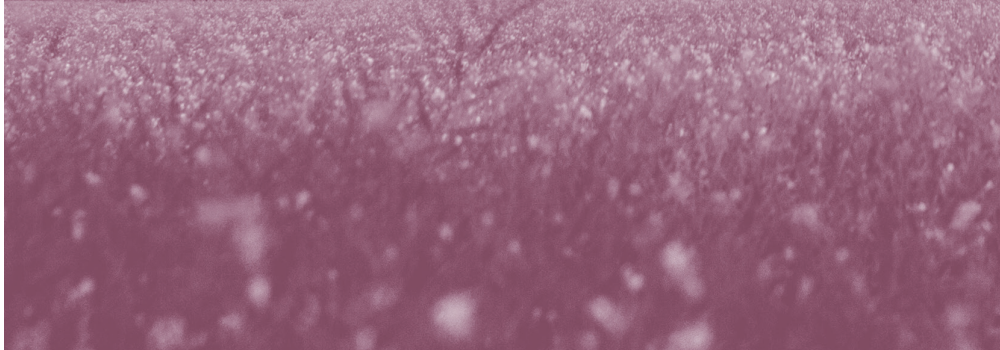




capital region air quality management framework

2017 AMBIENT AIR QUALITY
ASSESSMENT SUMMARY REPORT

October 4, 2018



PURPOSE

Ambient air quality Assessment Summary Reports are produced annually under the *Capital Region Air Quality Management Framework*¹. The purpose of these reports is to assign an ambient air quality level to each monitoring station in the Capital Region for the Framework's four contaminants of concern (nitrogen dioxide, sulphur dioxide, fine particulate matter, and ozone).

See the *Background to the Capital Region Assessment Summary Reports*² for descriptions of the following four contaminants of concern: the air monitoring in the region and the triggers, limits, and levels for the contaminants. The *Implementation Progress Report*³ provides analysis of how the sources and other factors have influenced the ambient air quality levels and information about management actions chosen or assigned to stations in the Capital Region.

The 2017 Assessment Summary Report contains new management level assignments for:

- **NO₂** and **SO₂** based on the 2017 data
- **PM_{2.5}** and **O₃** for the 2012-2014 and 2013-2015 data periods.

The 2017 Assessment Summary Reports contains new level assignments for **PM_{2.5}** and **O₃** for the 2012-2014 and 2013-2015, respectively. The level assignments for this data period are part of Alberta's Air Zone reporting under the Canadian Ambient Air Quality Standards (CAAQS) and Canada's Air Quality Management System. The level assignments for these data periods were released in April 2018 and were included in this report for reference.

The 2017 ambient air quality level assignments are outlined on the following pages. Air quality level assignments for each air quality parameter in the Capital Region Air Quality Management Framework correspond to specific management intents.


Historical trends for each air quality parameter consist of a graphical display of the following:

- Calculated metric concentrations from 2004 to 2017 for **NO₂** and **SO₂**
- Assigned action/management levels from 2001-2003 to 2013-2015 for **PM_{2.5}** and **O₃** (the assessment of **PM_{2.5}** and **O₃** are based on three year averages).

1 Alberta Environment and Sustainable Resource Development. 2012. *Capital Region Air Quality Management Framework*. <https://open.alberta.ca/publications/9781460100653>

2 Alberta Environment and Sustainable Resource Development. 2013. *Backgrounder – Ambient Air Quality Assessment Summary Reports*. <https://open.alberta.ca/publications/9781460113240>

3 Alberta Environment and Sustainable Resource Development. 2016. *Implementation Progress Report*. <https://open.alberta.ca/publications/2371-0683>



Figures and textual summaries of the historical trends can be found in the Appendix of this report. Historical trends for upper range (NO_2 and SO_2), 98th percentile of 24 hour average action/management level ($\text{PM}_{2.5}$) and 4th highest daily 8-hour maximum action/management level (O_3) are intended to highlight the frequency and magnitude of peak (short-term elevated) concentrations. In this report historical trends are described based on the absolute change in concentrations or action/management level from the beginning to the end of the analyzed period. An increasing trend may signify that peak concentrations are increasing in magnitude or occurring more frequently. Likewise, a decreasing trend may signify that peak concentrations are decreasing in magnitude or occurring less frequently. Historical trends for the annual average (NO_2 , SO_2 , $\text{PM}_{2.5}$) are intended to highlight year-round large scale changes in observed concentrations.

NITROGEN DIOXIDE ANNUAL AVERAGE

Level Assignment

Gold Bar monitoring station was assigned a management level in 2017 as it met the data completeness requirements and was assigned to Level 2.

St. Albert monitoring station met data completeness requirements for the first time in 2017 and was assigned a Level 2.

Gibbons monitoring station met data completeness requirements for the first time in 2017 and was assigned a Level 1.

Redwater Industrial station was relocated to the Town of Redwater in November 2017, 12 km north of the old site. The relocation was the result of a suitability assessment completed by the Fort Air Partnership in an effort to collect data more representative of regional air quality near the Town of Redwater. As a result, data completeness requirements were not met at the former site (Redwater Industrial) or the relocated station site (Redwater) in 2017. Future assessments will use information from the relocated station location (Redwater).

All other monitoring stations remain assigned to the same levels as the *2016 Assessment Summary Report*⁴.

Table 1 lists the results of the nitrogen dioxide annual average assessment and ambient air quality level assignment.

⁴ Alberta Environment and Parks. 2018. *Capital Region Air Quality Management Framework 2015 Ambient Air Quality Assessment Summary Report*. (Publication forthcoming)

Table 1: Nitrogen Dioxide Annual Average Ambient Air Quality Level Assignment

Year	Alberta Capital Airshed							Fort Air Partnership							West Central Airshed Society							
	Ardrossan	Edmonton Central	Edmonton East	Edmonton South	Gold Bar	Sherwood Park	St. Albert	Woodcroft	Bruderheim	Elk Island	Fort Saskatchewan	Gibbons	Lamont	Range Road 220	Redwater Industrial	Redwater	Ross Creek	Scottford (Temporary)	Genesee	Meadows	Tomahawk	Wagner
2004		3	2							2		1	1	1		2					1	
2005		3	2							2		1	2	2		2			1	1	1	
2006		3	2	2						2		1	1	1		2			1	1	1	
2007		3	2	2					1	2		1	1	1		2			1	1	1	
2008		3	2	2					1	2		1	2	2		2			1	1	1	
2009		3	2	2	2	2			1	2		1	1	2		2			1	1	1	
2010		3	2	2	2	2			1	2		1	2	2		2			1	1	1	1
2011		2	2	2	2	2		3	1	1	2		1	1	1		1		1	1	1	1
2012		2	2	2	2	2		2	1	1	2		1	1	1		1		1	1	1	1
2013		3	2	2	2	2		2	1	1	2		1	1	2		2		1	1	1	1
2014		2	2	2	2	2		2	1	1	1		1	1	2		2		1	1	1	1
2015		2	2	2	2	2		2	1	1	2		1	2	2		1	1	1	1	1	1
2016	1	2	2	2		2		2	1	1	2		1	1	2		1	1	1	1	1	1
2017	1	2	2	2	2	2	2	2	1	1	2	2	1	1			2	1	1	1	1	1

NITROGEN DIOXIDE UPPER RANGE OF THE HOURLY DATA

Level assignment

Gold Bar monitoring station was assigned a management level in 2017 as it met the data completeness requirements and was assigned to Level 2.

Gibbons and St. Albert monitoring stations met the data completeness requirements for the first time in 2017 and were assigned to Level 2.

Redwater Industrial station was relocated to the Town of Redwater in November 2017, 12 km north of the old site. The relocation was the result of a suitability

assessment completed by the Fort Air Partnership in an effort to collect data that is more representative of regional air quality near the Town of Redwater. As a result, data completeness requirements were not met at the former site (Redwater Industrial) or the relocated station site (Redwater) in 2017. Future assessments will use information from the new location (Redwater).

All other monitoring stations remain assigned to the same levels as the 2016 Assessment Summary Report.

Table 2 lists the results of the nitrogen dioxide upper range of the hourly data assessment and ambient air quality level assignment.

Table 2: Nitrogen Dioxide Upper Range of the Hourly Data Ambient Air Quality Level Assignment

Year	Alberta Capital Airshed								Fort Air Partnership								West Central Airshed Society					
	Ardrossan	Edmonton Central	Edmonton East	Edmonton South	Gold Bar	Sherwood Park	St. Albert	Woodcroft	Bruderheim	Elk Island	Fort Saskatchewan	Gibbons	Lamont	Range Road 220	Redwater Industrial	Redwater	Ross Creek	Scottford (Temporary)	Genesee	Meadows	Tomahawk	Wagner
2004		2	2							2		1	1	2		2				1		
2005		2	2							2		1	2	2		2		1	1	1		
2006		2	2	2						2		1	2	2		2		1	1	1		
2007		2	2	2					1	2		1	2	2		2		1	1	1		
2008		2	2	2					1	2		1	3	2		2		1	1	1		
2009		2	2	2	2	2			1	2		1	2	2		2		1	1	1		
2010		2	2	2	2	2			1	2		1	2	2		2		1	1	1	1	
2011		2	2	2	2	2		2	1	1	2		1	2	2		2		1	2	1	1
2012		2	2	2	2	2		2	1	1	2		1	1	1		2		1	1	1	1
2013		2	2	2	2	2		2	2	1	2		1	2	2		2		1	2	1	1
2014		2	2	2	2	2		2	1	1	2		1	2	2		2		1	1	1	1
2015		2	2	2	2	2		2	1	1	2		1	2	2		2	1	1	1	1	1
2016	1	2	2	2		2		2	1	1	2		1	1	2		2	1	1	1	1	1
2017	1	2	2	2	2	2	2	2	1	1	2	2	1	1			2	1	1	1	1	1

SULPHUR DIOXIDE ANNUAL AVERAGE

Level Assignment

Redwater Industrial station was relocated to the Town of Redwater in November 2017, 12 km north of the old site. The relocation was the result of a suitability assessment completed by the Fort Air Partnership in an effort to collect data that is more representative of regional air quality near the Town of Redwater. As a result, data completeness requirements were not met at the former site (Redwater Industrial) or the relocated station site (Redwater) in 2017. Future assessments will use information from the new location (Redwater).

