

Air Quality and Weather in 2023

The Metro Vancouver Regional District has regulated and managed air contaminants in the region for over 50 years. This authority was delegated to Metro Vancouver under the provincial *Environmental Management Act*.

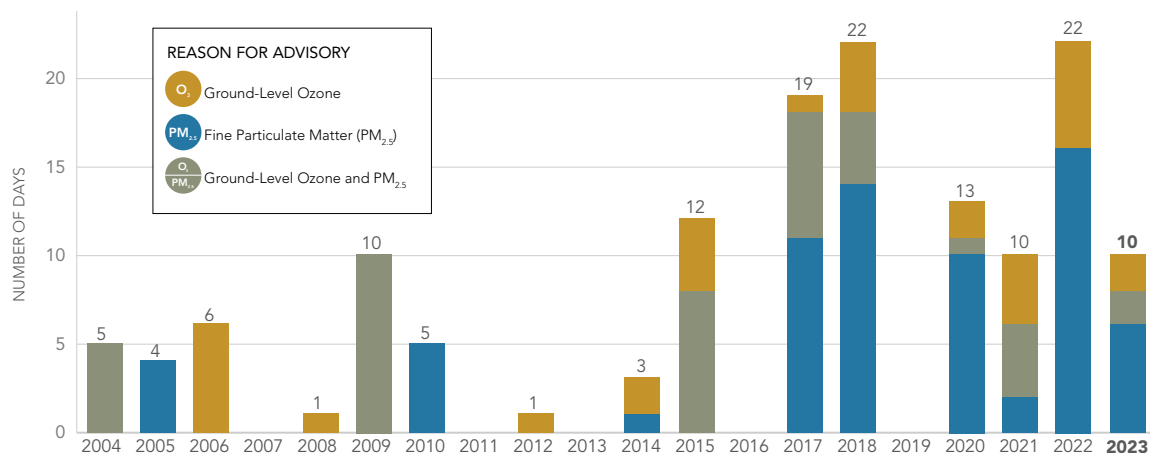
Metro Vancouver’s air quality monitoring network measures air contaminants from Horseshoe Bay to Hope. This annual summary provides an overview of the data measured by the network. It shows how the measurements compare to Metro Vancouver’s ambient air quality objectives — which are health-based benchmarks for acceptable air quality — and highlights notable air quality and weather events and trends in 2023.

Air Quality Advisories

Metro Vancouver issues air quality advisories when air quality is poor or expected to become poor. There are many different types of health-harming air contaminants, and those that are the most likely to cause a regional air quality advisory are:

- ground-level ozone (smog), which is produced by a chemical reaction on hot and sunny days
- fine particulate matter (particles in the air) from sources including wildfire smoke, residential wood smoke, vehicle exhaust, industrial processes, and chemical reactions

AIR QUALITY ADVISORIES 2004 – 2023 (NUMBER OF DAYS)



