



Oregon Air Quality Monitoring Annual Report: 2021



This document was prepared by
The Oregon Department of Environmental Quality
Program Name
700 NE Multnomah Street, Suite 600
Portland Oregon, 97232
Contact: Contact
Phone: 971-806-2223
www.oregon.gov/deq



Translation or other formats

[Español](#) | [한국어](#) | [繁體中文](#) | [Русский](#) | [Tiếng Việt](#) | [العربية](#)

800-452-4011 | TTY: 711 | deqinfo@deq.oregon.gov

Non-discrimination statement

DEQ does not discriminate on the basis of race, color, national origin, disability, age or sex in administration of its programs or activities. Visit DEQ's [Civil Rights and Environmental Justice page](#).

Executive Summary

DEQ's Mission Statement

The Department of Environmental Quality's (DEQ) mission is to be a leader in restoring, maintaining, and enhancing the quality of Oregon's air, land and water.

Each year DEQ updates the Air Quality Annual Report including the most recent year of data. For this report, that is calendar year 2021. The air pollutants of greatest concern in Oregon are:

- **Fine particulate matter** known as **PM2.5** (2.5 micrometers and smaller diameter) and **PM10** (10 micrometers and smaller diameter).
- **Air Toxics** - pollutants that cause or may cause cancer or other serious health effects
- **Ground-level ozone**, a component of smog
- **Greenhouse gas** (GHG) emissions and global climate change are also of concern in Oregon. Oregon state agencies track GHG emissions from a wide variety of products, services, utilities, and fuel providers. These emissions data are available on DEQ's web site under Air Quality/AQ Programs / Greenhouse Gas Reporting Home. <https://www.oregon.gov/deq/ghgp/Pages/GHG.aspx>

There is much more information about climate change on the Oregon Global Warming Commission's web page <http://www.keeporegoncool.org/>



Contents

Oregon’s 2021 Ambient Air Quality	1
Air Quality Index.....	2
How the AQI is computed.....	2
2021 Oregon Air Quality Index by City	3
Air Quality Trends	32
Ozone Trends	32
PM2.5 Trends	36
Wildfire smoke impacts	52
PM10 Trends	54
Carbon Monoxide Trends.....	55
Sulfur Dioxide Trends.....	56
Nitrogen Dioxide Trends.....	57
Air Toxics Trends	58
Oregon Greenhouse Gas (GHG) Emissions Trends.....	68
Sector-based GHG Emission Trends:	70
Consumption-based GHG Emission Trends:.....	71
National Ambient Air Quality Standards (NAAQS).....	72
Recent NAAQS Exceedances	73
Appendix 1. Data Summaries	75
DEQ Air Monitoring Methods:.....	75
PM2.5 Data Summary	77
PM10 Data Summary	83
Ozone Data Summary.....	85
Nitrogen Dioxide Data Summary	88
Sulfur Dioxide Data Summary	88
Carbon Monoxide Data Summary	89
Air Quality Index Summary (Number of days in each health category by year)	90
Air Toxics	101
Appendix 2 Ambient Air Monitoring Network.....	103
Appendix 3 Data Quality	113

Figure 1. 2021 Albany Air Quality Index Summary.....	4
Figure 2. 2021 Ashland Air Quality Index Summary.....	4
Figure 3. 2021 Baker City Air Quality Index Summary.....	5
Figure 4. 2021 Beaverton Air Quality Index Summary.....	5
Figure 5. 2021 Bend Air Quality Index Summary.....	6
Figure 6. 2021 Brookings Air Quality Index Summary.....	6
Figure 7. 2021 Burns/Hines Air Quality Index Summary.....	7
Figure 8. 2021 Cave Junction Air Quality Index Summary.....	7
Figure 9. 2021 Chiloquin Air Quality Index Summary.....	8
Figure 10. 2021 Coos Bay Air Quality Index Summary.....	8
Figure 11. 2021 Corvallis Air Quality Index Summary.....	9
Figure 12. 2021 Cottage Grove Air Quality Index Summary.....	9
Figure 13. 2020 Cove Air Quality Index Summer Summary.....	10
Figure 14. 2021 Crater Lake Summer Air Quality Index Summary.....	10
Figure 15. 2021 Dallas Air Quality Index Summary.....	11
Figure 16. 2021 Detroit Lake Summer Air Quality Index Summary.....	11
Figure 17. 2021 Enterprise Air Quality Index Summary.....	12
Figure 18. 2021 Estacada Air Quality Index Summary.....	12
Figure 19. 2020 Eugene/Springfield Air Quality Index Summary.....	13
Figure 20. 2021 Florence Air Quality Index Summary.....	13
Figure 21. 2021 Forest Grove Air Quality Index Summary.....	14
Figure 22. 2021 Grants Pass Air Quality Index Summary.....	14
Figure 23. 2021 Gresham Air Quality Index Summary.....	15
Figure 24. 2021 Hermiston Summer Air Quality Index Summary.....	15
Figure 25. 2021 Hillsboro Air Quality Index Summary.....	16
Figure 26. 2021 Hood River Air Quality Index Summary.....	16
Figure 27. 2021 John Day Air Quality Index Summary.....	17
Figure 28. 2021 Klamath Falls Air Quality Index Summary.....	17
Figure 29. 2021 La Grande Air Quality Index Summary.....	18
Figure 30. 2020 Lakeview Air Quality Index Summary.....	18
Figure 31. 2021 La Pine Air Quality Index Summary.....	19
Figure 32. 2021 Lyons Air Quality Index Summary.....	19
Figure 33. 2021 Madras Air Quality Index Summary.....	20
Figure 34. 2021 Medford Air Quality Index Summary.....	20
Figure 35. 2021 Mill City Summer Air Quality Index Summary.....	21
Figure 36. 2021 Mt. Hood Summer Air Quality Index Summary.....	21
Figure 37. 2021 Oakridge Air Quality Index Summary.....	22
Figure 38. 2021 Ontario Air Quality Index Summary.....	22
Figure 39. 2021 Pendleton Air Quality Index Summary.....	23
Figure 40. 2021 Portland Air Quality Index Summary.....	23
Figure 41. 2021 Prineville Air Quality Index Summary.....	24
Figure 42. 2021 Redmond Air Quality Index Summary.....	24
Figure 43. 2021 Roseburg Air Quality Index Summary.....	25
Figure 44. 2021 Salem Air Quality Index Summary.....	25
Figure 45. 2021 Sauvie Island Air Quality Index Summary.....	26
Figure 46. 2021 Shady Cove Air Quality Index Summary.....	26
Figure 47. 2021 Silverton Summer Air Quality Index Summary.....	27
Figure 48. 2021 Sisters Air Quality Index Summary.....	27
Figure 49. 2021 Sweet Home Air Quality Index Summary.....	28
Figure 50. 2021 The Dalles Air Quality Index Summary.....	28

Figure 51. 2021 Tillamook Air Quality Index Summary.....	29
Figure 52. 2021 Tualatin Interstate-5 Near-Road Air Quality Index Summary	29
Figure 53. 2021 Turner Air Quality Index Summary	30
Figure 54. Oregon ozone trend.	33
Figure 55. Willamette Valley ozone trends	34
Figure 56. Southwest and Eastern Oregon ozone trends	35
Figure 57. Oregon cities 2019-2021 Ozone Levels	36
Figure 58. Albany PM2.5 trends.....	37
Figure 59. Baker City PM2.5 trends	37
Figure 60. Bend PM2.5 trends	38
Figure 61. Burns PM2.5 trend.	38
Figure 62. Cave Junction PM2.5 trend.	39
Figure 63. Corvallis PM2.5 trend.....	39
Figure 64. Cottage Grove PM2.5 trends.....	40
Figure 65. Enterprise PM2.5 trends.....	40
Figure 66. Eugene/Springfield PM2.5 trends.....	41
Figure 67. Grants Pass PM2.5 trends.	41
Figure 68. John Day PM2.5 trends.....	42
Figure 69. Klamath Falls PM2.5 trends.	42
Figure 70. Lakeview PM2.5 trends.	43
Figure 71. La Grande PM2.5 trends.	43
Figure 72. Medford PM2.5 trends.....	44
Figure 73. Oakridge PM2.5 trends.	44
Figure 74. Pendleton PM2.5 trends.....	45
Figure 75. Portland Metro PM2.5 trends.....	45
Figure 76. Prineville PM2.5 trends.	46
Figure 77. Roseburg PM2.5 trends.	46
Figure 78. Salem PM2.5 trends.....	47
Figure 79. Sisters PM2.5 trends.....	47
Figure 80. Sweet Home PM2.5 trends.	48
Figure 81. The Dalles PM2.5 trends.....	48
Figure 82. Oregon cities 2018-2020 daily PM2.5 comparison.	50
Figure 83. Oregon cities 2018-2020 annual average PM2.5 comparison.	51
Figure 84. Average number of days >USG from wildfires smoke – 2002 through 2012.....	52
Figure 85. Average number of days >USG from wildfires smoke – 2002 through 2012.....	53
Figure 86. Oregon PM10 trends.....	54
Figure 87. Oregon carbon monoxide Trend.....	55
Figure 88. Oregon sulfur dioxide one hour average trends.....	56
Figure 89. Oregon nitrogen dioxide one hour and annual average trends.	57
Figure 90. Benzene trends.	58
Figure 91. 1,3-Butadiene trends.....	59
Figure 92. Tetrachloroethylene (PERC) trends.....	59
Figure 93. Acrylonitrile trends.....	60
Figure 94. Carbon tetrachloride trends.....	60
Figure 95. Dichloromethane (DCM) trends.....	61
Figure 96. Tetrachloroethylene (PERC) trends.....	61
Figure 97. Trichloroethylene trends.....	62
Figure 98. Acrolein trends.	62
Figure 99. Acetaldehyde trends.	63
Figure 100. Formaldehyde trends.	63

Figure 101. Benzo[a]pyrene trends.	64
Figure 102. Naphthalene total suspended particulate trends.	64
Figure 103. PM10 arsenic trends.	65
Figure 104. PM10 beryllium trends.	65
Figure 105. PM10 cadmium trends.	66
Figure 106. Hexavalent chromium total suspended particulate trends.	66
Figure 107. PM10 lead trends.	67
Figure 108. PM10 manganese trends.	67
Figure 109. PM10 nickel trends.	68
Figure 110. Oregon total greenhouse gas emissions by sector 1990-2016	69
Figure 111. Oregon total Sector-based emissions by economic sector.	70
Figure 112. Oregon total Consumption-based GHG emissions by consumption type.	71
Figure 113. 2020 Ambient Air Quality Monitoring Network.	107
Figure 114. 2020 Portland Metro Ambient Air Quality Monitoring Network	108
Figure 115. 2020 Mid Willamette Valley Ambient Air Quality Monitoring Network.	109
Figure 116. 2020 Eugene-Springfield Ambient Air Quality Monitoring Network	110
Figure 117. 2020 SW Oregon Ambient Air Quality Monitoring Network.	111
Figure 118. 2020 Bend Ambient Air Quality Monitoring Network	112
Table 1 Air Quality Index Health Category Descriptors.	2
Table 2. Air Quality Index Ranges and Episode Stages for PM2.5 and ozone.	2
Table 3. Figure Key for 2021 Air Quality Index.	3
Table 4. Oregon 2021 AQI Summary.	30
Table 5. 2017 National Ambient Air Quality Standards (NAAQS).	72
Table 6. PM2.5 98th Percentile – Eastern Oregon.	73
Table 7. PM2.5 98th Percentile – Western Oregon.	73
Table 8. PM10 Number of Exceedances per year.	74
Table 9. Carbon Monoxide Number of Exceedances per year.	74
Table 10. Ozone Number of Exceedances per year.	74
Table 11. Ambient Air Quality Monitoring Methods.	76
Table 12. Oregon Ambient Air Monitoring Network.	104
Table 13. Oregon Ambient Air Monitoring Visibility and Forest Health Network.	106

Oregon's 2021 Ambient Air Quality

- **PM2.5**

Many areas experienced Unhealthy for Sensitive Groups or worse air quality conditions from wildfire smoke. Fires in Northern California, SW Oregon, by Waldo Lake in the central Cascades, in Eastern Oregon, and SW Washington all impacted air quality. The Cedar Creek fire by Waldo Lake was the longest lasting and largest fires and had the most impacts on nearby communities of Oakridge, Eugene, Springfield and La Pine.

- **Air toxics**

Some air toxics such as benzene and acetaldehyde, remain near or above ambient benchmark concentrations. *Ambient benchmark concentrations are levels at which, if exposed over a lifetime, an individual's risk of getting cancer is increased by one in a million, or non-cancer health effects could occur.*

- **Ozone** (smog)

Portland had one day of Unhealthy air quality that coincided with a wildfire smoke event. Portland had 17 Moderate days all of which were non wildfire smoke related. Medford had two days of Unhealthy for Sensitive Groups and 45 Moderate days. These coincided with wildfire smoke impacts. Eugene and Hermiston had one day each of Unhealthy for Sensitive Groups which coincided with wildfire smoke. Salem had one day that was just under the Unhealthy for Sensitive Groups.

- **Carbon monoxide, nitrogen dioxide, sulfur dioxide and PM10**

These criteria pollutants have been trending mostly downward for most locations over the last ten years.

Air Quality Index

The Air Quality Index (AQI) converts ambient air pollutant concentrations into categories of health concern. The AQI uses index numbers, levels of health risk, and colors to communicate six categories of health concern (Table 1) and identifies air quality levels that range from good to hazardous.

Table 1 Air Quality Index Health Category Descriptors.

Health Category	AQI	Description of Air Quality
Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk
Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Unhealthy	151 to 200	Members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Hazardous	301 & higher	Health warning of emergency conditions: everyone is more likely to be affected.

How the AQI is computed

The AQI is computed for PM_{2.5}, PM₁₀, ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide but the PM_{2.5} and ozone AQI's are typically the highest in Oregon and usually drive the health category. See EPA's AIRNow web site for more detail about the AQI.

Table 2. Air Quality Index Ranges and Episode Stages for PM_{2.5} and ozone.

Air Quality Rating	Air Quality Index (AQI)	PM _{2.5} 24-hour Average (µg/m ³)	Ozone 8-hour Average (ppm)
GOOD	0 - 50	0.0 - 12.0	0.000 - 0.054
MODERATE	51 - 100	12.1 - 35.4	0.055 - 0.070
UNHEALTHY FOR SENSITIVE GROUPS	101 - 150	35.5 - 55.4	0.071 - 0.085
UNHEALTHY	151 - 200	55.5 - 150.4	0.086 - 0.105
VERY UNHEALTHY	201 - 300	150.5 - 250.4	0.106 - 0.200
HAZARDOUS	>300	>250.5	>0.200

2021 Oregon Air Quality Index by City

The AQI provides a review of the health levels over the past year. The Figures below display the AQI health levels over the past year for all the areas where DEQ and the Lane Regional Air Protection Agency (LRAPA) monitor air quality.

Note: A summary of all the AQI days are shown in Appendix G.

Table 3. Figure Key for 2021 Air Quality Index.

Figure	City or Area	Figure	City or Area	Figure	City or Area
1	Albany	19	Eugene/Springfield	37	Oakridge
2	Ashland	20	Florence	38	Ontario
3	Baker City	21	Forest Grove	39	Pendleton
4	Beaverton	22	Grants Pass	40	Portland
5	Bend	23	Gresham	41	Prineville
6	Brookings	24	Hermiston	42	Redmond
7	Burns	25	Hillsboro	43	Roseburg
8	Cave Junction	26	Hood River	44	Salem
9	Chiloquin	27	John Day	45	Sauvie Island
10	Coos Bay	28	Klamath Falls	46	Shady Cove
11	Corvallis	29	La Grande	47	Silverton
12	Cottage Grove	30	Lakeview	48	Sisters
13	Cove	31	La Pine	49	Sweet Home
14	Crater Lake	32	Lyons	50	The Dalles
15	Dallas	33	Madras	51	Tillamook
16	Detroit Lake	34	Medford	52	Tualatin at I-5
17	Enterprise	35	Mill City	53	Turner
18	Estacada	36	Mt. Hood Wilderness		

Note USG = Unhealthy for Sensitive Groups in Charts

2021 Albany Air Quality Index Based on PM2.5

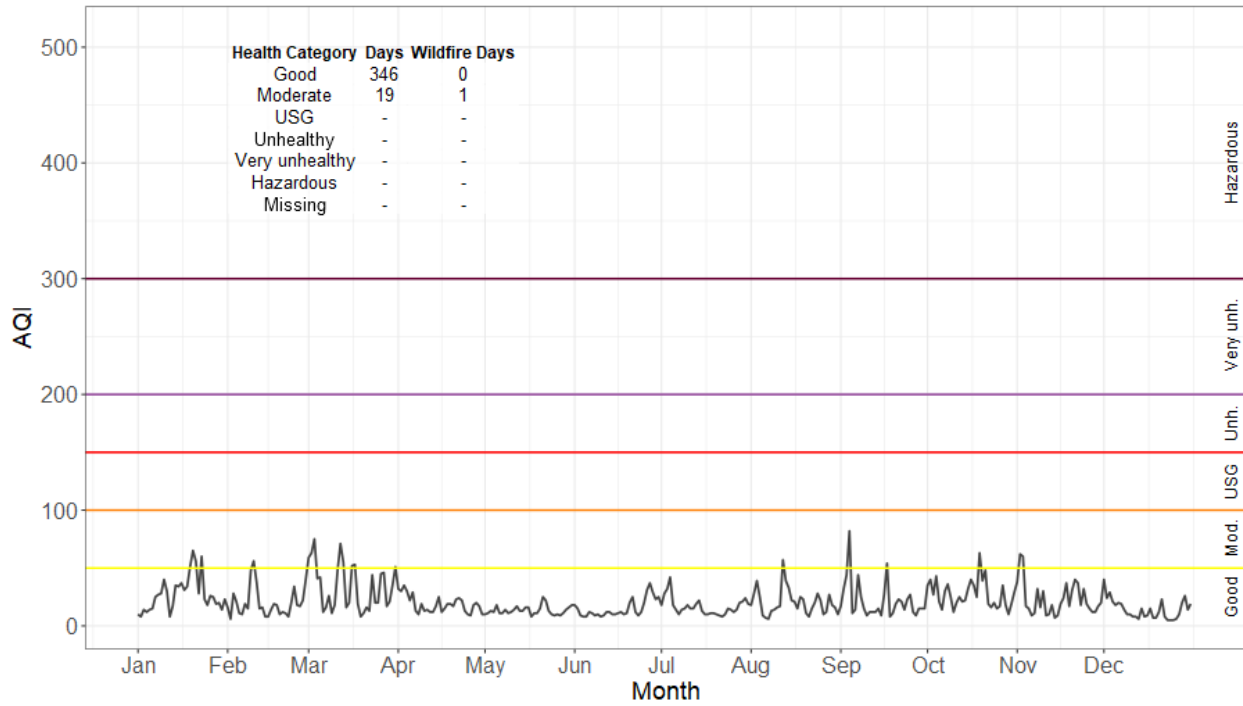


Figure 1. 2021 Albany Air Quality Index Summary.

2021 Ashland Air Quality Index Based on PM2.5

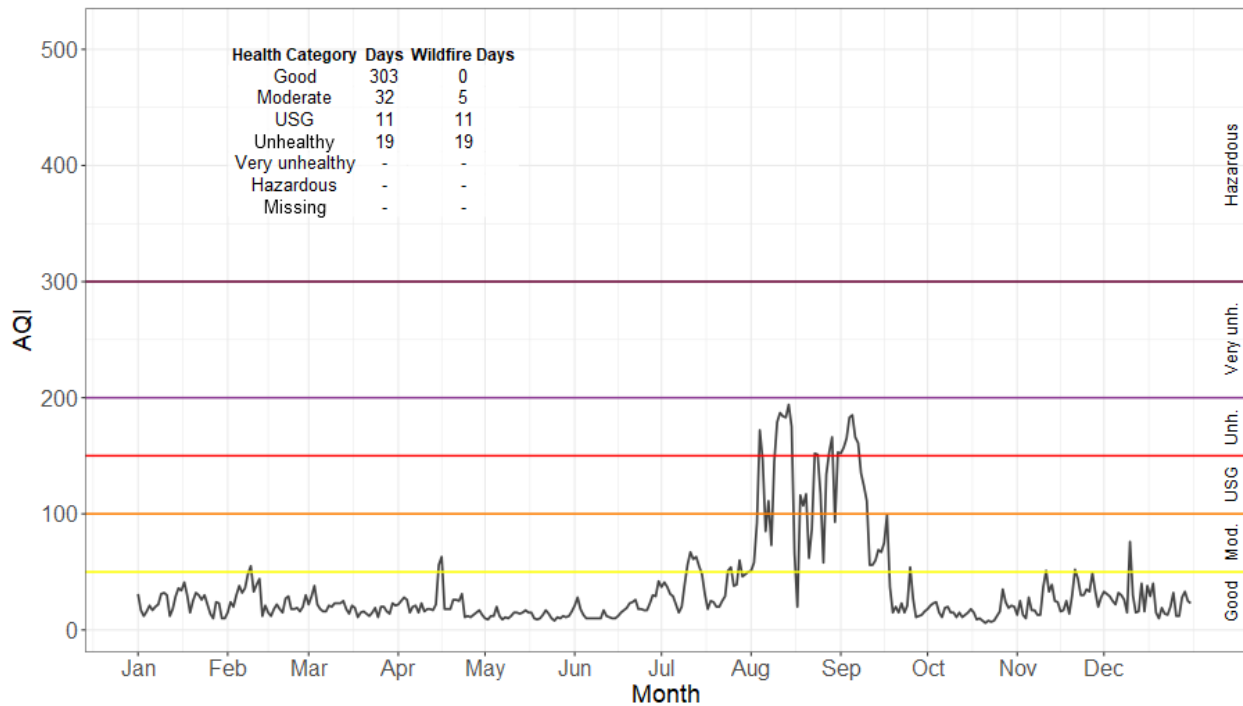


Figure 2. 2021 Ashland Air Quality Index Summary.