Scotford monitoring station was moved from its location in May 2014 due to pipeline right-of-way expansion at the location of the site. Scotford (Temporary) monitoring station was established in May 2014, 5 km southeast of the Scotford monitoring station site. Scotford (Temporary) monitoring station will remain indefinitely until a location for a permanent monitoring station can be located. The Fort Air Partnership is actively working with stakeholders to identify and establish a suitable permanent site in the near future.

Following an assessment of sulphur dioxide monitoring at Range Road 220 monitoring, conducted by Fort Air Partnership, it was determined that the measurement of sulphur dioxide concentrations was redundant at that station. The nearby industrial processes that originally required sulphur dioxide monitoring at Range Road 220 no longer exist and other stations in the Fort Air Partnership network sufficiently measure sulphur dioxide emissions from other sources in the region. Therefore, following approval from Alberta Environment and Parks, sulphur dioxide measurements ceased at Range Road 220 monitoring station on January 13, 2017. As a result, data completeness requirements were not met in 2017 and Range Road 220 monitoring station was not assigned a level for sulphur dioxide concentrations.

Gibbons met the data completeness requirement in 2017 and will report a level for the first time and was assigned to Level 1.

All other stations remain assigned to Level 1.

Table 3 lists the results of the sulphur dioxide annual assessment and ambient air quality level assignment.

Table 3: Sulphur Dioxide Annual Average Ambient Air Quality Level Assignment

Year	Alberta Capital Airshed							Fort Air Partnership							West Central Airshed Society								
	Ardrossan	Beverly	Edmonton East	Edmonton South	Elmjay	Gold Bar	Sherwood Park	Woodcroft	Bruderheim	Elk Island	Fort Saskatchewan	Gibbons	Lamont	Range Road 220	Redwater Industrial	Redwater	Ross Creek	Scotford	Scotford (Temporary)	Genesee	Meadows	Tomahawk	Wagner
2004			1							1		1	1	2		1						1	
2005			1							1		1	1	2		1				1	1	1	
2006			1							1		1	1	1		1				1	1	1	
2007			1						1	1		1	1	2		1	1			1	1	1	
2008			1	1					1	1		1	1	2		1	1			1	1	1	
2009		1	1	1	1	1	1			1	1		1	2		1	1			1	1	1	
2010		1	1	1	1	1	1			1	1		1	3		1	1			1	1	1	1
2011		1	1	1	1	1	1	1	1	1	1		1	2		1	1			1	1	1	1
2012		1	1	1	1	1	1	1	1		1		1	2		1	1			1	1	1	1
2013		1	1	1	1	1	1	1	1	1	1		1	2		1	1			1	1	1	1
2014		1	1	1	1	1	1	1	1	1	1		1	2		1				1	1	1	1
2015		1	1	1		1	1	1	1	1	1		1	2		1		1		1	1	1	1
2016	1	1	1	1		1	1	1	1	1	1		1	3		1		1		1	1	1	1
2017	1	1	1	1		1	1	1	1	1	1	1				1		1		1	1	1	1

SULPHUR DIOXIDE UPPER RANGE OF THE HOURLY DATA

Level Assignment

Redwater Industrial station was relocated to the Town of Redwater in November 2017, 12 km north of the old site. The relocation was the result of a suitability assessment completed by the Fort Air Partnership in an effort to collect data more representative of regional air quality near the Town of Redwater. As a result, data completeness requirements were not met at the former site (Redwater Industrial) or the relocated station site (Redwater) in 2017. Future assessments will use information from the new location (Redwater).

Beverly and Sherwood Park monitoring stations were assigned to Level 2 and are located in close proximity downwind of several major industrial facilities with large point source emissions of sulphur dioxide. The assignment of Beverly and Sherwood Park monitoring stations to levels higher than other stations in the Capital Region indicates that these stations are more affected by peak concentrations than other stations in the Capital Region.

Scotford monitoring station was moved from its location in May 2014 due to pipeline right-of-way expansion at the location of the site. Scotford (Temporary) monitoring station was established in May 2014, 5 km southeast of the Scotford monitoring station site. Scotford (Temporary) monitoring station will remain indefinitely until a location for a permanent monitoring station can be located. The Fort Air Partnership is actively working with stakeholders to identify and establish a suitable permanent site in the near future.

Following an assessment of sulphur dioxide monitoring at Range Road 220 monitoring, conducted by Fort Air Partnership, it was determined that the measurement of sulphur dioxide concentrations was redundant at that station. The nearby industrial processes that originally required sulphur dioxide monitoring at Range Road 220 no longer exist and other stations in the Fort Air Partnership network sufficiently measure sulphur dioxide emissions from other sources in the region. Therefore, following approval from Alberta Environment and Parks, sulphur dioxide measurements ceased at Range Road 220 monitoring station on January 13, 2017. As a result, data completeness requirements were not met in 2017 and Range Road 220 monitoring station was not assigned a level for sulphur dioxide concentrations.

Wagner monitoring station was assigned to Level 1, a reduction from the Level 2 assignment the monitoring station received in 2015 and 2016.

Gibbons met data completeness requirement in 2017 and will report a level for the first time and was assigned to Level 1.

All other monitoring stations remain assigned to Level 1.

Table 4 lists the results of the sulphur dioxide upper range of the hourly data assessment and ambient air quality level assignment.

Table 4: Sulphur Dioxide Upper Range of the Hourly Data Ambient Air Quality Level Assignment

Year	Alberta Capital Airshed							Fort Air Partnership							West Central Airshed Society								
	Ardrossan	Beverly	Edmonton East	Edmonton South	Elmjay	Gold Bar	Sherwood Park	Woodcroft	Bruderheim	Elk Island	Fort Saskatchewan	Gibbons	Lamont	Range Road 220	Redwater Industrial	Redwater	Ross Creek	Scottford	Scottford (Temporary)	Genesee	Meadows	Tomahawk	Wagner
2004			1							1		1	1	4		1						1	
2005			1							1		1	1	4		1				1	1	1	
2006			1							1		1	1	4		1				2	2	1	
2007			1						1	1		1	1	4		1	1			1	1	1	
2008			1	1					1	1		1	1	4		1	1			1	1	1	
2009		2	1	1	1	1	2			1	1		1	4		1	1			1	1	1	
2010		1	1	1	1	1	2			1	1		1	4		1	1			1	1	1	1
2011		1	1	1	1	1	2	1	1	1	1		1	4		1	2			1	1	1	1
2012		1	1	1	1	1	2	1	1		1		1	4		1	1			1	1	1	1
2013		1	1	1	1	1	2	1	1	1	1		1	4		1	1			1	1	1	1
2014		1	1	1	1	1	2	1	1	1	1		1	4		1				1	1	1	1
2015		2	1	1		1	2	1	1	1	1		1	4		1		1	1	1	1	1	2
2016	1	2	1	1		1	2	1	1	1	1		1	4		1		1	1	1	1	1	2
2017	1	2	1	1		1	2	1	1	1	1	1				1		1	1	1	1	1	1

FINE PARTICULATE MATTER

Note that in 2017, the fine particulate matter analyzers at all monitoring stations in the Capital Region, were designated as Federal Equivalent Method (FEM) compliant. The FEM type analyzers more effectively account for the volatile components in measurements of fine particulate matter. This results in higher, but likely more representative measurements of fine particulate matter concentrations.

Alberta Environment and Parks has recently completed the second reporting of the CAAQS (April 2018) and included two periods, 2012-2014 and 2013-2015. Calculation of ambient metrics and determination of action level are similar for the CAAQS and the Capital Region Air Quality Management Framework. Assessed management levels, presented in this report for fine particulate matter, for the period of 2012-2014 and 2013-2015, are those assigned using the CAAQS and documented in the *Alberta: Air Zones Report 2012-2014, 2013-2015*⁵. The following action levels for fine particulate matter in the Capital Region Air Quality Management Framework and management levels for fine particulate matter under the CAAQS have similar management intent: Level 1 and Green; Level 2 and Yellow; Level 3 and Orange; Level 4 and Red. This comparison is not an official equivalency. Under the CAAQS management planning must be implemented if the red or orange level has been assigned to an air zone. For the 2012-2014 time period transboundary flow and exceptional event (TF/EE) analysis was completed for all stations. For the 2013-2015 time period TF/EE analysis was only performed for stations in the orange and red management levels. For stations in the yellow management level an assignment of "Yellow or lower" was made if TF/EE analysis may have brought the station to the green management level.

FINE PARTICULATE MATTER 24-HOUR METRIC


Level Assignment

The *Alberta: Air Zones Report 2012-2014, 2013-2015* indicates that:

- For 2012-2014, all stations in the Capital Region remain assigned to the same management levels as they were assigned to in the *Alberta: Air Zones Report 2011-2013*. Bruderheim, Edmonton Central, Edmonton East, Edmonton South, and Fort Saskatchewan monitoring stations exceeded the *middle threshold value* (as defined in the *Guidance Document for Air Zone Management*⁶) and were therefore assessed to the *orange* management level. The *orange* management level involves management actions for *preventing CAAQS exceedance*. A *Level 3* response in the Capital Region Air Quality Management Framework involves similar intent to *take action on pressures and prevent reaching air quality limits*. Elk Island and Lamont

⁵ Alberta Environment and Parks. 2018. Alberta: Air Zones Report 2012-2014, 2013-2015. <https://open.alberta.ca/publications/9781460134962>

⁶ Canadian Council of Ministers of the Environment. (2012). Guidance Document on Air Zone Management. http://www.ccme.ca/files/Resources/air/qaqs/pn_1481_gdazm_e.pdf



County monitoring stations exceeded the *lowest threshold value* (as defined in the *Guidance Document for Air Zone Management*) and were therefore assessed to the *yellow* management level. The *yellow* management level involves management actions for *preventing air quality deterioration*. A Level 2 response the Capital Region Air Quality Management Framework involves similar intent to *understand pressures and conditions*. Genesee and Tomahawk monitoring stations were assigned to the *green* management level. The *green* management level is the lowest of the four management levels and involves management actions for *keeping clean areas clean*. This management intent is similar to the lowest of the four management levels in the Capital Region Air Quality Management Framework, *Level 1* to which a management response comprising of *monitoring and reporting* is expected.

