmission System and the Juan de Fuca Water Distribution System, as well as data from the municipal distribution systems. Monthly and weekly summary reports on water quality data are posted on the CRD's website at: https://www.crd.ca/about/data/drinking-water-quality-reports.

2.0 WATER SYSTEM DESCRIPTION

In 2024, the GVDWS supplied drinking water to approximately 425,000 people and is the third-largest drinking water system operating in British Columbia. It comprises two separate service areas:

1. The **Goldstream Service Area** that supplies water to approximately 407,000 people in Victoria, Saanich, Oak Bay, Esquimalt, Central Saanich, North Saanich, Sidney, Highlands, Colwood, Langford and Metchosin via the Goldstream Water Treatment Plant.

2. The **Sooke Service Area** that supplies water to approximately 18,000 people in Sooke and East Sooke via the Sooke River Road Water Treatment Plant.

2.1 Source Water Systems

Drinking water for the GVDWS comes from protected watersheds called the Greater Victoria Water Supply Area (see Map 1). This CRD-owned and managed area, which is approximately 20,500 hectares (ha) in size, is located about 30 km northwest of Victoria and encompasses about 98% of Sooke Lake, 98% of Goldstream Lake and 92% of the Leech River catchment areas. The Goldstream and Sooke watersheds, with 11,000 ha area, comprise the active water supply area, whereas 9,500 ha of the Leech watershed are currently inactive and designated for future water supply.

Goldstream Service Area

The five reservoirs in the supply area have been used as a source of drinking water since the early 1900's. The Sooke Lake Reservoir, the largest of the reservoirs, is the primary water source for this system, supplying typically between 98% and 100% of Greater Victoria's drinking water. In 2024, Sooke Lake Reservoir supplied 100% of the source water. The four reservoirs in the Goldstream system (Butchart, Lubbe, Goldstream and Japan Gulch) are typically off-line and are used only as a backup water supply. Controlled releases from the Goldstream watershed provide water for salmon enhancement in the lower Goldstream River. The Leech River watershed does not yet contribute to the water supply for the GVDWS.

Water at the southern end of Sooke Lake Reservoir enters two of the variable depth gates in the intake tower and is screened through a stainless-steel travelling screen (openings of 0.5 mm). From the intake tower, the water passes through two 1,200 mm-diameter pipelines to the head tank and then through the 8.8 km-long, 2.3 m-diameter Kapoor Tunnel and then into 1,525 mm- and 1,220 mm-diameter pipes connecting the Kapoor Tunnel to the Goldstream Water Treatment Plant, where it is disinfected.

During occasional brief periods of use (typically used only when the Kapoor Tunnel is out of service for inspection by CRD staff), water in the Goldstream Watershed is released from Goldstream Reservoir and flows down the upper reaches of Goldstream River into Japan Gulch Reservoir. Water from Japan Gulch Reservoir enters the Japan Gulch intake tower through a low-level and a high-level intake, passing through a 14-mesh, stainless steel screen and is then carried in a 1,320 mm-diameter pipe into the Goldstream Water Treatment Plant.

Sooke Service Area

Drinking water for the Sooke Service Area is only supplied from Sooke Lake Reservoir but travels a different route. This water is passed through a 14.5 km-long (9 miles), 600 mm-diameter PVC and ductile iron pipe from a point just above the head tank to the Sooke River Road Water Treatment Plant. The Sooke Service Area has no backup water source.

2.2 Water Disinfection

The drinking water of the GVDWS is only treated by a multi-stage disinfection process. Further treatment such as filtration is not required due to compliance with the BC Ministry of Health requirements for a Filtration Exemption (Drinking Water Treatment Objectives for Surface Water Supplies in BC). A Filtration Exemption is also supported by meeting the United States Environmental Protection Agency (USEPA) requirements under the Surface Water Treatment Rules for unfiltered water systems. The disinfection process in the GVDWS is both simple and effective and uses two water treatment plants to provide disinfected drinking water to the two main service areas.

Both water treatment plants utilize the same disinfection concepts and process methods. The Goldstream Water Treatment Plant uses delivered liquid sodium hypochlorite and liquid ammonia for the disinfection process. The Sooke River Road Water Treatment Plant generates sodium hypochlorite on site and injects delivered liquid ammonia to achieve the disinfection effect.

At both water treatment plants, the water passes through a three-part disinfection process in sequential order - two primary disinfection steps that provide disinfection of the water entering the system, followed by a secondary disinfection step that provides continuing disinfection throughout the transmission system and the distribution systems:

1. **UV Disinfection**. Ultraviolet (UV) disinfection provides the first step in the primary disinfection process (disinfection of the raw source water entering the plants) and inactivates parasites, such as *Giardia* and *Cryptosporidium* [3-log (99.9%) inactivation], as well as reducing the level of bacteria in the water. Based on the consistently applied high UV dosage at the Goldstream plant (50-90 mJ/cm^2), it can be assumed that it is also effective in inactivating certain viruses (66-99% rotavirus inactivation). The newer Sooke River Road Water Treatment Plant applies a much lower dosage of UV (15-25 mJ/cm^2), in accordance with the Operating Permit requirements and current industry standards.

2. **Free Chlorine Disinfection**. Free chlorine disinfection provides the second step in the primary disinfection process, using a free chlorine dosage of approximately 1.5-2.5 mg/L and a minimum of 10-minute (depending upon flow) contact time between the free chlorine and the water. By achieving the minimum CT (Concentration x Contact Time) of 12 (chlorine concentration multiplied by contact time) at all times, the free chlorine disinfection step inactivates bacteria and provides a 4-log (99.99%) reduction of viruses.

3. **Ammonia Addition**. The secondary disinfection process consists of the addition of ammonia to form chloramines at a point downstream where the water has been in contact with the free chlorine for approximately 10 minutes or more. The ammonia is added at a ratio of approximately one part ammonia to four-five parts chlorine. In the water, these chemicals combine to produce a chloramine residual (measured as total chlorine). Monochloramine is the desired residual product, which typically represents 90% of the total chlorine when leaving the plants. This residual remains in the water and continues to protect the water from bacterial contamination (secondary disinfection), as it travels throughout the pipelines of the distribution systems.

In East Sooke, at the Iron Mine Reservoir, the CRD re-chloraminates the water to boost the chlorine residual provided to the extremities of that system. In Metchosin, at Rocky Point Reservoir, the CRD maintains another re-chloramination station, which has not been in service for approximately eight years. It has been deemed unnecessary for maintaining adequate residuals. Currently, there are no provisions to re-chloraminate the water at the far reaches of the distribution system on the Saanich Peninsula; however, emergency re-chlorination stations are provided at Upper Dean Park Reservoir and Deep Cove pump station, supplying Cloake Hill Reservoir. These re-chlorination stations are able to add free chlorine to the system if the total chlorine residuals were to drop to inadequate levels or during water quality emergencies.

2.3 CRD Transmission System

The CRD Transmission System comprises a number of large-diameter transmission mains and several connected supply storage reservoirs. Almost all of the supply storage reservoirs are on the Saanich Peninsula, leaving the Core Area municipalities without any supply storage. Using a series of large-diameter transmission mains, the CRD supplies treated water to its downstream customers. These large-diameter transmission mains are sorted into three sections:

1. Regional Transmission System, that supplies the Westshore and Core Area municipalities, and up to the Saanich Peninsula boundary;

2. The Saanich Peninsula Trunk Water Distribution System that receives water at two points on the Saanich Peninsula from the Regional Transmission System and supplies it to the three municipalities and other customers on the Saanich Peninsula; and

3. The Sooke Supply Main.

2.3.1 Regional Transmission System

The CRD currently uses eight large-diameter transmission mains to supply drinking water to the municipal distribution systems in the Goldstream Service Area. These transmission mains range in diameter from 1,525 mm (60") down to 300 mm (12") and transfer water from the Goldstream Water Treatment Plant to the distribution systems listed in Section 2.4.

- Main #1 is a 1,067 mm-diameter (42") cement mortar-lined, welded steel pipe that starts at the Humpback pressure regulating valve (PRV) below the Humpback Reservoir Dam and ends at the David Street vault. This transmission main provides water primarily to the City of Victoria, but also services portions of Saanich and the Westshore communities.

- Main #2 is a 910 (36") to 780 mm-diameter (31") steel and ductile iron pipe, which starts at the Colwood overpass and runs primarily through View Royal, Esquimalt and Vic West along the Old Island Highway and Craigflower Road. Main #2 joins Main #1 at the David Street vault after crossing the Bay Street Bridge. This supply main is 7.6 km in length and provides water to View Royal, Victoria and Esquimalt.

- Main #3 is primarily a 990 mm-diameter (39") steel pipe that supplies water from the Humpback PRV and terminates at the CRD's Mt. Tolmie Reservoir. There are several sections in this line that include 1,220 mm-diameter (48") and 810 mm-diameter (32") pipes. The 810 mm-diameter pipe terminates at the Oak Bay meter vault. This supply main is 21.3 km in length and provides water to the Westshore communities, Saanich, Victoria and Oak Bay.

- Main #4, a high-pressure transmission main, is primarily a 1,220 mm-diameter (48") welded steel pipe that supplies water from the Goldstream Water Treatment Plant primarily to Saanich and the Saanich Peninsula. There are two small sections of 1,320 mm (52") and 1,372 mm (54") reinforced concrete pipe. This transmission main is 26.2 km in length and terminates near the Saanich-Central Saanich boundary, where it transfers water to the 762 mm (30") trunk main, which extends to McTavish Reservoir. It supplies the municipalities on the Saanich Peninsula and to Bear Hill Reservoir and Hamsterly pump station, near Elk Lake.

- Main #5 is a 1,524 mm-diameter (60") pipe that connects the Kapoor Tunnel via the Goldstream Water Treatment Plant to the Humpback PRV just below the old Humpback Reservoir dam. It is approximately 1.6 km in length and provides water to mains #1 and #3.

- Main #7 is a 610 mm-diameter (24") steel pipe that runs from Goldstream and Whitehead Road to Metchosin and Duke Road. It is 4 km in length and provides water to portions of Colwood, Langford and Metchosin.

- Main #8 is a 457 mm-diameter (18") steel and asbestos cement pipe that runs from Glen Lake School, primarily along Happy Valley Road to Happy Valley and Glen Forest Way. It is 3.6 km in length and provides water to Langford, Colwood and Metchosin.

- Main #16 is a 300 mm-diameter (12") ductile iron pipe that comes off Main #2 at the intersection Island

Highway and Admirals Road and follows Admirals Road until its terminus at Maple Bank Road where is transitions to the Victoria/Esquimalt distribution system. It was formerly part of the Juan de Fuca Water Distribution System but recently transferred to the CRD Regional Water Service and included in the Regional Transmission System.

There are three active inter-connections between the high-pressure Main #4 and the low pressure mains #1 and #3, where water can be transferred from Main #4 to the other two mains via PRV stations. These stations are located at Watkiss Way, Millstream at Atkins, Goldstream/Veteran's Memorial Parkway, and Burnside at Wilkinson Road. There is also a series of inter-connections between mains #1 and #3, with the major inter-connections being at Price, Station, Tillicum and Dupplin roads.

2.3.2 Saanich Peninsula Trunk Water Distribution System

The Saanich Peninsula Trunk Water Distribution System receives water at two points on the Saanich Peninsula from the Regional Transmission System and supplies it to four customers on the Saanich Peninsula: the municipalities of Central Saanich, North Saanich, Sidney and the Agricultural Research Station. Several First Nations distribution systems are supplied via a short proxy-connection by either the Central Saanich or North Saanich municipality.

The Saanich Peninsula Trunk Water Distribution System is comprised of 46 km of transmission mains, including the 762 mm (30") Bear Hill Main, the 400 mm (16") Martindale Main, the 300 to 400 mm (12"-16") Dean Park Main and the 250-500 mm (10-20") Saanich Peninsula mains.

The McTavish Reservoir is the terminus of the Regional Transmission System and Main #4, a 610 mm-diameter (24") concrete cylinder pipe. The Saanich Peninsula Trunk Water Distribution System begins with pipes from or bypassing McTavish Reservoir, which then continue further along the peninsula. In the vicinity of the airport at Mills Road, the main from McTavish Reservoir reduces from a 500 mm (20") to a 406 mm-diameter (16") asbestos cement pipe that terminates at the Deep Cove pump house. A dedicated 300 mm-diameter (12") ductile iron (DI) supply main from Deep Cove pump station transitions at the end of Hillgrove Road to 250 PVC pipe just before it connects with Cloake Hill Reservoir. A 457 mm-diameter (18") AC (asbestos cement) pipe along Mills Road connects the trunk main to the northwest end of the Sidney Distribution System.

The CRD also operates five major pumping stations located at Hamsterly, Lowe Road, Dean Park Lower, Dean Park Middle and Deep Cove, along with one minor pumping station located at Dawson Upper Reservoir, which are all considered part of the transmission system.

2.3.3 Sooke Supply Main

The Sooke Drinking Water Service Area is supplied by Main #15, a 600 mm pipe (upper section, PVC; lower high-pressure section, ductile iron) that conveys raw water from Sooke Lake Reservoir to the Sooke River Road Water Treatment Plant. Main #15 feeds directly into the Sooke Distribution System downstream of the water treatment plant.

2.3.4 Supply Storage Reservoirs

A number of supply storage reservoirs are considered part of the transmission system, even though most of them technically operate as a distribution reservoir with all of its typical functions: balancing, fire and emergency storage.

The only CRD-owned and operated transmission system storage reservoir in the Regional Transmission System is:

- Mt. Tolmie Reservoir, a two-cell concrete in-ground reservoir, 27,300 m^3 (6M gallon), located on Mt. Tolmie at the terminus of Main #3 near the Oak Bay-Saanich boundary.

Haliburton Reservoir, a one-cell concrete in-ground reservoir, 22,700 m^3 (5M gallon), located off Haliburton Road in Saanich, has been disconnected from the system (off Main #4) and is empty. It is anticipated that this reservoir will not be used for drinking water purposes again.

The CRD-owned and operated transmission system storage reservoirs in the Saanich Peninsula Trunk Water Distribution System are:

- Bear Hill Reservoir, a two-cell concrete above-ground reservoir, 4,546 m^3 (1M gallon), located on Bear Hill in Saanich.
- Cloake Hill Reservoir, a one-cell, 4,546 m^3 (1M gallon) reservoir located on Cloake Hill in North Saanich.
- Dawson Upper Reservoir, a one-cell, 455 m^3 (100,000 gallon) reservoir located off Benvenuto Avenue in Central Saanich.
- Dean Park Lower Reservoir, a two-cell concrete above-ground reservoir, 4,546 m^3 (1M gallon), located beside Dean Park Road in North Saanich.
- Dean Park Middle Reservoir, two cylindrical concrete above-ground tanks, 2,730 m^3 (600,000 gallon), located near the bottom of Dean Park in North Saanich.
- Dean Park Upper Reservoir, a two-cell concrete partly in-ground reservoir, 4,546 m^3 (1M gallon), located near the top end of Dean Park in North Saanich.
- McTavish Reservoir, a two-cell concrete in-ground reservoir, 6,820 m^3 (1.5M gallon), located on the south side of McTavish Road in North Saanich.

2.4 Distribution Systems

The GVDWS contains eight individual distribution systems. Six distribution systems are separately owned and operated by the municipalities of Central Saanich, North Saanich, Oak Bay, Saanich, Sidney and Victoria. Victoria owns and operates the distribution system in Esquimalt. Two distribution systems are owned by the CRD and operated by the CRD Infrastructure & Water Services Department. These latter two systems include the combined distribution system in the Westshore communities of Langford, Colwood, Metchosin, View Royal and a small portion of the Highlands, and a separate system supplying water to Sooke and parts of East Sooke. Each distribution system owner/operator is defined as a water supplier and is responsible for providing safe water to their individual customers and meeting all the requirements under the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation*.

2.4.1 Juan de Fuca Water Distribution System – CRD

In 2024, water was supplied to the Juan de Fuca Water Distribution System primarily from mains #1 and #3. In this report, the Juan de Fuca Water Distribution System does not include Sooke. For Sooke/East Sooke, see Section 2.4.2 Sooke/East Sooke Distribution system below. Parts of Langford and View Royal were supplied from Main #4. The development at Bear Mountain in Langford was supplied by Main #4. The Westhills development, serviced by its own privately-operated distribution system, was supplied via mains #1 and #3. In the Juan de Fuca Water Distribution System, water flowed generally in a northerly and southerly direction away from the supply mains. The federal William Head Institution and the Beecher Bay meter vault are located at the southern extremities of this system. The Beecher Bay meter registers flows to the Sc'ianew First Nation community water system.

The Juan de Fuca Water Distribution System includes the following distribution reservoirs:

- Bear Mountain Reservoir #1, a two-cell, 1,250 m^3 (275,000 gallon) reservoir located on the lower slopes of the Bear Mountain development in Langford.
- Deer Park Reservoir, a one-cell, 1,657 m^3 (365,000 gallon) reservoir located downstream of Rocky Point Reservoir re-chloramination station near the extremity of the water system off of Deer Park Trail in Metchosin (new in 2022).
- Fulton Reservoir, a two-cell, 4,580 m^3 (1,007,459 gallon) reservoir located at the end of Fulton Road in Colwood.

- Rocky Point Reservoir, a three-cell, 546 m^3 (120,000 gallon) reservoir located near the end of Rocky Point Road in Metchosin.

- Skirt Mountain Reservoir, a three-cell, 6,525 m^3 (1,435,300 gallon) reservoir located near the top of Skirt Mountain in the Bear Mountain development in Langford.

- Stirrup Place Reservoir, a two-cell, 242 m^3 (53,300 gallon) reservoir located off of Stirrup Place Road in Metchosin.

- Walfred Reservoir, a three-cell, 560 m^3 (123,180 gallon) reservoir located on Triangle Mountain in Colwood.

- Flint North Reservoir, currently one-cell steel tank with area for proposed and future tanks (current cell 2,750 m^3 (605,000 gallons), (new in 2023).

Peacock Reservoir, consisting of two steel tanks with a total storage volume of 583.8 m^3 (128,420 gallon), located north of the Trans-Canada Highway off of Peacock Place in Langford, was drained and taken offline in early 2025. It is anticipated that this now redundant asset including its former supply pump station (Gourman Pump Station) will be dismantled and removed from the system in the near future. The former Peacock zone is now being supplied from another zone through a newly looped connection.

2.4.2 Sooke/East Sooke Distribution System – CRD

The Sooke/East Sooke Distribution System begins downstream of the Sooke River Road Water Treatment Plant, at the end of Main #15 on Sooke River Road, where the ammonia storage and metering building is located. The primary water supply main to the community follows Sooke River Road downstream and splits at Milne's Landing going east toward Saseenos and west toward the central area of Sooke. Near the eastern and the southern ends of the distribution system, two parts of the T'Sou-ke First Nation community are being supplied. Two underwater pipelines across Sooke Basin, one at and another just east of Billings Spit, supply East Sooke. Sunriver Estates came on-line in 2006 and is serviced by a 300 mm (12") pipeline on Phillips Road and the Sunriver Reservoir complex consisting of a two-cell concrete plus a one-cell steel tank. In 2020, the water main along West Coast Road was extended to connect the formerly self-sufficient Kemp Lake Waterworks District to the Sooke/East Sooke Distribution System. At this most western extremity of the Sooke/East Sooke Distribution system, the CRD now supplies bulk water to the Kemp Lake District. The CRD infrastructure ends with a meter station on West Coast Road before a Kemp Lake District-owned and operated pump station supplies their distribution system.

The Sooke/East Sooke Distribution System includes the following distribution reservoirs:

- Coppermine Reservoir, a one-cell concrete partly in-ground reservoir, 455 m^3 (100,000 gallon), located off of Coppermine Road in East Sooke.

- Helgesen Reservoir, a four-cell concrete partly in-ground reservoir, 6,973 m^3 (1,533,850 gallon), located at the west end of Helgesen Road in Sooke.

- Henlyn Reservoir, a one-cell steel tank tower, 224 m^3 (49,270 gallon), located off of Henlyn Drive in Sooke.

- Silver Spray Reservoir, a two-cell cylindrical concrete tank, 841 m^3 (185,000 gallon), located off of Silver Spray Drive in East Sooke.

- Sunriver Reservoir, a two-cell concrete above-ground reservoir, 1,800 m^3 (395,944 gallon) plus a single cell 1,355 m^3 (300,000 gallon) steel tank (new in 2022), located off of Sunriver Way in Sooke.

2.4.3 Central Saanich Distribution System – District of Central Saanich

In 2024, drinking water was supplied to the Central Saanich Distribution System via ten pressure zones (seven off the Bear Hill main and three off the Martindale Valley main). The Bear Hill main supplied the Tanner Ridge area by direct feed, the central area in one pressure zone through three PRVs, the Saanichton area in two pressure zones through two PRVs, the Brentwood Bay area, and the Tsartlip First Nation through a PRV. Five smaller pressure zones served the rest of Central Saanich. Dawson Upper Reservoir (CRD-owned and operated) supplied a small area of higher elevation residences in Brentwood Bay. Martindale metering station supplied an agricultural area in the southeast corner of the municipality. The Island View Road area was supplied by the Lochside metering station. The Mount Newton metering station provided water to the northeast corner and to the Tsawout First Nation lands. A municipally-owned pump station on Oldfield Road serviced a small area in the southwest corner.

Bear Hill Reservoir (CRD-owned and operated) has the largest service population in Central Saanich, providing approximately 80% of Central Saanich's water. It is the primary supply to most of Central Saanich (south of Haldon Road), including Brentwood Bay.

The Central Saanich Distribution System has technically no balancing, fire or emergency storage, but relies on the CRD Transmission System infrastructure to provide this. One CRD-owned reservoir (Dawson Upper) in Central Saanich, that is considered part of the transmission system, functions as a distribution reservoir for the Central Saanich Distribution System.

2.4.4 North Saanich Distribution System – District of North Saanich

In 2024, drinking water was supplied to the North Saanich Distribution System from a number of points along the Saanich Peninsula Trunk Water Distribution System. This included Dean Park via the Lowe Road pump station, Dean Park pump stations and Dean Park Reservoirs (all CRD-owned and operated), Deep Cove/Lands End area via connections upstream of the Deep Cove pump station, Cloake Hill Reservoir via Deep Cove pump station (all CRD-owned and operated), and Swartz Bay. In the North Saanich Distribution System, Cloake Hill Reservoir (CRD-owned and operated) was the largest pressure zone. Water flowed generally in an easterly direction through the Dean Park pressure zone, northwest into the Deep Cove/Lands End area and northeast to the Swartz Bay area. Dean Park Upper Reservoir (CRD-owned and operated) supplied a small portion of the Dean Park Estates.

The North Saanich Distribution System has technically no balancing, fire or emergency storage, but relies on the CRD Transmission System infrastructure to provide this. Several CRD-owned reservoirs in North Saanich, which are considered part of the transmission system, function as distribution reservoirs for the North Saanich Distribution System.

North Saanich provides water to the Victoria Airport Authority via the water main on the south side and the east side of the airport. As water quality in the airport distribution system falls under federal jurisdiction, it was not monitored by the CRD in 2024 and is, therefore, not included in this report.

2.4.5 Oak Bay Distribution System – District of Oak Bay

In 2024, drinking water was supplied to the Oak Bay Distribution System at Lansdowne and Foul Bay roads from Main #3. The water flowed in a west to east direction across Lansdowne with north and south branches. Oak Bay conveys water via a 406 mm main, which crosses Oak Bay diagonally from northwest to southeast. Water was distributed from the north end to the south end via the 406 mm main. Oak Bay has an outer loop flow on Beach Drive to the Victoria boundary. The Oak Bay Distribution System has no balancing, fire or emergency storage and the CRD Transmission System infrastructure has limited provisions for this.

Oak Bay used four local pressure zones supplied by booster pumps. Sylvan Lane pump station supplied the Barkley-Sylvan area; Plymouth supplied the north Henderson area; Foul Bay supplied the south Henderson area; and Uplands pump station (seasonal) supplied the Uplands area. There are two inter-connections with the Victoria/Esquimalt Distribution System, which are normally closed, but can be used in emergencies.

2.4.6 Saanich Distribution System – District of Saanich

In 2024, drinking water was supplied to the Saanich Distribution System at a number of points from the CRD's transmission mains. Water was supplied from Main #1 at Dupplin, Wilkinson and Marigold, Holland/Burnside and Admirals/Burnside; from Main #3 at Douglas, Tillicum, Admirals, Shelbourne, Richmond, Foul Bay, Mt. Tolmie and Maplewood pump house; and from Main #4 at Burnside, Blue Ridge, Roy Road, Markham, Layritz, Cherry Tree Bend and Sayward. In the Saanich Distribution System, water flowed generally in a northerly direction from mains #1 and #3 and both east and west from Main #4.

There are four major pumping systems in the Saanich Distribution System. Maplewood pumps water north from Main #3, ending in the Gordon Head area. Cherry Tree Bend pumps from Main #4 to Wesley Reservoir and the west central high elevation area. The Mt. Tolmie/Plymouth pump station pumps water from Main #3 and the CRD Mt. Tolmie Reservoir to Saanich's Mt. Tolmie Reservoir and the Gordon Head area via a 610 mm-diameter (24") main.

Water from Sayward supplies the north end of the Saanich Distribution System via Main #4 with a southerly flow through Cordova Bay. Saanich also has a number of other small pressure zones controlled by pump stations.

The Saanich Distribution System includes some storage for balancing, fire and emergency purposes. The following distribution reservoirs are owned and operated by Saanich:

- Hartland Reservoir, a one-cell, 769 m^3 (170,000 gallon) reservoir located on Hartland Road in Saanich. This new one-cell steel tank reservoir was constructed in 2020 to replace the smaller old reservoir.
- Mt. Tolmie Reservoir (Saanich), a one-cell, 4,545 m^3 (1M gallon) reservoir located on the east side of the summit of Mt. Tolmie near Cromwell Reservoir in Saanich.
- Rithet Reservoir, a one-cell, 16,807 m^3 (3.7M gallon) reservoir located at the end of Perez Drive in Broadmead in Saanich.
- Wesley Reservoir, a two-cell, 3,182 m^3 (700,000 gallon) reservoir located at the end of Wesley Road on Haliburton Ridge in Saanich.

2.4.7 Sidney Distribution System – Township of Sidney

In 2024, drinking water was supplied to the northern portion of the Sidney Distribution System from the 457 mm CRD transmission main on Mills Road from upstream of the Deep Cove pump station. The southern portion of the distribution system is supplied from a 300 to 400 mm ductile iron main that is connected to the CRD Transmission System and McTavish Reservoir. Within the Sidney Distribution System, water flowed generally from the west via Mills Road and from the south via McTavish Reservoir and met in the middle of the distribution system, with approximately 60% of the water coming from the Mills Road supply.

The Sidney Distribution System has no balancing, fire or emergency storage, but rather relies on the CRD Transmission System infrastructure to provide this.

2.4.8 Victoria/Esquimalt Distribution System – City of Victoria/Township of Esquimalt

Note: The City of Victoria also owns and operates the Water Distribution System in the Township of Esquimalt.

In 2024, drinking water was supplied to the Victoria/Esquimalt Distribution System from mains #1 and #2 at David Street/Gorge Road and David Street/Rock Bay Avenue. From these supply points, the system divides into several smaller looped water mains within the distribution system. Water was also supplied to Victoria from Main #3 at Cook Street/Mallek Crescent, Somerset Street/Tolmie Avenue, Douglas Street/Tolmie Avenue and Shelbourne Street/North Dairy Road. In general, water flows from a north to south direction.

Water was supplied at multiple locations to Vic West and Esquimalt from Main #2. These locations include

Tyee Road/Bay Street, Burleith Crescent/Craigflower Road, Garthland Road/Craigflower Road and Admirals Road/Maple Bank Road.

The Victoria/Esquimalt Distribution System has no balancing, fire or emergency storage and the CRD Transmission System infrastructure has limited provisions for this.

3.0 MULTIPLE BARRIER APPROACH TO WATER QUALITY

The CRD and the municipalities that operate their distribution systems use a multiple barrier approach to prevent the drinking water in the GVDWS from becoming contaminated. Multiple barriers can include procedures, operations, processes and physical components. In a drinking water system, any individual contamination barrier used in isolation has an inherent risk of failure and may result in contamination of the drinking water. However, if a number of individual barriers are used together in combination with each other and, especially if they are arranged so that they complement each other, these multiple barriers are a very powerful means of preventing drinking water contamination. All CRD-owned and operated, and most other large drinking water utilities, use the multiple barrier approach to prevent drinking water contamination. The exact types and applications of barriers are unique for each system, to address the system-specific risks.

The following barriers are used in the GVDWS to prevent the drinking water from becoming contaminated:

1. **Good Water System Design**. Good water system design is one of the preeminent barriers to drinking water contamination, as it allows all of the other components within the water system to operate in an optimal fashion and does not contribute to the deterioration of the quality of the drinking water contained within the system. Good water system design includes such aspects as: drinking water treatment plants that are easy to operate; piping appropriately sized to the number of users being supplied; and the use of appropriate pipe materials. All new designs are designed by qualified professionals registered in BC, reviewed and approved by qualified CRD or municipal staff, and approved and permitted by a Public Health Engineer from Island Health. This acts as a multiple check on good system design.

2. **Source Water Protection**. The CRD uses what is considered the ultimate source water protection: ownership of the catchment (watershed) lands surrounding the source reservoirs. This land area is called the Greater Victoria Drinking Water Supply Area. Within this area, no public access, commercial logging, farming, mining or recreation is permitted, and no use of herbicides, pesticides or fertilizers is allowed. This source water protection barrier eliminates many of the organic and inorganic chemicals that can contaminate the source water and virtually eliminates the potential for human disease agents being present. Very few drinking water utilities in Canada and the United States can claim this type of protection. In addition, the CRD Watershed Protection Division operates a complete and comprehensive watershed management program that provides additional protection to the quality of Greater Victoria's source water.

3. **Water Treatment/Disinfection**. The GVDWS is an unfiltered drinking water system that continues to meet the provincial, as well as the stringent USEPA criteria, to remain an unfiltered surface water supply. The treatment process consists of primary disinfection (ultraviolet light and free chlorine) of the raw source water entering the treatment plant, and secondary disinfection (chloramination) that provides a disinfectant residual throughout the transmission and distribution systems. Although the water treatment barrier used in Greater Victoria is not as rigorous as that provided by most drinking water utilities using a surface water supply, the microbiological quality of the source water is exceptionally good and the chief medical health officer for Island Health has approved this treatment process as providing safe drinking water for the public.

   In 2022, the CRD released the new Regional Water Supply Master Plan, which identified the need for additional water treatment, in the form of filtration, to increase resiliency from future water quality risks. In February 2024, the chief medical health officer for Island Health issued a statement concurring with the requirement for water filtration in the mid-to-long term perspective.

4. **Distribution System Maintenance**. All water suppliers in the GVDWS provide good distribution system maintenance, including activities such as annual water main flushing, hydrant maintenance, valve exercising, leak detection, and reservoir cleaning and disinfection. This barrier helps to promote good water quality within the distribution systems.

5. **Infrastructure Replacement**. The timely replacement of aging water system infrastructure is an important mechanism to prevent the deterioration of water quality in the pipes and provides a continual renewal of the water system. The CRD's water infrastructure replacement program is informed by its asset management system thereby ensuring that critical components are replaced before their end of service life.

6. **Well Trained and Experienced Staff**. All water system operators must receive regular training and be certified to operate water system components. In addition, the laboratory staff cannot analyze drinking water samples in accordance with the *BC Drinking Water Protection Regulation* unless the laboratory has been inspected by representatives of the BC Ministry of Health and issued an operating certificate. CRD and municipal staff meet these requirements.

7. **Cross Connection Control**. Cross connection control provides a barrier to contamination by assisting in the detection of conditions that have the potential to introduce contaminants into the drinking water from another type of system. Therefore in 2005, in cooperation with the other water suppliers, the CRD implemented a regional Cross Connection Control Program throughout the GVDWS. 2008 saw the implementation of the first CRD Cross Connection Control Bylaw for the GVDWS. This bylaw was reviewed and updated last in 2019 to its current form as CRD Bylaw No. 3516.

8. **Water Quality Monitoring**. Rigorous water quality monitoring can be considered a barrier not only because it verifies the satisfactory operation of other barriers and detects contaminations quickly, but comprehensive monitoring data may also allow water suppliers to see trends and react proactively, before a contamination occurs. The CRD has designed and executes a comprehensive water quality monitoring program for the GVDWS that collects daily bacteriological samples across the entire region for compliance purposes (on CRD water infrastructure and in the municipal water distribution systems). This CRD water quality monitoring program tests for water quality parameters beyond the legislated requirements to verify good drinking water quality in the GVDWS.

4.0 WATER QUALITY REGULATIONS

The CRD and the municipal water suppliers in the GVDWS must comply with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation*. The regulation stipulates the following water quality and sampling criteria for water supply systems:

- No detectable *Escherichia coli (E.coli)* per 100 milliliters (mL)
- At least 90% of samples have no detectable total coliform bacteria per 100 mL and no sample has more than 10 total coliform bacteria per 100 mL
- 5,000-90,000 population served: one sample per month per 1,000 population served
- >90,000 population served: 90 + 1 samples per month per 10,000 in excess of 90,000 population served

In addition to the aforementioned water quality monitoring criteria by the *Drinking Water Protection Regulation*, as due diligence to ensure public safety and maintain public trust, the CRD Water Quality Monitoring Program also uses the much larger group of water quality parameters listed in the current version of the *Guidelines for Canadian Drinking Water Quality* (the Canadian guidelines) for compliance purposes. These limits are provided in Appendix A, Tables 1 to 5, under the column titled 'Canadian Guidelines'. The water quality limits in the Canadian guidelines[1] fall into one of the following five categories:

1. **Maximum Acceptable Concentration**. This is a health-related limit and lists the maximum acceptable concentration (MAC) of a substance that is known or suspected to cause adverse effects on health. Thus, an exceedance of a MAC can be quite serious and requires immediate action by the water supplier.

[1] (see: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html)

2. **Aesthetic Objectives**. These limits apply to certain substances or characteristics of drinking water that can affect its acceptance by consumers or interfere with treatment practices for supplying good quality drinking water. These limits are generally not health related, unless the substance is well above the aesthetic objectives (AO).

3. **Parameters Without Guidelines**. Some chemical and physical substances have been identified as not requiring a numerical guideline because data currently available indicate that it poses no health risk nor aesthetic problem at the levels currently found in drinking water in Canada. These substances are listed as 'No Guideline Required' in Appendix A, Tables 1 to 5.

4. **Archived Parameters**. Guidelines are archived for parameters that are no longer found in Canadian drinking water supplies at levels that could pose a risk to human health, including pesticides that are no longer registered for use in Canada, and for mixtures of contaminants that are addressed individually. Some of these parameters are still being included in the current water quality monitoring program because the analytical laboratory includes them in their scans. These parameters are listed as 'Guideline Archived' in Appendix A, Tables 1 to 5.

5. **Operational Guidance**. The limit was established based on operational considerations and listed as an operational guidance value. For example, the limit for aluminum is designed to apply only to drinking water treatment plants using aluminum-based coagulants.

It should be noted that not all of the water quality parameters analyzed by the CRD Water Quality Monitoring Program have the Canadian guidelines' limits, since some of these parameters are used for operational purposes. Where the Canadian guidelines are silent for a particular parameter, the limit for that parameter is left blank in Appendix A, Tables 1 to 5.

In addition to the Canadian provincial regulations and federal guidelines, on a voluntary basis, the CRD also complies with most of the USEPA rules and regulations. Some of the limits in the USEPA rules are used as the basis for the CRD's water treatment goals.

The GVDWS, as an unfiltered surface water system, must meet the provincial Drinking Water Treatment Objectives for Surface Water Supplies in BC, which includes similar criteria as the conditions for filtration exemption in the Canadian guidelines. In summary, the applicable criteria are:

- 4-log inactivation of viruses (met with chlorination)
- 3-log removal or inactivation of parasites (*Giardia* and *Cryptosporidium*) (met with UV disinfection)
- Two forms of disinfection (UV and chlorination)
- Water entering disinfection facilities has an average daily turbidity of <1 Nephelometric Turbidity Unit (NTU) and not more than two days/year with an average daily turbidity of >5 NTU
- No *E. coli* or total coliform in treated water
- A watershed control program to minimize fecal, parasite and viral contamination of source water (in place)
- Detectable disinfectant residual in distribution system
- *E. coli* in source water $\leq$20 CFU/100 mL

5.0 OPERATIONAL CHANGES AND EVENTS – CRD SYSTEMS

5.1 Use of Goldstream Water

In 2024, the Goldstream Supply System was not used at all. A Kapoor Tunnel inspection project, necessitating a switch to the Goldstream Supply System, was not scheduled for 2024. The last time this project was conducted was in 2017. Throughout 2024, the Goldstream System remained filled and ready for emergency use.

5.2 Main #15 Break

During the early morning hours of September 27, a dead tree fell down a steep embankment upstream of the Sooke Water Treatment Plant and penetrated the shallow buried Main #15 which supplies the Sooke plant with raw water from Sooke Lake. The pipe break resulted in a sudden increase of flows which dislodged sediments in this raw water main. This caused a sudden turbidity spike at the Sooke plant and the plant was shut off after the turbidity reached 3.6 NTU within a few minutes. While staff investigated and planned the repair, the Sooke system was supplied with treated water from the storage reservoirs within the distribution system. Then the main was flushed to remove any pipe sediments that could cause another turbidity excursion. Upon completion of the flushing the turbidity dropped to < 1 NTU and remained under this threshold for the entire period required to refill all Sooke storage reservoirs. At noon on September 28, the Sooke plant was shut off again to begin the repair works on Main #15. At midnight, the repair works were successfully completed and the Sooke plant was turned on again without any further turbidity excursion.

5.3 Mt. Tolmie Reservoir Roof Leaks

Potential water quality risks related to structural damage at the Mount Tolmie Reservoir that were identified in the 2023 Annual Water Quality Report have been mitigated. Repairs to leaks identified in the roof structure have been spot sealed.

5.4 Chlorine Dosage

In 2024, the CRD made some minor adjustments to the chlorine dosage rate at both plants, based on daily or weekly monitoring results. The goal of chlorine dosing is to use just enough chlorine to ensure both effective primary and secondary disinfection, while minimizing the amount of chemicals used to manage both cost and aesthetics.

For primary disinfection, it is essential to meet the required CT value (the product of chlorine concentration and contact time). This target was consistently met at both water treatment plants in 2024.

For secondary disinfection, a high ratio of monochloramine to total chlorine is important. The Goldstream Water Treatment Plant consistently maintained ratios above 90%, while the Sooke River Road Plant generally maintained ratios between 85% and 95%.

During the unusual total coliform event in July and August (see Section 7.1 below), UV and chlorination dosages were temporarily increased to maximize disinfection efficacy. During expected turbidity excursions on peak watering days, the UV dosage was increased to compensate for the negative impact of elevated turbidity on the disinfection process.

5.5 CRD Reservoir Maintenance

The CRD has followed the reservoir cleaning schedule developed through the reservoir review project led by CRD Water Quality Operations. This schedule is based on a thorough water quality data review for each CRD-owned and operated transmission or distribution reservoir and is regularly updated based on new data and information. Following this cleaning schedule has resulted in improved water quality conditions and operational efficiencies in a number of reservoirs.

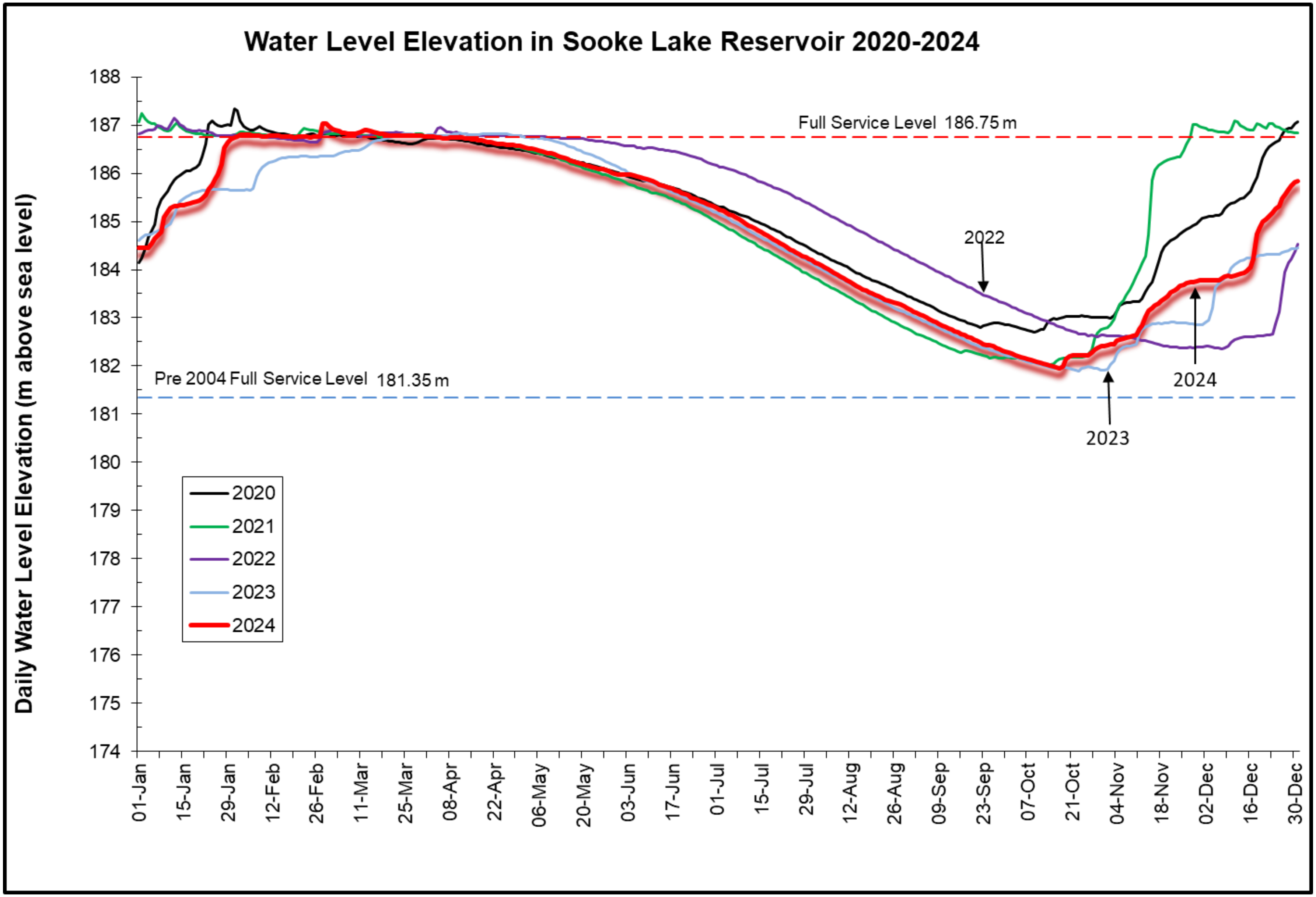

Figure 1 **Water Level Elevation in Sooke Lake Reservoir 2020-2024**

6.0 WATER QUALITY MONITORING

The CRD Water Quality Program includes the collection, analysis and reporting of water quality information in all CRD-owned and operated portions of the GVDWS from the source reservoirs to the point of delivery (typically the water meter) to each consumer. While the municipal water suppliers are responsible for water quality and any potential corrective measures within their particular distribution system, CRD staff provide water sampling and testing for regulatory compliance monitoring to these municipalities.

The CRD Water Quality Program has dedicated professional staff who are trained to collect water samples from source water and treated water sampling locations across the region, as well as technical staff trained to analyze and interpret water quality data in support of operational decisions. The CRD Laboratory is certified for a number of water quality test methods and is staffed with highly-trained laboratory technicians. The CRD Aquatic Ecology Laboratory has professional staff specialized to analyze phyto- and zooplankton in lake water, periphyton communities in lakes and streams, to test for cyanotoxins and understand the source water limnology. The Cross Connection Control division includes certified plumbing and cross connection control inspectors, as well as staff trained to process data in order to administer the requirements of the BC Building Code and the CRD Cross Connection Bylaw No. 3516.