2021 Baker City Air Quality Index

Based on PM2.5

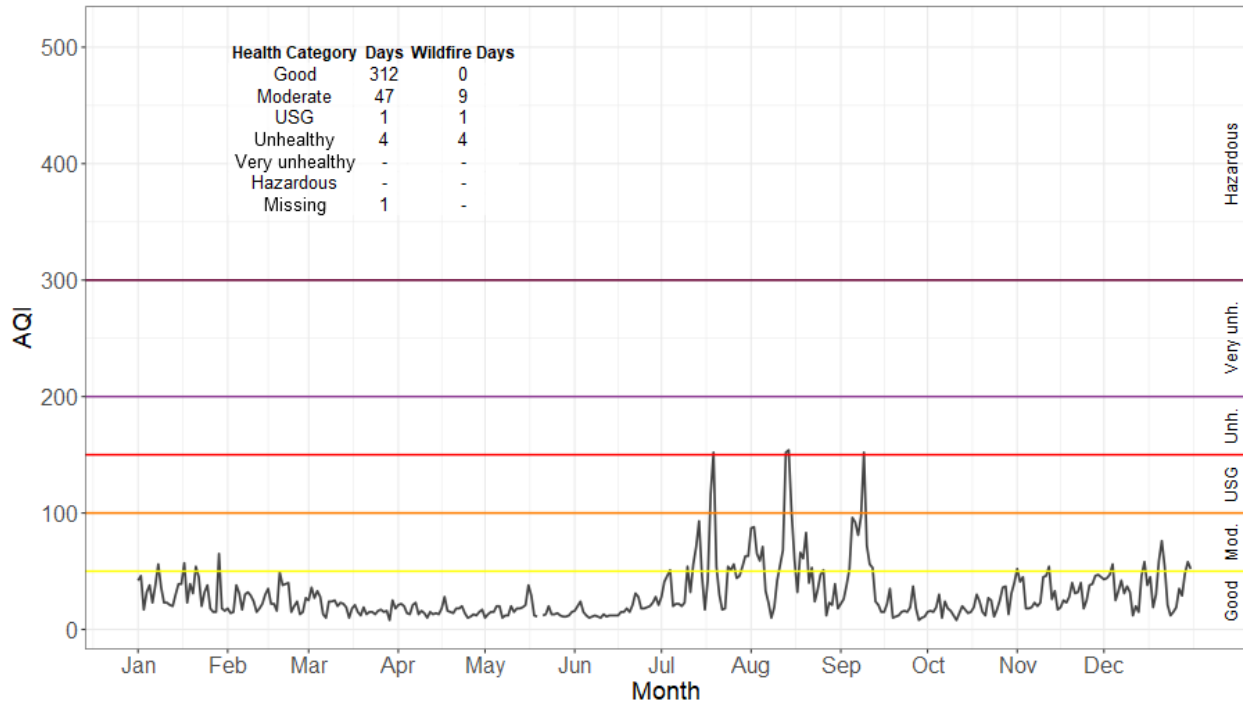


Figure 3. 2021 Baker City Air Quality Index Summary.

2021 Beaverton Air Quality Index

Based on PM2.5

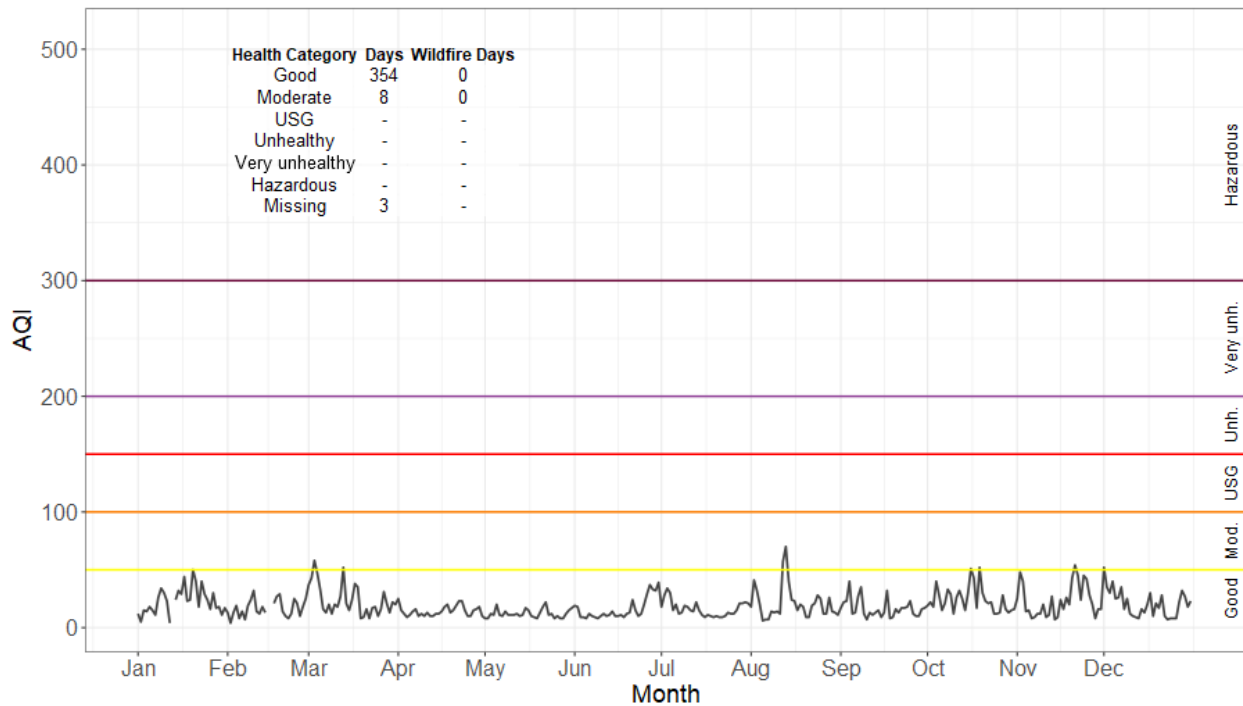


Figure 4. 2021 Beaverton Air Quality Index Summary.

2021 Bend Air Quality Index Based on PM2.5

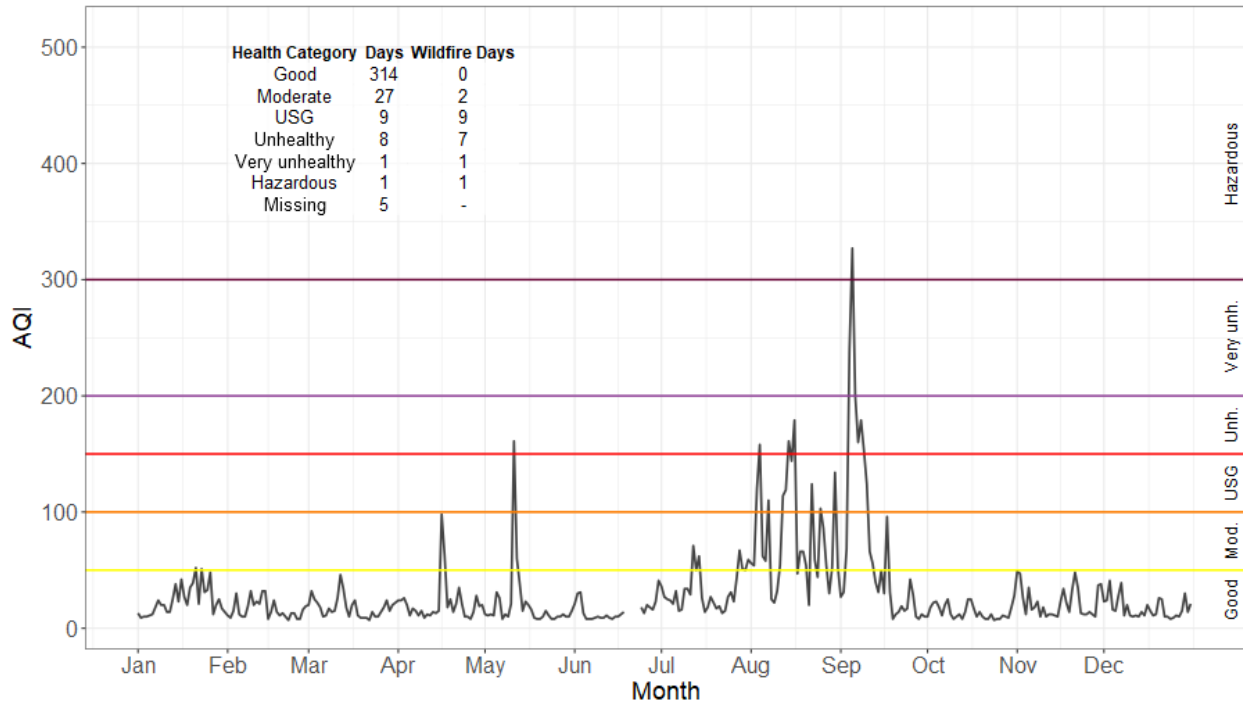


Figure 5. 2021 Bend Air Quality Index Summary.

2021 Brookings Air Quality Index Based on SensOR PM2.5

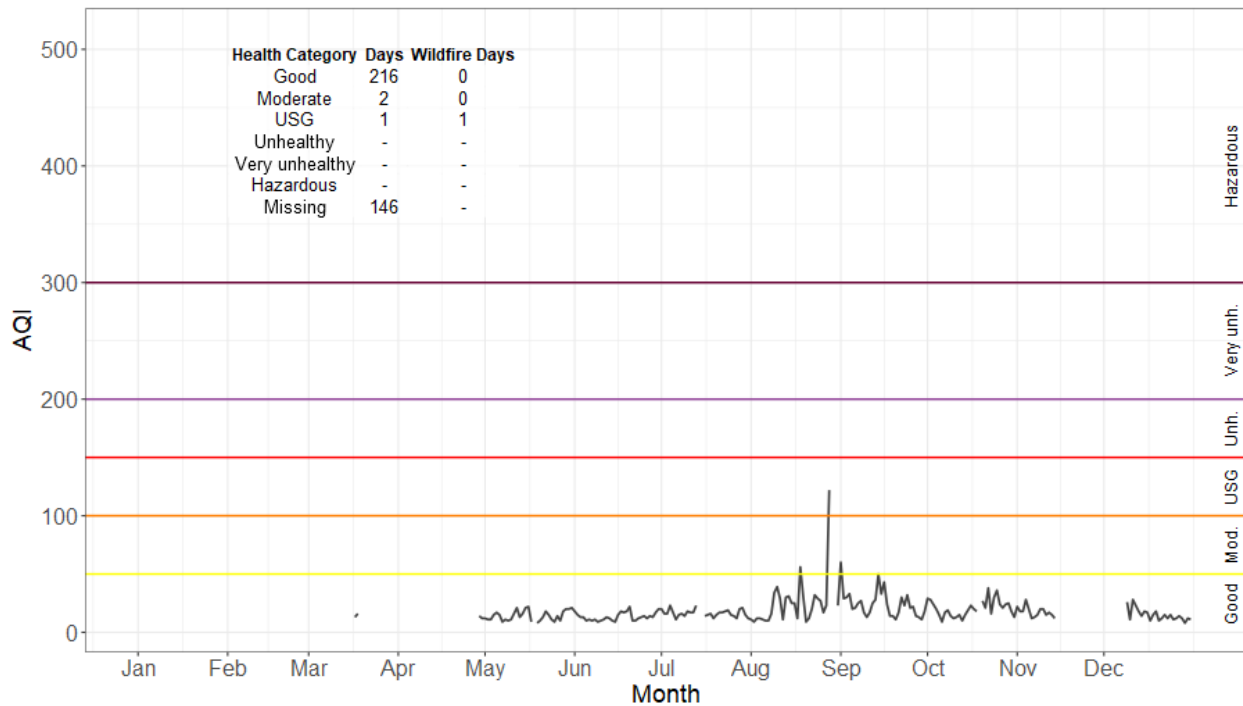


Figure 6. 2021 Brookings Air Quality Index Summary.

2021 Burns Air Quality Index Based on PM2.5

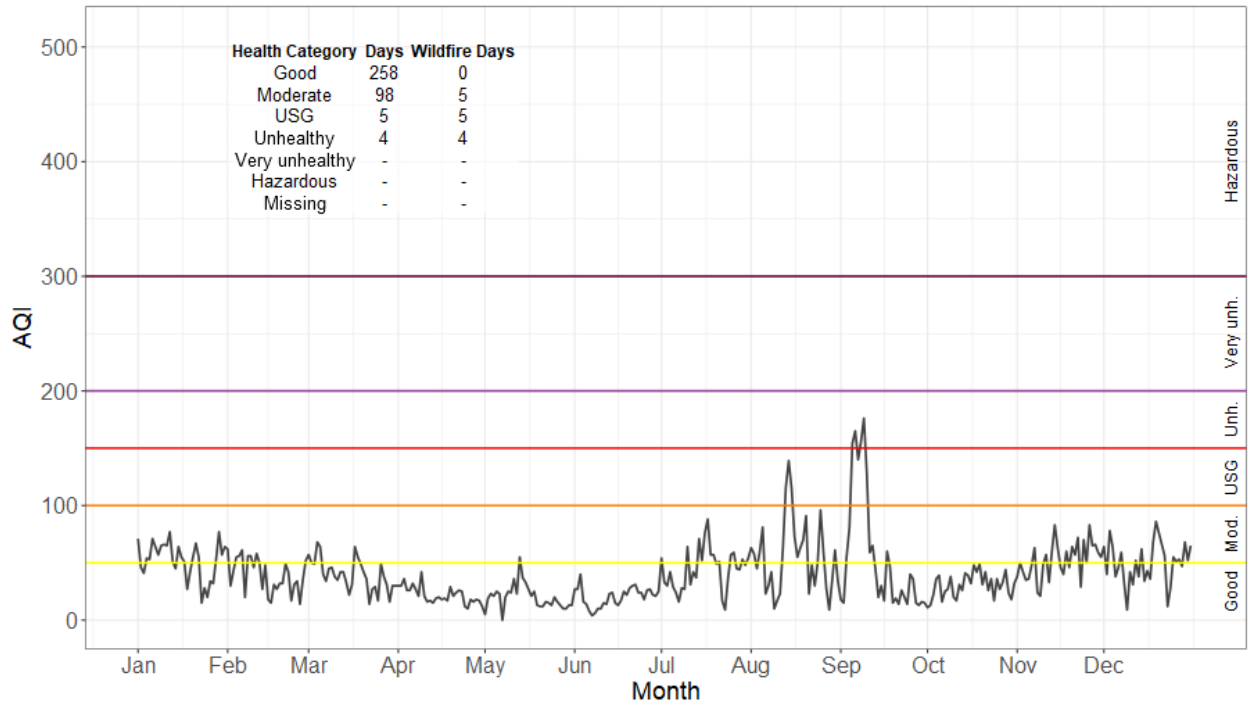


Figure 7. 2021 Burns/Hines Air Quality Index Summary.

2021 Cave Junction Air Quality Index Based on PM2.5

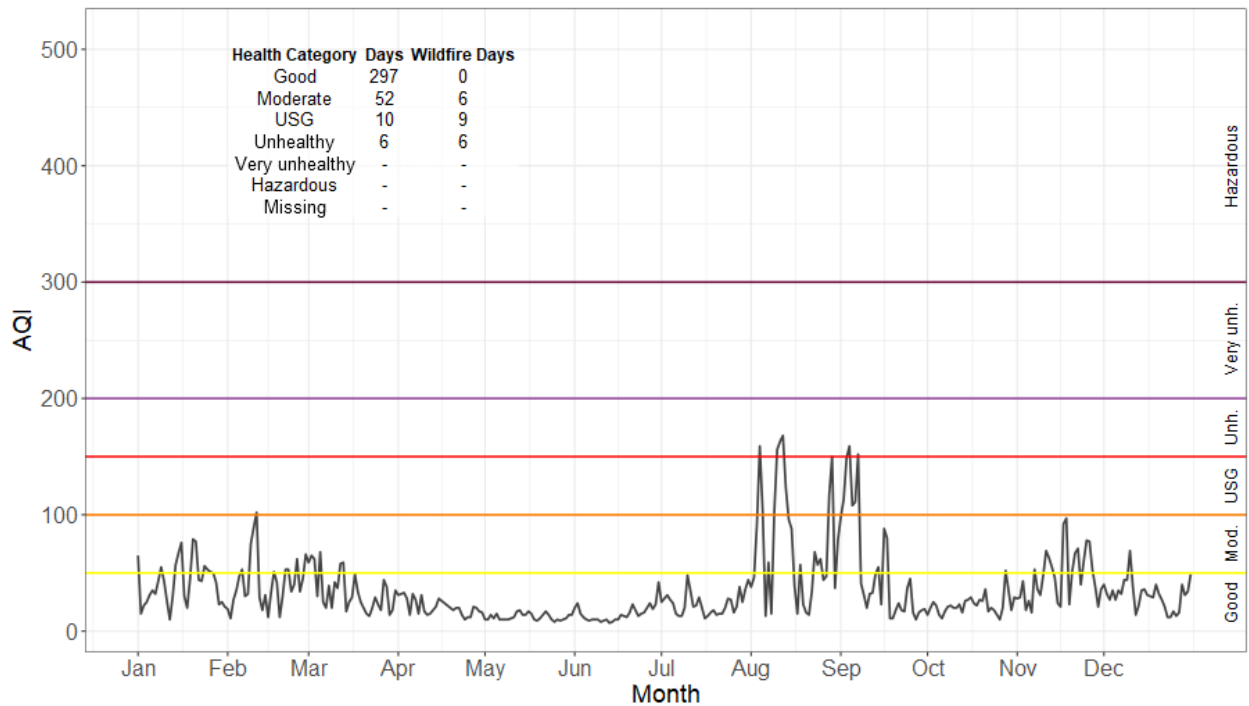


Figure 8. 2021 Cave Junction Air Quality Index Summary.

2021 Chiloquin Air Quality Index Based on Sensor PM2.5

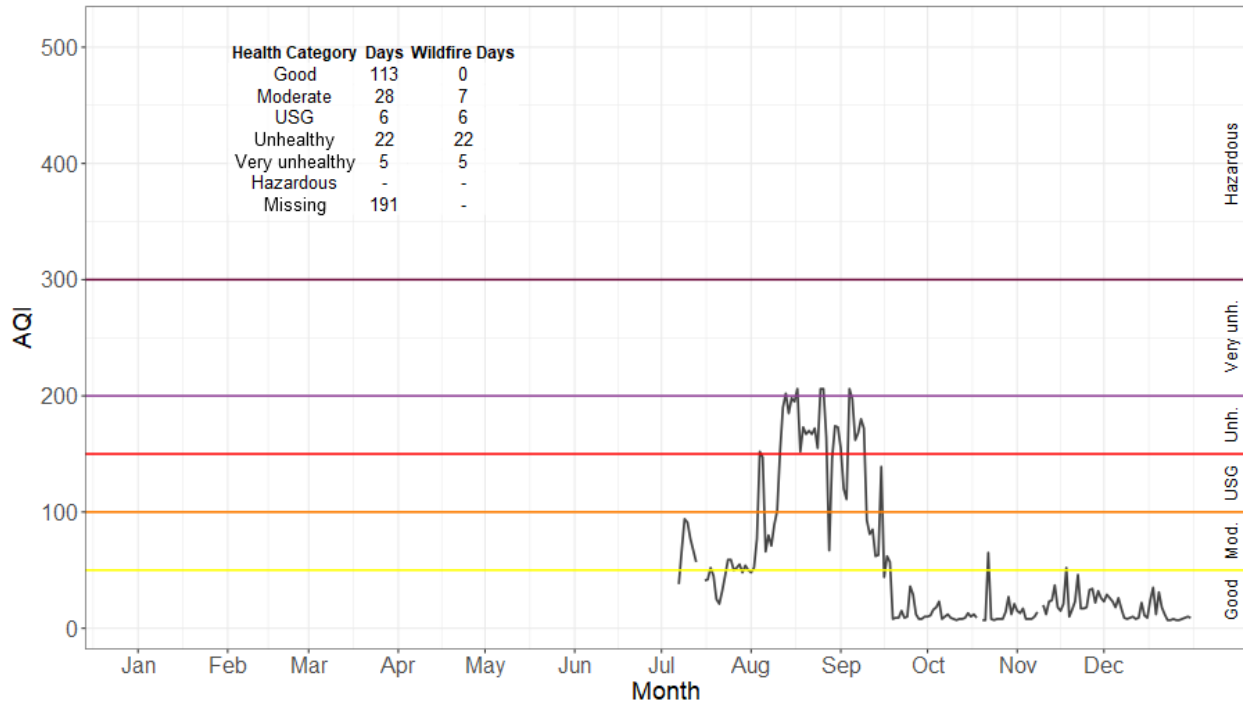


Figure 9. 2021 Chiloquin Air Quality Index Summary.