- For 2013-2015, all stations in the capital region remain assigned to the same management levels as they were assigned to in the *Alberta: Air Zones Report 2011-2013* with the exception of Edmonton East, Genesee, Tomahawk and Woodcroft monitoring stations. Please refer to the description of management level assignments and management intents presented above for the other monitoring stations in the Capital Region. Edmonton East monitoring station exceeded the *highest threshold value* (as defined in the *Guidance Document for Air Zone Management*) and was therefore assessed to the *red* management level. However, since Edmonton East only had two of three years with complete data, the station was excluded from setting the air zone metric value for the North Saskatchewan air zone (as per the *Guidance Document for Achievement Determination*⁷). Therefore, for the purposes of the Capital Region Air Quality Management Framework, this management level assignment will be disregarded in favor of developing management actions based on monitoring stations assigned management levels with three complete years of data. Woodcroft monitoring station began reporting to the *Alberta airdata warehouse* in June 2013. Therefore a management level was only able to be assigned to this monitoring station for the 2013-2015 data period as at least two full years of valid data are required in order to calculate the CAAQS metric (as per the *Guidance Document for Achievement Determination*). Woodcroft monitoring station exceeded the *middle threshold value* (as defined in the *Guidance Document for Air Zone Management*) and was therefore assessed to the *orange* management level. The *orange* management level involves management actions for *preventing CAAQS exceedance*. Genesee and Tomahawk monitoring stations exceeded the *lowest threshold value* (as defined in the *Guidance Document for Air Zone Management*) prior to TF/EE assessment. Performing TF/EE assessment on these stations may have brought these stations below the *lowest threshold*

7 Canadian Council of Ministers of the Environment. (2012). Guidance Document on Achievement Determination Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone. https://www.ccme.ca/files/Resources/air/aqms/pn_1483_gdad_eng.pdf

value resulting in an assignment to the green management level. However, as explained above, management planning is only required when assigned to the orange or red management levels. Therefore, in order to expedite the assignment of management levels, TF/EE analysis was not completed for Genesee and Tomahawk monitoring station and these stations were assigned to the yellow or lower management level.

Redwater Industrial monitoring station was excluded from the assessment under the CAAQS. The rationale for this decision was based on the monitoring station's location very near to industrial activity. This rationale follows from Section 1.3 of the *Alberta Implementation of the Air Zone Management Framework for Fine Particulate Matter and Ozone*⁸.

Table 5: Fine Particulate Matter 24-hour Ambient Air Quality Level Assignment

	Bruderheim	Edmonton Central	Edmonton East	Edmonton South	Elk Island	Fort Saskatchewan	Genesee	Lamont	Redwater Industrial	Tomahawk	Woodcroft
Year	Capital Region Air Quality Management Framework Assessment Level										
02-04		2	2		2	2				1	
03-05		2	2		1	1		2		1	
04-06		1	2		1	1	1	2		1	
05-07		1	2		1	1	1	2	2	1	
06-08		1	2	2	1	1	1	2	2	1	
07-09		1	2	2	1	1	1	2	2	1	
08-10		4	4	3	1	2	1	3	2	1	
09-11		4	4	3	1	2	1		2	1	
10-12	3	4	3	3	1	2	1	3	2	1	
	CAAQS Assessment Level										
11-13	O	O	O	O	Y	O	G	Y		G	
12-14	O	O	O	O	Y	O	G	Y		G	
13-15	O	O	R	O	Y	O	Y/L	Y		Y/L	O

R = Red, O = Orange, Y = Yellow, Y/L = Yellow or Lower, G = Green


⁸ Alberta Environment and Parks (2015). Alberta Implementation of the Air Zone Management Framework for Fine Particulate Matter and Ozone. <http://aep.alberta.ca/air/management-frameworks/canadian-ambient-air-quality-standards/documents/ImplementationFramework-PM-Ozone-Sep2015.pdf>

FINE PARTICULATE MATTER ANNUAL AVERAGE METRIC

Level Assignment

The *Alberta: Air Zones Report 2012-2014, 2013-2015* indicates that:

- For 2012-2014 all stations in the capital region remain assigned to the same management levels as they were assigned to in the *Alberta: Air Zones Report 2011-2013*. Bruderheim, Edmonton Central, Edmonton East, Edmonton South, and Fort Saskatchewan monitoring stations exceeded the *middle threshold value* (as defined in the [Guidance Document for Air Zone Management](#)) and were therefore assessed to the *orange* management level. The *orange* management level involves management actions for *preventing CAAQS exceedance*. A *Level 3* response in the Capital Region Air Quality Management Framework involves similar intent to *take action on pressures and prevent reaching air quality limits*. Elk Island and Lamont County monitoring stations exceeded the *lowest threshold value* (as defined in the [Guidance Document for Air Zone Management](#)) and were therefore assessed to the *yellow* management level. The *yellow* management level involves management actions for *preventing air quality deterioration*. A *Level 2* response the Capital Region Air Quality Management Framework involves similar intent to *understand pressures and conditions*. Genesee and Tomahawk monitoring stations were assigned to the *green* management level. The *green* management level is the lowest of the four management levels and involves management actions for *keeping clean areas clean*. This management intent is similar to the lowest of the four management levels in the Capital Region Air Quality Management Framework, *Level 1* to which a management response comprising of *monitoring and reporting* is expected.
- For 2013-2015 all stations in the capital region remain assigned to the same management levels as they were assigned to in the *Alberta: Air Zones Report 2011-2013* with the exception of Edmonton East, Elk Island, Lamont County, Tomahawk and Woodcroft monitoring stations. Please refer to the description of management level assignments and management intents presented above for the other monitoring stations in the Capital Region. Edmonton East monitoring station exceeded the *highest threshold value* (as defined in the [Guidance Document for Air Zone Management](#)) and were therefore assessed to the *red* management level. However, since Edmonton East only had two of three years with complete data, the station was excluded from setting the air zone metric value for the North Saskatchewan air zone (as per the [Guidance Document for Achievement Determination](#)). Therefore for the purposes of the Capital Region Air Quality Management Framework this management level assignment will be disregarded in favor of developing management actions based on monitoring stations assigned management levels with three complete years of data. Woodcroft monitoring station began reporting to the [Alberta airdata warehouse](#) in June 2013, therefore a management level



was only able to be assigned to this monitoring station for the 2013-2015 data period as at least two full years of valid data are required in order to calculate the CAAQS metric (as per the *Guidance Document for Achievement Determination*). Woodcroft and Lamont County monitoring stations exceeded the *middle threshold value* (as defined in the *Guidance Document for Air Zone Management*) and were therefore assessed to the orange management level. The *orange* management level involves management actions for *preventing CAAQS exceedance*. This is the first time that Lamont County monitoring station has been assigned to the *orange* management level and represents an increase from the *yellow* management level assigned in previous assessments. Elk Island and Tomahawk monitoring stations exceeded the *lowest threshold value* (as defined in the *Guidance Document for Air Zone Management*) prior to TF/EE assessment. Performing TF/EE assessment on these stations may have brought these stations below the *lowest threshold value* resulting in an assignment to the *green* management level. However, as explained above, management planning is only required when assigned to the *orange* or *red* management levels. Therefore, in order to expedite the assignment of management levels, TF/EE analysis was not completed for Elk Island and Tomahawk monitoring station and these stations were assigned to the *yellow* or *lower* management level.

Redwater industrial monitoring station was excluded from the assessment under the CAAQS. The rationale for this decision was based on the monitoring station's location very near to industrial activity. This rationale follows from Section 1.3 of the *Alberta Implementation of the Air Zone Management Framework for Fine Particulate Matter and Ozone*.

Table 6 lists the results of the fine particulate matter assessment for the annual average metric and the ambient air quality management level assignment.


Table 6: Fine Particulate Matter Annual Average Ambient Air Quality Level Assignment

Year	Bruderheim	Edmonton Central	Edmonton East	Edmonton South	Elk Island	Fort Saskatchewan	Genesee	Lamont	Redwater Industrial	Tomahawk	Woodcroft
	Capital Region Air Quality Management Framework Assessment Level										
02-04		2	2		2	2				1	
03-05		2	2		1	1		2		1	
04-06		1	2		1	1	1	2		1	
05-07		1	2		1	1	1	2	2	1	
06-08		1	2	2	1	1	1	2	2	1	
07-09		1	2	2	1	1	1	2	2	1	
08-10		4	4	3	1	2	1	3	2	1	
09-11		4	4	3	1	2	1		2	1	
10-12	3	4	3	3	1	2	1	3	2	1	
	CAAQS Assessment Level										
11-13	O	O	O	O	Y	O	G	Y		G	
12-14	O	O	O	O	Y	O	G	Y		G	
13-15	O	O	R	O	Y/L	O	G	O		Y/L	O

R = Red, O = Orange, Y = Yellow, Y/L = Yellow or Lower, G = Green

OZONE

Alberta Environment and Parks has recently completed the second reporting of the CAAQS (April 2018) and included two periods, 2012-2014 and 2013-2015. Calculation of ambient metrics and determination of action level are similar for the CAAQS and the Capital Region Air Quality Management Framework. Assessed management levels, presented in this report for ground-level ozone, for the period of 2012-2014 and 2013-2015, are those assigned using the CAAQS and documented in the *Alberta: Air Zones Report 2012-2014, 2013-2015*. The following action levels for ground-level ozone in the Capital Region Air Quality Management Framework and management levels for ground-level ozone under the CAAQS have




similar management intent: Level 1 and Green; Level 2 and Yellow; Level 3 and Orange; Level 4 and Red. This comparison is not an official equivalency. Under the CAAQS management planning must be implemented if the red or orange level has been assigned to an air zone. For the 2012-2014 time period transboundary flow and exceptional event (TF/EE) analysis was completed for all stations. For the 2013-2015 time period TF/EE analysis was only performed for stations in the orange and red management levels. For stations in the yellow management level an assignment of “Yellow or lower” was made if TF/EE analysis may have brought the station to the green management level.