6.1 CRD Water Quality Monitoring Program

The CRD Water Quality Monitoring Program consists of the following three components that provide direction for the collection and analysis of water quality samples from the water systems:

- **Compliance Monitoring:** The goal of the compliance monitoring is to ensure that water quality from source to consumer meets the relevant drinking water regulations and guidelines. Island Health, as the provincial regulator, has issued the CRD two operating permits (for CRD water infrastructure in the Goldstream Service Area and in the Sooke Drinking Water Service Area). These operating permits require, in addition to the water quality and sampling criteria, as per the *Drinking Water Protection Regulation*, continuous monitoring of turbidity. The CRD Water Quality Operations Section, therefore, conducts bacteriological monitoring on the raw water entering the treatment plants, treated water after leaving the plants, at the first customer sampling locations, sampling locations on the large transmission mains and sampling locations in the CRD-owned distribution systems, including distribution reservoirs. Bacteriological samples are collected at a frequency that meets the regulatory requirements and provides a consistent and day-to-day system-wide water quality oversight. Continuous turbidity monitoring, as per operating permits, is accomplished by on-line turbidity meters (monitored via Supervisory Control and Data Acquisition (SCADA)) at each water treatment plant (at each plant: two analyzers in line to provide redundancy). Part of the compliance monitoring program are the services provided by the CRD to the municipal water suppliers where CRD staff collect and analyze bacteriological samples from inside the municipal water distribution systems, report monthly results on the CRD website and include the results and findings in this annual report.

  Island Health has granted the GVDWS an exemption from filtration treatment, the conventional water treatment requirement for surface water source users in BC, based on the evidence of year-round high source water quality. However, it is expected that the CRD closely monitors a number of water quality parameters, in addition to the criteria listed in the regulations and in the operating permits. As a result, the CRD has included in its compliance monitoring program a number of water quality parameters that are regularly tested on the raw, as well as on the treated water to verify compliance with the Canadian guidelines and USEPA rules and regulations. Such parameters in the raw water include parasites, organic and inorganic compounds, including metals and various water chemistry and physical parameters. On the treated water, these include disinfection byproducts, metals and water chemistry and physical parameters that are used to verify good drinking water quality.

- **Aquatic Ecology Monitoring:** The goal of the aquatic ecology monitoring is to understand and document the components that affect or may affect the natural cycles of the source streams and reservoirs. The source reservoirs and streams in the Greater Victoria Water Supply Area (see Map 1) are monitored according to the recommendations by the CRD Aquatic Ecology Section, as there are no legislated requirements for either sampling frequency or parameter selection for these water bodies. It is, however, important for the CRD, as the supplier of unfiltered surface water, to have a comprehensive understanding of the natural processes taking place in the source waters and potential implications for the drinking water quality in the GVDWS. Depending on the season, the source lakes and their tributaries are sampled at a frequency ranging from quarterly to weekly for parameters such as algal species, distribution and concentrations, zooplankton species and concentrations, chlorophyll-a concentrations and nutrient concentrations. Additional samples may be collected based on risk management decisions, for instance, as a response to severe weather conditions or unusual observations.

- **Operational Water Quality Monitoring:** The CRD Water Quality Monitoring Program provides an audit function on all water quality-related aspects of the GVDWS, including performance monitoring of the treatment plants and distribution systems. Specific sampling and testing occurs to support operational decisions by the CRD and municipal system operators. Daily field tests of chloramine residual concentrations are conducted to verify the efficiency of the secondary disinfection region-wide. A number of qualitative (e.g., taste and odour) and quantitative tests [e.g., heterotrophic plate count (HPC), turbidity] are regularly performed on samples across the region to verify the need for specific system maintenance. The customer inquiry program is also part of this monitoring program component, as a water quality complaint or observation by the public can give clues to ongoing system issues or identify water quality risks in the system. Water samples are occasionally collected from taps within individual houses or facilities, in response to inquiries from customers about the quality of water being received at their address.

  The CRD Water Quality Monitoring Program also monitors for emerging contaminants that may be highlighted by Health Canada, industry associations such as the British Columbia Water and Wastewater Association (BCWWA), Canadian Water and Wastewater Association (CWWA) or other agencies as a possible risk to public health and drinking water safety. Sometimes, media attention to a certain water quality topic increases customers' desire for additional data and information. Such monitoring may then occur ad hoc and temporary, or long-term in the regular sampling plans. For instance, the CRD has been monitoring Per- and Polyfluoroalkyl Substances (PFAS) in the source water since 2020.

- **Drinking Water Safety Plan:** In 2018, CRD Water Quality Operations developed a Drinking Water Safety Plan, following the principle of a method developed by the Alberta Ministry of Environment for all drinking water systems in Alberta. This plan is a comprehensive water quality risk assessment and registry in the GVDWS. Identified risks have been documented and are being tracked as the CRD Integrated Water Services Department addresses them. At the end of 2024, the Drinking Water Safety Plan included 24 High Risks and 179 Moderate Risks to water quality; 23 and 181 respectively in 2023, for comparison.

6.2 Sampling Plans

The efforts to collect the required number of samples for the CRD Water Quality Monitoring Program are organized into three distinct sampling plans:

1. The **Watershed Sampling Plan** manages the sampling frequency, schedule and parameter list for the source water lakes and tributaries and is based on an up-to-date risk to water quality assessment. Sooke Lake Reservoir is sampled from a boat at three dedicated lake sampling stations from weekly in the summer to bi-weekly in the winter (see Figure 2). Goldstream Reservoir is sampled monthly from a boat at two dedicated lake sampling stations. Tributary creeks to Sooke Lake Reservoir are sampled monthly near their mouths. Significant tributary lakes in the Sooke Lake watershed, as well as Butchart Lake and Japan Gulch Reservoir in the Goldstream System, are sampled quarterly by boat. The Leech watershed is currently sampled monthly in four different locations, following a more comprehensive sampling/testing project in 2019-2020.

2. The **Treatment Plant Sampling Plan** includes the daily samples collected at the Goldstream Water Treatment Plant and the two first customer locations (for mains #4 and #5), the weekly samples collected at the Sooke River Road Water Treatment Plant and the Sooke first customer location. This plan is designed to verify adequate treatment at both treatment plants and to detect unusual water quality conditions, before they spread across the systems.

3. The **Transmission and Distribution System Sampling Plan** is a designed sampling plan that manages sampling at approximately 200 permanent sampling stations across the GVDWS, including all municipal systems. These permanent sampling stations are installed on transmission mains, storage reservoirs, distribution mains, booster pump stations and meter or valve stations. The plan is designed to achieve an evenly distributed two-week rotation for most sampling stations, while providing a representative snapshot of the entire Goldstream Service Area on each business day. The Sooke Drinking Water Service Area is sampled once per week. Samples collected on the daily runs, as part of this plan, are primarily used for compliance monitoring, but also for operational purposes.

   When total coliform-positive bacteriological results are found in a CRD-owned system, CRD sampling staff resample those locations and, depending upon the situation, may direct CRD operators to flush the affected mains and/or drain and clean affected storage reservoirs. Consecutive total coliform positive results in one or more locations trigger the emergency response procedures. When total coliform-positive bacteriological results are found in a municipal system, the CRD sampling staff resample those locations and notify the municipal operators of the results. If a sample tests positive for *E.coli*, Island Health is notified immediately, and emergency response procedures are followed.

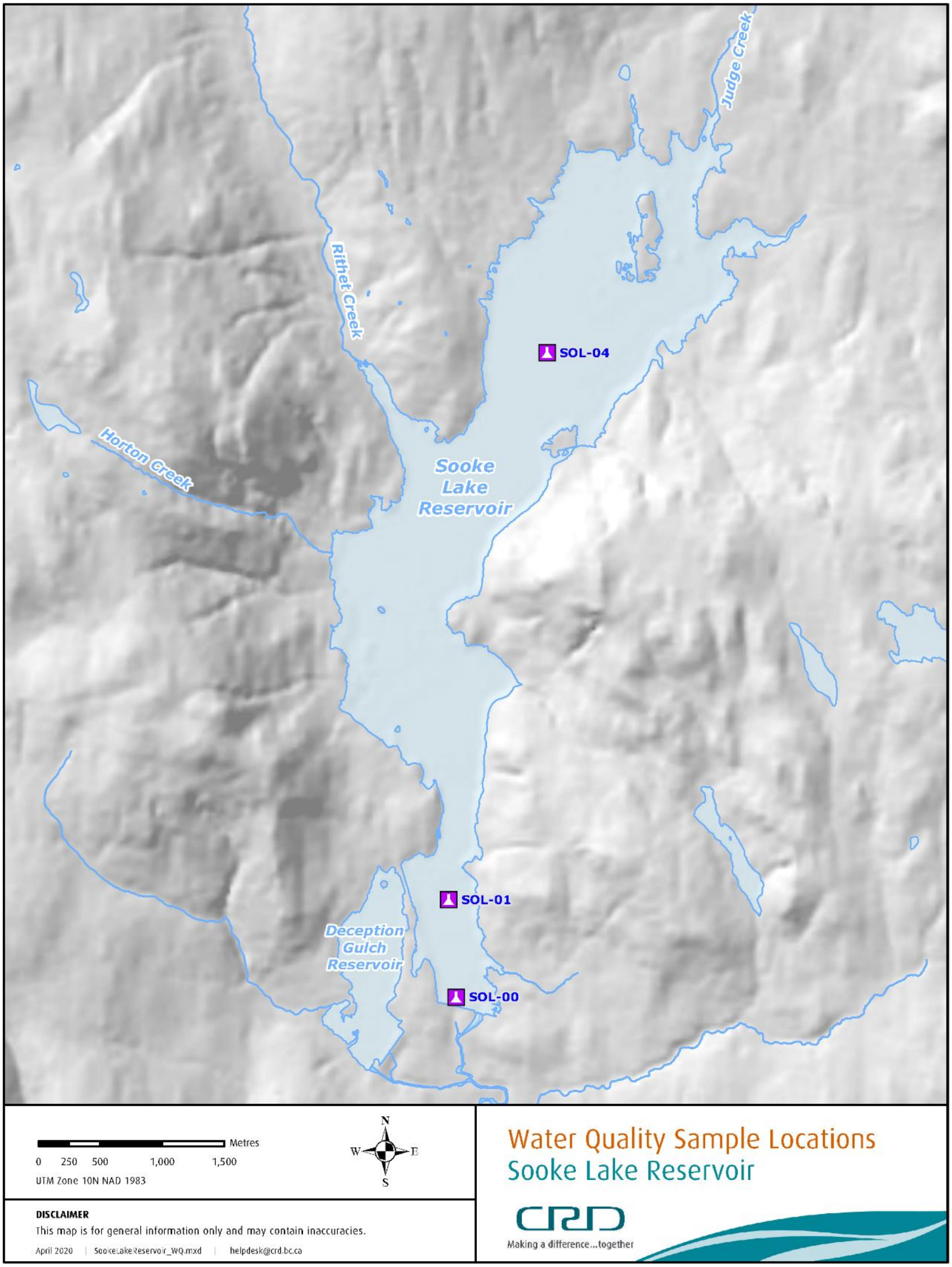

Figure 2 Sooke Lake Reservoir Water Sampling Stations

6.3 Bacteriological Analyses

Outlined below are descriptions of bacteriological parameters used in the CRD Water Quality Monitoring Program and the regulatory limits that were in place in 2024.

Total Coliform Bacteria

Total coliforms. The total coliform bacteria group include those found abundantly in human and animal intestinal (fecal) wastes and in water that has been contaminated with fecal material. Because this coliform are also environmentally ubiquitous (found naturally in water, soil, vegetation), in the absence of *Escherichia (E.) coli,* total coliform detection may indicate surface water infiltration, biofilm sloughing, or the presence of decaying organic matter. Because of its superior survival characteristics, the total coliform group is used as an indicator for treatment efficacy and microbial conditions in drinking water systems.

Test Method. In 2024, the CRD Water Quality Laboratory analyzed total coliform bacteria using the membrane filtration method with Chromocult Coliform Agar. This medium was incubated at 36-38ºC for 21-24 hours. Test results were expressed as colony-forming units (CFU) per 100 mL of water. This testing method utilizes dual chromagen, defined substrate technology, leveraging the presence of the enzyme β-galactosidase in coliforms. This enzyme cleaves a chromogenic substrate, releasing a coloured compound that facilitates quantification. The CRD Water Quality Monitoring Program conducts these tests in accordance with regulations to ensure the effectiveness of water treatment and ongoing monitoring.

Regulatory Limits. Based on the requirements in the *Drinking Water Protection Regulation* and the *Guidelines for Canadian Drinking Water Quality*, the maximum acceptable concentration for the GVDWS is summarized as follows:

- *No sample should contain more than 10 total coliform organisms per 100 mL.*
- *No consecutive sample from the same site should show the presence of coliform organisms.*
- *Not more than 10% of the samples based on a minimum of 10 samples should show the presence of coliform organisms.*

Escherichia coli

E. coli. *E. coli* is a common member of the total coliform group and is abundant in the feces of humans and warm-blooded animals. *E coli* is not naturally found in the environment and can be easily and quickly detected in water, making it an ideal indicator for fecal contamination. Although most members of this species are considered harmless, some strains of *E. coli* can be pathogenic. The presence of *E. coli* in water indicates recent fecal contamination and the possible presence of intestinal disease-causing bacteria, viruses and protozoa. The absence of *E. coli* in drinking water generally indicates that the water is free of intestinal disease-causing bacteria.

Test Method. In 2024, *E.coli* was analyzed using the same medium and method as in total coliforms above. The *E. coli* test measures bacteria possessing the enzymes β-galactosidase and β-glucuronidase.

Regulatory Limits. In disinfected drinking water, the maximum acceptable concentration of *E. coli* (both federal and provincial limits) is zero *E. coli* per 100 mL.

Heterotrophic Plate Count Bacteria

Heterotrophic Plate Count. Microorganisms, such as bacteria, moulds, and yeasts that require organic carbon for growth, are known as heterotrophs and many bacteria associated with drinking water systems are heterotrophs. Heterotrophic plate count (HPC) bacteria are used to monitor trends in water treatment and distribution systems. Under increasing nutrient conditions and/or a reduction in the concentration of chlorine residual, the heterotrophic bacteria are usually the first group to increase and provide an early warning of the potential regrowth of coliforms. In addition, an increase in HPC bacteria in the distribution system will promote more rapid decomposition of chloramines. The CRD Water Quality Monitoring Program uses HPC to monitor treatment efficacy at the disinfection plants and to track the decline in chlorine residuals in the distribution system and storage reservoirs.

Test Method. In 2024, samples were analyzed for HPC by the CRD Water Quality Laboratory using membrane filtration onto R2A medium and incubated at 21-28°C for seven days. HPC can be measured in several different ways; in this test method, the low incubation temperature and long incubation time improves the recovery of stressed and chlorine-tolerant bacteria. HPC testing was carried out on raw water samples, water leaving the treatment plant, and treated water samples with low chlorine residual levels (below 0.2 mg/L).

Regulatory Limits. There is no federal or provincial regulatory limit for heterotrophic bacteria in drinking water. However, the USEPA Surface Water Treatment Rule considers 500 CFU/mL of heterotrophic bacteria as an indicator for a "detectable chlorine residual" when using membrane filtration onto Standard Methods agar incubated at 35°C for 48 hours. Therefore, in the absence of a Canadian regulatory limit, the CRD Water Quality Monitoring Program uses the USEPA value as a monitoring criterion to trigger site-specific operational measures for assessing and mitigating drinking water quality.

6.4 Certification and Audits

To ensure that analytical testing is carried out to the highest possible standard, the CRD Water Quality Laboratory participates in several types of external quality assurance and quality control (QA/QC) programs, in addition to rigorous internal QA/QC procedures that are included as part of the methodology and are a normal component of good laboratory practice.

6.4.1 Certification

All laboratories analyzing drinking water samples for total coliforms and *E. coli* according to the Drinking Water Protection Act/Regulation are required by the Province of BC to be approved in writing by the Provincial Health Officer. Laboratory approval requires both an approval certificate and a proficiency testing certificate, as noted below:

- **Water Bacteriology Testing Laboratory Approval Certificate**. This certificate is issued by the BC Provincial Health Officer for bacteriological testing of drinking water in the Province of BC. This certificate is renewed every three years via an on-site inspection (audit) of the analytical laboratory.

- **Canadian Microbiology Proficiency Testing Program Certificate of Participation**. This certificate is issued by the Advisory Committee for Water Bacteriology Laboratories, which is operated by the Department of Pathology and Laboratory Medicine at the University of British Columbia. Satisfactory performance is required to maintain laboratory certification. Three rounds of proficiency tests are carried out per year.

6.4.2 Accreditation

In 2017, the CRD Water Quality Laboratory attained accreditation to the global ISO/IEC 17025 standard used by testing and calibration laboratories. The accreditation has management, quality and technical requirements. Accreditation is maintained by successful reassessment every two years by an accrediting body (Canadian Association for Laboratory Accreditation; CALA) and satisfactory participation in an external proficiency testing program for all methods (two rounds per year). The CRD Water Quality Lab was last assessed in 2023 and will be recertified in 2025.

7.0 WATER QUALITY RESULTS

The overview results of the 2024 CRD Water Quality Monitoring Program for the GVDWS are provided below. Water quality data are listed in Appendix A (Tables 1, 2 and 3). Note that the median (middle value between the high and low) is used in these tables rather than the average value, as the median eliminates the effect of extreme values (very high or very low) on the average value and provides a more realistic representation of typical conditions.

7.1 Source Water Quality Results

Total Coliform Bacteria (TC). Similar to previous years, the raw (untreated) source water entering both plants exhibited generally a very low concentration of total coliform bacteria, in particular during the colder seasons (Figure 3). Usually, between July and October, when the Sooke Lake south basin is destratified and fully mixed with warm water, total coliform concentrations in the raw water increase and can reach levels of a few hundred CFU/100 mL. In 2024, the total coliform concentrations suddenly rose on July 16 and spiked to 15,000 CFU/100 mL by the end of July and early August. This unusual but not unprecedented total coliform event lasted until August 16 when the total coliform concentrations fell below the operational alert level of 1,000 CFU/100 mL. A similar total coliform event occurred in 2017, and a subsequent investigation concluded that internal seiches in Sooke Lake Reservoir were likely the cause. Previous studies have shown that Sooke Lake is prone to internal seiche events during the summer and early fall period when the stratification in the south basin breaks down due to hypolimnetic water extraction. It is assumed that the 2024 total coliform event was caused by the same hydrodynamic mechanism although clear evidence for this has not been found yet. The Department of Biochemistry and Microbiology at the University of Victoria conducted a genomic sequencing on a sample collected during the peak of the total coliform event and determined that the species responsible for the high total coliform concentrations was *Lelliottia nimipressurali, a* common decomposing bacteria species that is not known to pose any risk to human health. This finding provided assurance that this total coliform event was not a result of a source water contamination and that the risk to public health was low.

With 244 samples from water entering the Goldstream Water Treatment Plant analyzed in 2024, the total coliform concentration ranged from 0-15,000 CFU/100 mL, with a median value of 5 CFU/100 mL (Appendix A, Table 1).

The USEPA *Surface Water Treatment Rule* for unfiltered systems has a non-critical total coliform criterion of maximum 100 CFU/100 mL at the 90th percentile of a six-month sample set. The 90th percentile of total coliform concentrations in the raw water between January and June 2024 was 6 CFU/100 mL, and between July and December 2024 it was 1,600 CFU/100 mL. Therefore, the source water was compliant with this non-critical USEPA filtration exemption criteria in the first half of 2024 but not in the second half. This is a typical pattern for Sooke Lake Reservoir but the magnitude of exceedances in the second half of 2024 was exacerbated by the occurrence of the total coliform event in July and August. While this is a secondary non-critical filtration assessment criterion, it indicates a vulnerability of the water quality with rising temperatures due to climate change.

***E. coli* Bacteria**. During more than three decades of monitoring bacteria within the GVDWS, it has been found that virtually 100% of the fecal coliform bacteria detected in the source water and the distribution system are *E. coli*. In 2024, as in previous years, the low detection of *E. coli* bacteria indicated that the raw water entering the Goldstream Water Treatment Plant from Sooke Lake Reservoir was good quality source water and complied with the primary criteria in the USEPA *Surface Water Treatment Rule* to remain an unfiltered drinking water supply (Figure 4).

In 2024, about 10.2% of the 245 samples collected from the raw source water contained *E. coli* and those that were positive for *E.coli* had levels well below 20 CFU/100 mL. The concentration ranged from 0-10 CFU/100 mL, with a median value of 0 CFU/100 mL. The low occurrence, as well as the low concentrations of *E.coli* bacteria in Sooke Lake, are in line with long-term historical bacteria concentrations. These results do not indicate a particular source of *E.coli* bacteria, but rather point to low levels of naturally occurring fecal matter in a healthy and unproductive aquatic ecosystem. The few sporadic *E. coli* hits are typically the result of the rainfall and runoff into Sooke Lake, which transported organic matter accumulated in the watershed to the lake. In years with a Kapoor Tunnel Inspection Project, a slight *E. coli* concentration increase in mid-December can be attributed to the supply from the Goldstream system. In 2024, the Goldstream system was not used as a drinking water source.

***Giardia and Cryptosporidium* Parasites**. In 2024, parasite samples were collected eight times as part of the CRD's routine monitoring program. This sampling frequency was set after an evaluation of long-term data showed extremely low detection of these organisms. The first five parasite samples were collected from the raw water sampling location at the Goldstream Water Treatment Plant while the last three samples in 2024 were collected with a portable pump directly from Sooke Lake Reservoir in 1 m depth in the south basin near the intake tower. This sampling location change was necessary due to the construction works in the UV treatment building which impacted the original parasite sampling location. All samples were shipped for analysis to an external laboratory. It should be noted that the efficiency of the analysis for detecting *Giardia*, and especially *Cryptosporidium*, is quite low (typically in the 15-25% range).

In 2024, no *Giardia* cysts and no *Cryptosporidium* oocysts were detected in all samples on the raw water entering the Goldstream Water Treatment Plant. The 10-year median value for total *Giardia* cyst and total *Cryptosporidium* oocyst concentrations is 0/100 L; however, historical data shows that occasionally very low concentrations of parasites can be found in the raw water from Sooke Lake. While these are extremely low values for a surface water supply, the addition of UV disinfection provides assurance that no infective parasites can enter the GVDWS.

The treatment target specified by the Canadian federal and provincial regulations, as well as the USEPA *Surface Water Treatment Rule*, require 3-log (99.9%) parasite inactivation to meet the filtration exemption criteria for surface water systems. Both CRD disinfection facilities provide UV treatment that, in conjunction with the CRD's drinking watershed management concept, is able to meet these targets and, therefore, adequately protects the public from waterborne parasitic illnesses.

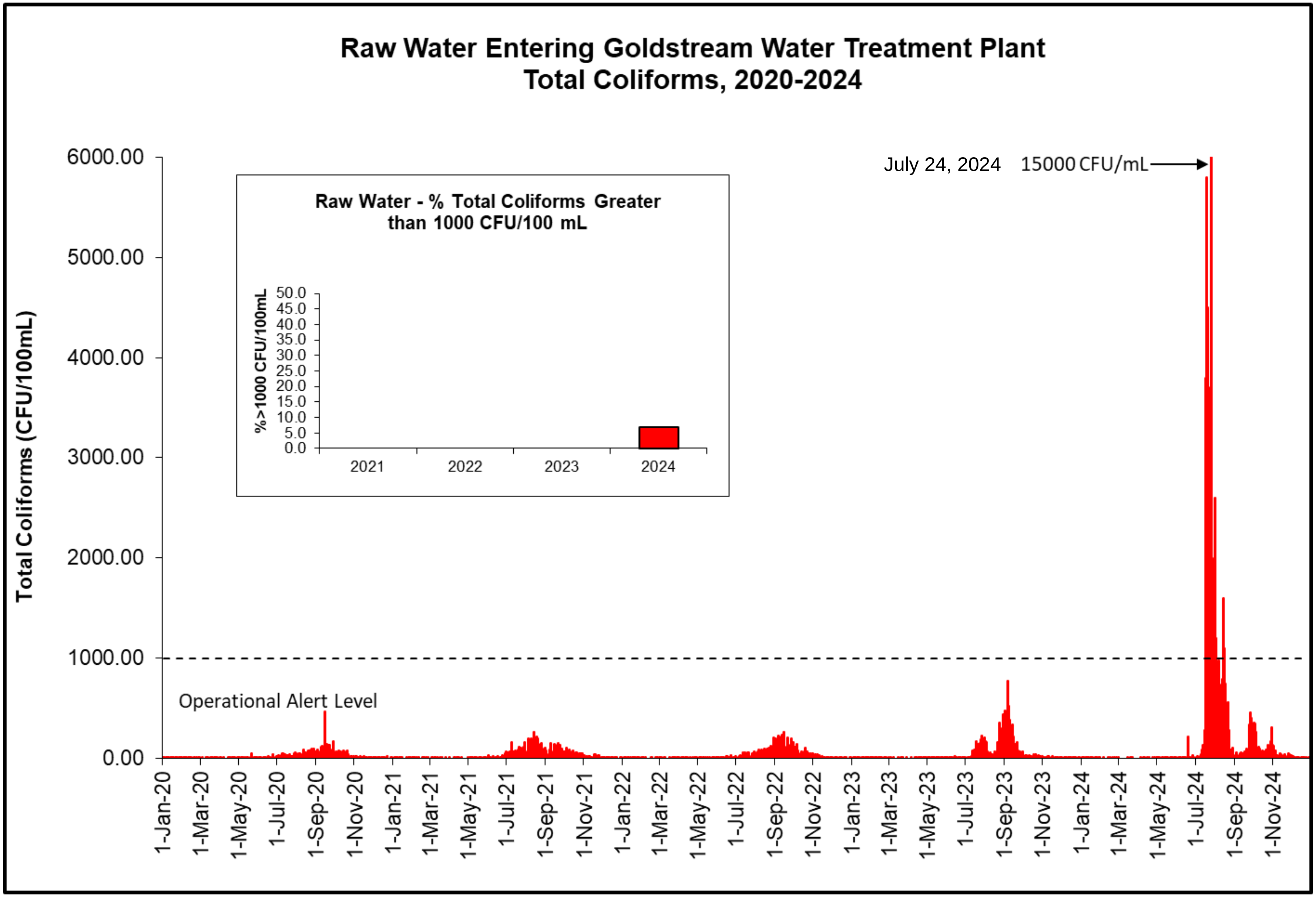

Figure 3 Raw Water Entering Goldstream Water Treatment Plant Total Coliforms 2020-2024

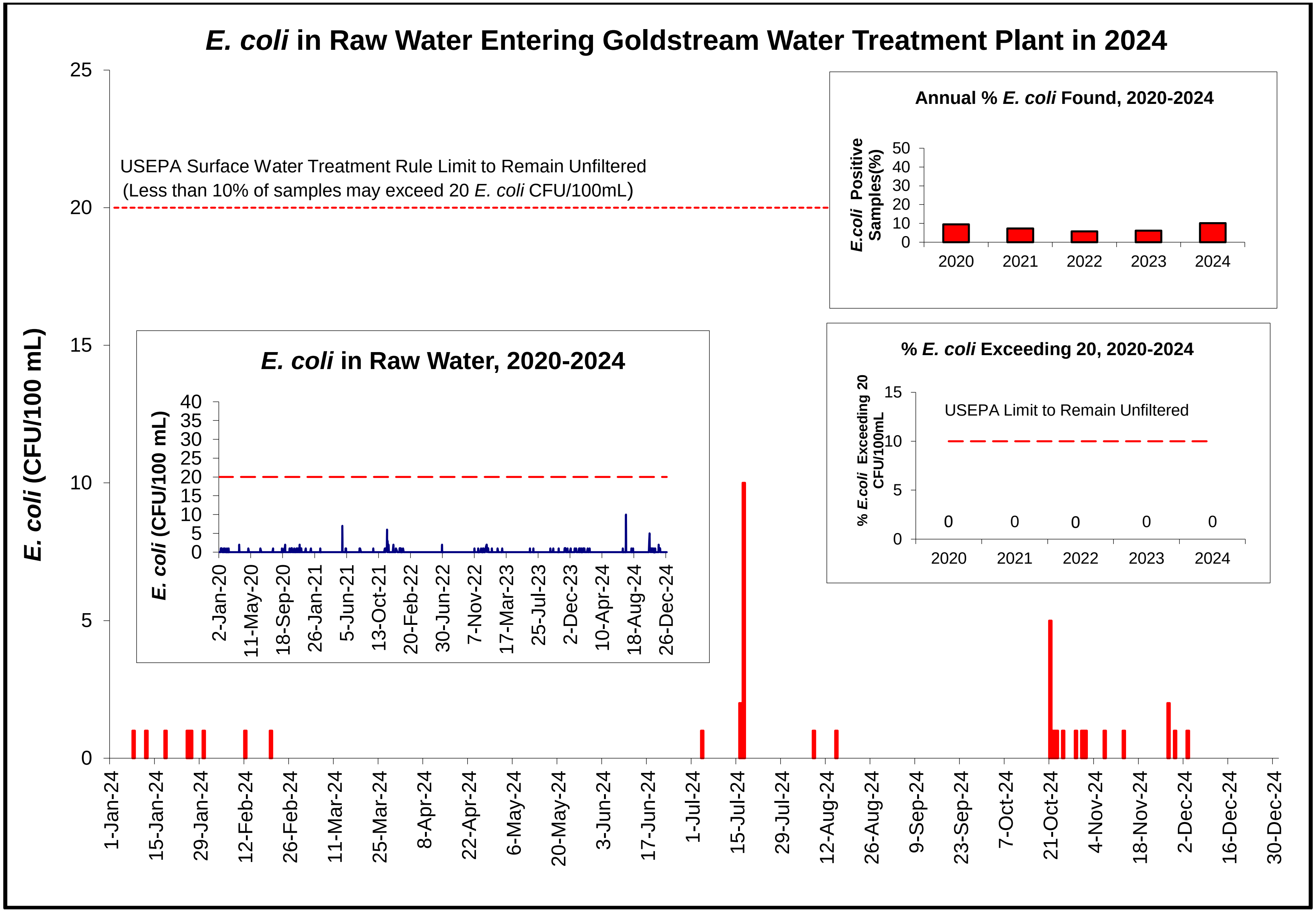

Figure 4 ***E.coli*** **in Raw Water Entering Goldstream Water Treatment Plant in 2024**

Algae – *Sooke Lake Reservoir (SOL)*. In the first half of 2024, the algal dynamics were generally in line with the long-term trend. The typical spring peak occurred in April when several taxa drove up the algae abundance (Chrysophytes, Bacillariophytes – also called Diatoms). This spring peak usually marks the highest algal activity in the year in Sooke Lake Reservoir and this was true again for 2024 (Figure 5, Figure 6 and Figure 7). While the algae concentrations during the spring period were still generally in line with the long-term historical trend, the summer period exhibited notably higher algal concentrations compared to the long-term average trendline. This was much more pronounced in 2024 but already visible in a few previous summers. There appears to be a trend towards generally higher algal activity between July and October. The increase in 2024 was approximately 200% compared to the long-term average. While this increase seems significant, the overall summer algae concentration of 1,500 NU/mL or less is still below bloom conditions for any algae species. While the typical spring peak in algae concentrations is due to favourable environmental conditions such as warming water and increased sunshine, coupled with the availability of freshly introduced nutrients after the reservoir recharge, the increased summer algae concentrations could be due to a growing influence of climate change associated with warmer water temperatures and extended warm water conditions. Sooke Lake water warmed particularly early in 2024 and therefore exhibited the longest warm water season since raising the dam in 2004. Algae have a remarkable ability to quickly adapt to environmental factors, such as temperature, nutrient availability and light intensity. Coincidental with the sudden increase in algal concentration in mid-July is a sudden increase in total nitrogen concentrations in the south basin. The timing of this is interesting as it also coincides with the onset of the unusual total coliform event (see page 21 above). It is possible that these events are linked and that the hydromechanical factors (internal seiches) that may have caused the total coliform event also kicked up nitrogen nutrients from the lake sediments and brought them higher up into the water column where they then induced a spike in algal activity. This theory is supported by the fact that seiche effects are usually limited to the south basin and that the total nitrogen increase is also only recorded in the south basin. The responding algal biomass increase was also most prominent in the south basin, although, with several weeks delay, this higher algal activity seemed to have propagated also towards the north basin, likely as a result of dispersion through wind and wave action.

Sooke Lake Reservoir did not experience an actual bloom of a specific algae species in 2024, which demonstrates the robustness of an intact ecosystem with a balanced and diverse algae population. Sooke Lake exhibited, as in previous years, a high algal diversity, ranging from green algae to diatoms, with some taxa that could potentially have adverse impact on water quality (Figure 8, Figure 9 and Figure 10). For example, the potential cyanotoxin producer *Dolichospermum/Anabaena* spp. was present in Sooke Lake during most months in 2024, in particular during late summer and fall. But the highest cell count for these cyanobacteria was still well below the critical threshold recommended by Health Canada (2017), (i.e., 2,000 cells/mL).

In June, CRD staff received reports from customers related to filter clogging issues. The analysis revealed that these incidents were caused mainly by the big-size diatom of *Lindavia / Cyclotella bodanica* (Figure 11). This is a common diatom in Sooke Lake Reservoir. Quantitative analysis showed that the abundance of this diatom started to increase in the middle of May and peaked in June, then decreased significantly in early July. Due to the nature of its rigid silica cell wall, diatoms like this taxon tend to be more concentrated at lower depths and are therefore situated close to the typically used low intake gate in the south basin (Figure 12).

For consistency with historical data, our analysis did not include some small-size single cell algae which do not contribute significantly to the overall algal biomass.

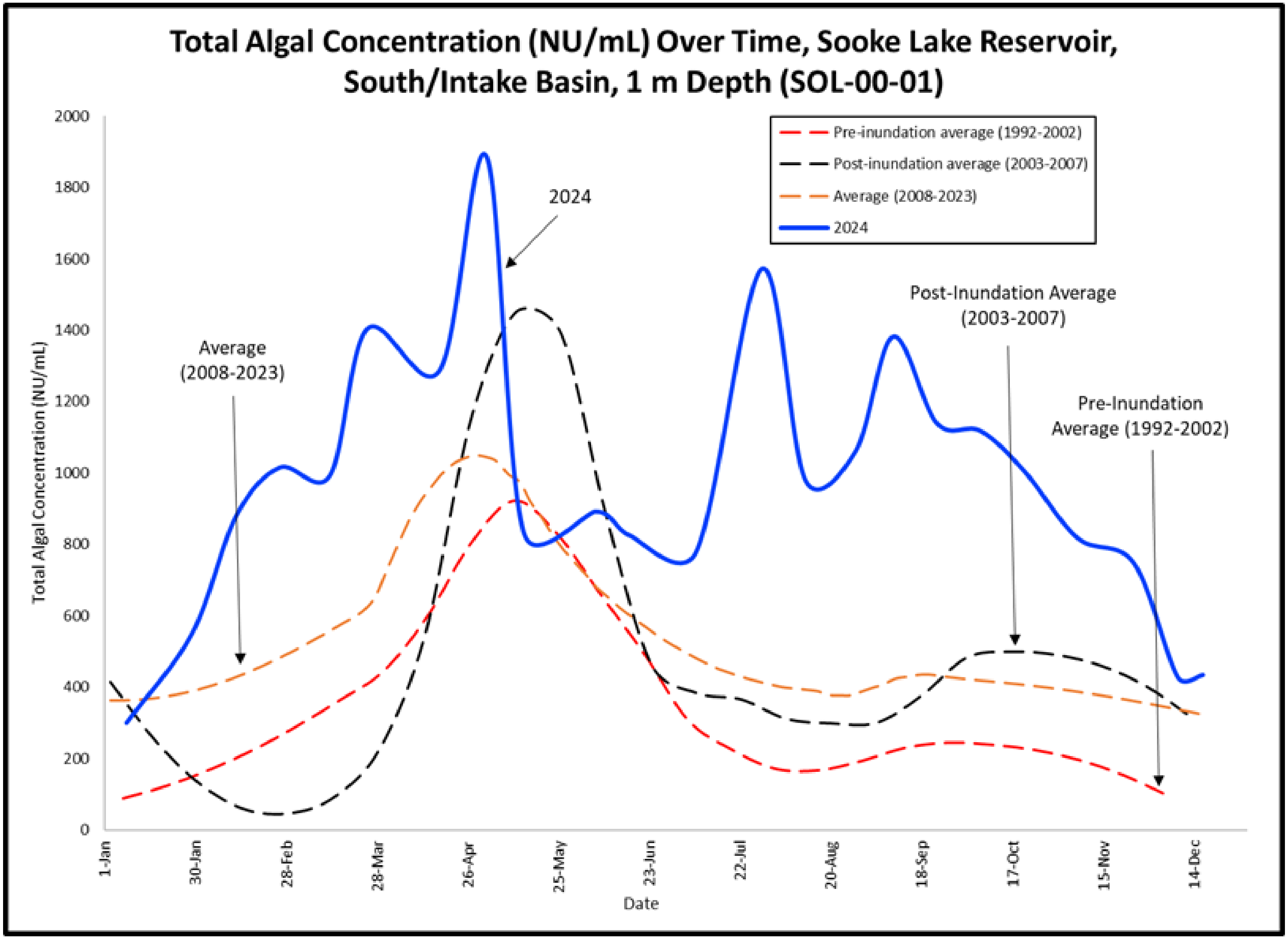

Figure 5 Total Algal Concentration (natural units/mL) Over Time, Sooke Lake Reservoir, South/Intake Basin, 1 m depth (SOL-00-01)

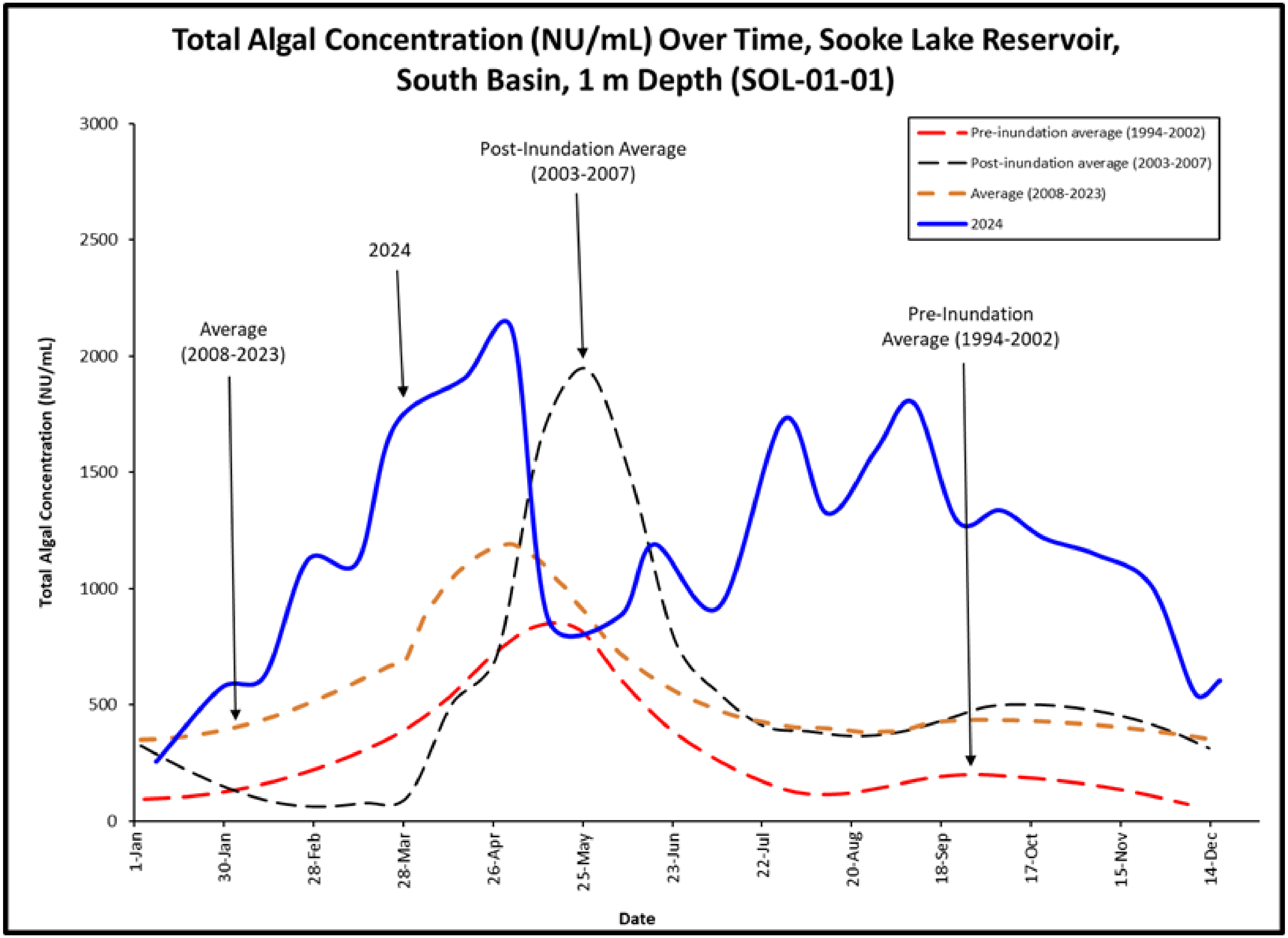

Figure 6 Total Algal Concentration (natural units/mL) Over Time, Sooke Lake Reservoir, South Basin, 1 m depth (SOL-01-01)

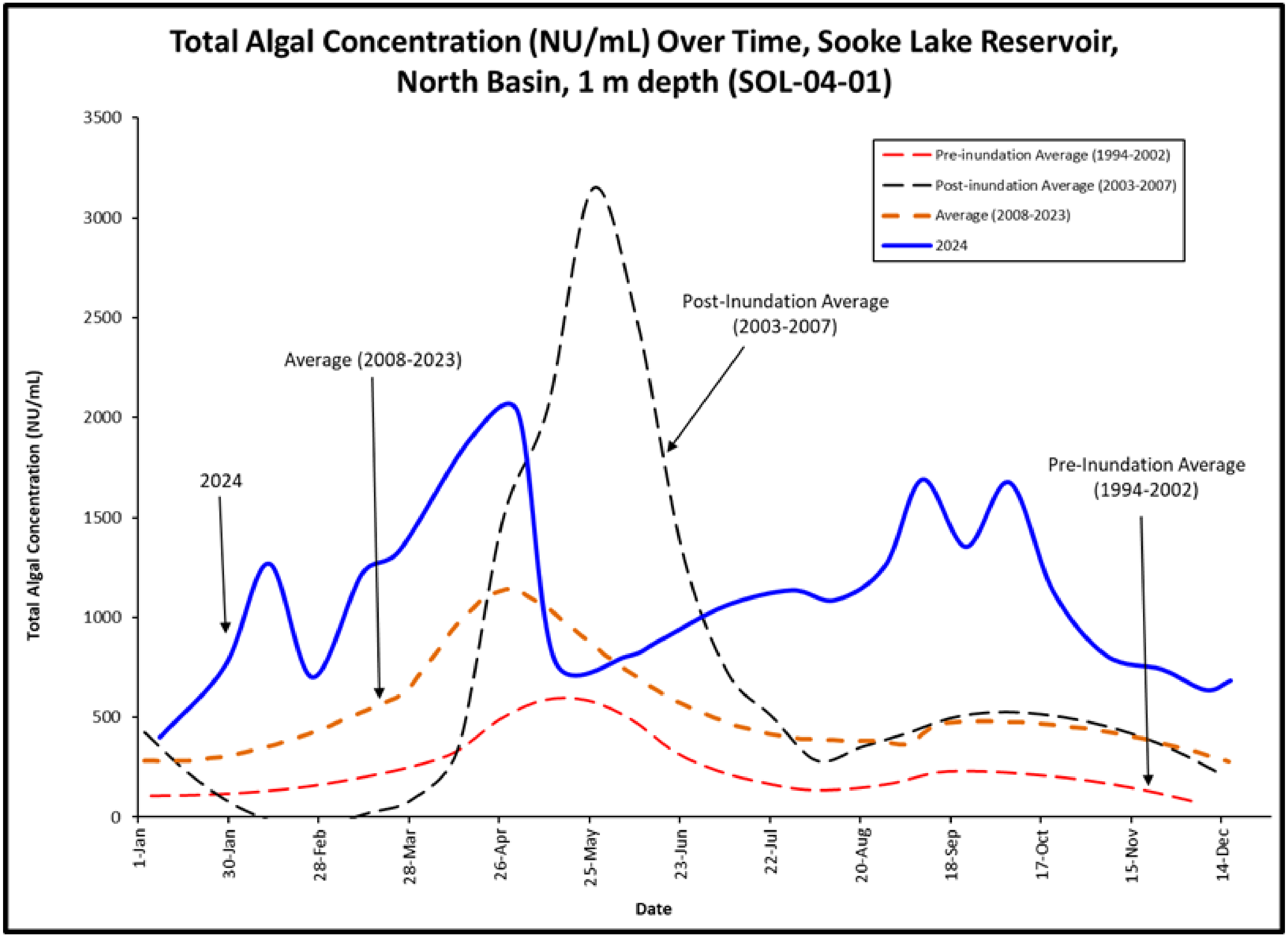

Figure 7 **Total Algal Concentration (natural units/mL) Over Time, Sooke Lake Reservoir, North Basin, 1 m depth (SOL-04-01)**