2021 Coos Bay Air Quality Index Based on Sensor PM2.5

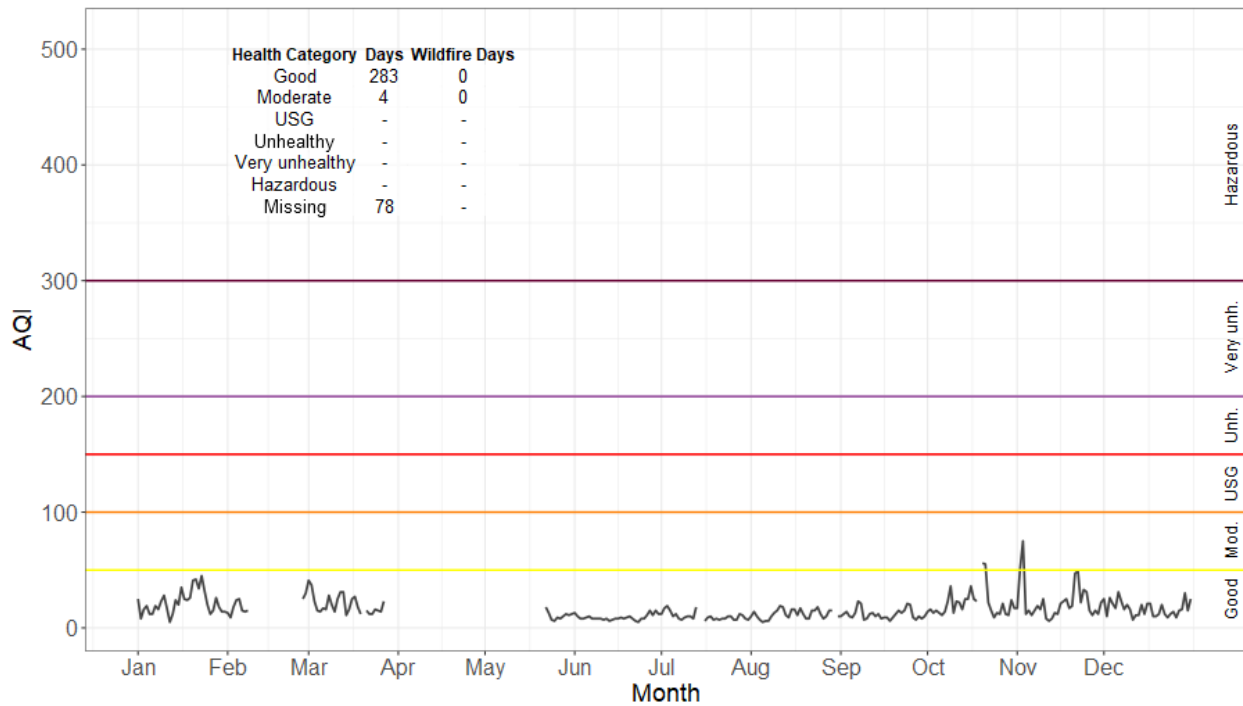


Figure 10. 2021 Coos Bay Air Quality Index Summary.

2021 Corvallis EPA Office Air Quality Index

Based on Sensor PM2.5

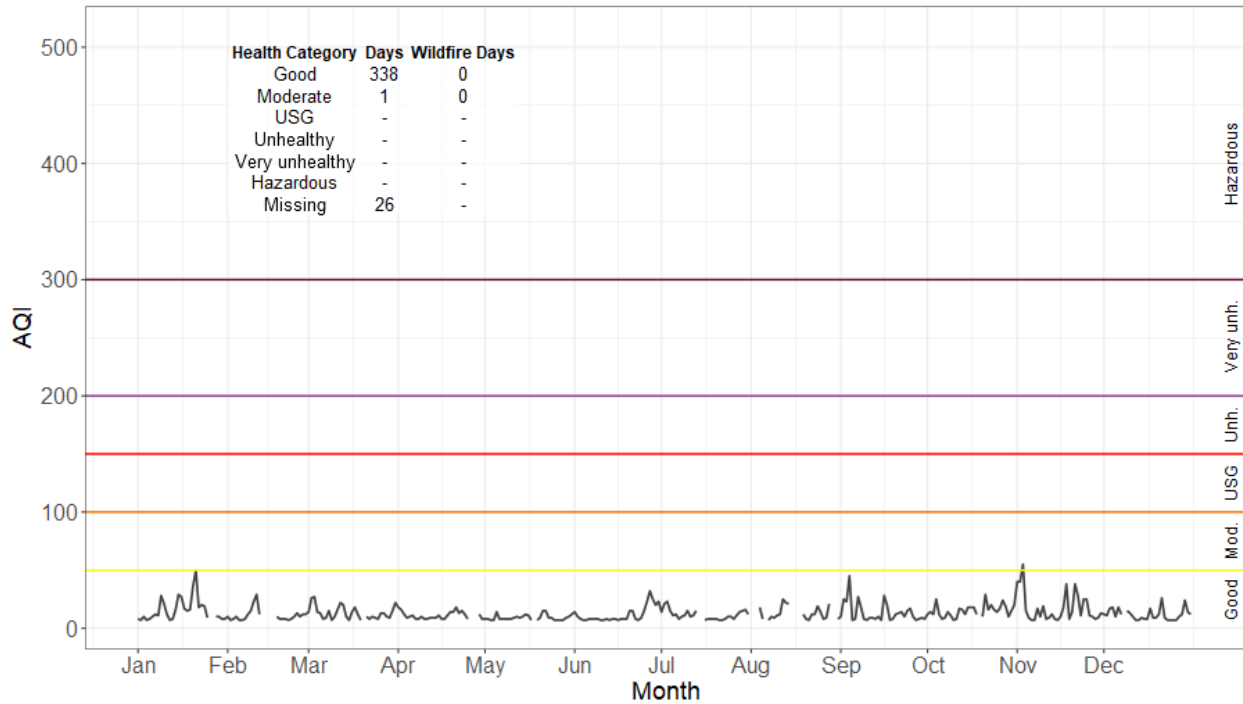


Figure 11. 2021 Corvallis Air Quality Index Summary.

2021 Cottage Grove Air Quality Index

Based on PM2.5

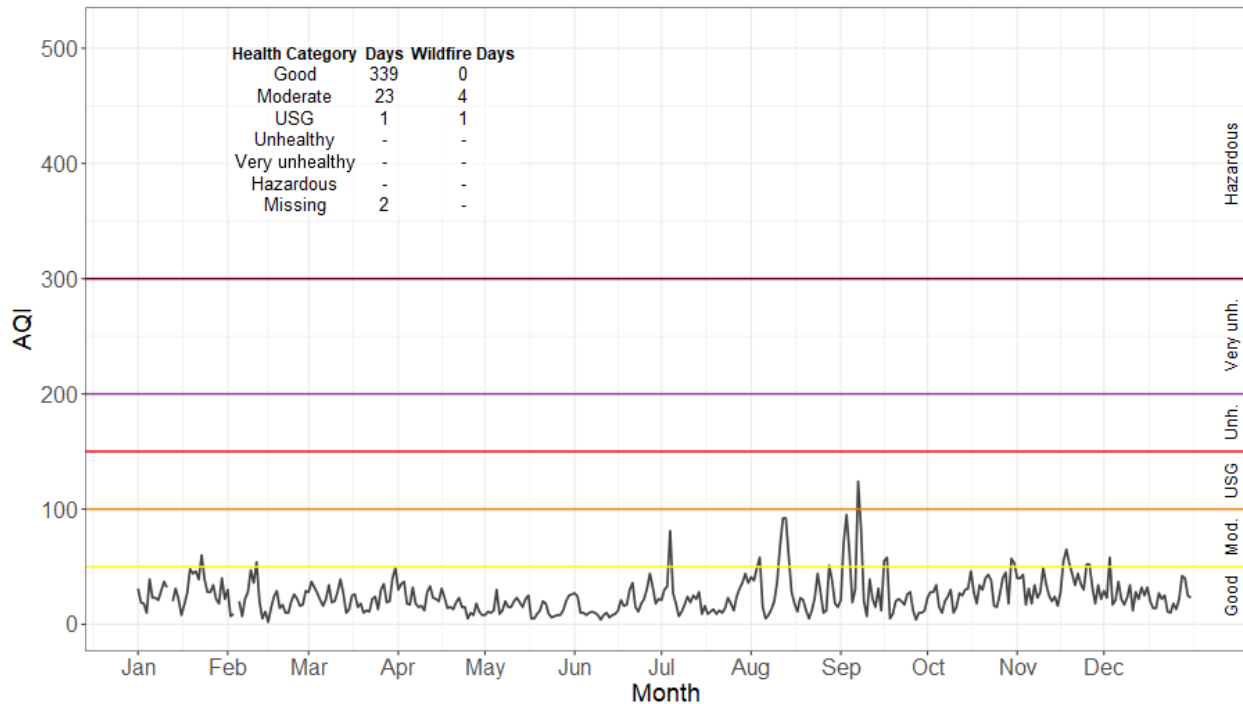


Figure 12. 2021 Cottage Grove Air Quality Index Summary.

2021 Cove Air Quality Index Based on PM2.5

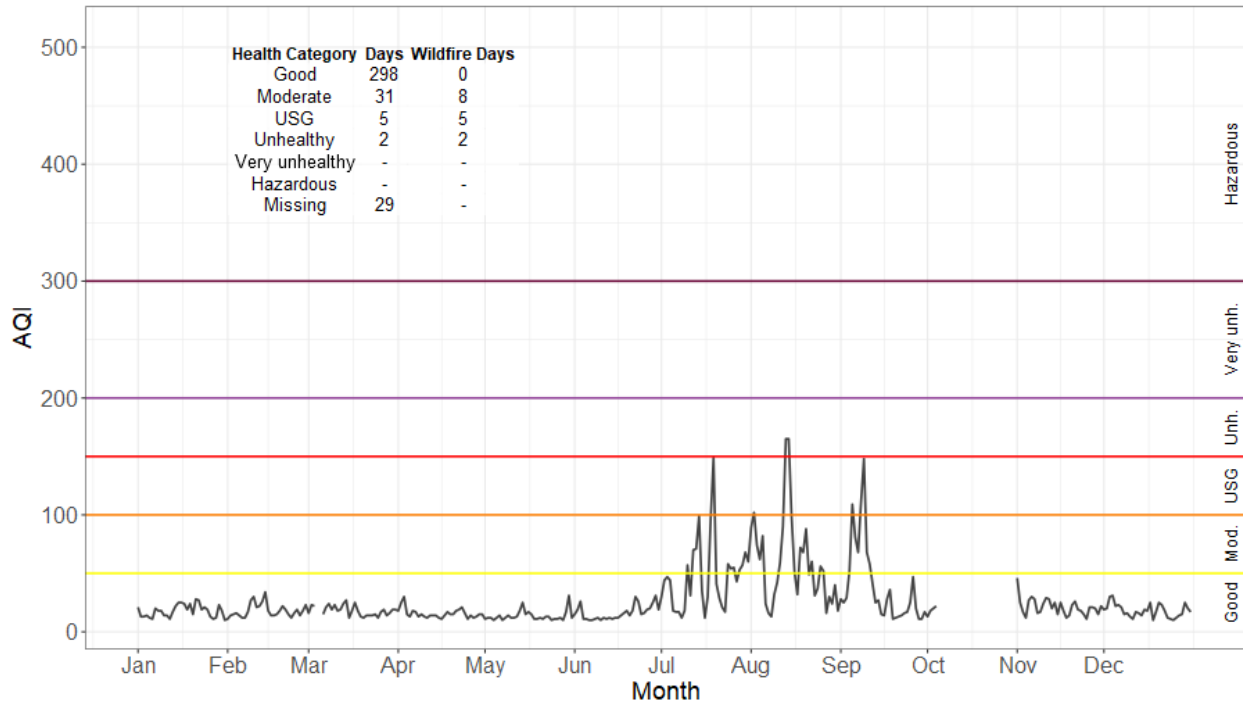


Figure 13. 2020 Cove Air Quality Index Summer Summary

2021 Crater Lake Air Quality Index Based on PM2.5

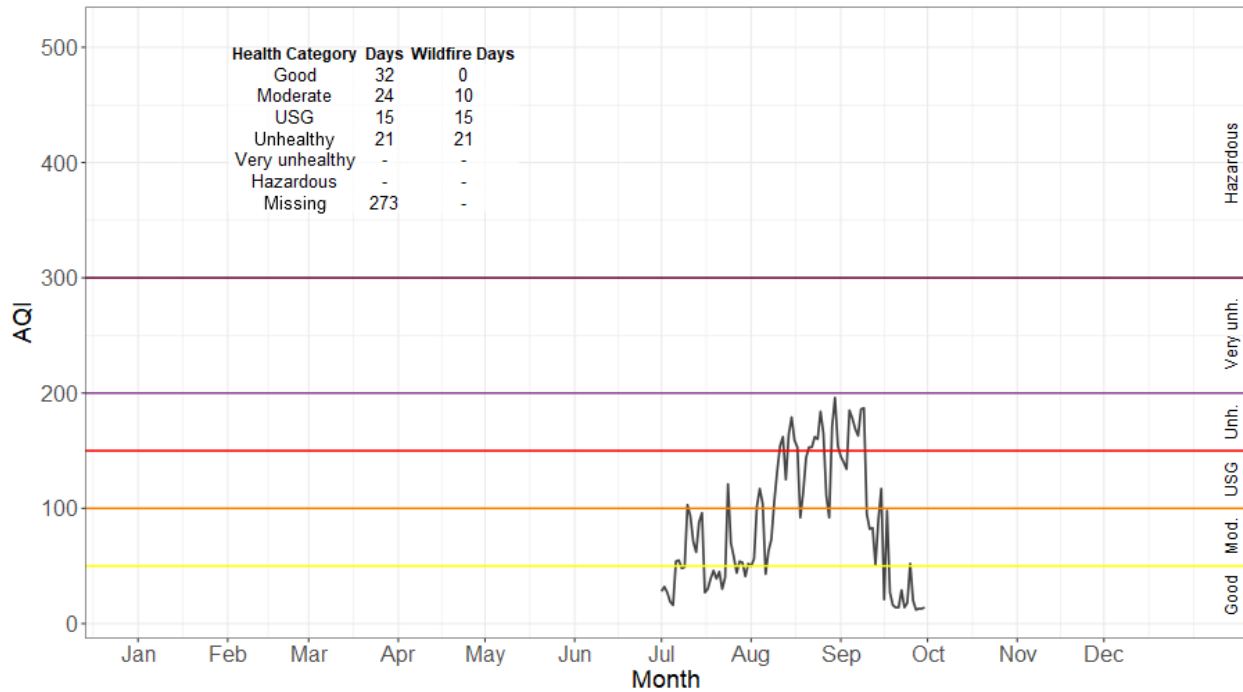


Figure 14. 2021 Crater Lake Summer Air Quality Index Summary.
Monitoring from June to October.

2021 Dallas Air Quality Index Based on Sensor PM2.5

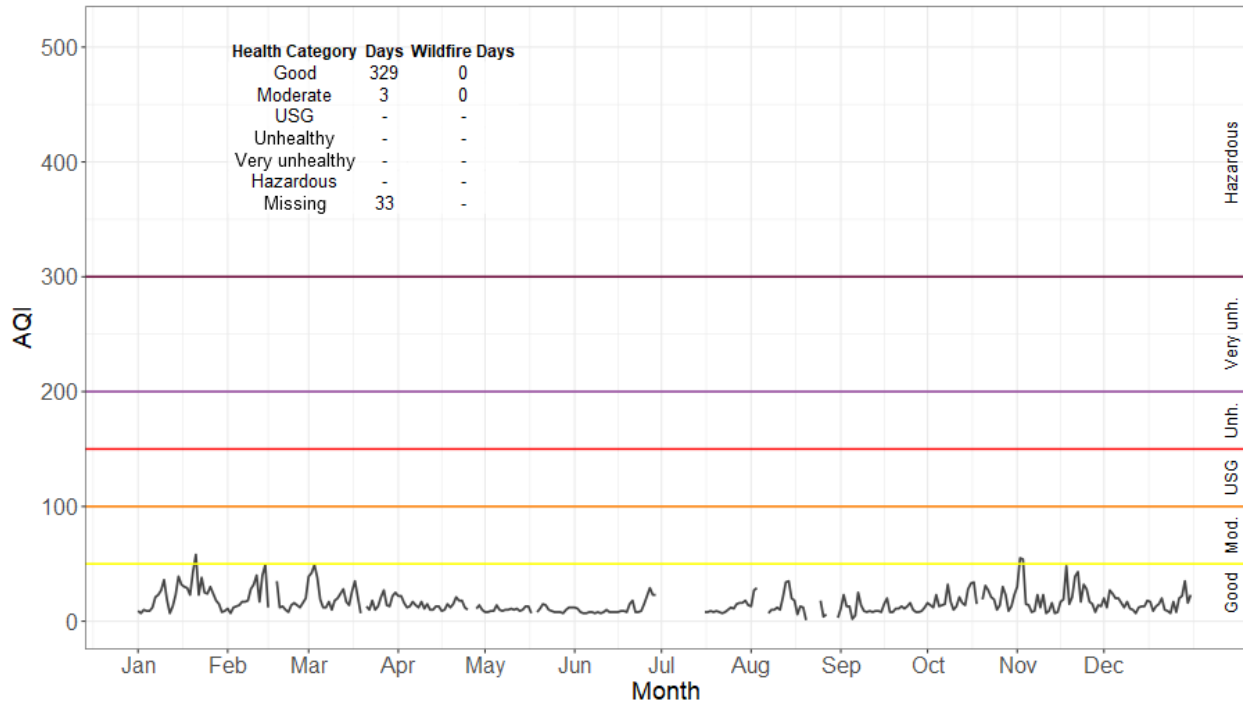


Figure 15. 2021 Dallas Air Quality Index Summary.

2021 Detroit Lake Air Quality Index Based on Sensor PM2.5

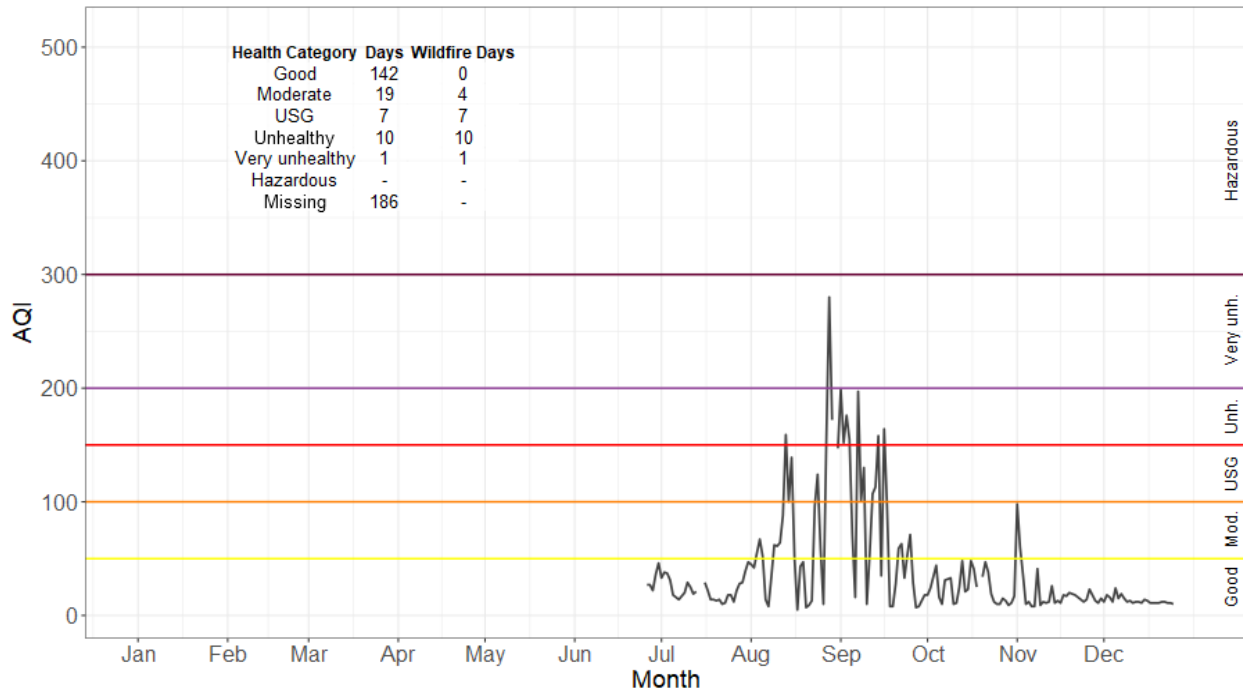


Figure 16. 2021 Detroit Lake Summer Air Quality Index Summary.