Level Assignment

The *Alberta: Air Zones Report 2012-2014, 2013-2015* indicates that:

- For 2012-2014 Genesee monitoring station was the only station that exceeded the *middle threshold value* (as defined in the *Guidance Document for Air Zone Management*) and was therefore assessed to the orange management level. The *orange* management level involves management actions for *preventing CAAQS exceedance*. A *Level 3* response in the Capital Region Air Quality Management Framework involves similar intent to *take action on pressures and prevent reaching air quality limits*. Bruderheim, Edmonton South, Elk Island, Fort Saskatchewan, Lamont County and Tomahawk monitoring stations exceeded the *lowest threshold value* (as defined in the *Guidance Document for Air Zone Management*) and were therefore assessed to the *yellow* management level. The *yellow* management level involves management actions for *preventing air quality deterioration*. A *Level 2* response the Capital Region Air Quality Management Framework involves similar intent to *understand pressures and conditions*. Assignment to the *yellow* management level represents an improvement in ambient condition at Bruderheim and Lamont County monitoring stations from the 2011-2013 data period. Edmonton Central and Edmonton East monitoring stations were assigned to the *green* management level. The *green* management level is the lowest of the four management levels and involves management actions for *keeping clean areas clean*. This management intent is similar to the lowest of the four management levels in the Capital Region Air Quality Management Framework, *Level 1* to which a management response comprising of *monitoring and reporting* is expected. Assignment to the *green* management level represents an improvement in ambient condition at Edmonton Central and Edmonton East monitoring stations from the 2011-2013 data period.
- For 2013-2015 Bruderheim and Woodcroft monitoring stations exceeded the *middle threshold value* (as defined in the *Guidance Document for Air Zone Management*) and were therefore assessed to the *orange* management level. The *orange* management level involves management actions for *preventing CAAQS exceedance*. A *Level 3* response in the Capital Region



Air Quality Management Framework involves similar intent to take action on *pressures and prevent reaching air quality limits*. Woodcroft monitoring station began reporting to the [Alberta airdata warehouse](#) in June 2013, therefore the management level assigned to this monitoring station for the 2013-2015 data period was based on only two full years of valid data (as per the *Guidance Document for Achievement Determination*) and represents the first management level assigned to this monitoring station. The assignment of Bruderheim monitoring station to the *orange* management level represents a decline in ambient condition from the 2012-2014 data period and a return to the management level assigned to the 2011-2013 data period. Edmonton South, Elk Island, Fort Saskatchewan, Genesee, Lamont County and Tomahawk monitoring stations exceeded the *lowest threshold value* (as defined in the *Guidance Document for Air Zone Management*) and were therefore assessed to the *yellow* management level. The *yellow* management level involves management actions for *preventing air quality deterioration*. A *Level 2* response the Capital Region Air Quality Management Framework involves similar intent to *understand pressures and conditions*. Assignment to the *yellow* management level represents an improvement in ambient condition at Lamont County monitoring stations from the 2012-2014 data period. Edmonton Central and Edmonton East monitoring stations exceeded the *lowest threshold value* (as defined in the *Guidance Document for Air Zone Management*) prior to TF/EE assessment. Performing TF/EE assessment on these stations may have brought these stations below the *lowest threshold value* resulting in an assignment to the *green* management level. However, as explained above, management planning is only required when assigned to the *orange* or *red* management levels. Therefore, in order to expedite the assignment of management levels, TF/EE analysis was not completed for Edmonton Central and Edmonton East monitoring station and these stations were assigned to the *yellow* or *lower* management level.

Table 7 lists the results of the ozone assessment the ambient air quality management level assignment.

Table 7: Ozone Ambient Air Quality Level Assignment

Year	Bruderheim	Edmonton Central	Edmonton East	Edmonton South	Elk Island	Fort Saskatchewan	Genesee	Lamont	Tomahawk	Woodcroft
	Capital Region Air Quality Management Framework Assessment Level									
02-04		2	3		2	3		2	3	
03-05		2	2		2	2	3	2	2	
04-06		2	2		2	2	3	2	3	
05-07		2	2		2	2	3	2	2	
06-08		2	2	2	2	3	3	3	2	
07-09		2	2	2	2	3	3	3	3	
08-10		2	2	3	2	3	3	3	3	
09-11		2	2	3	3	2	3	3	2	
10-12	2	2	2	3	2	2	2	2	2	
	CAAQS Assessment Level									
11-13	O	Y	Y	Y	Y	Y	O	O	Y	
12-14	Y	G	G	Y	Y	Y	O	Y	Y	
13-15	O	Y/L	Y/L	Y	Y	Y	Y	Y	Y	O

R = Red, O = Orange, Y = Yellow, Y/L = Yellow or Lower, G = Green

APPENDIX

Nitrogen Dioxide Annual Average

Trends

Observations from urban monitoring stations (Edmonton Central, Edmonton East, Edmonton South, Fort Saskatchewan) have shown some year-by-year variation, but an overall reduction in nitrogen dioxide concentrations since 2004 (Figures 1 & 2). All other stations have shown variable year-over-year concentration changes between 2004 and 2017 (Figures 1, 2, & 3). Sherwood Park, Gold Bar, Woodcroft, Ross Creek, Genesee, Meadows, Tomahawk, and Wagner monitoring stations have all observed reductions in nitrogen dioxide concentrations (Figures 1, 2, & 3). Ardrossan, Lamont County and Redwater Industrial monitoring stations have observed modest increases in nitrogen dioxide concentrations (Figures 2 & 3). Bruderheim, Elk Island, Range Road 220 and Scotford (Temporary) monitoring stations observed little change in observed concentrations between 2004 and 2017 (Figure 2). Gibbons and St. Albert were assessed for the first time (Figures 1 & 2).

Figure 1: Annual average concentrations of Nitrogen Dioxide at monitoring stations within the boundary of the Alberta Capital Airshed.

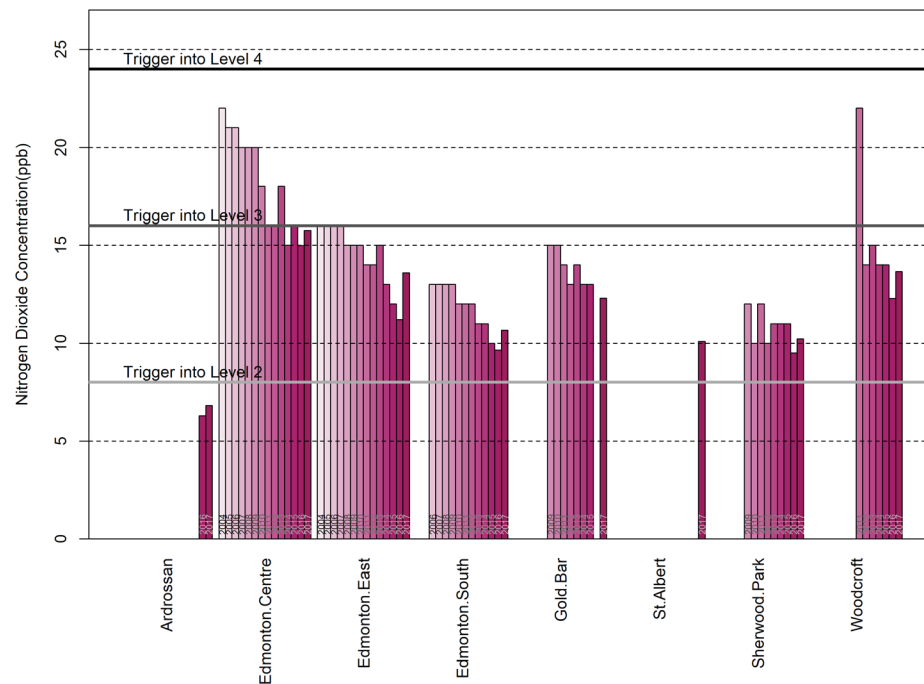


Figure 2: Annual average concentrations of Nitrogen Dioxide at monitoring stations operated by Fort Air Partnership.

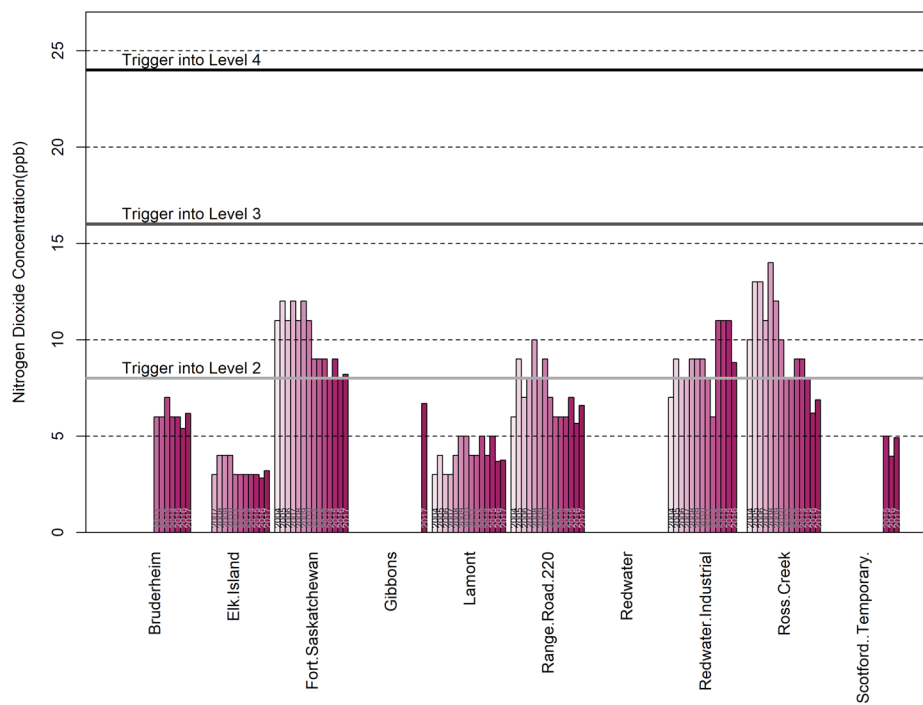
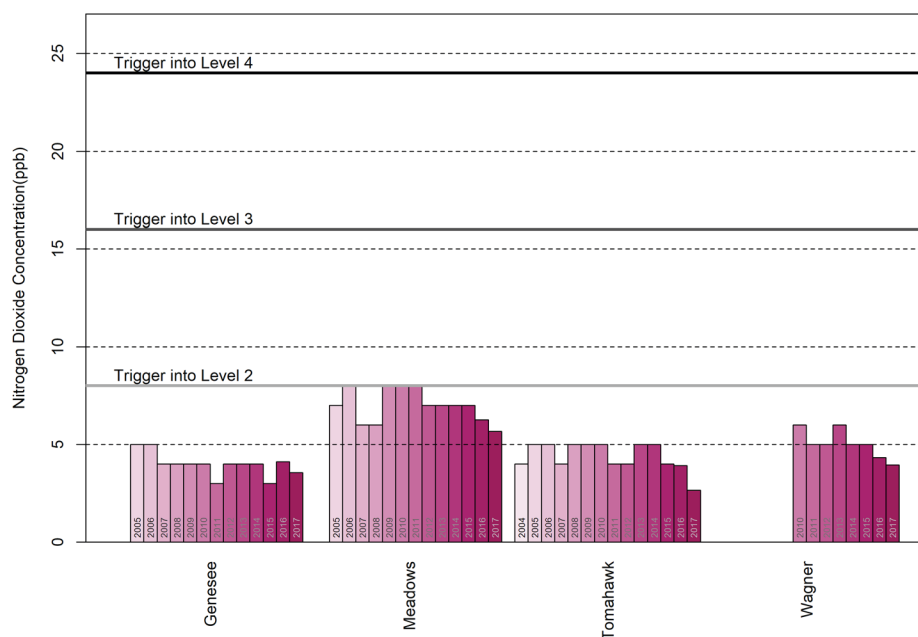


