



Air

Status of Ground-Level Ozone in B.C. (2011-2013)

British Columbia operates a network of air monitoring stations that measure ground-level ozone and other air pollutants. This indicator reports on the concentration of ground-level ozone from 2011-2013 and compares it to the [Canadian Ambient Air Quality Standards \(CAAQS\)](#) developed by the [Canadian Council of Ministers of the Environment](#).

Ground-Level Ozone Canadian Ambient Air Quality Standard (CAAQS)

- The CAAQS ozone metric should be **lower than 63 parts per billion**.
- The **CAAQS ozone metric** is the 3-year average of the annual 4th-highest daily maximum 8-hour rolling average concentration of ozone.

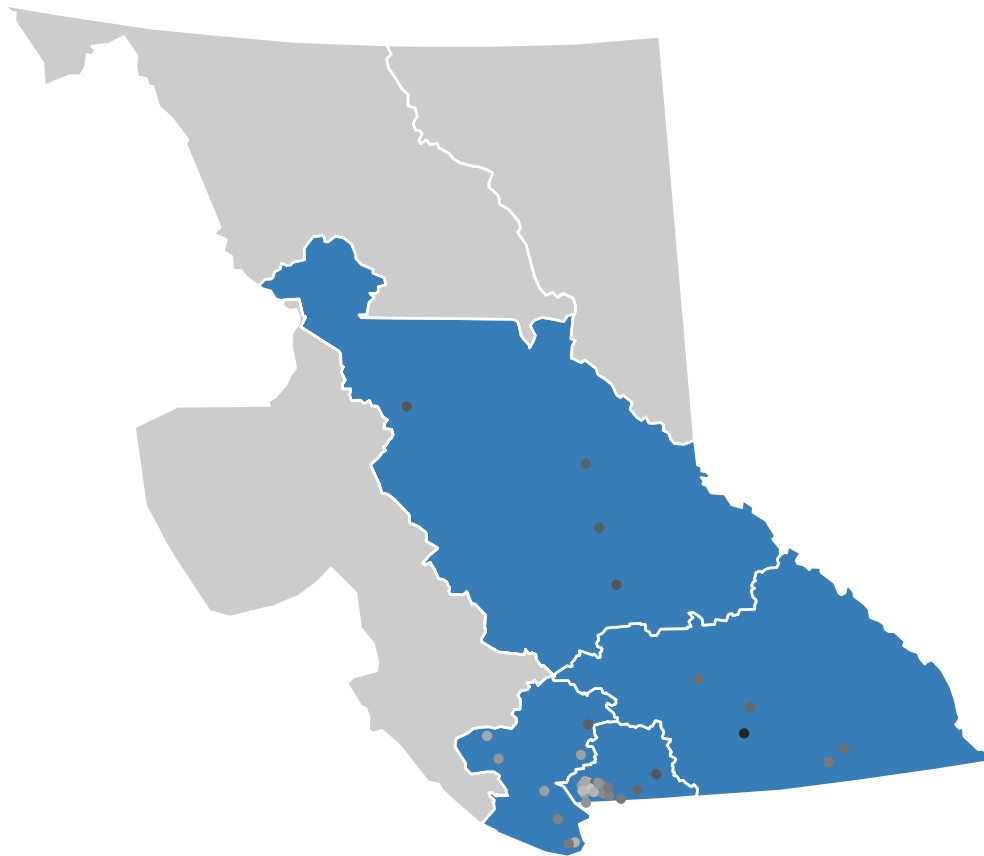
[Learn more about CAAQS ozone metric calculations.](#)

- **Ground-level ozone is an air pollutant.** While ozone in the Earth's atmosphere occurs naturally, additional ozone at the ground level is a pollutant. It forms through chemical reactions involving nitrogen oxides and volatile organic compounds in the presence of sunlight.
- **Ground-level ozone can be harmful to humans.** Exposure to ground-level ozone (hereafter ozone) can reduce lung function and cause inflammation of airways, which can increase respiratory symptoms and aggravate asthma¹. These effects are linked to more emergency room visits, hospitalizations, and absenteeism, and higher health care costs².
- **Ozone levels met the Canadian Ambient Air Quality Standard at all B.C. ozone monitoring stations.** The CAAQS ozone metric from the 37 stations ranged from 38 to 60 parts per billion (ppb). Metric values were ≤ 50 ppb at 25 reporting stations (68%). No stations reported CAAQS metric values > 60 ppb.
- **Ozone levels met the Canadian Ambient Air Quality Standard in four of B.C.'s seven air zones.** There was not enough data to estimate the CAAQS ozone metric for the remaining three air zones for this reporting period. The ozone level for an air zone is the highest CAAQS ozone metric value reported from monitoring stations within the air zone.


- **CAAQS ozone metrics are used to set management levels for each air zone.** Four management levels (green, yellow, orange, and red) are each associated with a suite of actions that become more rigorous as ozone metric values approach the Canadian Ambient Air Quality Standard.

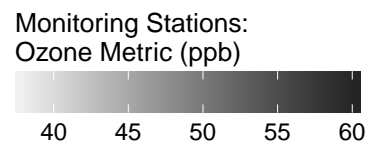
The map and chart below summarise the Canadian Ambient Air Quality Standard (CAAQS) achievement status for ozone in B.C. air zones, as well as the individual monitoring stations across the province. Summaries are given for each monitoring station where sufficient data was available for the 2011-2013 reporting period.

Status of Ozone Levels in B.C. Air Zones (2011–2013)

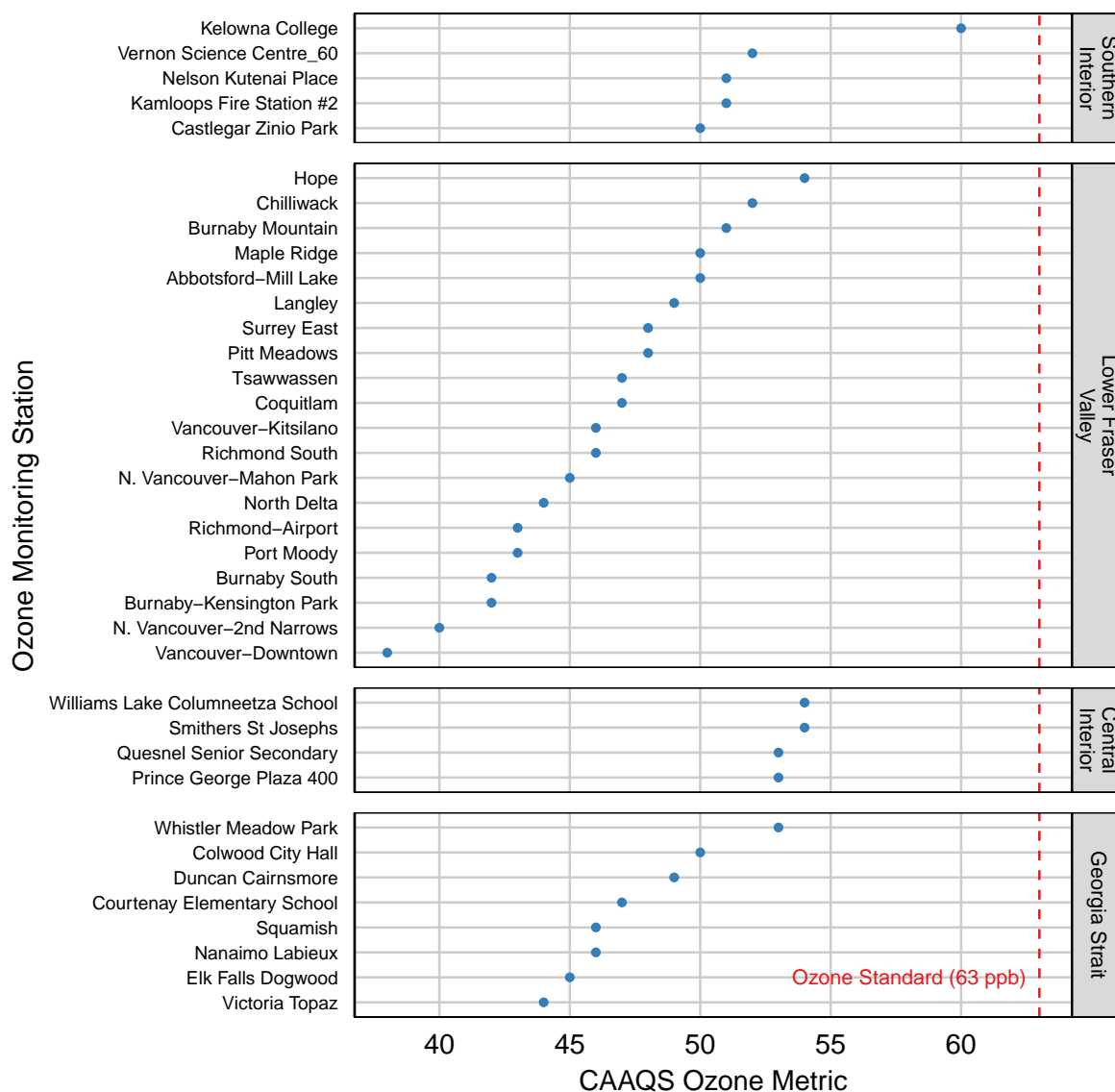


Airzones:
Ozone Air Quality Standard

	Insufficient Data		Achieved		Not Achieved
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Ozone Metric for Air Monitoring Stations within B.C. Air Zones



More about the CAAQS ozone metric:

- The CAAQS ozone metric is measured as the 3-year average of the annual 4th-highest daily maximum 8-hour rolling average concentration.
- The ozone level for an air zone is the highest CAAQS ozone metric value reported from monitoring stations within the air zone. However, stations with metric values based on only two years of data are excluded for consideration of the *air zone* metric value.
- Only air monitoring stations with sufficient data on ozone concentrations for the 2011-2013 reporting period were included in this indicator. Visit [B.C Air Quality](#) for a

complete list of air monitoring stations across B.C.

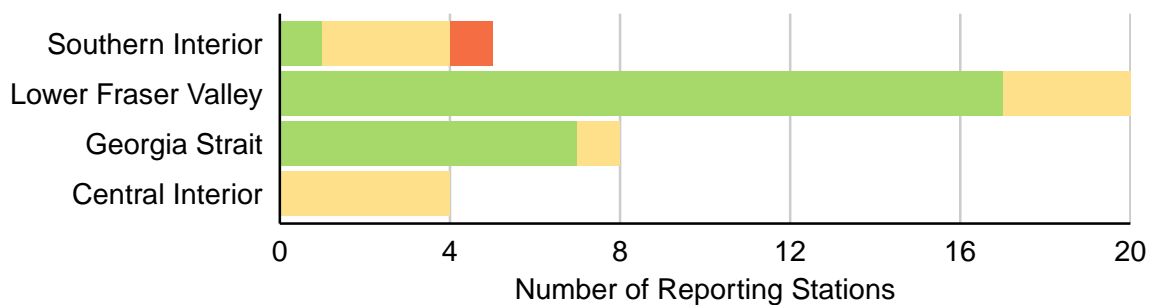
- Data completeness and sufficiency criteria for the CAAQS ozone metric are described in the [Guidance Document on Achievement Determination: Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone \(2012\)](#).

Canada-wide Air Quality Management System

The Air Quality Management System (AQMS) is Canada's approach for protecting air quality. Under the AQMS, provinces and territories monitor, report and manage local air quality within air zones, with the goal of continuously improving air quality and keeping pollutants below the Canadian Ambient Air Quality Standards (CAAQS).

