Introduction

This is the sixth annual air quality report for the Southern Interior Air Zone. Annual air zone reporting is a commitment under the national Air Quality Management System (AQMS). This report describes achievement of the Canadian Ambient Air Quality Standards (CAAQS) for ground-level ozone (O_3) and fine particulates ($PM_{2.5}$), the associated management levels and recent actions to improve air quality. A province-wide summary can be found at: http://www.env.gov.bc.ca/soe/indicators/air/.

Background

The AQMS is the national approach to managing air quality in Canada. Under the AQMS, the CAAQS are developed to drive action to protect human health and the environment. Air zones are areas that exhibit similar air quality characteristics, issues and trends, and that form the basis for monitoring, reporting and taking action on air quality. The Southern Interior Air Zone (see Figure 1) is one of seven broad air zones across the province. Under the AQMS progressively more rigorous actions are expected as air quality approaches or exceeds the CAAQS. The level of action is guided by the Air Zone Management Framework outlined in Table 1.

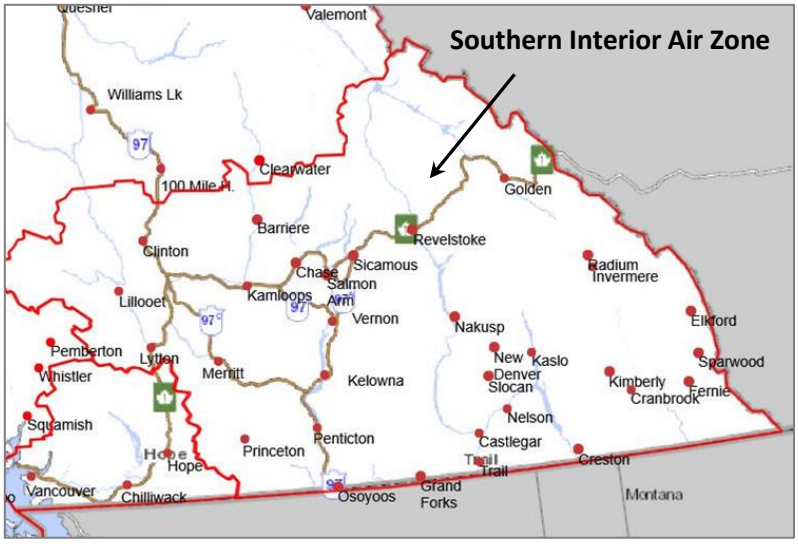


Figure 1. Southern Interior Air Zone.

Table 1. Air zone management framework for ground-level ozone and $PM_{2.5}$ defined based on 2015 CAAQS criteria.

Management Level	Objectives	Ozone	$PM_{2.5}$	
		8-hour (ppb)	Annual ($\mu g/m^3$)	24-hour ($\mu g/m^3$)
Red	Achieve CAAQS	>63	>10.0	>28
Orange	Prevent CAAQS Exceedance	>56 and ≤63	>6.4 and ≤10.0	>19 and ≤28
Yellow	Prevent Air Quality Deterioration	>50 and ≤56	>4.0 and ≤6.4	>10 and ≤19
Green	Keep Clean Areas Clean	≤50	≤4.0	≤10

Ozone Levels

Ozone measurements in the Southern Interior Air Zone are summarized in Figure 2. Concentrations ranged from 46 ppb in Castlegar to 55 ppb in Kelowna.[1] All sites were below the national standard of 63 ppb.

Trends in ozone levels are shown in Figure 3.[2] Concentrations have remained below the level of the national standard throughout this period, with the exception of 2012 in Kelowna, when wildfire smoke led to higher ozone concentrations.[3]

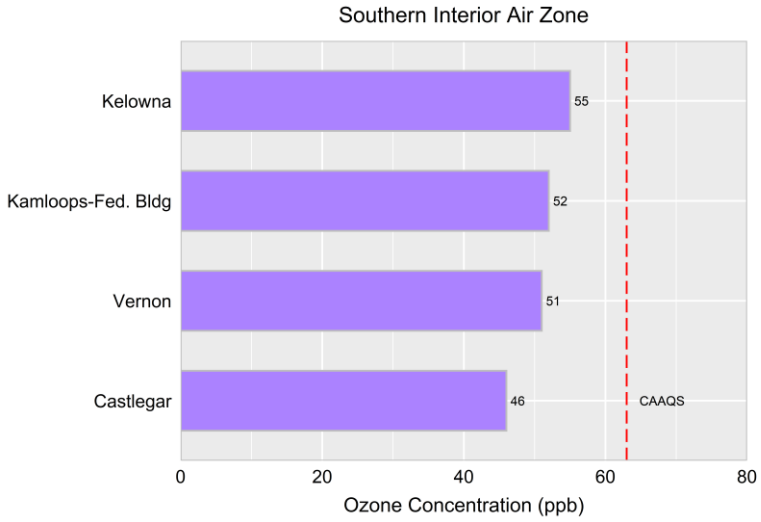


Figure 2. Ozone concentrations in the Southern Interior Air Zone, based on annual 4th highest daily 8-hour maxima, averaged over 2016-2018. Red dashed line identifies the CAAQS of 63 ppb.