2023 ANNUAL

AIR QUALITY SUMMARY



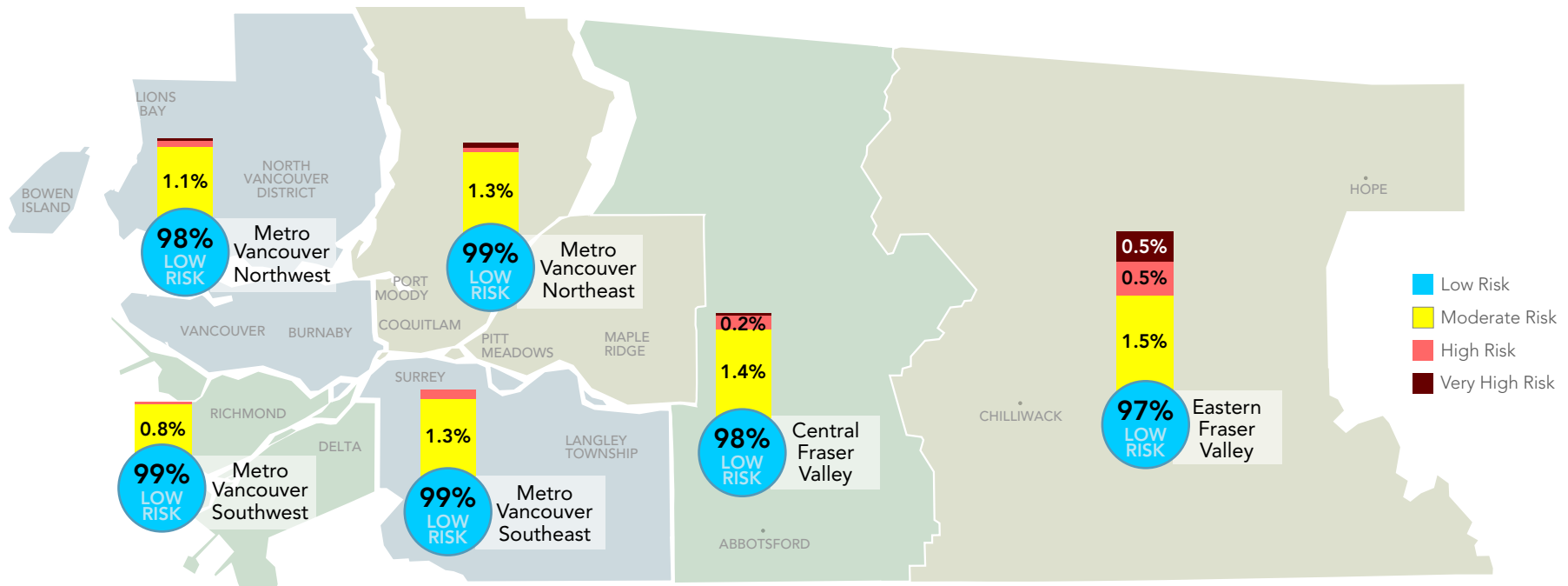
Air Quality Advisories in 2023

In 2023, Metro Vancouver issued five air quality advisories, which were in effect for a total of 10 days. On May 15, 2023, Metro Vancouver issued its earliest ground-level ozone (smog) advisory since the air quality advisory program began in 1993. This was due to unusually warm weather: May 2023 was the hottest May on record for Abbotsford and the second hottest for Vancouver. June, July, and August were also warmer and drier than normal. Hot and sunny weather, along with local emissions, led to air quality advisories for ground-level ozone in May, June, and July.

AIR QUALITY HEALTH INDEX

The Air Quality Health Index (AQHI) is a Canadian health index designed to help people understand how air quality can affect their health, and how they can protect themselves when air quality is poor. It uses a scale of 1 (low health risk) to 10+ (very high health risk) to indicate potential health risk and is updated every hour. The figure below shows the percentage of hours in each health risk category in 2023.

AIR QUALITY HEALTH INDEX: PERCENT OF ANNUAL HOURS BY HEALTH RISK CATEGORY IN 2023





2023 was Canada's worst wildfire season in recorded history, with wildfires burning over 18 million hectares. Usually about 2.5 million hectares are burned by wildfires in Canada each year. According to the BC Wildfire Service, the 2023 wildfire season was the most destructive in BC's recorded history. Fires burned over 2.84 million hectares of land in BC, 10 times the 20-year average annual area burned. The Metro Vancouver region experienced the most significant impacts from wildfire smoke in August. Smoke from fires throughout BC and Washington led to two multi-day air quality advisories.

Temperatures cooled and returned to normal in the fall, but only 60 percent of the normal November precipitation fell. December saw a return to warmer-than-normal temperatures, with both Vancouver and Abbotsford experiencing their warmest Decembers on record. December was also wetter than usual, with about 115 percent of the normal amount of precipitation.