Monitoring from July to December 2nd.

2021 Enterprise Air Quality Index Based on PM2.5

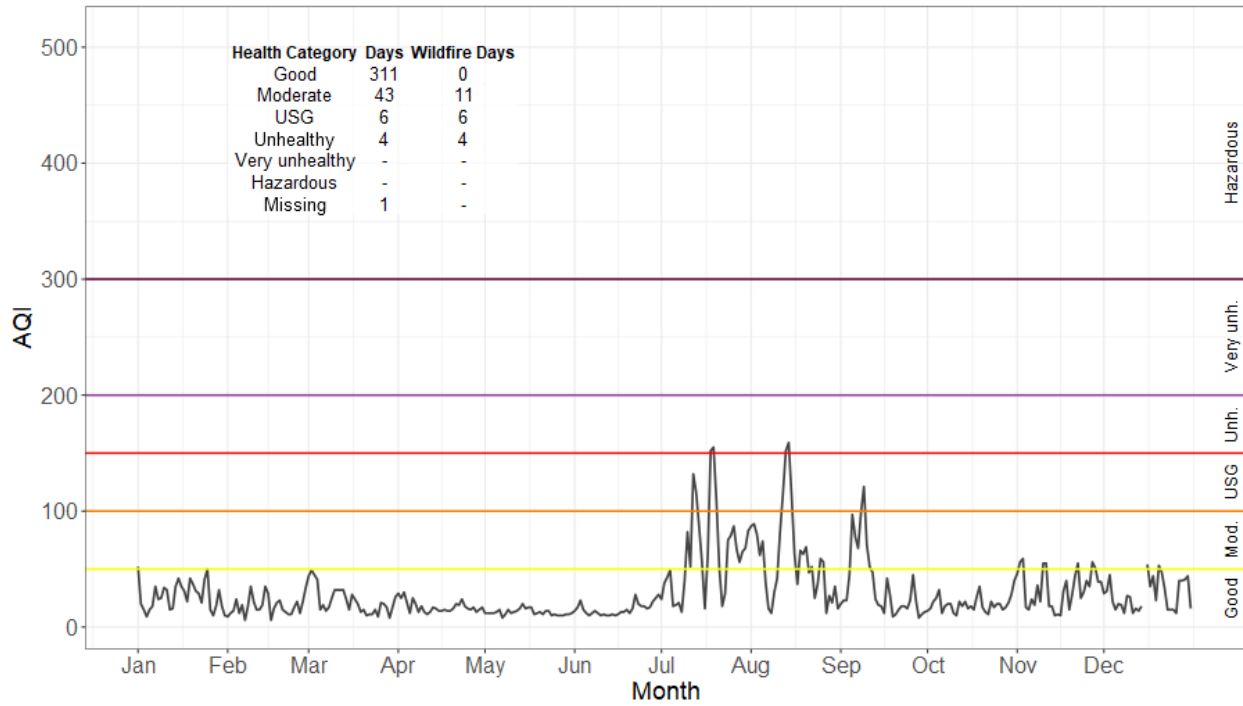


Figure 17. 2021 Enterprise Air Quality Index Summary.

2021 Estacada Air Quality Index Based on SensOR PM2.5

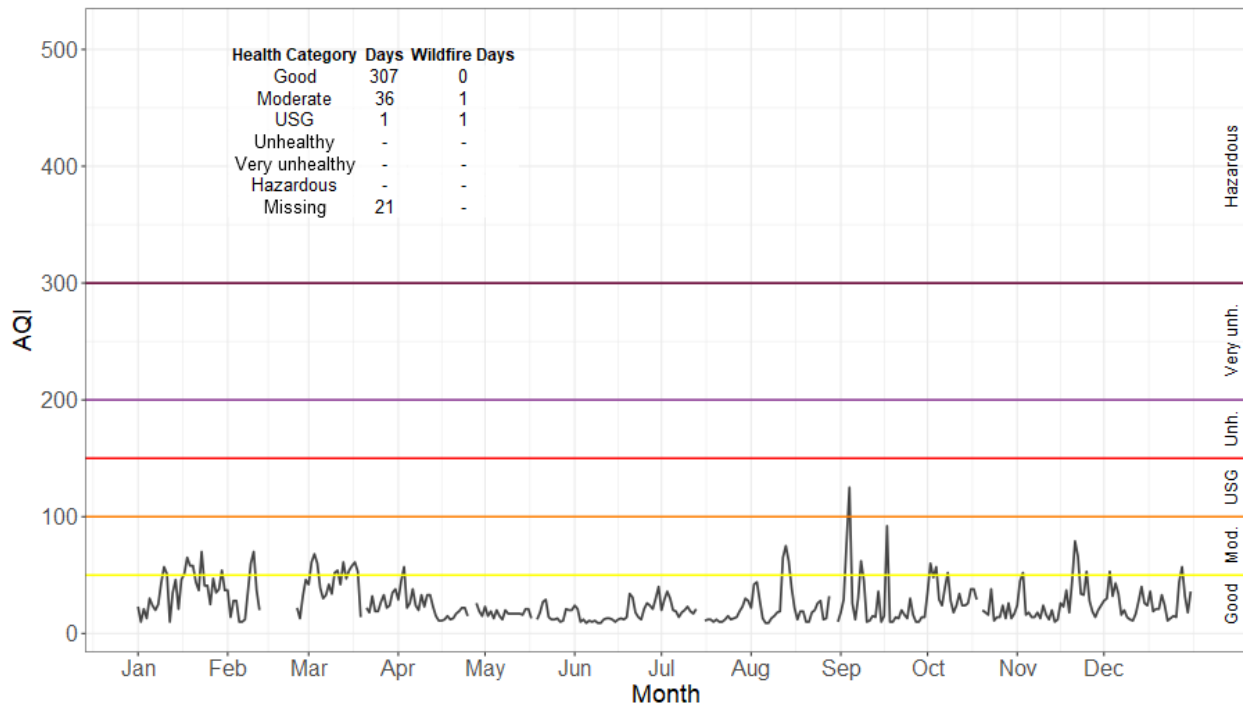


Figure 18. 2021 Estacada Air Quality Index Summary.

2021 Eugene Air Quality Index

Based on PM2.5 and Ozone

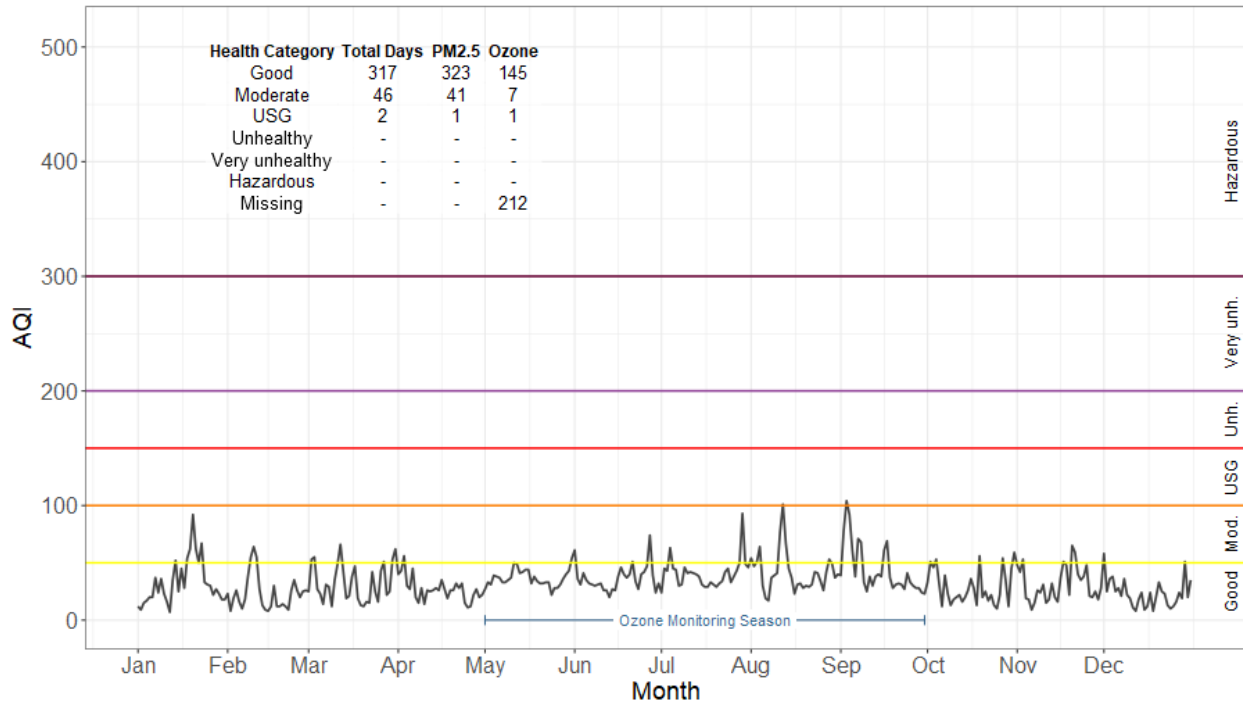


Figure 19. 2020 Eugene/Springfield Air Quality Index Summary.

Note: only the maximum ozone AQI or PM2.5 AQI is reported each day during ozone season.

2021 Florence Air Quality Index

Based on PM2.5

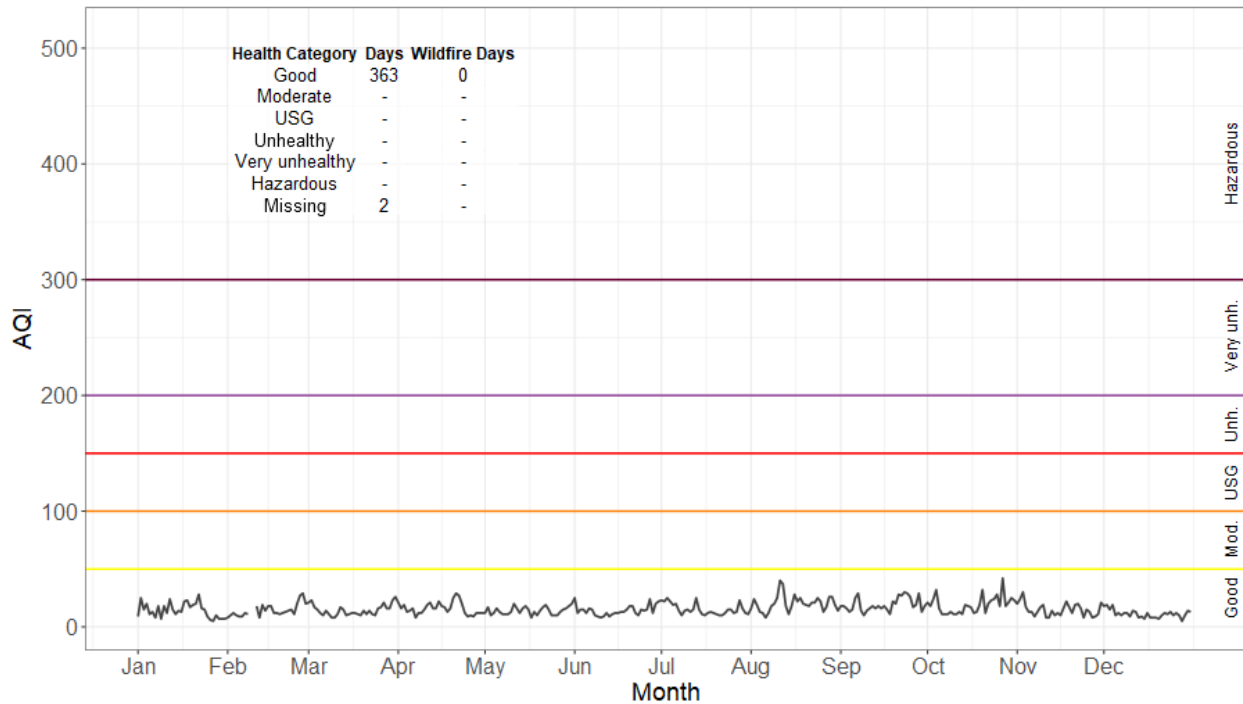


Figure 20. 2021 Florence Air Quality Index Summary.

2021 Forest Grove Air Quality Index

Based on Sensor PM2.5

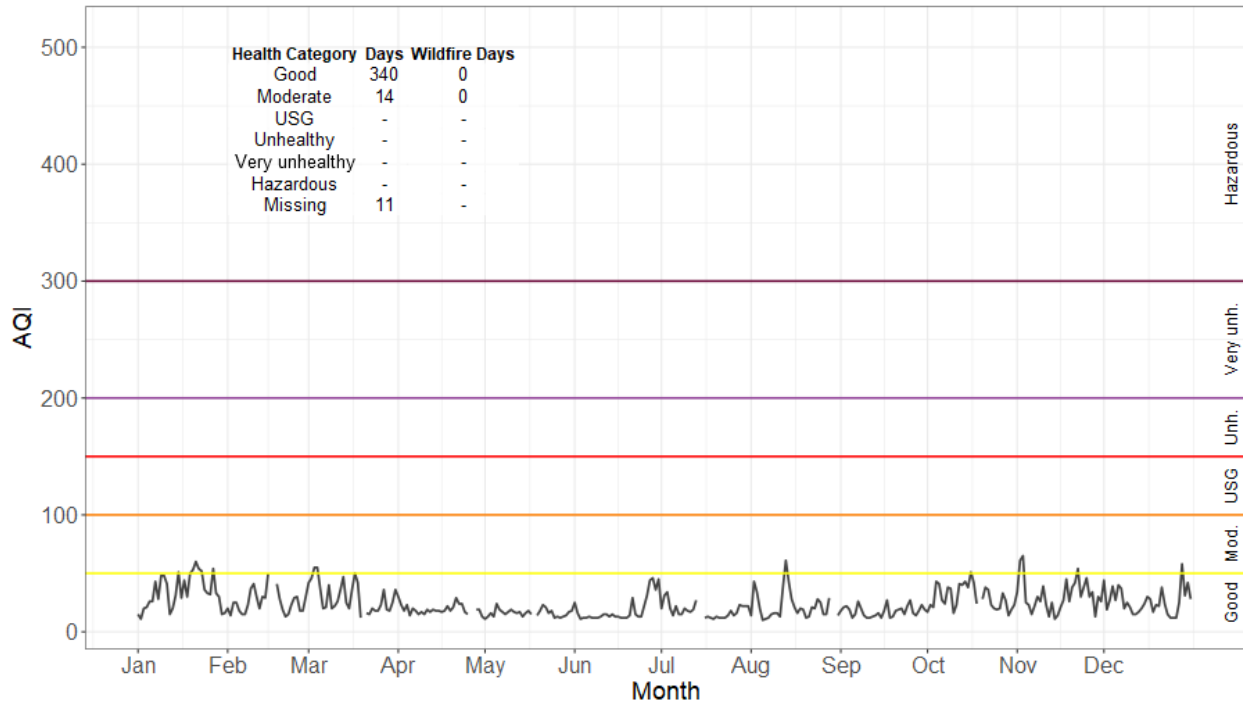


Figure 21. 2021 Forest Grove Air Quality Index Summary.

2021 Grants Pass Air Quality Index

Based on PM2.5

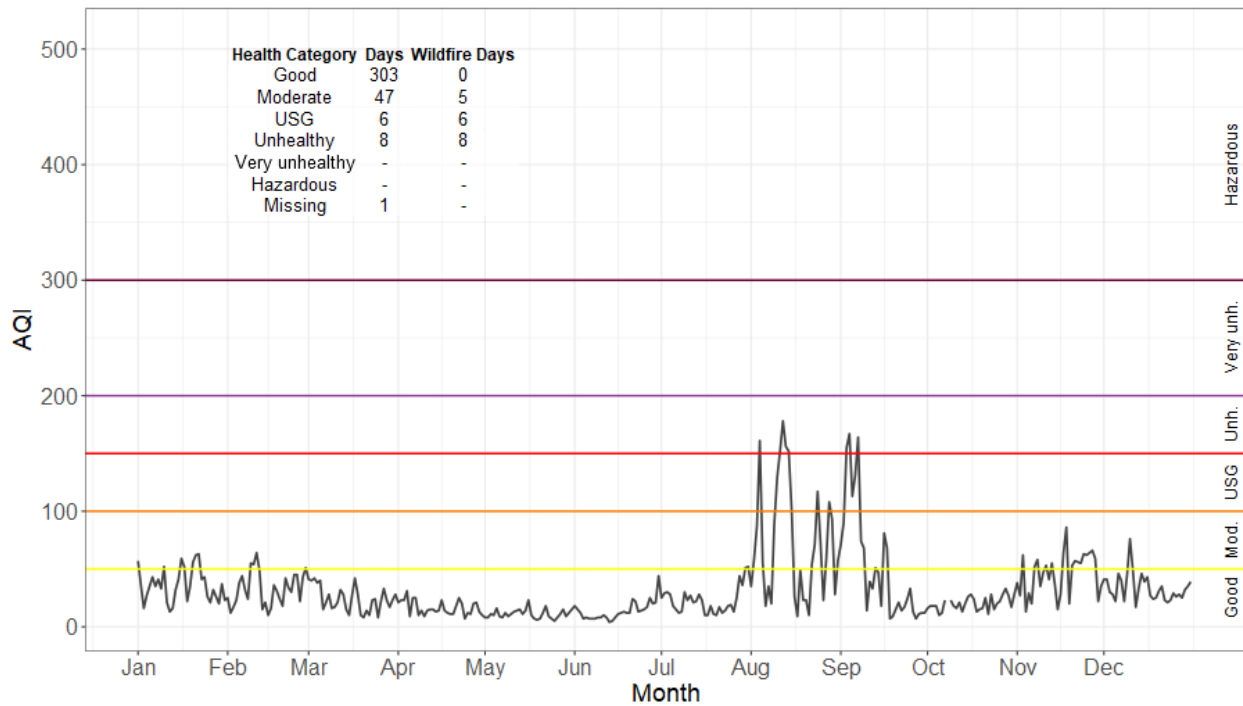


Figure 22. 2021 Grants Pass Air Quality Index Summary.

2021 Gresham Air Quality Index Based on Sensor PM2.5

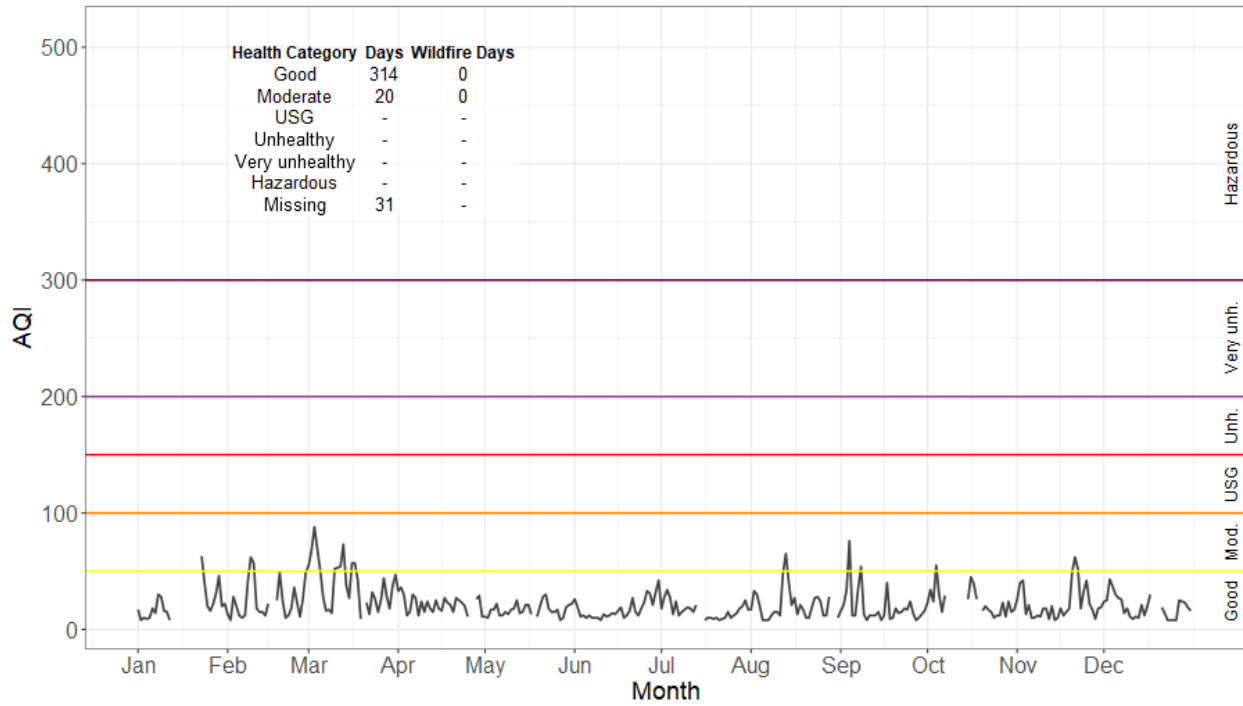


Figure 23. 2021 Gresham Air Quality Index Summary.