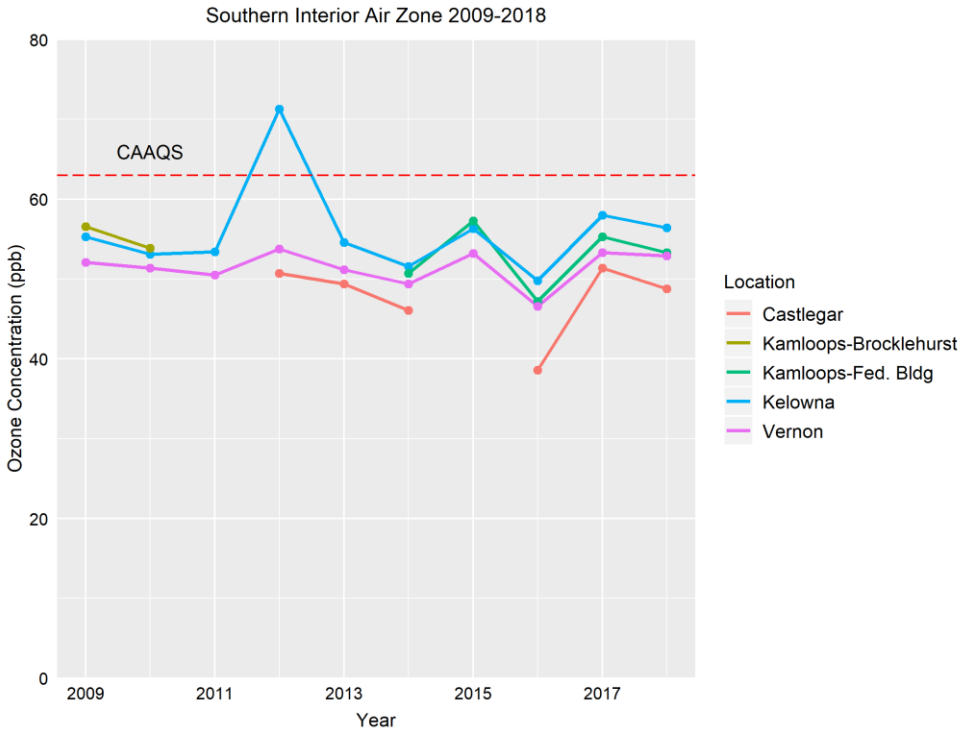
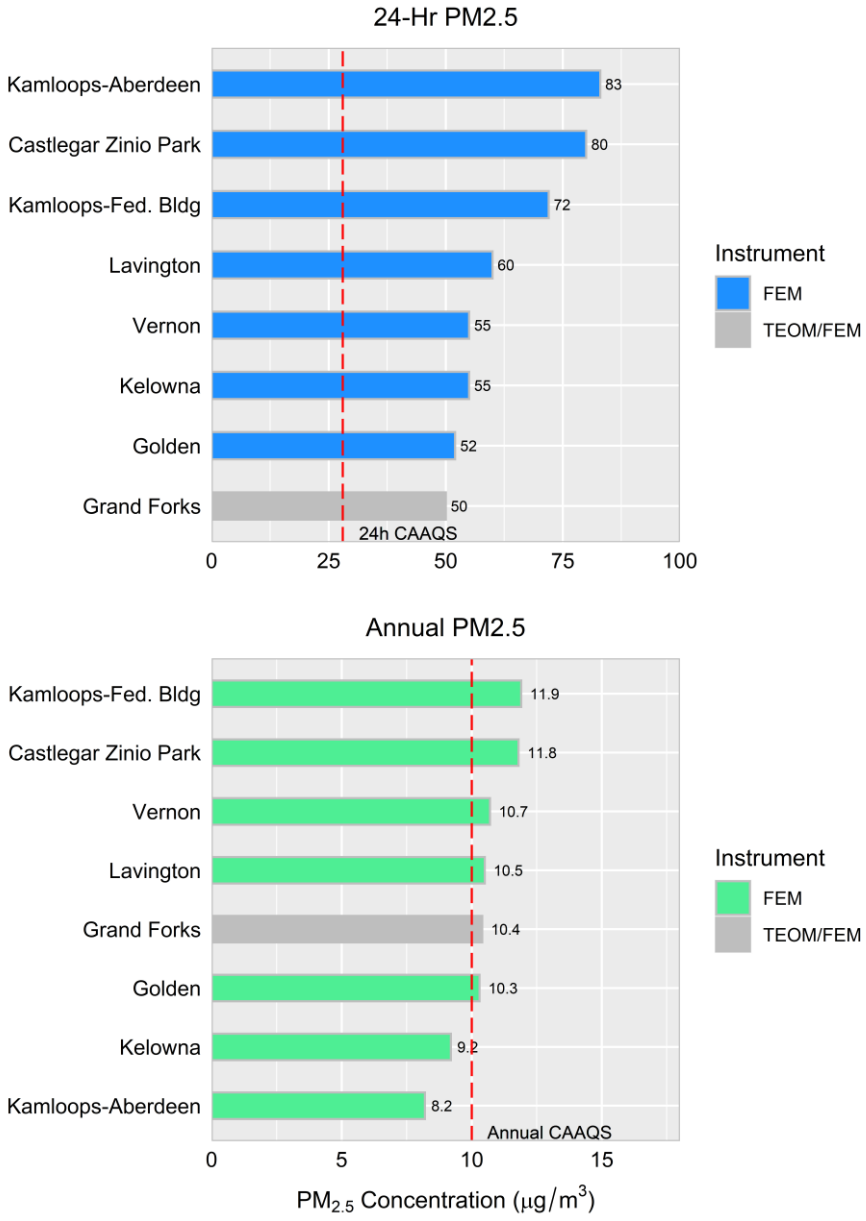


Figure 3. Trends in ozone concentrations (2009-2018), based on annual 4th highest daily 8-hour maxima for a single year. Red dashed line identifies CAAQS of 63 ppb.

[1] Concentrations based on 4th highest daily 8-hour maximum, averaged over three years (2016-2018).
[2] Concentrations based on 4th highest daily 8-hour maximum, averaged over a single year.
[3] Teakles, A.D., So, Rita, Ainslie, B. et al. (2017) Impacts of the July 2012 Siberian fire plume on air quality in the Pacific Northwest. Atmos. Chem. Phys. 17, pp. 2593-2611.

$PM_{2.5}$ Levels

$PM_{2.5}$ refers to inhalable particles up to 2.5 micrometres in diameter. $PM_{2.5}$ measurements are summarized in Figure 4. A distinction is made between data collected using the new Federal Equivalent Method (FEM) technology and the older TEOM instruments that are being phased out. The FEMs are the preferred instrument as they provide a more complete measure of $PM_{2.5}$ than the TEOMs.



Daily concentrations (upper plot) ranged from 50 µg/m^3 in Grand Forks to 83 µg/m^3 at Kamloops-Aberdeen.[4] All eight of the sites shown exceeded the national standard of 28 µg/m^3. Wildfire smoke is believed to have been a major factor in the elevated $PM_{2.5}$ levels.

Annual concentrations (lower plot) ranged from 8.2 µg/m^3 at Kamloops-Aberdeen to 11.9 µg/m^3 at Kamloops-Federal Bldg.[5] With the exception of Kamloops-Aberdeen and Kelowna, all sites exceeded the national standard of 10 µg/m^3.

identify CAAQS of 28 µg/m^3 (upper plot) and 10 µg/m^3 (lower plot).

Trends in annual mean $PM_{2.5}$ concentrations between 2009 and 2018 are shown in Figure 5 for a subset of these sites.[6] A shift to higher reported concentrations is seen with the change from TEOM to FEM

[4] Concentrations based on the annual 98th percentile of 24-hour values, averaged over three years (2016-2018).
[5] Concentrations based on the annual average of 24-hour values, averaged over three years (2016-2018).
[6] Concentrations based on the annual average of 24-hour values over a single year.

instrument, starting in 2011 at Kamloops-Federal Building. Over the 10-year period, the highest annual average $PM_{2.5}$ concentrations were observed during the major wildfire years of 2017 and 2018.