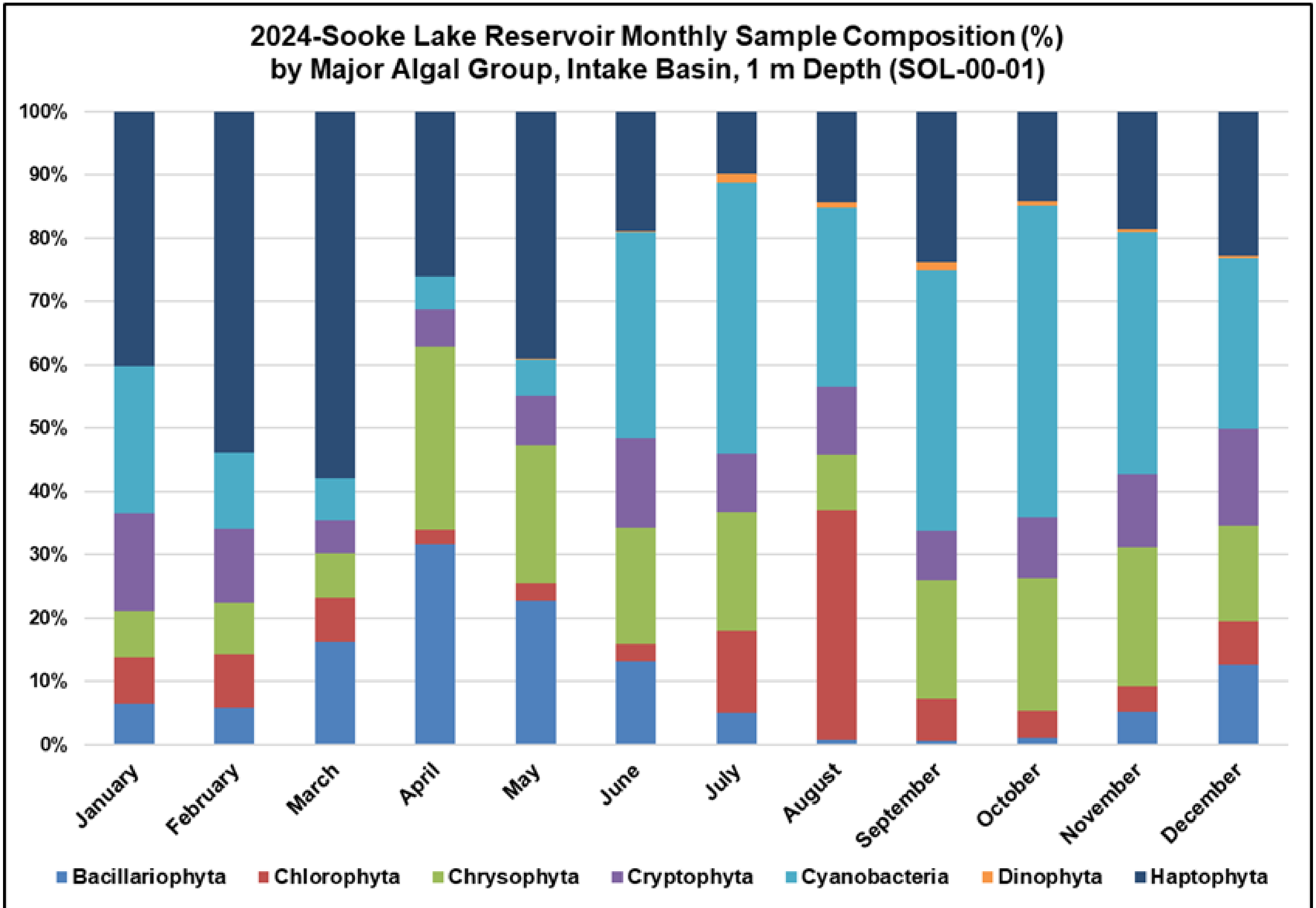

Figure 8 **Monthly Abundance Percent of Different Algal Groups, Intake Basin, 1 m depth, SOL-00-01, 2024**

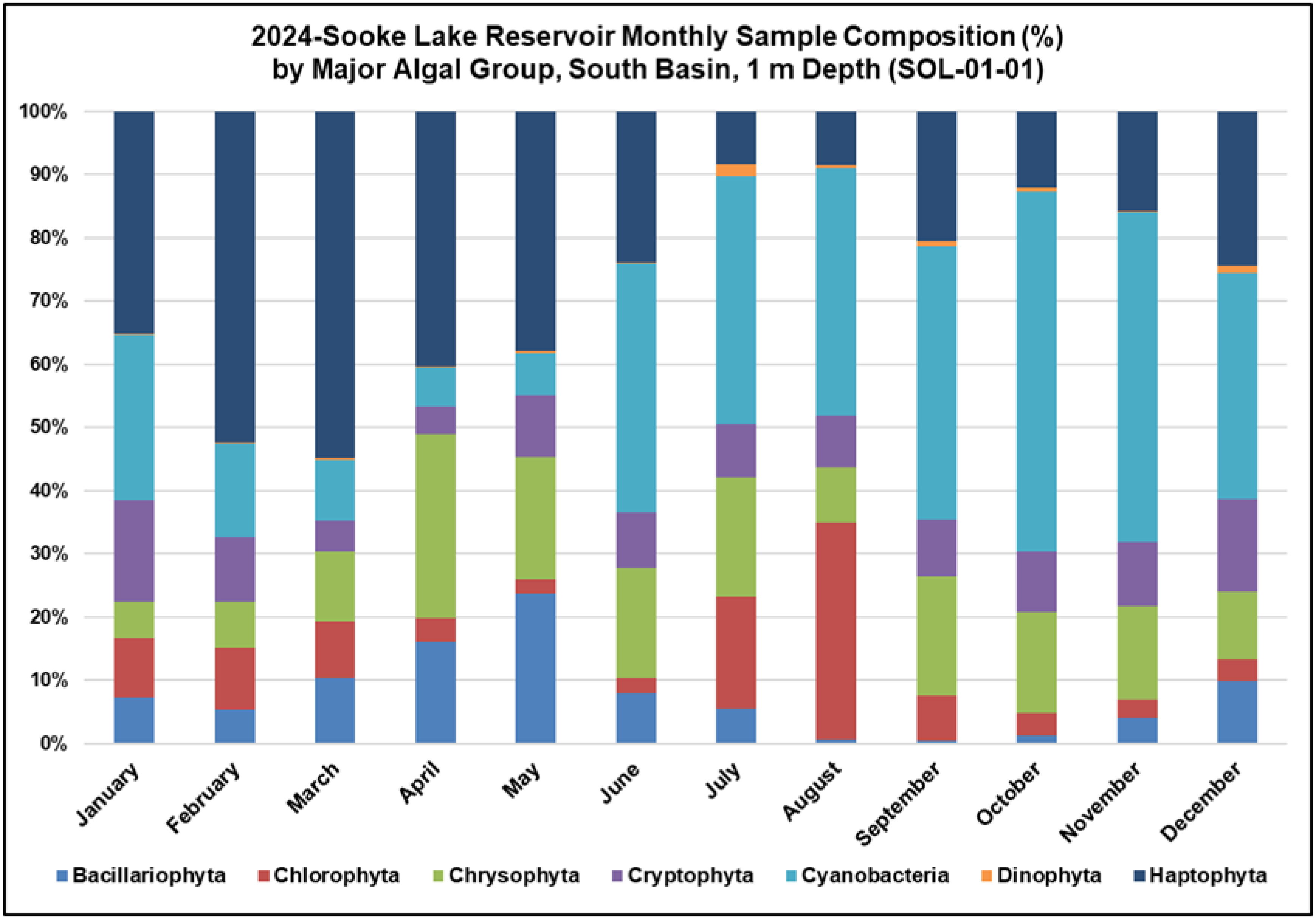

Figure 9 **Monthly Abundance Percent of Different Algal Groups, South Basin, 1 m depth, SOL-01-01, 2024**

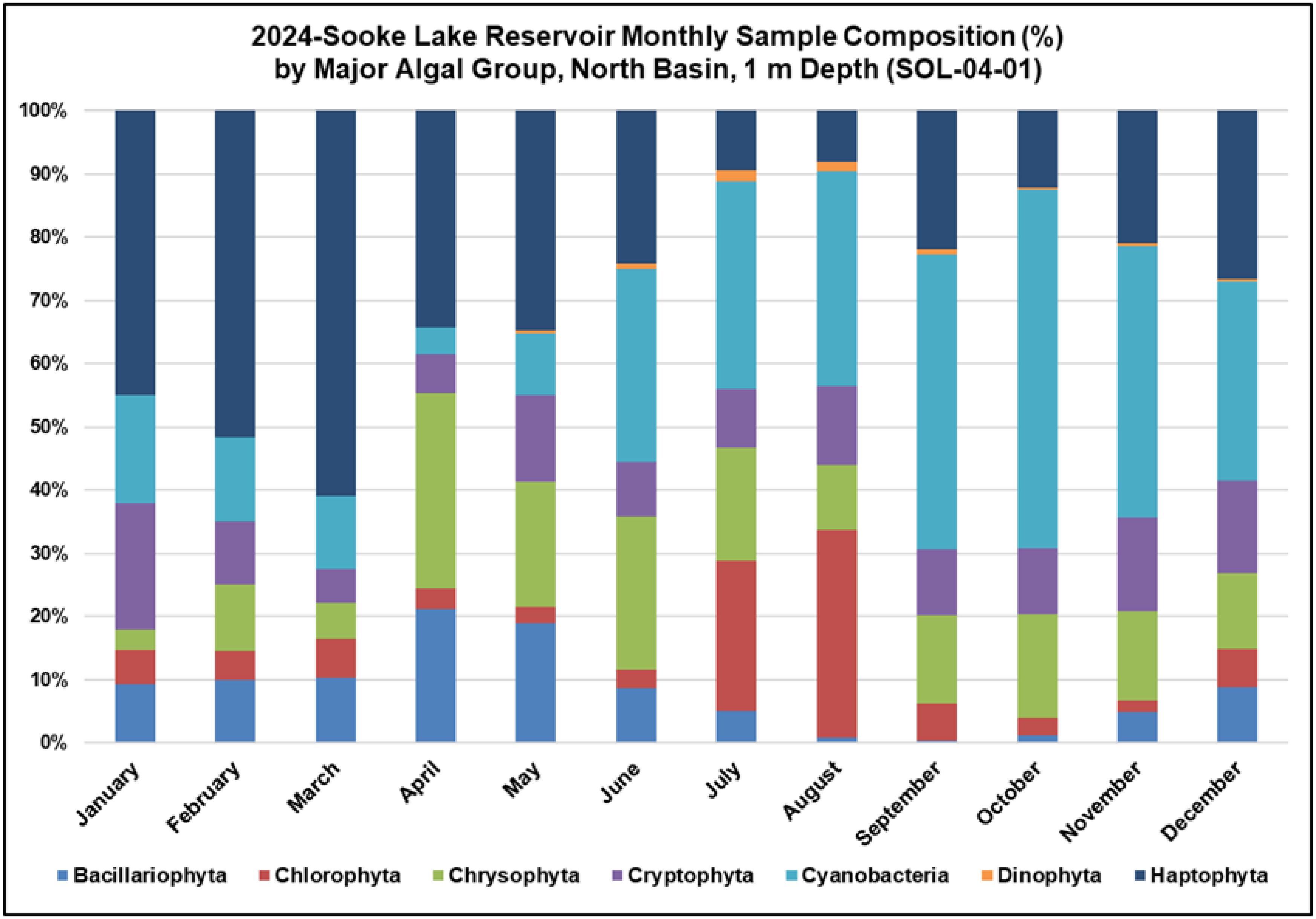

Figure 10 Monthly Abundance Percent of Different Algal Groups, North Basin, 1 m depth, SOL-04-01, 2024

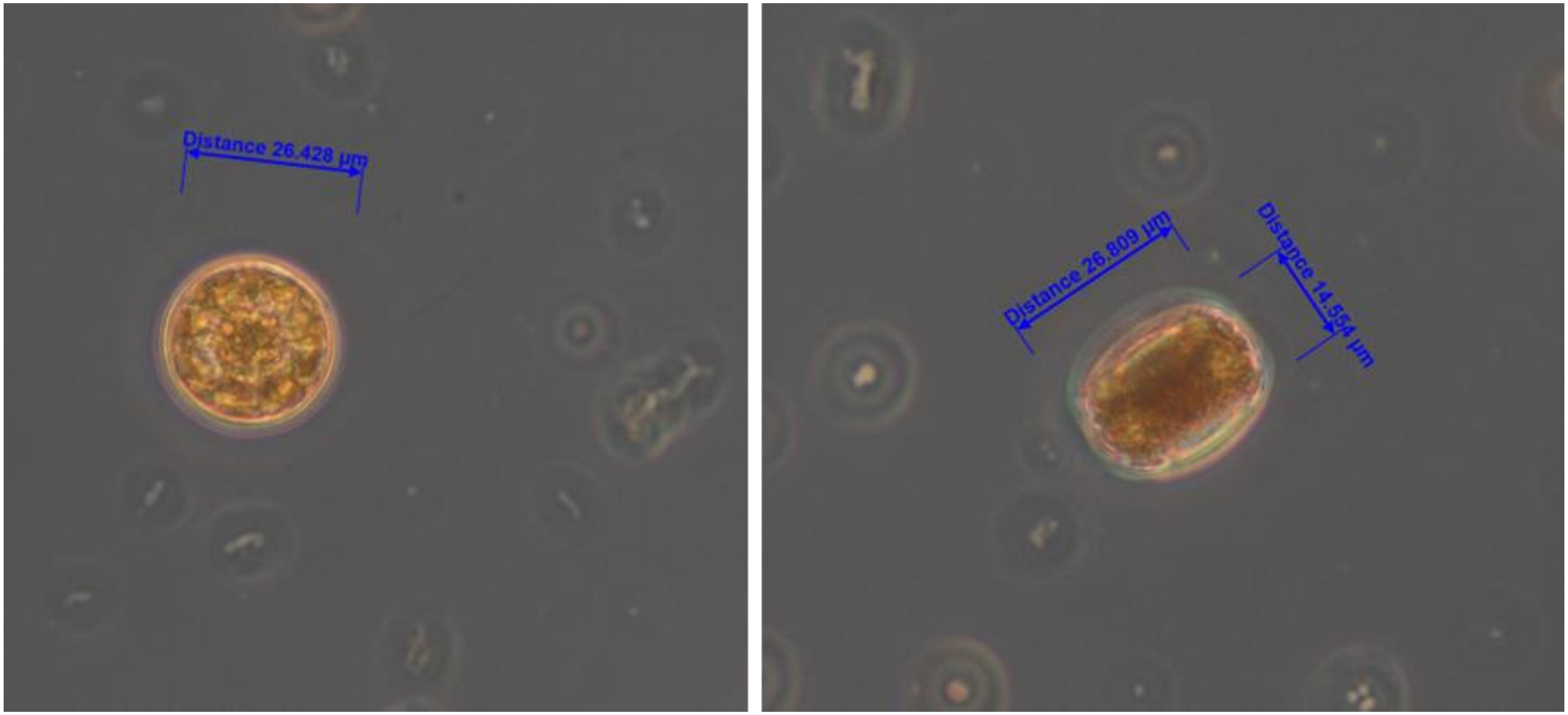

Figure 11 Diatom *Lindavia bodanica* in Sooke Lake in June 2024: Left - top view; Right - side view

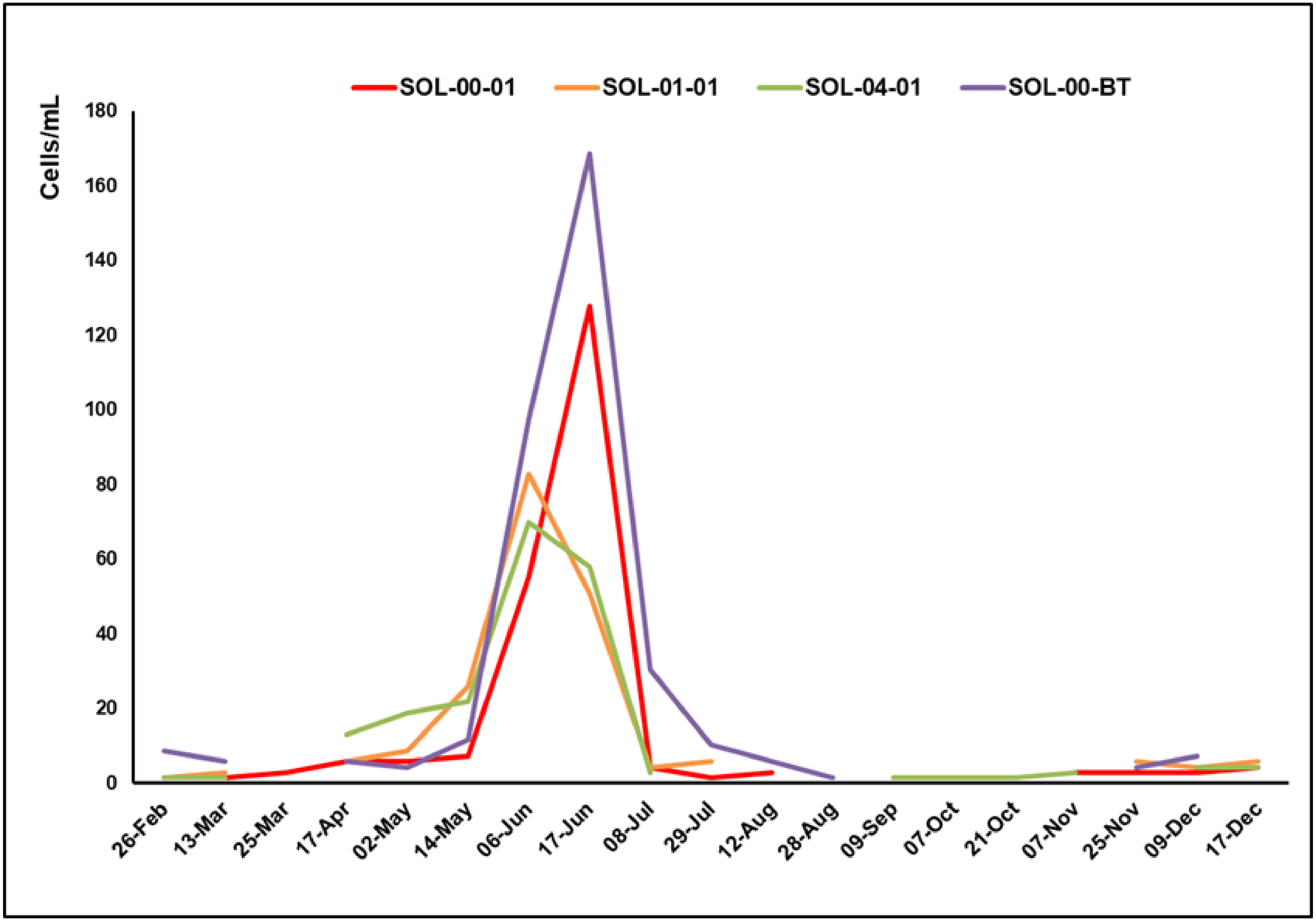

Figure 12 **Abundance of *Lindavia bodanica* in Sooke Lake at 3 stations near surface, and at bottom near Intake Tower, 2024**

Zooplankton – *Sooke Lake Reservoir (SOL)*. Zooplankton play an important role as an intermediate trophic stage, ensuring the energy flow from primary producers to higher trophic levels, e.g., macroinvertebrates, fish and other aquatic animals in aquatic ecosystems. Previous studies have shown that fish in Sooke Lake Reservoir predominantly rely on zooplankton for forage. Because of this important biological role, the CRD has included a regular zooplankton analysis to its source water monitoring program. Zooplanktonic species themselves can be herbivores, carnivores or omnivores. Studies have shown that any change of zooplankton species composition or densities or both could influence not only the trophic structure, but also physiochemical parameters in the ecosystems. There are three main zooplankton groups: Rotifera, Copepoda and Cladocera. Other aquatic invertebrates found in the collected samples included water mites, insect larvae, and rarely nematodes or tardigrades. In the ecosystems, phytoplankton are considered as a main food source for zooplankton and, therefore, phytoplankton dynamics can significantly reflect the changes of zooplankton and *vice versa*. The peak of zooplankton abundance normally occurs after the peak of phytoplankton. In general, zooplankton tend to have higher density during the spring-to-fall period than in winter.

In Sooke Lake Reservoir, zooplankton mainly consist of Rotifera and Copepoda, although Cladocera taxa, such as *Daphnia* spp., can be occasionally recorded. In 2024, these three main zooplankton groups were recorded in Sooke Lake. Rotifera was the most dominant group. Abundances of Rotifera and Copepoda were consistent with the long-term trends. Cladocera zooplankton, on the other hand, was less common and only observed in some discrete samples and was therefore excluded from the analysis.

As rotifers are considered one of the main food sources for copepods, these two groups might show opposite abundance trends. One of the main food sources of rotifers is phytoplankton and therefore they normally reach the highest density after the peak of phytoplankton. Zooplankton dynamics in Sooke Lake are also regulated by other higher trophic organisms, such as macroinvertebrates and fish.

Zooplankton trends in Sooke Lake Reservoir are typical of ecological succession models. 2024 zooplankton activity was consistent with long-term trends (Figure 13 to 18).

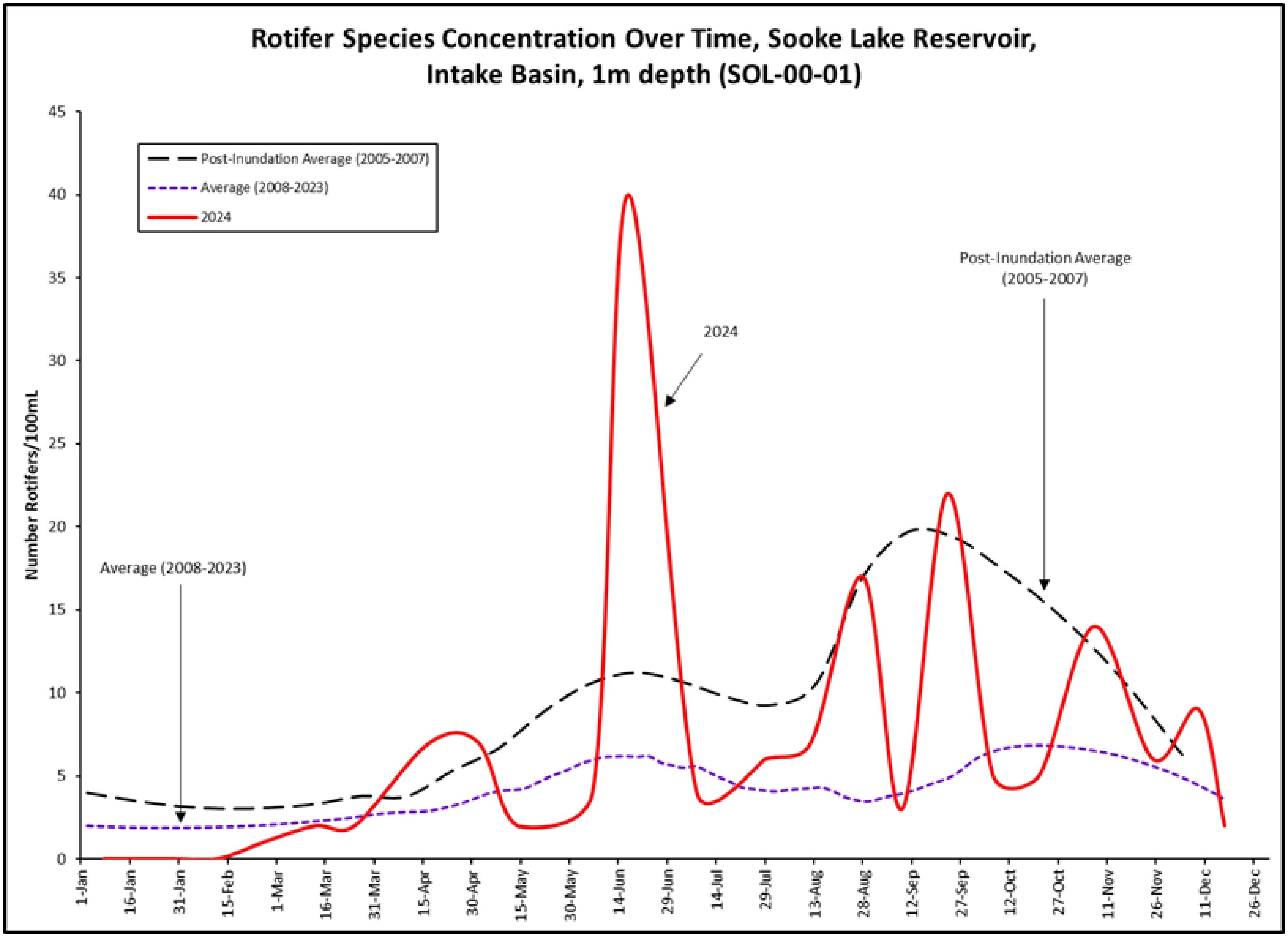

Figure 13 The Total Number of Rotifers Over Time, Sooke Lake Reservoir, Intake Basin, 1 m depth (SOL-00-01)

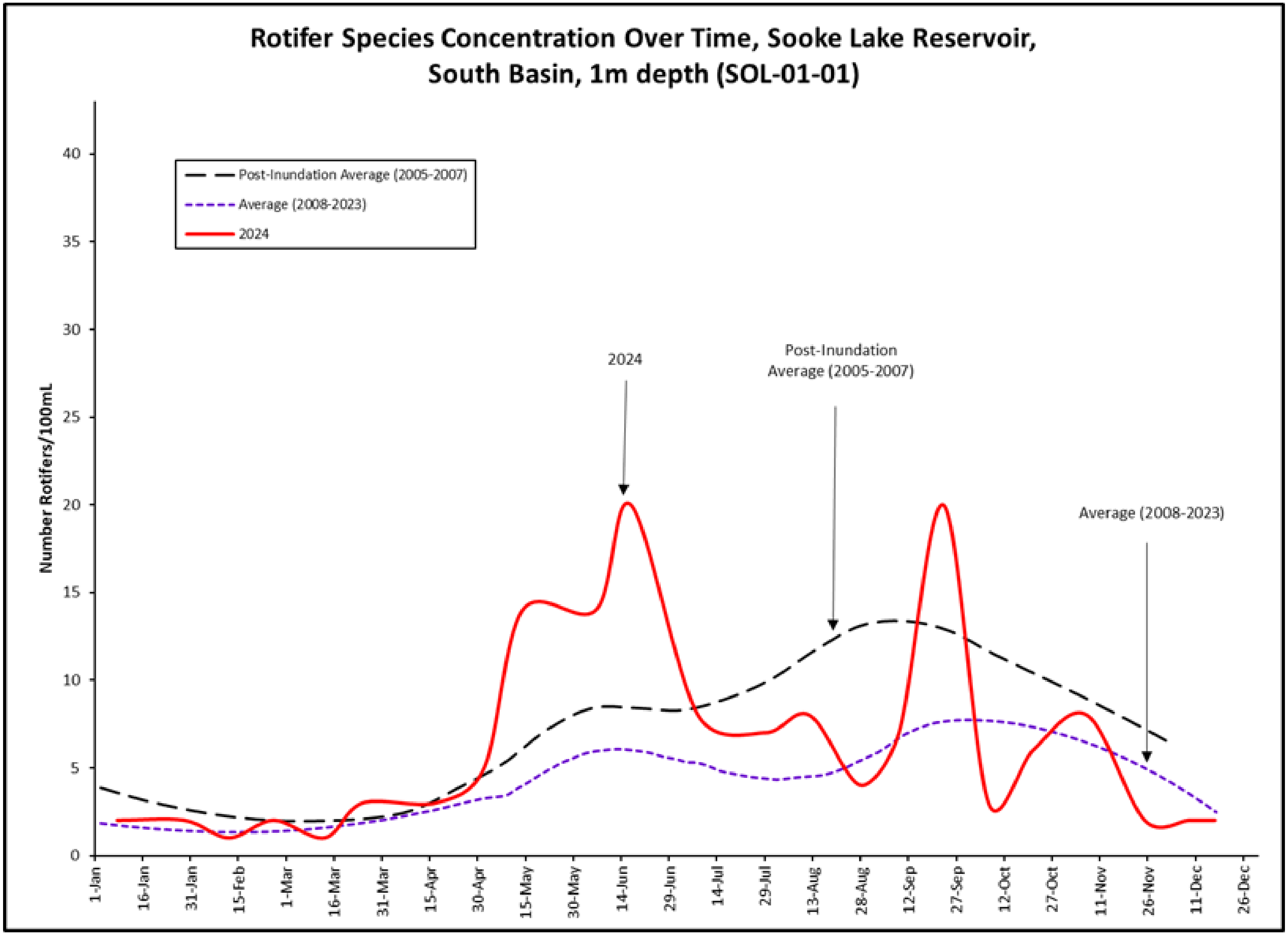

Figure 14 **The Total Number of Rotifers Over Time, Sooke Lake Reservoir, South Basin, 1 m depth (SOL-01-01)**

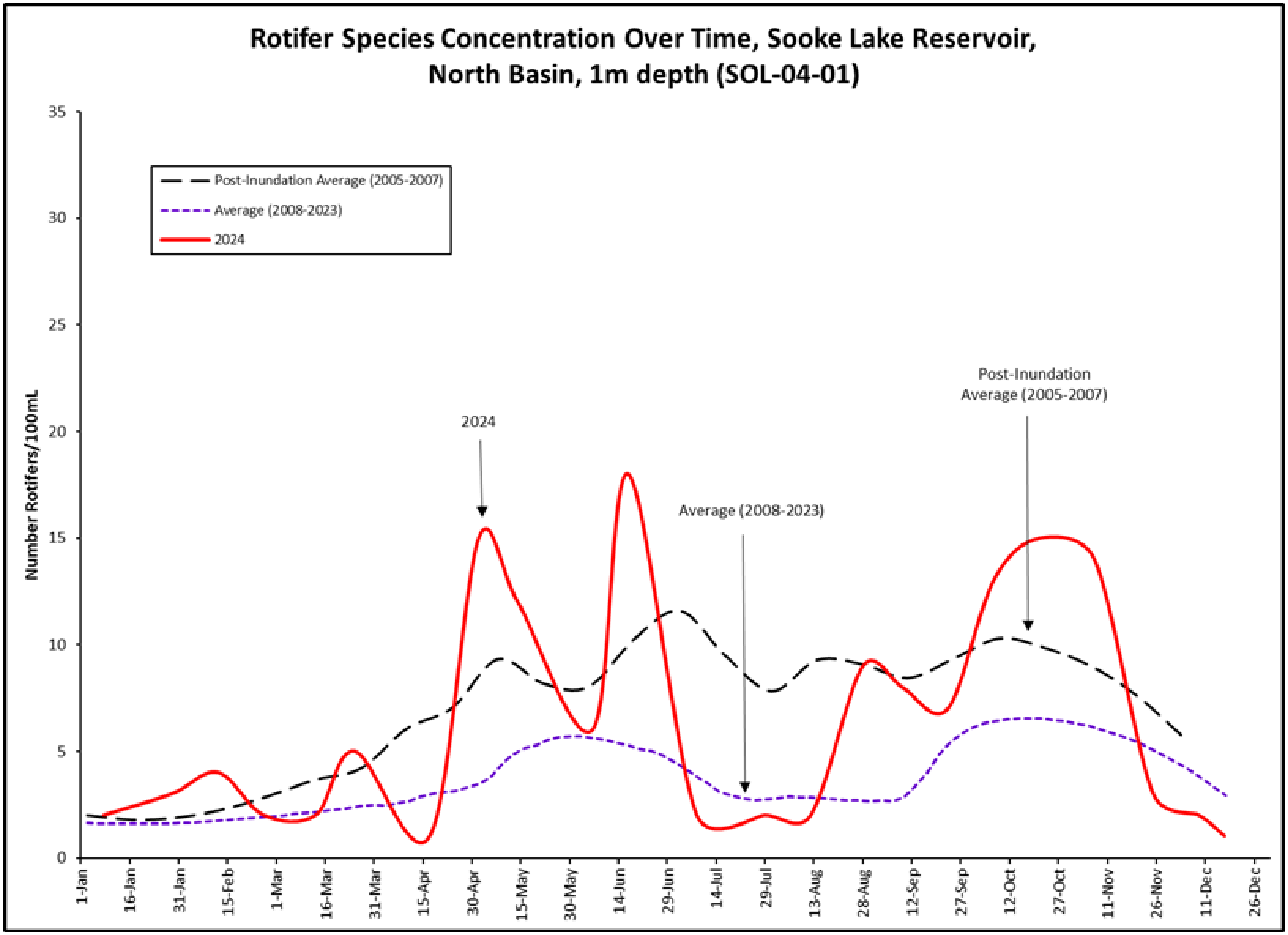

Figure 15 The Total Number of Rotifers Over Time, Sooke Lake Reservoir, North Basin, 1 m depth (SOL-04-01)

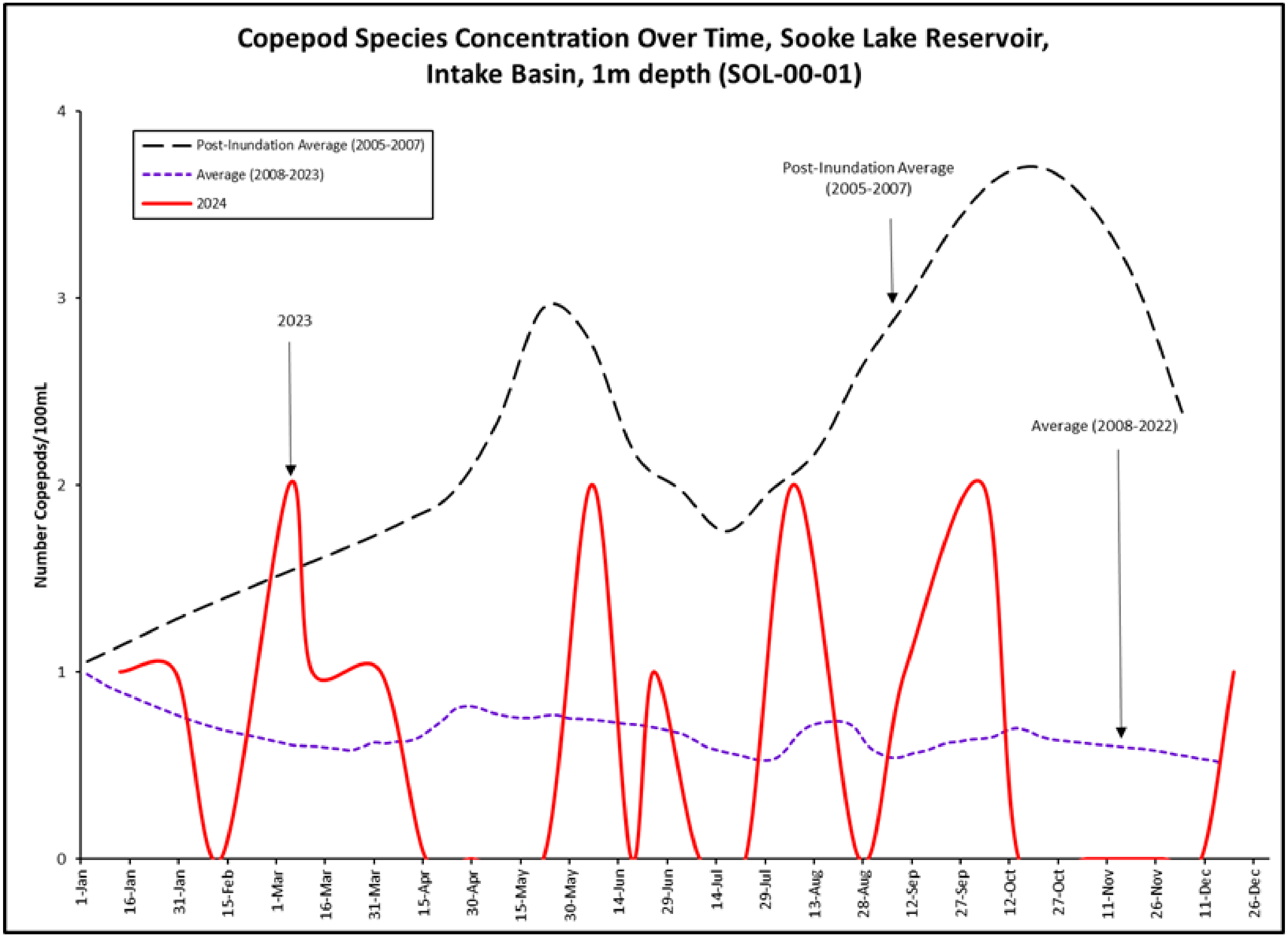

Figure 16 **The Total Number of Copepods Over Time, Sooke Lake Reservoir, Intake Basin, 1 m depth (SOL-00-01)**

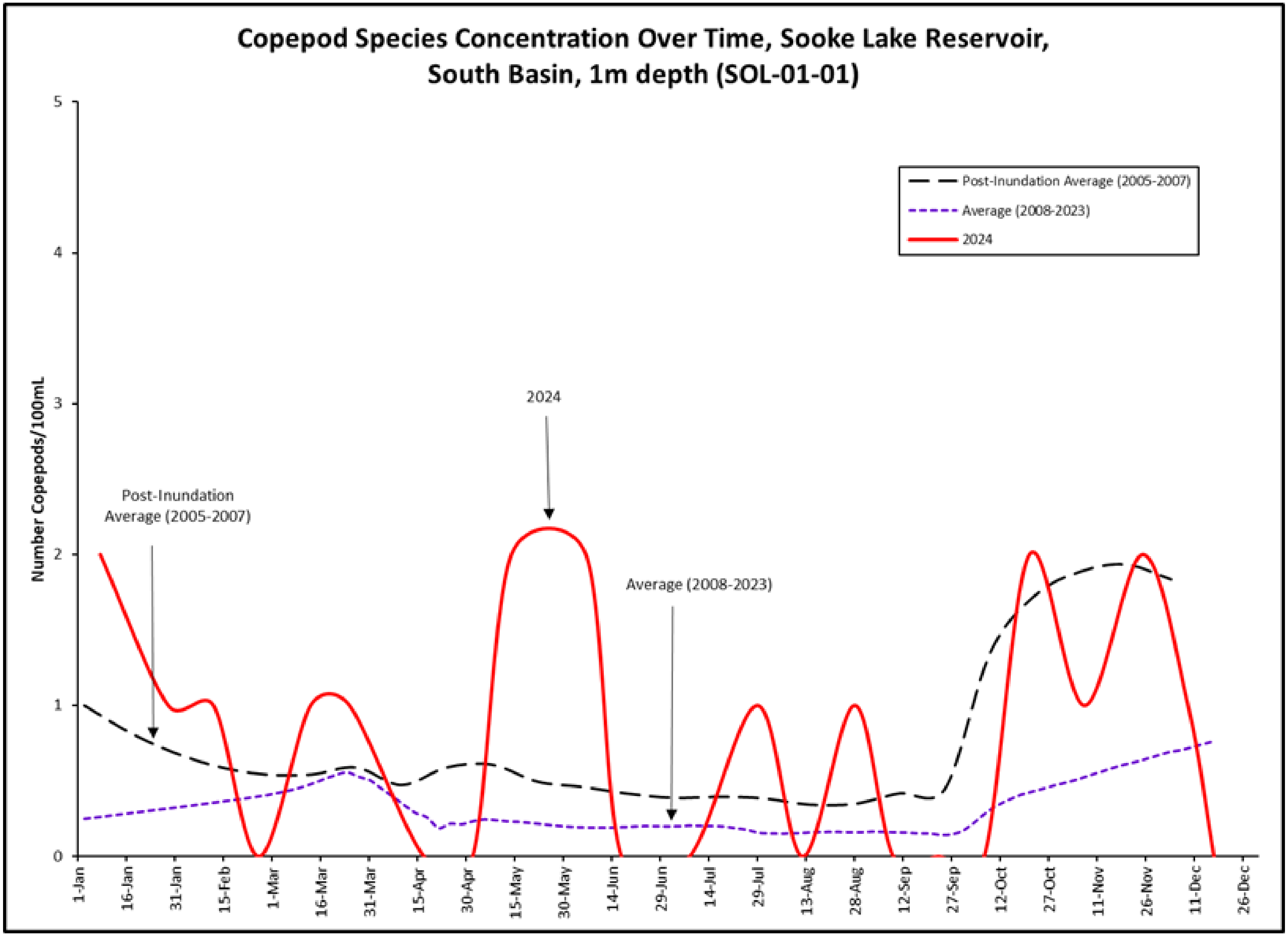

Figure 17 The Total Number of Copepods Over Time, Sooke Lake Reservoir, South Basin, 1 m depth (SOL-01-01)

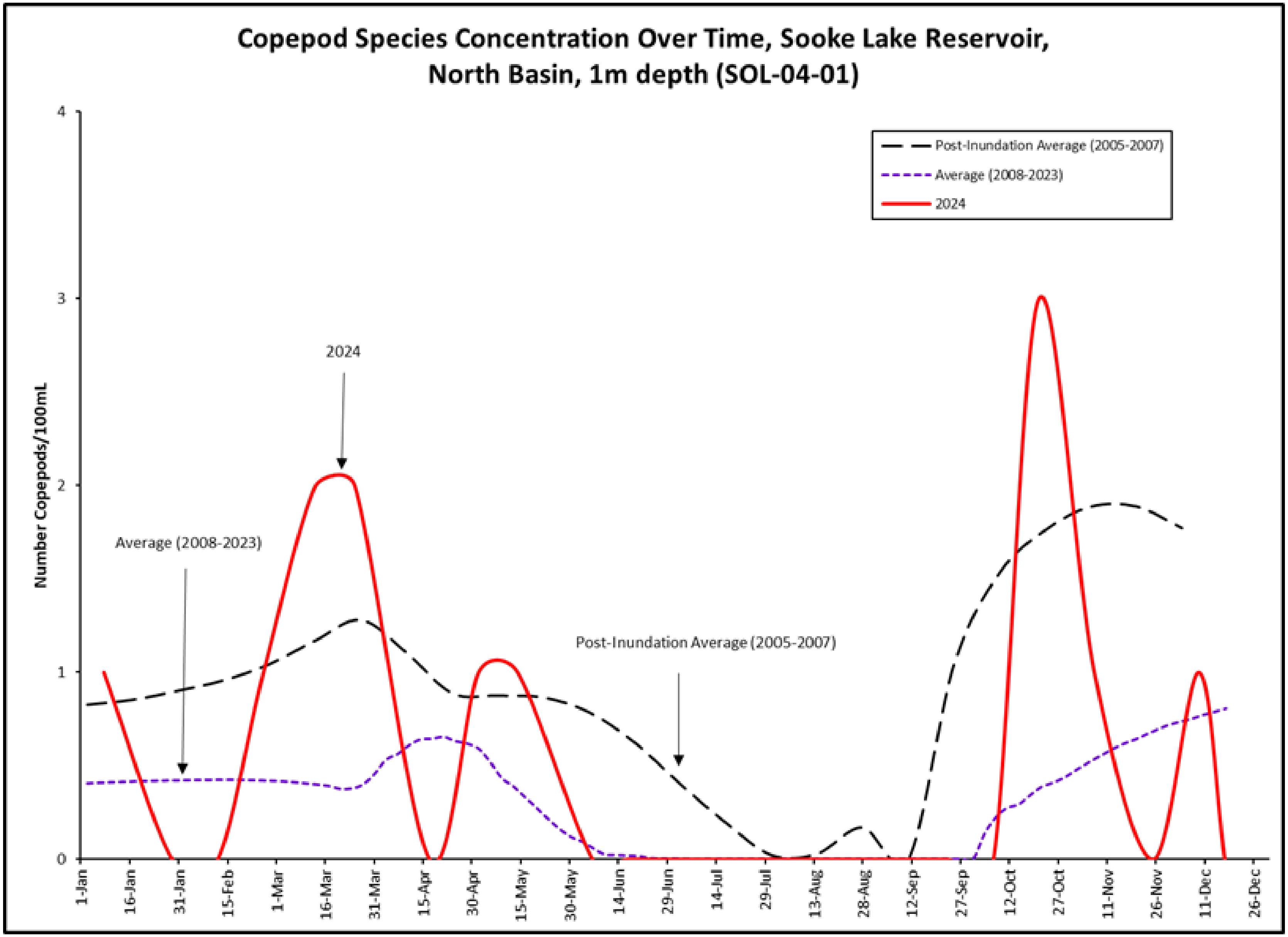

Figure 18 **The Total Number of Copepods Over Time, Sooke Lake Reservoir, North Basin, 1 m depth (SOL-04-01)**

Stratification: The 2024 thermal stratification pattern in Sooke Lake Reservoir was consistent with historical trends, as stratification occurred during spring, summer and early fall months. This phenomenon happens when the water column is divided into three layers from top to bottom, including: *epilimnion* (atop, warm, circulating and fairly turbulent), *metalimnion* (characterized by a steep thermal gradient or rapid temperature change) and *hypolimnion* (bottom, denser and colder water with little temperature change). The stratification reflects the vertical heat distribution in the water column and, therefore, might have a significant association with the dynamics of plankton communities. The stratified layers can function as barriers for exchanging of heat, chemicals, and nutrients, whereas mixing events could release nutrients from bottom and therefore favour algal growth, as often seen in the fall. CRD staff use a lake profiler with a temperature probe to create a vertical temperature profile once per month at the three usual Sooke Lake sampling stations (Intake Basin, South Basin and North Basin). In 2024, thermistor chains installed in four locations in the lake have provided an even more refined understanding of the reservoir's stratification processes and allowed for a precise determination of when established criteria for stratification were reached in different parts of the reservoir.

