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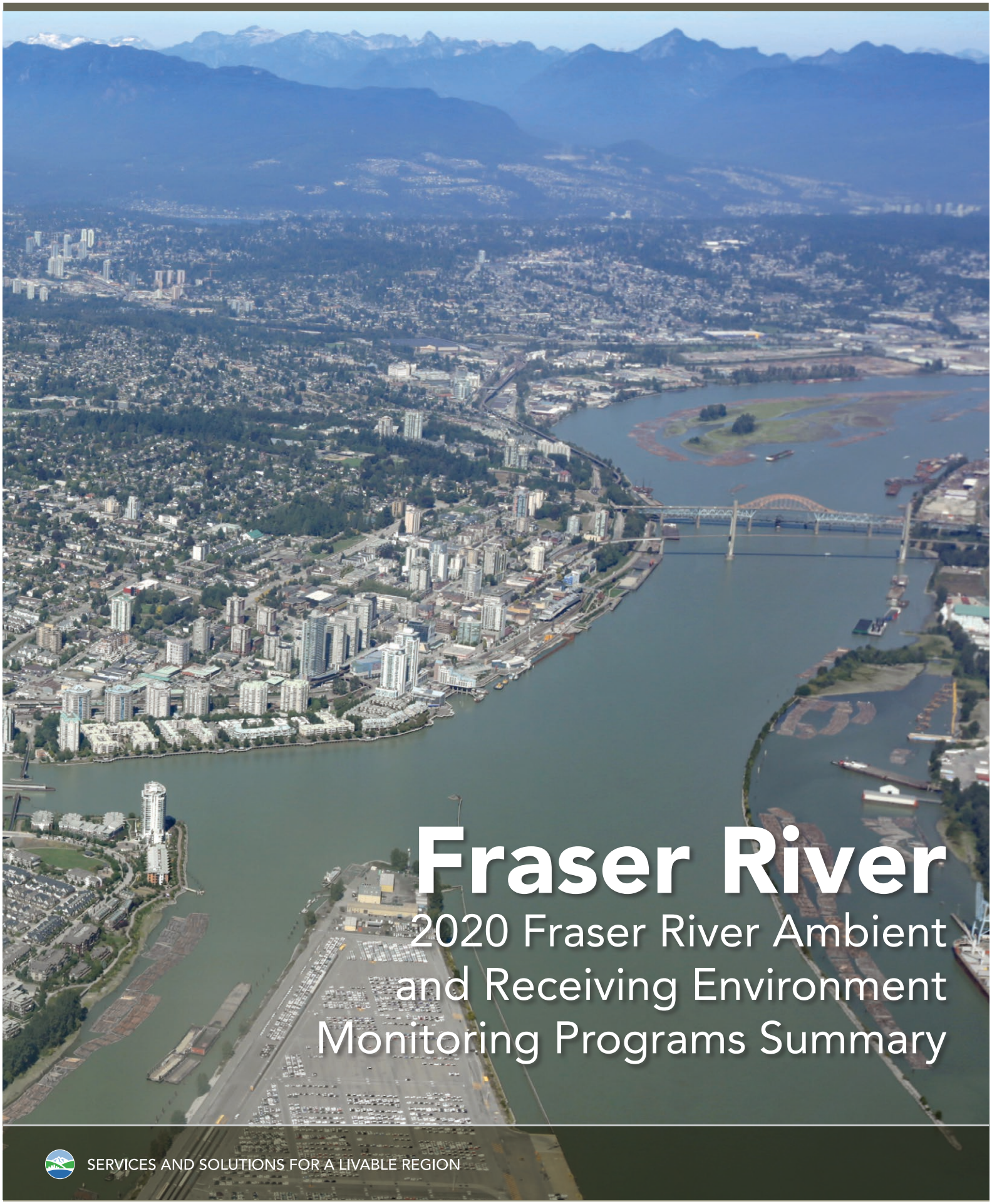

Fraser River

2020 Fraser River Ambient and Receiving Environment Monitoring Programs Summary

SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Metrotower III, 4515 Central Boulevard
Burnaby, BC V5H 0C6
metrovancouver.org

COVER: FRASER RIVER BETWEEN ANNACIS ISLAND, NEW WESTMINSTER AND SURREY

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Overview

In 2020, Metro Vancouver began taking a more holistic, integrated approach to its environmental monitoring programs on the Fraser River. This report integrates analyses and interpretation of the water quality data from the 2020 Receiving Environment Monitoring (REM) Program for the Fraser River Wastewater Treatment Plants (WWTPs) and the Fraser River Ambient Monitoring Program (FRAMP).