2021 Hermiston Air Quality Index Based on PM2.5 and Ozone

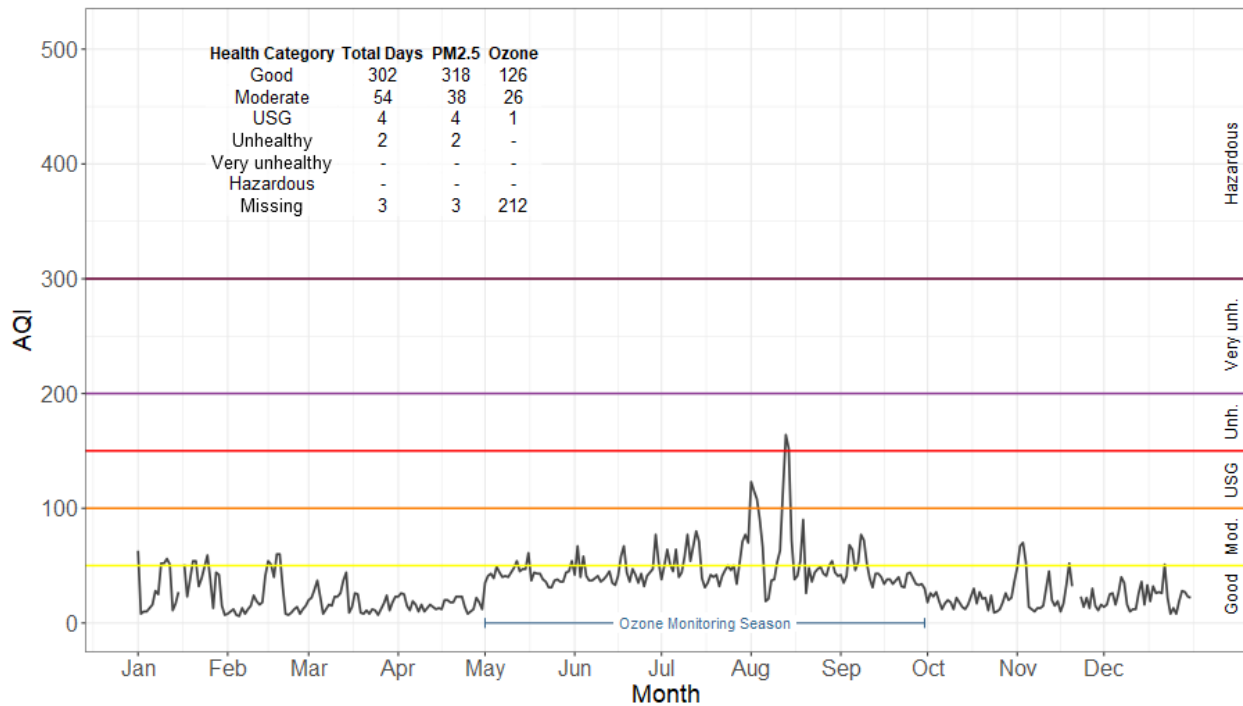


Figure 24. 2021 Hermiston Summer Air Quality Index Summary.

2021 Hillsboro Air Quality Index Based on PM2.5

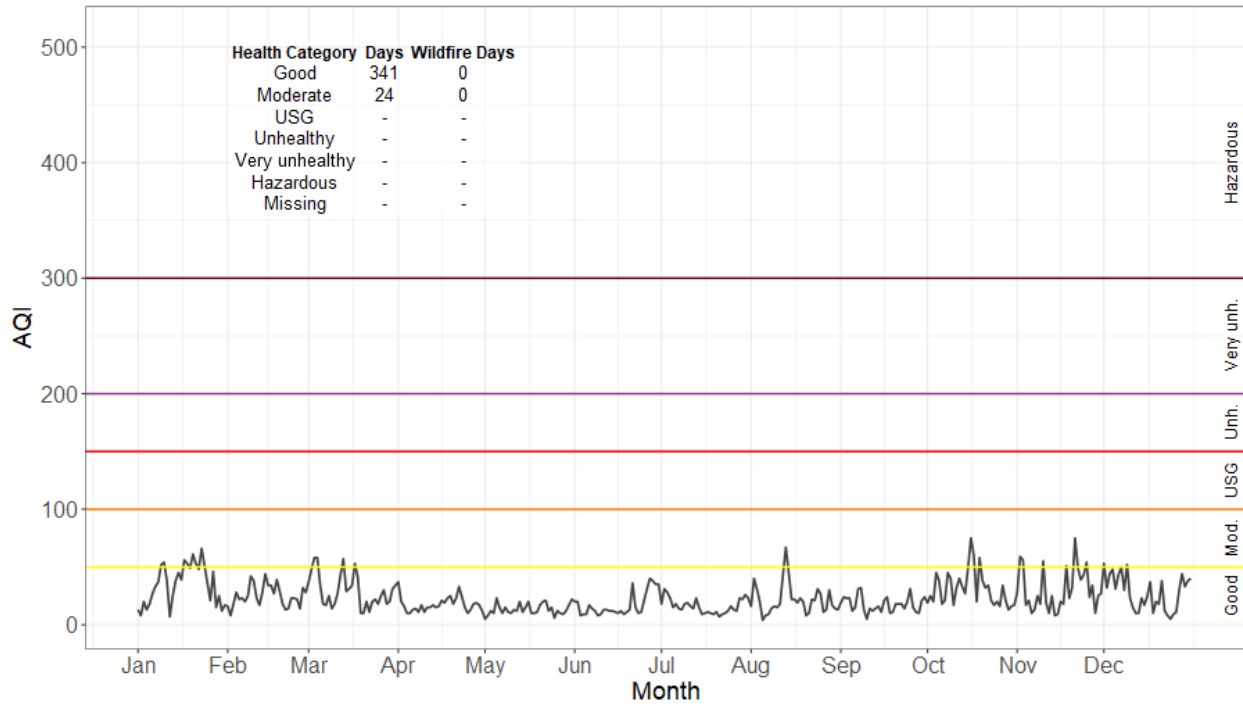


Figure 25. 2021 Hillsboro Air Quality Index Summary.

2021 Hood River Air Quality Index Based on SensOR PM2.5

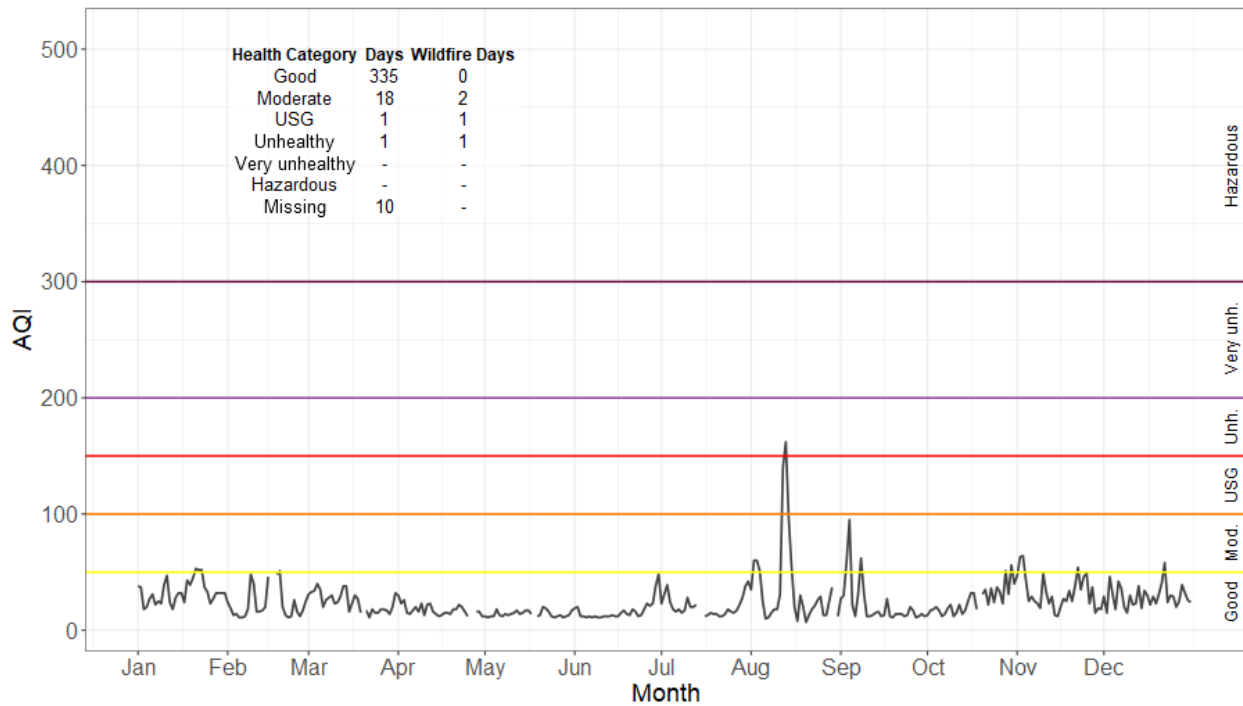


Figure 26. 2021 Hood River Air Quality Index Summary.

2021 John Day Air Quality Index Based on PM2.5

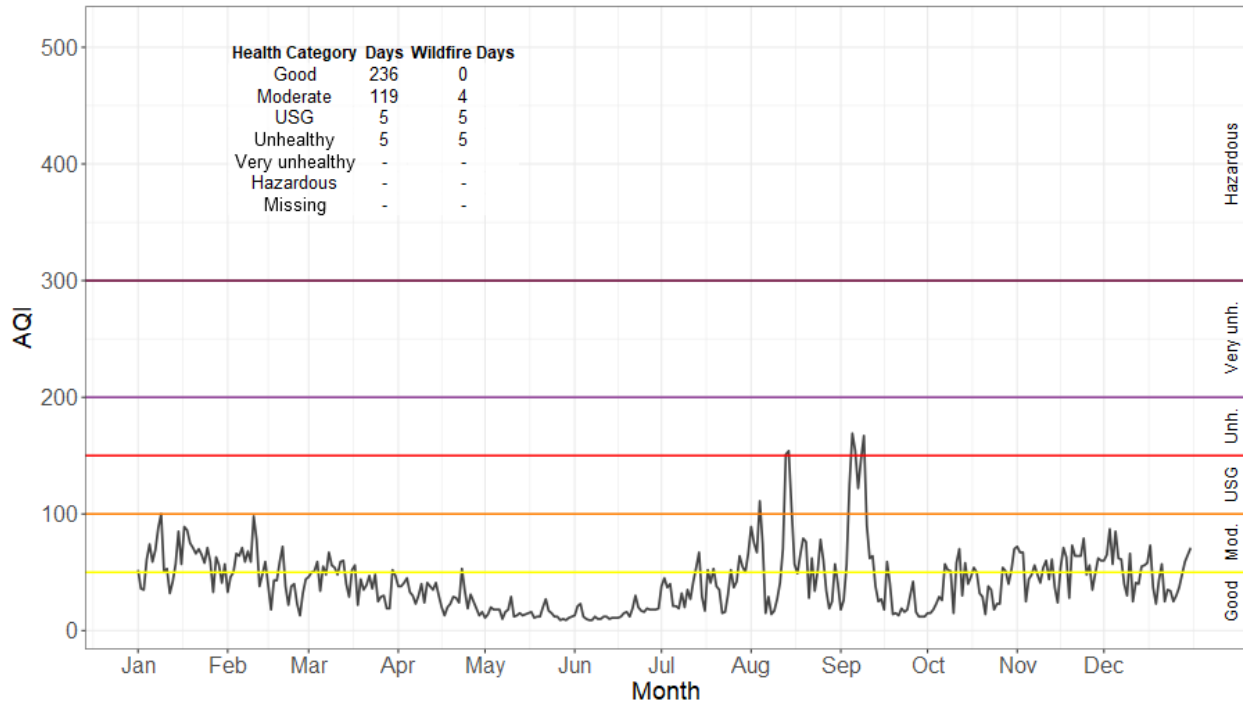


Figure 27. 2021 John Day Air Quality Index Summary.

2021 Klamath Falls Air Quality Index Based on PM2.5

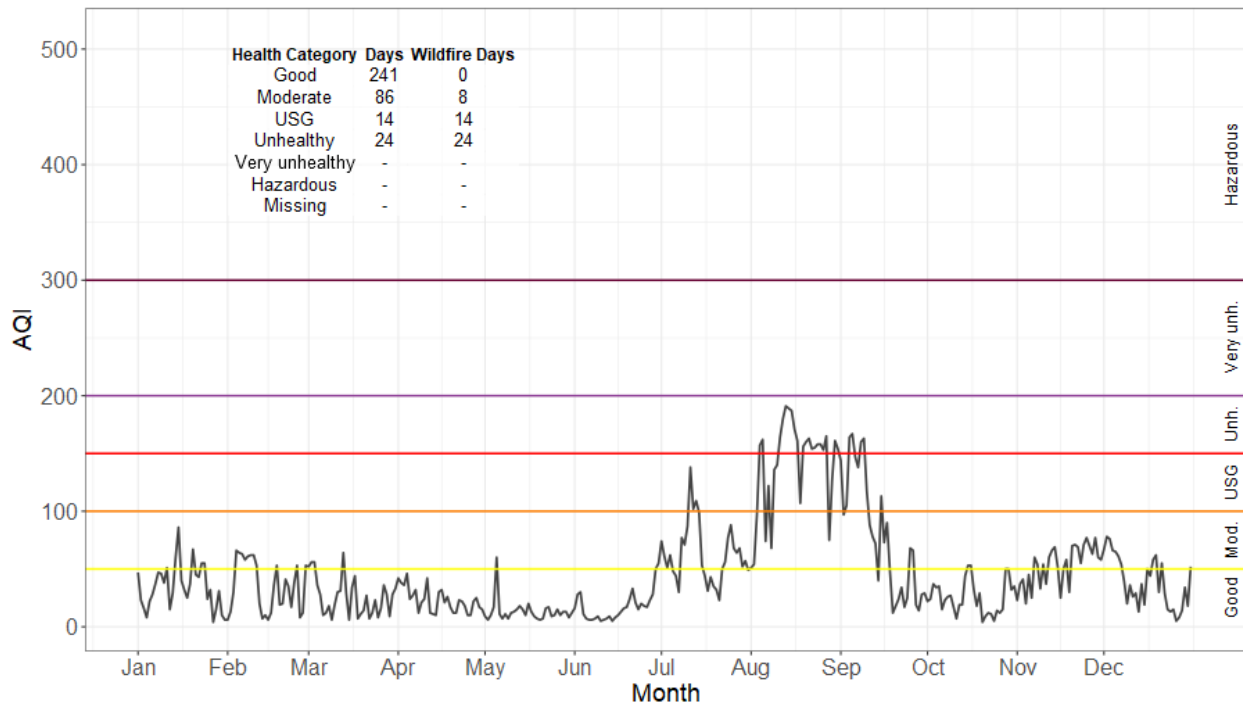


Figure 28. 2021 Klamath Falls Air Quality Index Summary.

2021 La Grande Air Quality Index

Based on PM2.5

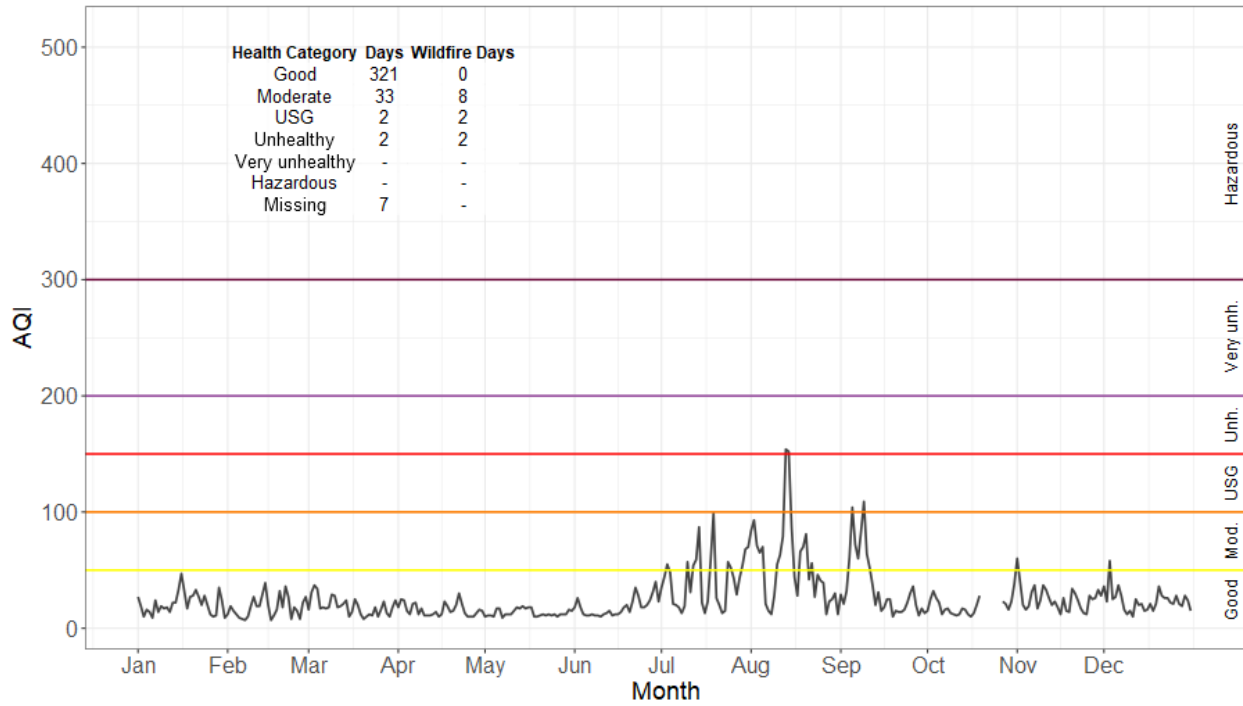


Figure 29. 2021 La Grande Air Quality Index Summary.

2021 Lakeview Air Quality Index

Based on PM2.5

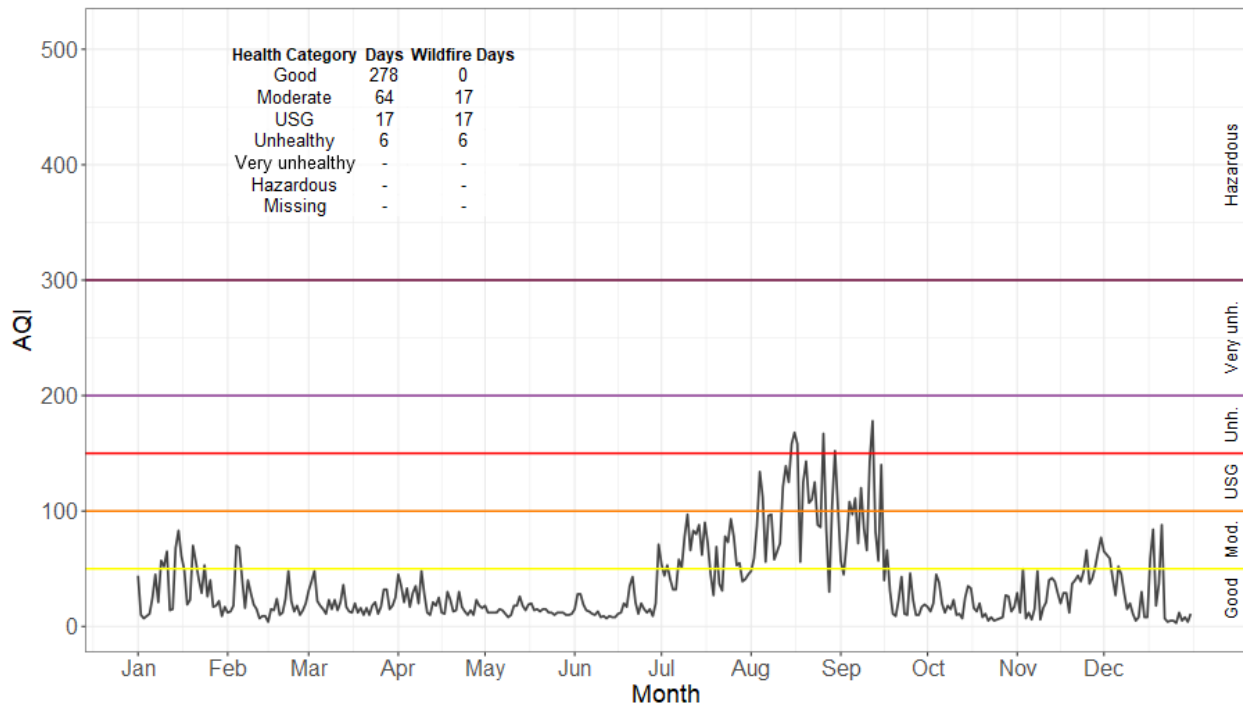


Figure 30. 2020 Lakeview Air Quality Index Summary.