The stratification onset and breakdown dates across four distinct lake locations are provided in Table 1 below. It stands out that the reservoir South Basin seems to stratify later than all other more northern parts of the reservoir. In turn, the stratification breaks down earliest in the South Basin. The new data from the profiler seemed to indicate that the area near the intake tower behaves differently from the South Basin overall in that a thermal stratification never really established itself in this location. It appears that the so-called Intake Basin remained fully mixed throughout. This may be due to the submerged old dam (original 1915 dam) acting as a hydraulic barrier in the hypolimnetic zone and the continuous and permanent extraction of the deep cold water from the low-level intake gates prevented a thermal stratification to set in. When the current dam was built in 1970, only one or two small gaps were blasted in the old dam structure to provide some but very limited hydraulic connection below the old dam crest elevation of about 174.50 m above sea level. CRD staff will continue to collect relevant data to study this phenomenon.

While the South Basin began to de-stratify by approximately mid-October and was fully mixed in early November, the North Basin retained its stratification until December 3. These are patterns typical for Sooke Lake Reservoir.

Table 1 2024 Sooke Lake Reservoir Stratification Timing

	Stratification Onset	Stratification Breakdown
Intake Basin*	n/a**	n/a**
South Basin	May 11	October 19
Mid Basin	April 18	October 30
North Basin - Rithet Creek	April 13	December 1
North Basin - Deep Part	April 4	December 3

* Intake Basin is the most southern part of the South Basin, right adjacent to the intake tower
**Based on monthly data sets it appears there was no stratification in this location

Turbidity. The turbidity is continuously measured at both water treatment plants and at the Sooke Lake intake tower, but also sampled and lab tested daily from the Goldstream Water Treatment Plant and weekly at the Sooke River Road Water Treatment Plant. Figure 19 shows that the source water turbidity was generally well under 1 NTU throughout 2024; however, on five early summer days with peak flows due to outdoor water demand, sediments in the raw water mains downstream of the Kapoor Tunnel were dislodged and caused short-period turbidity excursions above 1 NTU (May 31 peak at 3.3 NTU) at the Goldstream Water Treatment Plant. Similar events in the past have usually occurred on Wednesdays or Thursdays from 4 am to approximately 10 am or 11 am during the beginning of the peak summer demand times, only at the Goldstream and not at the Sooke River Road Water Treatment Plant. Supervisory Control and Data Acquisition monitoring data shows that the average daily turbidity was still well below 1 NTU on these turbidity event days. Also, the UV transmittance, a measure of how much ultraviolet light can pass through the water, was always around 90% during these events and the UV dose at least 60 mJ/cm^2, ensuring effective UV treatment.

The 2024 turbidity exceedance events coincide with the increase in peak demands at the start of the outdoor watering season. During these periods, high velocity in the two raw water mains (Main #4 and #5) between the Kapoor tunnel and the Goldstream plant stir up settled sediment resulting in increased turbidity. The CRD is working to mitigate these exceedances in two ways:

- Reducing Peak Demands: The CRD has implemented changes to the Water Conservation Bylaw and the associated watering rules in 2024 to reduce peak water demands. While this seemed to have limited success in 2024, it is hoped that further refinement and additional public education will eventually reduce extreme demand peaks and therefore the risk of turbidity excursions at the Goldstream plant.

- Flushing Program: Annual flushing of Main #4 and #5 in the springtime to remove pipe sediments prior to the high demand watering season. In 2024, flushing could not be completed due to a valve failure. This has subsequently been repaired and flushing was completed in spring of 2025.

The short duration of these turbidity events, low natural pathogen concentrations in the raw water, the fact that these events were not caused by an actual water contamination, and fully functional treatment processes during these events were the main criteria for assessing these events as very low risks to public health.

Overall, Sooke Lake water was very clear in 2024, and turbidity of the raw water was at no time a factor of concern to the drinking water quality in the GVDWS.

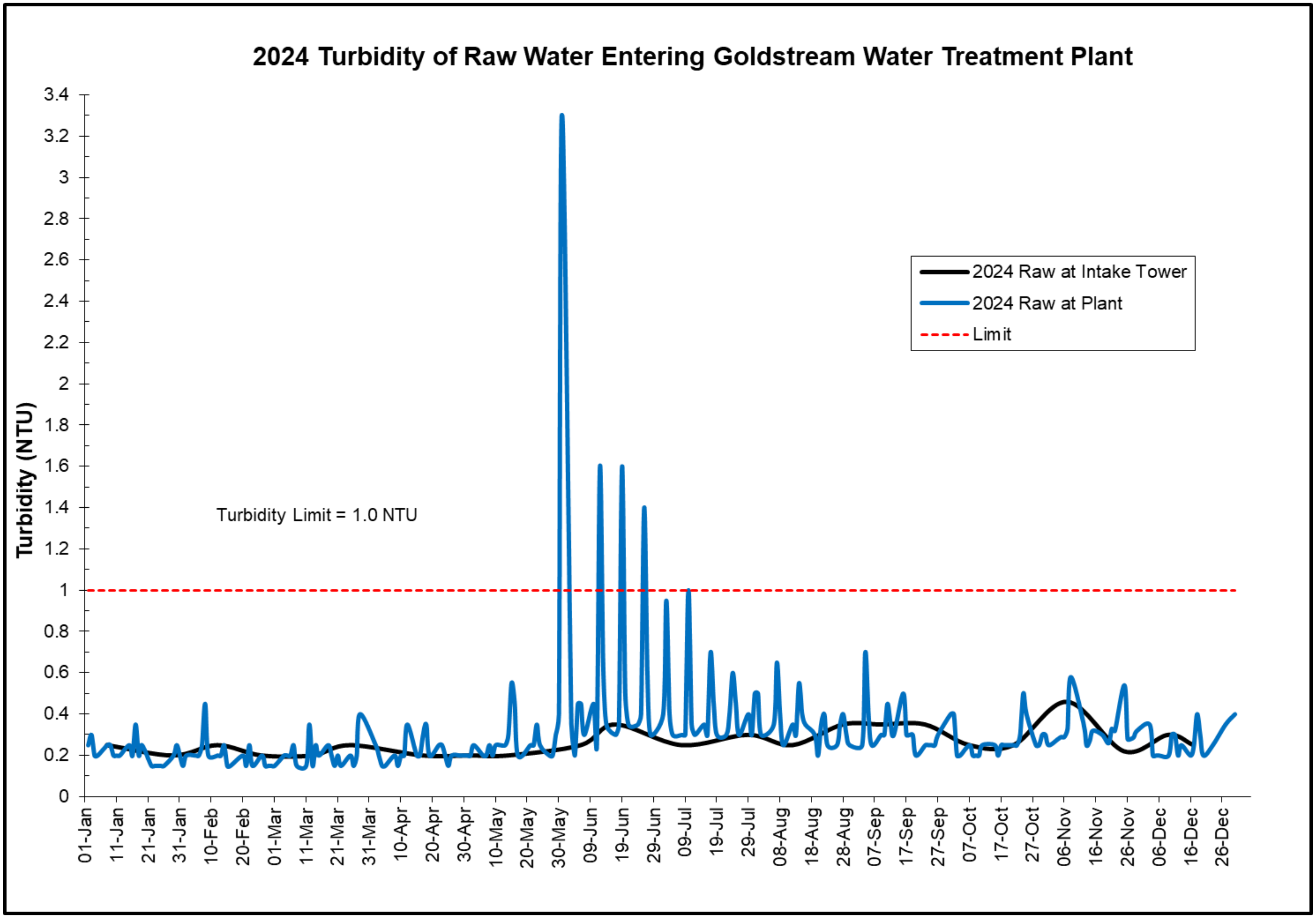

Figure 19 2024 Turbidity of Raw Water Entering Goldstream Water Treatment Plant (from Grab Sampling)

Raw Water Temperature. Cool water is beneficial in a distribution system because it reduces the potential for losses of chlorine residual and regrowth of bacteria. Warm water can also facilitate undesired chemical and biochemical processes during water treatment and in the piping system. It is also unpleasant for customers to consume warm tap water. For these reasons, the Canadian guidelines suggest a temperature limit of 15°C as an aesthetic objective.

In contrast to 2023, the temperature of the water entering the Goldstream Water Treatment Plant in 2024 was notably higher than the long-term average trend line during spring and summer (Figure 20). The trend of warmer water than usual started already in February but was especially pronounced from May to September. Unusually early warm weather conditions resulted in the exceedance of the 15°C aesthetic objective approximately four weeks earlier at the end of June compared with the long-term trend. With about 14 weeks of water temperatures above 15°C, 2024 was likely the year with the longest lasting exceedance of this aesthetic objective since the dam was raised in 2004. The temperature peaked several times at over 20°C throughout July and August. In the fall, the water temperatures were slightly cooler than the long-term trend.

The permanent usage of the lowest intake gates prevented the establishment of a thermal stratification in the Intake Basin and the hydraulic restriction through the old, submerged dam limited the inflow of deep and cool water stored in the hypolimnion of the South Basin. This allowed unusually warm weather conditions to quickly warm the entire water column in the Intake Basin and resulted in the unusually early and high water temperatures during the 2024 summer.

High raw water temperatures during the summer are not a new problem for the CRD. Before the expansion of the Sooke Lake Reservoir in 2004, the water temperature entering the plant reached 15°C as early as mid-June. Warmer and longer summers, as a result of climate change, will likely exacerbate this problem in the future. The cool water stored in the hypolimnion of the much deeper North Basin is currently inaccessible for the CRD with the existing infrastructure. But the CRD Water Supply Master Plan considers a deep North Basin intake in the future which could address this water temperature issue.

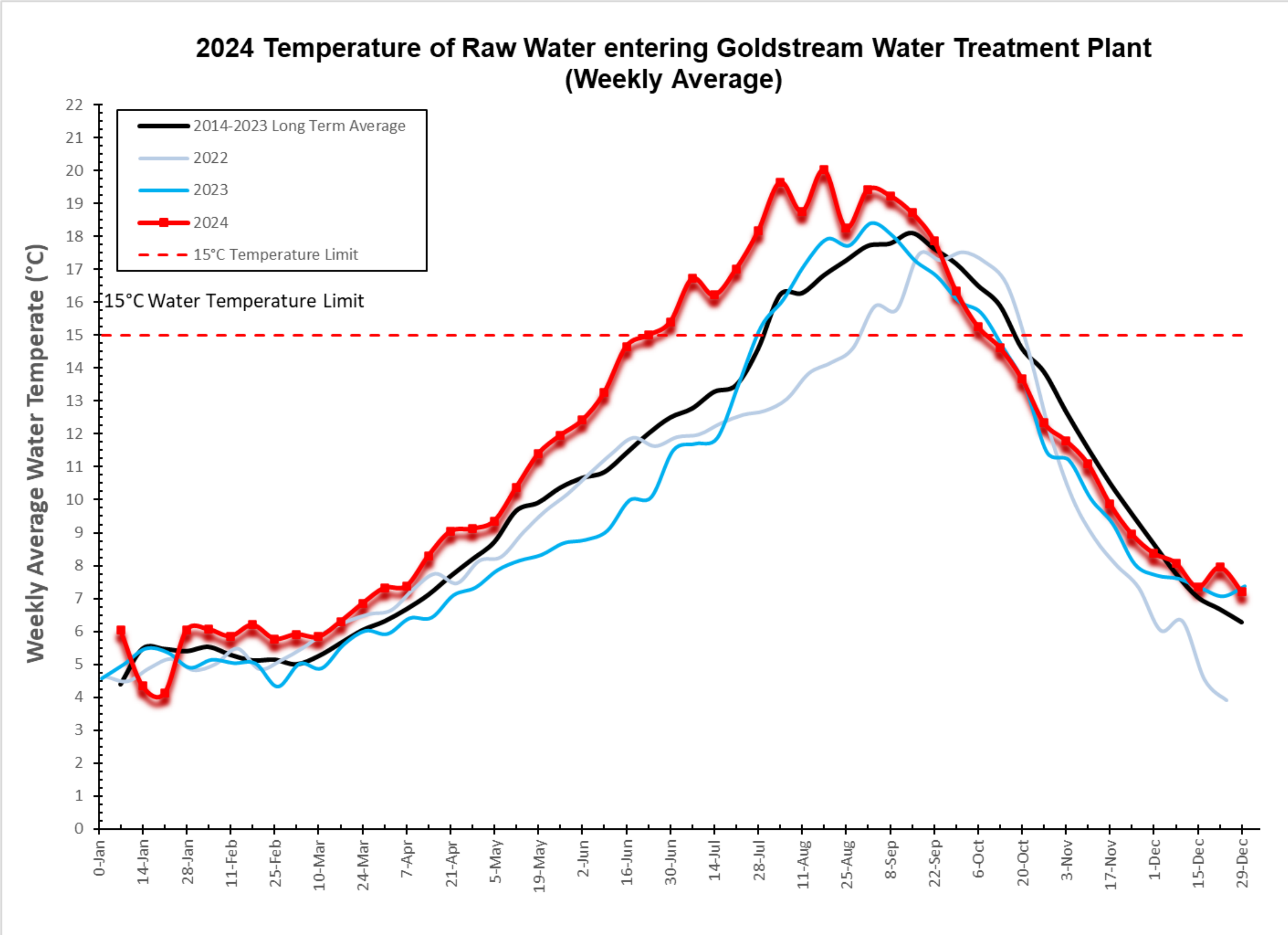

Figure 20 **2024 Temperature of Raw Water Entering Goldstream Water Treatment Plant (Weekly Average)**

Physical/Chemical Parameters. The raw water entering the Goldstream Water Treatment Plant had the following physical and chemical characteristics:

- Median pH: 7.2
- Median $CaCO_3$ Hardness: 16.80 mg/L
- Median Alkalinity: 15.9 mg/L
- Median Colour: 6.0 True Colour Units (TCU)
- Median Total Organic Carbon: 1.90 mg/L
- Median Conductivity (25ºC): 43.40 µS/cm

The values of the parameters above are consistent with those of previous years.

Inorganics/Metals. Table 1 in Appendix A lists all the inorganic and metal parameters tested in the source water in 2024. No unusual or concerning levels or trends have been detected.

Organics/Radionuclides. Table 1 in Appendix A lists all the organic radiological parameters tested in the source water in 2024. Most of them were not detected or were in insignificant concentrations. These results confirm the high level of protection from any anthropogenic impacts on the supply watershed.

Emerging Contaminants.

- Per- and Polyfluoroalkyl Substances (PFAS): CRD staff have been testing the raw water entering the Goldstream Water Treatment Plant two times per year since December 2020 for PFAS parameters. Since December 2023, all PFAS tests were conducted with a lower lab detection limit of 2 ng/L and following the proposed new Health Canada guidelines and USEPA method 537.1 that includes a total of 28 individual PFAS parameters. Results are compared to a MAC of 30 ng/L for the sum of all these 28 tested parameters. All tests to date yielded non-detectable results. Currently, with a protected watershed, the only pathway for PFAS to enter the source water is via rain and air. As there is currently no industrial PFAS emitter in the region or in British Columbia, this will guarantee very low, or as currently non-detectable, PFAS concentrations in the source water.

  Several PFAS tests were also conducted on treated water samples from various distribution systems across Greater Victoria. A few samples recorded results with low concentrations of one particular PFAS compound. The concentrations found were well below the current MAC. CRD staff will conduct more PFAS testing in the distribution systems in 2025.

- Microplastics: The CRD has not been testing the raw water entering the Goldstream Water Treatment Plant for microplastics because there are no commercial laboratories in Canada performing this analysis yet. Also, Health Canada and other regulatory agencies have not yet formulated any health guidelines for microplastic concentrations. The state of California has developed a standard operating procedure that will allow the state to begin issuing laboratory accreditation to qualified labs. CRD staff continue to investigate this emerging issue and will conduct testing when feasible. But comparable to many other anthropogenic contaminants, with a protected watershed with very limited human activity, the only viable pathway for microplastics to enter the source water is via rain and air.

Nutrients. Figure 21 to 24 show the total nitrogen and the total phosphorus concentrations in both the South and North Basins at 1 m depths in Sooke Lake Reservoir. Total phosphorus concentrations at both stations trended near or below the long-term average. In both lake basins, the total phosphorus concentration dropped at times near levels of the detection limit of 1 µg/L, which indicates that biological activity in the lake used up almost all available phosphorus nutrients. The lack of phosphorus in the middle of spring was a result of increased algal activity prior to this period. Substantial rainfall during the first few days of June likely contributed to the slightly higher phosphorus availability in early summer and may have facilitated the higher algal productivity during the summer of 2024. Nitrogen concentrations have been consistent with the long-term average trend in the North Basin but featured two distinct concentration spikes in the South Basin in July and September. These two total nitrogen spikes correlate well with simultaneous algae concentration spikes which indicates that any availability of nutrients immediately drives up phytoplankton activity in this otherwise nutrient-poor ecosystem. The triggers of the two nitrogen spikes are currently unknown. Because the nitrogen spikes seemed to be limited only to the South Basin and occurred during the same timeframe when the South Basin experienced the unusual and extreme total coliform event, it could be assumed that there is a correlation. CRD staff will monitor these parameters closely and conduct further investigations into possible interactions and correlations. In general, most of the identified nitrogen was present in the form of organic nitrogen and likely remained available for biological uptake due to the growth limitation dictated by the lack of phosphorus. This confirms previous conclusions that Sooke Lake Reservoir is extremely phosphorus limited.

In general, the nutrient concentrations confirm the ultra-oligotrophic status (extremely unproductive, phosphorus limited) of Sooke Lake Reservoir, which is positive for a drinking water supply source.

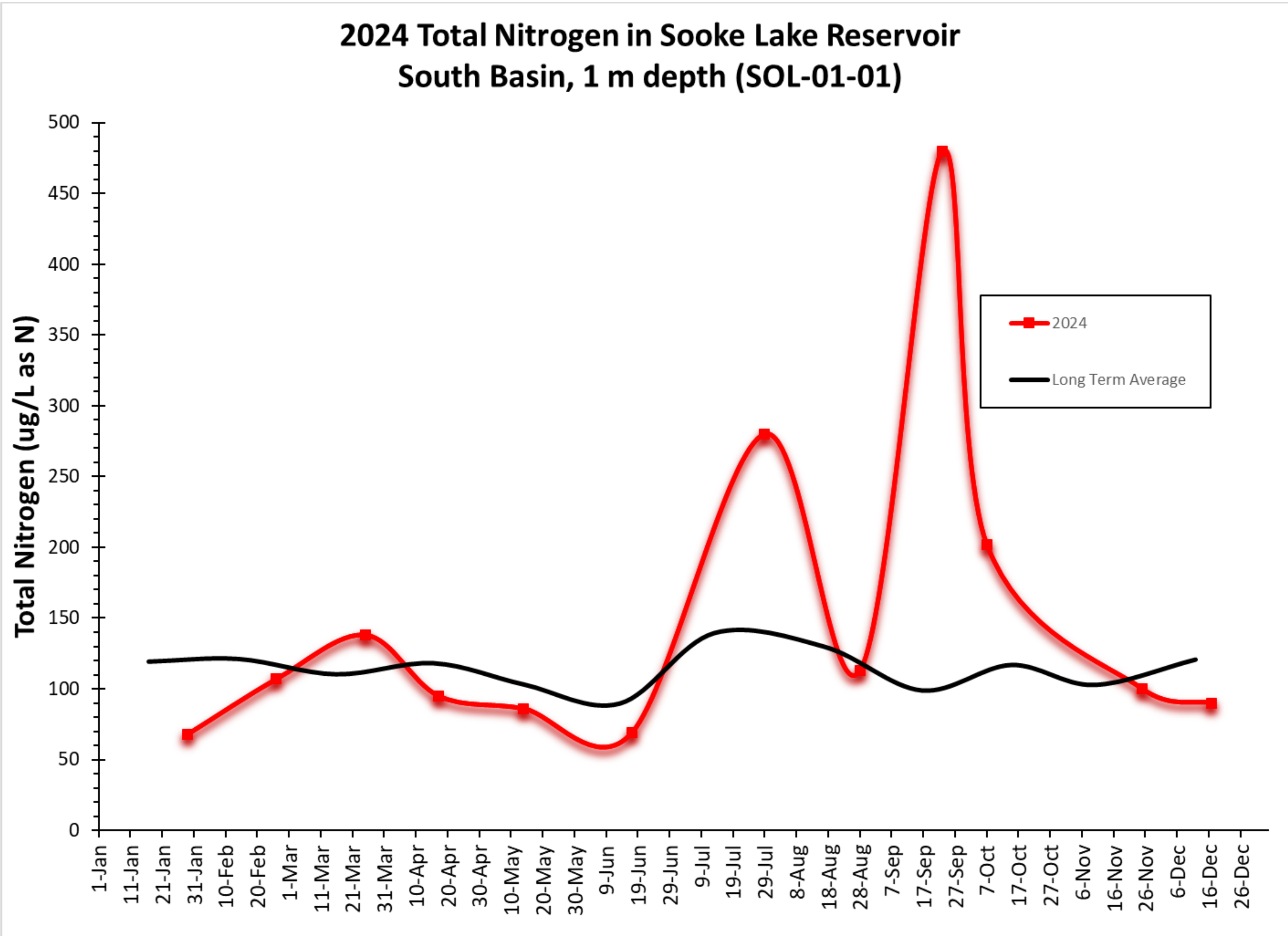

Figure 21 Total Nitrogen in Sooke Lake Reservoir, South Basin, 1 m depth (SOL-01-01)

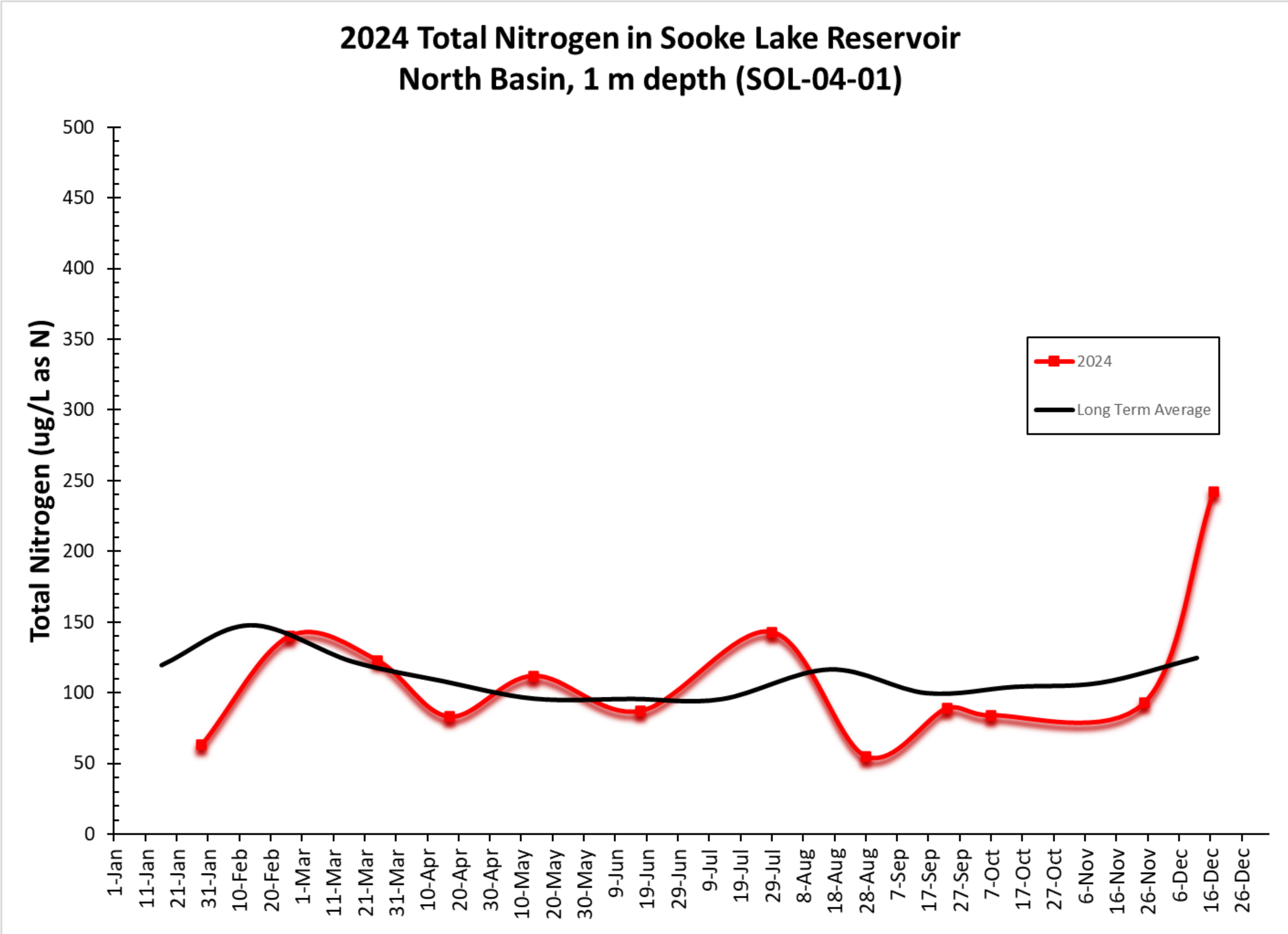

Figure 22 Total Nitrogen in Sooke Lake Reservoir, North Basin, 1 m depth (SOL-04-01)

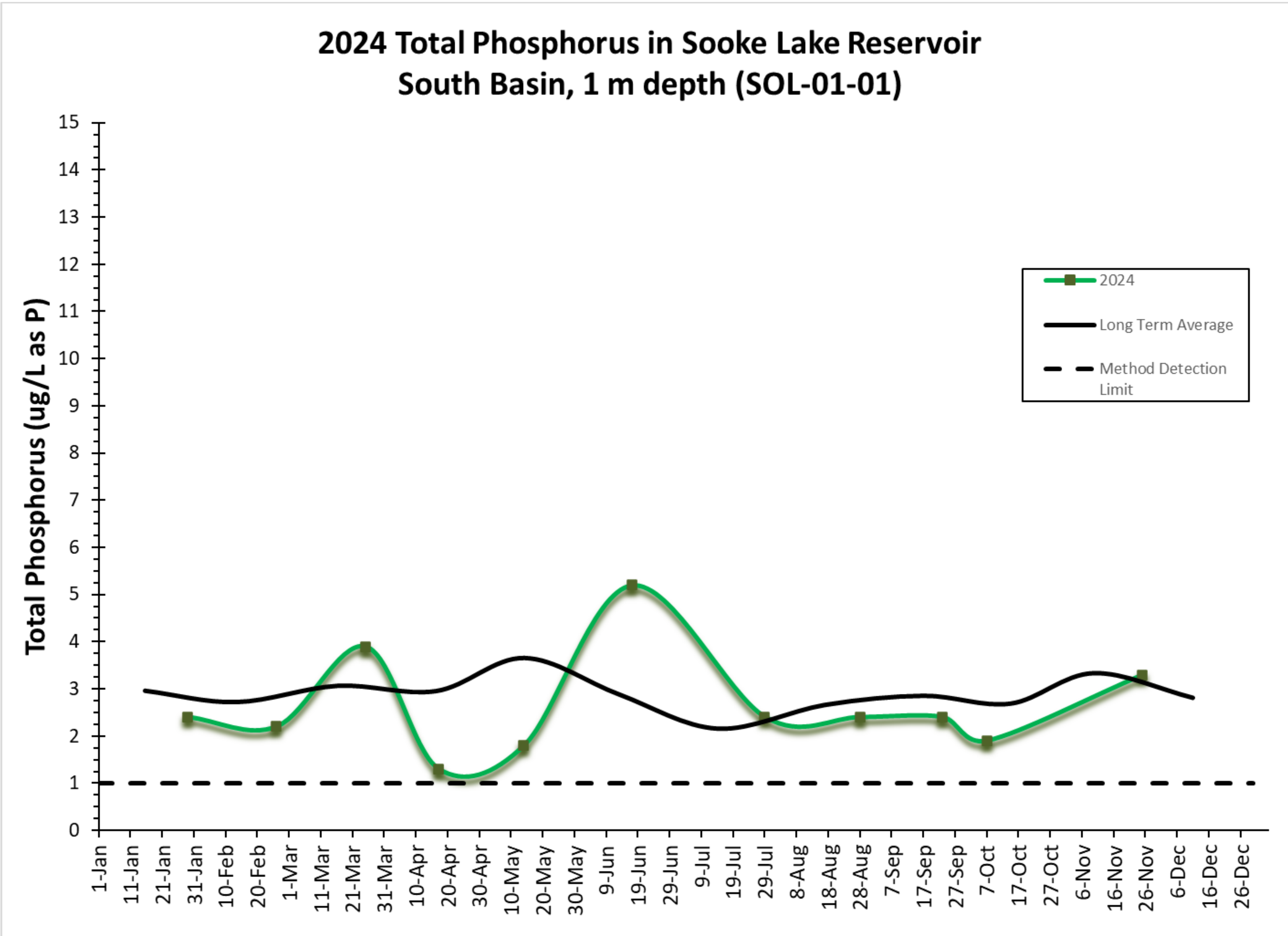

Figure 23 **Total Phosphorus in Sooke Lake Reservoir, South Basin, 1 m depth (SOL-01-01)**

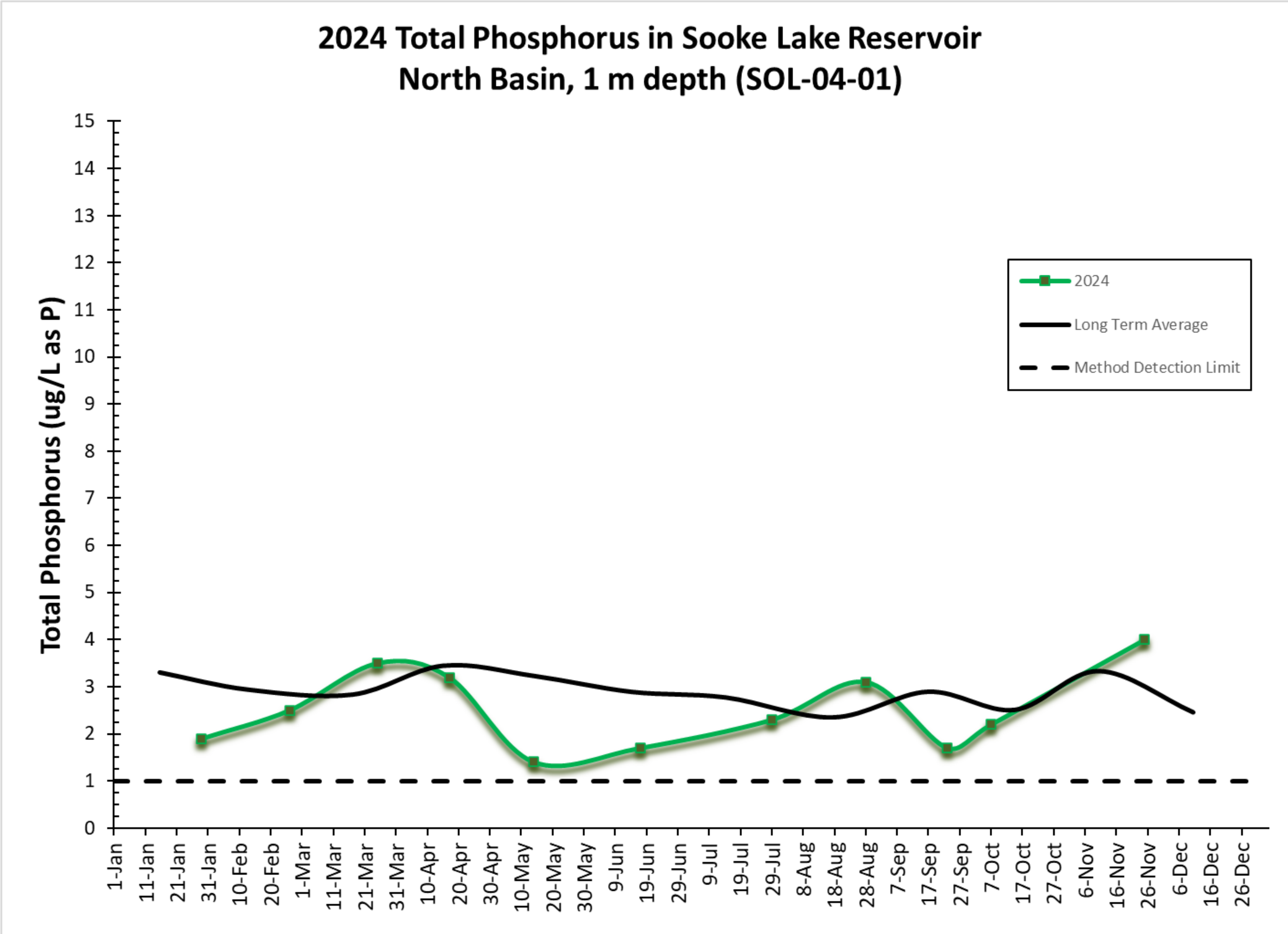

Figure 24 Total Phosphorus in Sooke Lake Reservoir, North Basin, 1 m depth (SOL-04-01)

7.2 Treatment Monitoring Results

The following sections summarize the water quality data collected and analyzed to monitor and verify the effectiveness of the disinfection process at both CRD disinfection facilities in the GVDWS.

7.2.1 Goldstream Water Treatment Plant

Bacteriological Results after UV Treatment. Figure 25 shows the results from 243 samples collected and analyzed just downstream of the UV reactors. The results indicate that the UV treatment is capable of greatly reducing the *E.coli* and total coliform concentrations. On ten occasions, mostly during the total coliform event in July and August, and only in low concentrations, have total coliform bacteria been found downstream of the UV treatment. The UV treatment is followed up by chlorination disinfection, designed to kill viruses and bacteria. These multiple disinfection stages are important components of the multi-barrier concept, which eliminates the reliance on only one module to achieve compliance.

Turbidity. The Goldstream Water Treatment Plant experienced five adverse turbidity events in 2024 (see Figure 19).

May 31, 2024: Fridays are not typical watering days. Therefore, this turbidity event was not related to the peak demand issue on watering days. On that day, a grab sample from the treated water turbidity after treatment recorded a turbidity of 3.3 NTU. Investigations into this event were unable to determine a cause, mainly because both online turbidity analyzers at the Goldstream Water Treatment Plant showed no indication of any unusual turbidity trend that day. It was therefore concluded that this was most likely not a real event, but an erroneous result caused by a sampling error.

June 12, 2024: First high-demand watering day (Wednesday) of the year. With peak demand and high flows due to outdoor watering, sediments in Main #4 and #5 between the Kapoor Tunnel and the Goldstream plant were dislodged and caused a short-period turbidity excursion to above 1 NTU (4.5 hours exceedance with a peak of 2.5 NTU according to SCADA). Lab results of the daily grab sample recorded 1.6 NTU.

June 19, 2024: Second high-demand watering day (Wednesday) of the year. With peak demand and high flows due to outdoor watering, sediments in Main #4 and #5 between the Kapoor Tunnel and the Goldstream plant were dislodged and caused a short-period turbidity excursion to above 1 NTU (4.75 hours exceedance with a peak of 2.2 NTU according to SCADA). Lab results of the daily grab sample recorded 1.6 NTU.

June 26, 2024: Third high-demand watering day (Wednesday) of the year. With peak demand and high flows due to outdoor watering, sediments in Main #4 and #5 between the Kapoor Tunnel and the Goldstream plant were dislodged and caused a short-period turbidity excursion to above 1 NTU (3.5 hours exceedance with a peak of 1.9 NTU according to SCADA). Lab results of the daily grab sample recorded 1.4 NTU.

July 3, 2024: Fourth high-demand watering day (Wednesday) of the year. With peak demand and high flows due to outdoor watering, sediments in Main #4 and #5 between the Kapoor Tunnel and the Goldstream plant were dislodged and caused a short-period turbidity excursion to above 1 NTU (2.5 hours in and out of exceedance with a peak of 1.4 NTU according to SCADA). Lab results of the daily grab sample recorded below 1.0 NTU.

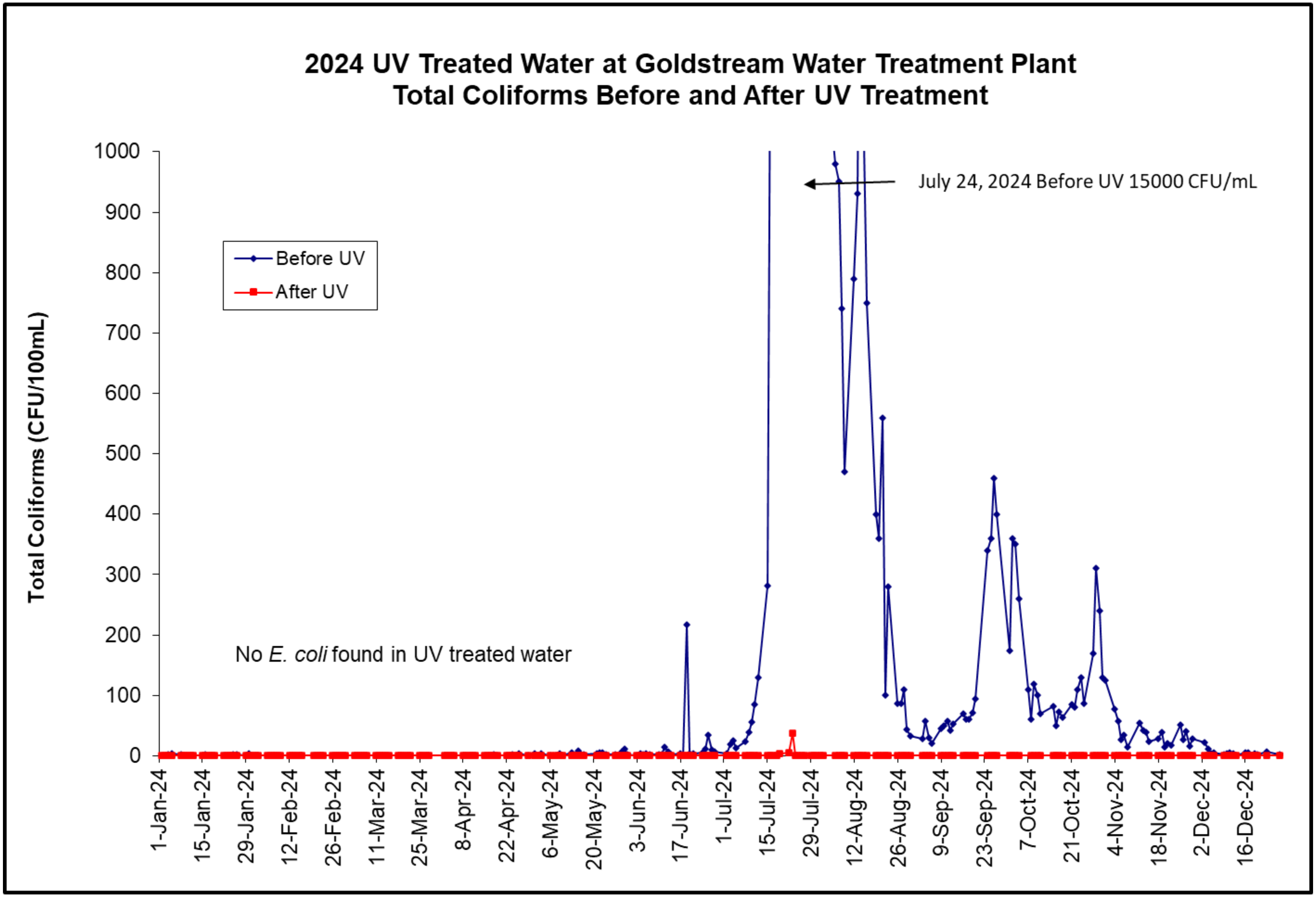

Figure 25 **2024 UV Treated Water at Goldstream Water Treatment Plant Total Coliforms Before and After UV Treatment**

Treated Water at Both First Customer Sampling Locations. The data collected from the two treated water sampling locations near the first customers below the Goldstream Water Treatment Plant (one at Main #4 and one at Main #5) indicated that the bacteriological quality of the disinfected water was good in all months except in July when approximately 15% of the bacteriological samples from those two locations indicated a presence of total coliform bacteria (Figure 26 and Appendix A, Table 2). This exceedance of the regulatory threshold (10%) in July was caused by the unusual total coliform event in Sooke Lake during which mostly low concentrations of coliform bacteria broke through the disinfection treatment at times of peak demands and flows (watering day mornings). In total, 292 samples were collected from the Main #4 first customer location and 307 samples from the Main #5 first customer location, for a combined total of 599 samples in 2024.

There were only eight total coliform-positive samples from both sampling stations throughout the year. But all adverse results occurred during the peak of the total coliform event at the end of July into early August. Five positive samples registered at the Main #5 first customer sampling station and three at the Main #4 station. Two results had high total coliform concentrations (July 23: 52 CFU/100 mL; July 30: 330 CFU/100 mL). Several of these positive results had a subsequent resample that also tested positive for total coliform bacteria. These are indicators of a limited breakthrough at the Goldstream Water Treatment Plant during the peak of the total coliform event.

Six total coliform-positive results alone in July at both first customer locations led to the exceedance of the 10% threshold for the monthly totals. Two of the positive results were in exceedance of the 10 CFU/100 mL maximum coliform limit, as per *Drinking Water Protection Regulation*. While the regulations require 90% of all monthly samples in the entire system to be free of total coliform bacteria, the CRD monitors the first customer locations based on even more stringent criteria, where water quality is gauged on the bacteriological results of these two first customer locations only.

The total chlorine residual ranged from 1.59-3.14 mg/L (Appendix A, Table 2), with a median value of 2.04 mg/L (Figure 26). During the total coliform event in July and August, the total chlorine dosage was increased to maximum level at the Goldstream plant which resulted in a short-term spike in residuals at both first customer sampling stations of up to 3.14 mg/L.

The treated water leaving the Goldstream Water Treatment Plant had the following physical and chemical characteristics:

- Median pH: 7.6
- Median Alkalinity: 17.90 mg/L
- Median Colour: 4.0 TCU
- Median Total Organic Carbon: 1.90 mg/L
- Median Conductivity (25ºC): 55.10 µS/cm
- Median Turbidity: 0.25 NTU

The values of the parameters above are consistent with those of previous years.