- Provinces and territories establish air zones that are defined by a similar set of air quality characteristics, issues and trends.
- There are seven air zones in British Columbia: Coastal, Georgia Strait, Lower Fraser Valley, Southern Interior, Central Interior, Northeast and Northwest.
- The Air Zone Management Framework defines management levels based on the highest CAAQS ozone metric value reported from monitoring stations within the air zone.
- The four management levels include: (1) green (actions for keeping clean areas clean); (2) yellow (actions for preventing air quality deterioration); (3) orange (actions for preventing CAAQS exceedance); and (4) red (actions for achieving air zone CAAQS). Each management level is associated with a suite of actions that become more rigorous as ozone concentration levels approach the CAAQS.
- All four B.C. air zones that were assessed met the Canadian Ambient Air Quality Standard for ground-level ozone (≤ 63 ppb).
- Based on the highest CAAQS ozone metric value reported within each air zone, the Central Interior, Georgia Strait, and Lower Fraser Valley air zones were assigned to a yellow management level (actions for preventing air quality deterioration) and the Southern Interior air zone to an orange management level (actions for preventing CAAQS exceedance). Due to insufficient data, ozone management levels in the Coastal, Northwest and Northeast air zones are yet to be determined.
- Actions for each management level are detailed in the [CCME Guidance Document on Air Zone Management \(2012\)](#).

Management Levels for Ozone in B.C. Air Zones



Air Zone Management Levels

- Actions for Achieving Air Zone CAAQS (>63 ppb)
- Actions for Preventing CAAQS Exceedance (>56 & <=63 ppb)
- Actions for Preventing Air Quality Deterioration (>50 & <=56 ppb)
- Actions for Keeping Clean Areas Clean (<=50 ppb)

More about the AQMS management levels:

- There can be cases when an air zone does not achieve a given CAAQS because of sources over which jurisdictions have little or no control, such as those related to transboundary flows and exceptional events like forest fires.
- Prior to determining management levels, jurisdictions have the option of adjusting their air zone metric values to remove such external influences. These arrangements aim to ensure that jurisdictions are responsible for managing only the emissions sources they can control.
- For the 2011-2013 reporting period, all ozone monitoring stations met the CAAQS and no adjustments for transboundary or exceptional events were warranted. Air zone management levels for ground-level ozone were determined directly from the CAAQS ground-level ozone metric for this reporting period.

Methods

The methods used to develop this indicator — including procedures, data requirements, and calculation of the CAAQS ozone metric — are detailed in the [CCME Guidance Document on Achievement Determination: Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone \(2012\)](#). **R package and code:** We have developed an R package to facilitate the calculation of air quality metrics according to the Canadian Ambient Air Quality Standards CAAQS. Download the 'rcaaq' package from [GitHub](#). The source code for repeating the analysis presented on this page is also available on [GitHub](#).

References and Other Useful Links

Visit [BC Air Quality](#) for more information on the implementation of the AQMS in B.C., and to read individual Air Zone reports on the achievement of CAAQS for ground-level ozone and fine particulate matter.

Access [B.C.'s Air Quality Readings](#) for real-time data on air pollutants and locations of all air monitoring stations in B.C.

For more details on the CAAQS and Canada's Air Quality Management System visit [Canada-wide Air Quality Management System \(AQMS\)](#)

[BC Lung Association's BC State of the Air Reports](#)

¹[United States Environmental Protection Agency. February 2013. Integrated Science Assessment of Ozone and Related Photochemical Oxidants \(600/R-10/076F\)](#)

²Willey, J., N. Gilbert, and N. Lyrette. 2004. Human health effects of ozone: Update in support of the Canada-wide standards for particulate matter and ozone. Revised

version. Working paper prepared for Canadian Council of Ministers of the Environment. Health Canada. Ottawa, Ontario: Health Canada

Data

*By accessing these datasets, you agree to the license associated with each file, as indicated in parentheses below.

- [Indicator data: BC Ozone CAAQS 2011-2013](#) (License: B.C. OGL)
- [Hourly ozone data](#) (License: B.C. OGL)
- [BC Air Monitoring Stations](#) (License: B.C. OGL)
- [BC Air Zones](#) (License: B.C. OGL)

Published and Available On-Line at Environmental Reporting BC (August 2015): <http://www.env.gov.bc.ca/soe/indicators/air/ozone.html>

Email correspondence to: envreportbc@gov.bc.ca

Appendix: Detailed CAAQS results for each monitoring station within air zones in B.C.

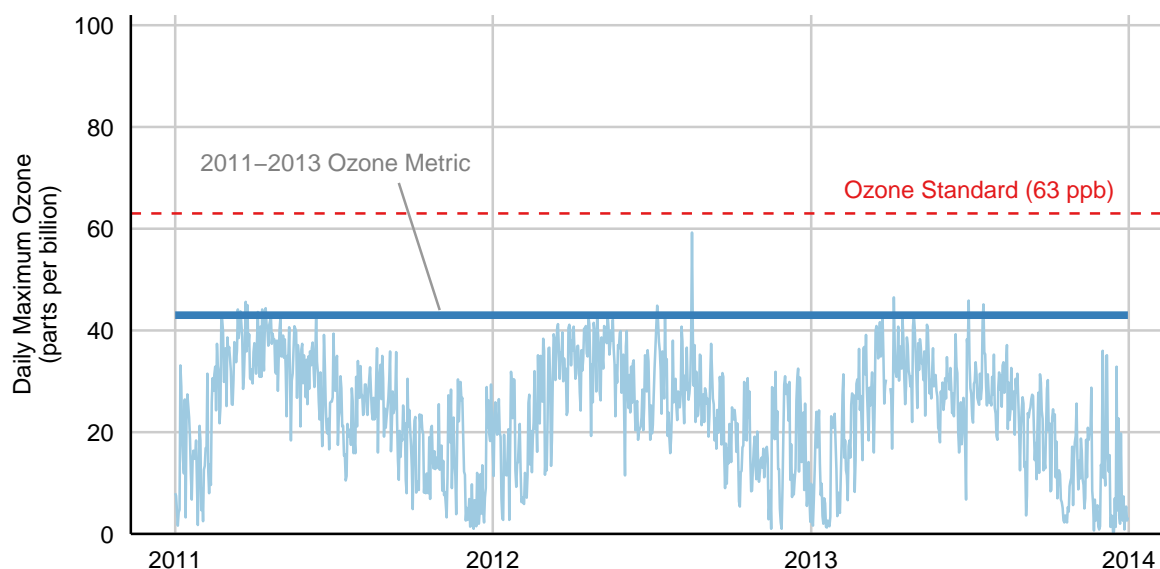
Lower Fraser Valley Air Zone

Port Moody monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 43 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

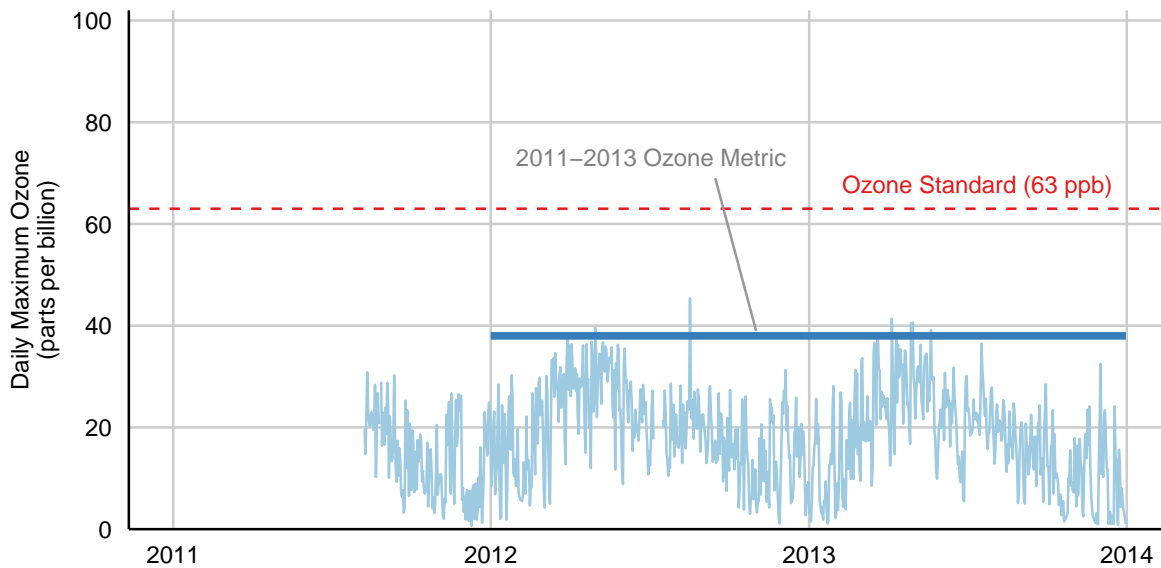


Vancouver-Downtown monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 38 ppb (2 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

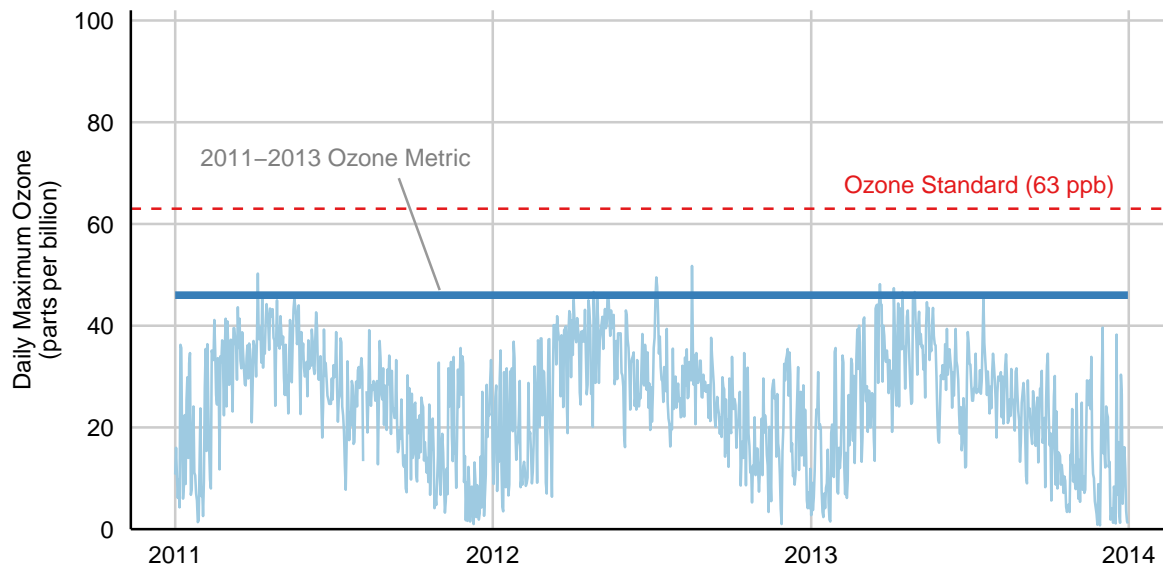


Vancouver-Kitsilano monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 46 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

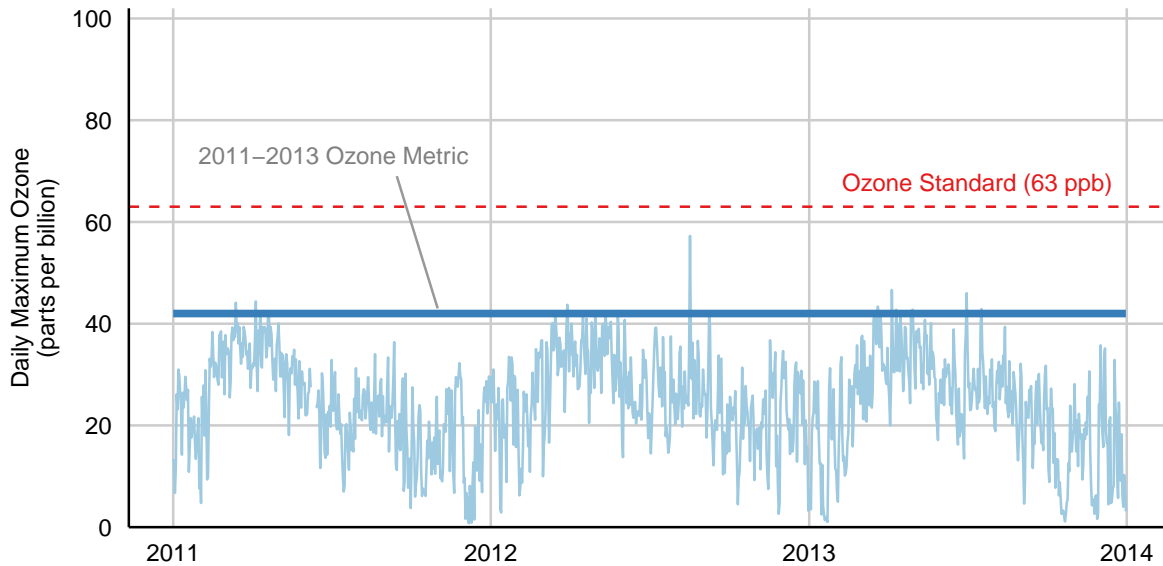


Burnaby-Kensington Park monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 42 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