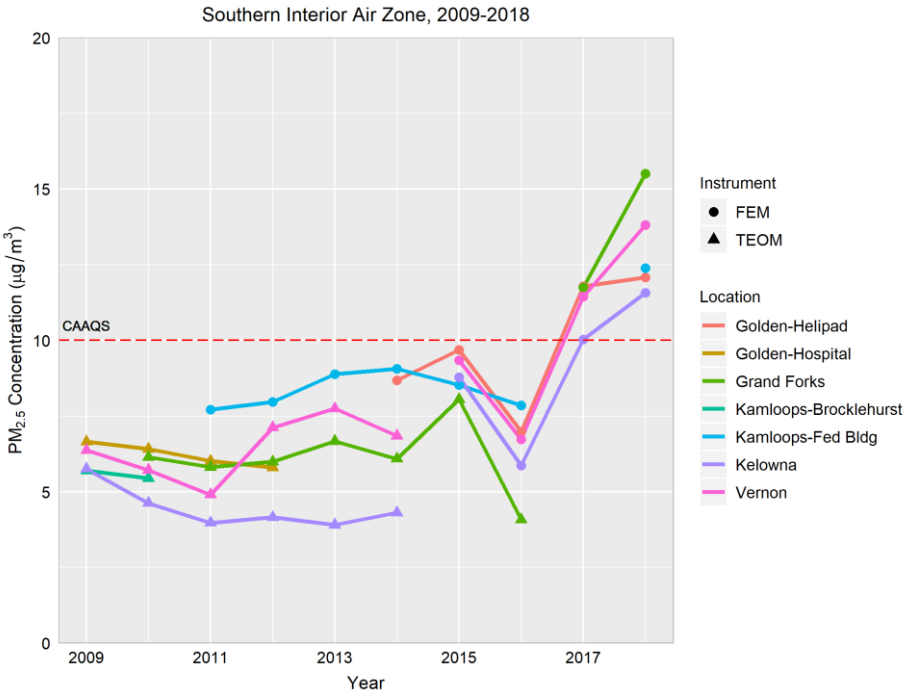


Figure 5. Trends in $PM_{2.5}$ concentrations (2009-2018), based on annual mean concentrations from a single year. The CAAQS value of 10 µg/m^3 is shown by the dashed line. $PM_{2.5}$ measurements prior to 2011 are reported at 25°C and 1 atm. From 2011 onward, measurements are reported at local conditions.

Air Zone Management Levels

Air zone management levels are assigned on the basis of the highest concentrations within an air zone, excluding contributions from transboundary flows (TF) and exceptional events (EE) such as wildfires. This is done so that long-term management strategies are not developed on the basis of events that are beyond local or provincial control.

In the Southern Interior Air Zone, wildfires are the primary contributor to TF/EE. The methodology for identifying wildfire-influenced data is provided in Appendix I and excluded data are summarized in Appendix II. The summers of 2017 and 2018 were characterized by hot, dry conditions and an above-average number of hectares burned compared to 2016. These fires created smoky conditions and periods of degraded air quality in several communities across the air zone.

Table 2 summarizes the as-measured concentrations for ground-level ozone and the management levels after consideration of TF/EE influences (none were identified). The Southern Interior Air Zone is assigned

a “yellow” management level based on ozone concentrations in Kelowna. This indicates that ozone-related actions should focus on preventing further air quality deterioration.

Table 2. Summary of ozone concentrations as measured and air zone management levels for the Southern Interior Air Zone (based on 2016-2018 data).

Location	No. Valid Years	4th Highest Daily 8-hour Maxima		Air Zone Management Level
		As Measured	TF/EE Influences Removed	
Castlegar	2	46	46	Goal: Preventing Air Quality Deterioration
Kamloops	3	52	52	
Kelowna	3	55	55	
Vernon	3	51	51	

Table 3 summarizes $PM_{2.5}$ concentrations as measured and with TF/EE influences removed for each monitoring site (see Appendix II for more information on excluded data). The impact of removing such data changed overall management levels for each site (i.e. the higher level based on daily mean and annual mean values) from “red” to “orange” or “yellow”. As a result, the Southern Interior Air Zone is assigned an “orange” management level. This indicates that $PM_{2.5}$-related activities would be appropriate to prevent future CAAQS exceedances.

Table 3. Summary of $PM_{2.5}$ concentrations as measured and air zone management levels for the Southern Interior Air Zone (based on 2016-2018 data).

Location	Monitor Type	No. Valid Years	Daily Mean (98th Percentile)		Annual Mean		Air Zone Management Level
			As Measured	TF/EE Removed	As Measured	TF/EE Removed	
Castlegar	FEM	2	80	20	11.8	7.6	Goal: Preventing CAAQS Exceedance
Golden	FEM	3	52	20	10.3	7.9	
Grand Forks	TEOM/ FEM	3	50	22	10.4	8.2	
Kamloops-Fed. Bldg	FEM	3	72	20	11.9	7.7	
Kamloops-Aberdeen	FEM	2	83	13	8.2	3.8	
Kelowna	FEM	3	55	19	9.2	6.5	
Lavington	FEM	3	60	22	10.5	7.7	
Vernon	FEM	3	55	22	10.7	8.0	

Actions to Protect Air Quality

The reduction of $PM_{2.5}$ emissions continues to be a major air quality priority in many areas of B.C., including the Southern Interior Air Zone.

In 2016, the Province adopted a new Solid Fuel Burning Domestic Appliance Regulation that requires nearly all wood burning appliances sold in B.C. to be certified to meet particulate emissions standards set by the US Environmental Protection Agency (EPA) in 2015, or equivalent standards set by the Canadian Standards Association (CSA) in 2010. The regulation also specifies the types of fuels that can be burnt and has provisions around the sale and installation of outdoor wood boilers. For more information on the regulation, see: https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-pollution/smoke-burning/regulations/solid-fuel-burning-domestic-appliance-regulation.

The Provincial Wood Stove Exchange Program encourages residents to change out their older, smoky wood stoves for low-emission appliances including new CSA-/EPA-certified clean-burning wood stoves. Between 2016 and 2018, wood stove change-out programs were carried out in the Regional Districts of Kootenay-Boundary, Central Kootenay and Central Okanagan as well as in Golden and District, City of Kamloops, Coldstream, Lavington and Lumby.

Strategies and actions to reduce $PM_{2.5}$ emissions have been documented in local airshed plans that have been developed for the Central Okanagan Regional District,[7] City of Kamloops,[8] the Boundary airshed,[9] and Merritt.[10] Golden is host to an active air quality committee.[11]

A description of other activities underway in B.C. air zones can be found in the "Air Zone Management Response for British Columbia" (see: www.gov.bc.ca/bcairquality).