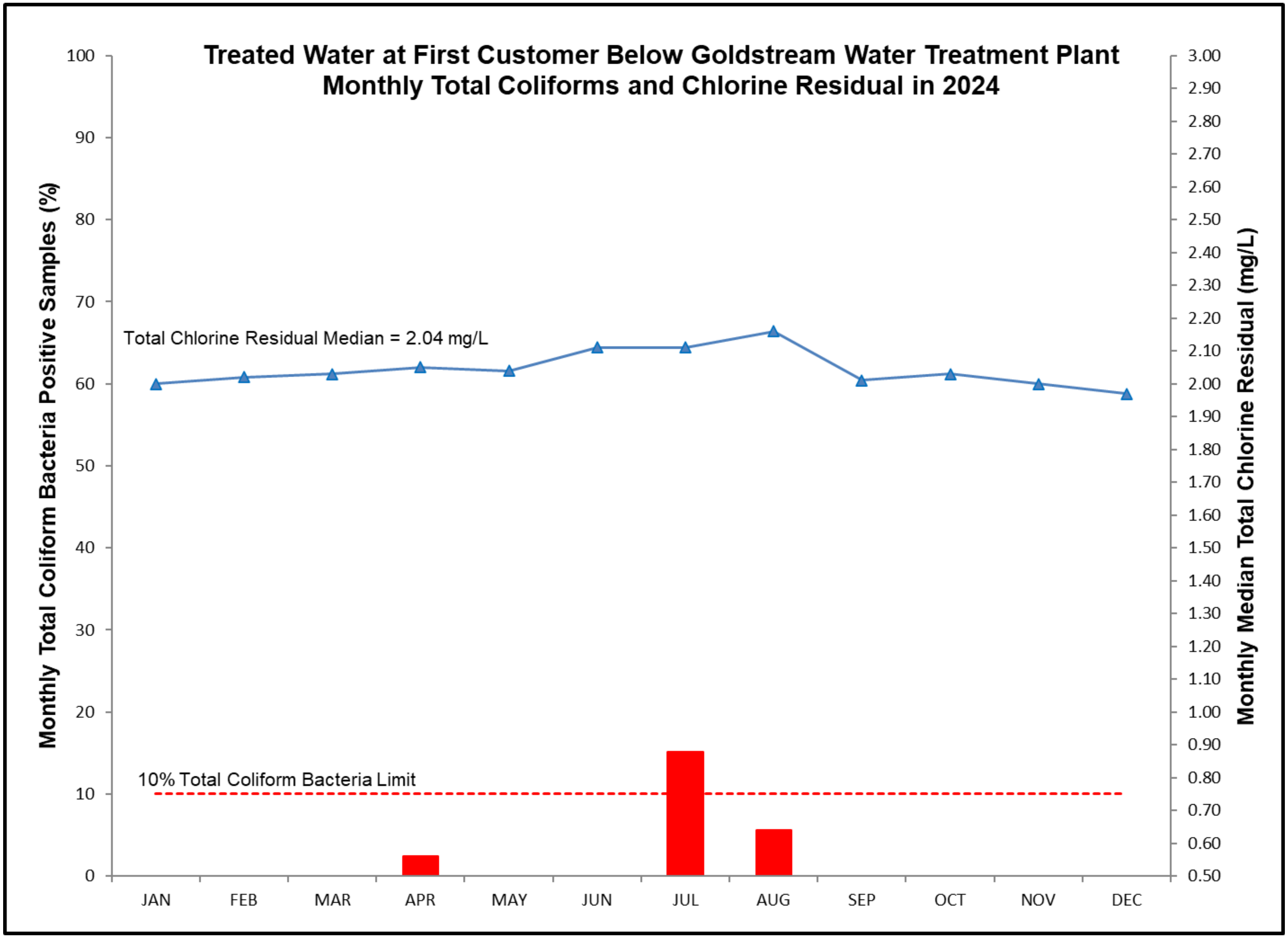

Figure 26 **Treated Water at First Customer Locations below Goldstream Water Treatment Plant; Monthly Total Coliforms and Chlorine Residual in 2024**

7.2.2 Sooke River Road Water Treatment Plant

Bacteriological Results after UV Treatment. Figure 27 shows the results from 36 samples collected and analyzed just downstream of the UV reactors. The results indicate that the UV treatment is capable of greatly reducing the *E. coli* and total coliform concentrations. There were only two occasions when total coliform bacteria had been found downstream of the UV treatment. This is evidence of a very effective UV disinfection stage at this plant. The UV treatment is followed up by chlorination disinfection, designed to kill viruses and bacteria. These multiple disinfection stages are important components of the multi-barrier concept, which eliminates the reliance on only one module to achieve compliance.

Turbidity. The Sooke River Road Water Treatment Plant experienced one adverse turbidity event in 2024.

<u>September 27:</u> Turbidity suddenly spiked up to 3.6 NTU caused by a break in Main #15 which is detailed in Section 5.2.

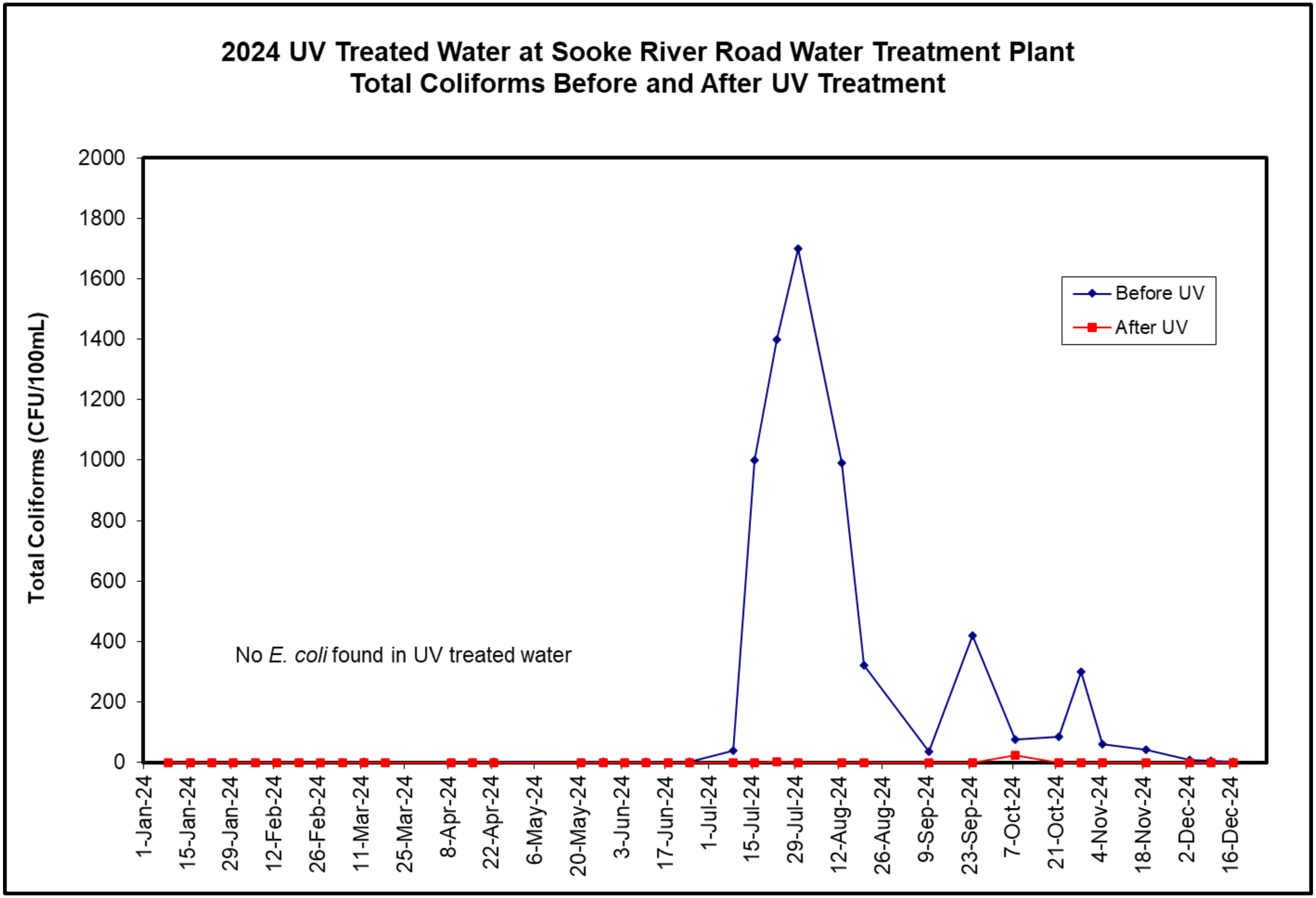

Figure 27 2024 UV Treated Water at Sooke River Road Water Treatment Plant Total Coliforms Before and After UV Treatment

Treated Water at First Customer. The data collected from the treated water sampling location near the first customer below the Sooke River Road Water Treatment Plant indicated that the bacteriological quality of the treated water met Canadian guidelines in all months of 2024 (Figure 28). Even throughout the unusual total coliform event with extremely high bacteria concentrations in the raw water, no bacteria breakthrough was observed at the Sooke plant; in fact, no total coliform bacteria were even registered post UV but before chlorination during this event. This demonstrates the efficacy of the disinfection process at the Sooke plant and highlights the risk posed by the sudden and large flow fluctuations experienced at the Goldstream plant during peak demand times, which showed brief periods of bacterial breakthrough during total coliform event.

No total coliform bacteria were detected in all 44 samples from this sampling station in 2024.

With no total coliform positive results in 2024, this part of the system was in full compliance with the *Drinking Water Protection Regulation*. While the regulations require 90% of all monthly samples in the entire system to be free of total coliform bacteria, the CRD monitors the first customer locations based on even more stringent criteria, where water quality is gauged on the bacteriological results of this first customer locations only.

The total chlorine residual ranged from 1.80-2.30 mg/L with a median value of 2.05 mg/L.

The treated water leaving the Sooke River Road Water Treatment Plant had the following physical and chemical characteristics:

- Median pH: 7.7
- Median Alkalinity: 18.10 mg/L
- Median Colour: 4.0 TCU
- Median Conductivity (25ºC): 59.70 µS/cm
- Median Turbidity: 0.25 NTU

The values of the parameters above are consistent with those of previous years.

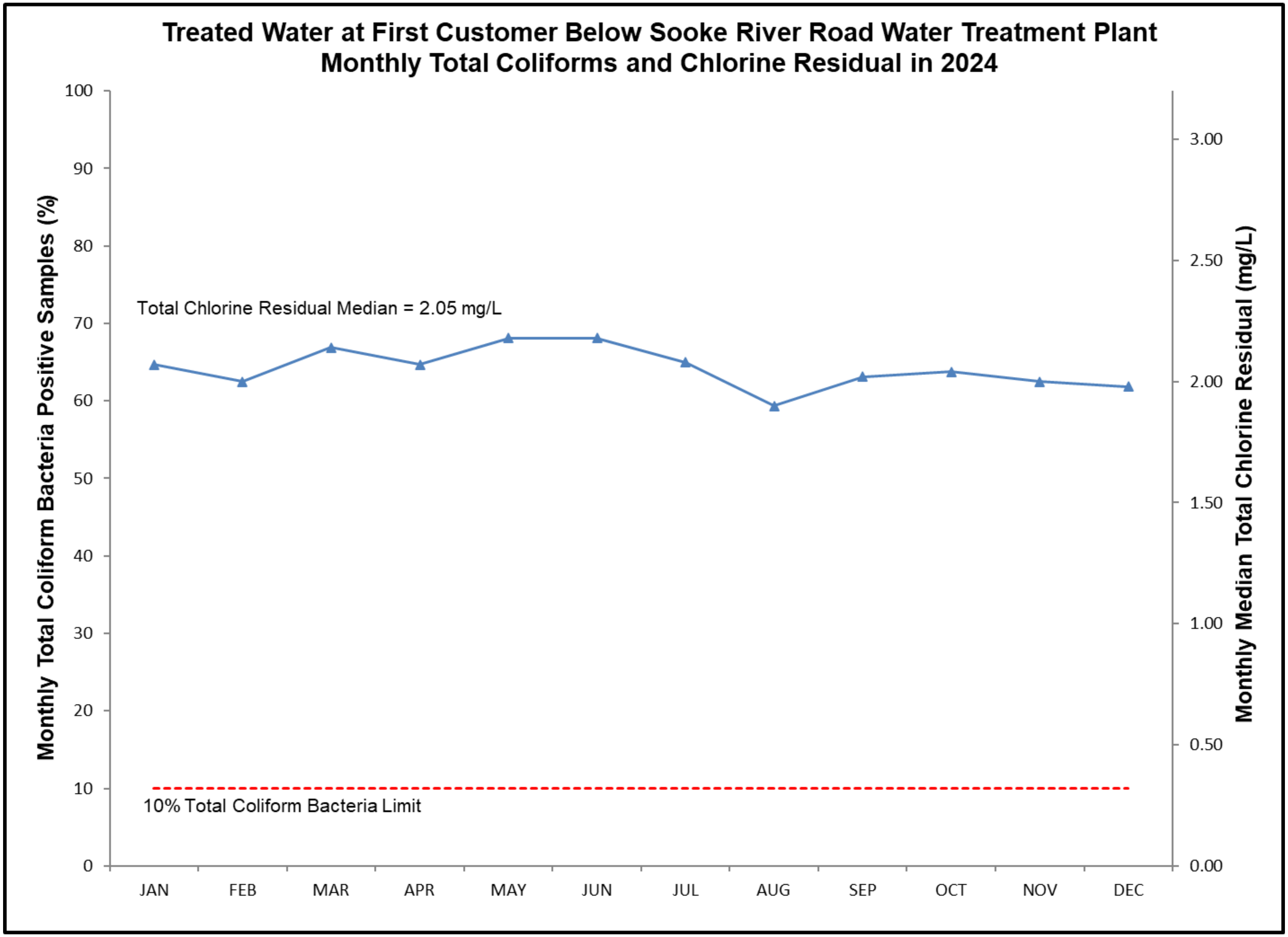

Figure 28 Treated Water at First Customer below Sooke River Road Water Treatment Plant, Monthly Total Coliforms and Chlorine

7.3 CRD Transmission System Results

The following sections summarize the water quality data collected and analyzed for monitoring and verifying the safety of the drinking water conveyed through the transmission system before it reaches the municipal distribution systems. Bacteriological results of the samples collected in the transmission system are considered for compliance purposes. There is no applicable requirement for monthly sample numbers for a transmission system. The number of samples collected monthly from the CRD Transmission System infrastructure was based on a water quality risk assessment and based on professional judgement.

7.3.1 Transmission Mains

The CRD transmission mains were sampled in 19 different sampling locations. The sampling locations for CRD transmission mains also include the Main #4 and Main #5 first customer sampling stations. In 2024, a total of 995 bacteriological and 897 water chemistry samples were collected and analyzed.

Bacteriological Results. Table 2 and Figure 29 show the results from 879 CRD transmission main samples collected and analyzed in 2024. In general, the results indicate that the water delivered through the transmission mains was bacteriologically safe. Outside of July, only a few and only low concentrations of total coliform bacteria were detected. In July, during the unusual total coliform event in Sooke Lake, over 10% of all collected bacteriological samples tested positive for total coliform bacteria. Three samples recorded total coliform concentrations over 10 CFU/100 mL. There were also three consecutive positive samples in July, and one in August. While these results are in exceedance of the regulatory thresholds for a drinking water system, they are over-amplified due to the disproportionate sampling effort during the total coliform event.

There were no *E coli* or total coliform positive samples in 2024.

Chlorine Residual. Table 2 and Figure 29 demonstrate that the annual median total chlorine concentration in the transmission mains was 1.83 mg/L and, therefore, provided for adequate secondary disinfection within the transmission system and within most areas of the downstream municipal distribution systems.

Water Temperature. The annual median water temperature in the transmission mains was 11.0°C, with monthly medians ranging between 6.0°C (January) and 18.8°C (September) (Table 2). Based on these results, the water temperatures in the transmission mains were slightly higher than in 2023 and previous years.

Table 2 2024 Bacteriological Quality of the CRD Transmission Mains

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as	Median ° C
JAN	79	0	0	0	0	0	43	0	1.77	6.0
FEB	77	0	0	0	0	0	41	0	1.84	6.3
MAR	72	0	0	0	0	0	42	0	1.8	6.5
APR	76	1	1.3	0	0	0	42	0	1.79	8.3
MAY	75	0	0	0	0	0	46	0	1.76	10.9
JUN	70	0	0	0	0	0	41	3	1.84	13.7
JUL	93	10	10.8	3	3	0	45	0	1.83	16.4
AUG	102	4	3.9	0	1	0	44	0	1.89	18.7
SEP	100	0	0	0	0	0	40	0	1.77	18.8
OCT	112	0	0	0	0	0	46	0	1.83	14.5
NOV	72	0	0	0	0	0	40	0	1.88	11.0
DEC	67	0	0	0	0	0	30	0	1.82	8.2
Total:	995	15	1.5	3	4	0	500	3	1.83	11.0

Notes:
TC = Total Coliforms, *E. coli* = *Escherichia coli,* Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Disinfection Byproducts. The CRD collected six sets of samples for a disinfection byproduct analysis from a transmission main at Mills Road. The annual average total trihalomethane (TTHM) and annual average total haloacetic acid (HAA) concentrations were 21.2 and 16.7 µg/L, respectively, well below the MAC (TTHM = 100 and HAA = 80 µg/L) stipulated in the Canadian guidelines. These annual averages are in-line with the historical disinfection byproduct concentrations. At the beginning of 2021, the GVDWS was switched to free chlorine for about one month, which resulted in higher disinfection byproduct concentrations (see 2021 Annual Report). While this was a short-term effect and concentrations remained below the health limits, these results have demonstrated the importance of using chloramines for secondary disinfection for the purpose of disinfection byproduct management. This sampling location was also sampled and tested for the disinfection byproduct Nitrosodimethylamine (NDMA), a parameter that is classified as "probably carcinogenic" by Health Canada and associated with disinfection using chloramines. The Canadian guidelines MAC for NDMA is 40 ng/L. All NDMA results at this location were below the detection limit of 1.9 ng/L.

The Mills Road main was the only transmission main where disinfection byproduct samples were collected (bi-monthly). The CRD disinfection byproduct monitoring focuses on locations with higher potential for disinfection byproduct formation, such as system extremities with high water age or areas downstream of re-chlorination stations (free chlorine).

Metals. The CRD Water Quality Monitoring Program for the CRD Transmission System included regular metals tests in four strategic locations: at the beginning of the transmission system at the Main #4 first customer location, and three locations where the water transitions from the CRD Transmission System to a downstream distribution system. In particular, the CRD pays attention to metals commonly found in drinking water, such as iron, manganese, copper and lead. All metal results were below the Canadian guideline.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

Physical/Chemical Parameters. The drinking water in the regional transmission mains had the following physical and chemical characteristics:

- Median pH: 7.6
- Median $CaCO_3$ Hardness: 16.9 mg/L
- Median Alkalinity: 17.90 mg/L
- Median Colour: 4.0 TCU
- Median Turbidity: 0.25 NTU
- Median Conductivity (25ºC): 55.10 µS/cm

Compliance Status. The transmission mains of the CRD Transmission System were in compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation* **except** for July with 10.8% of the monthly samples with the presence of total coliform bacteria - three samples were in exceedance of 10 CFU/100 mL, consecutive coliform positive results occurred on three occasions, and in August with consecutive coliform positive results on one occasion. These non-compliances were directly related to the total coliform event in July and August (see Section 5.2).

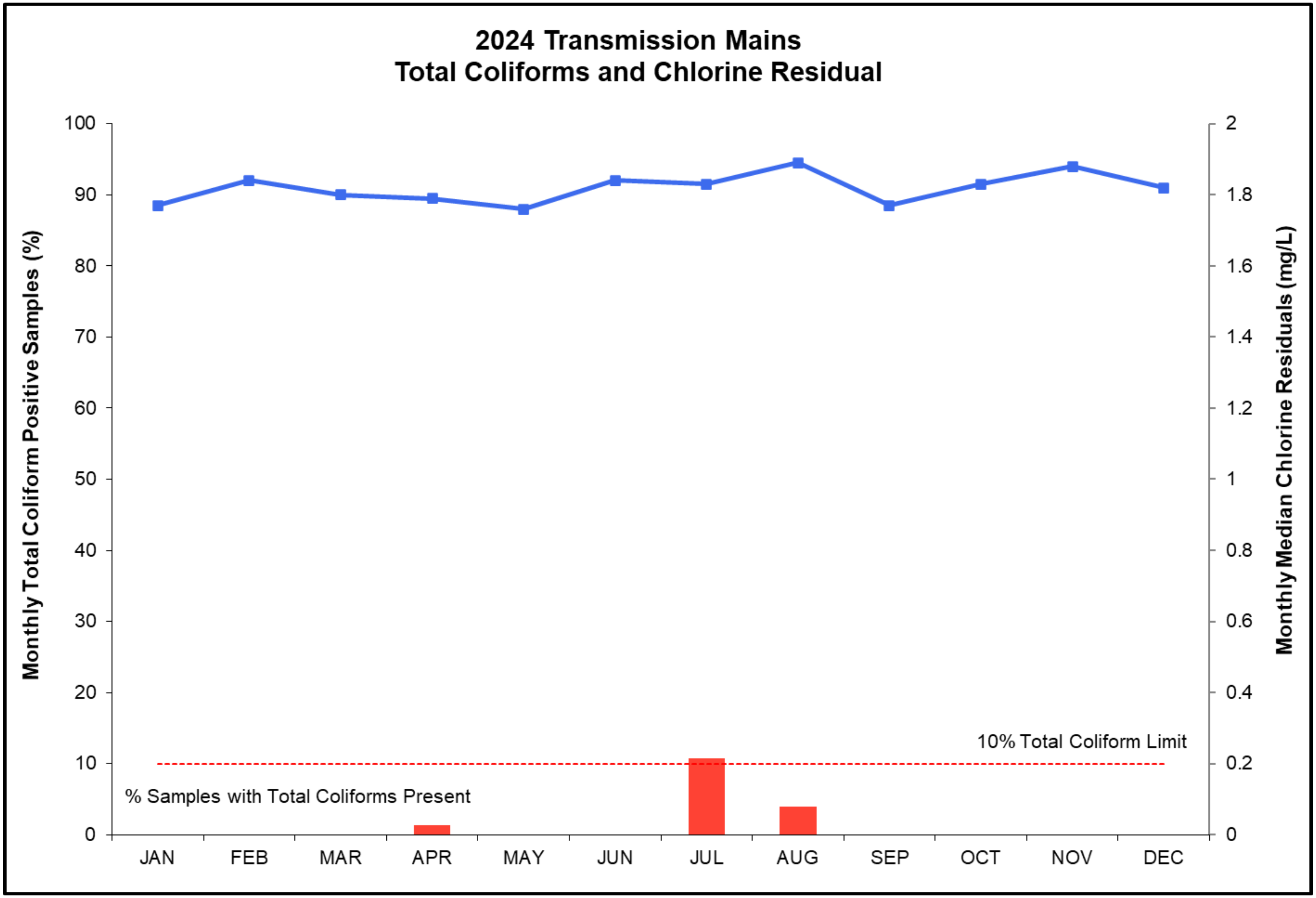

Figure 29 Transmission Mains Total Coliforms and Chlorine Residual in 2024

7.3.2 Supply Storage Reservoirs

The CRD supply storage reservoirs were sampled in seven different sampling locations. In 2024, a total of 182 bacteriological and 82 water chemistry samples were collected and analyzed.

Bacteriological Results. Typically, storage reservoirs are vulnerable to bacteria regrowth and potential contamination, due to the long retention times and generally lower chlorine residual concentrations. Because of the higher risks to water quality in reservoirs compared to pipes, the CRD typically monitors the water quality closely in all of its storage reservoirs and follows a rigorous maintenance schedule at these facilities.

Figure 29 and Table 3 show the 2024 results from the samples on the CRD supply storage reservoirs that are considered part of the CRD Transmission System. No total coliform bacteria were found in any sample from the supply storage reservoirs in 2024. This system therefore complied with the 10% total coliform-positive limit and the 10 CFU/100 mL maximum limit for all months.

There were no *E coli* or total coliform positive samples in 2024.

Table 3 2024 Bacteriological Quality of Storage Reservoirs

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as CL2	Median ° C
JAN	14	0	0	0	0	0	1	0	1.67	7.3
FEB	13	0	0	0	0	0	1	0	1.67	6.8
MAR	14	0	0	0	0	0	1	0	1.66	7.4
APR	15	0	0	0	0	0	1	0	1.61	9.1
MAY	16	0	0	0	0	0	1	0	1.57	11.5
JUN	16	0	0	0	0	0	1	0	1.5	14.3
JUL	18	0	0	0	0	0	1	0	1.54	16.7
AUG	19	0	0	0	0	0	1	0	1.72	18.7
SEP	16	0	0	0	0	0	1	0	1.49	18.7
OCT	14	0	0	0	0	0	1	0	1.22	15.4
NOV	11	0	0	0	0	0	1	0	1.55	12.4
DEC	16	0	0	0	0	0	1	0	1.48	8.9
Total:	182	0	0.0	0	0	0	12	0	1.56	12.0

Notes:
TC = Total Coliforms, *E. coli* = *Escherichia coli;* Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Chlorine Residual. Table 3 and Figure 30 indicate that the median total chlorine concentration in the storage reservoirs ranged from 1.22-1.67 mg/L, with an annual median total chlorine concentration of 1.56 mg/L. These results demonstrate adequate secondary disinfection within the Supply Storage Reservoirs.

Water Temperature. The annual median water temperature in the storage reservoirs was 10.3°C, with monthly medians ranging between 6.8°C (February) and 18.7°C (July and August) (Table 3).

Disinfection Byproducts. The CRD collected a total of 30 samples for a disinfection byproduct analysis. The samples were collected at two storage reservoirs in the CRD Transmission System (Cloake Hill and Upper Dean Park reservoirs). Upstream of both locations, the CRD maintains a re-chlorination station that can boost free chlorine concentrations, if the residuals fall below 0.2 mg/L. While this procedure is rarely exercised, any free chlorine concentration can lead to an increase in disinfection byproduct formation. The annual average TTHM and HAA concentrations were 21.2 and 16.0 µg/L at Cloake Hill and 18.2 and 5.3 µg/L at Upper Dean, respectively, well below the MAC (TTHM = 100 and HAA = 80 µg/L) stipulated in the Canadian guidelines. These annual averages are in-line with historical disinfection byproduct concentrations. At the beginning of 2021, the GVDWS was switched to free chlorine for about one month, which resulted in higher disinfection byproduct concentrations (see 2021 Annual Report). While this was a short-term effect and concentrations remained below the health limits, these results have demonstrated the importance of using chloramines for secondary disinfection for the purpose of disinfection byproduct management. In all samples, the NDMA concentrations at both locations were below the detection limit (1.9 ng/L) and therefore well below the Canadian guideline MAC of 40 ng/L.

Physical/Chemical Parameters. The drinking water in the regional supply storage reservoirs had the following physical and chemical characteristics in 2024:

- Median pH: 7.8
- Median Alkalinity: 17.6 mg/L
- Median Colour: 4.0 TCU
- Median Turbidity: 0.25 NTU
- Median Conductivity (25ºC): 56.40 µS/cm

Metals. No data for 2024.

Nitrification. Nitrification occurs in many chloraminated water systems. It is a complex bacteriological process in which ammonia is oxidized initially to nitrite and then to nitrate and is caused by two groups of bacteria that have low growth rates relative to other bacteria. Water temperature seems to be a critical factor for nitrification in distribution systems, as it has been almost exclusively associated with warm water temperatures. Nitrification is also associated with high water age (reservoirs, dead ends, low-flow pipes) and with sediment biofilms.

Monitoring for nitrifying bacteria directly is inefficient; however, the extent of nitrification in the distribution system can be monitored by measuring chlorine residuals and nitrite (also nitrate, free ammonia). When the chlorine residuals drop (in the absence of any pipe break or plant disinfection failure), accompanied by increases of nitrite, then nitrification is occurring. Since Greater Victoria's source water has no background nitrite, the presence of nitrite in the distribution system is the best indicator of nitrification.

The control of nitrification in a chloraminated distribution system involves limiting the excess free ammonia leaving the disinfection plant, maintaining an adequate chlorine residual throughout the distribution system, minimizing water age in storage facilities and in the low-flow areas of the distribution system, and maintaining annual flushing routines to limit the accumulation of sediment and biofilm in the distribution system piping. CRD Water Quality Operations staff, in conjunction with Infrastructure & Water Services Department Operations and Engineering staff, are undertaking projects to optimize the reservoir and pipe-cleaning schedules to address nitrification and other water quality affecting processes throughout the distribution systems. The new hypochlorite plant at the Goldstream Water Treatment Plant has improved the chemical dosing system and reduced the potential for free ammonia in the treated water.

CRD staff will be completing a nitrification study in the GVDWS in 2025 to determine the extent of occurrence, possible water quality or operational impacts and potential mitigation.

Compliance Status. The CRD-owned and operated supply storage reservoirs in the CRD Transmission System were in full compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation*.

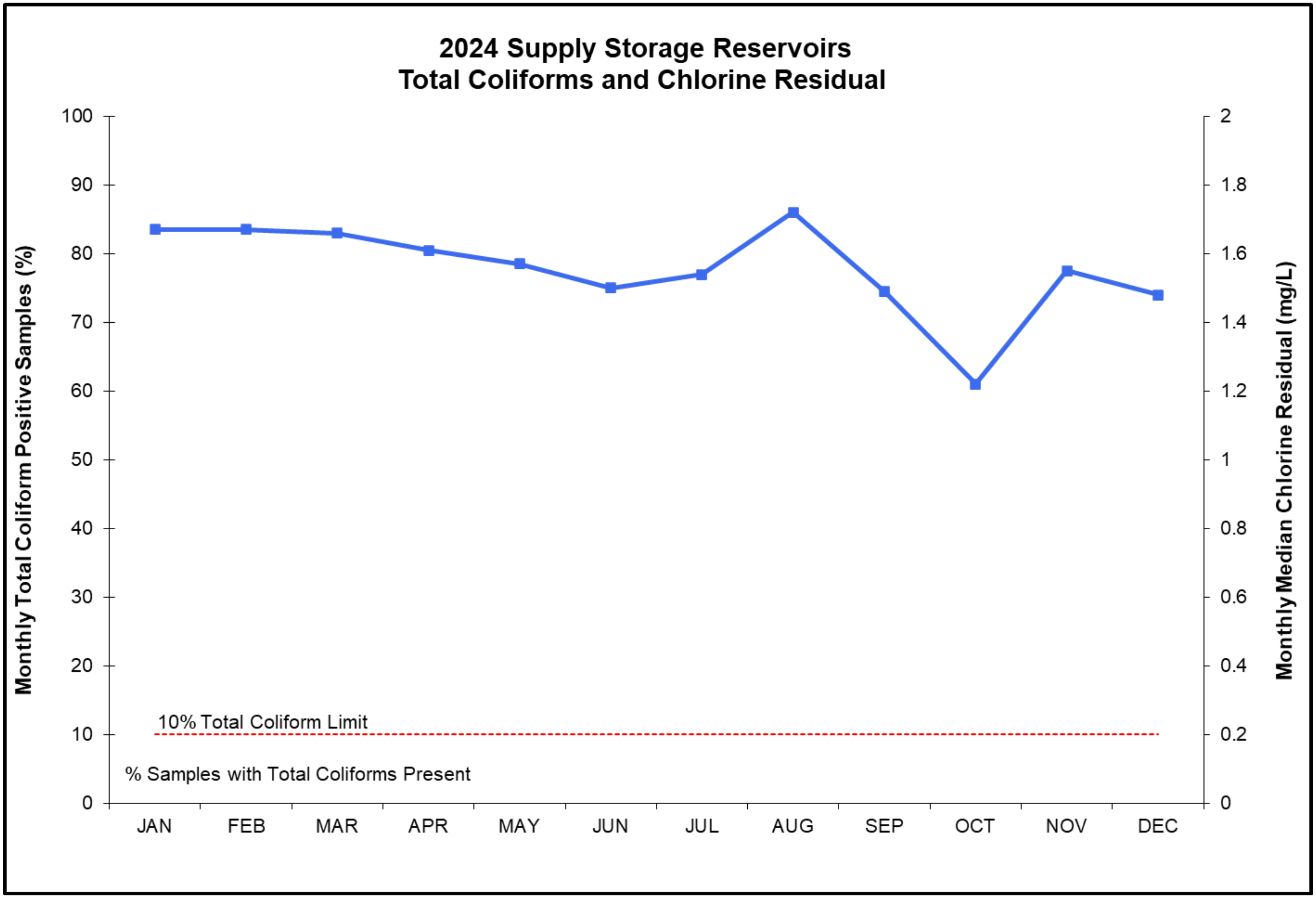

Figure 30 Supply Storage Reservoirs Total Coliforms and Chlorine Residual in 2024

7.4 Distribution System Results

The following sections summarize the water quality monitoring results within the various distribution systems and indicate the compliance status of each system.

7.4.1 Juan de Fuca Water Distribution System – Westshore Municipalities (Owned and Operated by the CRD)

In 2024, 37 distribution system sampling locations were used by the CRD Water Quality Monitoring Program to monitor the bacteriological quality of the water in the Westshore system.

Sample Collection. In 2024, 1,115 bacteriological and 277 water chemistry samples were collected from the Juan de Fuca Water Distribution System (Table 4). Based on current population data for the Westshore municipalities, 82 samples are required for bacteria testing each month. Table 4 shows the number of monthly samples collected and analyzed for compliance.

Bacteriological Results. Total coliforms were found in 15 samples throughout the year. All resamples, immediately collected after a total coliform positive result, were free of total coliform bacteria. One sample exceeded the 10 CFU/100 mL total coliform concentration threshold (August 6). A resample the following day was free of total coliforms but operators were instructed to spot-flush this dead end pipe section weekly to lower water age. This system complied with the 10% total coliform-positive limit for all months of the year during 2024. The annual total coliform positive percentage was well below the 10% limit at 1.3% (Table 4).

There were no *E coli*-positive samples in 2024.

Table 4 2024 Bacteriological Quality of the Juan de Fuca Distribution System – Westshore Municipalities (CRD)

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as CL2	Median ° C
JAN	88	0	0	0	0	0	5	0	1.61	7.0
FEB	97	0	0	0	0	0	5	0	1.55	7.3
MAR	85	0	0	0	0	0	5	0	1.44	8.0
APR	99	0	0	0	0	0	5	0	1.34	9.7
MAY	95	0	0	0	0	0	5	0	1.31	12.2
JUN	84	0	0	0	0	0	5	0	1.21	14.7
JUL	107	4	3.7	0	0	0	6	0	1.06	17.4
AUG	89	5	5.6	0	1	0	4	0	1.26	19.1
SEP	87	1	1.1	0	0	0	4	0	1.32	18.6
OCT	110	2	1.8	0	0	0	4	0	1.38	15.0
NOV	86	2	2.3	0	0	0	8	0	1.41	11.0
DEC	88	1	1.1	0	0	0	5	0	1.45	8.7
Total:	1115	15	1.3	0	1	0	61	0	1.36	11.6

Notes:
TC = Total Coliforms, E. coli = Escherichia coli, Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Chlorine Residual. The annual median chlorine residual in the Westshore municipalities of the Juan de Fuca Water Distribution System was 1.36 mg/L (Table 4). The lowest monthly median was in July (1.06 mg/L) and the maximum monthly median was in January (1.61 mg/L) (Figure 31, Table 4).

Water Temperature. The annual median water temperature in the Juan de Fuca Water Distribution System was 11.6ºC, with monthly medians ranging between 7.0°C (January) and 19.1ºC (August) (Table 4).

Disinfection Byproducts. One location in the Juan de Fuca Water Distribution System had 18 samples collected for disinfection byproducts. The annual average TTHM and haloacetic acid (HAA5) concentrations in six samples each were 14.7 µg/L and 8.9 µg/L, respectively, far below the Canadian guideline MAC (TTHM = 100; HAA5 = 80). In three of six samples, the NDMA concentrations were below the detection limit of 1.9 ng/L. Three samples registered low NDMA concentrations of up to 2.8 ng/L, well below the Canadian guideline MAC of 40 ng/L.

Physical/Chemical Parameters. The drinking water in the Westshore municipalities of the Juan de Fuca Water Distribution System had the following physical and chemical characteristics in 2024:

- Median pH: 7.5
- Median $CaCO_3$ Hardness: 17.2 mg/L
- Median Alkalinity: 17.60 mg/L
- Median Colour: 5.0 TCU
- Median Conductivity (25ºC): 57.40 µS/cm
- Median Turbidity: 0.25 NTU

No regular grab sample from this distribution system exhibited an elevated turbidity of >1 NTU all year (Table 4). This indicates good drinking water quality in general.

Metals. One sampling station in this system was sampled for metals bi-monthly. All metals were below the Canadian guideline limits.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

Compliance Status. The Westshore municipalities of the Juan de Fuca Water Distribution System were in compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation* in 2024 **except** for August 6, with one total coliform-positive result in exceedance of 10 CFU/100 mL. In this singular case, an immediate resample confirmed the safety of the drinking water.

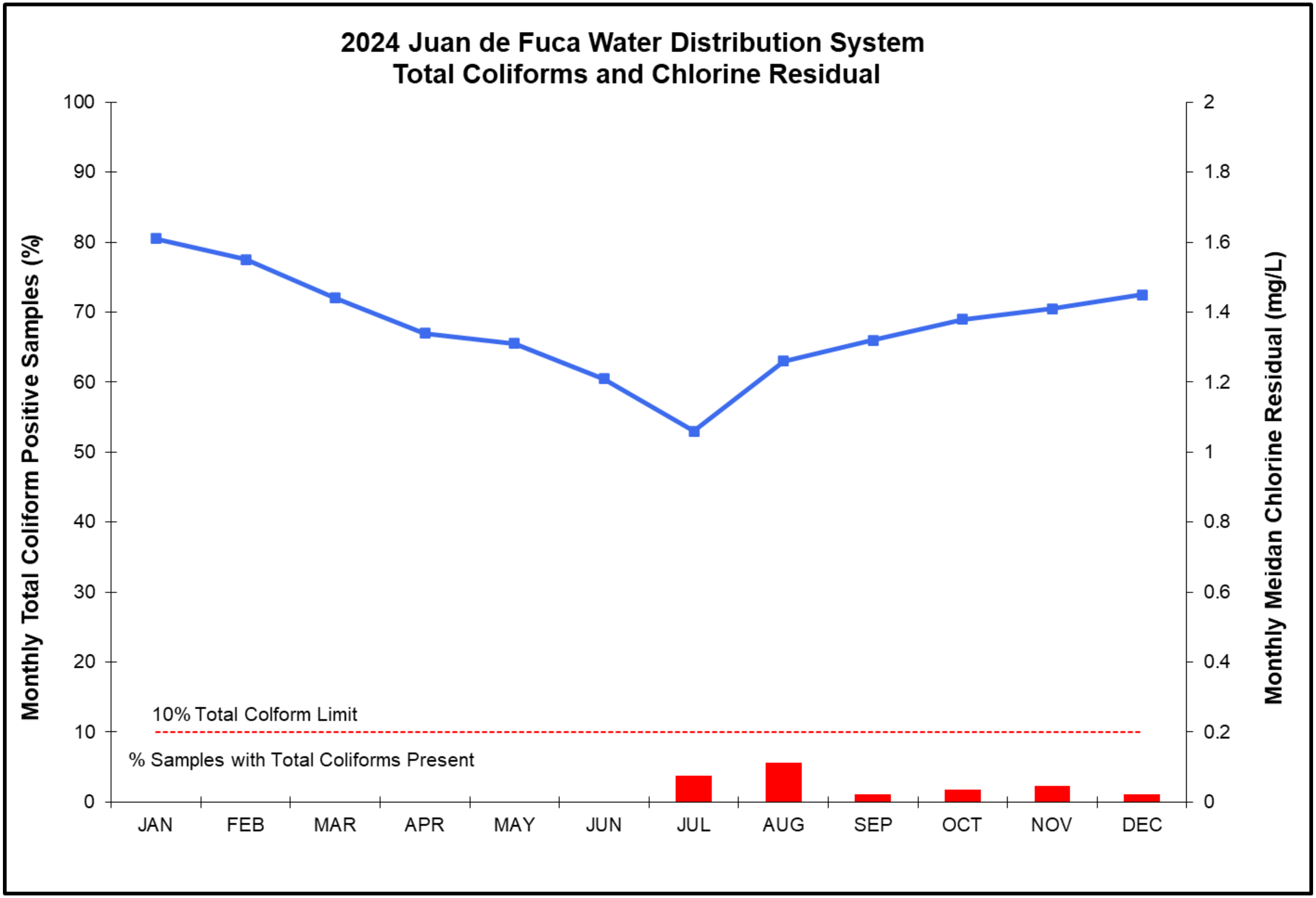

Figure 31 Juan de Fuca – Westshore Distribution System Total Coliforms and Chlorine Residual in 2024

7.4.2 Sooke/East Sooke Distribution System (Owned and Operated by the CRD)

In 2024, 21 sampling locations were used by the CRD Water Quality Monitoring Program to monitor the bacteriological quality of the water in Sooke/East Sooke system. Half of all Sooke/East Sooke sampling stations were typically sampled once per week for a bi-weekly sampling frequency of all stations.

Sample Collection. In 2024, 389 bacteriological and 227 water chemistry samples were collected from the Sooke/East Sooke Distribution System (Table 5). Based on current population data for the District of Sooke, 17 samples are required for bacteria testing each month. Table 5 shows the number of monthly samples collected and analyzed for compliance.

Bacteriological Results. Total coliforms were found in one sample throughout the year; in October. A resample, immediately collected after a total coliform positive result, was free of total coliform bacteria. The same sample also exceeded the 10 CFU/100 mL total coliform concentration threshold. This system complied with the 10% total coliform-positive limit for all months of the year during 2024. The annual total coliform positive percentage was well below the 10% limit at 0.3% (Table 5).

No *E. coli* bacteria were found in any sample collected in 2024 (Table 5).

Table 5 2024 Bacteriological Quality of the Sooke/East Sooke Distribution System (CRD)

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as CL2	Median ° C
JAN	35	0	0	0	0	0	6	0	1.31	7.1
FEB	37	0	0	0	0	0	8	0	1.26	7.5
MAR	33	0	0	0	0	0	6	0	1.26	7.7
APR	30	0	0	0	0	0	7	0	1.39	9.9
MAY	30	0	0	0	0	0	7	0	1.4	12.7
JUN	42	0	0	0	0	0	8	0	1.11	14.8
JUL	44	0	0	0	0	0	9	0	1.11	18.2
AUG	26	0	0	0	0	0	6	0	0.83	17.9
SEP	24	0	0	0	0	0	6	0	0.54	16.8
OCT	33	1	3	0	1	0	7	0	1.21	13.5
NOV	24	0	0	0	0	0	6	0	1.27	11
DEC	31	0	0	0	0	0	7	0	1.15	8.7
Total:	389	1	0.3	0	1	0	83	0	1.24	11.9

Notes:
TC = Total Coliforms, *E. coli* = *Escherichia coli,* Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Chlorine Residual. The annual median chlorine residual in the Sooke/East Sooke Distribution System was 1.24 mg/L (Table 5, Figure 32). The lowest monthly median was in September (0.54 mg/L), and the maximum monthly median was in April (1.39 mg/L). The Sooke/East Sooke system performed satisfactory in 2024 in terms of maintaining good chlorine residuals during the early fall period when the chlorine demand is typically highest due to warm water conditions.

Water Temperature. The annual median water temperature in the Sooke/East Sooke Distribution System was 11.9°C, with monthly medians ranging between 7.1ºC (January) and 18.2°C (July) (Table 5).

Disinfection Byproducts. One location in the Sooke distribution system had 18 samples collected for disinfection byproducts. The annual average TTHM and HAA5 concentrations from six samples each were 30.2 and 22.2 µg/L, respectively, far below the Canadian guideline MAC (TTHM = 100; HAA5 = 80). In all six samples, the NDMA concentrations were below the detection limit of 1.9 ng/L and therefore well below the Canadian guideline MAC of 40 ng/L.

Physical/Chemical Parameters. The drinking water in the Sooke/East Sooke Distribution System had the following physical and chemical characteristics:

- Median pH: 7.6
- Median $CaCO_3$ Hardness: 17.4 mg/L
- Median Colour: 4.0 TCU
- Median Alkalinity: 17.80 mg/L
- Median Turbidity: 0.25 NTU
- Median Conductivity (25ºC): 60.80 µS/cm

No regular grab sample from this distribution system exhibited an elevated turbidity of >1 NTU all year (Table 5). This indicates good drinking water quality in general.

Metals. The CRD Water Quality Monitoring Program for the Sooke/East Sooke system included bi-monthly metal tests in two strategic locations in 2024: first customer sampling station on Sooke River Road, and Whiffen Spit Road. All metallic parameters, including lead, were well below the Canadian guideline limits.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

Compliance Status. The Sooke/East Sooke Distribution System was in compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation* in 2024 **except** for October, with one total coliform-positive results in exceedance of 10 CFU/100 mL. In this singular case, an immediate resample confirmed the safety of the drinking water.