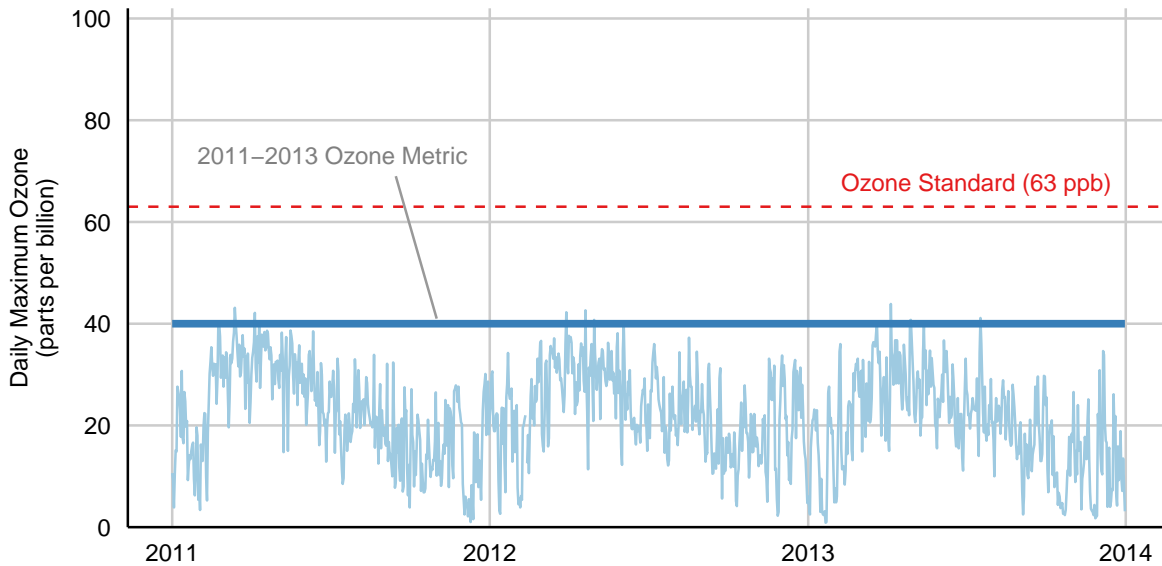


N. Vancouver-2nd Narrows monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 40 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

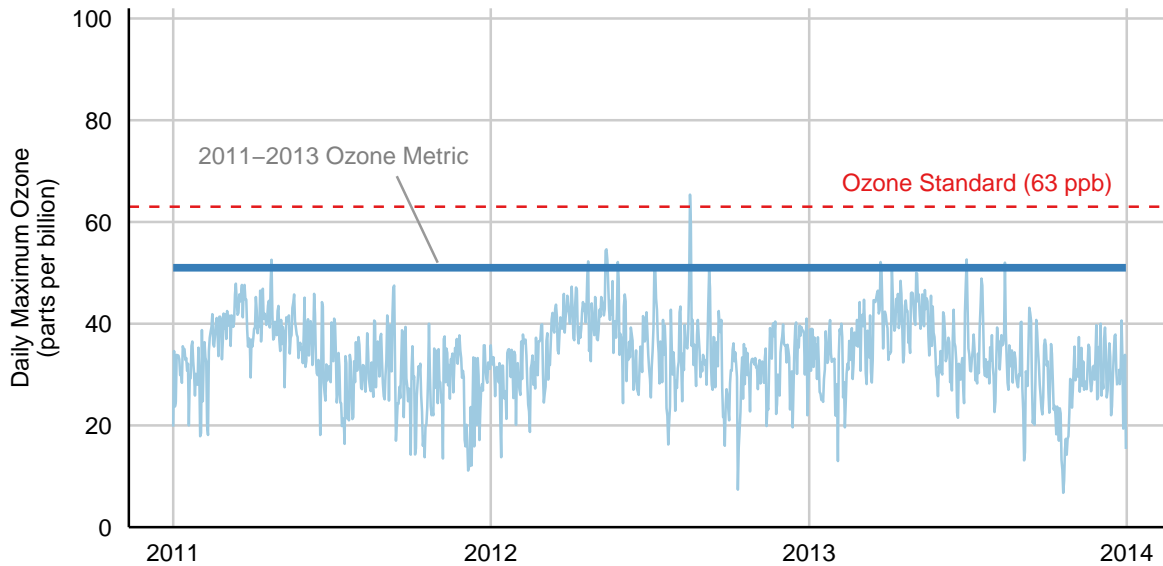


Burnaby Mountain monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 51 ppb (3 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration

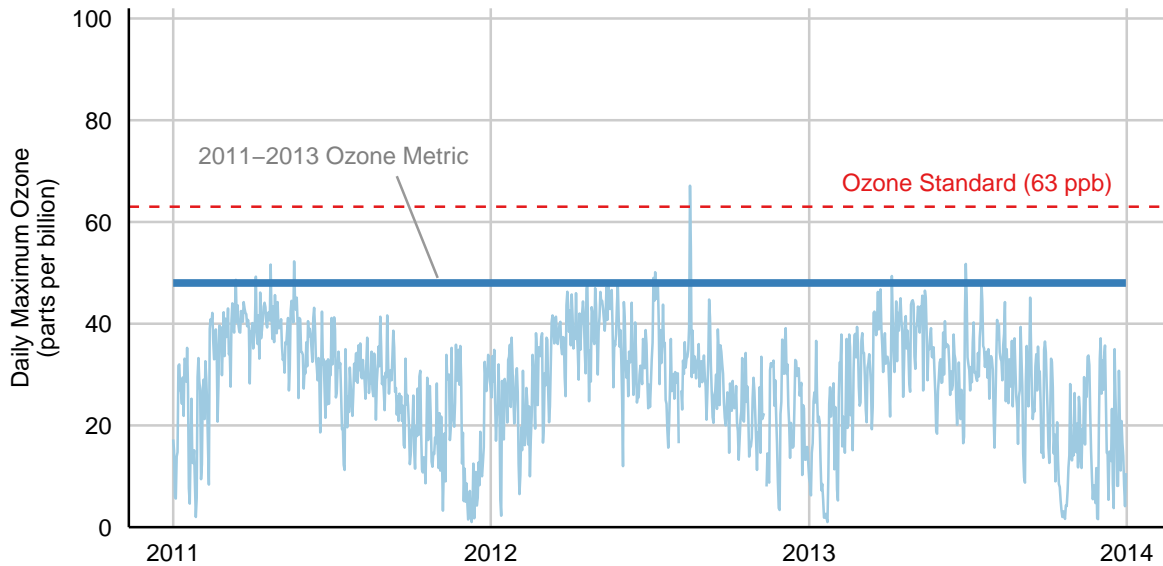


Surrey East monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 48 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

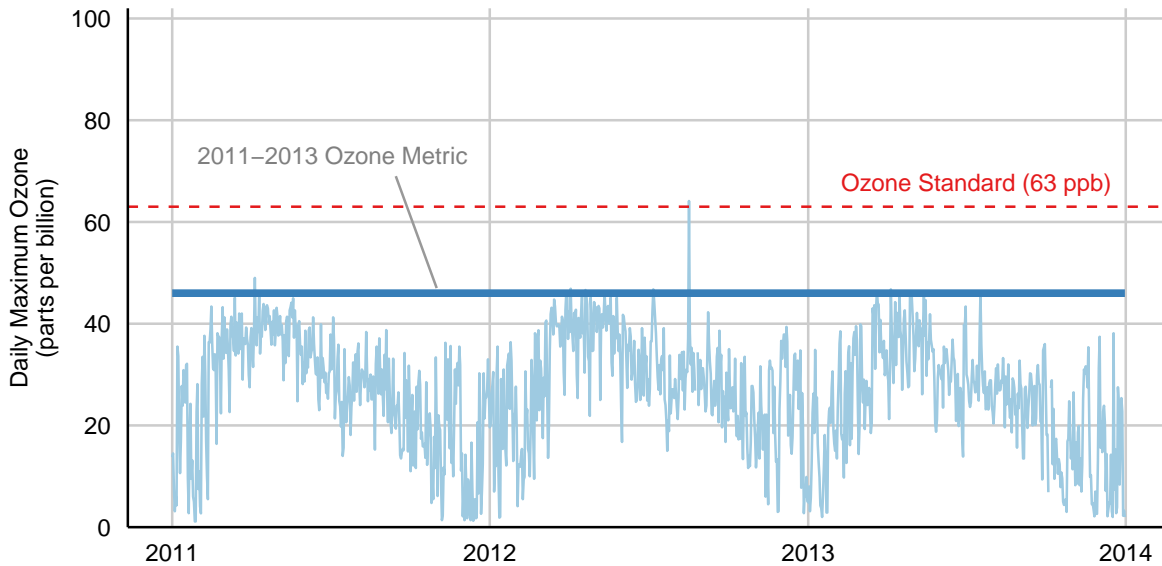


Richmond South monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 46 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

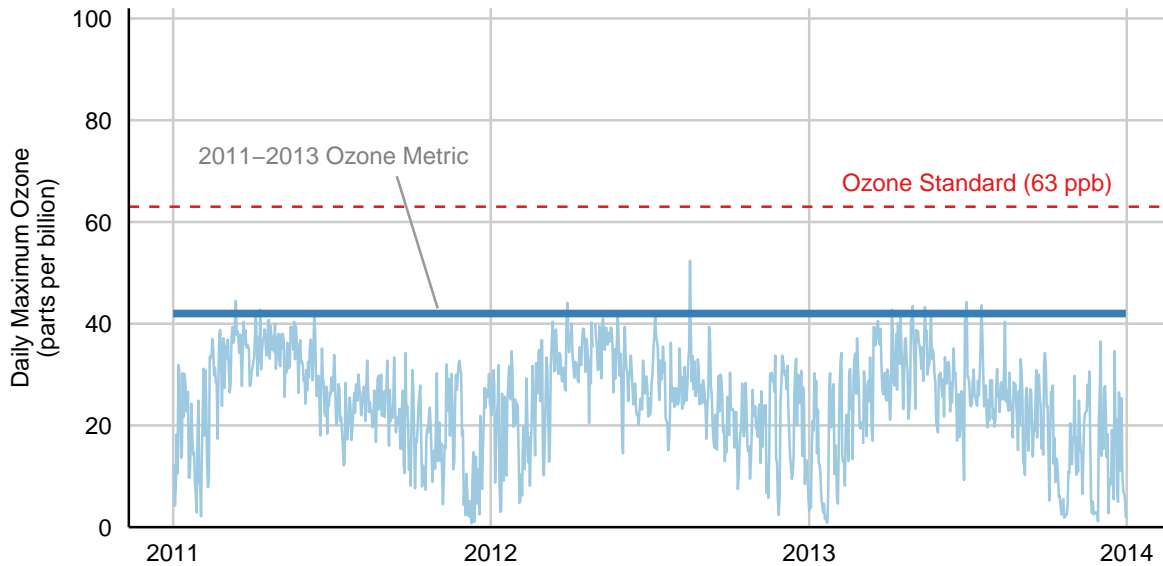


Burnaby South monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 42 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