[7] http://www.regionaldistrict.com/media/217275/RDCO_2015_Clean_Air_Strategy_Final_DRAFT_2015_02_03_final.pdf

[8] http://www.kamloops.ca/environment/pdfs/13-05-AirshedManagementPlan.pdf

[9] http://www.grandforks.ca/air/aqmplans/GrandForksAQMP-Oct22.pdf

[10] http://www.env.gov.bc.ca/epd/bcairquality/reports/pdfs/merritt_aqmp.pdf

[11] http://www.goldenairquality.ca/

Appendix I – Approach to Identify Wildfire-influenced Data

Summertime air quality in British Columbia is periodically influenced by wildfire smoke – from local fires as well as long-range transport from outside of the province. The wildfire season in B.C. typically occurs between May and September, when warm and dry conditions prevail.

A myriad of different pollutants is emitted from wildfires. These include $PM_{2.5}$ and gases such as nitrogen oxides and volatile organic compounds that can react in the atmosphere to form ground-level ozone and additional $PM_{2.5}$.

Given that smoke-affected areas may be extensive, and that smoke may linger for days before being fully dispersed from an airshed, the current analysis has focussed on those periods when wildfire smoke may have contributed to an exceedance of the CAAQS levels for ground-level ozone or $PM_{2.5}$. Criteria used to flag and evaluate wildfire-influenced data included the following:

- 24-hour $PM_{2.5}$ concentrations in excess of the CAAQS level of 28 $\mu g/m^3$ and/or 8-hour daily maximum ozone concentrations in excess of the CAAQS level of 63 ppb between May and September;
- Wildfires of interest identified based on data from the B.C. Wildfire Management Branch;
- Smoky Skies bulletins issued by the Ministry to notify the public of rapidly changing smoke conditions;
- NASA satellite images showing smoke impacts over the region; and
- Multiple monitoring sites in the area of concern showing elevated pollutant levels, suggesting a common source or contributing source.

Wildfire-influenced data were excluded from the calculation of air zone management levels. Excluded data are as summarized in Appendix II.

Appendix II – Wildfire-influenced Data in the Southern Interior Air Zone (2016-2018)

Ozone and $PM_{2.5}$ data from 2016-2018 for the Southern Interior Air Zone were evaluated based on the criteria set out in Appendix I for TF/EE influences. Various pieces of evidence were used to support identification of wildfire-influenced periods. These included the following:

- Wildfires of note – either due to size or proximity to populated areas – are tracked by the BC Wildfire Service (see: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary).
    - 2016 was below-average in terms of the amount of land burned (0.10 million hectares.
    - In contrast, 2017 (1.22 million hectares) and 2018 (1.35 million hectares ha) were record-breaking years in terms of area of land burned.
    - Several large fires burned in the interior of B.C. in the summers of 2017 and 2018 (see Table II-1 for example). The smoke impacts due to these fires was at times widespread and affected air quality in B.C. and beyond, as shown in satellite images (see Figures II-1-3).
    - Smoke from wildfires in Washington State also affected air quality in the Southern Interior Air Zone (see Figure II-2(d)).
- Days flagged as wildfire-influenced (Table II-2) generally coincided with Smoky Skies Bulletins issued by the Ministry, and in a handful of cases, occurred the day before or after a bulletin was announced or ended.
- No bulletin was issued immediately before, during or after the period from Sept. 16-17, 2017 when elevated $PM_{2.5}$ levels were observed in Kamloops and Grand Forks. However, satellite images (e.g. Figure II-2(f)) indicated that there was still residual smoke over the region.

Table II-1. Examples of notable wildfires in the central and southern interior during 2018.[12]

Date Discovered	Size (ha)	Geographic Location	Description
2017-05-28	30	Fountain Valley Road	8 km east of Lillooet
2017-07-06	191,865	Elephant Hill	Large area spanning near Ashcroft to near B.C. Highway 24 at north end
2017-07-06	5,700	Gustafsen fire	Just west of 100 Mile House
2017-07-07	3,278	Princeton	10 km northeast of Princeton
2017-07-07	3,607	Little Fort Complex-Thuya Lake	3 fires near Little Fort and Clearwater
~2017-07-07	545,151	Chilcotin Plateau	Complex of nearly 20 separate fires on Chilcotin Plateau

[12] https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary

Table II-1 (continued)

Date Discovered	Size (ha)	Geographic Location	Description
~2017-07-07	241,160	Hanceville Complex	Complex of fires around Hanceville, Riske Creek, Alexis Creek and surrounding areas
~2017-07-07	31,181	Central Cariboo Complex	Complex of fires around Williams Lake, Soda Creek and surrounding areas
2017-07-23	12,453	Diamond Creek	Ashnola Valley; part of a larger fire in the U.S. that crossed over into B.C.
2017-07-27	3,117	Harrop Creek	4.5 km south of Harrop-Procter, east of Nelson
2017-07-29	12,000	White River	37 km northeast of Canal flats
2017-08-22	1,285	Linklater Creek	18 km southwest of Newgate; part of a larger fire in the U.S. that crossed over into B.C.
2017-08-24	465	Philpott Road	20 km east of Kelowna, near Joe Rich
2017-08-28	2,215	Lamb Creek	2.5 km northwest of Moyie and 18 km southwest of Cranbrook
2017-08-30	15,449	Kenow Mountain	Flathead Valley; burned into Alberta and Waterton Lake National Park
2017-09-02	2,224	Finlay Creek	7.5 km southwest of Peachland
2018-07-17	19,226	Placer Mount Complex-Snowy Mountain	Lightning-caused
2018-07-17	2,372	Placer Mountain Complex-Placer Mountain	37 km south of Princeton; lightning-caused
2018-07-17	1,370	Okanagan Complex-Goode's Creek	21 km south of Kelowna; lightning-caused
2018-07-17	1,790	Okanagan Complex-Mount Eneas	4 km south of Peachland; lightning-caused
2018-07-17	119	Okanagan Complex-Mount Conkle	6 km southwest of Summerland; lightning-caused
2018-07-18	2,363	Syringa Complex-Blacktail Mountain	8 km southeast of Silverton; lightning-caused
2018-07-29	703	Syringa Complex-McArthur Creek	13 km southeast of Salmo, lightning-caused
2018-07-31	1,370	Monashee Complex-Mabel Creek	6.5 km east of Mabel Lake; lightning-caused
2018-07-31	394	Monashee Complex-Sugar Mtn	4 km east of Sugar Lake; suspected lightning-caused

Table II-1 (continued)

Date Discovered	Size (ha)	Geographic Location	Description
2018-08-01	9,284	Syringa Complex-Meachen Creek	Located within Kianuko Provincial Park, 25.5 km southwest of St. Mary's Lake; lightning-caused
2018-08-02	3,015	Syringa Complex-Cross Creek	23 km northeast of Radium; lightning-caused
2018-08-07	6,798	Syringa Complex-Blazed Creek	20 km west of Creston; lightning-caused
2018-08-12	1,181	Syringa-Randal Creek	17 km southeast of Yahk, on Canada/U.S. border; lightning-caused
2018-08-09	642	Okanagan Complex-Gottfriedsen Mountain Creek	24 km west of West Kelowna, 8 km north of Hwy 97; lightning-caused
2018-08-11	2,227	Syringa Complex-Bulldog Mountain	5 km south of Renata; lightning-caused
2018-08-15	13,626	Placer Mountain Complex-Cool Creeek	20 km northeast from Eastgate; lightning-caused

Table II-2 – Wildfire-influenced $PM_{2.5}$ data from 2016-2018. Al dates shown coincided with a Smoky Skies Bulletin for the area of interest, with exception of those highlighted in red.