Climate Change Impacts

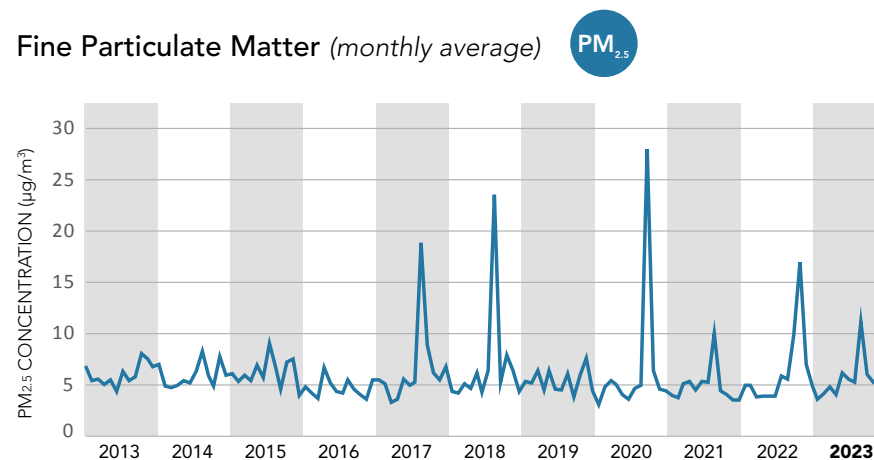
The average global temperature in 2023 was the warmest on record. Weather in 2023 may be a sign of our future climate. Climate projections suggest that the region could experience hotter, drier summers and wetter, warmer winters. A warming climate will likely increase how often wildfires and smoke impacts occur and how long they last. Heat waves could also become more intense and prolonged, increasing ground-level ozone formation in the region. Furthermore, wildfire smoke could contribute to increased ozone formation. In response, Metro Vancouver is updating the *Regional Ground-Level Ozone Strategy* to account for more extreme temperatures and new sources of emissions, including wildfires.

Air Quality Trends

Trend charts illustrate changes in average air quality across the region over time. Measurements from monitoring stations, spanning from Horseshoe Bay to Hope, are averaged to represent the typical outdoor air quality in the region. Trends show that most air pollutant levels have been improving over the last decade, even as the region's population has grown.

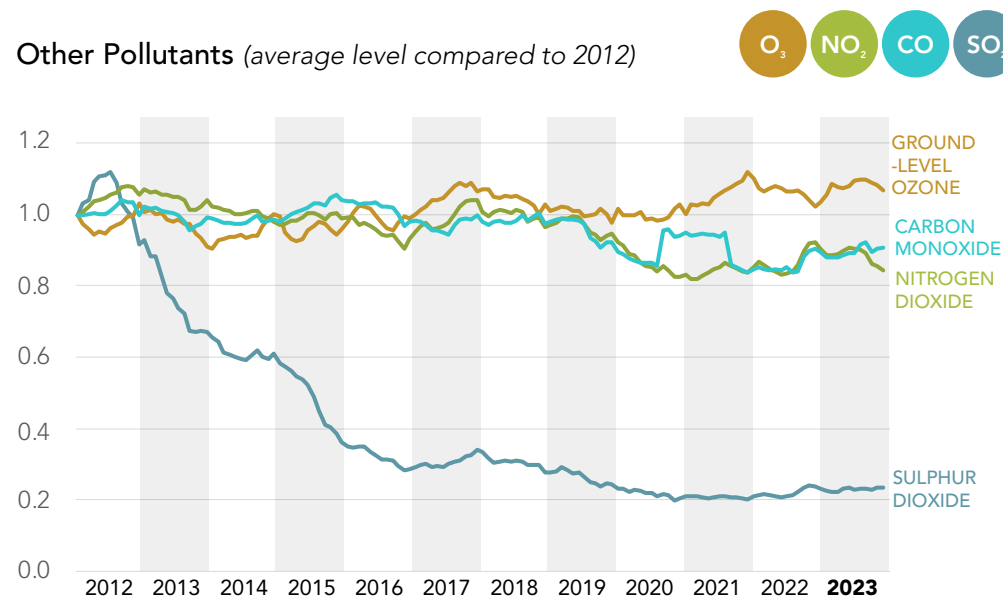
Fine Particulate Matter

Wildfire smoke has impacted Metro Vancouver's air quality in seven of the last nine years, including 2023. As seen in the graph, the highest monthly average concentrations were measured in 2017, 2018, and 2020.