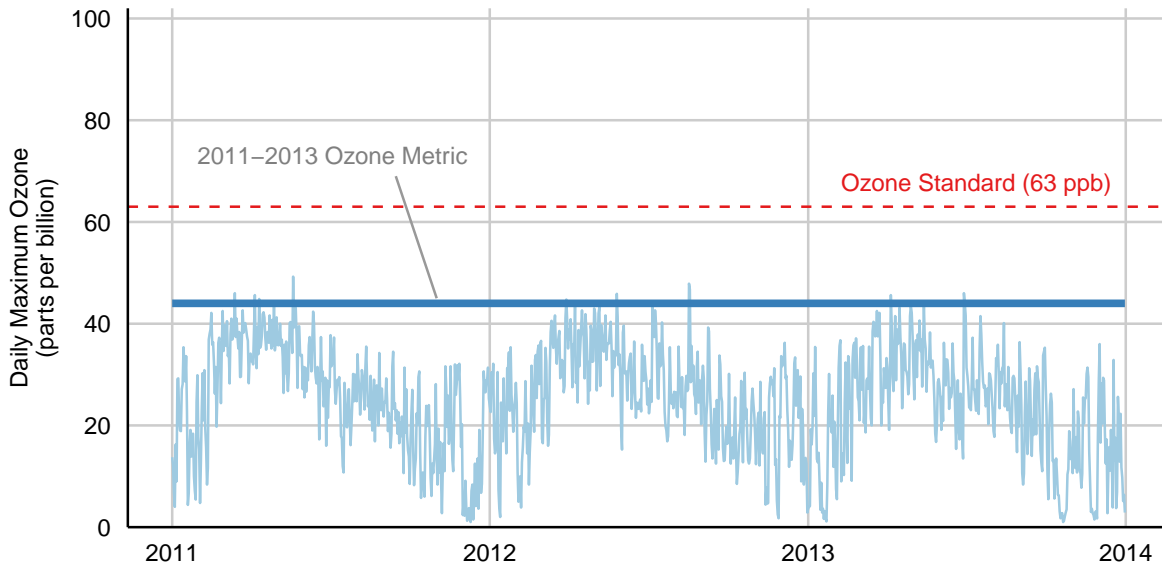


North Delta monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 44 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

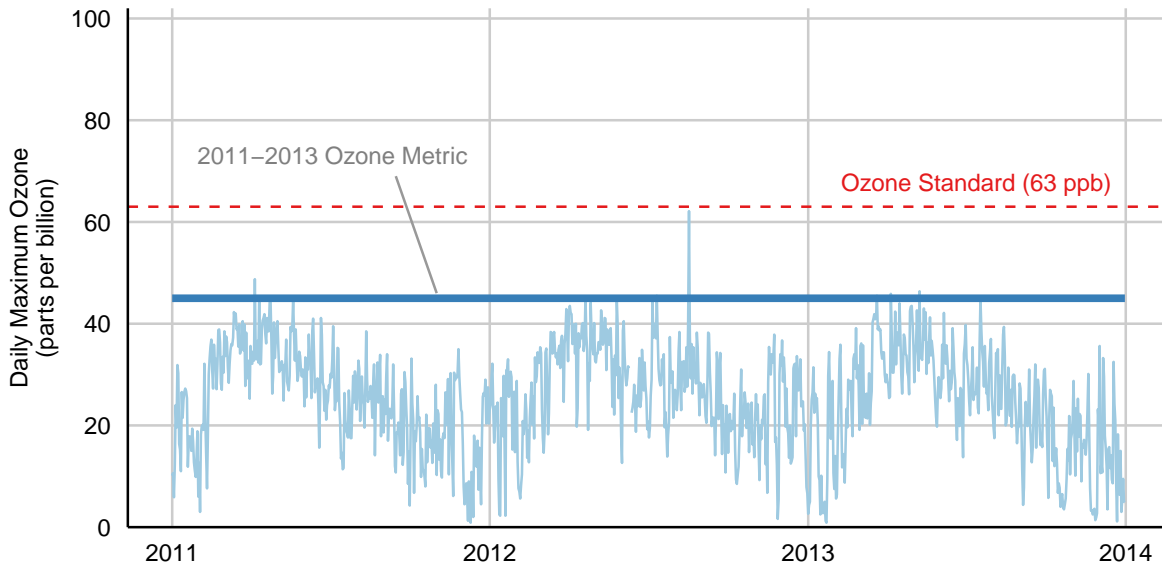


N. Vancouver-Mahon Park monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 45 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

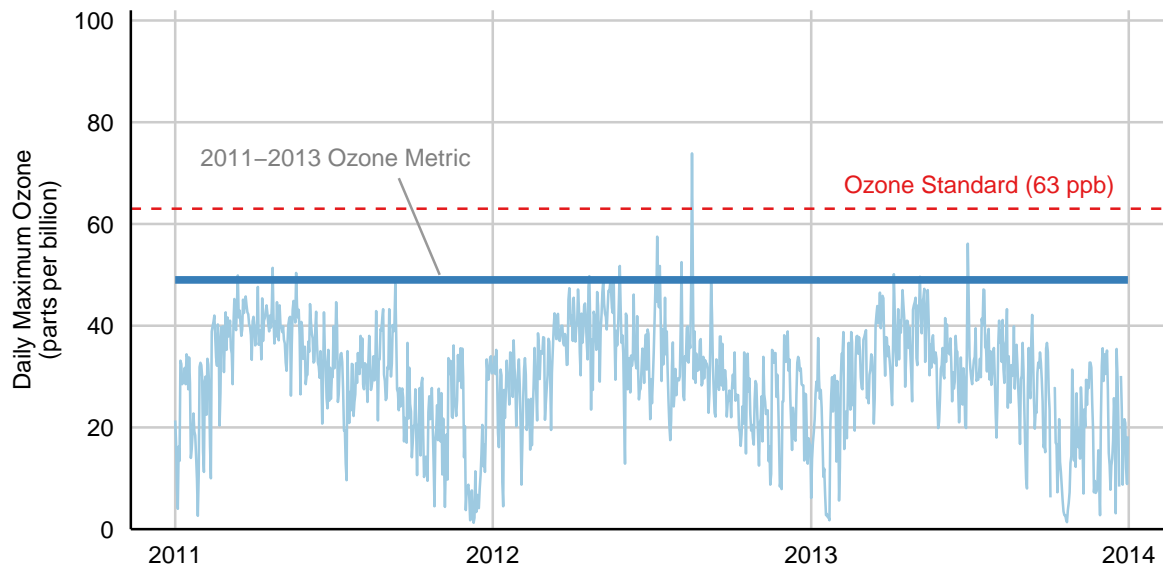


Langley monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 49 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

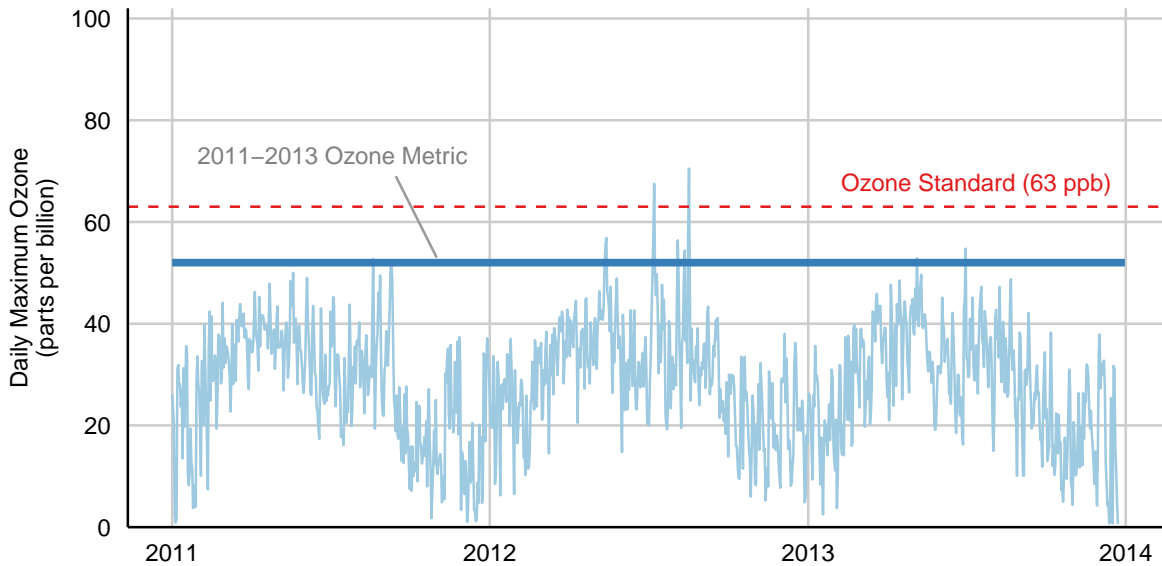


Chilliwack monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 52 ppb (3 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration

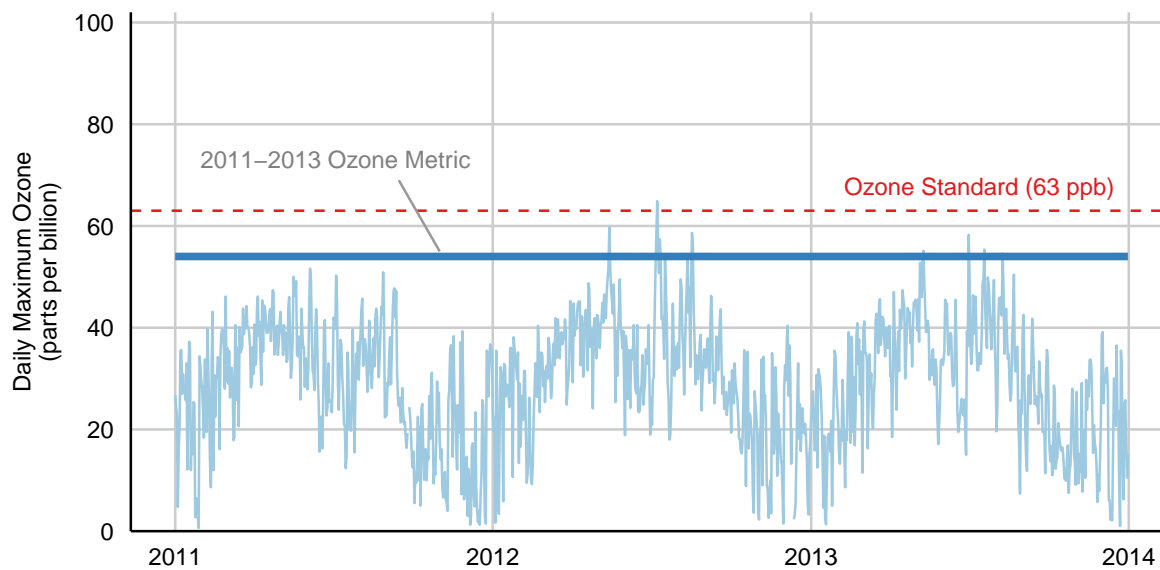


Hope monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 54 ppb (3 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration

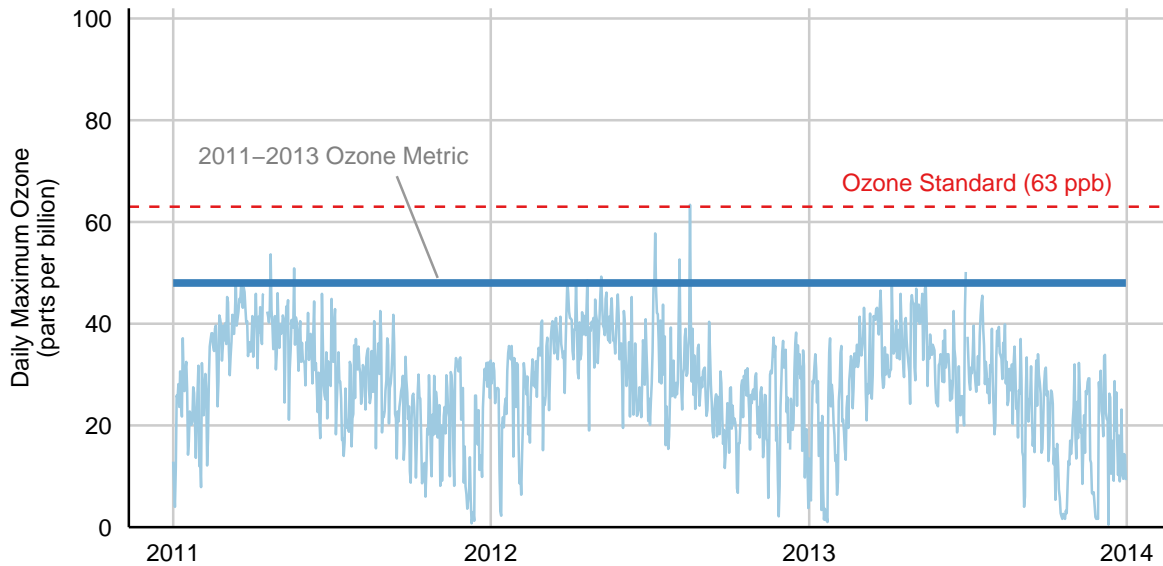


Pitt Meadows monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 48 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