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Castlegar	2017-07-17	45.4
Castlegar	2017-07-18	39.2
Castlegar	2017-08-01	49.3
Castlegar	2017-08-02	45.1
Castlegar	2017-08-03	36.9
Castlegar	2017-08-04	30.5
Castlegar	2017-08-07	34.5
Castlegar	2017-08-08	50.4
Castlegar	2017-08-09	45.9
Castlegar	2017-08-10	46.4
Castlegar	2017-08-11	45.1
Castlegar	2017-08-12	38.6
Castlegar	2017-08-15	42
Castlegar	2017-08-29	35.1
Castlegar	2017-08-30	53.6

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Castlegar	2017-08-31	29.3
Castlegar	2017-09-05	68.9
Castlegar	2017-09-06	73.4
Castlegar	2017-09-07	74.2
Castlegar	2017-09-08	98
Castlegar	2017-09-09	38.4
Castlegar	2018-08-08	35
Castlegar	2018-08-09	37.7
Castlegar	2018-08-10	42.1
Castlegar	2018-08-11	35.7
Castlegar	2018-08-12	96.1
Castlegar	2018-08-13	94.4
Castlegar	2018-08-14	71.6
Castlegar	2018-08-15	109
Castlegar	2018-08-16	114.5

Table II-2 (continued)

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Castlegar	2018-08-17	108.5
Castlegar	2018-08-18	265.2
Castlegar	2018-08-19	420.2
Castlegar	2018-08-20	177.5
Castlegar	2018-08-21	172.5
Castlegar	2018-08-22	217.3
Castlegar	2018-08-23	66.6
Castlegar	2018-08-24	143.1
Castlegar	2018-08-25	211.7
Castlegar	2018-08-26	139.2
Castlegar	2018-09-01	37.4
Castlegar	2018-09-02	88.6
Castlegar	2018-09-03	52.5
Castlegar	2018-09-04	66.5
Castlegar	2018-09-05	137.7
Castlegar	2018-09-06	130.8
Castlegar	2018-09-07	77.9
Castlegar	2018-09-11	35.7
Cranbrook	2018-08-23	93.3
Cranbrook	2018-08-24	86.6
Cranbrook	2018-09-02	30.2
Golden	2017-07-11	45.7
Golden	2017-07-12	43.2
Golden	2017-07-16	41.9
Golden	2017-07-17	50.5
Golden	2017-07-18	76.2
Golden	2017-07-19	79.6
Golden	2017-07-31	36.5
Golden	2017-08-01	34.2
Golden	2017-08-03	40.6
Golden	2017-08-07	52.2
Golden	2017-08-08	52.9
Golden	2017-08-09	41.6
Golden	2017-08-12	29
Golden	2017-08-13	29.4
Golden	2017-08-14	32.3
Golden	2017-08-15	62.9
Golden	2017-08-16	76.9

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Golden	2017-08-17	44.3
Golden	2017-08-21	42.9
Golden	2017-08-30	54.1
Golden	2017-08-31	48
Golden	2017-09-01	32.2
Golden	2017-09-05	78.5
Golden	2017-09-06	117.8
Golden	2017-09-07	100.2
Golden	2017-09-08	112.1
Golden	2017-09-09	41.9
Golden	2018-08-08	50.8
Golden	2018-08-09	65.4
Golden	2018-08-10	70.7
Golden	2018-08-11	77.4
Golden	2018-08-13	30.1
Golden	2018-08-14	36.9
Golden	2018-08-15	90.8
Golden	2018-08-16	73.1
Golden	2018-08-17	56.8
Golden	2018-08-18	159.7
Golden	2018-08-19	152.6
Golden	2018-08-20	42.9
Golden	2018-08-21	40.3
Golden	2018-08-22	59.5
Golden	2018-08-23	86.1
Golden	2018-08-24	76.4
Golden	2018-08-25	96.5
Golden	2018-08-26	60.6
Golden	2018-09-01	32.6
Golden	2018-09-02	41.2
Grand Forks	2017-07-11	35.6
Grand Forks	2017-07-17	45
Grand Forks	2017-07-18	37.2
Grand Forks	2017-08-01	60.6
Grand Forks	2017-08-02	54.4
Grand Forks	2017-08-03	28.8
Grand Forks	2017-08-04	33.8
Grand Forks	2017-08-06	35.5

Table II-2 (continued)