Figure 3: Annual average concentrations of Nitrogen Dioxide at monitoring stations operated by West Central Airshed Society.



Nitrogen Dioxide Upper Range of the Hourly Data

Trends

Observations from urban monitoring stations (Edmonton Central, Edmonton East, Edmonton South, Fort Saskatchewan) have shown overall reductions in nitrogen dioxide concentrations since 2004 (Figures 4 & 5). However, these reductions have not been to the same degree as those observed for annual average concentrations, in addition to more variability being observed from year to year. All other stations have shown variable year-over-year concentrations changes between 2004 and 2017 (Figures 4, 5, & 6). Gold Bar, Sherwood Park, Woodcroft, Elk Island, Lamont County, Ross Creek, Scotford Temporary, Genesee, Tomahawk, and Meadows monitoring stations have all observed overall modest reductions in nitrogen dioxide concentrations (Figures 4, 5, & 6). Ardrossan, Bruderheim, Range Road 220, Redwater Industrial and Wagner monitoring stations have observed a modest increase in nitrogen dioxide concentrations (Figures 4, 5, & 6). Gibbons and St. Albert were assessed for the first time (Figures 4 & 5).

Figure 4: Upper range concentrations of Nitrogen Dioxide at monitoring stations within the boundary of the Alberta Capital Airshed.

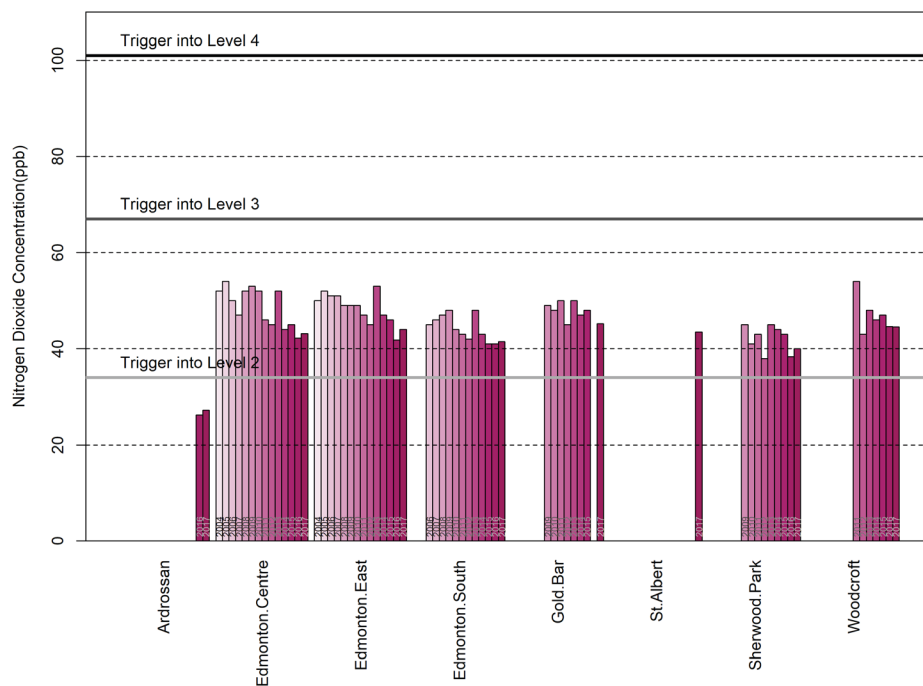


Figure 5: Upper range concentrations of Nitrogen Dioxide at monitoring stations operated by Fort Air Partnership.

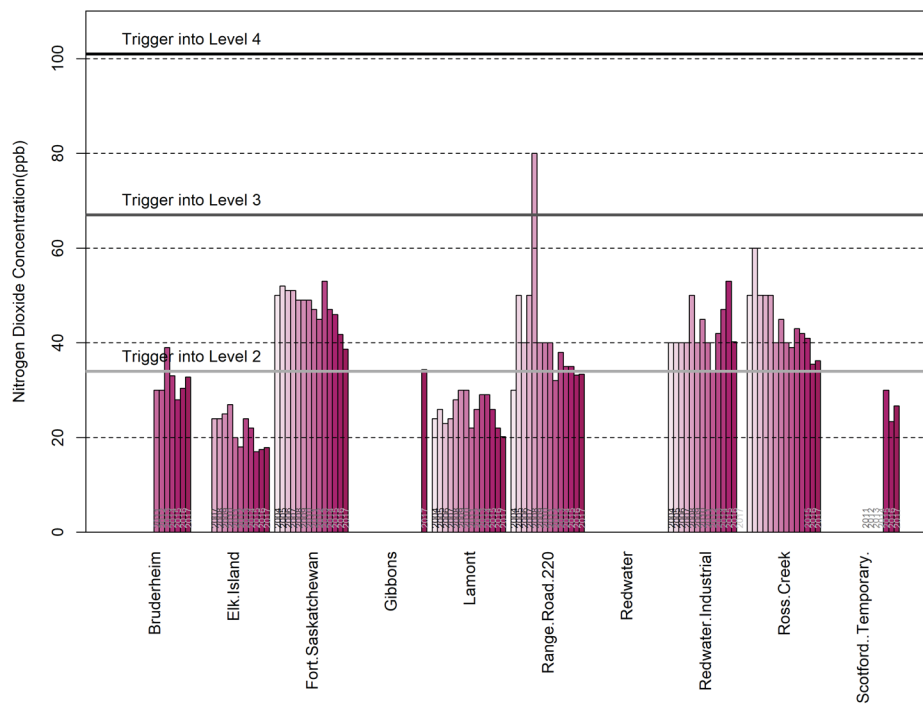
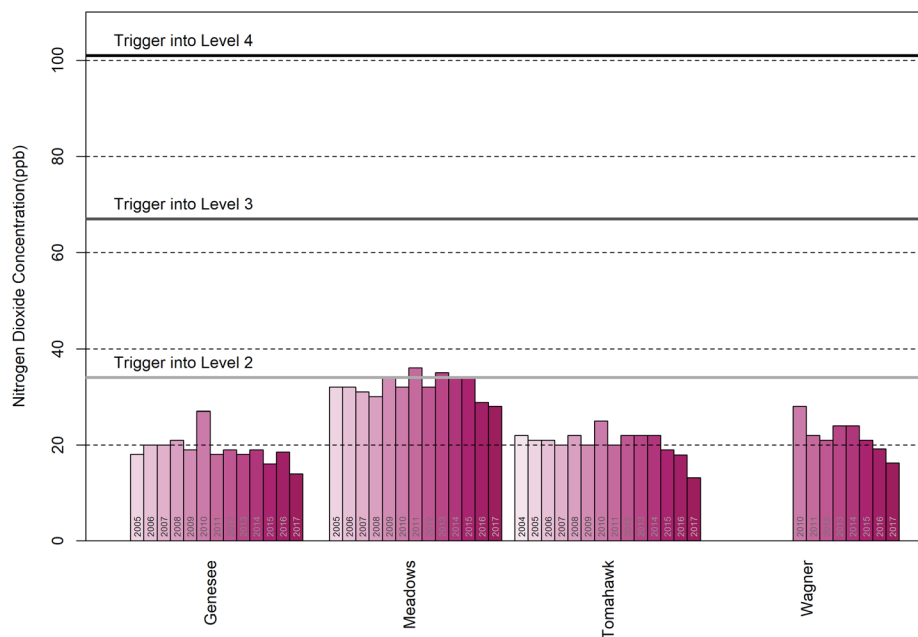


Figure 6: Upper range concentrations of Nitrogen Dioxide at monitoring stations operated by West Central Airshed Society.



Sulphur Dioxide Annual Average

Trends

Beverly, Edmonton South, Elk Island, Fort Saskatchewan, Meadows, Sherwood Park, Tomahawk and Woodcroft stations observed a decline in overall average sulphur dioxide concentrations between 2004 and 2017 (Figures 7, 8 & 9). Redwater Industrial station observed an increase in sulphur dioxide concentrations between 2004 and 2017 (Figure 8). Other monitoring stations observed no overall change, outside of year-over-year variation, in observed annual average concentrations between 2004 and 2017 (Figures 7, 8, & 9). Gibbons was assessed for the first time (Figure 8).

Figure 7: Annual average concentrations of Sulphur Dioxide at monitoring stations within the boundary of the Alberta Capital Airshed. Years with a date and no visible bar recorded an annual average of 0 ppb for that year.