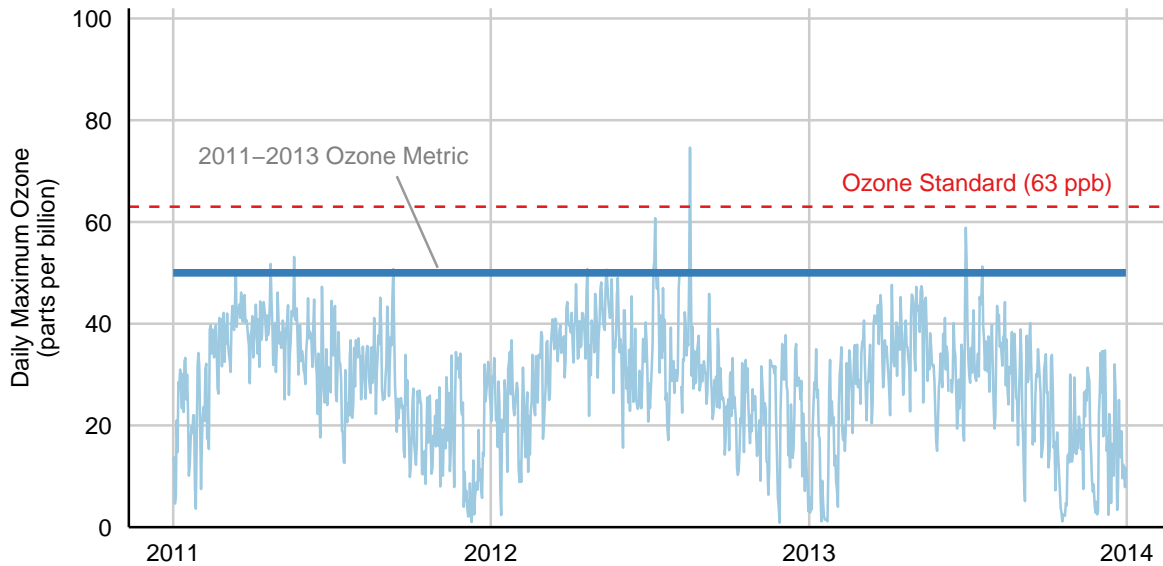


Maple Ridge monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 50 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

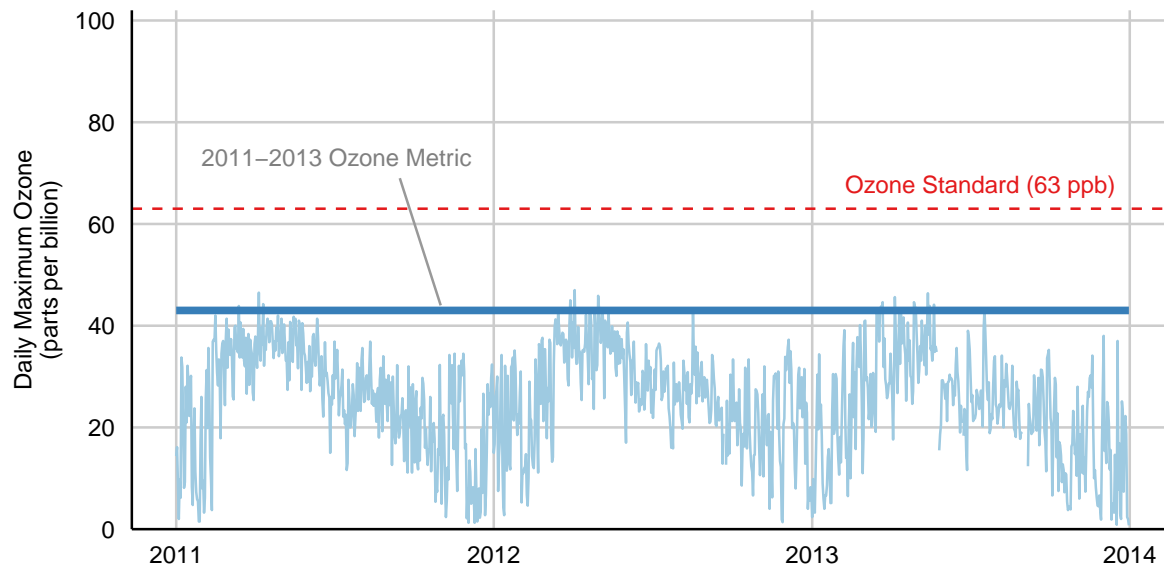


Richmond-Airport monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 43 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

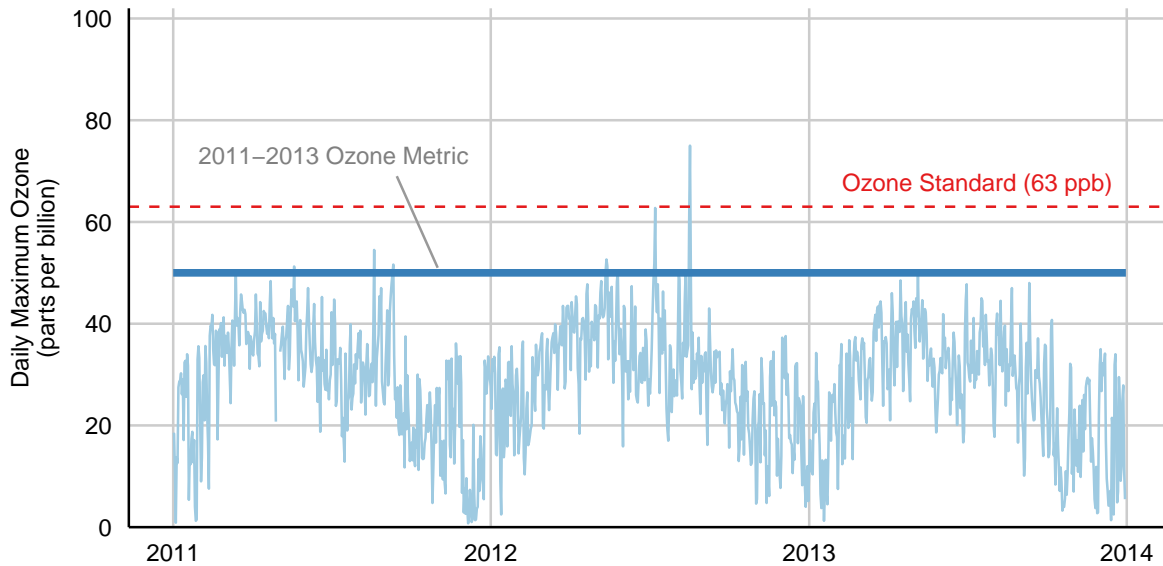


Abbotsford-Mill Lake monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 50 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

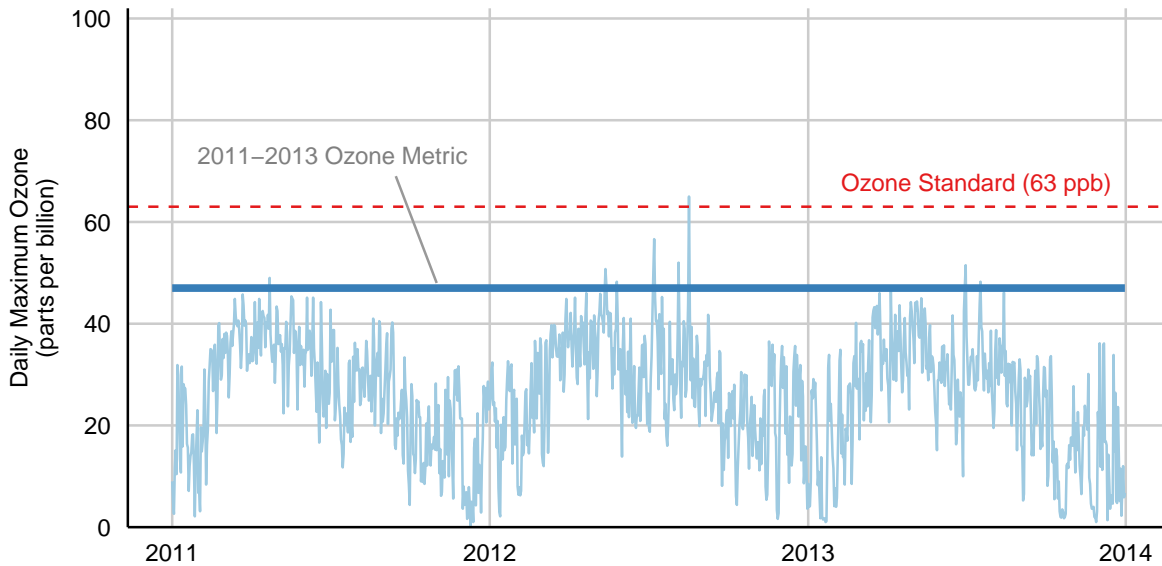


Coquitlam monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 47 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

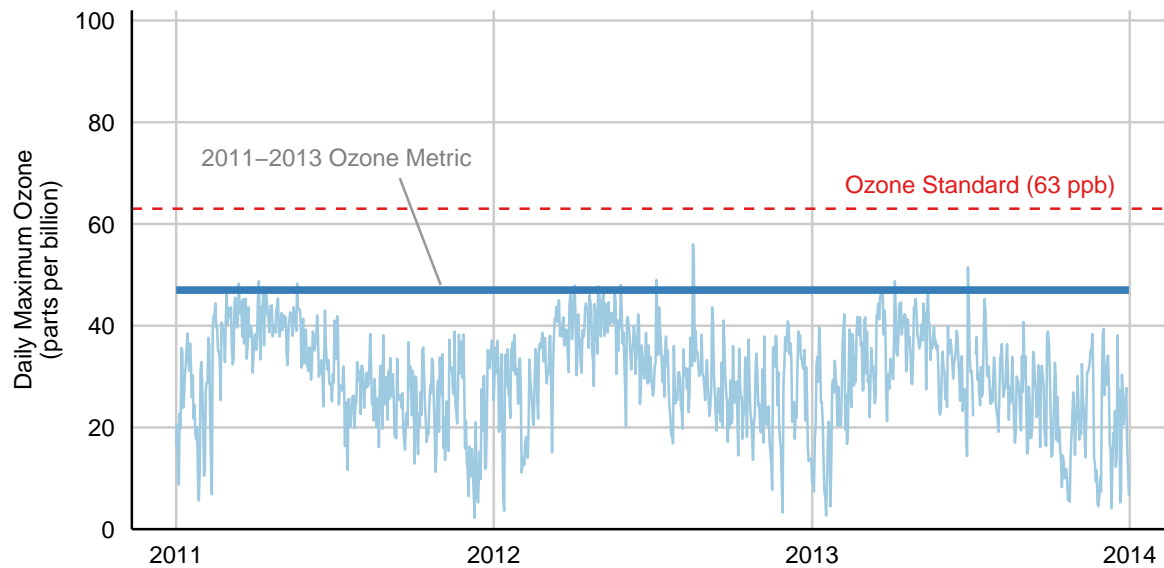


Tsawwassen monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 47 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean