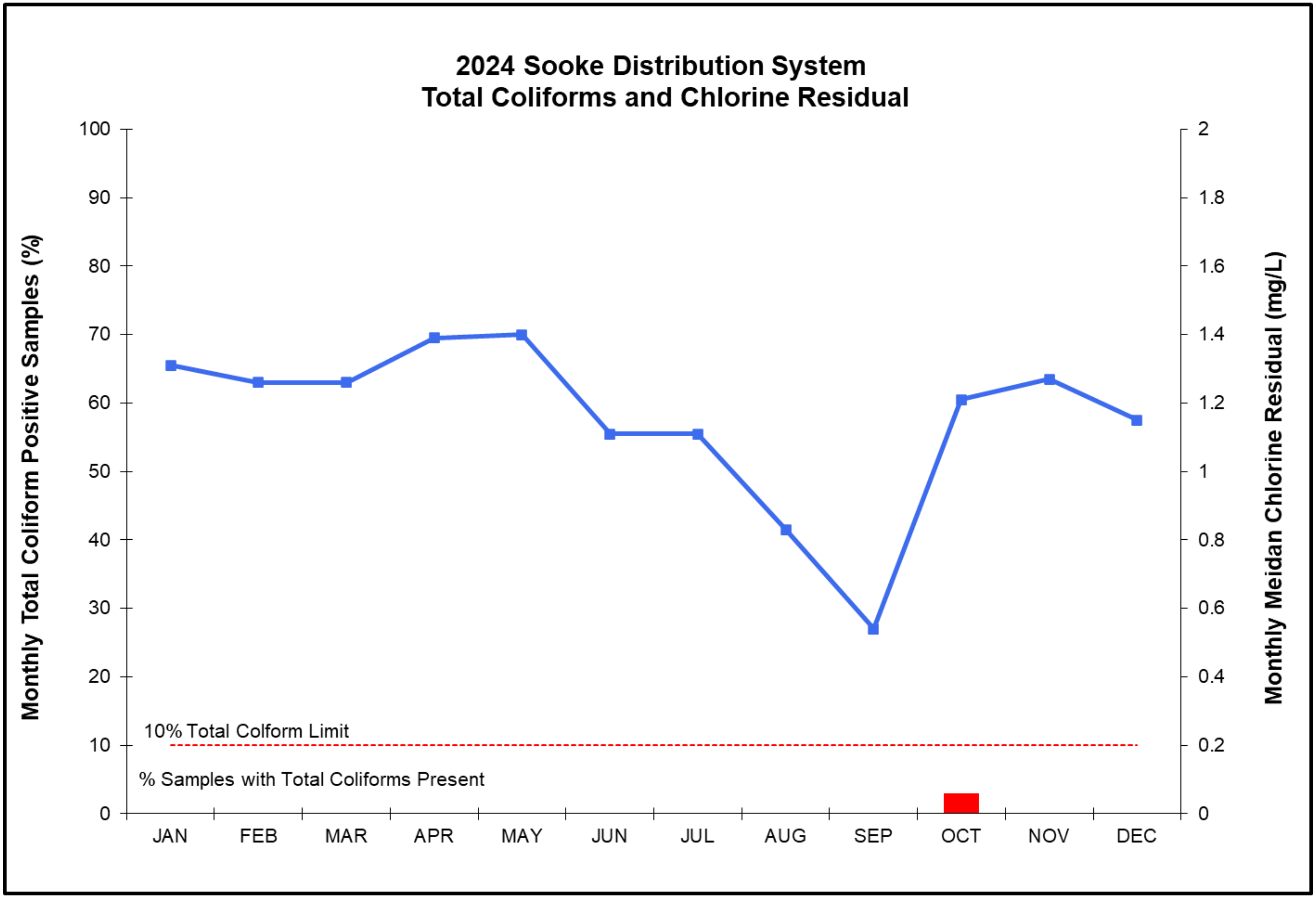

Figure 32 Sooke/East Sooke Distribution System Total Coliforms and Chlorine Residual in 2024

7.4.3 Central Saanich Distribution System (Owned and Operated by the District of Central Saanich)

In 2024, 11 sampling locations were used by the CRD Water Quality Monitoring Program to monitor the bacteriological quality of the water in the Central Saanich Distribution System. Central Saanich sampling stations are part of the daily distribution sampling runs by CRD staff.

Sample Collection. In 2024, 273 bacteriological and 207 water chemistry samples were collected from the Central Saanich Distribution System (Table 6). Based on current population data for the District of Central Saanich, 17 samples are required for bacteria testing each month. Table 6 shows the number of monthly samples collected and analyzed for compliance.

Bacteriological Results. No total coliform bacteria were found in any sample from the Central Saanich Distribution System in 2024. This system therefore complied with the 10% total coliform-positive limit and the 10 CFU/100 mL maximum limit for all months (Table 6).

Chlorine Residual. The annual median chlorine residual in the Central Saanich Distribution System was 1.62 mg/L (Table 6). The lowest monthly median was in October (1.48 mg/L) and the maximum monthly median was in March and July (1.68 mg/L) (Figure 33, Table 6).

Water Temperature. The annual median water temperature in the Central Saanich Distribution System was 12.5°C, with monthly medians ranging between 7.9°C (January) and 19.5°C (August) (Table 6).

Table 6 2024 Bacteriological Quality of the Central Saanich Distribution System

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as CL2	Median ° C
JAN	25	0	0	0	0	0	8	0	1.59	7.9
FEB	21	0	0	0	0	0	8	0	1.62	8
MAR	23	0	0	0	0	0	8	0	1.68	8.2
APR	23	0	0	0	0	0	8	0	1.62	10.2
MAY	25	0	0	0	0	0	8	0	1.62	12.7
JUN	22	0	0	0	0	0	8	0	1.65	15.2
JUL	24	0	0	0	0	0	8	0	1.68	18.2
AUG	24	0	0	0	0	0	9	1	1.66	19.5
SEP	20	0	0	0	0	0	8	0	1.56	18.5
OCT	25	0	0	0	0	0	9	0	1.48	15
NOV	20	0	0	0	0	0	10	2	1.52	12.3
DEC	21	0	0	0	0	0	7	0	1.59	9.4
Total:	273	0	0.0	0	0	0	99	3	1.62	12.5

Notes:
TC = Total Coliforms, *E. coli* = *Escherichia coli,* Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Disinfection Byproducts. No data for 2024.

Physical/Chemical Parameters. The drinking water in the Central Saanich Distribution System had the following physical and chemical characteristics in 2024:

- Median pH: 7.7
- Median Turbidity: 0.30 NTU
- Median Colour: 4.0 TCU
- Median Alkalinity: 18.00 mg/L
- Median Conductivity (25ºC): 56.30 µS/cm

Three samples in August and November exhibited an elevated turbidity of >1 NTU (Table 6). All three adverse samples came from the same sampling station at 1701 Verling Avenue, which is prone to accumulating sediments in the long sampling line. Hence, this sampling line requires extensive flushing before sample collection, and sampling staff were reminded of this again.

Metals. No data for 2024.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

Compliance Status. The Central Saanich Distribution System was in full compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation* in 2024.

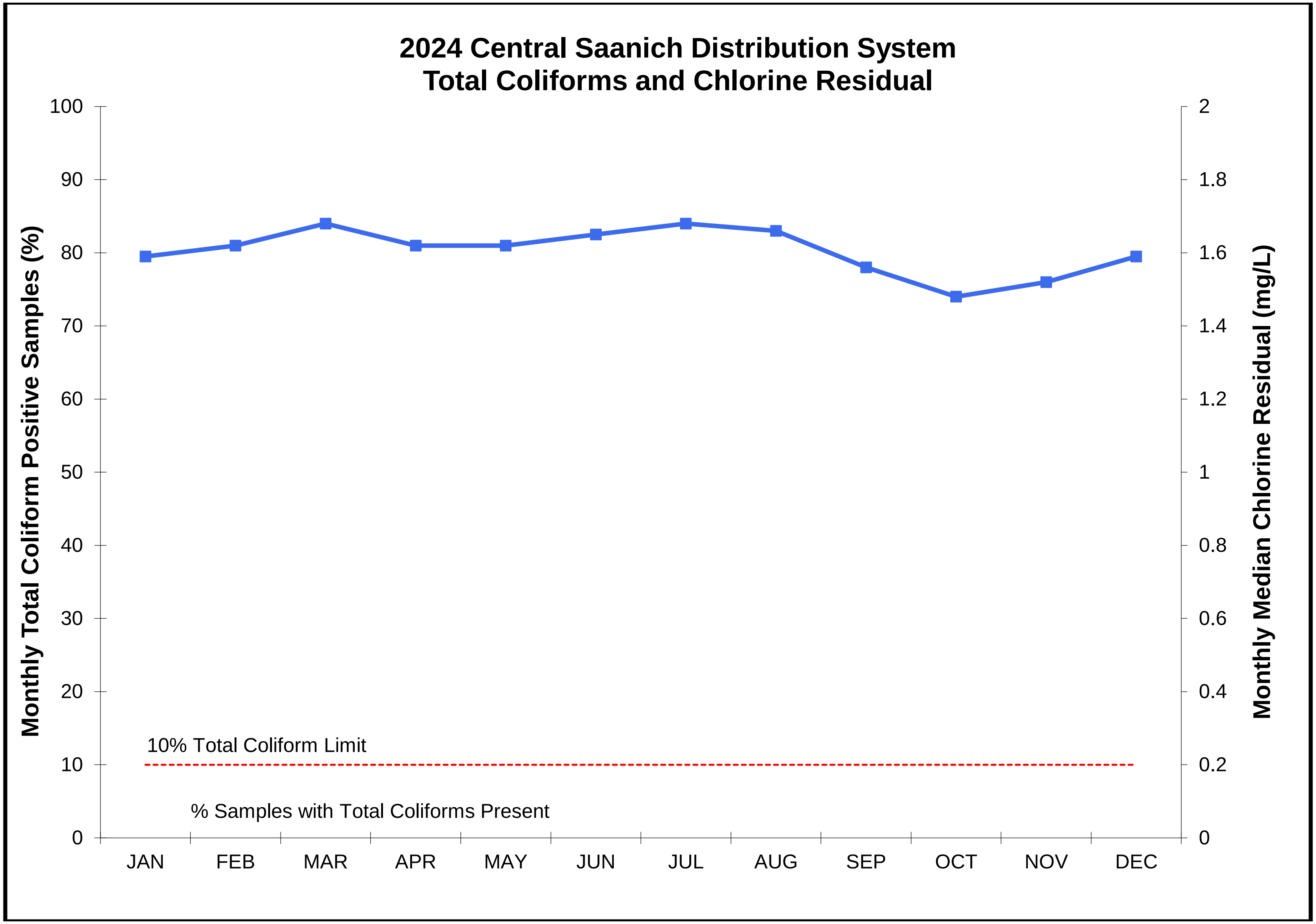

Figure 33 **Central Saanich Distribution System Total Coliforms and Chlorine Residual in 2024**

7.4.4 North Saanich Distribution System (Owned and Operated by the District of North Saanich)

In 2024, eight sampling locations were used by the CRD Water Quality Monitoring Program to monitor the bacteriological quality of the water in the North Saanich Distribution System. North Saanich sampling stations are part of the daily distribution sampling runs by CRD staff.

Sample Collection. In 2024, 225 bacteriological and 91 water chemistry samples were collected from the North Saanich Distribution System (Table 7). Based on current population data for the District of North Saanich, 13 samples are required for bacteria testing each month. Table 7 shows the number of monthly samples collected and analyzed for compliance.

Bacteriological Results. No total coliform bacteria were found in any sample from the North Saanich Distribution System in 2024. This system therefore complied with the 10% total coliform-positive limit and the 10 CFU/100 mL maximum limit for all months (Table 7).

None of the samples contained *E. coli* in 2024 (Table 7).

Table 7 2024 Bacteriological Quality of the North Saanich Distribution System

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as CL2	Median ° C
JAN	19	0	0	0	0	0	2	0	1.19	8.1
FEB	17	0	0	0	0	0	1	0	1.35	8.2
MAR	19	0	0	0	0	0	1	0	1.48	8.2
APR	19	0	0	0	0	0	1	0	1.46	10.1
MAY	22	0	0	0	0	0	1	0	1.41	12.2
JUN	18	0	0	0	0	0	1	0	1.4	14.8
JUL	18	0	0	0	0	0	1	0	1.39	17.7
AUG	19	0	0	0	0	0	1	0	1.43	18.7
SEP	17	0	0	0	0	0	1	0	1.35	18.4
OCT	21	0	0	0	0	0	1	0	1.2	15.3
NOV	18	0	0	0	0	0	2	0	1	12.4
DEC	18	0	0	0	0	0	1	0	1.15	9.9
Total:	225	0	0.0	0	0	0	14	0	1.37	12.3

Notes:
TC = Total Coliforms, *E. coli* = *Escherichia coli,* Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Chlorine Residual. The annual median chlorine residual in the North Saanich Distribution System was 1.37 mg/L (Table 7). The lowest monthly median was in November (1.00 mg/L) and the maximum monthly median was in March (1.48 mg/L) (Figure 34, Table 7).

Water Temperature. The annual median water temperature in the North Saanich Distribution System was 12.3°C, with monthly medians ranging between 8.1°C (January) and 18.7°C (August) (Table 7).

Disinfection Byproducts. No data in 2024.

Physical/Chemical Parameters. The drinking water in the North Saanich Distribution System had the following physical and chemical characteristics in 2024:

- Median pH: 7.9
- Median Colour: 4.5 TCU
- Median Turbidity: 0.24 NTU
- Median Alkalinity: 18.50 mg/L
- Median Conductivity (25ºC): 57.80 µS/cm

No regular grab sample from this distribution system exhibited an elevated turbidity of >1 NTU all year (Table 7). This indicates good drinking water quality in general.

Metals. No data in 2024.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

Compliance Status. The North Saanich Distribution System was in full compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation* in 2024.

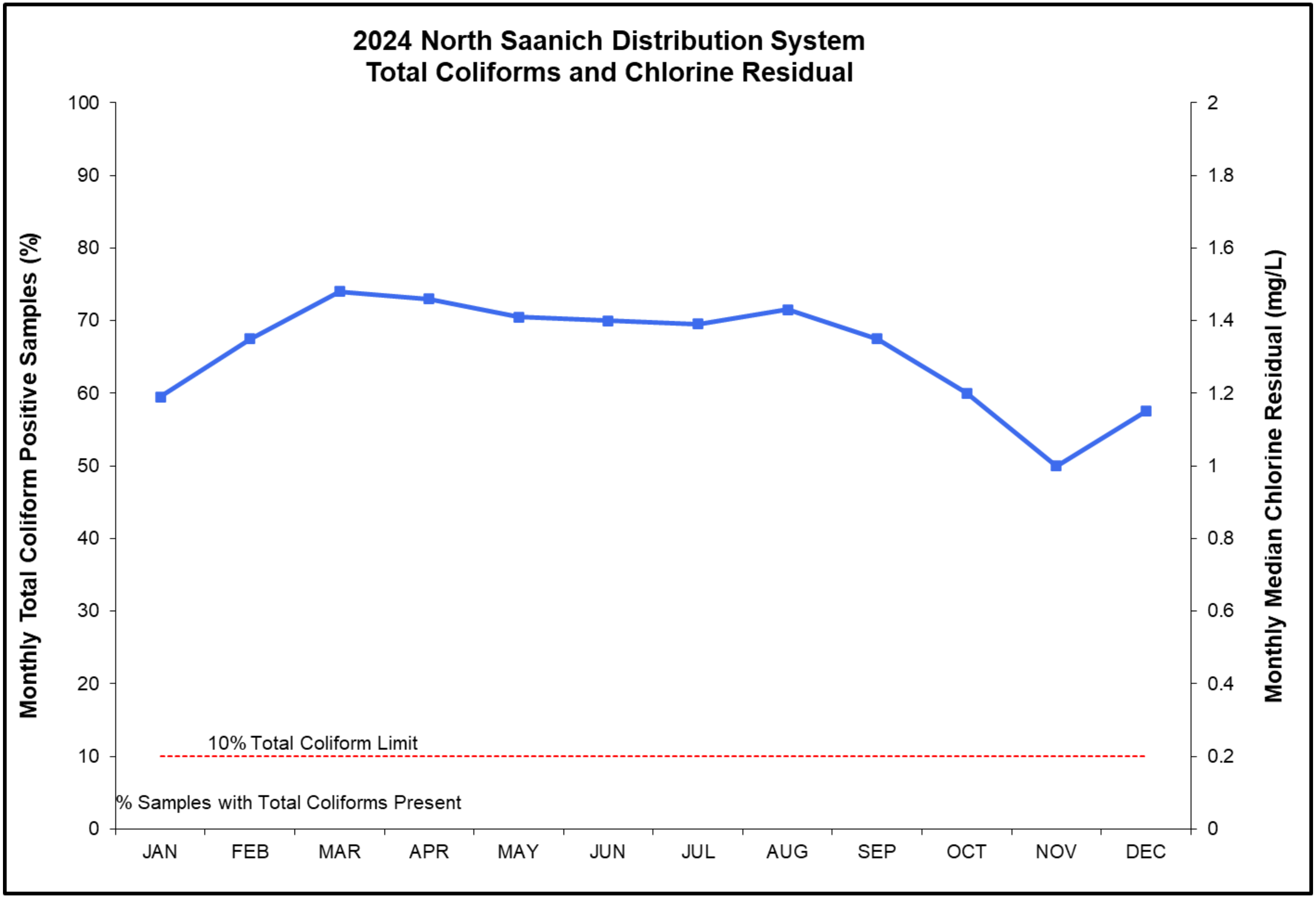

Figure 34 North Saanich Distribution System Total Coliforms and Chlorine Residual in 2024

7.4.5 Oak Bay Distribution System (Owned and Operated by the District of Oak Bay)

In 2024, eight sampling locations were used by the CRD Water Quality Monitoring Program to monitor the bacteriological quality of the water in the Oak Bay Distribution System. Oak Bay sampling stations are part of the daily distribution sampling runs by CRD staff.

Sample Collection. In 2024, 284 bacteriological and 147 water chemistry samples were collected from the Oak Bay Distribution System (Table 8). Based on current population data for the District of Oak Bay, 20 samples are required for bacteria testing each month. Table 8 shows the number of monthly samples collected and analyzed for compliance.

Bacteriological Results. No total coliform bacteria were found in any sample throughout the year. This system therefore complied with the 10% total coliform-positive limit and the 10 CFU/100 mL maximum limit for all months (Table 8).

No *E. coli* bacteria were found in any sample collected in 2024 (Table 8).

Chlorine Residual. The annual median chlorine residual in the Oak Bay Distribution System was 1.68 mg/L (Table 8). The lowest monthly median was in October (1.60 mg/L) and the maximum monthly median was in August (1.87 mg/L) (Figure 35).

Water Temperature. The annual median water temperature in the Oak Bay Distribution System was 12.7°C, with monthly medians ranging between 8.2°C (January/February) and 19.6°C (August) (Table 8).

Table 8 2024 Bacteriological Quality of the Oak Bay Distribution System

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as CL2	Median ° C
JAN	23	0	0	0	0	0	3	0	1.63	8.2
FEB	24	0	0	0	0	0	2	0	1.68	8.2
MAR	22	0	0	0	0	0	2	0	1.7	8.6
APR	25	0	0	0	0	0	2	0	1.7	10.8
MAY	24	0	0	0	0	0	2	0	1.67	12.8
JUN	22	0	0	0	0	0	2	0	1.78	15.9
JUL	25	0	0	0	0	0	2	0	1.71	18
AUG	25	0	0	0	0	0	2	0	1.87	19.6
SEP	22	0	0	0	0	0	2	0	1.67	19.3
OCT	27	0	0	0	0	0	3	0	1.6	15.6
NOV	22	0	0	0	0	0	2	0	1.65	12.6
DEC	23	0	0	0	0	0	2	0	1.68	9.4
Total:	284	0	0.0	0	0	0	26	0	1.68	12.7

Notes:
TC = Total Coliforms, *E. coli = Escherichia coli,* Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Disinfection Byproducts. No data for 2024.

Physical/Chemical Parameters. The drinking water in the Oak Bay Distribution System had the following physical and chemical characteristics:

- Median pH: 7.9
- Median Alkalinity: 18.00 mg/L
- Median Turbidity: 0.25 NTU
- Median Conductivity (25ºC): 57.10 µS/cm
- Median Colour: 5.0 TCU

No regular grab sample from this distribution system exhibited an elevated turbidity of >1 NTU all year (Table 8). This indicates good drinking water quality in general.

Metals. No data in 2024.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

Compliance Status. The Oak Bay Distribution System was in full compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation* in 2024.

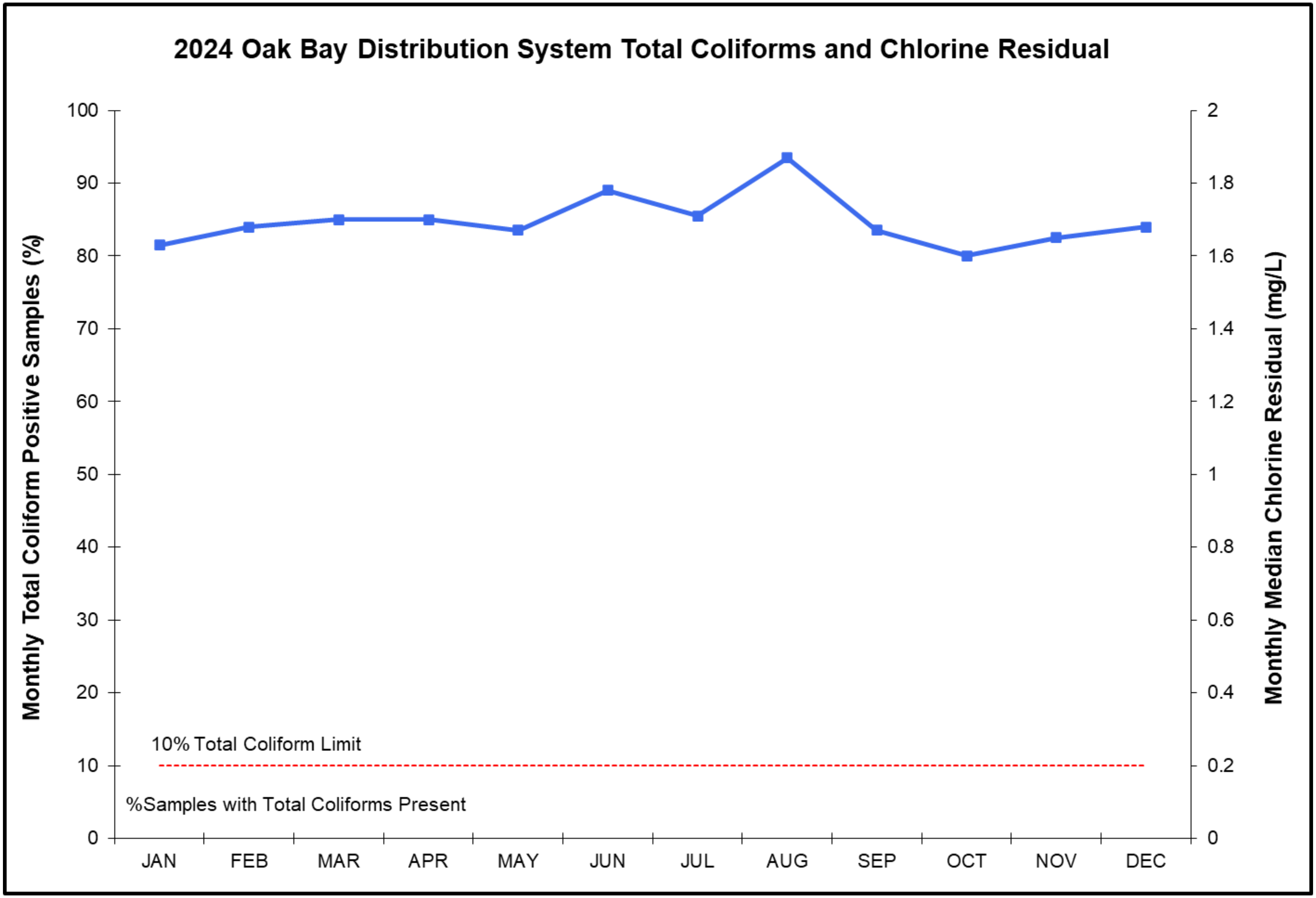

Figure 35 Oak Bay Distribution System Total Coliforms and Chlorine Residual in 2024

7.4.6 Saanich Distribution System (Owned and Operated by the District of Saanich)

In 2024, 66 sampling locations were used by the CRD Water Quality Monitoring Program to monitor the bacteriological quality of the water in the Saanich Distribution System. Saanich sampling stations were part of the daily distribution sampling runs by CRD staff and a weekly run by Saanich staff.

Sample Collection. In 2024, 1,180 bacteriological and 172 water chemistry samples were collected from the Saanich Distribution System (Table 9). Based on current population data for the District of Saanich, 94 samples are required for bacteria testing each month. Table 9 shows the number of monthly samples collected and analyzed for compliance.

Bacteriological Results. No total coliform bacteria were found in any sample throughout the year. This system therefore complied with the 10% total coliform-positive limit and the 10 CFU/100 mL maximum limit for all months (Table 9).

No *E. coli* bacteria were found in any sample collected in 2024 (Table 9).

Chlorine Residual. The annual median chlorine residual in the Saanich Distribution System was 1.59 mg/L (Table 9). The lowest monthly median was in October (1.42 mg/L) and the maximum monthly median was in April (1.81 mg/L) (Figure 36).

Water Temperature. The annual median water temperature in the Saanich Distribution System was 12.3°C, with monthly medians ranging between 7.5°C (January) and 19.5°C (August) (Table 9).

Table 9 2024 Bacteriological Quality of the Saanich Distribution System

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as CL2	Median ° C
JAN	98	0	0	0	0	0	4	1	1.62	7.5
FEB	96	0	0	0	0	0	5	0	1.67	8.1
MAR	96	0	0	0	0	0	4	0	1.7	7.8
APR	97	0	0	0	0	0	4	0	1.61	10.3
MAY	105	0	0	0	0	0	4	0	1.57	12.6
JUN	95	0	0	0	0	0	3	0	1.66	15.1
JUL	97	0	0	0	0	0	4	0	1.56	17.8
AUG	99	0	0	0	0	0	4	0	1.63	19.5
SEP	96	0	0	0	0	0	4	0	1.53	19
OCT	105	0	0	0	0	0	6	1	1.42	14.8
NOV	98	0	0	0	0	0	2	0	1.43	11.9
DEC	98	0	0	0	0	0	3	0	1.56	9.2
Total:	1180	0	0.0	0	0	0	47	2	1.59	12.3

Notes:
TC = Total Coliforms, *E. coli* = *Escherichia coli,* Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Disinfection Byproducts. No data for 2024.

Physical/Chemical Parameters. The drinking water in the Saanich Distribution System had the following physical and chemical characteristics in 2024:

- Median pH: 7.8
- Median Alkalinity: 18.0 mg/L
- Median Turbidity: 0.25 NTU
- Median Conductivity (25ºC): 56.40 µS/cm
- Median Colour: 5.0 TCU

Two samples in January and October exhibited an elevated turbidity of >1 NTU (Table 9). These two incidents coincided with the timing of municipal water main flushing activities and were likely caused by this.

Metals. No data in 2024.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

Compliance Status. The Saanich Distribution System was in full compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation* in 2024.

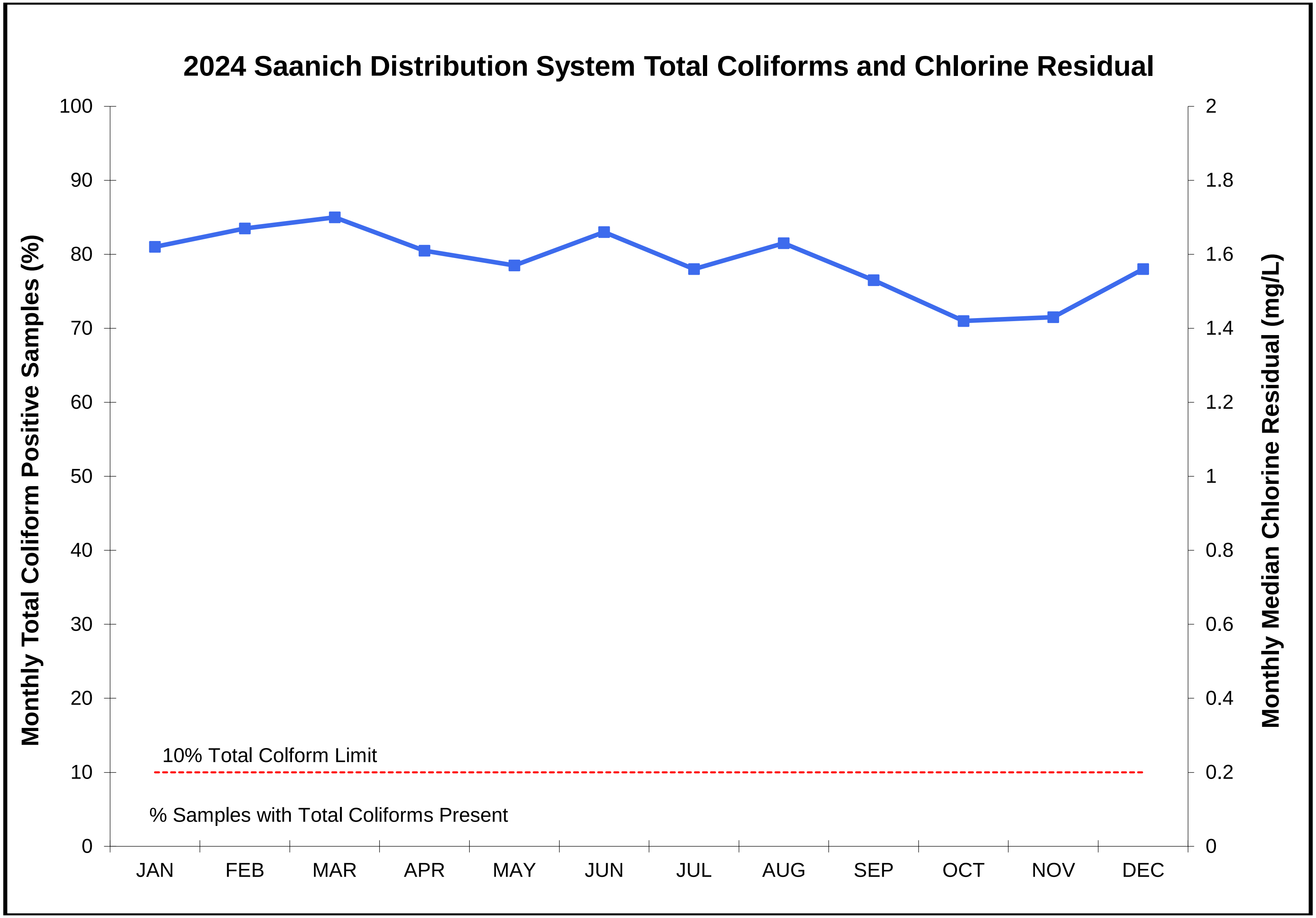

Figure 36 **Saanich Distribution System Total Coliforms and Chlorine Residuals in 2024**

7.4.7 Sidney Distribution System (Owned and Operated by the Town of Sidney)

In 2024, eight sampling locations were used by the CRD Water Quality Monitoring Program to monitor the bacteriological quality of the water in the Sidney Distribution System. Sidney sampling stations are part of the daily distribution sampling runs by CRD staff.

Sample Collection. In 2024, 211 bacteriological and 85 water chemistry samples were collected from the Sidney Distribution System (Table 10). Based on current population data for the Town of Sidney, 14 samples are required for bacteria testing each month. Table 10 shows the number of monthly samples collected and analyzed for compliance.

Bacteriological Results. No total coliform bacteria were found in any sample throughout the year. This system therefore complied with the 10% total coliform-positive limit and the 10 CFU/100 mL maximum limit for all months (Table 10).

No sample tested positive for *E. coli* in 2024 (Table 10).

Chlorine Residual. The annual median chlorine residual in the Sidney Distribution System was 1.52 mg/L (Table 10). The lowest monthly median was in July/October (1.42 mg/L) and the maximum monthly median was in March (1.70 mg/L) (Figure 37).

Water Temperature. The annual median water temperature in the Sidney Distribution System was 12.6°C, with monthly medians ranging between 7.5°C (January) and 19.4°C (October) (Table 10).

Table 10 2024 Bacteriological Quality of the Sidney Distribution System

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as CL2	Median ° C
JAN	18	0	0	0	0	0	1	0	1.52	7.5
FEB	20	0	0	0	0	0	7	1	1.62	8.1
MAR	17	0	0	0	0	0	1	0	1.7	8.2
APR	18	0	0	0	0	0	1	0	1.62	10.3
MAY	19	0	0	0	0	0	1	0	1.51	12.5
JUN	16	0	0	0	0	0	1	0	1.66	15.3
JUL	18	0	0	0	0	0	2	0	1.42	18
AUG	17	0	0	0	0	0	1	0	1.57	19.4
SEP	15	0	0	0	0	0	1	0	1.47	19
OCT	20	0	0	0	0	0	1	0	1.42	15.6
NOV	16	0	0	0	0	0	2	0	1.51	12.6
DEC	17	0	0	0	0	0	1	0	1.5	10
Total:	211	0	0.0	0	0	0	20	1	1.52	12.6

Notes:
TC = Total Coliforms, *E. coli* = *Escherichia coli,* Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Disinfection Byproducts. No data for 2024.

Physical/Chemical Parameters. The drinking water in the Sidney Distribution System had the following physical and chemical characteristics in 2024:

- Median pH: 7.8
- Median Alkalinity: 17.70 mg/L
- Median Turbidity: 0.26 NTU
- Median Conductivity (25ºC): 56.60 µS/cm
- Median Colour: 3.0 TCU

One sample in February exhibited an elevated turbidity of >1 NTU (Table 10). This incident coincided with the timing of municipal water main flushing activities and was likely caused by this.

Metals. No data in 2024.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

Compliance Status. The Sidney Distribution System was in full compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation* in 2024.

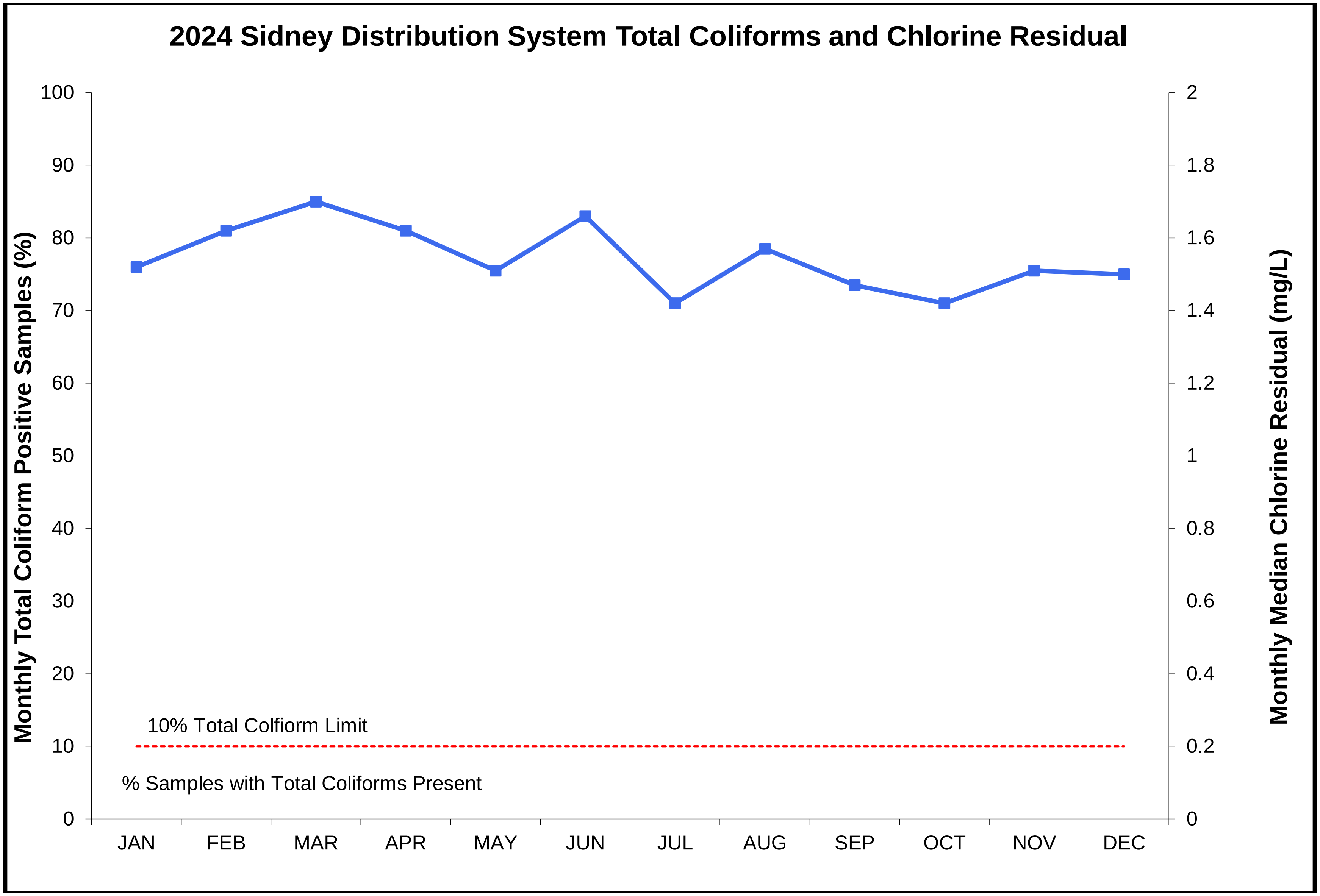

Figure 37 **Sidney Distribution System Total Coliforms and Chlorine Residuals in 2024**

7.4.8 Victoria/Esquimalt Distribution System (Owned and Operated by the City of Victoria)

In 2024, 17 sampling locations were used by the CRD Water Quality Monitoring Program to monitor the bacteriological quality of the water in the Victoria/Esquimalt Distribution System. Victoria/Esquimalt sampling stations are part of the daily distribution sampling runs by CRD staff.

Sample Collection. In 2024, 1,234 bacteriological and 222 water chemistry samples were collected from the Victoria/Esquimalt Distribution System (Table 11). Based on current population data for Victoria and Esquimalt, 93 samples are required for bacteria testing each month. Table 11 shows the number of monthly samples collected and analyzed for compliance.

Bacteriological Results. No total coliform bacteria were found in any sample throughout the year. This system therefore complied with the 10% total coliform-positive limit and the 10 CFU/100 mL maximum limit for all months (Table 11).

No *E. coli* was detected in any sample in 2024 (Table 11).

Chlorine Residual. The annual median chlorine residual in the Victoria/Esquimalt Distribution System was 1.63 mg/L (Table 11). The lowest monthly median was in September/October (1.57 mg/L) and the maximum monthly median was in March (1.71 mg/L) (Figure 38).

Water Temperature. The annual median water temperature in the Victoria/Esquimalt Distribution System was 13.1°C, with monthly medians ranging between 7.9°C (January) and 20.1°C (August) (Table 11).

Table 11 2024 Bacteriological Quality of the Victoria Distribution System

Month	Samples Collected	Total Coliforms (CFU/100mL)				*E.coli* CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC>0	Resamples TC > 0	Samples TC > 10	Samples >0	Samples Collected	Samples >1 NTU	Median mg/L as CL2	Median ° C
JAN	109	0	0	0	0	0	7	0	1.65	7.9
FEB	97	0	0	0	0	0	6	0	1.7	8.3
MAR	99	0	0	0	0	0	5	0	1.71	8.6
APR	107	0	0	0	0	0	8	0	1.63	11.1
MAY	107	0	0	0	0	0	7	0	1.6	14
JUN	94	0	0	0	0	0	6	0	1.61	16.9
JUL	105	0	0	0	0	0	7	0	1.6	19.5
AUG	108	0	0	0	0	0	6	0	1.67	20.1
SEP	97	0	0	0	0	0	6	0	1.57	19.6
OCT	118	0	0	0	0	0	8	0	1.57	15.9
NOV	96	0	0	0	0	0	7	0	1.63	12.2
DEC	97	0	0	0	0	0	6	0	1.66	9.2
Total:	1234	0	0.0	0	0	0	79	0	1.63	13.1

Notes:
TC = Total Coliforms, *E. coli* = *Escherichia coli,* Cl_2 = chlorine, NTU = Nephelometric turbidity unit
> = Greater than, mg/L = milligrams per litre, °C = degrees Celsius

Disinfection Byproducts. No data for 2024.

Physical/Chemical Parameters. The drinking water in the Victoria/Esquimalt Distribution System had the following physical and chemical characteristics in 2024:

- Median pH: 7.8
- Median Alkalinity: 18.10 mg/L
- Median Turbidity: 0.25 NTU
- Median Conductivity (25ºC): 57.10 µS/cm
- Median Colour: 5.0 TCU

No regular grab sample from this distribution system exhibited an elevated turbidity of >1 NTU all year (Table 11). This indicates good drinking water quality in general.

Metals. No data in 2024.

The Greater Victoria pH & Corrosion Study completed in 2021 concluded that metal corrosion and lead leaching in the public piping systems, as well as in the vast majority of private plumbing systems, is not an issue in the Greater Victoria Drinking Water System.

Compliance Status. The Victoria/Esquimalt Distribution System was in full compliance with the *BC Drinking Water Protection Act* and *Drinking Water Protection Regulation* in 2024.

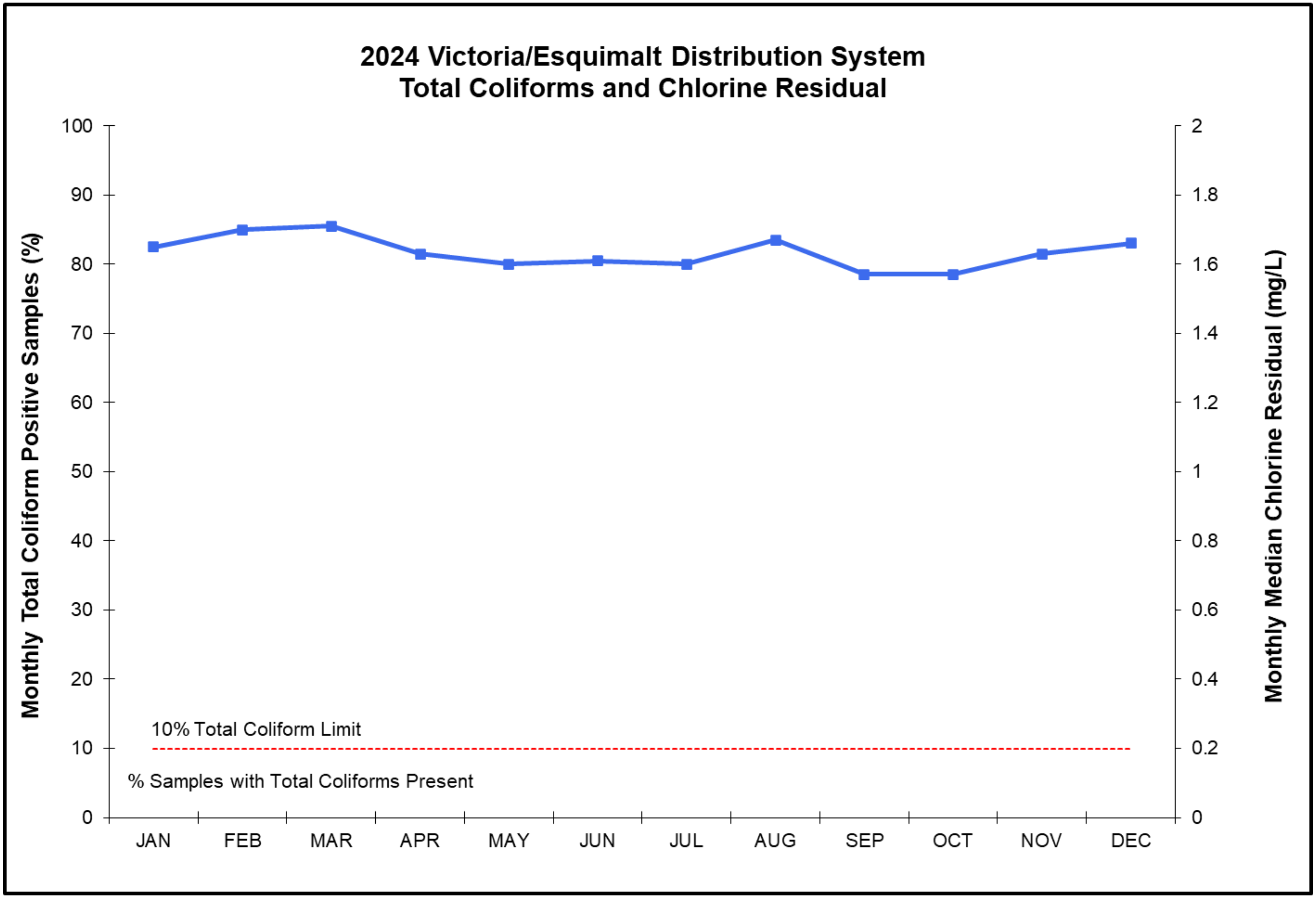

Figure 38 Victoria/Esquimalt Distribution System Total Coliforms and Chlorine Residuals in 2024

7.5 Water Quality Inquiry Program

Records of customer inquiries, including complaints about drinking water quality, have been maintained since 1992. In 2024, with 299 customer inquiries in total, it was typical compared to previous years with no single category represented proportional over another. Figure 39 depicts the distribution of topics and categories of received customer inquiries in 2024.

11% of customer inquiries that CRD staff received were from people concerned about the general safety of their drinking water. These concerns were addressed individually and, in general, most customers are content to know that CRD staff are actively sampling both the source water and the treated drinking water being delivered to their homes. For those people wanting to know more about the composition of their drinking water, they were either provided with the annual tables or directed to the CRD website.