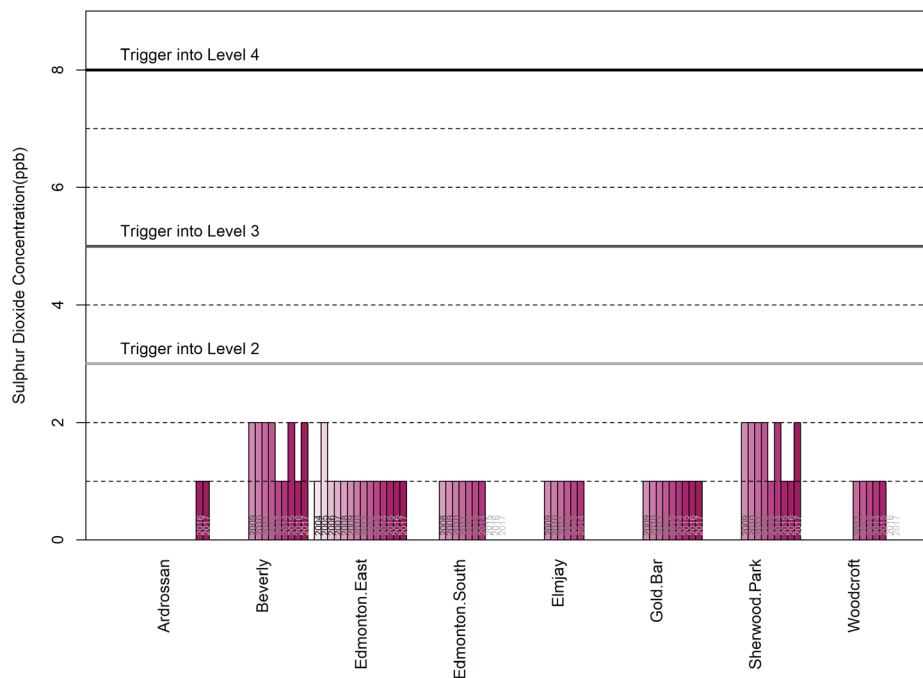


Figure 8: Annual average concentrations of Sulphur Dioxide at monitoring stations operated by Fort Air Partnership. Years with a date and no visible bar recorded an annual average of 0 ppb for that year.

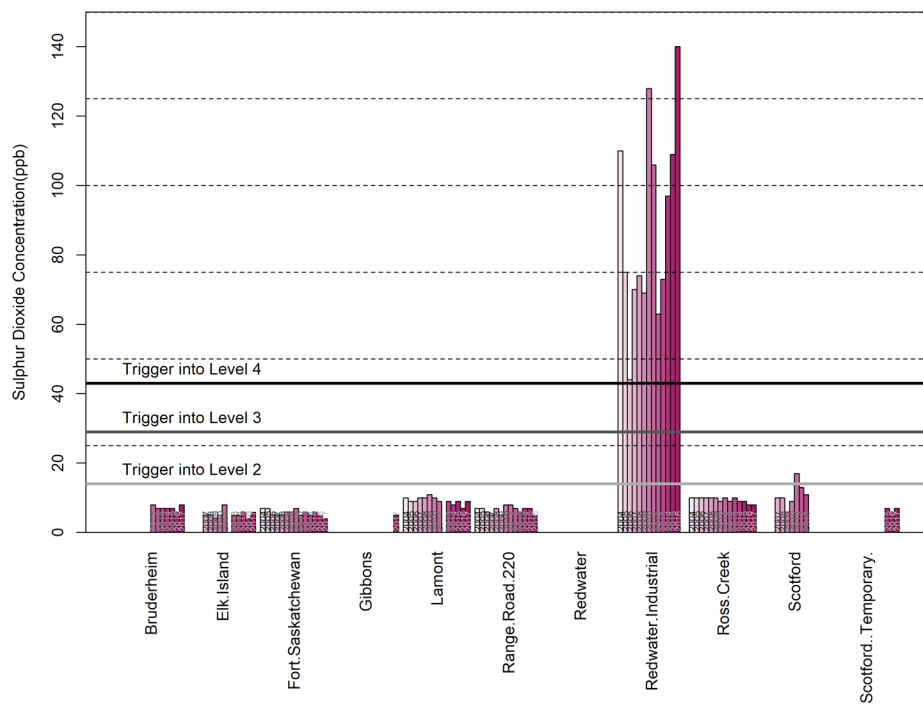
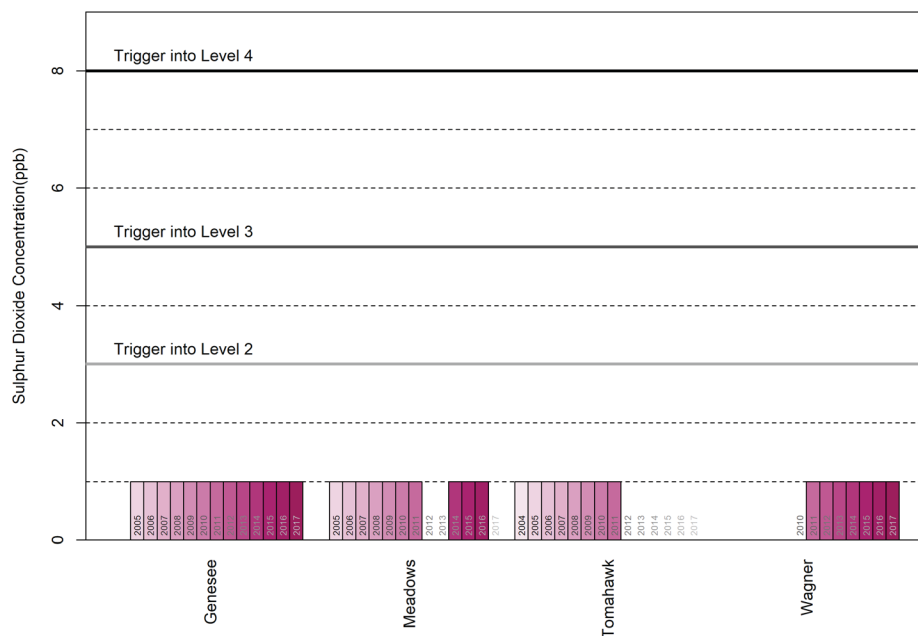


Figure 9: Annual average concentrations of Sulphur Dioxide at monitoring stations operated by West Central Airshed Society. Years with a date and no visible bar recorded an annual average of 0 ppb for that year.



Sulphur Dioxide Upper Range of the Hourly Data

Trends

Monitoring stations near industrial facilities (Beverly, Edmonton East, Elmjay, Gold Bar, Lamont County, Sherwood Park, Range Road 220, Redwater Industrial, Ross Creek, Genesee, Meadows, and Wagner) have shown variable year-over-year upper range concentrations changes between 2004 and 2017 (Figures 10, 11, & 12). Of these monitoring stations, Edmonton East, Redwater Industrial, Sherwood Park and Wagner have observed modest increases, and Range Road 220, Gold Bar, Beverly, Lamont, Ross Creek, Genesee and Meadows observed an overall decrease in concentration between 2004 and 2017. Elmjay did not observe any overall changes.

Monitoring stations away from industrial facilities (Ardrossan, Edmonton South, Woodcroft, Elk Island, Fort Saskatchewan, Bruderheim, and Tomahawk), with the exception of Ardrossan and Elk Island (which increased slightly), observed small decreases outside of year-to-year variability in observed upper range sulphur dioxide concentration between 2004 and 2017. Gibbons was assessed for the first time (Figure 11).

Figure 10: Upper range concentrations of Sulphur Dioxide at monitoring stations within the boundary of the Alberta Capital Airshed.

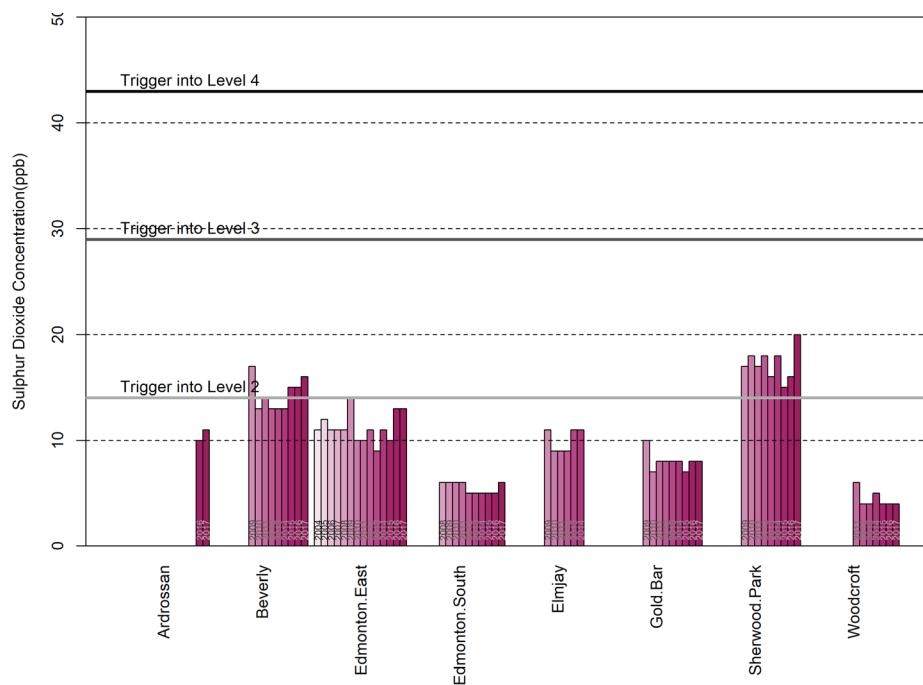


Figure 11: Upper range concentrations of Sulphur Dioxide at monitoring stations operated by Fort Air Partnership.