NORTHWEST LANGLEY WASTEWATER TREATMENT PLANT


ANNACIS ISLAND WASTEWATER TREATMENT PLANT


LULU ISLAND WASTEWATER TREATMENT PLANT

Background

Metro Vancouver's Integrated Liquid Waste and Resource Management Plan (ILWRMP) outlines goals, strategies and supporting actions that are designed to protect public health and the environment. The ILWRMP provides an effective, affordable, and collaborative approach to the management of liquid waste as a resource. A strategy in the ILWRMP includes monitoring the performance of the liquid waste system and its impacts on the receiving environment.

Since 2003, Metro Vancouver has been conducting two independent monitoring programs to characterize water quality in the Fraser River. The Annacis Island WWTP Initial Dilution Zone (IDZ) Boundary Monitoring Program, which was the focus of the REM program, assessed water quality at the edge of the IDZ of the largest Fraser River WWTP, where Annacis WWTP effluent mixes with the river water. The FRAMP assessed background water quality in areas of the Fraser River that are not directly affected by WWTP effluent discharges and provided context for interpretation of the REM program results.

Approach

The approach to combining and completing the above noted monitoring programs, included three components:

1. **Sample collection:** Between January 27 and February 26, 2020, water samples were collected once a week, over a period of five weeks. The ambient monitoring included the weekly collection of water samples at seven sites encompassing the Fraser River Main Stem, Main Arm, and North Arm. The REM program included the weekly collection of 5 water samples at the Annacis WWTP IDZ boundary and 3 samples from the Annacis reference site at New Westminster (Figure 1).

2. **Sample analysis:** All samples were analyzed for physical properties, nutrients, bacteria, metals and select organic substances, following approved standard methods.

3. **Data compilation and analysis:** Appropriate statistical tools were used to assess substances associated with wastewater for variations in time and space, which included a review of the last 18 years of monitoring results in the Fraser River. The 2020 results were also compared to applicable site-specific Fraser River Water Quality Objectives and provincial and federal water quality guidelines.