Coloured water inquires encompassed 21%, which was an increase from 15% in 2023. Sediments in pipes can become stirred up during periods of water main flushing activities (January-May, September-December) in the distribution systems, fire hydrant inspections and other operational duties that may change the speed or the direction of the water flow. During such operational procedures, customers may experience over a short time cloudy or coloured water at their taps. CRD proactively communicates large and scheduled procedures, such as the annual water main flushing program, to customers in newspapers and social media. Coloured water can also be caused by seasonal source water quality events. Water can be tinged green in the spring due to an increase in algal activity or tinged yellow in the fall due to tannins in the leaves that have dropped. Some customers noticed the slight increase in water colour during the summer of 2024 which was likely related to the unusual high algal activity during the warm water season.

Customer inquiries regarding water pressure, service line leaks and water meter inquiries were directed to the Infrastructure & Water Services' operators. Similarly, customers requesting information on how and where to have their water tested were provided with contact information for external laboratories.

Throughout the year, several inquiries or complaints regarding taste and odour were received. Taste and odour complaints vary from concerns about chlorine to stale, musty, metallic and/or fishy characteristics. There are a variety of reasons for taste and odour issues. High chlorine taste and odour could be due to high water demand or the annual flushing program. Other tastes and odours observed may be due to natural fluctuations in the source water algal communities or areas in the distribution system that have a higher water age.

CRD staff have communicated regularly with Island Health hospital facility management staff to provide useful water quality information to these facilities. No hospital staff complaints or concerns were raised in 2024.

Metals inquiries, primarily lead, decreased from 6% in 2023 to 2% in 2024. External laboratory information was provided to customers who wanted to have a test completed at their private home. In 2024, customer inquiries about laboratory testing increased from 7% to 11%. CRD staff also provided information to customers inquiring about the potential for lead in their tap water and recommended the steps to take to verify lead levels at the tap. This includes support to customers in interpreting tap sample results.

Newly emerging topics in customer inquiries were related to potential contamination of the drinking water with microplastics and forever chemicals (per- and polyfluoroalkyl substances (PFAS)), both topics that have had a strong presence in the media. About 5% of all inquiries were related to these topics. A few questions to staff were also related to a potential addition of fluoride to the drinking water, with some customers strongly against and some in favour.

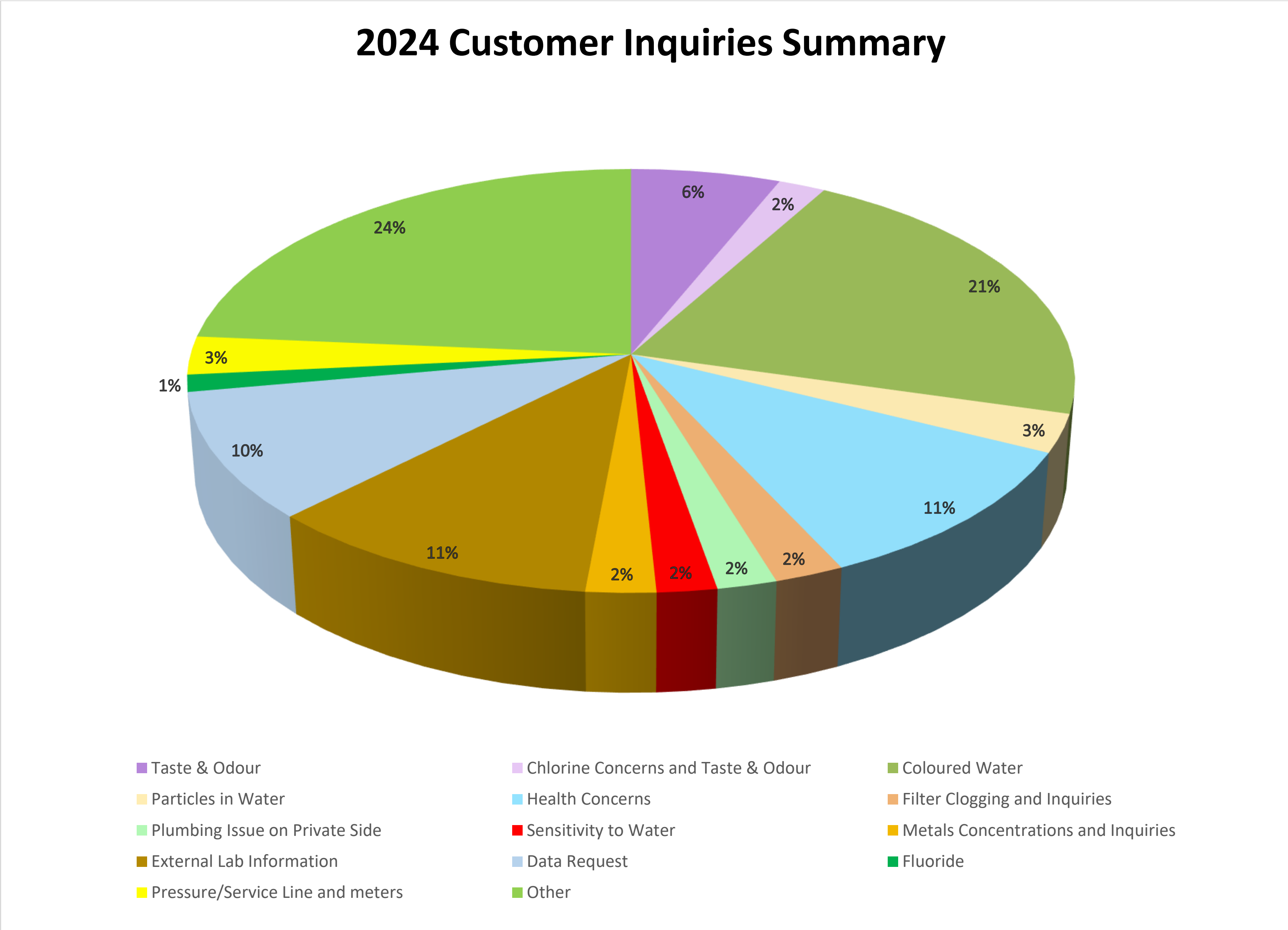

Figure 39 Summary of Customer Inquiries Categories in 2024

7.6 Cross Connection Control Program

2006, the CRD was mandated by the Chief Medical Health Officer from Island Health to design, implement and maintain a Cross Connection Control Program (CCC) on behalf of all the municipalities currently connected to the CRD's Greater Victoria Drinking Water system. Since then, it has become exemplary for an effective and efficient cross connection control program in Canada. Operating under Cross Connection Control Bylaw No. 3516, this program has been referenced as an example of industry standards in the water and wastewater industry, recognized by the BCWWA, local trades and training institutions.

The program is an important component of the multi-barrier concept in the Greater Victoria Drinking Water System. Working alongside Island Health, 13 municipalities and participating electoral areas, the objective of this program is to identify, eliminate and prevent cross connections within the Greater Victoria Drinking Water System that could lead to drinking water contaminations.

CRD CCC staff have taken an active and leading role in the industry to promote cross connection control science and practice and to inform existing industry standards and regulatory requirements. In 2024, CRD CCC staff participated in several industry committees, presenting at local training institutes, trades companies, and most notably hosting the annual CRD Regional Inspectors Roundtable event.

The program met its objectives by enforcing backflow prevention requirements referenced in the *National Building Code* and the Canadian Standard Association's CSAB64 series. This was achieved through facility audits, management of a backflow assembly registry, enforcing required testing and public education. In 2024, the CCC inspections team conducted audits of 408 moderate and 301 severe hazard facilities. Continued focus was on construction sites, agricultural connections and, in addition, medical, manufacturing and educational facilities.

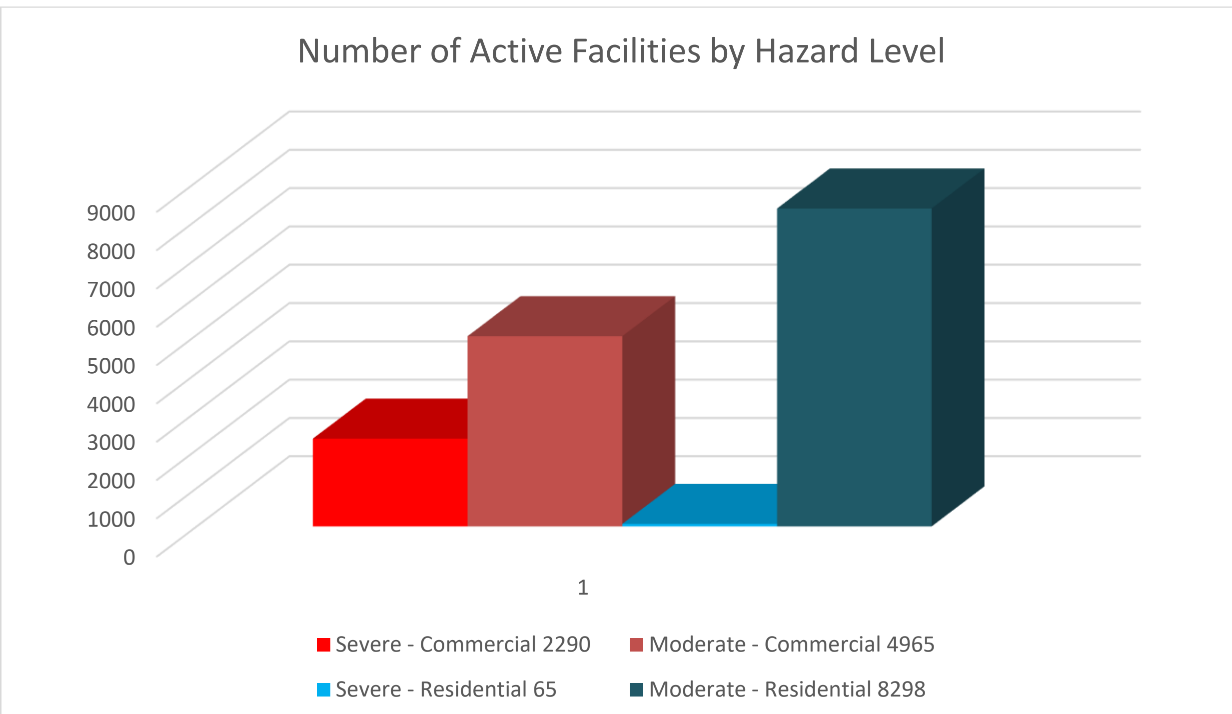

Figure 40 Facilities of Different Hazard Levels in Greater Victoria

In addition to Bylaw No. 3516, one of the key tools used by the CRD CCC program was the Cross Connection & Regional Source Control Information Management System (2016) paired up with the CRD CCC online website portal. In 2025 this data system is expected to be improved with additional features to assist CCC staff monitor the increasing number of connections and hazards due to expected growth in the region.

In 2024, CCC staff processed close to 20,000 assembly test report submissions. Of these, 12,000 (60%) were processed through the CRD CCC online portal and the remaining 8,000 (40%) were manually entered from paper test report submissions, achieving an overall 75% compliance rate. With a planned “Get on The Portal” campaign in 2025, staff expect higher test compliance with the expectations to become a paperless program in 2025.

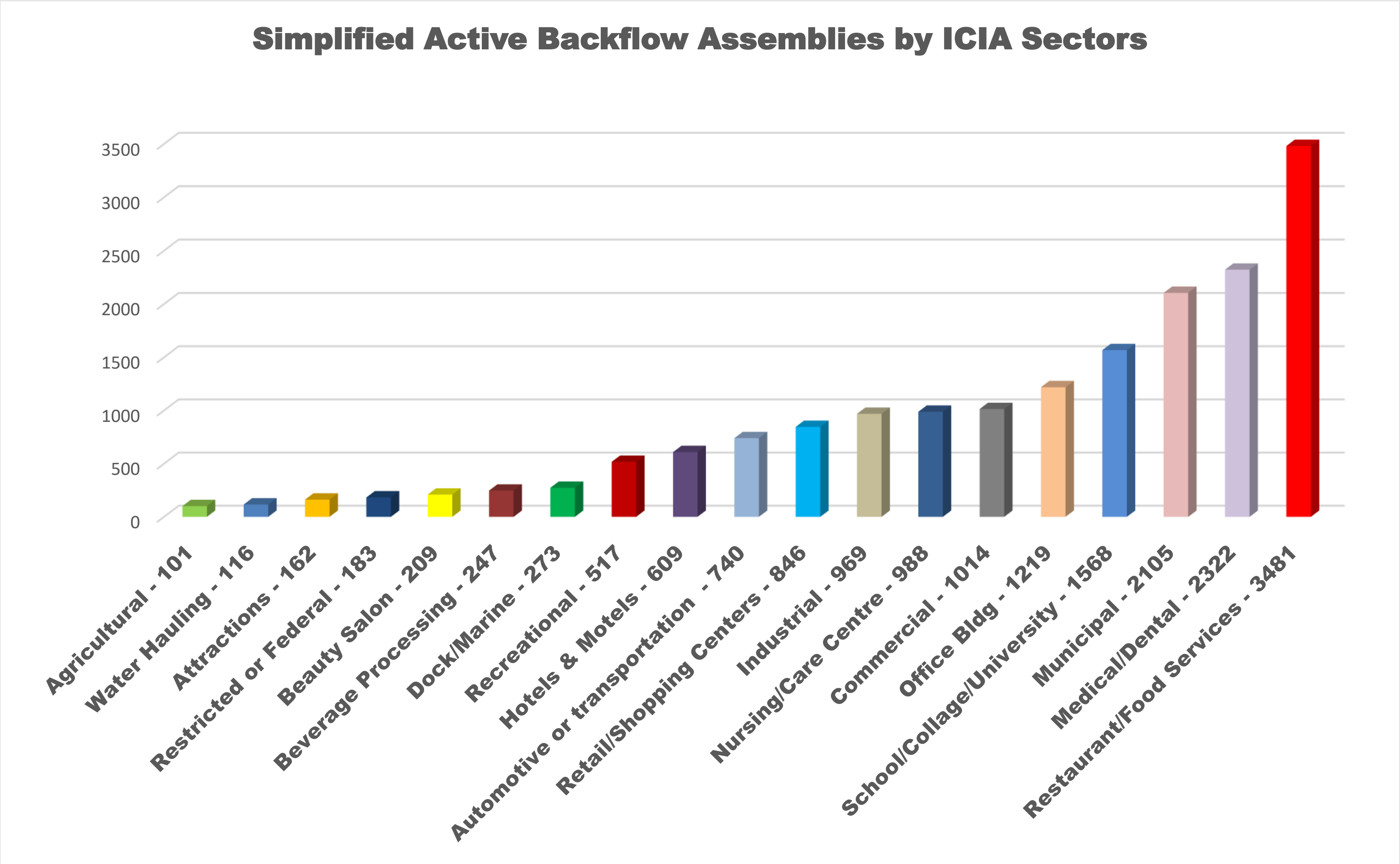

Figure 41 **Backflow Devices in Greater Victoria according to their Type and Hazard Category ICIA Facilities**

8.0 CONCLUSIONS

1. The water quality data collected in 2024 indicates that the drinking water in Greater Victoria was of good quality and safe to drink. The drinking water temperature exceeded the aesthetic objective of 15°C between the end of June and early October, and with approximately 14 weeks of exceedance of this aesthetic objective, the summer of 2024 recorded the warmest water conditions in Sooke Lake Reservoir since the dam was raised in 2004. This exceedance did have some minor operational implications for the local water suppliers and was a temporary unpleasant experience for the customers.

2. Sooke Lake Reservoir experienced an elevated total coliform event from July 16 to August 16. This is the second time that such a total coliform event was recorded since the inception of the Water Quality program in 1988. The first event occurred in 2017. During this event, total coliform concentrations increased rapidly in mid-July, reaching a maximum concentration of 15,000 CFU/100 mL on July 25. The bacteria concentrations stayed unusually elevated until mid-August. On seven days with high morning water demand, there were indications for brief bacteria breakthroughs at the Goldstream Water Treatment Plant. Test results showed that post-treatment bacterial concentrations remained low and were confined to the area immediately downstream of the Goldstream plant. While the exact mechanisms of this event remain unclear, it is assumed such infrequent events are related to hydrodynamic effects linked to thermal stratification in the reservoir (internal seiches). CRD staff are in the process of developing a hydrodynamic computer model of Sooke Lake Reservoir which will also improve the understanding of such processes and events. The CRD Transmission System was not in full compliance with the *BC Drinking Water Protection Regulation* in July and August due to exceedances of several total coliform rules. The cause of these exceedances was the unusual total coliform event in Sooke Lake which caused short-term and limited breakthroughs at the Goldstream Water Treatment Plant. Due to the limited reach of the breakthrough and the nature of the bacteria involved, the risk to public health was low.

3. *E. coli* bacterial levels in the raw source water were very low for the entire year.

4. Sooke Lake Reservoir experienced higher algal concentrations during the summer, especially in the South Basin. This could be related to the warmer water conditions during the summer of 2024. Coincidental with the total coliform event in July and August, the South Basin also exhibited spikes of nitrogen concentrations, which likely contributed to increased algal growth. The algal species that were active, and relatively abundant in 2024, belonged to known and low-risk (non-toxin producing) algal species. Cyanobacteria, with the potential to produce harmful cyanotoxins under bloom conditions, were present, as usual, throughout the year. However, a stable and nutrient-poor ecosystem, such as the Sooke Lake Watershed, does currently not provide conditions needed for cyanobacteria or other adverse algal blooms with serious implications for the drinking water quality. These natural nutrient-poor conditions limit the biological productivity in Sooke Lake Reservoir, which is very favourable for a drinking water source.

5. Greater Victoria continues to enjoy a water supply in which *Giardia* and *Cryptosporidium* parasites are well below the levels commonly considered by the health authorities to be responsible for disease outbreaks. For many years, including 2024, all tests conducted on Sooke Lake samples did not detect any *Giardia* and *Cryptosporidium* parasites.

6. On four occasions in 2024, the Goldstream Water Treatment Plant experienced turbidity exceedances during peak demand periods on watering days (typically Wednesday). The turbidity events were caused by peak flows dislodging pipe sediments in the raw water mains upstream of the treatment plant. During these events, disinfection capacities were increased to compensate the negative effects of turbidity on the disinfection process.

7. Consumers in the GVDWS received drinking water that had very low disinfection byproducts. Overall levels of trihalomethanes and haloacetic acids remain below the Canadian guideline limits and the USEPA limits. The newly-monitored disinfection byproduct, Nitrosodimethylamine, was, if detected at all, only in concentrations well below the current MAC in the Canadian guidelines.

8. The CRD tested the source water for emerging contaminants such as 28 PFAS compounds and did not have any detections at detection limits of 2 ng/L. Several PFAS tests were also conducted on treated water samples from various distribution systems across Greater Victoria. A few samples recorded results with low concentrations of one particular PFAS compound. The concentrations found were well below the current Health Canada MAC.

9. Greater Victoria's drinking water exhibited a slightly higher colour rating in 2024 compared to 2023, but similar to years prior. This was related to the higher than usual algal activity during the summer. Some retail water customers also noticed this change.

10. CRD staff had to deal with a few operational challenges with water quality impact potential, such as the Main #15 break repair in Sooke. Careful consideration of any water quality risks during planning of any work procedure, as well as water quality monitoring during and after repair activities, has ensured that the safety of the drinking water remained protected and the risk to public health was low. Island Health was informed and consulted during this event.

11. The number of water quality inquiries and complaints received by CRD staff in 2024 was comparable to previous years. Staff noticed more complaints and inquiries about the water colour or noticeable water discolouration. Approximately 5% of all inquiries were related to potential health risks from emerging contaminants, such as PFAS or microplastics.

12. The CRD Juan de Fuca System was non-compliant in August due to one sample containing total coliform concentrations higher than the limit of 10 CFU/100 mL, and CRD Sooke/East Sooke System was non-compliant in October due to one sample exceeding the total coliform limit of 10 CFU/100 mL. In all cases, no evidence of an actual drinking water contamination was found, and it was concluded that no risk to public health existed.

13. The CRD Supply Storage Reservoirs, Sidney, Central Saanich, North Saanich, Saanich, Oak Bay and Victoria/Esquimalt systems were in full compliance with the *BC Drinking Water Protection Regulation.*

14. All systems did meet the monthly sampling requirements, as per *BC Drinking Water Protection Regulation.*

15. The analytical results in all CRD and municipal water systems show that the drinking water was of good quality and was safe for consumption throughout 2024.

APPENDIX A

TABLE 1. 2024 UNTREATED (RAW) WATER QUALITY ENTERING GOLDSTREAM WATER TREATMENT PLANT

(Guideline values provide reference only for untreated water)

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Physical Parameters (ND means less than instrument can detect)										
Alkalinity, Total	mg/L	15.85	16	14.00	19.00		15.20	139	8.84 - 17.1	12/year
Carbon, Dissolved Organic	mg/L as C	1.90	12	1.60	2.40		1.70	116	< 0.5 - 4	12/year
Carbon, Total Organic	mg/L as C	1.90	12	1.70	2.30	Guideline Archived	1.83	117	0.82 - 3.9	12/year
Colour, True	TCU	6.00	53	3.00	10.00	≤15 AO	6.00	512	< 2 - 19	52/year
Conductivity @ 25 C	uS/cm	43.40	53	40.60	49.50		42.35	508	28.2 - 62.9	52/year
Hardness as $CaCO_3$	mg/L	16.75	6	16.20	17.00	No Guideline Required	17.20	107	11.7 - 20.9	6/year
pH	pH units	7.20	47	6.27	7.80	7.0 - 10.5 AO	7.30	543	6.45 - 7.94	52/year
Tannins and Lignins	mg/L	< 0.2	2	< 0.2	0.20	Guideline Archived	< 0.2	23	< 0.1 - 0.38	2/year
Total Dissolved Solids	mg/L	37.00	12	24.00	46.00	≤500 AO	26.8	113	<10 - 58	12/year
Total Suspended Solids	mg/L	< 1	12	< 1	2.00		<1.0	116	0.16 - < 4	12/year
Total Solids	mg/L	37.00	12	16.00	72.00		28	109	1.7 - 110	12/year
Turbidity, Grab Samples	NTU	0.25	241	0.15	RC 3.3	1.0 MAC	0.30	2,408	0.15 - 3.1	250/year
Ultraviolet Absorption, 5 cm	Abs.@ 254 nm	0.24	51	0.19	0.28		0.26	503	0.133 - 88.2	52/year
Ultraviolet Transmittance	%	89.10	52	87.60	92.00		88.70	503	0.20 - 94.4	52/year
Water Temp., Grab Samples	degrees C	11.00	248	3.90	21.50	≤15 AO	10.00	2,453	2.7 - 21.0	250/year
Non-Metallic Inorganic Chemicals (ND means less than instrument can detect)										
Bromide	ug/L as Br	< 0.01	4	< 0.01	0.01		< 0.01	45	0.000011 - 0.013	4/year
Chloride	mg/L as Cl	1.50	2	1.40	1.60	≤ 250 AO	2.35	30	< 0.045 - < 10	4/year
Cyanide	mg/L as Cn	< 0.0005	4	< 0.0005	0.00	0.2 MAC	< 0.0005	30	< 0.0005 - < 0.006	4/year
Fluoride	mg/L as F	< 0.05	4	< 0.05	< 0.05	1.5 MAC	< 0.05	31	< 0.007 - < 0.05	4/year
Iodide, dissolved	mg/L as I	< 0.1	2	< 0.1	< 0.1		< 0.1	14	< 0.1 - < 0.1	4/year
Nitrate, Dissolved	ug/L as N	< 20	12	< 20	28.00	45000 MAC	< 20	110	0.3 - 46.4	12/year
Nitrite, Dissolved	ug/L as N	< 5	12	< 5	< 5	3000 MAC	< 5	109	< 0.3 - < 10	12/year
Nitrate + Nitrite	ug/L as N	< 20	12	< 20	28.00		< 20	111	0.3 - 46.4	12/year
Nitrogen, Ammonia	ug/L as N	< 15	12	< 15	< 15	No Guideline Required	< 15	115	0.079 - 130	12/year
Nitrogen, Total Kjeldahl	ug/L as N	119.00	12	83.00	227.00		105.44	110	59 - 820	12/year
Nitrogen, Total	ug/L as N	128.00	12	83.00	227.00		118.00	115	49.4 - 610	12/year
Phosphate, Ortho, Dissolved	ug/L as P	< 1	12	< 1	1.60		< 3	111	0.1 - 24.3	12/year
Phosphate, Total, Dissolved	ug/L as P	1.45	12	< 1	4.20		2.30	114	0.35 - 31	12/year
Phosphate, Total	ug/L as P	3.20	11	1.90	7.80		3.00	115	<1.0 - <10	12/year
Silica	mg/L as SiO_2	4.35	12	1.60	5.50		4.17	103	2.96 - 5.6	12/year
Silicon	ug/L as Si	1935.00	6	1590.00	2450.00		1940.00	72	1550 - 2520	6/year
Sulphate	mg/L as SO_4	1.10	12	< 1	2.50	≤ 500 AO	1.40	113	< 0.5 - < 10	12/year

Appendix A, Table 1 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Sulphide	mg/L as H_2S	< 0.0018	12	< 0.0018	< 0.0018	≤ 0.05 AO	< 0.0018	35	< 0.0018 - < 0.0019	12/year
Sulphur	mg/L as S	< 3	6	< 3	< 3		< 3	71	< 3 - < 3	6/year
Metallic Inorganic Chemicals (ND means less than instrument can detect)										
Aluminum	ug/L as Al	10.80	6	5.60	22.40	2900 MAC / 100 OG	15.10	72	3.4 - 52.3	6/year
Antimony	ug/L as Sb	< 0.5	6	< 0.5	< 0.5	6 MAC	< 0.5	72	< 0.5 - < 5	6/year
Arsenic	ug/L as As	< 0.1	6	< 0.1	0.10	10 MAC	< 0.1	72	< 0.1 - 0.24	6/year
Barium	ug/L as Ba	3.70	6	3.30	3.90	2000 MAC	3.80	72	3.3 - 5.3	6/year
Beryllium	ug/L as Be	< 0.1	6	< 0.1	< 0.1		< 0.1	72	< 0.1 - < 10	6/year
Bismuth	ug/L as Bi	< 1	6	< 1	< 1		< 1	72	< 1 - < 10	6/year
Boron	ug/L as B	< 50	6	< 50	< 50	5000 MAC	< 50	72	< 50 - < 50	6/year
Cadmium	ug/L as Cd	< 0.01	6	< 0.01	0.01	7 MAC	< 0.01	72	< 0.01 - 0.07	6/year
Calcium	mg/L as Ca	4.88	6	4.65	4.96	No Guideline Required	4.90	72	4.32 - 6.13	6/year
Chromium	ug/L as Cr	< 1	6	< 1	< 1	50 MAC	< 1	72	< 1 - 5.1	6/year
Cobalt	ug/L as Co	< 0.2	6	< 0.2	< 0.2		< 0.2	72	< 0.2 - < 0.5	6/year
Copper	ug/L as Cu	0.84	6	0.37	1.44	2000 MAC / ≤ 1000 AO	1.19	72	0.61 - 13.9	6/year
Iron	ug/L as Fe	25.35	6	11.20	45.00	≤ 100 AO	24.00	72	12 - 217	6/year
Lead	ug/L as Pb	< 0.2	6	< 0.2	0.24	5 MAC	< 0.2	72	< 0.2 - 0.3	6/year
Lithium	ug/L as Li	< 2	6	< 2	< 2		< 5	53	< 2 - 10.4	6/year
Magnesium	mg/L as Mg	1.13	6	1.05	1.13	No Guideline Required	1.16	72	1.01 - 1.42	6/year
Manganese	ug/L as Mn	7.10	6	1.30	15.80	120 MAC / ≤ 20 AO	4.75	72	1.4 - 81.8	6/year
Mercury, Total	ug/L as Hg	< 0.0019	6	< 0.0019	< 0.03	1.0 MAC	< 0.01	71	< 0.0019 - < 10	6/year
Molybdenum	ug/L as Mo	< 1	6	< 1	< 1		< 1	72	< 1 - 4.9	6/year
Nickel	ug/L as Ni	< 1	6	< 1	< 1		< 1	72	< 1 - 21.5	6/year
Potassium	mg/L as K	0.13	6	0.12	0.14		0.13	72	0.117 - 0.214	6/year
Selenium	ug/L as Se	< 0.1	6	< 0.1	< 0.1	50 MAC	< 0.1	72	< 0.1 - < 0.1	6/year
Silver	ug/L as Ag	< 0.02	6	< 0.02	< 0.02	No Guideline Required	< 0.02	72	< 0.02 - 0.071	6/year
Sodium	mg/L as Na	1.61	6	1.50	1.63	≤ 200 AO	1.67	72	1.41 - 2.91	6/year
Strontium	ug/L as Sr	14.35	6	13.60	15.30	7000 MAC	15.10	72	13.2 - 21.8	6/year
Thallium	ug/L as Tl	< 0.01	6	< 0.01	< 0.01		< 0.01	72	< 0.01 - < 0.05	6/year
Tin	ug/L as Sn	< 5	6	< 5	< 5		< 5	72	< 5 - < 5	6/year
Titanium	mg/L as Ti	< 5	6	< 5	< 5		< 5	72	< 5 - < 5	6/year
Uranium	ug/L as U	< 0.1	6	< 0.1	< 0.1	20 MAC	< 0.1	72	<0.01-<0.1	6/year
Vanadium	ug/L as V	< 5	6	< 5	< 5		< 5	72	<5 - <5	6/year
Zinc	ug/L as Zn	< 5	6	< 5	6.30	≤ 5000 AO	< 5	72	<5.0 - 82.9	6/year
Zirconium	ug/L as Zr	< 0.1	6	< 0.1	< 0.1		< 0.1	72	<0.1 - <0.5	6/year

Appendix A, Table 1 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Microbial Parameters										
Coliform Bacteria										
Coliforms, Total	Coliforms/100 mL	5.00	244	< 1	15000.00		10.00	2,413	0 - 24200	250/year
E. coli	*E. coli*/100 mL	< 1	244	< 1	< 10		< 1	2,415	0 - 13	250/year
Heterotrophic / Other Bacteria										
Hetero. Plate Count, 28C (7 day)	CFU/1 mL	370.00	218	23.00	A 3900		340.00	2,300	< 10 - 7200	250/year
Cyanobacterial Toxins										
Anatoxin a	ug/L	Analyzed as required - last analyzed in 2005					Analyzed as required - last analyzed in 2005			
Microcystin-LR	ug/L	Analyzed as required - last analyzed in 2011				1.5 MAC (Total Microcystins)	Analyzed as required - last analyzed in 2011			
Parasites										
Cryptosporidium, Total oocysts	oocysts/100 L	< 0.1	8	< 0.1	< 0.1	Zero detection desirable	< 0.1	90	<1 - 2	8/year
Giardia, Total cysts	cysts/100 L	< 0.1	8	< 0.1	< 0.1	Zero detection desirable	<0.1	84	<1 - 2	8/year
Radiological Parameters (ND means less than instrument can detect)										
Gross alpha radiation	Bq/L	< 0.02	2	< 0.02	0.02	0.5 (Screening Value)	< 0.02	15	< 0.02 - 0.06	2/year
Gross beta radiation	Bq/L	< 0.02	2	< 0.02	0.02	1.0 (Screening Value)	< 0.02	15	< 0.02 - 0.07	2/year
Iodine-131	Bq/L	0.30	2	< 0.2	< 0.4	6 Bq/L	< 0.2	15	< 0.1 - < 0.4	Special
Cesium-137	Bq/L	0.14	2	< 0.08	< 0.2	10 Bq/L	< 0.1	15	< 0.04 - < 0.2	Special
Organic Parameters (ND means less than instrument can detect)										
Pesticides/Herbicides										
1,4-DDD	ug/L	<0.001	2	<0.001	<0.001	Guideline Archived	< 0.001	11	< 0.001 - < 0.005	2/year
1,4'-DDE	ug/L	<0.001	2	<0.001	<0.001	Guideline Archived	< 0.001	11	< 0.001 - < 0.005	2/year
1,4'-DDT	ug/L	<0.001	2	<0.001	<0.001	Guideline Archived	< 0.001	11	< 0.001 - < 0.005	2/year
2,4,5-T	ug/L	< 0.08	2	< 0.08	< 0.08	Guideline Archived	< 1	19	<0.08 - <1	2/year
2,4,5-TP (Silvex)	ug/L	< 0.08	2	< 0.08	< 0.08	Guideline Archived	0.3	14	<0.01 - <1.0	2/year
2,4-D (2,4-Dichlorophenoxyacetic acid)	ug/L	< 0.05	2	< 0.05	< 0.05	100 MAC	< 0.1	15	< 0.05 - < 0.5	2/year
2,4-D (BEE)	ug/L	< 0.5	2	< 0.5	< 0.5		< 2	23	< 0.5 - < 2	2/year
2,4-DP (Dichlorprop)	ug/L	< 0.08	2	< 0.08	< 0.08		< 1	18	<0.08 - <1.0	2/year
4,4'-DDD	ug/L	< 0.001	2	< 0.001	< 0.001	Guideline Archived	< 0.001	16	<0.001 - <0.005	2/year
4,4'-DDE	ug/L	< 0.001	2	< 0.001	< 0.001	Guideline Archived	< 0.001	16	<0.001 - <0.005	2/year
4,4'-DDT	ug/L	< 0.001	2	< 0.001	< 0.001	Guideline Archived	< 0.001	16	<0.001 - <0.005	2/year
Alachlor	ug/L	Not analyzed in 2024				Guideline Archived	< 0.5	4	< 0.5 - < 0.5	2/year
Aldicarb	ug/L	< 0.1	2	< 0.1	< 0.1	Guideline Archived	< 0.1	20	< 0.1 - < 5	2/year
Aldrin	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	18	< 0.003 - < 0.005	2/year
Aldrin + Dieldrin	ug/L	<0.003	2	<0.003	<0.003	Guideline Archived	< 0.003	16	< 0.003 - < 0.005	2/year
Atrazine	ug/L	< 0.05	2	< 0.05	< 0.05	5 MAC	< 0.1	13	< 0.05 - < 0.5	2/year

Appendix A, Table 1 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Azinphos-methyl	ug/L	< 0.2	2	< 0.2	< 0.2	Guideline Archived	<0.01	13	<0.001 - <2	2/year
BHC (alpha)	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	19	< 0.003 - < 0.005	2/year
BHC (beta)	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	19	< 0.003 - < 0.005	2/year
BHC (delta)	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	19	< 0.003 - < 0.5	2/year
Bendiocarb	ug/L	< 0.1	2	< 0.1	< 0.1	Guideline Archived	< 0.1	20	< 0.1 - < 2	Irregular
Bromacil	ug/L	< 0.05	2	< 0.05	< 0.05		< 0.1	19	< 0.05 - < 0.1	2/year
Bromoxynil	ug/L	< 0.02	2	< 0.02	< 0.02	30 MAC	< 0.1	20	< 0.02 - < 0.1	2/year
Captan	ug/L	< 0.1	2	< 0.1	< 0.1		< 0.1	17	< 0.003 - < 1	2/year
Carbaryl	ug/L	< 0.1	2	< 0.1	< 0.1	Guideline Archived	< 0.1	20	< 0.1 - < 5	2/year
Carbofuran	ug/L	< 0.1	2	< 0.1	< 0.1	Guideline Archived	< 0.1	20	< 0.1 - < 5	2/year
Chlordane (alpha)	ug/L	< 0.003	2	< 0.003	< 0.003	Guideline Archived	< 0.003	18	< 0.003 - < 0.005	2/year
Chlordane (gamma)	ug/L	< 0.003	2	< 0.003	< 0.003	Guideline Archived	< 0.003	18	< 0.003 - < 0.005	2/year
Chlorpyearifos (Dursban)	ug/L	< 0.01	2	< 0.01	< 0.01	90 MAC	< 0.01	21	< 0.0008 - < 1	2/year
Chlorothalonil	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	17	< 0.003 - < 0.05	2/year
Cyanazine (Bladex)	ug/L	< 0.05	2	< 0.05	< 0.05	Guideline Archived	< 0.1	20	< 0.05 - < 1	2/year
Demeton	ug/L	< 2	2	< 2	< 2		< 2	16	< 2 - < 2	2/year
Diazinon	ug/L	< 0.02	2	< 0.02	< 0.02	Guideline Archived	< 0.02	21	< 0.002 - < 1	2/year
Dicamba	ug/L	< 0.005	2	< 0.005	< 0.005	110 MAC	< 0.006	20	< 0.005 - < 1	2/year
Diclofop-methyl	ug/L	< 0.05	2	< 0.05	< 0.05	Guideline Archived	< 0.05	19	< 0.0007 - < 0.9	2/year
Dichlorvos	ug/L	< 2	2	< 2	< 2		< 2	19	< 2 - < 2	2/year
Dieldrin	ug/L	< 0.002	2	< 0.002	< 0.002		< 0.002	18	< 0.002 - < 0.005	2/year
Dimethoate	ug/L	< 0.05	2	< 0.05	< 0.05	20 MAC	< 0.05	8	< 0.05 - < 0.05	2/year
Dinoseb (DNBP)	ug/L	< 0.02	2	< 0.02	< 0.02	Guideline Archived	< 0.05	9	< 0.02 - < 0.05	2/year
Diquat	ug/L	< 7	2	< 7	< 7	50 MAC	< 7	19	< 7 - < 350	2/year
Endosulfan l	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	18	< 0.003 - < 0.005	2/year
Endosulfan ll	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	18	< 0.003 - < 0.005	2/year
Endosulfan Sulphate	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	19	< 0.003 - < 0.005	2/year
Endosulfan (Total)	ug/L	<0.003	2	<0.003	<0.003		< 0.003	17	<0.003 - <0.005	2/year
Endrin	ug/L	< 0.005	2	< 0.005	< 0.005	Guideline Archived	< 0.005	18	< 0.005 - < 0.005	2/year
Endrin Aldehyde	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	19	< 0.003 - < 0.005	2/year
Endrin Ketone	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	19	< 0.003 - < 0.005	2/year
Ethion	ug/L	< 1	2	< 1	< 1		< 1	20	<0.5 - <1	2/year
Parathion Ethyl	ug/L	Not analyzed in 2024					<1	13	<1.0 - <2.0	2/year
Fenchlorophos (Ronnel)	ug/L	< 2	2	< 2	< 2		< 2	19	< 0.5 - < 2	2/year
Fenthion	ug/L	< 1	2	< 1	< 1		< 1	19	< 0.5 - < 1	2/year
Fonofos	ug/L	< 2	2	< 2	< 2		< 2	19	< 0.5 - < 2	2/year
Glyphosate	ug/L	< 10	2	< 10	< 10	280 MAC	< 10	19	< 10 - < 10	2/year
Heptachlor	ug/L	< 0.003	2	< 0.003	< 0.003	Guideline Archived	< 0.003	18	< 0.003 - < 0.005	2/year
Heptachlor Epoxide	ug/L	< 0.003	2	< 0.003	< 0.003	Guideline Archived	< 0.003	18	< 0.003 - < 0.005	2/year

Appendix A, Table 1 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Imazapyear	ug/L	< 0.1	2	< 0.1	< 0.1		< 0.1	16	< 0.1 - < 0.1	2/year
IPBC	ug/L	< 0.1	2	< 0.1	< 0.1		< 0.1	16	< 0.1 - < 0.1	2/year
Malathion	ug/L	< 0.05	2	< 0.05	< 0.05	190 MAC	< 0.05	21	< 0.002 - < 2	2/year
MCPA	ug/L	0.02	2	< 0.02	0.02	350 MAC	< 0.025	27	< 0.02 - < 2	2/year
MCPP	ug/L	< 0.08	2	< 0.08	< 0.08		< 2	20	< 0.08 - < 2	2/year
Methoxychlor	ug/L	< 0.003	2	< 0.003	< 0.003	Guideline Archived	< 0.003	18	< 0.003 - < 0.01	2/year
Methyl Parathion	ug/L	< 2	2	< 2	< 2	Guideline Archived	< 2	19	< 0.1 - < 2	2/year
Metolachlor	ug/L	< 0.05	2	< 0.05	< 0.05	Guideline Archived	< 0.1	20	< 0.05 - < 0.5	2/year
Metribuzin (Sencor)	ug/L	< 0.1	2	< 0.1	< 0.1	80 MAC	< 0.1	21	< 0.0004 - < 5	2/year
Mevinphos	ug/L	< 2	2	< 2	< 2		< 2	19	< 0.5 - < 2	2/year
Mirex	mg/L	< 0.003	2	< 0.003	< 0.003	Guideline Archived	< 0.003	19	< 0.003 - < 0.005	2/year
Nitrilotriacetic acid (NTA)	ug/L	< 0.05	2	< 0.05	< 0.05	400 MAC	< 0.05	19	< 0.05 - 0.099	Irregular
Oxychlordane	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	17	< 0.003 - < 0.005	2/year
Parathion	ug/L	<0.05	2	< 0.05	<0.05	Guideline Archived	< 0.05	27	< 0.0004 - < 2	2/year
Paraquat (ion)	ug/L	< 1	2	< 1	< 1	Guideline Archived	< 1	19	< 1 - < 1	2/year
Permethrin	ug/L	< 0.05	2	< 0.05	< 0.05		< 0.04	17	< 0.0005 - < 3.3	2/year
Phorate (Thimet)	ug/L	< 0.05	2	< 0.05	< 0.05	Guideline Archived	< 0.05	21	< 0.0003 - < 1	2/year
Phosmet	ug/L	< 2	2	< 2	< 2		< 2	19	< 0.5 - < 2	2/year
Picloram	ug/L	< 0.08	2	< 0.08	< 0.08	Guideline Archived	<0.1	20	<0.08 - <5.0	2/year
Prometryn	ug/L	< 1	2	< 1	< 1		< 1	17	< 0.25 - < 1	Irregular
Simazine	ug/L	< 0.05	2	< 0.05	< 0.05	Guideline Archived	< 0.1	20	< 0.05 - < 1	2/year
Tebuthiuron	ug/L	< 0.1	2	< 0.1	< 0.1		< 0.1	16	< 0.1 - < 0.1	2/year
Temephos	ug/L	Not analyzed in 2024				Guideline Archived	< 10	5	< 10 - < 10	2/year
Terbufos	ug/L	< 0.05	2	< 0.05	< 0.05	Guideline Archived	< 0.05	21	< 0.0002 - < 0.5	2/year
Toxaphene	ug/L	< 0.2	2	< 0.2	< 0.2	Guideline Archived	< 0.2	8	< 0.2 - < 0.2	2/year
Trifluralin	ug/L	< 0.05	2	< 0.05	< 0.05	Guideline Archived	< 0.05	21	< 0.0003 - < 1	2/year
Polycyclic Aromatic Hydrocarbons (PAH's)										
Acenaphthene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	0.03	20	< 0.01 - < 0.2	2/year
Acenaphthylene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	0.03	20	< 0.01 - < 0.2	2/year
Anthracene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	< 0.01	20	< 0.01 - < 0.1	2/year
Benzo(a)anthracene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	< 0.01	20	< 0.01 - < 0.1	2/year
Benzo(a)pyrene	ug/L	< 0.005	2	< 0.005	< 0.005	0.04 MAC	< 0.005	20	< 0.005 - < 0.05	2/year
Benzo(b)fluoranthene	ug/L	<0.01	2	<0.01	<0.01	Guideline Archived	0.04	12	< 0.01 - < 0.2	2/year
Benzo(g,h,i)perylene	ug/L	< 0.02	2	< 0.02	< 0.02	Guideline Archived	0.03	20	< 0.02 - < 0.2	2/year
Benzo(b&j)fluoranthene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	< 0.01	6	< 0.01 - < 0.04	2/year
Benzo(k)fluoranthene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	0.03	20	< 0.01 - < 0.2	2/year
Chrysene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	0.02	20	< 0.01 - < 0.15	2/year
Dibenz(a,h)anthracene	ug/L	< 0.02	2	< 0.02	< 0.02	Guideline Archived	< 0.02	20	< 0.003 - < 0.2	2/year
Fluoranthene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	< 0.02	20	< 0.01 - < 0.1	2/year