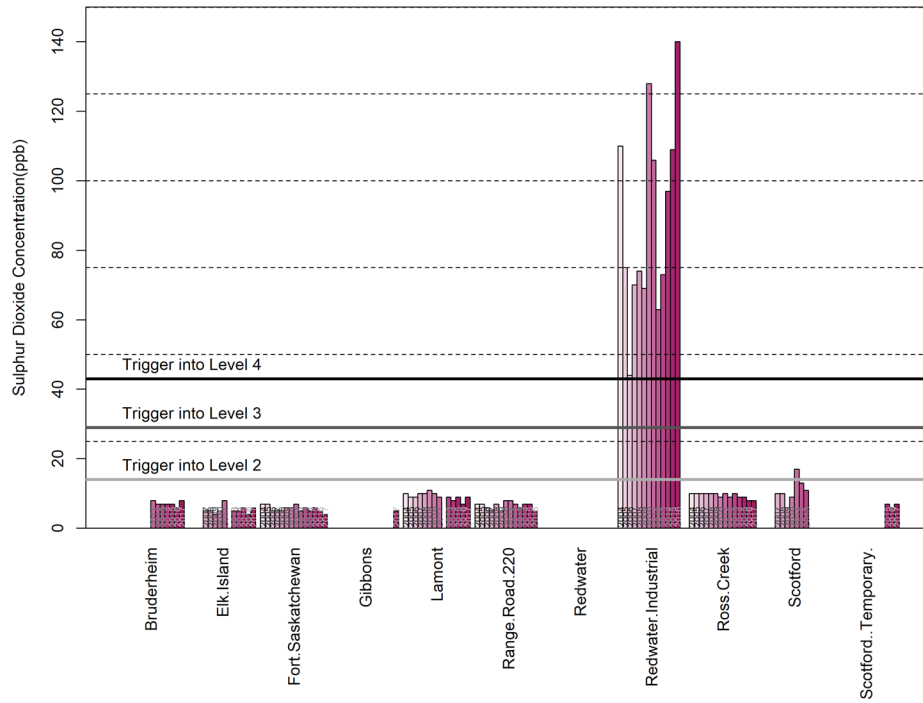
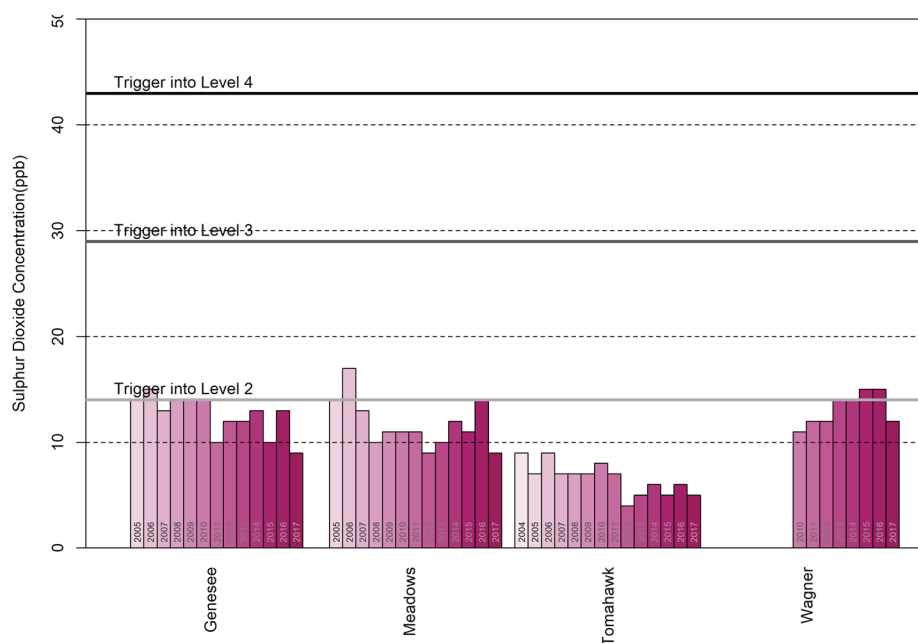


Figure 12: Upper range concentrations of Sulphur Dioxide at monitoring stations operated by West Central Airshed Society.



Fine Particulate Matter 24-hour Metric

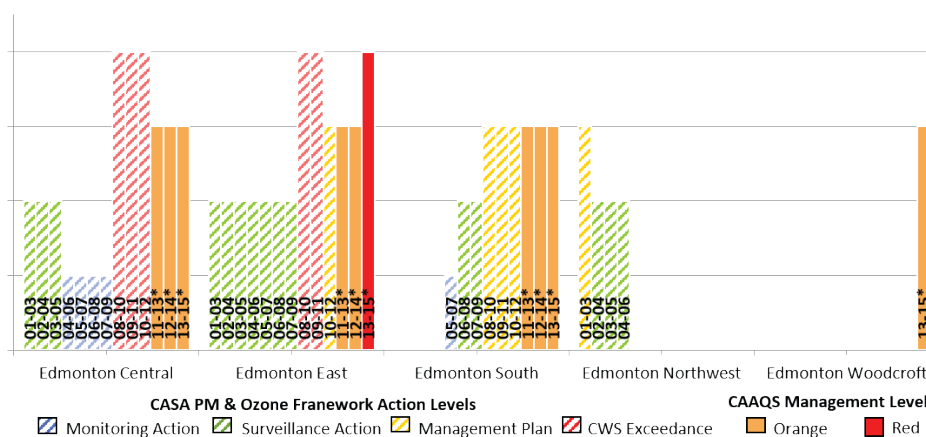
Trends

Reported concentrations of fine particulate matter against the CAAQS include all measured data to determine the 98th percentile or annual average concentration. In cases where a CAAQS metric exceeds the standard, trans-boundary flows and exceptional events (e.g. forest fire smoke events) may be considered for removal before re-calculation of the 98th percentile or annual average concentration and verification of achievement of the metric. Concentrations reported in the *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015* do not account for removal of trans-boundary flows and exceptional events, but the management level assignments do. The action/management levels reported in Figures 13, 14, and 15 take into account any trans-boundary flows and exceptional events.

Adoption of FEM type analyzers has resulted in a step change in observed fine particulate matter concentrations at Edmonton Central, Edmonton East, Edmonton South, Fort Saskatchewan and Lamont County monitoring stations between 2001-2003 and 2013-2015. This has resulted in an equivalent increase in assigned

action/management level over this period. As outlined in the *Capital Region Fine Particulate Matter Science Report*⁹ volatile species of fine particulate matter are in abundance in urban areas. The observed increase in assigned action/management level at urban locations is therefore consistent with the adoption of FEM analyzers at these locations. In general there is substantial variability in the 24-hour metric concentrations from year to year, potentially a result of the meteorologically dependent and episodic nature of secondary fine particulate matter formation in the Capital Region.

Figure 13: 24-hour metric of fine particulate matter (3 year average of annual 98th percentile concentrations) action/management level assignments at monitoring stations in the Alberta Capital Airshed. Columns with diagonal striping are action levels assigned under the former Clean Air Strategic Alliance (CASA) Particulate Matter and Ozone Management Framework, adopted by the Capital Region Air Quality Management Framework. Solid columns are management levels from *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015* assigned using the CAAQS. Action levels determined under the CASA Particulate Matter and Ozone Framework and management levels determined under the CAAQS may not be directly comparable due to differences in the removal of transboundary flows and exceptional events.



9 Alberta Environment and parks. 2014. Capital Region Fine Particulate Matter Science Report. <https://open.alberta.ca/publications/9781460120736>

Figure 14: 24-hour metric of fine particulate matter (3 year average of annual 98th percentile concentrations) action/management level assignments at monitoring stations in the Fort Air Partnership airshed. Columns with diagonal striping are action levels assigned under the former Clean Air Strategic Alliance (CASA) Particulate Matter and Ozone Management Framework, adopted by the Capital Region Air Quality Management Framework. Solid columns are management levels from *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015* assigned using the CAAQS. Action levels determined under the CASA Particulate Matter and Ozone Framework and management levels determined under the CAAQS may not be directly comparable due to differences in the removal of transboundary flows and exceptional events.

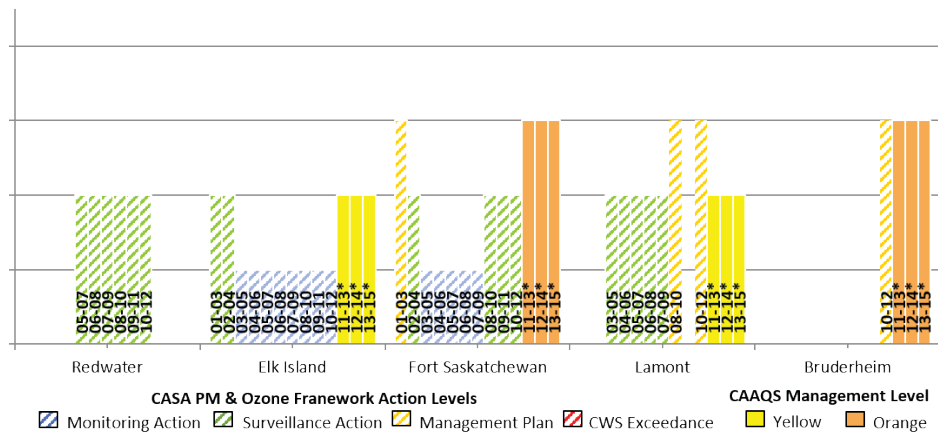
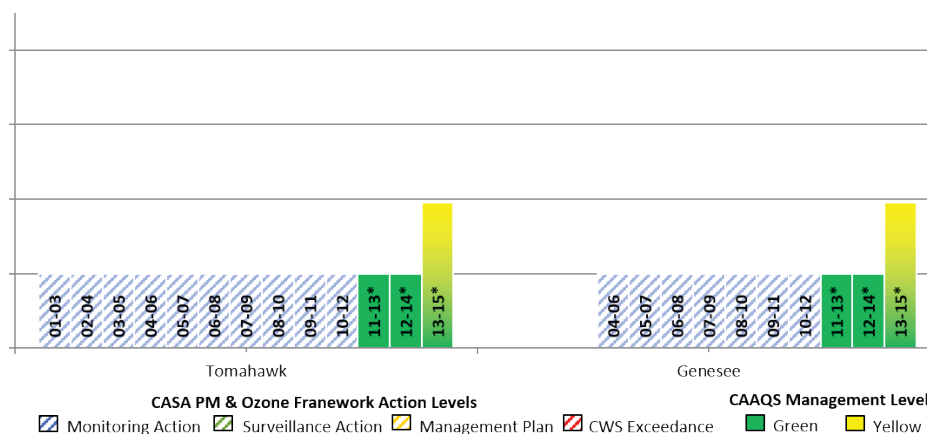