2021 La Pine Air Quality Index Based on Sensor PM2.5

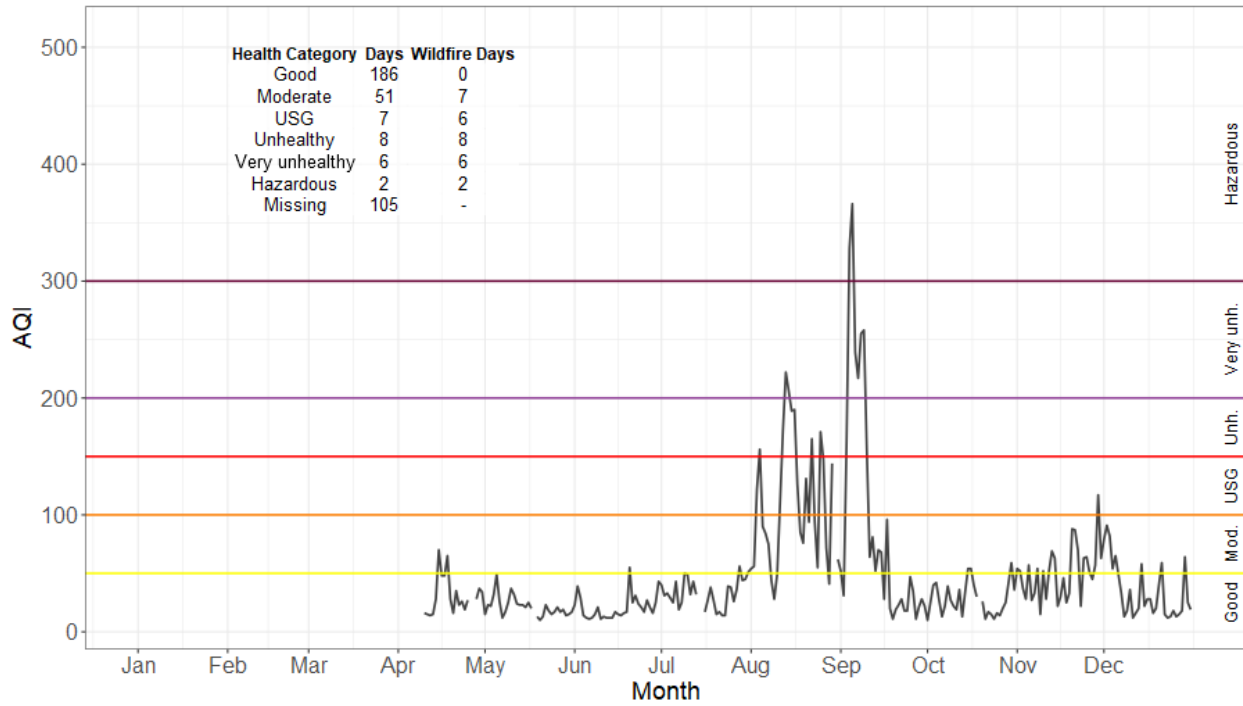


Figure 31. 2021 La Pine Air Quality Index Summary.

2021 Lyons Air Quality Index Based on PM2.5

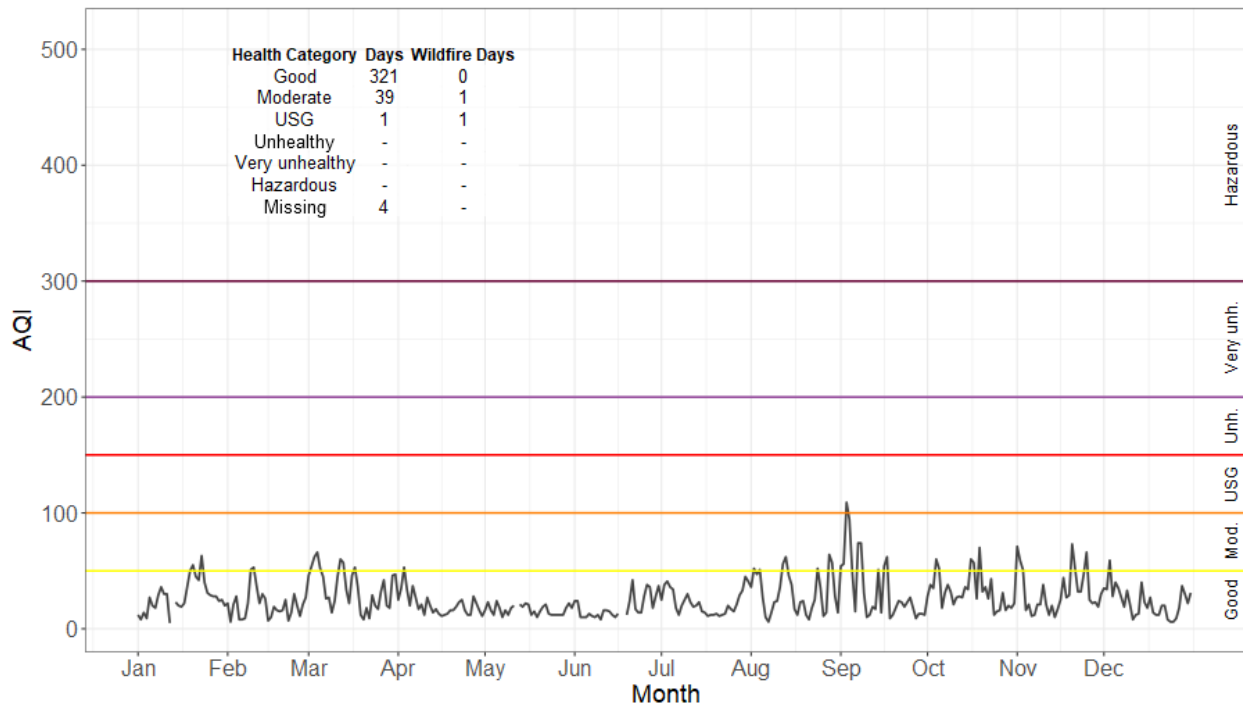


Figure 32. 2021 Lyons Air Quality Index Summary.

2021 Madras Air Quality Index Based on PM2.5

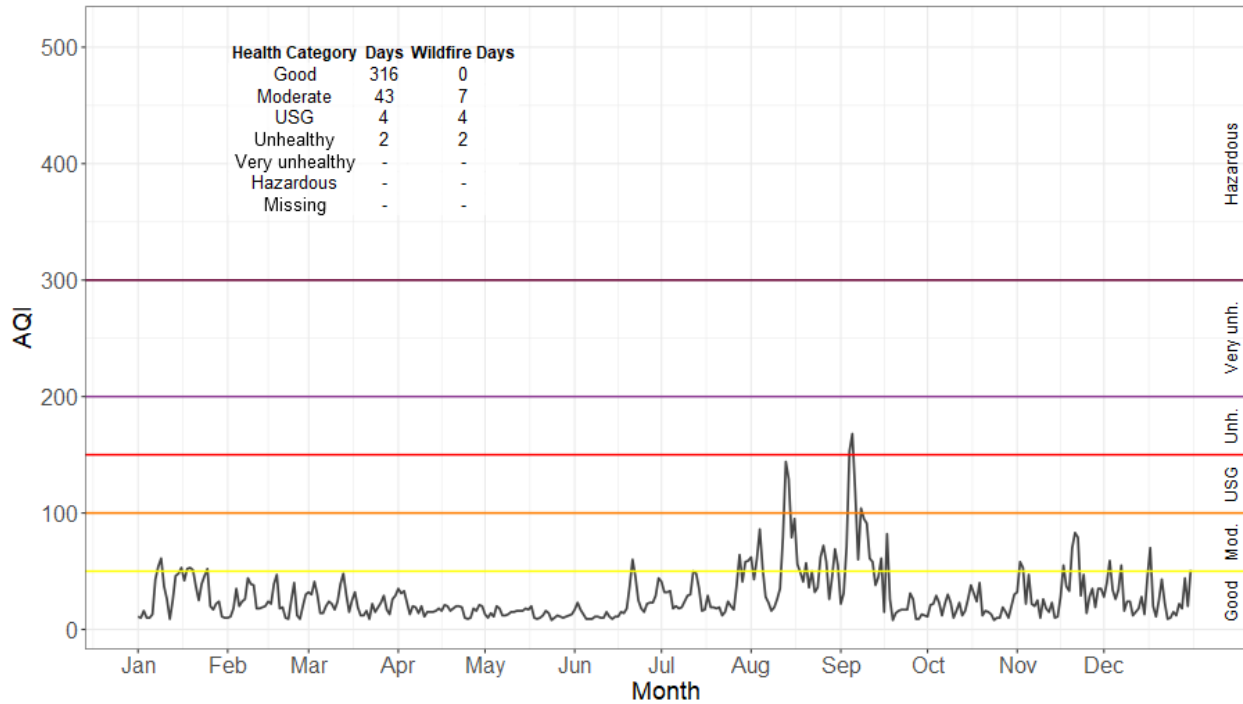


Figure 33. 2021 Madras Air Quality Index Summary.

2021 Medford Air Quality Index Based on PM2.5 and Ozone

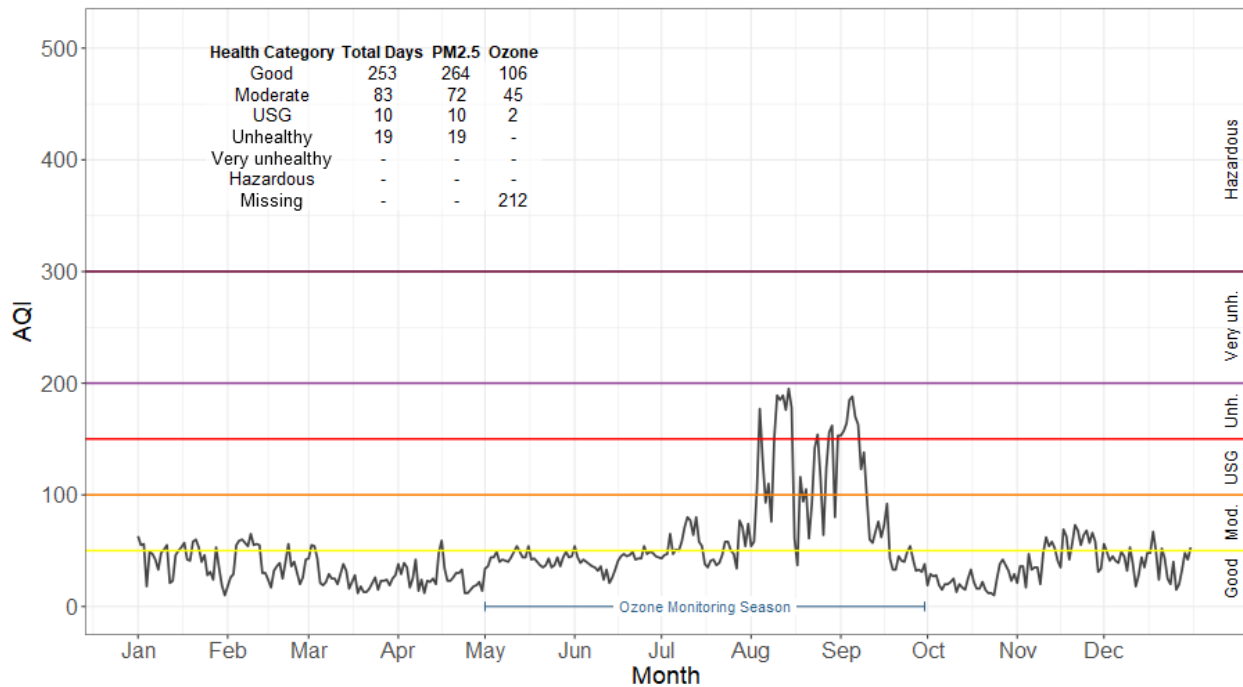


Figure 34. 2021 Medford Air Quality Index Summary.

Note: only the maximum ozone AQI or PM2.5 AQI is reported each day during ozone season.

2021 Mill City Air Quality Index
Based on Sensor PM2.5

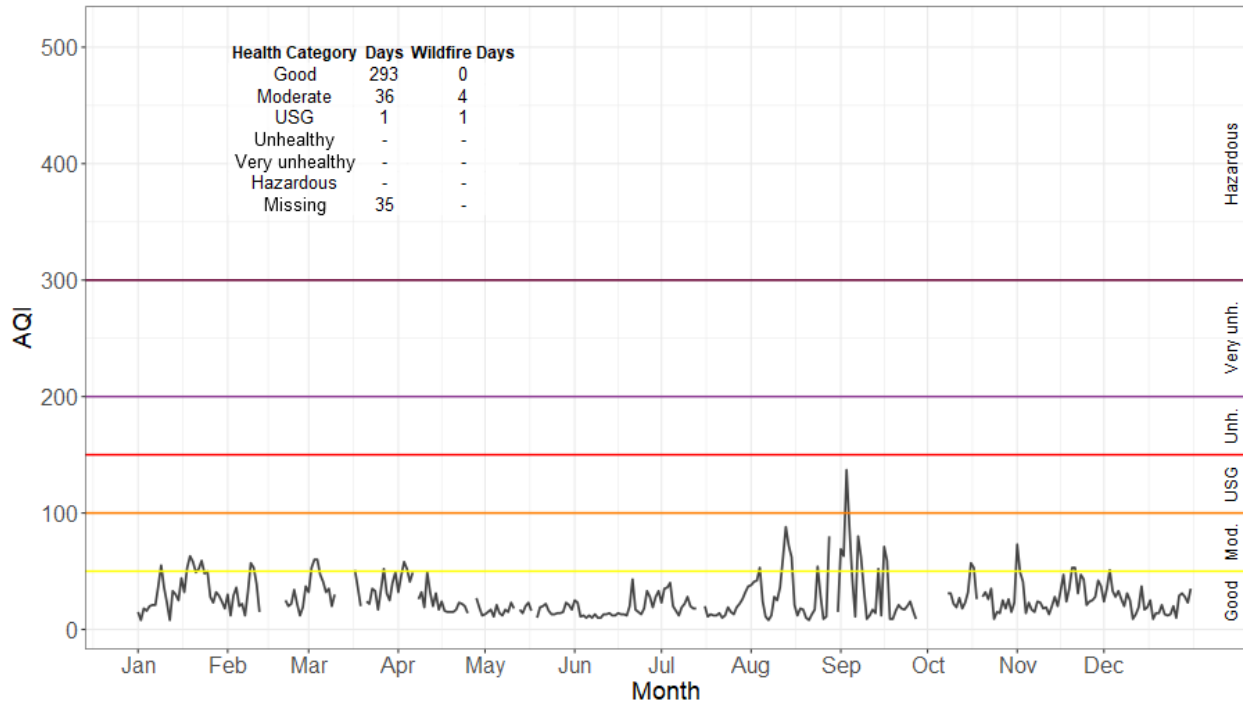


Figure 35. 2021 Mill City Summer Air Quality Index Summary.

2021 Multorpor Air Quality Index
Based on Sensor PM2.5

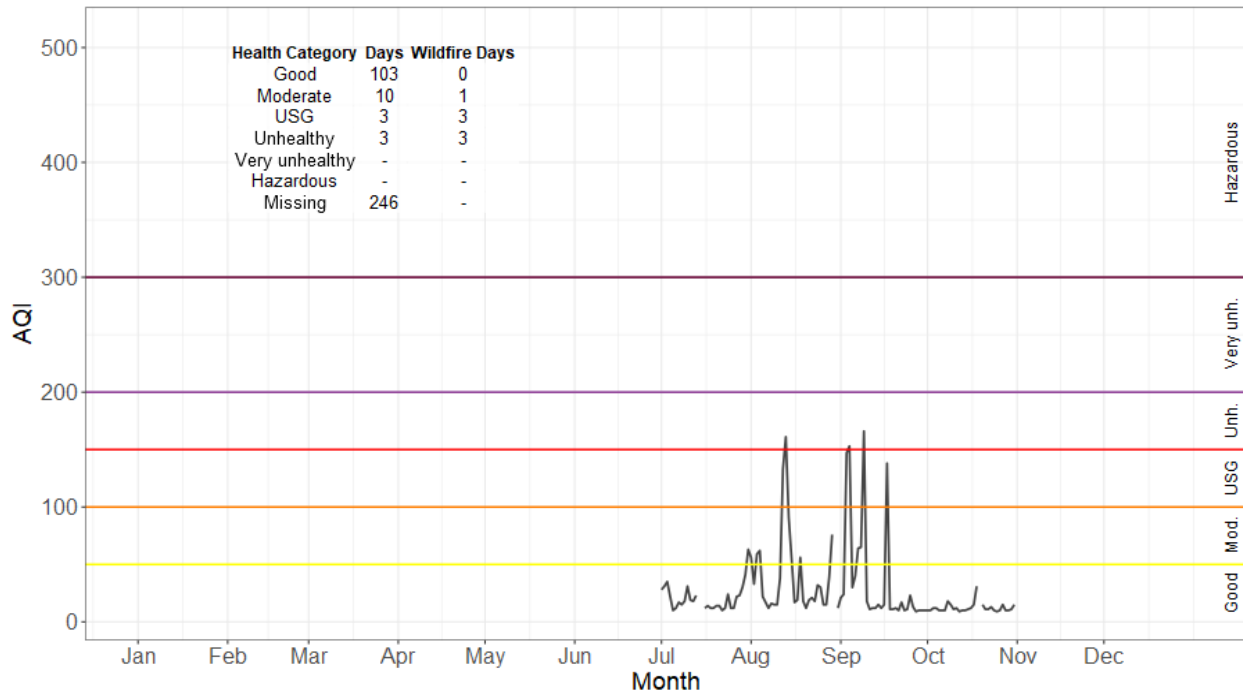


Figure 36. 2021 Mt. Hood Summer Air Quality Index Summary.
Monitoring from July to November.

2021 Oakridge Air Quality Index

Based on PM2.5

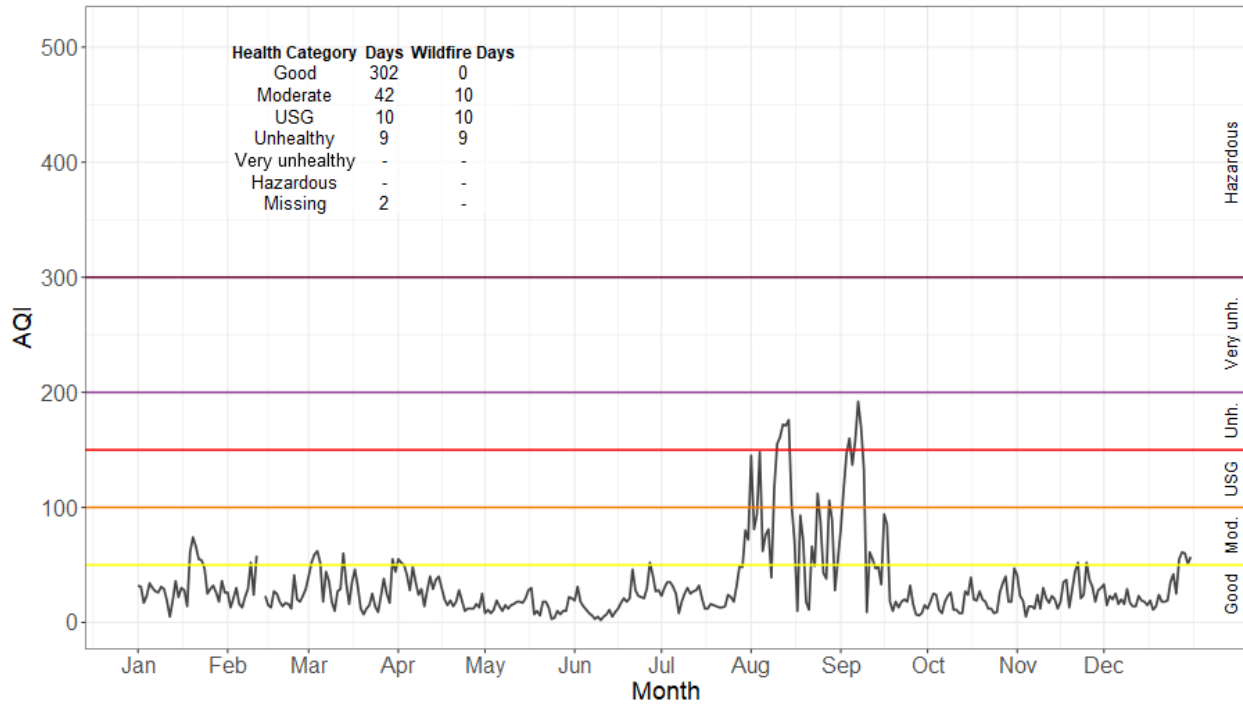


Figure 37. 2021 Oakridge Air Quality Index Summary.