Appendix A, Table 1 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Fluorene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	0.02	20	< 0.01 - < 0.15	2/year
Indeno(1,2,3-c,d)pyrene	ug/L	< 0.02	2	< 0.02	< 0.02	Guideline Archived	0.04	20	< 0.02 - < 0.3	2/year
Naphthalene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	< 0.04	19	< 0.01 - < 2.5	2/year
Phenanthrene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	0.03	20	< 0.01 - < 0.15	2/year
Pyrene	ug/L	< 0.01	2	< 0.01	< 0.01	Guideline Archived	< 0.02	20	< 0.01 - < 0.15	2/year
Volatile Hydrocarbons	ug/L	< 300	4	< 300	< 300	Guideline Archived	< 300	29	< 300 - < 300	2/year
Phenols										
2,3,4,5-Tetrachlorophenol	ug/L	0.45	2	< 0.4	< 0.5		< 0.5	16	< 0.1 - < 1	2/year
2,3,4,6-Tetrachlorophenol	ug/L	0.45	2	< 0.4	< 0.5	Guideline Archived	< 0.5	19	< 0.1 - < 1	2/year
2,3,5,6-Tetrachlorophenol	ug/L	0.45	2	< 0.4	< 0.5		< 0.5	16	< 0.1 - < 1	2/year
2,4,6-Trichlorophenol	ug/L	0.45	2	< 0.4	< 0.5	5.0 MAC and ≤ 2.0 AO	< 0.5	20	< 0.1 - < 2	2/year
2,4-Dichlorophenol	ug/L	< 0.5	2	< 0.5	< 0.5	Guideline Archived	< 0.1	7	< 0.1 - < 0.5	2/year
2,4-Dimethylphenol	ug/L	2.25	2	< 2	< 2.5		<0.05	19	<0.05 - <10.0	2/year
2,4-Dinitrophenol	ug/L	5.85	2	< 5.2	< 6.5		< 6.5	20	< 0.05 - < 26	2/year
2-Chlorophenol	ug/L	0.45	2	< 0.4	< 0.5		< 0.5	20	< 0.1 - < 2	2/year
2-Nitrophenol	ug/L	2.25	2	< 2	< 2.5		< 0.5	13	< 0.5 - < 2.5	2/year
4,6-Dinitro-2-Methylphenol	ug/L	2.25	2	< 2	< 2.5		< 2.5	20	< 0.5 - < 10	2/year
4-Chloro-3-Methylphenol	ug/L	< 0.25	2	< 0.25	< 0.25		< 0.2	13	< 0.2 - < 1	2/year
4-Nitrophenol	ug/L	2.25	2	< 2	< 2.5		< 2.5	20	< 0.5 - < 10	2/year
Alpha-Terpineol	ug/L	4.50	2	< 4	< 5		< 5	20	< 1 - < 20	2/year
Pentachlorophenol	ug/L	0.45	2	< 0.4	< 0.5	60 MAC and ≤ 30 AO	< 0.5	20	< 0.1 - < 2	2/year
Phenol	ug/L	2.25	2	< 2	< 2.5	Guideline Archived	< 1.5	28	< 0.5 - < 10	2/year
Polychlorinated Biphenyls (PCBs)										
PCB-1016	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	17	< 0.00005 - < 0.0001	Irregular
PCB-1221	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	17	< 0.00005 - < 0.0001	Irregular
PCB-1232	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	17	< 0.00005 - < 0.0001	Irregular
PCB-1242	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	17	< 0.00005 - < 0.0001	Irregular
PCB-1248	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	17	< 0.00005 - < 0.0001	Irregular
PCB-1254	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	17	< 0.00005 - < 0.0001	Irregular
PCB-1260	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	18	< 0.00005 - < 0.0001	Irregular
PCB-1262	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	13	< 0.00005 - < 0.0001	Irregular
PCB-1268	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	13	< 0.00005 - < 0.0001	Irregular
Total PCBs	ug/L	< 0.00005	2	< 0.00005	< 0.00005	Guideline Archived	< 0.00005	18	< 0.00005 - < 0.0001	Irregular
Other Synthetic Chemicals										
1,1,1-Trichloroethane	ug/L	< 0.5	2	< 0.5	< 0.5		< 0.5	20	< 0.5 - < 0.5	2/year
1,1,1,2-Tetrachloroethane	ug/L	< 0.5	2	< 0.5	< 0.5		< 0.5	20	< 0.5 - < 0.5	2/year
1,1,2,2-Tetrachloroethane	ug/L	< 0.5	2	< 0.5	< 0.5		< 0.5	19	< 0.5 - < 0.5	2/year
1,1,2-Trichloroethane	ug/L	< 0.5	2	< 0.5	< 0.5		< 0.5	20	< 0.5 - < 0.5	2/year

Appendix A, Table 1 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
1,1-Dichloroethane	ug/L	< 0.5	2	< 0.5	< 0.5		< 0.5	20	< 0.5 - < 0.5	2/year
1,1-Dichloroethene (1,1-Dichloroethylene)	ug/L	< 0.5	2	< 0.5	< 0.5	14 MAC	< 0.5	18	< 0.5 - < 0.5	2/year
1,2,3-Trichlorobenzene	ug/L	< 2	2	< 2	< 2		< 2	20	< 2 - < 2	2/year
1,2,4-Trichlorobenzene	ug/L	< 2	2	< 2	< 2		< 2	20	< 0.04 - < 2	2/year
1,2-Dibromoethane	ug/L	< 0.2	2	< 0.2	< 0.2		< 0.2	20	< 0.2 - < 0.2	2/year
1,2-Dichlorobenzene	ug/L	< 0.5	2	< 0.5	< 0.5	Guideline Archived	< 0.5	20	< 0.5 - < 0.5	2/year
1,2-Dichloroethane	ug/L	< 0.5	2	< 0.5	< 0.5	5.0 MAC	< 0.5	20	< 0.5 - < 0.5	2/year
1,2-Dichloroethene (cis)	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
1,2-dichloroethene (trans)	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
1,2-Dichloropropane	ug/L	< 0.5	2	< 0.5	< 0.5		< 0.5	20	< 0.5 - < 0.5	2/year
1,2-Diphenylhydrazine	ug/L	0.05	2	< 0.04	< 0.05		< 0.05	20	< 0.01 - < 0.2	2/year
1,3-Dichlorobenzene	ug/L	< 0.5	2	< 0.5	< 0.5		< 0.5	19	< 0.5 - < 0.5	2/year
1,3-Dichloropropene (cis)	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
1,3-Dichloropropene (trans)	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
1,4-Dichlorobenzene	ug/L	< 0.5	2	< 0.5	< 0.5	5.0 MAC and ≤ 1.0 AO	< 0.5	20	< 0.5 - < 0.5	2/year
1,4-Dioxane	ug/L	< 1	2	< 1	< 1					2/year
2,4-Dinitrotoluene	ug/L	0.23	2	< 0.2	< 0.25		< 0.25	20	< 0.05 - < 1.3	2/year
2,6-Dinitrotoluene	ug/L	0.23	2	< 0.2	< 0.25		< 0.25	20	< 0.05 - < 1	2/year
2-Chloronaphthalene	ug/L	0.23	2	< 0.2	< 0.25		< 0.25	20	< 0.05 - < 1	2/year
1-Methylnaphthalene	ug/L	< 0.01	2	< 0.01	< 0.01		< 0.01	12	< 0.01 - < 0.05	2/year
2-Methylnaphthalene	ug/L	< 0.01	2	< 0.01	< 0.01		0.02	20	< 0.01 - 0.16	2/year
3,3'-Dichlorobenzidene	ug/L	0.45	2	< 0.4	< 0.5		< 0.5	20	< 0.1 - < 2	2/year
4-Bromophenyl-phenylether	ug/L	0.05	2	< 0.04	< 0.05		< 0.05	20	< 0.01 - < 0.2	2/year
4-Chlorophenyl-phenylether	ug/L	0.23	2	< 0.2	< 0.25		< 0.25	20	< 0.05 - < 1	2/year
Atrazine	ug/L	< 0.05	2	< 0.05	< 0.05	5.0 MAC	< 0.1	20	< 0.05 - < 0.5	2/year
Benzene	ug/L	< 0.4	4	< 0.4	< 0.4	5.0 MAC	< 0.4	30	< 0.4 - < 0.4	2/year
Benzidine	ug/L	Not analyzed in 2024					< 10	7	< 10 - < 50	2/year
Bis(-2-chloroethoxy) methane	ug/L	Not analyzed in 2024					< 0.25	1	< 0.25 - < 0.25	2/year
Bis(-2-chloroethyl) ether	ug/L	0.23	2	< 0.2	< 0.25		< 0.25	20	< 0.05 - < 1	2/year
Bis(2-chloroisopropyl) ether	ug/L	Not analyzed in 2024					< 0.25	1	< 0.25 - < 0.25	2/year
Bis(2-ethylhexyl) phthalate	ug/L	4.50	2	< 4	< 5	Guideline Archived	< 5	20	< 1 - < 20	2/year
Bromodichloromethane	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
Bromobenzene	ug/L	< 2	2	< 2	< 2		< 2	18	< 2 - < 2	2/year
Bromoform	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
Bromomethane	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
Butylbenzyl phthalate	ug/L	Not analyzed in 2024				Guideline Archived	< 0.5	13	< 0.5 - < 2.5	2/year
Carbon Tetrachloride (Tetrabromomethane)	ug/L	< 0.5	2	< 0.5	< 0.5	2.0 MAC	< 0.5	20	< 0.5 - < 0.5	2/year
Chloroform	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
Chloroethane	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year

Appendix A, Table 1 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Chloromethane	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
Desethyl Atrazine	ug/L	< 0.05	2	< 0.05	< 0.05		< 0.1	15	< 0.05 - < 0.5	2/year
Dibromochloromethane	ug/L	< 1	2	< 1	< 1		< 1	20	< 1 - < 1	2/year
Dichlorodifluoromethane	ug/L	< 2	2	< 2	< 2		< 2	20	< 2 - < 2	2/year
Dichloromethane	ug/L	< 2	2	< 2	< 2	50 MAC	< 2	19	< 2 - < 2	2/year
Diethyl phthalate	ug/L	< 0.25	2	< 0.25	< 0.25	Guideline Archived	< 0.25	19	< 0.05 - 1	2/year
Dimethyl phthalate	ug/L	0.23	2	< 0.2	< 0.25	Guideline Archived	< 0.25	19	< 0.05 - < 1	2/year
Di-n-butyl phthalate	ug/L	Not analyzed in 2024				Guideline Archived	< 2.5	18	< 0.05 - < 10	2/year
Di-n-ocyl phthalate	ug/L	0.23	2	< 0.2	< 0.25	Guideline Archived	< 0.25	19	< 0.05 - < 1	2/year
Diuron	ug/L	< 0.1	2	< 0.1	< 0.1	Guideline Archived	< 0.1	20	< 0.1 - < 10	2/year
Ethylbenzene	ug/L	< 0.4	4	< 0.4	< 0.4	140 MAC and ≤ 1.6 AO	< 0.4	30	< 0.4 - < 0.4	2/year
Formaldehyde	ug/L	< 10	2	< 10	< 10	No Guideline Required	< 10	18	< 10 - < 10	2/year
Hexachlorobenzene	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	19	< 0.003 - < 0.5	2/year
Hexachlorobutadiene	ug/L	0.38	4	< 0.2	< 0.5		< 0.25	29	< 0.004 - < 1	2/year
Hexachlorocyclopentadiene	ug/L	0.23	2	< 0.2	< 0.25		< 0.05	21	< 0.01 - < 1	2/year
Hexachloroethane	ug/L	0.23	2	< 0.2	< 0.25		< 0.05	21	< 0.003 - < 1	2/year
Isophorone	ug/L	0.23	2	< 0.2	< 0.25		< 0.25	20	< 0.05 - < 1	2/year
Methyltertiarybutylether (MTBE)	ug/L	< 4	4	< 4	< 4	15 AO	< 4	36	< 4 - < 4	2/year
Monochlorobenzene	ug/L	< 0.5	2	< 0.5	< 0.5	Guideline Archived	< 0.5	20	< 0.5 - < 0.5	2/year
N-Nitrosodimethylamine (NDMA)	ug/L	0.90	2	< 0.8	< 1	0.04 MAC	< 0.2	14	< 0.2 - < 1	2/year
Nitrobenzene	ug/L	0.23	2	< 0.2	< 0.25		< 0.25	20	< 0.05 - < 1	2/year
N-nitroso-di-n-propylamine	ug/L	0.90	2	< 0.8	< 1		< 1	20	<0.2 - <4	2/year
N-nitrosodiphenylamine	ug/L	0.90	2	< 0.8	< 1		< 1	6	< 1 - < 4	2/year
Octachlorostyrene	ug/L	< 0.003	2	< 0.003	< 0.003		< 0.003	19	< 0.003 - < 0.005	2/year
Styrene	ug/L	0.45	4	< 0.4	< 0.5		< 0.5	30	< 0.4 - < 0.5	2/year
Tetrachloroethene	ug/L	< 0.5	2	< 0.5	< 0.5	10 MAC	< 0.5	20	< 0.5 - < 0.5	2/year
Toluene	ug/L	< 0.4	4	< 0.4	< 0.4	60 MAC and ≤ 24 AO	< 0.4	30	< 0.4 - < 0.4	2/year
Triallate	ug/L	< 0.05	2	< 0.05	< 0.05	Guideline Archived	< 0.05	21	< 0.0003 - < 1	2/year
Trichloroethylene	ug/L	< 0.5	2	< 0.5	< 0.5	5.0 MAC	< 0.5	17	< 0.5 - < 0.5	2/year
Trichlorofluoromethane	ug/L	< 4	2	< 4	< 4		< 4	20	< 4 - < 4	2/year
Trichlorotrifluoroethane	ug/L	< 2	2	< 2	< 2		< 2	16	< 2 - < 2	2/year
Vinyl Chloride (Chloroethene)	ug/L	< 0.5	2	< 0.5	< 0.5	2.0 MAC	< 0.5	20	< 0.5 - < 0.5	2/year
o-Xylene	ug/L	< 0.4	4	< 0.4	< 0.4		< 0.4	30	< 0.4 - < 0.4	2/year
m&p-Xylene	ug/L	< 0.4	4	< 0.4	< 0.4		< 0.4	30	< 0.4 - < 1	2/year
Xylenes (Total)	ug/L	< 0.4	4	< 0.4	< 0.4	90 MAC and ≤ 20 AO	< 0.4	30	< 0.4 - < 0.4	2/year
Miscellaneous										
Perfluoropentanoic Acid (PFPeA)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluorohexanoic Acid (PFHxA)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluoroheptanoic Acid (PFHpA)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year

Appendix A, Table 1 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Perfluorooctanoic Acid (PFOA)	ng/L	< 2	2	< 2	< 2	200 MAC	< 20	7	< 2 - < 20	2/year
Perfluorononanoic Acid (PFNA)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluorododecanoic acid (PFDoA)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluorodecanoic Acid (PFDA)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluoroundecanoic Acid (PFUnA)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perflurotridecanoic Acid (PFTRDA)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluorotetradecnoic Acid (PFTEDA)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluorobutanesulfonic Acid (PFBS)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluoropentanesulfonic Acid (PFPes)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluorohexanesulfonic Acid (PFHxS)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluoroheptanesulfonic Acid (PFHpS)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluorooctanesulfonic Acid (PFOS)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluorononane sulfonic Acid (PFNS)	ng/L	< 2	2	< 2	< 2	600 MAC	< 20	7	< 2 - < 20	2/year
Perfluorodecanesulfonic Acid (PFDS)	ng/L	< 2	2	< 2	< 2		< 20	7	< 2 - < 20	2/year
Perfluorooctane Sulfonamide (PFOSA)	ng/L	< 4	2	< 4	< 4		< 20	7	< 4 - < 20	2/year
4:2 Flurotelomer Sulfonic Acid	ng/L	< 4	2	< 4	< 4		<20	7	<4 - <20	2/year
6:2 Flurotelomer Sulfonic Acid	ng/L	< 4	2	< 4	< 4		<20	7	<4 - <20	2/year
8:2 Flurotelomer Sulfonic Acid	ng/L	< 4	2	< 4	< 4		<20	7	<4 - <20	2/year

Notes: mg/L = milligrams per litre; ug/L = micrograms per litre; ND = Not Detected; CFU = Colony Forming Units; NTU = Nephelometric Units; TCU = True Colour Units; AO = Aesthetic Objective; MAC = Max. Acceptable Conc.; Median = middle point of all values

APPENDIX A
TABLE 2. 2024 TREATED WATER QUALITY AFTER GOLDSTREAM WATER TREATMENT PLANT

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Physical Parameters (ND means less than instrument can detect)										
Alkalinity, Total	mg/L	17.85	20	15.4	23		13.90	135	6.92-18.3	12/year
Carbon, Dissolved Organic	mg/L	1.9	11	1.6	2.6		1.80	113	< 0.5-370	12/year
Carbon, Total Organic	mg/L	1.9	11	1.6	2.5	Guideline Archived	1.80	113	0.93 - 4.99	12/year
Colour, True	TCU	4	52	< 2	12	≤ 15 AO	3.40	498	< 1.4-17	52/year
Conductivity @ 25 C	uS/cm	55.1	53	50	65.5		46.95	496	31.1-98.6	52/year
Hardness as $CaCO_3$	mg/L	16.4	11	15.7	18.6	No Guideline Required	17.10	144	12-22.1	12/year
Odour	Odour Profile	1	221	1	1	Inoffensive	1.00	2,286	1-1	250/year
pH	pH units	7.6	56	6.42	8.33	7.0-10.5 AO	7.13	523	6.54-8.24	52/year
Taste	Flavour Profile	1	220	1	1	Inoffensive	1.00	2,274	1-1	250/year
Total Dissolved Solids	mg/L	30	11	26	50	≤500 AO	28.00	102	<10 - 78.0	12/year
Total Suspended Solids	mg/L	< 1	11	< 1	2		< 1	112	0.1-10.9	12/year
Total Solids	mg/L	44	11	30	70		32.00	98	<1 - 110	12/year
Turbidity, Grab Samples	NTU	0.25	239	0.1	1.4	1.0 MAC	0.30	2,340	2.5-21.1	250/year
Water Temp., Grab Samples	degrees C	11.4	253	3.7	21.1	≤ 15 AO	10.40	2,343	0.00	250/year
Non-Metallic Inorganic Chemicals (ND means less than instrument can detect)										
Bromate	mg/L as BrO3	< 0.0095	8	< 0.0095	< 0.0095	0.01 MAC	< 0.0095	33	< 0.0095-0.011	12/year
Bromide	ug/L as Br	0.101	4	0.093	0.256		< 0.01	44	0.000018-0.046	4/year
Chloride	mg/L as Cl	4.75	2	4.4	5.1	≤ 250 AO	4.20	31	< 0.045-< 10	4/year
Chlorate, dissolved	mg/L as ClO2	< 0.1	10	< 0.1	0.38	1 MAC	< 0.1	39	< 0.1-< 0.1	4/year
Chlorite, dissolved	mg/L as ClO3	Not analyzed in 2024				1 MAC	< 0.1	10	< 0.1-< 0.1	12/year
Cyanide	mg/L as Cn	< 0.0005	4	< 0.0005	< 0.0005	0.2 MAC	< 0.0005	30	< 0.0005-< 0.006	4/year
Fluoride	mg/L as F	< 0.05	4	< 0.05	< 0.05	1.5 MAC	<0.02	27	<0.02 - <0.05	4/year
Nitrate, Dissolved	ug/L as N	< 20	17	< 20	26	45000 MAC	< 20	109	< 0.02-47.5	12/year
Nitrite, Dissolved	ug/L as N	< 5	17	< 5	< 5	3000 MAC	< 5	108	< 0.3-5	12/year
Nitrate + Nitrite	ug/L as N	< 20	17	< 20	26	-	< 20	109	2.9-47.5	12/year
Nitrogen, Ammonia	ug/L as N	250	11	170	370	No Guideline Required	210.00	113	0.11-760	12/year
Nitrogen, Total Kjeldahl	ug/L as N	460	11	332	590		367.50	108	74-950	12/year
Nitrogen, Total	ug/L as N	460	11	352	590		360.00	113	75.6-976	12/year
Phosphate, Ortho, Dissolved	ug/L as P	< 1	11	< 1	3		< 3	109	0.1-6.2	12/year
Phosphate, Total, Dissolved	ug/L as P	1.8	11	1.1	6.7		2.60	113	0.8 - 18	12/year
Phosphate, Total	ug/L as P	2.6	11	<1.6	5.5		2.89	102	<1 - 14	12/year
Silica	mg/L as SiO2	4.4	11	4	5.5		4.16	103	2.91-5.2	12/year
Silicon	ug/L as Si	1930	11	1620	2360		1960.00	114	1400-2740	12/year
Sulphate	mg/L as SO4	1.2	11	< 1	1.6	≤ 500 AO	1.40	111	0.8-< 10	12/year

Appendix A, Table 2 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range Minimum	Range Maximum	≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range Minimum - Maximum	
Sulphide	mg/L as H2S	< 0.0018	11	< 0.0018	< 0.0018	≤ 0.05 AO	< 0.0018	35	< 0.0018-0.027	12/year
Sulphur	mg/L as S	< 3	11	< 3	< 3		< 3	114	< 3-< 3	12/year
Metallic Inorganic Chemicals (ND means less than instrument can detect)										
Aluminum	ug/L as Al	11.5	11	5.9	22.2	2900 MAC / 100 OG	15.85	114	3.6-67.7	12/year
Antimony	ug/L as Sb	< 0.5	11	< 0.5	< 0.5	6 MAC	< 0.5	114	< 0.02-< 0.5	12/year
Arsenic	ug/L as As	< 0.1	11	< 0.1	0.13	10 MAC	< 0.1	114	0.04-0.17	12/year
Barium	ug/L as Ba	3.6	11	3.3	4.2	2000 MAC	3.80	114	3.3-4.8	12/year
Beryllium	ug/L as Be	< 0.1	11	< 0.1	< 0.1		< 0.1	113	< 0.01-< 0.1	12/year
Bismuth	ug/L as Bi	< 1	11	< 1	< 1		< 1	114	< 0.005-< 1	12/year
Boron	ug/L as B	< 50	11	< 50	< 50	5000 MAC	< 50	114	< 10-50	12/year
Cadmium	ug/L as Cd	< 0.01	11	< 0.01	< 0.01	7 MAC	< 0.01	114	< 0.005-< 0.1	12/year
Calcium	mg/L as Ca	4.76	11	4.55	5.37	No Guideline Required	4.90	114	4.18-6.82	12/year
Chromium	ug/L as Cr	< 1	11	< 1	< 1	50 MAC	< 1	114	< 0.1-1.2	12/year
Cobalt	ug/L as Co	< 0.2	11	< 0.2	< 0.2		< 0.2	114	0.023-< 0.5	12/year
Copper	ug/L as Cu	1.65	11	1.07	3.72	2000 MAC / ≤ 1000 AO	8.62	114	1.03-202	12/year
Iron	ug/L as Fe	17.4	11	10.4	52	≤ 100 AO	24.60	114	10.5-198	12/year
Lead	ug/L as Pb	< 0.2	11	< 0.2	1.94	5 MAC	< 0.2	114	0.017-0.92	12/year
Lithium	ug/L as Li	< 2	11	< 2	< 2		< 2	76	< 0.5-13.5	12/year
Magnesium	mg/L as Mg	1.1	11	0.997	1.26	No Guideline Required	1.14	114	0.146-1.41	12/year
Manganese	ug/L as Mn	4.5	11	1.3	17.3	120 MAC / ≤ 20 AO	4.50	114	1.4-51.1	12/year
Mercury, Total	ug/L as Hg	< 0.0019	11	< 0.0019	< 0.03	1.0 MAC	< 0.002	112	< 0.0019-< 10	12/year
Molybdenum	Ug/L as Mo	< 1	11	< 1	< 1		< 1	114	< 0.05-< 1	12/year
Nickel	mg/L as Ni	< 1	11	< 1	< 1		< 1	114	0.206-2	12/year
Potassium	mg/L as K	0.126	11	0.115	0.136		0.13	114	0.111-0.216	12/year
Selenium	ug/L as Se	< 0.1	11	< 0.1	< 0.1	50 MAC	< 0.1	114	< 0.04-0.21	12/year
Silver	ug/L as Ag	< 0.02	11	< 0.02	< 0.02	No Guideline Required	< 0.02	114	< 0.005-0.058	12/year
Sodium	mg/L as Na	3.7	11	3.51	4.49	≤ 200 AO	1.75	114	1.39-4.17	12/year
Strontium	ug/L as Sr	14.4	11	13.1	15.8	7000 MAC	14.95	114	13-19.7	12/year
Thallium	ug/L as Tl	< 0.01	11	< 0.01	< 0.01		< 0.01	114	< 0.002-< 0.05	12/year
Tin	ug/L as Sn	< 5	11	< 5	< 5		< 5	114	< 0.2-< 5	12/year
Titanium	ug/L as Ti	< 5	11	< 5	< 5		< 5	114	< 0.05-< 5	12/year
Uranium	ug/L as U	< 0.1	11	< 0.1	< 0.1	20 MAC	< 0.1	114	0.004-< 0.1	12/year
Vanadium	ug/L as V	< 5	11	< 5	< 5		< 5	114	<0.2-<5	12/year
Zinc	ug/L as Zn	< 5	11	< 5	< 5	≤ 5000 AO	< 5	114	0.37-54.1	12/year
Zirconium	ug/L as Zr	< 0.1	11	< 0.1	< 0.1		< 0.1	114	<0.1-<0.5	12/year
Microbial Parameters (ND means less than method or instrument can detect)										
Coliform Bacteria										
Coliforms, Total	CFU/100 mL	< 1	307	< 1	330	0 MAC	<1	2,358	<1 - 200	250/year

Appendix A, Table 2 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
E. coli	CFU/100 mL	< 1	307	< 1	< 1	0 MAC	<1	2,356	<1 - <1	250/year
Heterotrophic/Other Bacteria										
Hetero. Plate Count, 28C (7 day)	CFU/1 mL	< 10	221	< 1	360		< 10	2,212	<1 - 770	250/year
Disinfectants (ND means less than instrument can detect)										
Total Residual Chlorine	mg/L as Cl_2	2.01	242	1.59	3.14	No Guideline Required	1.89	1,154	0.8 - 2.33	250/year
Monochloramine	mg/L as Cl_2	1.86	242	1.29	3.09	No Guideline Required	1.75	1,139	0-2.22	250/year

Notes: mg/L = milligrams per litre; ug/L = micrograms per litre; ND = Not Detected; CFU = Colony Forming Units; NTU = Nephelometric Units; TCU = True Colour Units; AO = Aesthetic Objective; MAC = Max. Acceptable Conc.; Median = middle point of all values

APPENDIX A

TABLE 3. 2024 TREATED WATER QUALITY AFTER SOOKE RIVER ROAD WATER TREATMENT PLANT

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range Minimum	Range Maximum	≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range Minimum - Maximum	
Physical Parameters (ND means less than instrument can detect)										
Alkalinity, Total	mg/L	18.1	17	15.7	20.0		16.4	116	7.1-19	12/year
Colour, True	TCU	4.0	37	< 2	9.0	≤ 15 AO	3.0	328	1-11.3	52/year
Conductivity @ 25 C	uS/cm	59.7	37	54.5	63.1		56.6	325	26.4-71.6	52/year
Hardness as $CaCO_3$	mg/L	17.1	6	16.1	18.0	No Guideline Required	16.6	49	14.8-23.9	6/year
Odour	Flavour Profile	1.0	35	1.0	1.0	Inoffensive	1.0	341	1-1	52/year
pH	pH units	7.7	36	6.9	8.0	7.0-10.5 AO	7.5	321	7-8.32	52/year
Taste	Flavour Profile	1.0	35	1.0	1.0	Inoffensive	1.0	342	1-2	52/year
Turbidity, Grab Samples	NTU	0.3	37	0.2	0.4	1 MAC	0.3	353	0.15 - 0.95	52/year
Water Temp., Grab Samples	degrees C	11.5	38	4.6	19.0	≤ 15 AO	10.5	355	1.19-20	52/year
Microbial Parameters (ND means less than instrument can detect)										
Coliform Bacteria										
Coliforms, Total	CFU/100 mL	< 1	43	< 1	< 1	0 MAC	< 1	357	<1 - 1	52/year
E. coli	CFU/100 mL	< 1	43	< 1	< 1	0 MAC	< 1	358	<1 - <1	52/year
Heterotrophic Bacteria										
Hetero. Plate Count, 28C (7 day)	CFU/1 mL	< 10	35.0	< 1	29.0		< 10	314	<1 - 210	52/year
Disinfectants (ND means less than instrument can detect)										
Disinfectants										
Total Residual Chlorine	mg/L as Cl_2	2.1	37.0	1.8	2.3	No Guideline Required	1.9	187	1.27-2.4	52/year
Monochloramine	mg/L as Cl_2	1.9	37.0	1.5	2.1	No Guideline Required	1.7	186	1.15-2.16	52/year
Metallic Inorganic Chemicals (ND means less than instrument can detect)										
Aluminum	ug/L as Al	7.9	6.0	5.0	14.9	2900 MAC / 100 OG	11.7	49	4.4-22.7	6/year
Antimony	ug/L as Sb	< 0.5	6.0	< 0.5	< 0.5	6 MAC	< 0.5	49	< 0.5-< 0.5	6/year
Arsenic	ug/L as As	< 0.1	6.0	< 0.1	< 0.1	10 MAC	< 0.1	49	< 0.1-< 0.1	6/year
Barium	ug/L as Ba	3.6	6.0	3.4	3.9	2000 MAC	3.7	49	3.2-4.2	6/year
Beryllium	ug/L as Be	< 0.1	6.0	< 0.1	< 0.1		< 0.1	49	< 0.1-< 0.1	6/year
Bismuth	ug/L as Bi	< 1	6.0	< 1	< 1		< 1	49	< 1-< 1	6/year
Boron	ug/L as B	< 50	6.0	< 50	< 50	5000 MAC	< 50	49	< 50-< 50	6/year
Cadmium	ug/L as Cd	< 0.01	6.0	< 0.01	< 0.01	7 MAC	< 0.01	49	< 0.01-0.015	6/year
Calcium	mg/L as Ca	5.0	6.0	4.7	5.2	No Guideline Required	4.8	51	4.29-7.67	6/year
Chromium	ug/L as Cr	< 1	6.0	< 1	< 1	50 MAC	< 1	49	< 1-5	6/year
Cobalt	ug/L as Co	< 0.2	6.0	< 0.2	< 0.2		< 0.2	49	< 0.2-< 0.5	6/year
Copper	ug/L as Cu	34.0	6.0	23.6	45.6	2000 MAC / ≤ 1000 AO	28.7	49	10.9-80.4	6/year
Iron	ug/L as Fe	16.0	6.0	10.9	26.3	≤ 100 AO	22.9	49	12-53	6/year

Appendix A, Table 3 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Lead	ug/L as Pb	0.2	6.0	< 0.2	0.3	5 MAC	< 0.2	51	< 0.2-0.64	6/year
Lithium	ug/L as Li	< 2	6.0	< 2	< 2		< 2	31	< 2-< 5	6/year
Magnesium	mg/L as Mg	1.1	6.0	1.1	1.2	No Guideline Required	1.1	49	0.982-1.34	6/year
Manganese	ug/L as Mn	3.1	6.0	1.4	5.5	120 MAC / ≤ 20 AO	3.4	49	1.3-10	6/year
Mercury, Total	ug/L as Hg	< 0.0019	6.0	< 0.0019	< 0.0019	1.0 MAC	< 0.002	49	< 0.0019-< 0.01	6/year
Molybdenum	ug/L as Mo	< 1	6.0	< 1	< 1		< 1	49	< 1-4.7	6/year
Nickel	ug/L as Ni	< 1	6.0	< 1	< 1		< 1	49	< 1-20.3	6/year
Potassium	mg/L as K	0.1	6.0	0.1	0.1		0.1	49	0.115-0.247	6/year
Selenium	ug/L as Se	< 0.1	6.0	< 0.1	< 0.1	50 MAC	< 0.1	49	< 0.1-0.1	6/year
Silver	ug/L as Ag	< 0.02	6.0	< 0.02	< 0.02	No Guideline Required	< 0.02	49	< 0.02-< 0.02	6/year
Sodium	mg/L as Na	4.3	6.0	3.9	4.6	≤ 200 AO	4.4	49	3.24-7.02	6/year
Strontium	ug/L as Sr	14.6	6.0	13.9	15.7	7000 MAC	14.7	49	13.2-17.1	6/year
Thallium	ug/L as Tl	< 0.01	6.0	< 0.01	< 0.01		< 0.01	49	< 0.01-< 0.05	6/year
Tin	ug/L as Sn	< 5	6.0	< 5	< 5		< 5	49	< 5-< 5	6/year
Titanium	ug/L as Ti	< 5	6.0	< 5	< 5		< 5	49	< 5-< 5	6/year
Uranium	ug/L as U	< 0.1	6.0	< 0.1	< 0.1	20 MAC	< 0.1	49	< 0.1-< 0.1	6/year
Vanadium	ug/L as V	< 5	6.0	< 5	< 5		< 5	49	< 5-< 5	6/year
Zinc	ug/L as Zn	< 5	6.0	< 5	5.4	≤ 5000 AO	< 5	49	< 5-79.4	6/year
Zirconium	ug/L as Zr	< 0.1	6.0	< 0.1	< 0.1		< 0.1	49	< 0.1-< 0.5	6/year

Notes: mg/L = milligrams per litre; ug/L = micrograms per litre; ND = Not Detected; CFU = Colony Forming Units; NTU = Nephelometric Units; TCU = True Colour Units; AO = Aesthetic Objective; MAC = Max. Acceptable Conc.; Median = middle point of all values

APPENDIX A

TABLE 4. 2024 TREATED WATER QUALITY TRANSMISSION / DISTRIBUTION SYSTEMS GOLDSTREAM SERVICE AREA

PARAMETER	2024 ANALYTICAL RESULTS				CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range Minimum	Range Maximum	≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range Minimum - Maximum	
Metals (ND means less than instrument can detect)										
Mercury, Total	ug/L as Hg	< 0.0019	24	< 0.0019	< 0.03	1 MAC	< 0.002	184	< 0.0019-< 0.01	24/year
Aluminum	ug/L as Al	11.1	24	5.7	16.1	2900 MAC / 100 OG	13.1	202	5-61	24/year
Antimony	ug/L as Sb	< 0.5	24	< 0.5	< 0.5	6 MAC	< 0.5	202	< 0.5-5.59	24/year
Arsenic	ug/L as As	< 0.1	24	< 0.1	0.22	10 MAC	< 0.1	202	< 0.1-1.55	24/year
Barium	ug/L as Ba	3.6	24	3	4.1	2000 MAC	3.8	202	1.6-4.7	24/year
Boron	ug/L as B	< 50	24	< 50	< 50	5000 MAC	< 50	202	< 50-50	24/year
Cadmium	ug/L as B	< 0.01	24	< 0.01	< 0.01	7 MAC	< 0.01	202	< 0.01-0.468	24/year
Chromium	ug/L as Cr	< 1	24	< 1	< 1	50 MAC	< 1	202	< 0.1-1.3	24/year
Copper	mg/L as Cu	6.81	24	2.33	25.7	2000 MAC / 1000 AO	19.25	202	0.66-12400	24/year
Iron	ug/L as Fe	24	24	9.7	42.6	≤ 100 AO	23.7	202	8.2-359	24/year
Lead	ug/L as Pb	< 0.2	24	< 0.2	0.38	5 MAC	0.32	350	< 0.2-1570	24/year
Manganese	ug/L as Mn	4.55	24	1.7	8.5	120 MAC / 20 AO	4	202	1.4-35.1	24/year
Selenium	ug/L as Se	< 0.1	24	< 0.1	< 0.1	50 MAC	< 0.1	202	< 0.1-< 0.1	24/year
Strontium	ug/L as Sr	15.15	24	13.3	17.7	7000 MAC	15.15	202	11.1-20.1	24/year
Uranium	ug/L as U	< 0.1	24	< 0.1	< 0.1	20 MAC	< 0.1	202	< 0.1-< 0.1	24/year
Zinc	ug/L as Zn	< 5	24	< 5	6.4	≤ 5000 MAC	< 5	202	< 5-1660	24/year
Sodium	mg/L as Na	3.735	24	3.21	4.32	≤ 200 AO	1.85	201	1.46-13	24/year
Disinfection Byproducts Parameters (ND means less than method or instrument can detect)										
Nitrosamines										
N-Nitrosodiethylamine	ng/L	< 1.9	24	< 1.9	< 2.1		< 1.9	143	0.000375-3.8	24/year
N-Nitrosodimethylamine	ng/L	< 1.9	24	< 1.9	2.8	40 MAC	< 2	149	0.235-6.3	24/year
N-Nitroso-di-n-butylamine	ng/L	< 1.9	24	< 1.9	< 2.1		< 1.9	138	< 0.157-42	24/year
N-nitroso-di-n-propylamine	ng/L	< 1.9	24	< 1.9	< 2.1		< 1.9	129	< 0.0671-< 2.2	24/year
N-Nitrosoethylmethylamine	ng/L	< 1.9	24	< 1.9	< 2.1		< 1.9	137	0-< 2.2	24/year
N-Nitrosomorpholine	ng/L	< 1.9	24	< 1.9	< 2.1		< 1.9	138	0.00102-4.6	24/year
N-nitrosopiperidine	ng/L	< 1.9	24	< 1.9	< 2.1		< 2	136	< 0.0357-< 10	24/year
N-Nitrosopyrrolidine	ng/L	< 1.9	24	< 1.9	< 2.1		< 1.9	137	< 0.0662-< 8	24/year
Haloacetic Acids (HAAs)										
Total Haloacetic Acids	ug/L	15	24	< 5	19	80 MAC	15	196	< 5-104	24/year
Monobromoacetic Acid (MBAA)	ug/L	< 5	24	< 5	< 5		< 5	197	< 0.2-15.04	24/year
Dichloroacetic Acid (DCAA)	ug/L	9.65	24	< 5	13		9.1	197	1.2-30	24/year
Trichloroacetic Acid (TCAA)	ug/L	5.45	24	< 5	6.7		6.3	197	1.3-56	24/year
Bromochloroacetic Acid (BCAA)	ug/L	< 5	24	< 5	< 5		< 5	197	< 0.2-< 5	24/year
Dibromoacetic Acid (DBAA)	ug/L	< 5	24	< 5	< 5		< 5	197	< 0.2-5.6	24/year
Monochloroacetic Acid (MCAA)	ug/L	< 5	24	< 5	< 5		< 5	197	0.22-< 5	24/year

Appendix A, Table 4 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Trihalomethanes (TTHMs)										
Total Trihalomethanes	ug/L	18.5	24	12	27	100 MAC	18.9	200	11-77.9	24/year
Bromodichloromethane	ug/L	1.9	24	1.3	3.2		2	17	1.2-2.9	24/year
Bromoform	ug/L	< 1	24	< 1	< 1		< 1	200	< 0.1-< 2	24/year
Chlorodibromomethane	ug/L	< 1	24	< 1	< 1		< 1	200	< 0.1-< 3	24/year
Chloroform	ug/L	16	24	10	24		17	200	9.6-77.9	24/year

Notes: mg/L = milligrams per litre; ug/L = micrograms per litre; ND = Not Detected; CFU = Colony Forming Units; NTU = Nephelometric Units; TCU = True Colour Units; AO = Aesthetic Objective; MAC = Max. Acceptable Conc.; Median = middle point of all values

APPENDIX A
TABLE 5. 2024 TREATED WATER QUALITY DISTRIBUTION SYSTEM SOOKE SERVICE AREA

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Metals (ND means less than instrument can detect)										
Mercury, Total	ug/L as Hg	< 0.0019	6	< 0.0019	< 0.0019	1 MAC	< 0.002	48	< 0.0019-< 0.05	6/year
Aluminum	ug/L as Al	9	6	4.7	14.8	2900 MAC / 100 OG	12.8	50	4.6-242	6/year
Antimony	ug/L as Sb	< 0.5	6	< 0.5	< 0.5	6 MAC	< 0.5	50	< 0.5-< 0.5	6/year
Arsenic	ug/L as As	< 0.1	6	< 0.1	< 0.1	10 MAC	< 0.1	50	< 0.1-0.24	6/year
Barium	ug/L as Ba	3.65	6	3.3	3.9	2000 MAC	3.7	50	3.2-4.6	6/year
Boron	ug/L as B	< 50	6	< 50	< 50	5000 MAC	< 50	50	< 50-< 50	6/year
Cadmium	ug/L as B	< 0.01	6	< 0.01	0.03	7 MAC	< 0.01	50	< 0.01-0.075	6/year
Chromium	ug/L as Cr	< 1	6	< 1	< 1	50 MAC	< 1	50	< 1-< 1	6/year
Copper	mg/L as Cu	7.295	6	5.76	9.55	2000 MAC / 1000 AO	6.235	56	0.85-417	6/year
Iron	ug/L as Fe	27.55	6	24.2	35.6	≤ 100 AO	40.4	50	19.5-278	6/year
Lead	ug/L as Pb	0.245	6	< 0.2	0.33	5 MAC	< 0.2	104	< 0.2-EXG 22.5	6/year
Manganese	ug/L as Mn	2.65	6	1.8	6.2	120 MAC / 20 AO	2.8	57	< 0.01-1760	6/year
Selenium	ug/L as Se	< 0.1	6	< 0.1	< 0.1	50 MAC	< 0.1	49	< 0.1-< 0.1	6/year
Strontium	ug/L as Sr	15.75	6	15	17.1	7000 MAC	18	49	14.9-21.5	6/year
Uranium	ug/L as U	< 0.1	6	< 0.1	< 0.1	20 MAC	< 0.1	50	0	6/year
Zinc	ug/L as Zn	< 5	6	< 5	5.4	≤ 5000 MAC	< 5	50	0	6/year
Sodium	mg/L as Na	4.39	6	3.82	5.02	≤ 200 AO	4.42	49	3.36-6.08	6/year
Disinfection Byproducts Parameters (ND means less than method or instrument can detect)										
Nitrosamines										
N-Nitrosodiethylamine	ng/L	< 1.9	6	< 1.9	< 1.9		1.95	38	0.0000625-3.22	6/year
N-Nitrosodimethylamine	ng/L	< 1.9	6	< 1.9	< 1.9	40 MAC	< 2	39	< 1-4.3	6/year
N-Nitroso-di-n-butylamine	ng/L	< 1.9	6	< 1.9	< 1.9		< 2	35	< 0.268-< 3	6/year
N-nitroso-di-n-propylamine	ng/L	<1.9	5	<1.9	<2		<2	29	<0.019 - <2.1	6/year
N-Nitrosoethylmethylamine	ng/L	< 1.9	6	< 1.9	< 1.9		< 2	35	< 0.082-< 2.1	6/year
N-Nitrosomorpholine	ng/L	< 1.9	6	< 1.9	< 1.9		1.95	36	< 0.257-< 6.6	6/year
N-nitrosopiperidine	ng/L	< 1.9	6	< 1.9	< 1.9		< 2	35	< 0.0806-< 25.9	6/year
N-Nitrosopyrrolidine	ng/L	< 1.9	6	< 1.9	< 1.9		< 2	35	< 0.0806-< 141	6/year
Haloacetic Acids (HAAs)										
Total Haloacetic Acids	ug/L	21	6	19	27	80 MAC	25	40	16-34	6/year
Monobromoacetic Acid (MBAA)	ug/L	< 5	6	< 5	< 5		< 5	40	< 5-< 5	6/year
Dichloroacetic Acid (DCAA)	ug/L	11.5	6	11	15		13	40	9.3-19	6/year
Trichloroacetic Acid (TCAA)	ug/L	9.5	6	8.5	12		12	40	7-18	6/year
Bromochloroacetic Acid (BCAA)	ug/L	< 5	6	< 5	< 5		< 5	40	< 5-< 5	6/year
Dibromoacetic Acid (DBAA)	ug/L	< 5	6	< 5	< 5		< 5	40	< 5-< 5	6/year

Appendix A, Table 5 continued

PARAMETER	2024 ANALYTICAL RESULTS					CANADIAN GUIDELINES	TEN YEAR RESULTS (2014-2023)			Target Sampling Frequency
Parameter Name	Units of Measure	Median Value	Samples Analyzed	Range		≤ = Less than or equal to	10 Year Median	Samples Analyzed	Range	
				Minimum	Maximum				Minimum - Maximum	
Monochloroacetic Acid (MCAA)	ug/L	< 5	6	< 5	< 5		< 5	40	< 5-< 5	6/year
Trihalomethanes (TTHMs)										
Total Trihalomethanes	ug/L	30	6	26	35	100 MAC	32	40	0	6/year
Bromodichloromethane	ug/L	2.85	6	2	3.9		2.8	40	< 1-5	6/year
Bromoform	ug/L	< 1	6	< 1	< 1		< 1	40	< 1-< 1	6/year
Chlorodibromomethane	ug/L	< 1	6	< 1	< 1		< 1	40	< 1-< 1	6/year
Chloroform	ug/L	27	6	24	31		29	40	21-45	6/year

Notes: mg/L = milligrams per litre; ug/L = micrograms per litre; ND = Not Detected; CFU = Colony Forming Units; NTU = Nephelometric Units; TCU = True Colour Units; AO = Aesthetic Objective; MAC = Max. Acceptable Conc.; Median = middle point of all values