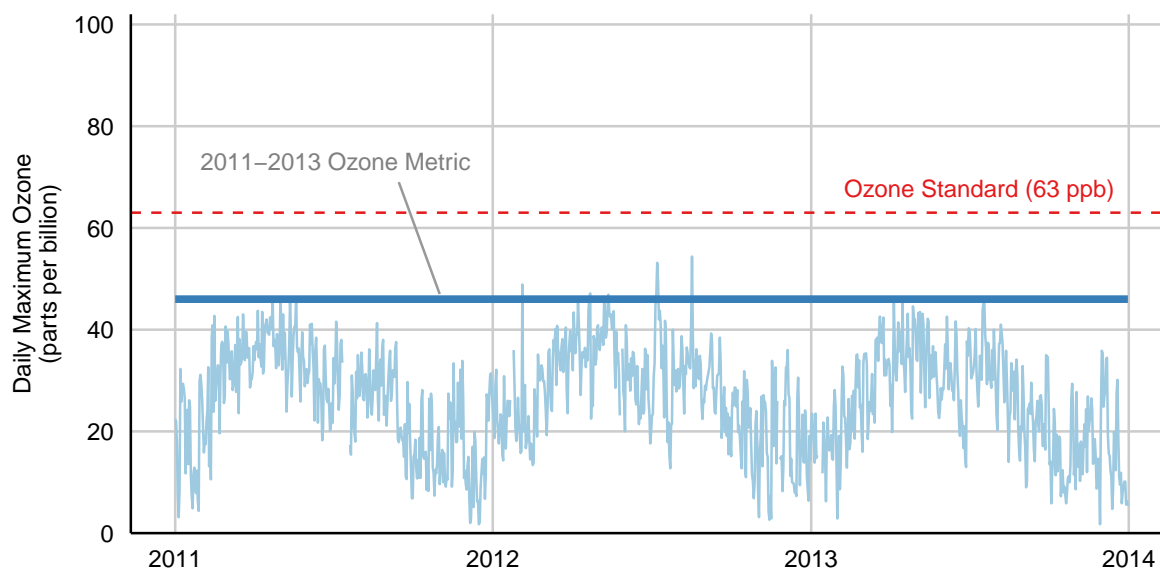
Georgia Strait Air Zone

Squamish monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 46 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

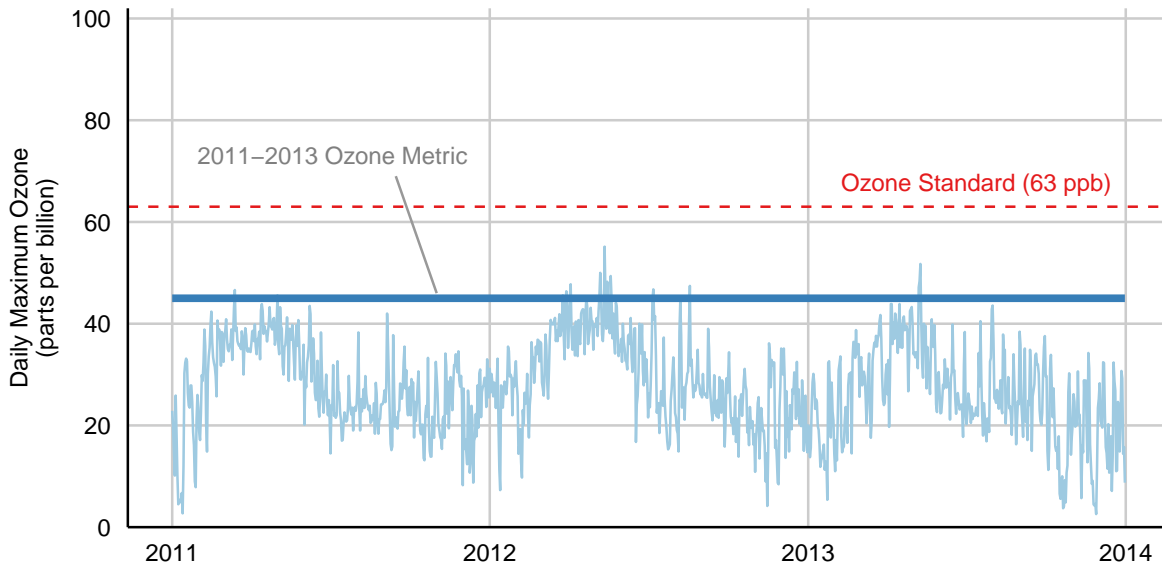


Elk Falls Dogwood monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 45 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

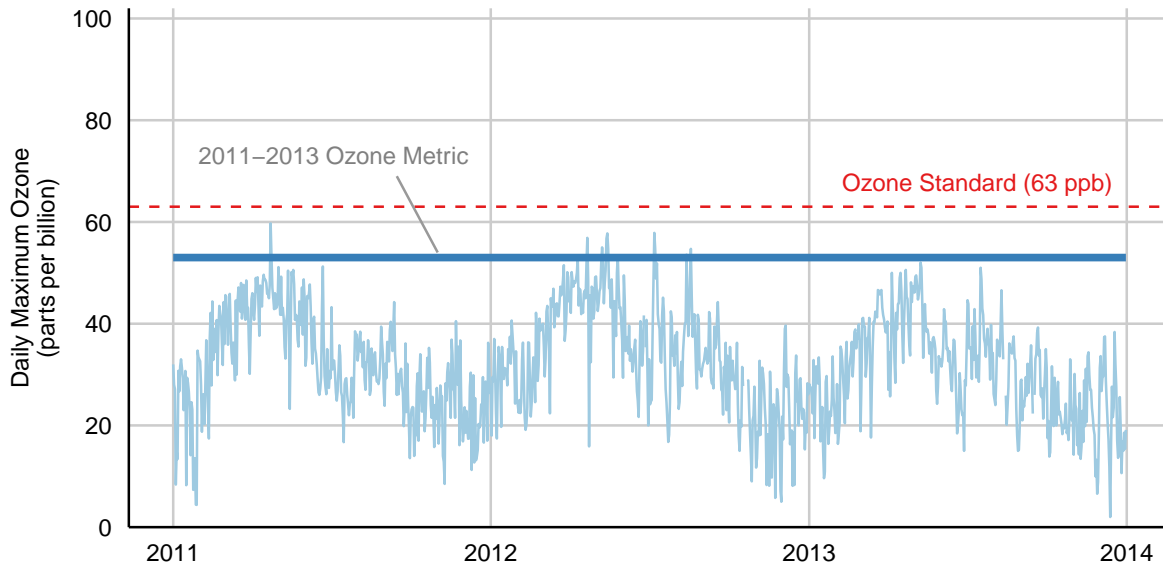


Whistler Meadow Park monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 53 ppb (3 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration

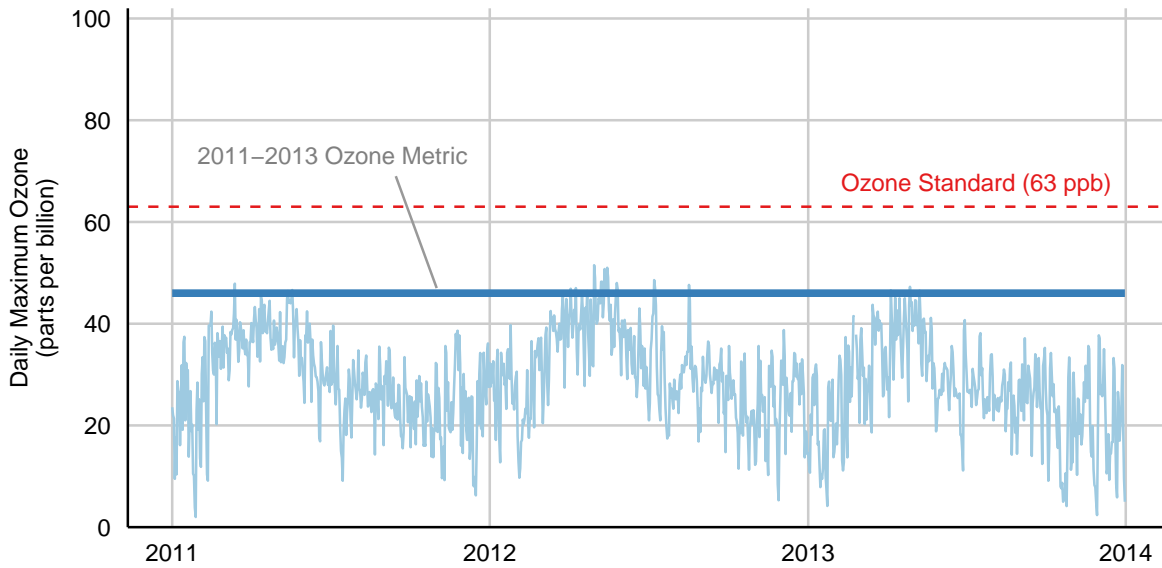


Nanaimo Labieux monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 46 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

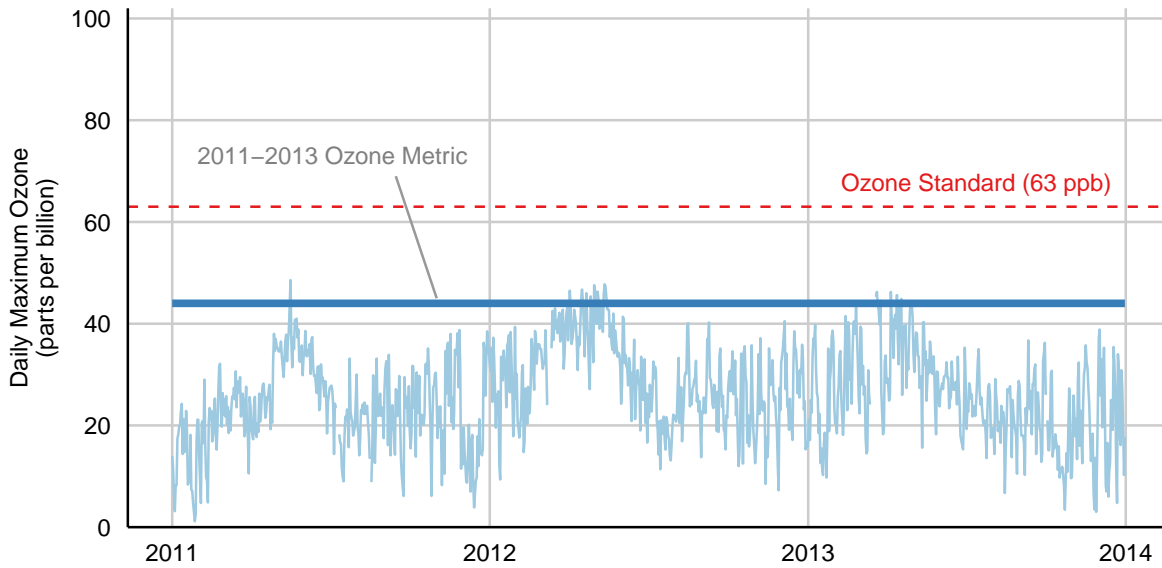


Victoria Topaz monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 44 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