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Grand Forks	2017-08-07	51.1
Grand Forks	2017-08-08	50.9
Grand Forks	2017-08-09	38.2
Grand Forks	2017-08-10	55
Grand Forks	2017-08-11	42.5
Grand Forks	2017-08-12	28.1
Grand Forks	2017-08-15	34
Grand Forks	2017-08-22	72.2
Grand Forks	2017-08-23	44
Grand Forks	2017-08-29	30.9
Grand Forks	2017-08-30	38.6
Grand Forks	2017-09-16	28.8
Grand Forks	2018-07-31	29.9
Grand Forks	2018-08-07	37
Grand Forks	2018-08-08	35.6
Grand Forks	2018-08-09	37.3
Grand Forks	2018-08-10	34.3
Grand Forks	2018-08-11	87.6
Grand Forks	2018-08-12	95.8
Grand Forks	2018-08-13	92.7
Grand Forks	2018-08-14	57.8
Grand Forks	2018-08-15	81.9
Grand Forks	2018-08-16	75.2
Grand Forks	2018-08-17	80.5
Grand Forks	2018-08-18	200.3
Grand Forks	2018-08-19	409.8
Grand Forks	2018-08-20	92.4
Grand Forks	2018-08-21	86
Grand Forks	2018-08-22	73
Grand Forks	2018-08-23	100.9
Grand Forks	2018-08-24	102.6
Grand Forks	2018-08-25	113.2
Grand Forks	2018-08-26	35.5
Grand Forks	2018-09-06	29
Kamloops-Aberdeen	2017-07-08	63.9
Kamloops-Aberdeen	2017-07-10	157.9
Kamloops-Aberdeen	2017-07-11	127
Kamloops-Aberdeen	2017-07-16	51.5
Kamloops-Aberdeen	2017-07-17	161.8
Kamloops-Aberdeen	2017-07-18	66.7
Kamloops-Aberdeen	2017-07-28	51.8
Kamloops-Aberdeen	2017-07-31	100.7
Kamloops-Aberdeen	2017-08-01	116.1
Kamloops-Aberdeen	2017-08-02	142.5
Kamloops-Aberdeen	2017-08-03	206.3
Kamloops-Aberdeen	2017-08-04	81.1
Kamloops-Aberdeen	2017-08-05	182.3
Kamloops-Aberdeen	2017-08-06	211.5
Kamloops-Aberdeen	2017-08-07	193.7
Kamloops-Aberdeen	2017-08-08	157.6
Kamloops-Aberdeen	2017-08-09	183.6
Kamloops-Aberdeen	2017-08-10	210
Kamloops-Aberdeen	2017-08-11	73.6
Kamloops-Aberdeen	2017-08-12	30.7
Kamloops-Aberdeen	2017-08-14	84
Kamloops-Aberdeen	2017-08-15	52.6
Kamloops-Aberdeen	2017-08-19	47.5
Kamloops-Aberdeen	2017-08-31	58.2
Kamloops-Aberdeen	2017-09-02	59.2
Kamloops-Aberdeen	2017-09-03	128.3
Kamloops-Aberdeen	2017-09-04	72.6
Kamloops-Aberdeen	2017-09-06	62.2
Kamloops-Aberdeen	2017-09-07	106.6
Kamloops-Aberdeen	2017-09-08	59.3
Kamloops-Aberdeen	2017-09-17	43.2
Kamloops-Fed. Bldg	2017-07-08	51.3
Kamloops-Fed. Bldg	2017-07-10	141.7
Kamloops-Fed. Bldg	2017-07-11	117.1
Kamloops-Fed. Bldg	2017-07-16	51.4
Kamloops-Fed. Bldg	2017-07-17	153.5
Kamloops-Fed. Bldg	2017-07-18	73.9
Kamloops-Fed. Bldg	2017-07-28	42.5
Kamloops-Fed. Bldg	2017-07-31	91
Kamloops-Fed. Bldg	2017-08-01	84.8
Kamloops-Fed. Bldg	2017-08-02	111.2
Kamloops-Fed. Bldg	2017-08-03	274.4

Table II-2 (continued)

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Kamloops-Fed. Bldg	2017-08-04	67.7
Kamloops-Fed. Bldg	2017-08-05	105.2
Kamloops-Fed. Bldg	2017-08-06	209.6
Kamloops-Fed. Bldg	2017-08-07	187.5
Kamloops-Fed. Bldg	2017-08-08	130.2
Kamloops-Fed. Bldg	2017-08-09	183.2
Kamloops-Fed. Bldg	2017-08-10	189.3
Kamloops-Fed. Bldg	2017-08-11	82
Kamloops-Fed. Bldg	2017-08-12	32.8
Kamloops-Fed. Bldg	2017-08-14	77.2
Kamloops-Fed. Bldg	2017-08-15	55.1
Kamloops-Fed. Bldg	2017-08-19	36
Kamloops-Fed. Bldg	2017-08-20	30
Kamloops-Fed. Bldg	2017-08-31	63.2
Kamloops-Fed. Bldg	2017-09-01	52.2
Kamloops-Fed. Bldg	2017-09-02	63.4
Kamloops-Fed. Bldg	2017-09-03	79.6
Kamloops-Fed. Bldg	2017-09-04	39.8
Kamloops-Fed. Bldg	2017-09-06	51.4
Kamloops-Fed. Bldg	2017-09-07	87.5
Kamloops-Fed. Bldg	2017-09-08	71.8
Kamloops-Fed. Bldg	2017-09-17	34
Kamloops-Fed. Bldg	2018-08-07	67.2
Kamloops-Fed. Bldg	2018-08-08	47.2
Kamloops-Fed. Bldg	2018-08-11	68.4
Kamloops-Fed. Bldg	2018-08-12	125.2
Kamloops-Fed. Bldg	2018-08-13	144.3
Kamloops-Fed. Bldg	2018-08-14	66.1
Kamloops-Fed. Bldg	2018-08-15	68.3
Kamloops-Fed. Bldg	2018-08-16	55.3
Kamloops-Fed. Bldg	2018-08-17	143.6
Kamloops-Fed. Bldg	2018-08-18	326.6
Kamloops-Fed. Bldg	2018-08-19	161
Kamloops-Fed. Bldg	2018-08-20	33.1
Kamloops-Fed. Bldg	2018-08-22	56
Kamloops-Fed. Bldg	2018-08-23	166.3
Kamloops-Fed. Bldg	2018-08-24	135.4
Kamloops-Fed. Bldg	2018-08-25	53.5

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Kelowna	2017-07-10	37
Kelowna	2017-07-11	76.3
Kelowna	2017-07-17	54.6
Kelowna	2017-07-18	83.6
Kelowna	2017-07-31	35.5
Kelowna	2017-08-01	65.1
Kelowna	2017-08-02	34.5
Kelowna	2017-08-03	30.7
Kelowna	2017-08-04	44.2
Kelowna	2017-08-07	68.2
Kelowna	2017-08-08	76.7
Kelowna	2017-08-09	62.6
Kelowna	2017-08-10	77.6
Kelowna	2017-08-11	65.2
Kelowna	2017-08-12	28.5
Kelowna	2017-08-15	65.6
Kelowna	2017-08-19	40.3
Kelowna	2017-08-25	37.7
Kelowna	2017-08-29	30.7
Kelowna	2017-08-30	28.2
Kelowna	2017-09-03	46.8
Kelowna	2017-09-07	73.1
Kelowna	2017-09-08	88
Kelowna	2018-07-19	48.6
Kelowna	2018-08-07	28.2
Kelowna	2018-08-08	47.8
Kelowna	2018-08-09	40
Kelowna	2018-08-10	49
Kelowna	2018-08-12	96.3
Kelowna	2018-08-13	127.8
Kelowna	2018-08-14	57.6
Kelowna	2018-08-15	81.9
Kelowna	2018-08-16	71.2
Kelowna	2018-08-17	122.1
Kelowna	2018-08-18	308.1
Kelowna	2018-08-19	299.2
Kelowna	2018-08-20	82.2
Kelowna	2018-08-21	51.5

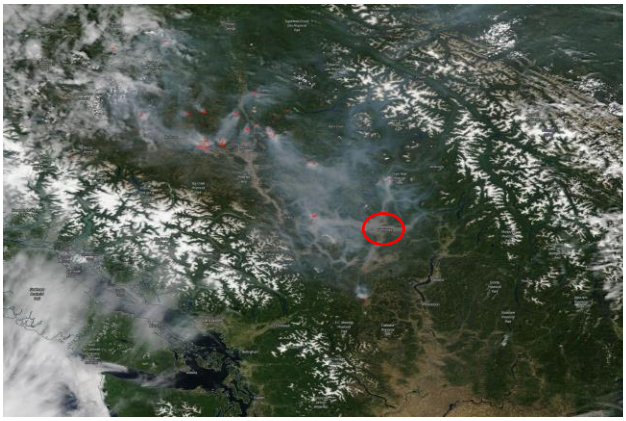
Table II-2 (continued)