Figure 15: 24-hour metric of fine particulate matter (3 year average of annual 98th percentile concentrations) action/management level assignments at monitoring stations in the West Central Airshed Society airshed. Columns with diagonal striping are action levels assigned under the former Clean Air Strategic Alliance (CASA) Particulate Matter and Ozone Management Framework, adopted by the Capital Region Air Quality Management Framework. Solid columns are management levels from *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015* assigned using the CAAQS. Columns with a yellow to green gradient are assigned to the “yellow or lower” management level, discussed previously. *Action levels determined under the CASA Particulate Matter and Ozone Framework and management levels determined under the CAAQS may not be directly comparable due to differences in the removal of transboundary flows and exceptional events.*

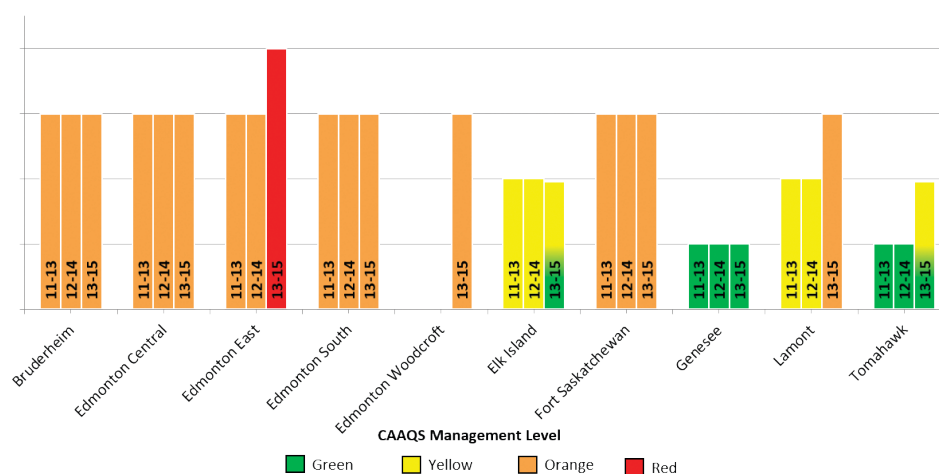


Fine Particulate Matter Annual Average Metric

Trends

Three data periods have been analyzed since the adoption of the CAAQS in 2015: 2011-2013, 2012-2014, and 2013-2015. The assigned management levels for these data periods are documents in *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015*. Generally, the annual average is more stable than the 24-hour metric from data period to data period with the only change in management level occurring at Edmonton East (an increase from orange in 2012-2014 to red in 2013-2015) and Lamont County (an increase from yellow in 2012-2014 to orange in 2013-2015) monitoring stations. Spatially, urban monitoring stations observe the highest concentrations of fine particulate matter, however stations downwind of the urban areas (e.g. Bruderheim and Lamont County) also observed elevated concentrations.

Figure 16: Annual average metric of fine particulate matter (3 year average of annual average concentrations) management level assignments at monitoring stations in the Capital Region. All management levels were determined after the removal of trans-boundary flows and exceptional events. Columns with a yellow to green gradient are assigned to the “yellow or lower” management level, discussed previously.



Ozone

Trends

Reporting of ozone concentrations against the CAAQS includes all observed data as included in the *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015*. In cases where a CAAQS metric exceeds the standard or threshold, trans-boundary flows and exceptional events (e.g. stratospheric intrusion of ozone) may be considered for removal before re-calculation of the 3-year-average of the annual 4th highest of the daily maximum 8-hour average concentration metric for verification of achievement of the metric. Concentrations reported in the *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015* do not account for removal of trans-boundary flows and exceptional events; however, the action/management level assignments do take into account trans-boundary flows and exceptional events.

Ozone action/management levels at all monitoring stations in the Capital Region have observed some variation. Many stations observed a rise in ozone action/management level assignment between 2006-2008 and 2009-2011. Stations within urban areas have generally remained stable or have decreased in terms of assigned management level (e.g. Edmonton Central, Edmonton East, Edmonton South, and Fort Saskatchewan). These stations tend to have the lowest assigned management

levels due to the effect of NO_x titration. Urban areas are sources of NO_x which react with O₃ to decrease overall concentrations of O₃. Several stations have been assigned to the orange management level since the adoption of the CAAQS, either continuously or have fluctuated over time. Stations such as Woodcroft, Bruderheim, and Genesee continue to see high concentrations of O₃ and therefore may be the target of management planning for O₃ reduction.

Figure 17: 8-hour metric of ozone (3-year-average of the annual 4th highest of the daily maximum 8-hour average concentrations) action/management level assignments at monitoring stations in the Alberta Capital Airshed. Columns with diagonal striping are action levels assigned under the former Clean Air Strategic Alliance (CASA) Particulate Matter and Ozone Management Framework, adopted by the Capital Region Air Quality Management Framework. Solid columns are management levels from *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015* assigned using the CAAQS. Action/management level assignments determined under the CASA Particulate Matter and Ozone Framework and the CAAQS may not be directly comparable due to differences in the removal of transboundary flows and exceptional events. Columns with a yellow to green gradient are assigned to the “yellow or lower” management level, discussed previously.

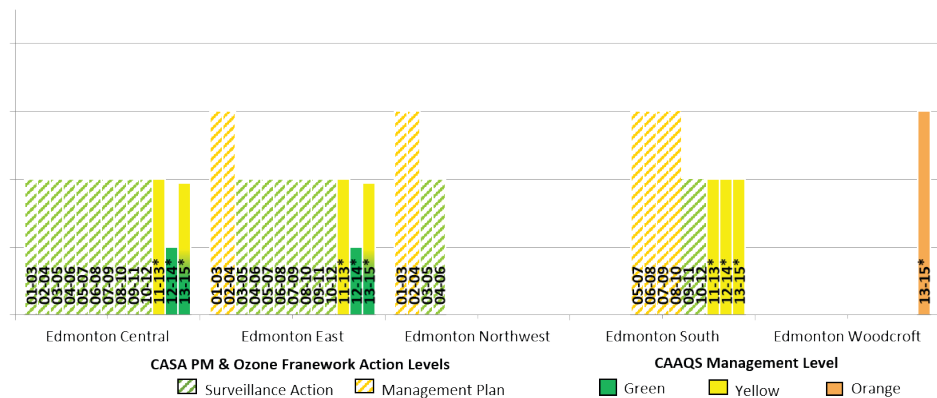


Figure 18: 8-hour metric of ozone (3-year-average of the annual 4th highest of the daily maximum 8-hour average concentrations) action/management level assignments at monitoring stations in the Fort Air Partnership airshed. Columns with diagonal striping are action levels assigned under the former Clean Air Strategic Alliance (CASA) Particulate Matter and Ozone Management Framework, adopted by the Capital Region Air Quality Management Framework. Solid columns are management levels from *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015* assigned using the CAAQS. Action/management level assignments determined under the CASA Particulate Matter and Ozone Framework and the CAAQS may not be directly comparable due to differences in the removal of transboundary flows and exceptional events.

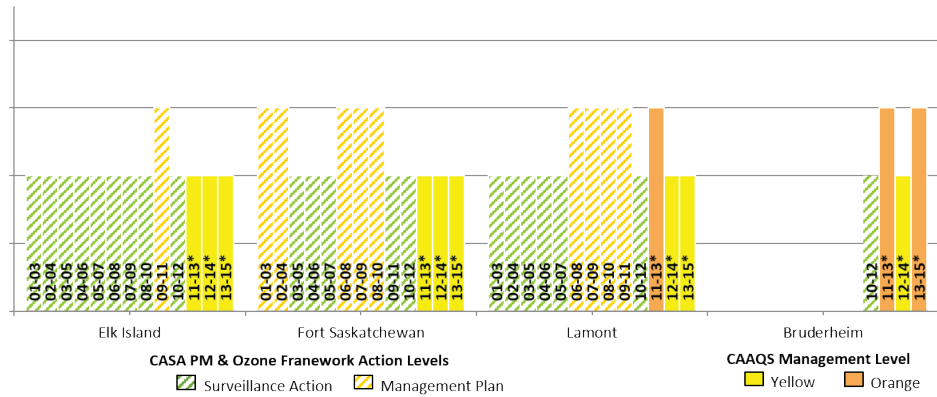
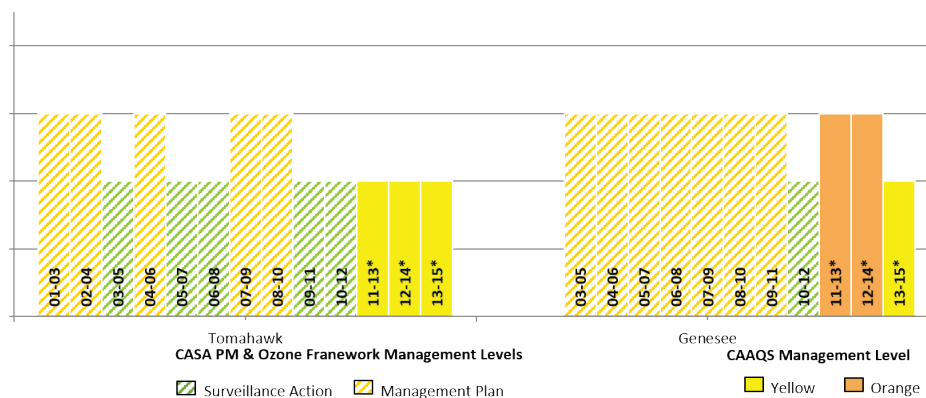


Figure 19: 8-hour metric of ozone (3-year-average of the annual 4th highest of the daily maximum 8-hour average concentrations) action/management level assignments at monitoring stations in the West Central Airshed Society airshed. Columns with diagonal striping are action levels assigned under the former Clean Air Strategic Alliance (CASA) Particulate Matter and Ozone Management Framework, adopted by the Capital Region Air Quality Management Framework. Solid columns are management levels from *Alberta: Air Zones Report 2011-2013* and *Alberta: Air Zones Report 2012-2014, 2013-2015* assigned using the CAAQS. Action/management level assignments determined under the CASA Particulate Matter and Ozone Framework and the CAAQS may not be directly comparable due to differences in the removal of transboundary flows and exceptional events.





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