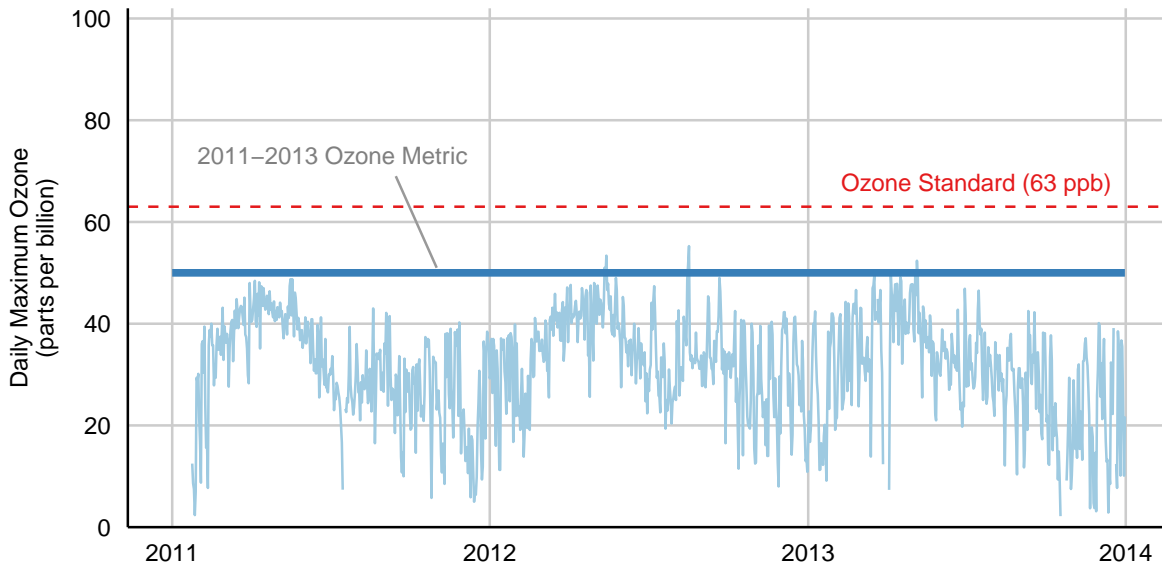


Colwood City Hall monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 50 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

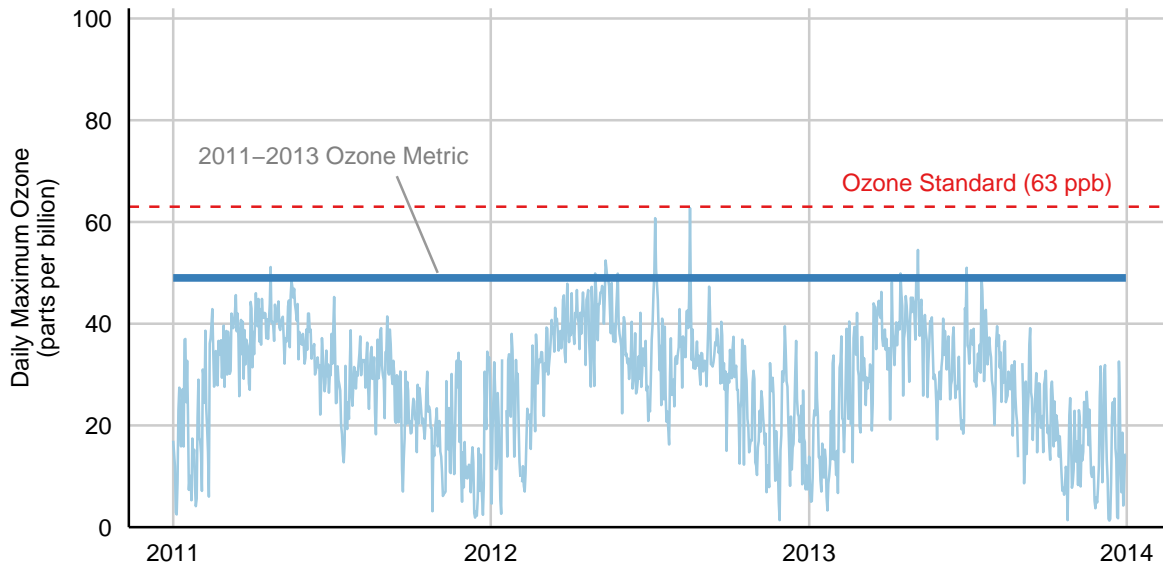


Duncan Cairnsmore monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 49 ppb (3 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

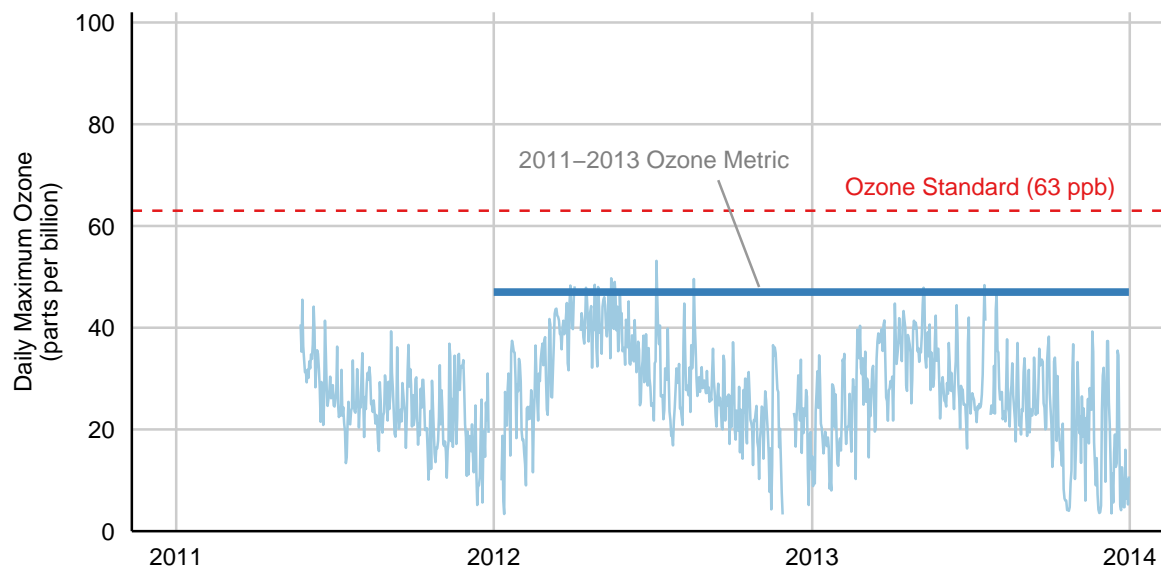


Courtenay Elementary School monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 47 ppb (2 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean



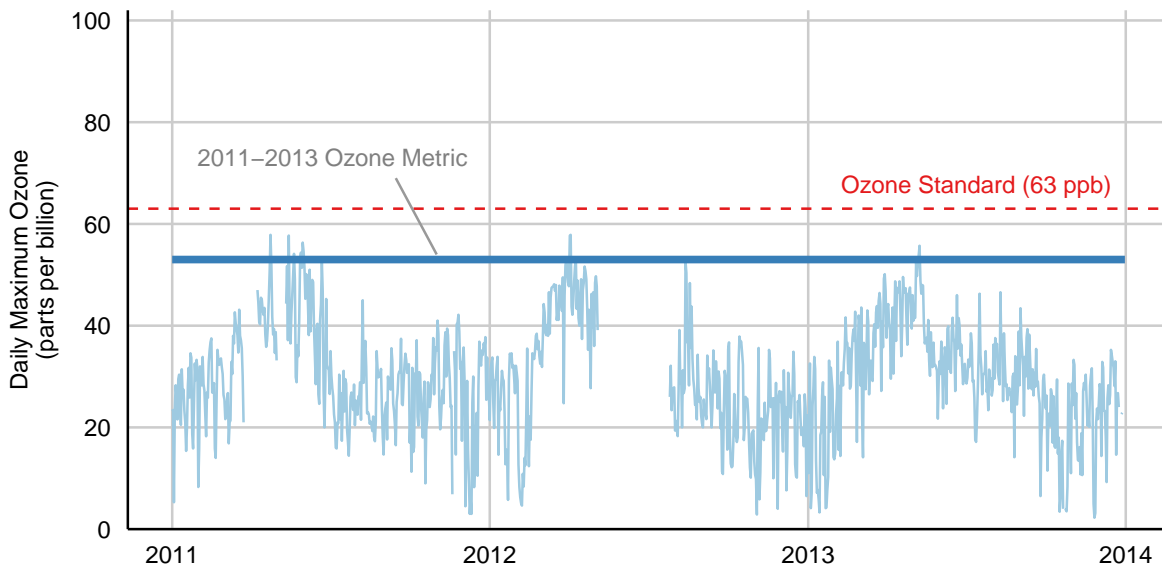
Central Interior Air Zone

Prince George Plaza 400 monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 53 ppb (2 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration

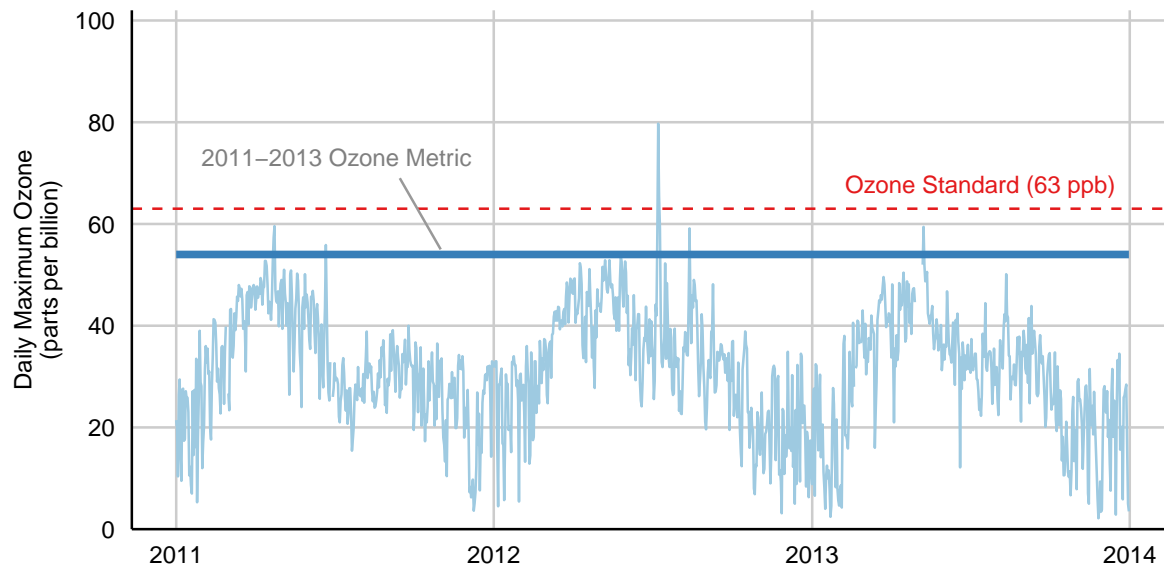


Williams Lake Columneetza School monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 54 ppb (3 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration

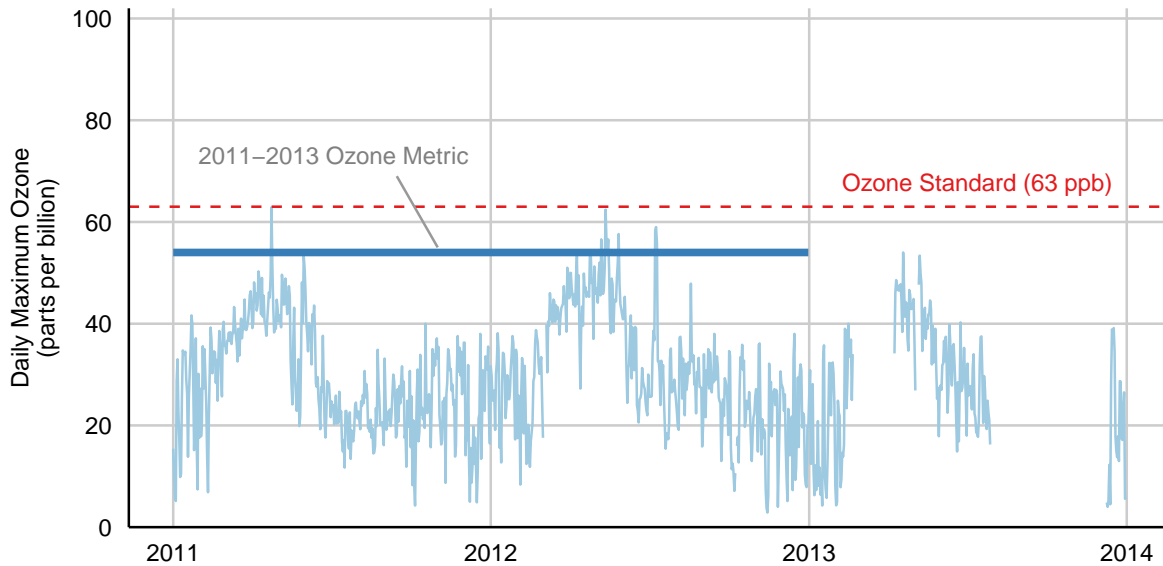


Smithers St Josephs monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 54 ppb (2 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration