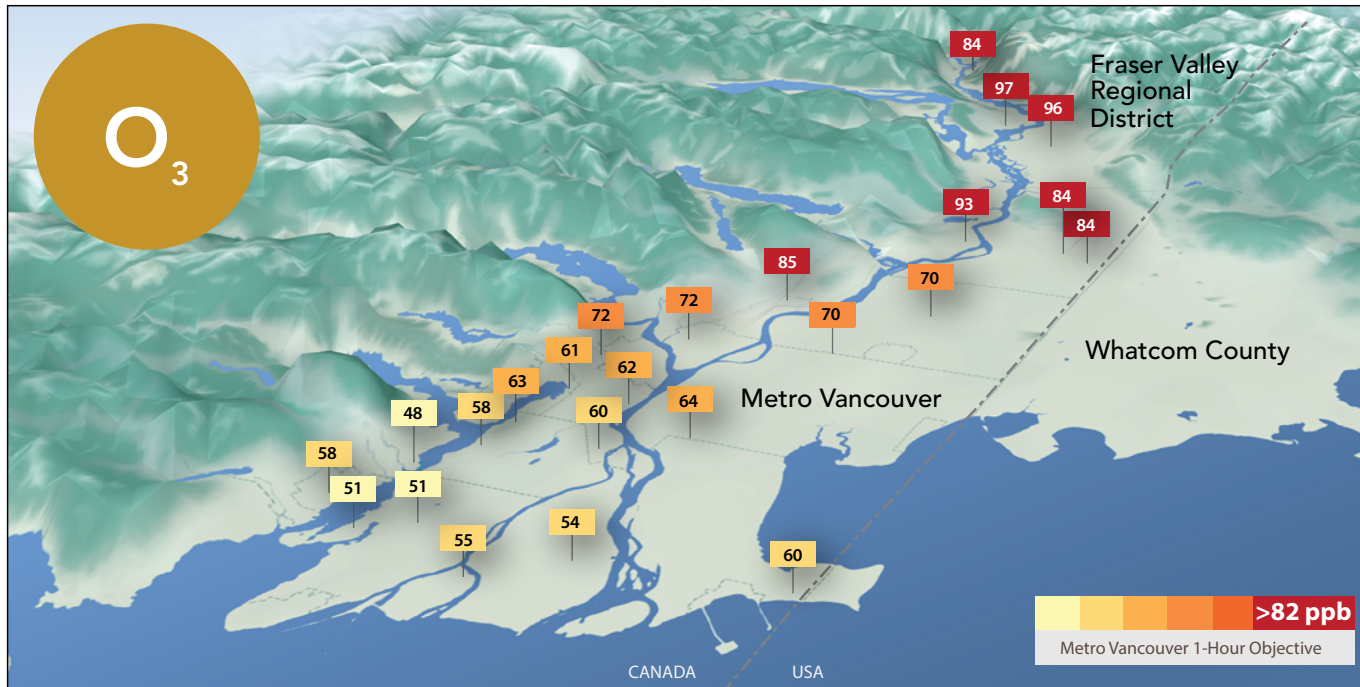


Other Pollutants

Sulphur dioxide (SO₂), ground-level ozone (O₃), nitrogen dioxide (NO₂), and carbon monoxide (CO) generally continued to decrease. NO₂, SO₂, and CO emissions have been decreasing due to improvements in engine and fuel standards for vehicles, marine vessels, and non-road equipment (like construction or agricultural machinery), and reduced emissions from industrial facilities. Average levels of ground-level ozone have increased slightly despite reductions in some pollutants that create it. This is partly due to an increase in ozone formed outside Canada coming into the region.



GROUND-LEVEL OZONE IN 2023



Ground-level ozone (smog) forms when nitrogen oxides and volatile organic compounds react in the air during hot, sunny weather. The highest ozone concentrations are measured in eastern parts of Metro Vancouver and in the Fraser Valley. In 2023, ozone concentrations exceeded Metro Vancouver's one-hour objective (82 ppb) in June in Chilliwack, Hope, Maple Ridge, Abbotsford, Mission, and Agassiz. In August, the objective was exceeded in Abbotsford and Mission. The map shows maximum one-hour averages and exceedances of the one-hour objective in red. Metro Vancouver's eight-hour objective (62 ppb) and Canadian Ambient Air Quality Standard were exceeded in Maple Ridge and Mission.

AIR QUALITY OBJECTIVES AND STANDARDS

Air quality objectives and standards are health-based metrics that are used to assess air quality and guide air quality management. They include [Metro Vancouver ambient air quality objectives](#) and [Canadian Ambient Air Quality Standards \(CAAQS\)](#).