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Kelowna	2018-08-22	61.9
Kelowna	2018-08-23	65.3
Kelowna	2018-08-24	118.9
Kelowna	2018-08-25	38.3
Lavington	2017-07-10	59.7
Lavington	2017-07-11	67.5
Lavington	2017-07-12	31.6
Lavington	2017-07-17	59.8
Lavington	2017-07-18	49.9
Lavington	2017-07-31	40.4
Lavington	2017-08-01	59.3
Lavington	2017-08-02	30.1
Lavington	2017-08-03	43.6
Lavington	2017-08-04	39
Lavington	2017-08-06	35.4
Lavington	2017-08-07	75.4
Lavington	2017-08-08	84.8
Lavington	2017-08-09	75
Lavington	2017-08-10	77.3
Lavington	2017-08-11	60.5
Lavington	2017-08-12	35
Lavington	2017-08-14	42.2
Lavington	2017-08-15	67.4
Lavington	2017-08-19	35
Lavington	2017-08-29	37.5
Lavington	2017-08-30	34
Lavington	2017-08-31	35.7
Lavington	2017-09-03	37.3
Lavington	2017-09-06	51.8
Lavington	2017-09-07	69.6
Lavington	2017-09-08	79
Lavington	2018-08-07	40.2
Lavington	2018-08-08	57
Lavington	2018-08-09	51.4
Lavington	2018-08-10	64.8
Lavington	2018-08-11	64.8
Lavington	2018-08-12	107.3
Lavington	2018-08-13	124

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Lavington	2018-08-14	72.9
Lavington	2018-08-15	96.2
Lavington	2018-08-16	63.3
Lavington	2018-08-17	119.3
Lavington	2018-08-18	257.9
Lavington	2018-08-19	292.3
Lavington	2018-08-20	100.1
Lavington	2018-08-21	62.1
Lavington	2018-08-22	92.2
Lavington	2018-08-23	86.6
Lavington	2018-08-24	146.9
Lavington	2018-08-25	88.7
Lavington	2018-09-07	37.6
Nelson	2017-08-02	44.2
Nelson	2017-08-03	52.1
Nelson	2017-08-04	48.3
Nelson	2017-08-05	38.6
Nelson	2017-08-12	55.7
Nelson	2017-08-15	46.1
Nelson	2017-08-06	34.6
Nelson	2017-08-07	39.9
Nelson	2017-08-08	63.1
Nelson	2017-08-09	50.9
Nelson	2017-08-10	56.5
Nelson	2017-08-11	68.3
Nelson	2017-08-27	30.4
Nelson	2017-08-28	42.6
Nelson	2017-08-29	60.9
Nelson	2017-08-30	65.1
Nelson	2017-08-31	28.6
Nelson	2017-09-02	29
Nelson	2017-09-04	69.6
Nelson	2017-09-05	158.9
Nelson	2017-09-06	148.2
Nelson	2017-09-07	129.7
Nelson	2017-09-08	131
Nelson	2017-09-09	47.6

Table II-2 (continued)

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Vernon	2017-07-10	60.7
Vernon	2017-07-11	82
Vernon	2017-07-16	28.3
Vernon	2017-07-17	64
Vernon	2017-07-18	53.4
Vernon	2017-07-31	42.6
Vernon	2017-08-01	61.1
Vernon	2017-08-03	45.2
Vernon	2017-08-04	38.6
Vernon	2017-08-06	32.6
Vernon	2017-08-07	72.2
Vernon	2017-08-08	71.5
Vernon	2017-08-09	68.8
Vernon	2017-08-10	70
Vernon	2017-08-11	60.3
Vernon	2017-08-12	34.5
Vernon	2017-08-14	38.8
Vernon	2017-08-15	71
Vernon	2017-08-19	36.2
Vernon	2017-08-29	31.9
Vernon	2017-08-30	30.5
Vernon	2017-08-31	36.5
Vernon	2017-09-03	43.9
Vernon	2017-09-06	45.8
Vernon	2017-09-07	62.1
Vernon	2017-09-08	74.6
Vernon	2018-08-07	36.4
Vernon	2018-08-08	52.3
Vernon	2018-08-09	39.3
Vernon	2018-08-10	43
Vernon	2018-08-11	48.6
Vernon	2018-08-12	111.3
Vernon	2018-08-13	117.8
Vernon	2018-08-14	59.1
Vernon	2018-08-15	77.5
Vernon	2018-08-16	58.1
Vernon	2018-08-17	139
Vernon	2018-08-18	284.6
Vernon	2018-08-19	264.6
Vernon	2018-08-20	80.3
Vernon	2018-08-21	46.9
Vernon	2018-08-22	68.8
Vernon	2018-08-23	86.7
Vernon	2018-08-24	138.7
Vernon	2018-08-25	76.5
Vernon	2018-09-07	29.8