2021 Ontario Air Quality Index

Based on SensOR PM2.5

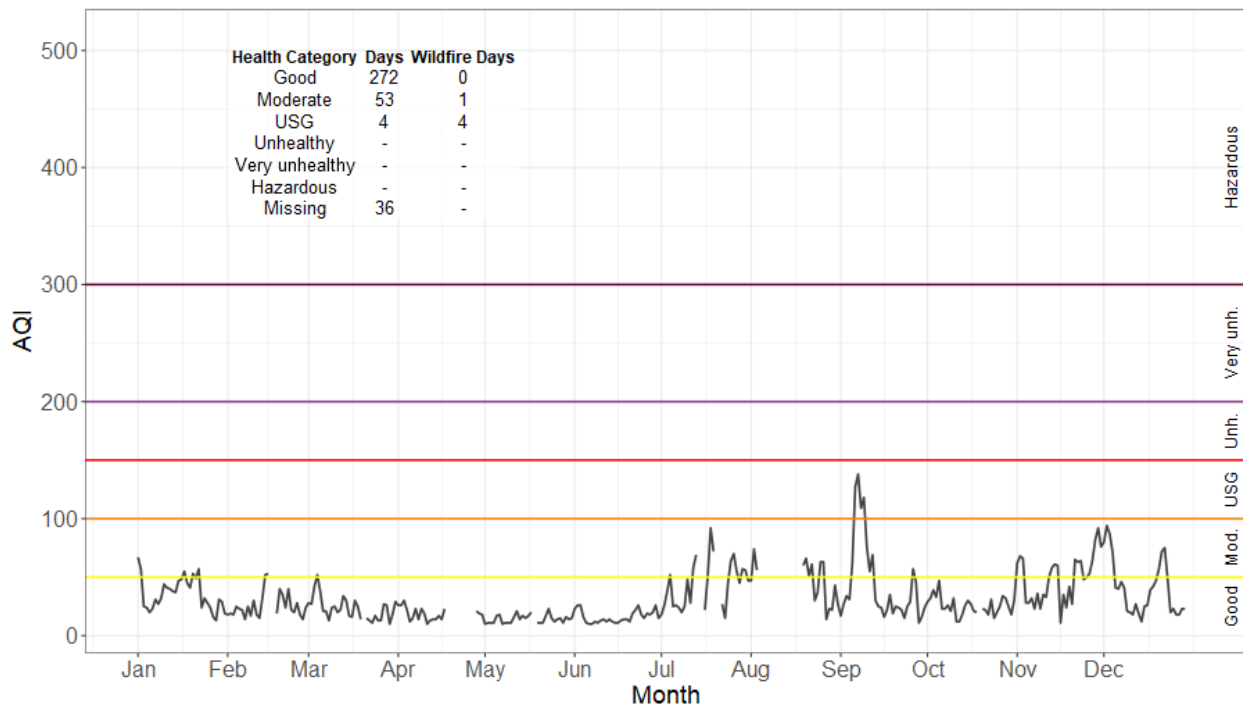


Figure 38. 2021 Ontario Air Quality Index Summary.

2021 Pendleton Air Quality Index

Based on PM2.5

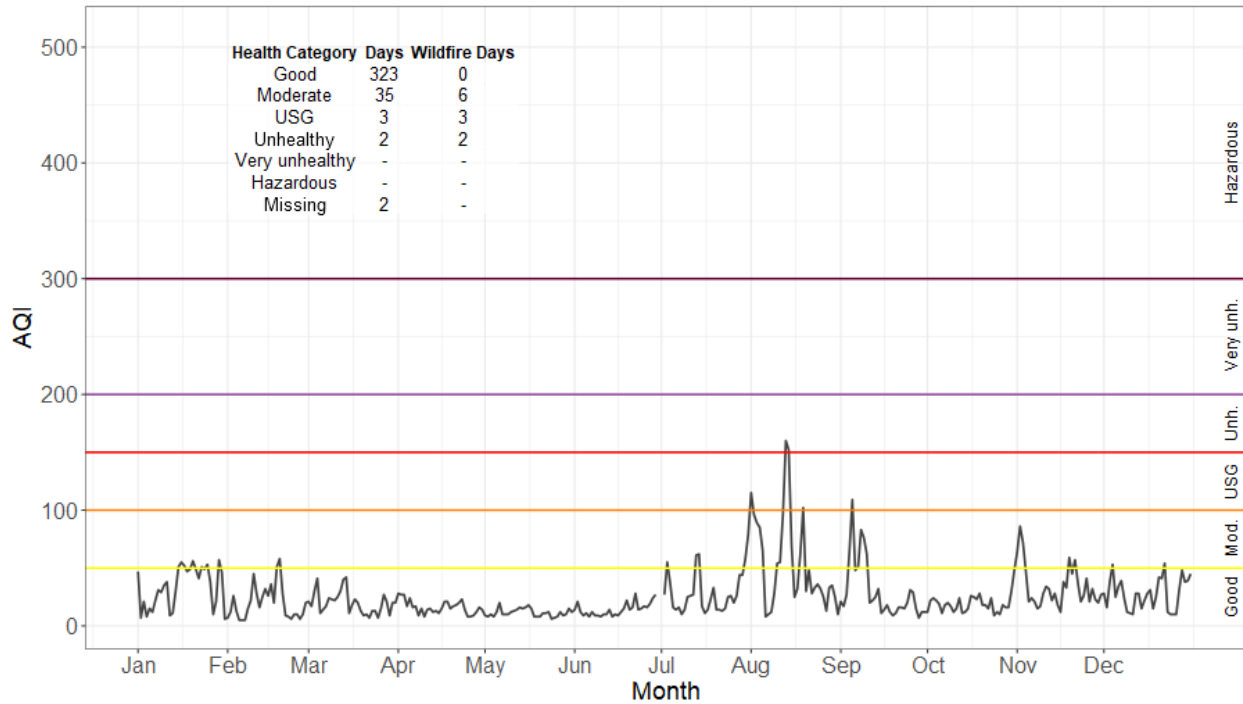


Figure 39. 2021 Pendleton Air Quality Index Summary.

2021 Portland Air Quality Index

Based on PM2.5 and Ozone

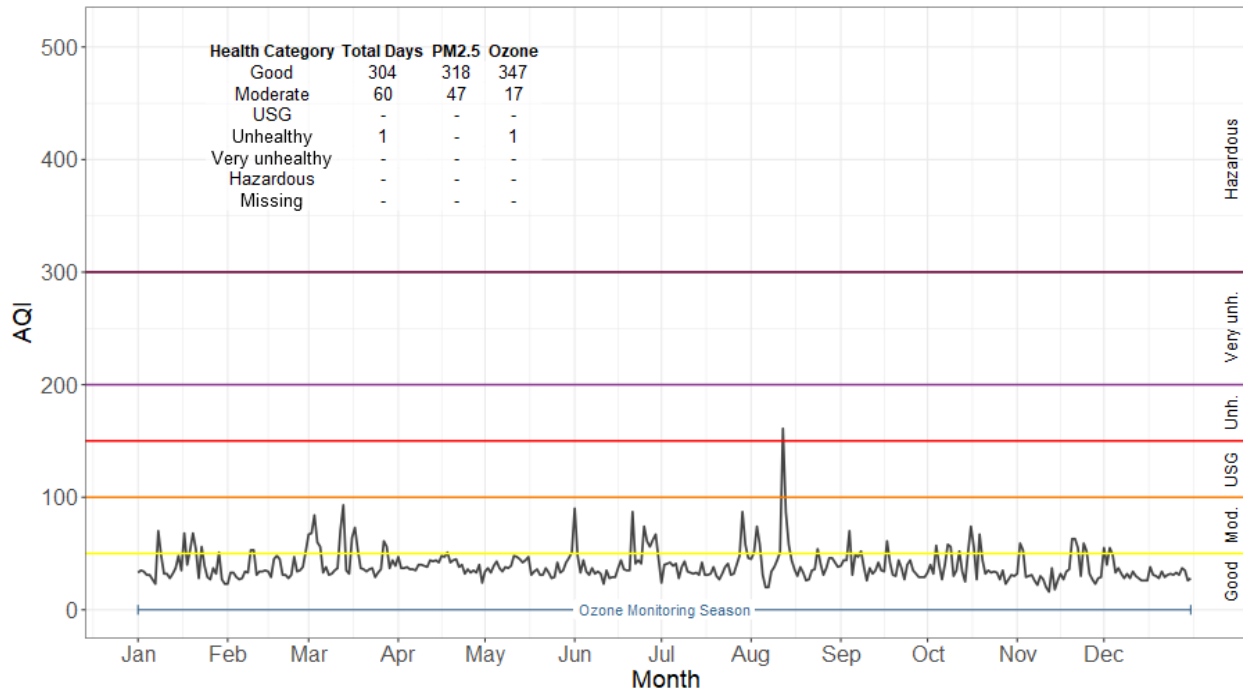


Figure 40. 2021 Portland Air Quality Index Summary.

Note: only the maximum AQI pollutant type is reported for each day.

2021 Prineville Air Quality Index

Based on PM2.5

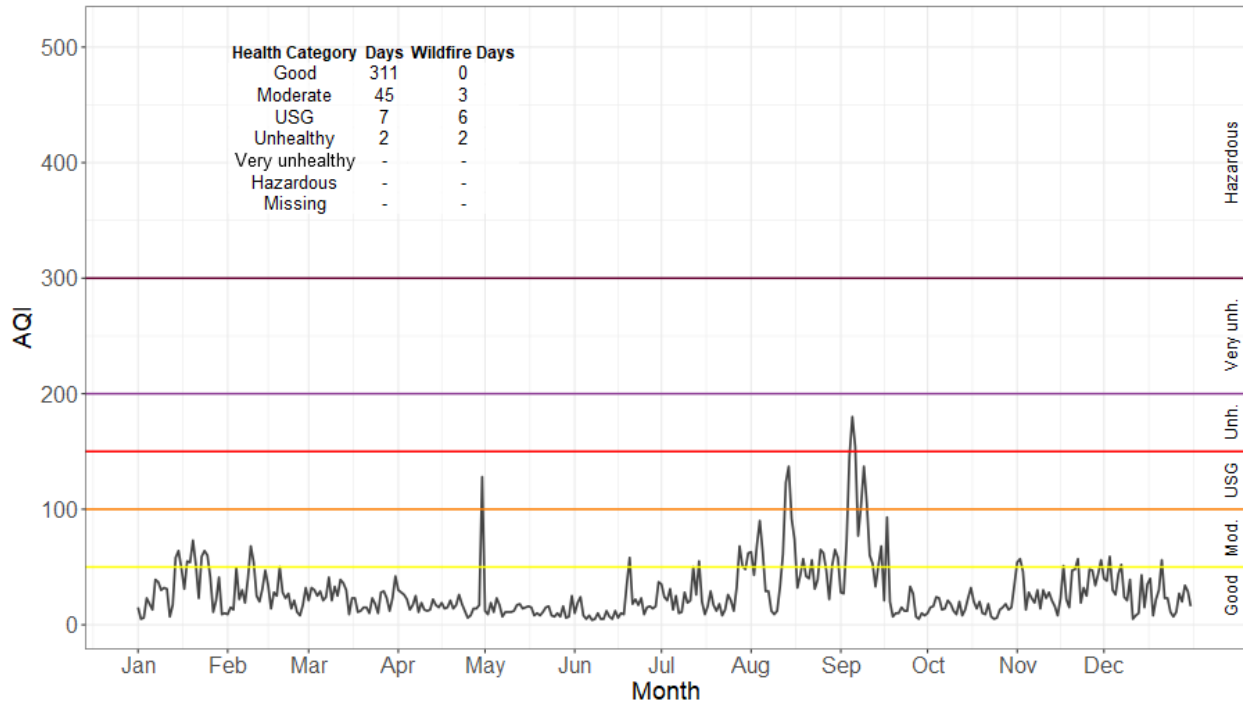


Figure 41. 2021 Prineville Air Quality Index Summary.

2021 Redmond Air Quality Index

Based on SensOR PM2.5

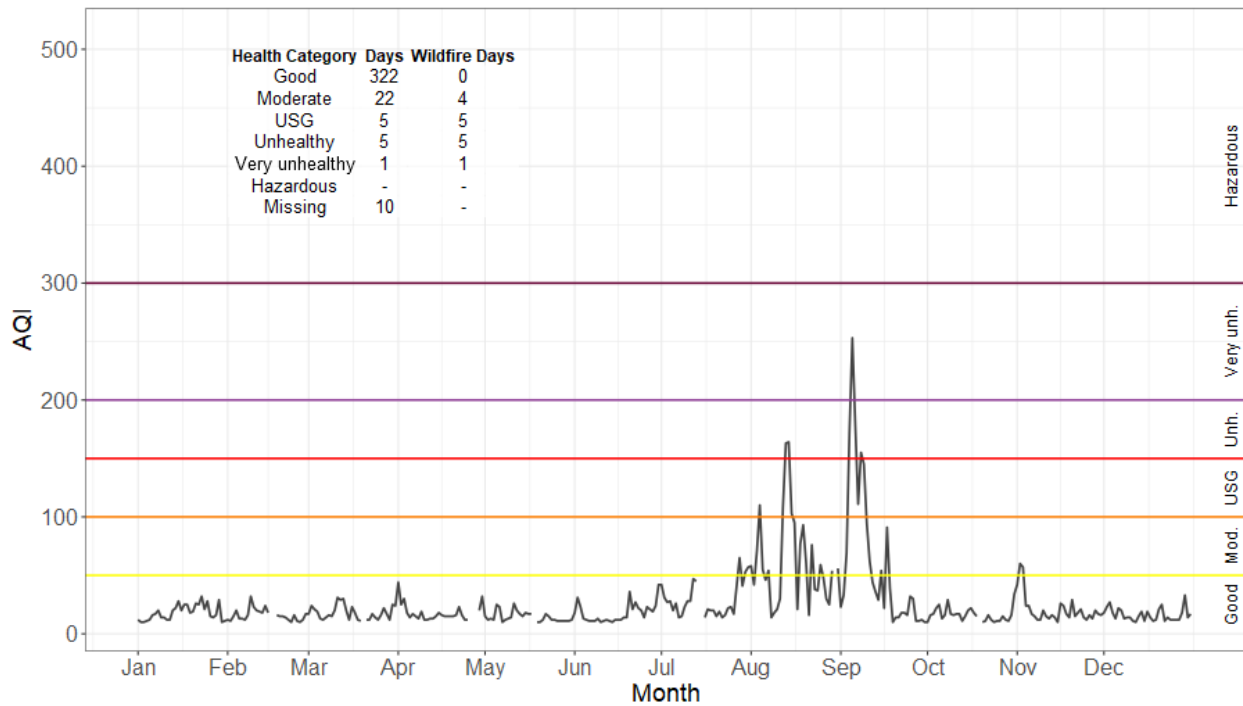


Figure 42. 2021 Redmond Air Quality Index Summary.

2021 Roseburg Air Quality Index

Based on PM2.5

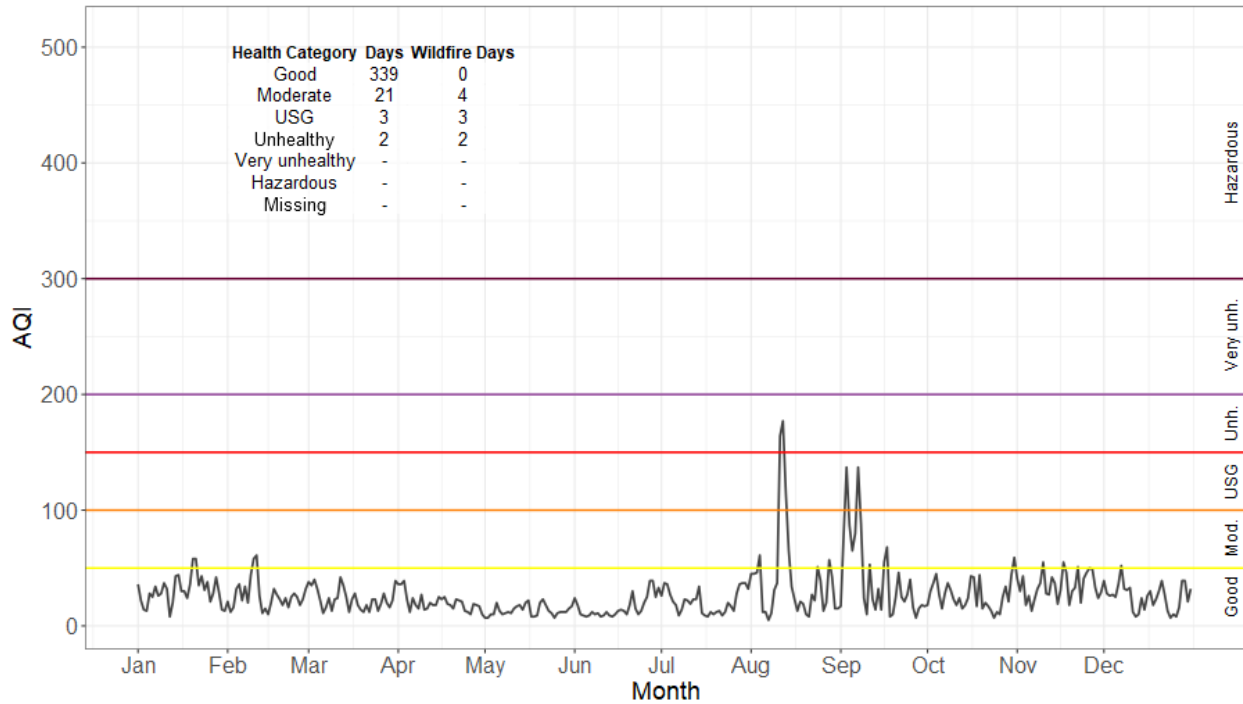


Figure 43. 2021 Roseburg Air Quality Index Summary.

2021 Salem Air Quality Index

Based on PM2.5 and Ozone

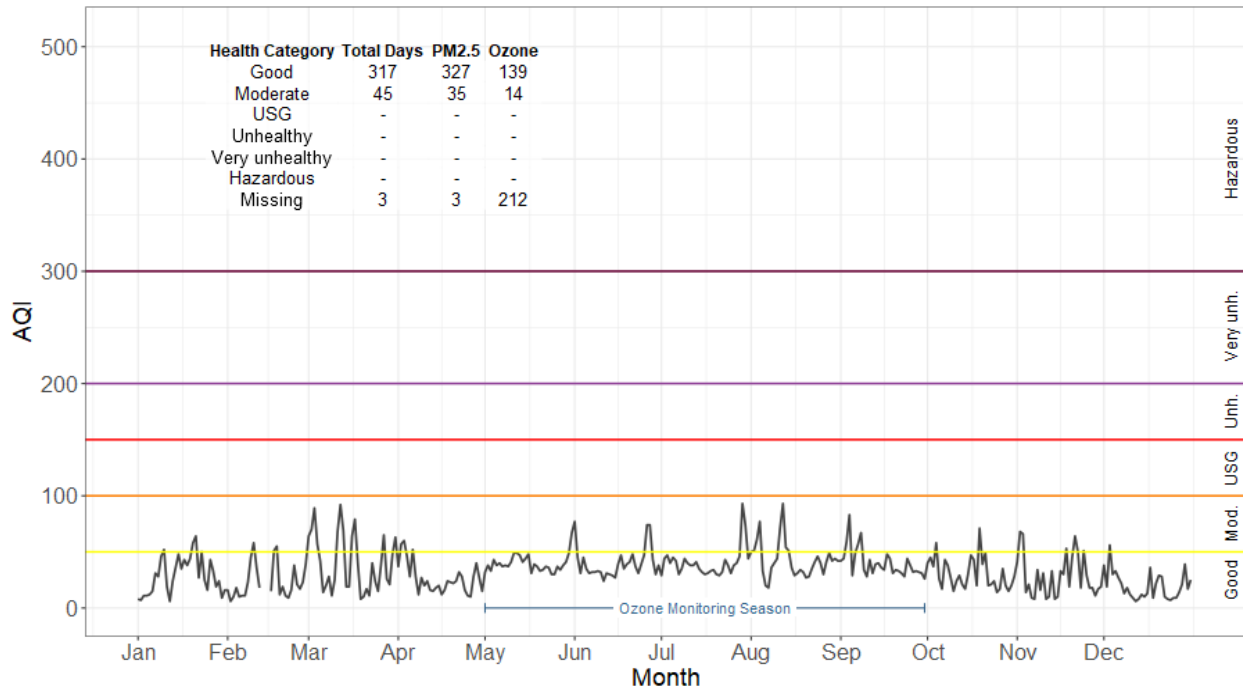


Figure 44. 2021 Salem Air Quality Index Summary.