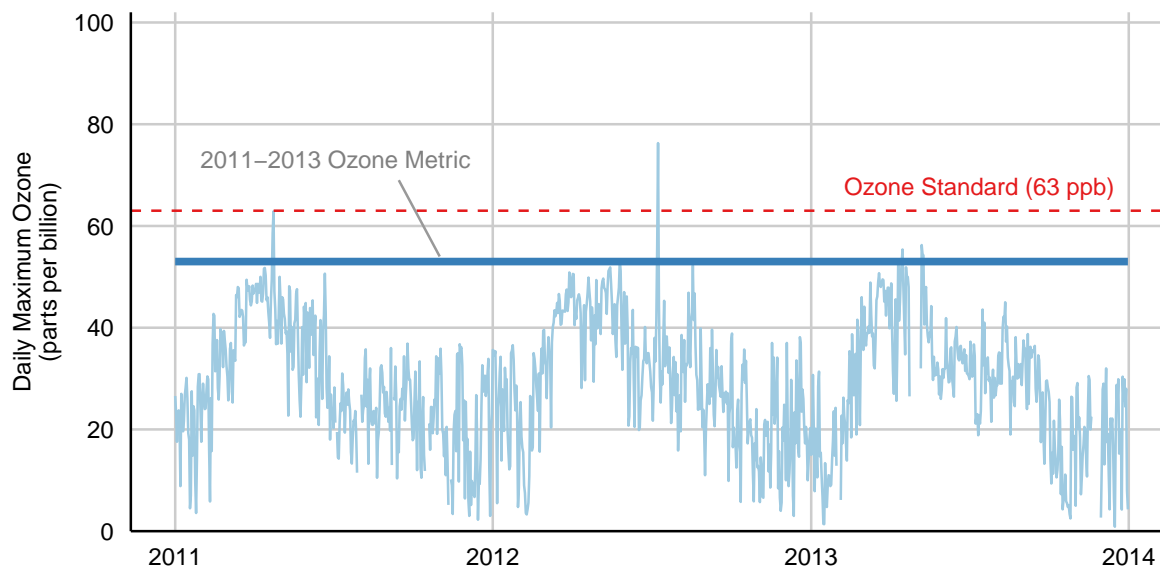


Quesnel Senior Secondary monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 53 ppb (3 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration



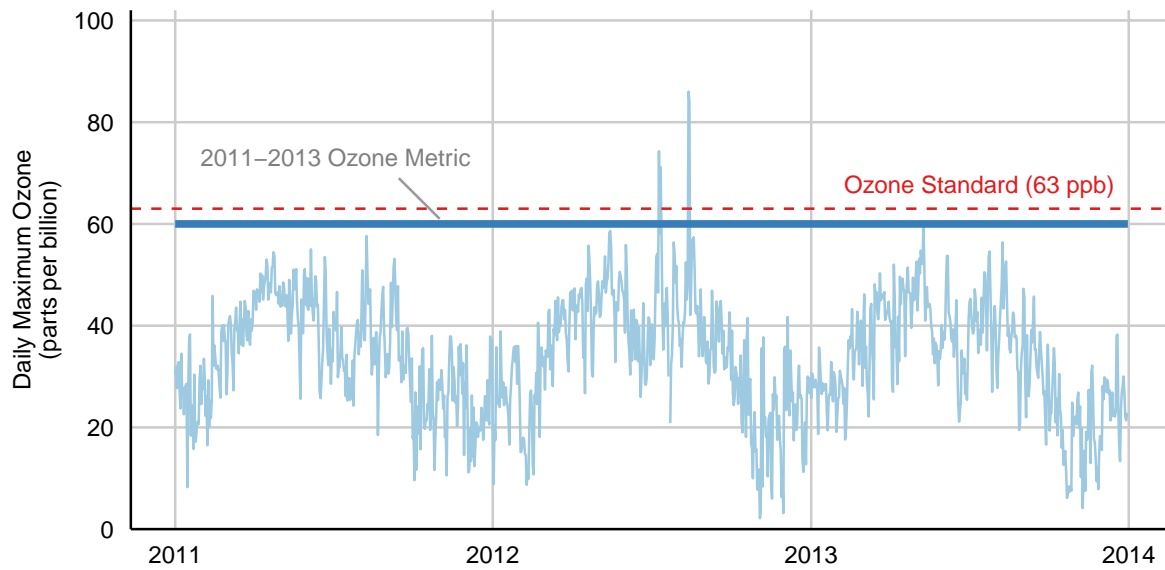
Southern Interior Air Zone

Kelowna College monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 60 ppb (3 year average)

Air Quality Management Level: Actions for Preventing CAAQS Exceedance

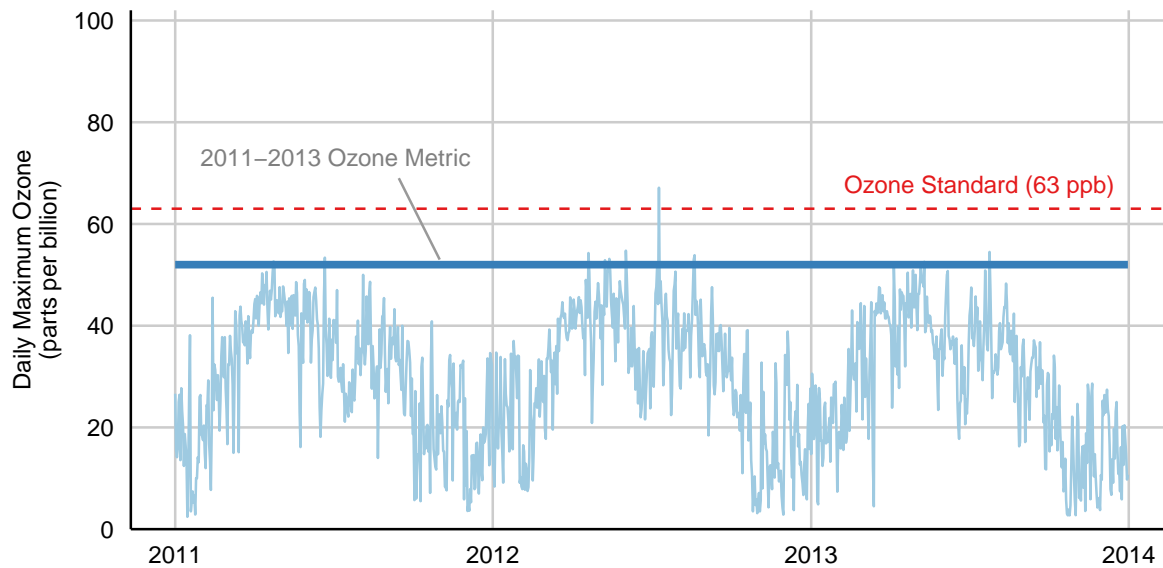


Vernon Science Centre_60 monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 52 ppb (3 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration

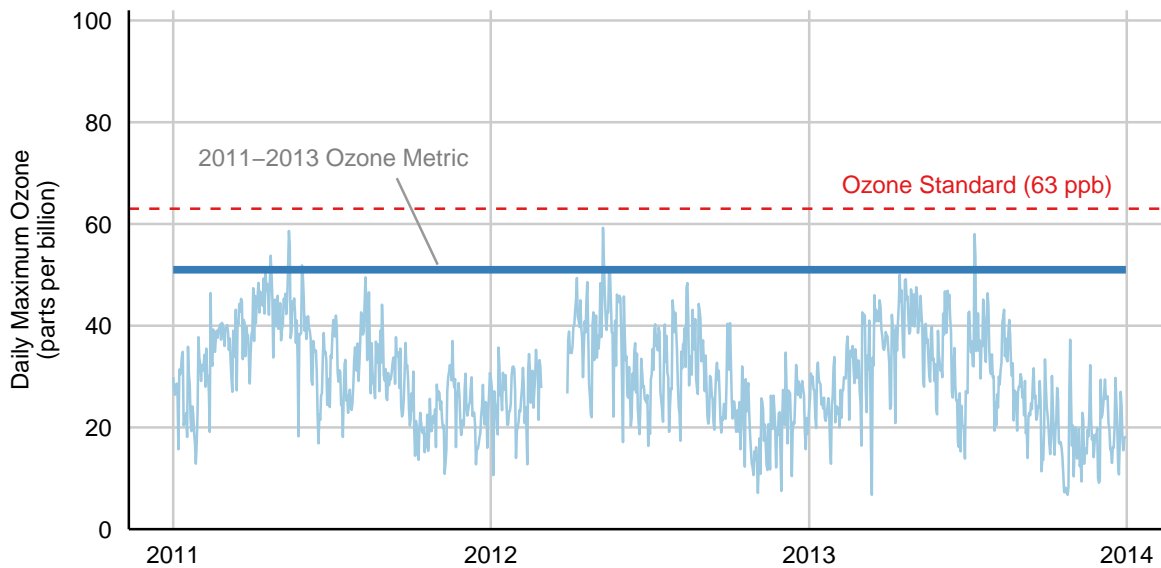


Nelson Kutenai Place monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 51 ppb (3 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration

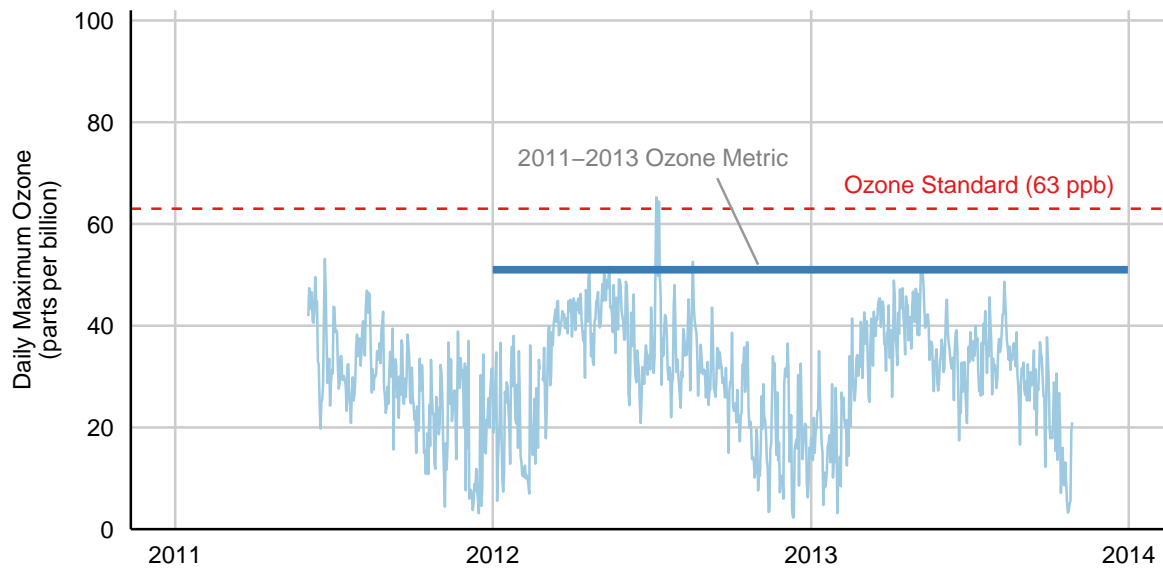


Kamloops Fire Station #2 monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 51 ppb (2 year average)

Air Quality Management Level: Actions for Preventing Air Quality Deterioration



Castlegar Zinio Park monitoring station

Ozone Air Quality Standard: Achieved

Ozone Metric: 50 ppb (2 year average)

Air Quality Management Level: Actions for Keeping Clean Areas Clean