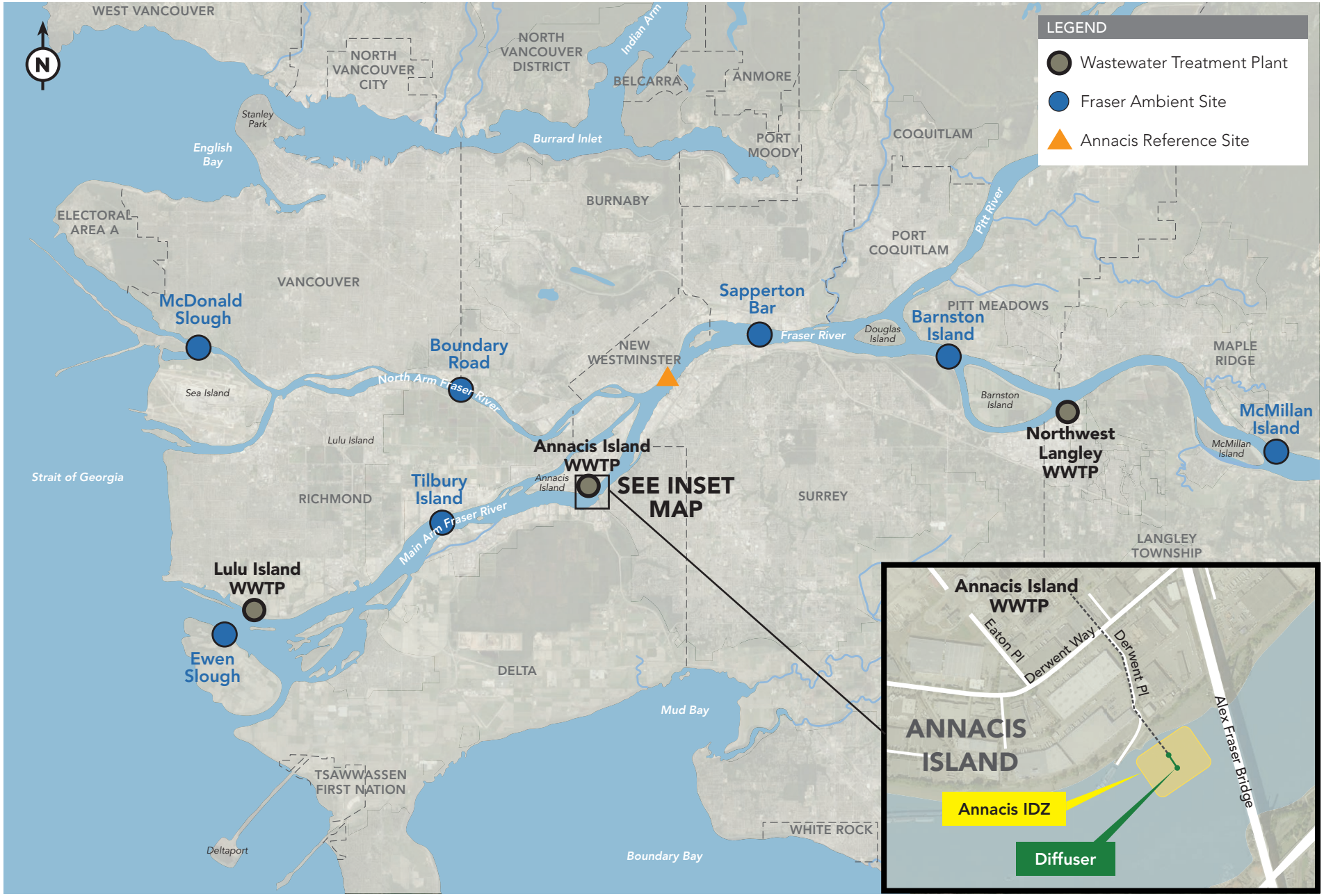

FIGURE 1: MAP SHOWING THE ANNACIS IDZ AND FRASER RIVER AMBIENT MONITORING SITES

Summary of Key Findings

Overall, the key findings of the 2020 monitoring program revealed that most of the analyzed substances met their respective water quality objectives, provincial or federal guidelines. The following two key exceptions were noted:

- In one sample from the Annacis IDZ boundary the concentration of total suspended solids (TSS) was found to be above the Fraser River Water Quality Objective. The concentration of TSS in the Annacis WWTP effluent was not high enough to have been the cause of the exceedance.

- The concentrations of several total metals (copper, iron, manganese and arsenic) and dissolved copper were found to be above the applicable objectives or guidelines at some of the background (ambient) sites. These total metals are typically associated with suspended solids, and exceedances were noted primarily when Fraser River flows and TSS concentrations were high.

The spatial patterns indicated by the Fraser River monitoring programs have remained relatively consistent over the 18-year history. On average, the concentrations of many monitored substances tend to increase as the river moves downstream. The exceptions included peaks in fecal coliform counts, ammonia, phosphorus, and copper concentrations at the Annacis IDZ boundary.

The results of the past 18 years of the annual Fraser River monitoring programs were evaluated and the following trends were identified:

- The total ammonia and total phosphorus concentrations at the Annacis IDZ boundary have shown an increase between 2003 and 2020.

- The total copper concentrations at the Main Stem and upper Main Arm ambient monitoring sites have shown an increase over 18 years. This trend was not observed at the Annacis IDZ boundary. This is likely because the samples at the background (ambient) sites were collected during ebb tidal conditions, whereas the Annacis sites were sampled under all tidal conditions (ebb, flood, and slack tide). It appears that the increasing concentrations of total copper are originating from upstream, but this trend is masked at the Annacis sites by the flood tides when more sea water moves upstream.

- Most parameters monitored at the Annacis IDZ boundary and the background (ambient) sites between 2003 and 2020 have routinely met applicable water quality objectives or guidelines. Exceptions are primarily some total metals, which have been elevated during years with higher-than-normal river flows. The elevated total metals concentrations were associated with elevated concentrations of suspended solids, which are typical during high river flow periods, and reflect background conditions.

Appendix:
Definitions of Technical Terms

Ambient/background: areas not directly affected by effluent discharges.

High flow periods: duration of time when river flows are much higher than average.

Initial Dilution Zone: area where an effluent is mixed into a waterbody. Water quality objectives and guidelines do not apply within this mixing zone but begin to apply at its boundary.

Tides:

Ebb tide: tide that occurs when a tidal current moves away from land.

Flood tide: tide that occurs when a tidal current moves towards land.

Slack tide: period between ebb and flood tide when there is no current.

Total suspended solids: particles suspended in the water column that can be trapped by a filter.

Wastewater Treatment Plant effluent discharge: treated wastewater flowing from the treatment plant out into a receiving water body.