Metro Vancouver's objectives align with the provincial and federal standards for nitrogen dioxide (NO₂), ground-level ozone (O₃), and sulphur dioxide (SO₂). Metro Vancouver's 24-hour objective for PM_{2.5} (25 µg/m³) is more stringent than the 24-hour CAAQS (27 µg/m³).

Metro Vancouver seeks to continually improve air quality, and to ensure that regional air quality meets or is better than these objectives. The [Clean Air Plan](#) describes actions to reduce air contaminants and greenhouse gas emissions in the region.

FINE PARTICULATE MATTER IN 2023

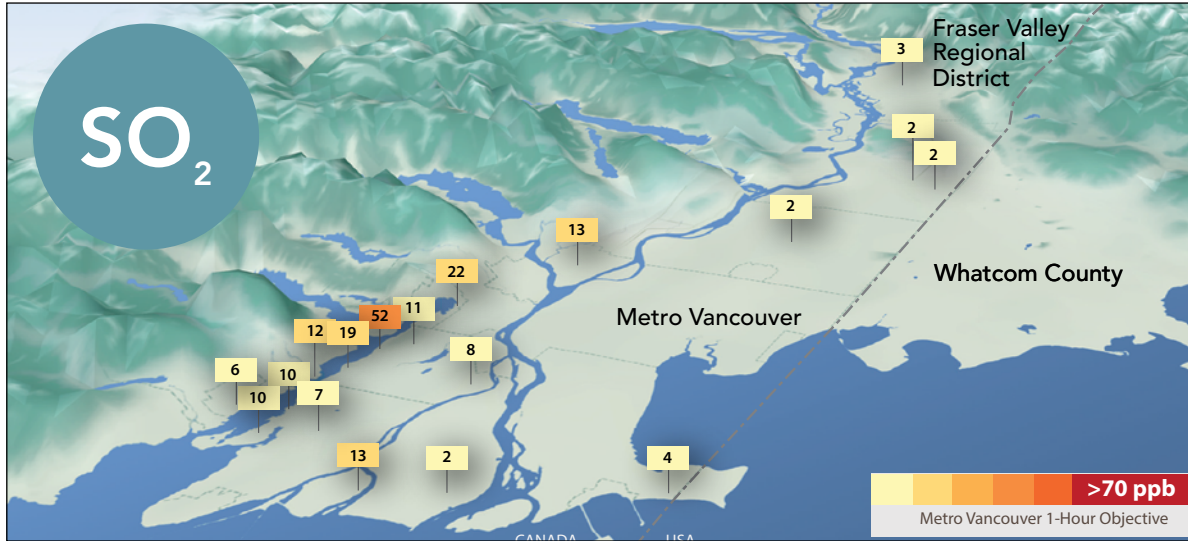


Fine particulate matter (PM_{2.5}) measurements exceeded Metro Vancouver's 24-hour objective (25 µg/m³) at all stations in 2023, as shown on the map. In June, wildfire smoke contributed to exceedances in Hope, Abbotsford, and Mission. In August, more stations exceeded the objective due to smoke from wildfires throughout BC. However, PM_{2.5} measurements did not exceed Metro Vancouver's annual objective at any of the monitoring stations.

The 24-hour Canadian Ambient Air Quality Standard* was exceeded at Chilliwack, Hope, and Agassiz. This was mainly due to wildfire smoke in the region.

**Calculated using data from 2021, 2022, and 2023 without removing exceptional events, such as wildfires.*

SULPHUR DIOXIDE IN 2023



Peak sulphur dioxide (SO₂) levels based on the highest one-hour average, as shown on the map, were below Metro Vancouver's one-hour objective (70 ppb) at all stations in 2023. Annual SO₂ averages were below both Metro Vancouver's annual objective (5 ppb) and the Canadian Ambient Air Quality Standard (5 ppb) in 2023.

Nitrogen dioxide concentrations were below Metro Vancouver's annual objective (17 ppb) at all monitoring stations in 2023, as shown on the map. Most of the region's nitrogen oxide emissions (which include nitrogen dioxide) come from transportation sources, and the highest average nitrogen dioxide concentrations were measured near busy roads.

Nitrogen dioxide concentrations were also below Metro Vancouver's hourly objective (60 ppb) at all monitoring stations except for North Vancouver-Second Narrows. Measurements at this station were likely influenced by nearby construction activities.

NITROGEN DIOXIDE IN 2023