a. July 8, 2017

b. July 11, 2017

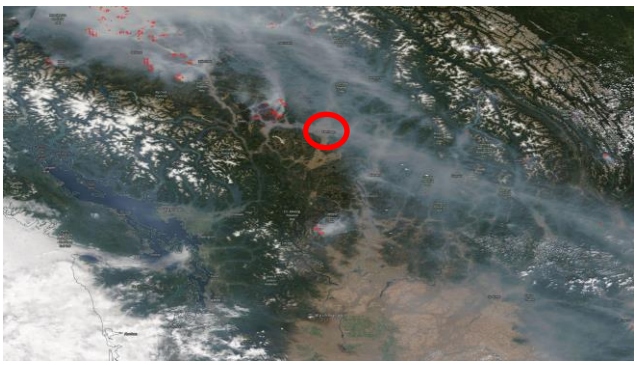
c. July 17, 2017

d. July 18, 2017

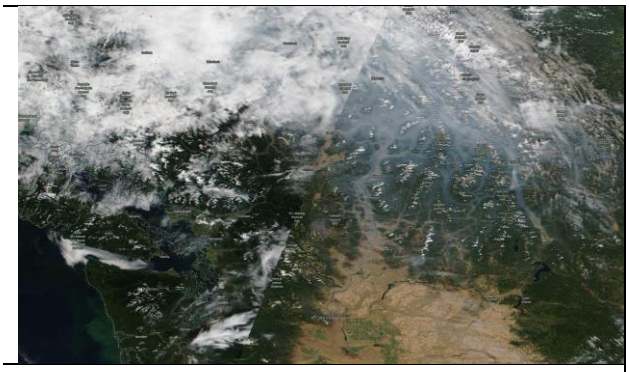
e. July 31, 2017

f. Aug. 6, 2017

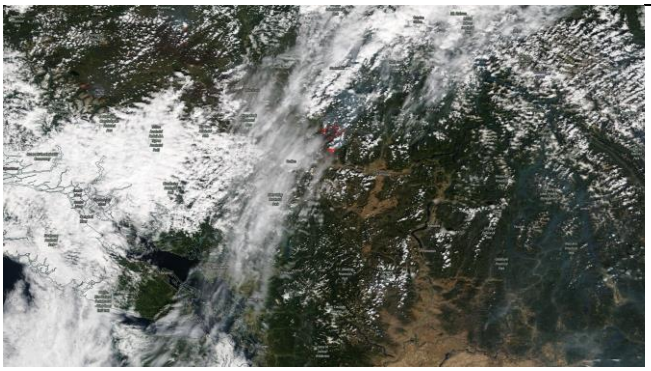
Figure II-1. Satellite images from Jul. 8 to Aug. 6, 2018, showing smoke (grey plumes) over the province, including the Southern Interior Air Zone. Red dots indicate fires and thermal anomalies. Large red circle in Figure II-1(a) identifies Kamloops on map. Source of images: NASA Worldview Snapshots at: https://worldview.earthdata.nasa.gov/.



a. Aug. 11, 2017

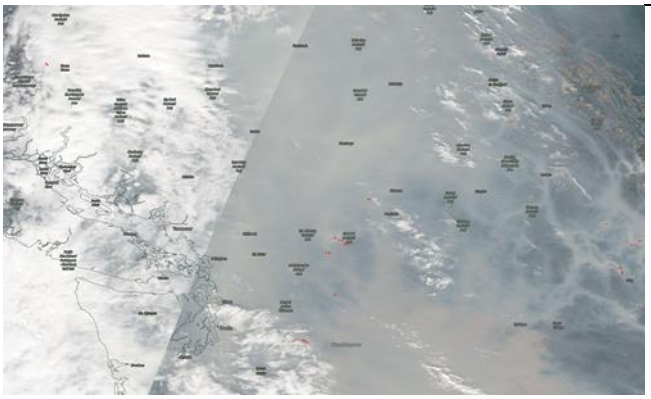


b. Aug. 15, 2017

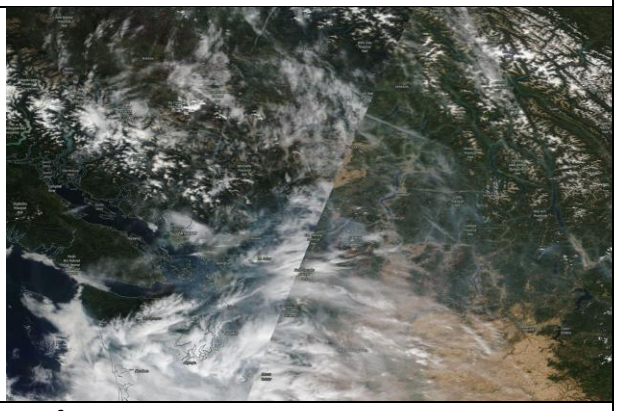


c. Aug. 23, 2017

d. Aug. 29, 2017



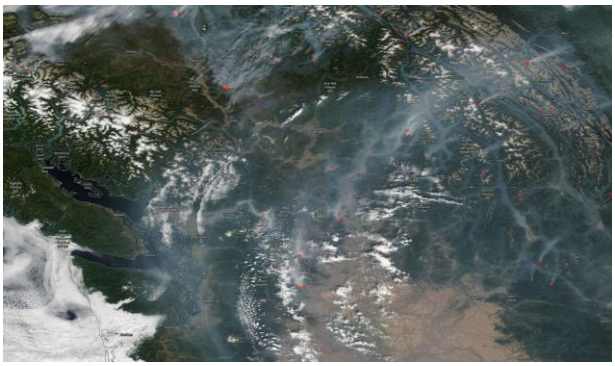
e. Sept. 7, 2017



f. Sept. 16, 2017

Figure II-2. Satellite images from Aug. 11 to Sept. 16, 2017, showing smoke (grey plumes) over the province, including the Southern Interior Air Zone. Red dots indicate fires and thermal anomalies. Large red circle in Figure II-2(a) identifies Kamloops on map. Source of images: NASA Worldview Snapshots at: https://worldview.earthdata.nasa.gov/.

a. Aug. 7, 2018



b. Aug. 10, 2018

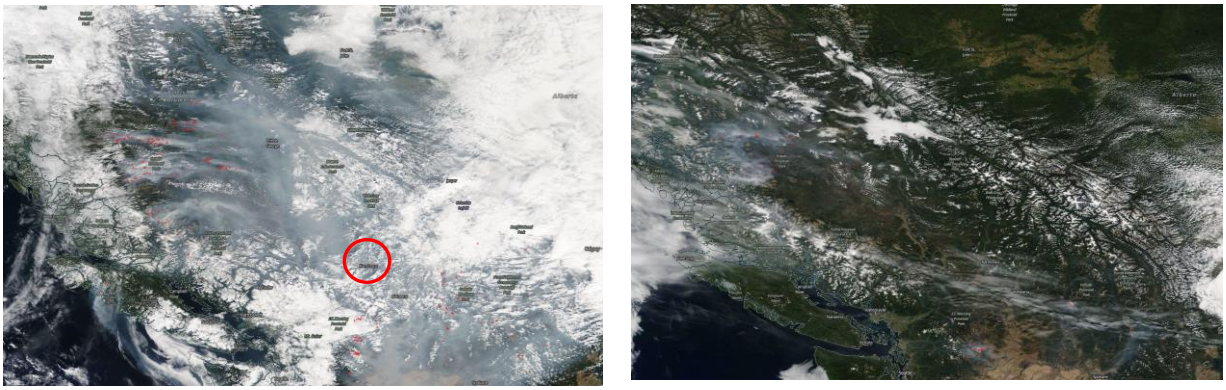
c. Aug. 14, 2018

d. Aug. 17, 2018

e. Aug. 20, 2018

f. Aug. 22, 2018

Figure II-3. Satellite images from Aug. 7-22, 2018, showing smoke (grey plumes) over the province, including the Southern Interior Air Zone. Red dots indicate fires and thermal anomalies. Large red circle in Figure II-3(a) identifies Kamloop on map. Source of images: NASA Worldview Snapshots at: https://worldview.earthdata.nasa.gov/.



a. Aug. 24, 2018 b. Sept. 4, 2018

Figure II-4. Satellite images from Aug. 24-Sept 4, 2018, showing smoke (grey plumes) over the province, including the Southern Interior Air Zone. Red dots indicate fires and thermal anomalies. Large red circle in Figure II-4(a) identifies Kamloops on map. Source of images: NASA Worldview Snapshots at: https://worldview.earthdata.nasa.gov/.