Note: only the maximum ozone AQI or PM2.5 AQI is reported each day during ozone season.

2021 Sauvie Island Air Quality Index

Based on PM2.5

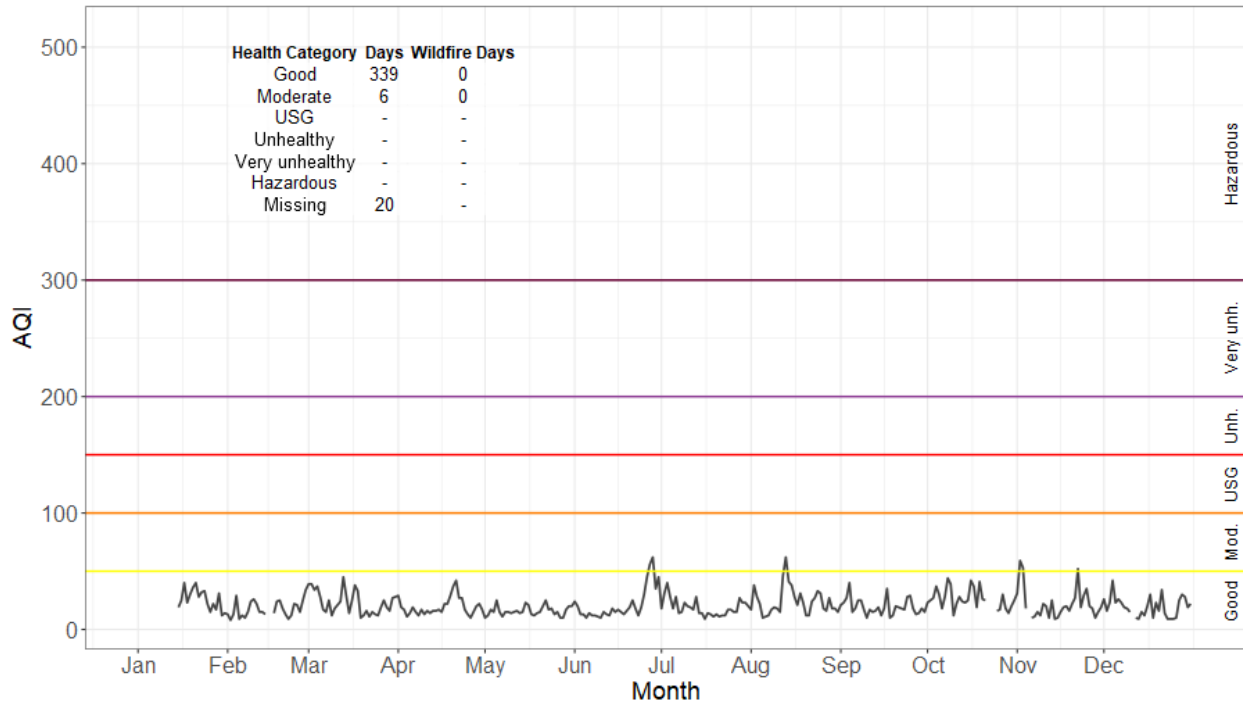


Figure 45. 2021 Sauvie Island Air Quality Index Summary.

2021 Shady Cove Air Quality Index

Based on PM2.5

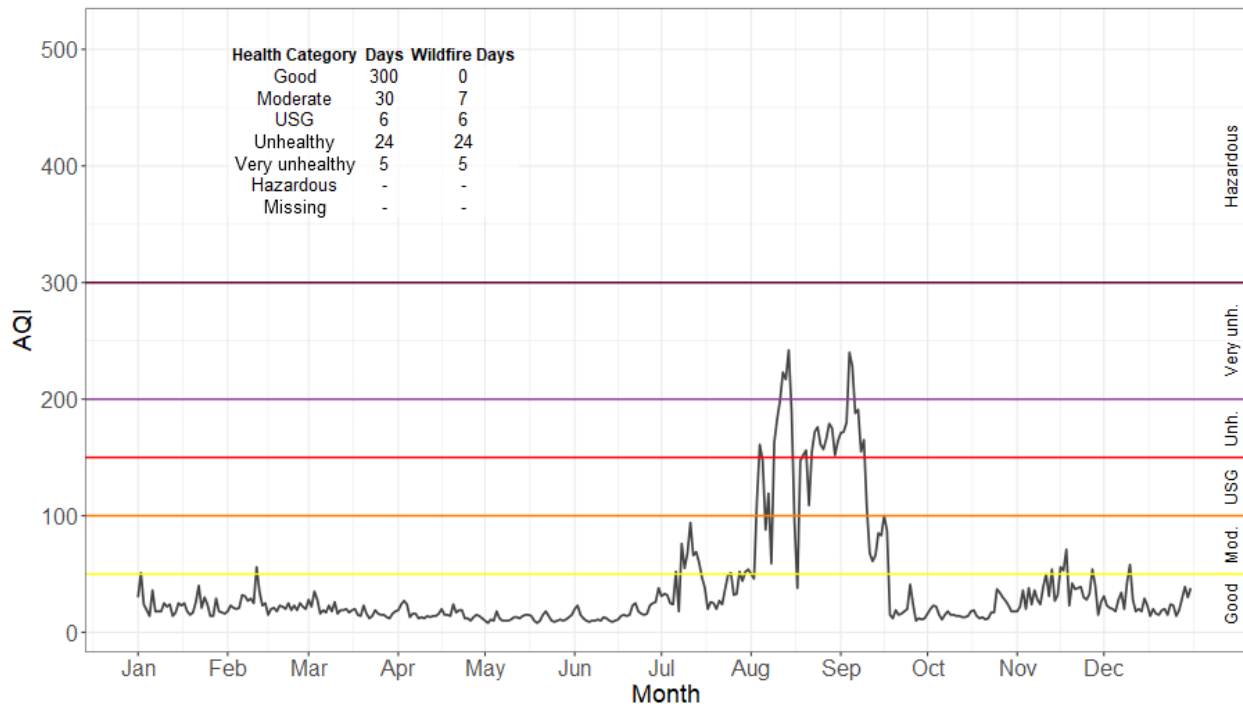


Figure 46. 2021 Shady Cove Air Quality Index Summary.

2021 Silverton Air Quality Index

Based on PM2.5

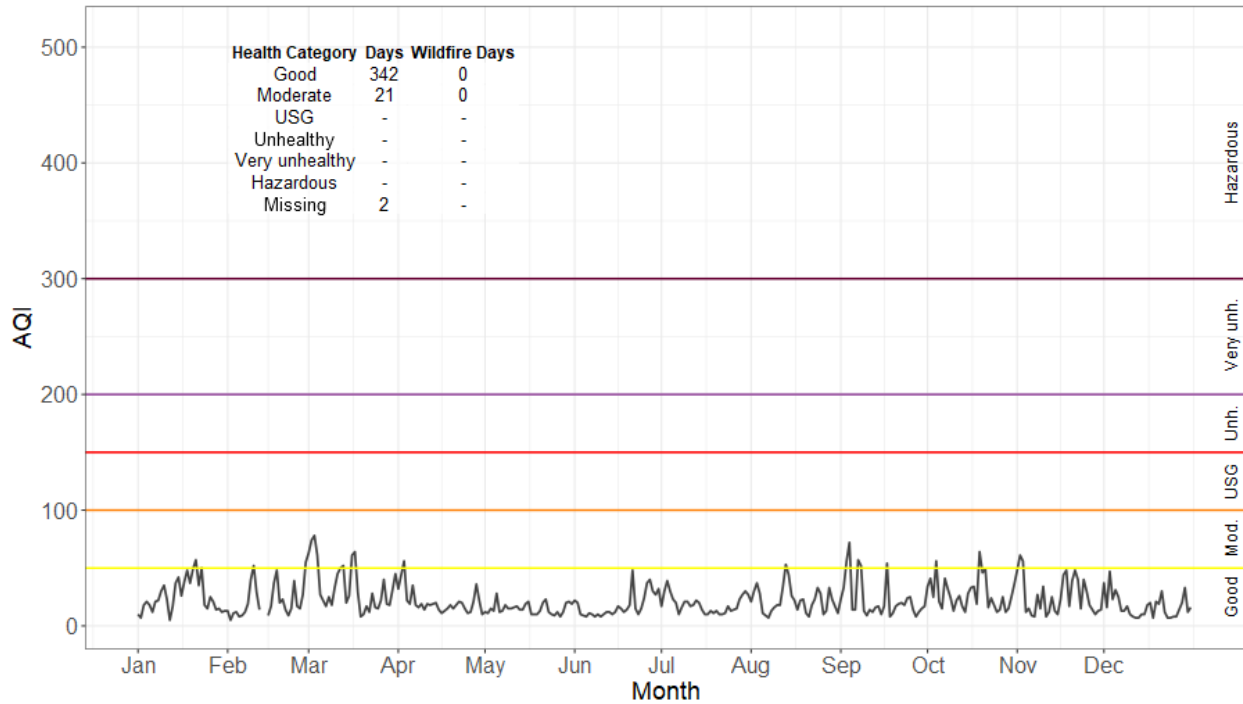


Figure 47. 2021 Silverton Summer Air Quality Index Summary.

2021 Sisters Air Quality Index

Based on PM2.5

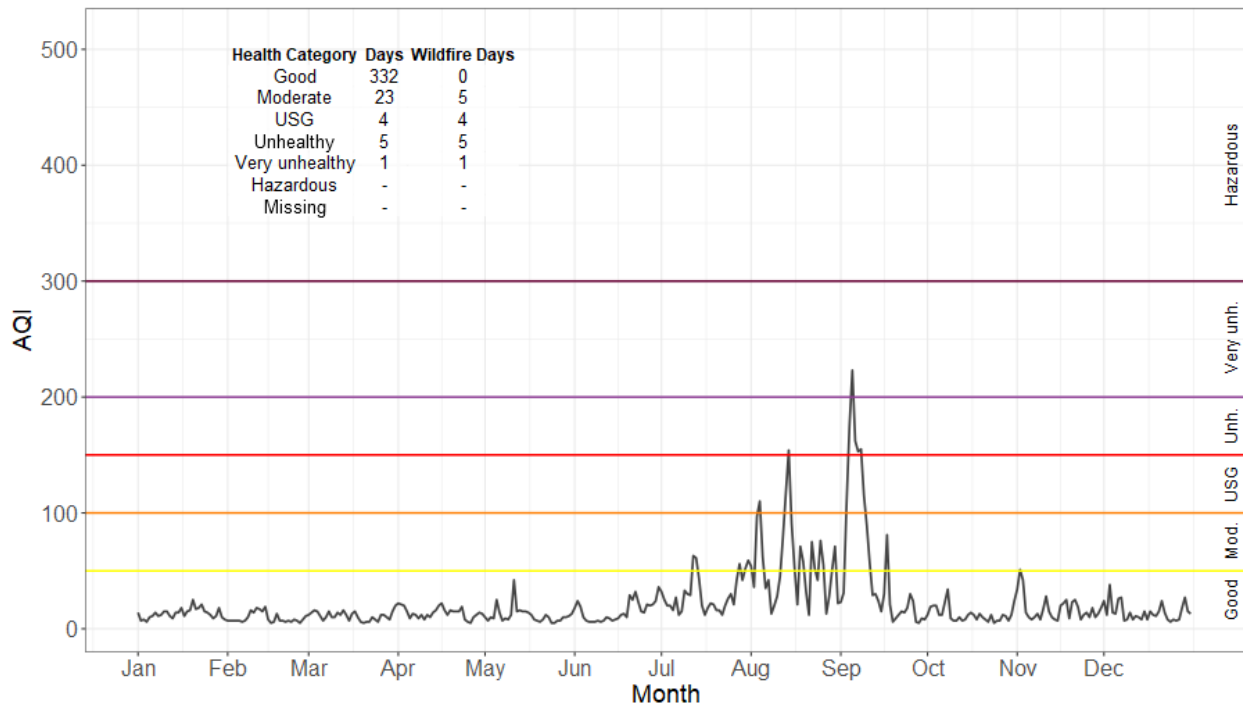


Figure 48. 2021 Sisters Air Quality Index Summary.

2021 Sweet Home Air Quality Index

Based on PM2.5

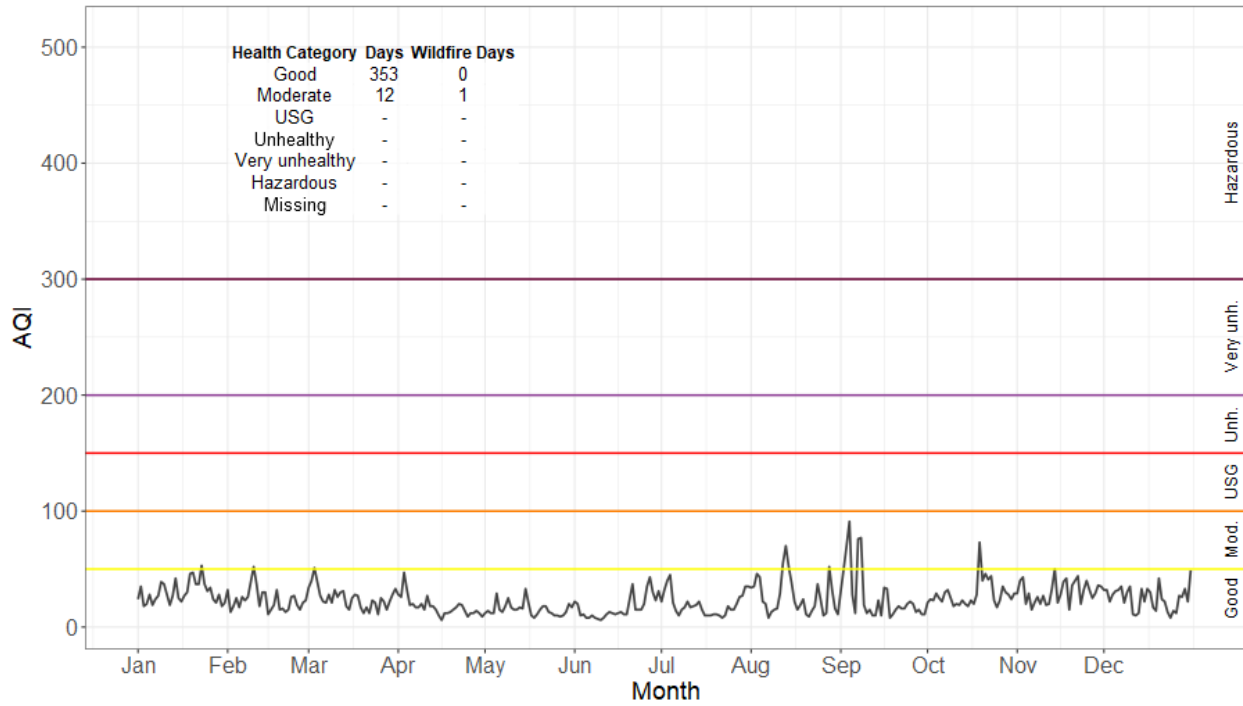


Figure 49. 2021 Sweet Home Air Quality Index Summary.

2021 The Dalles Air Quality Index

Based on PM2.5

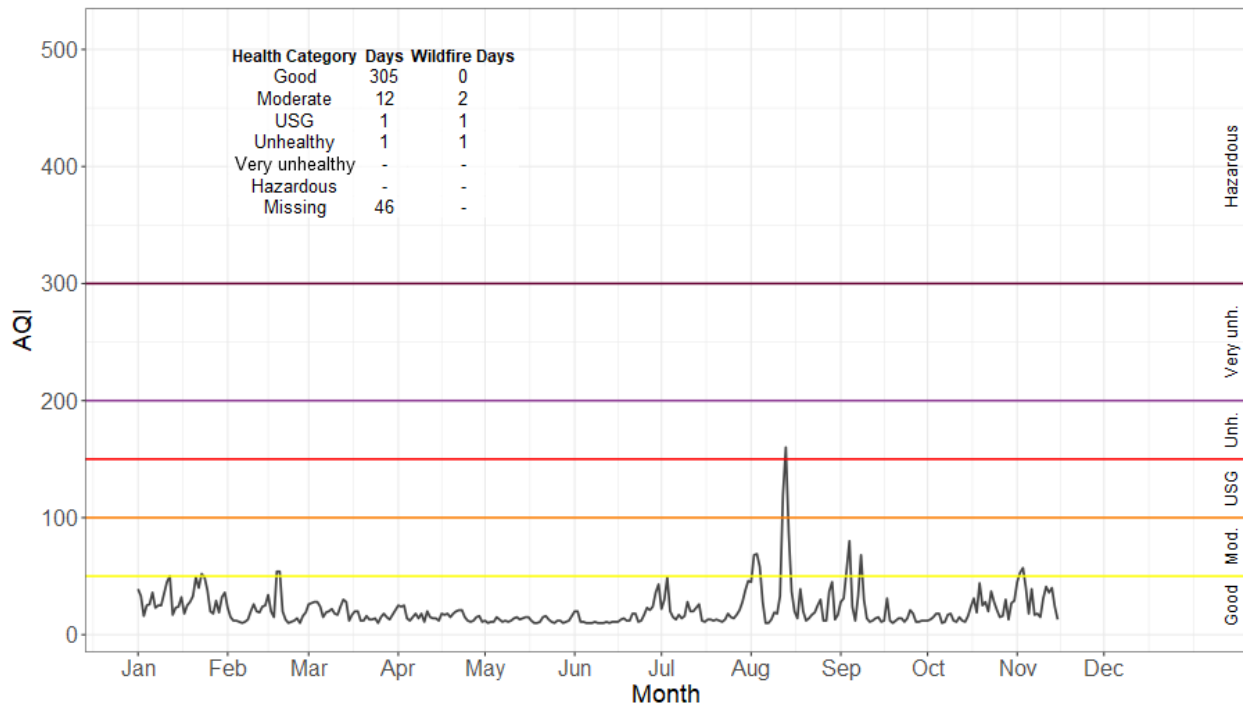


Figure 50. 2021 The Dalles Air Quality Index Summary.

2021 Tillamook Forestry Dept. Air Quality Index

Based on Sensor PM2.5

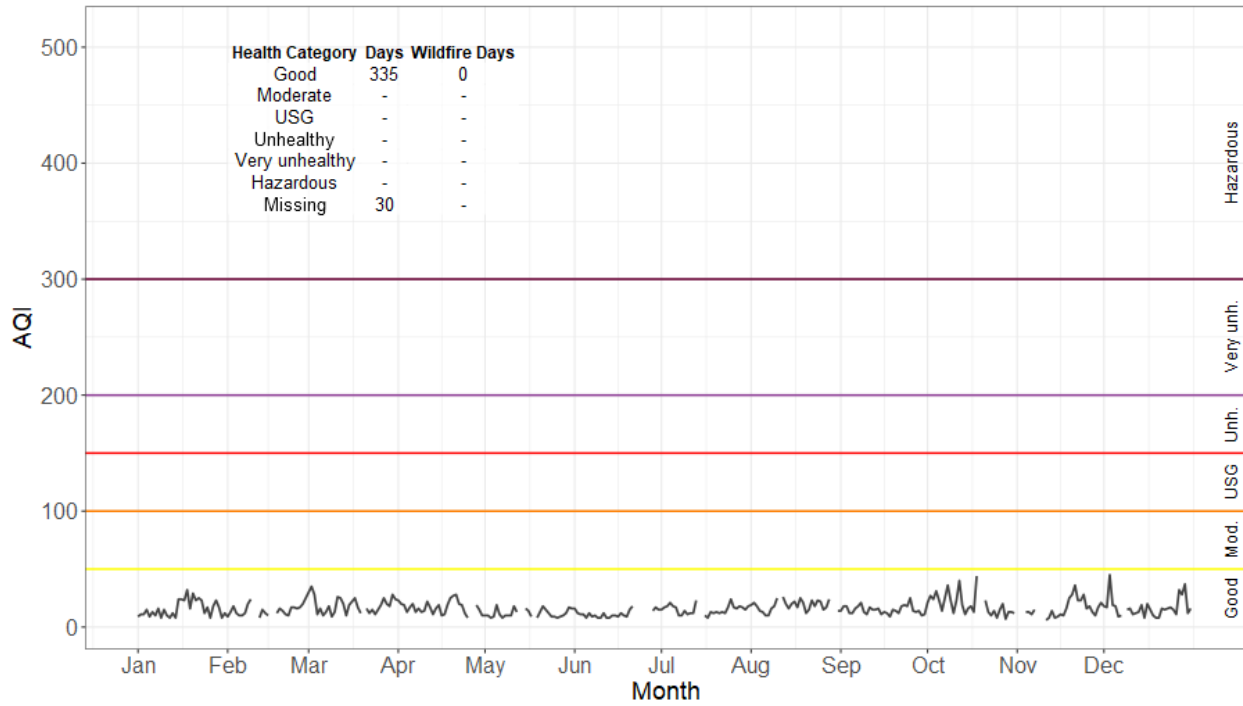


Figure 51. 2021 Tillamook Air Quality Index Summary

2021 Tualatin Air Quality Index

Based on PM2.5

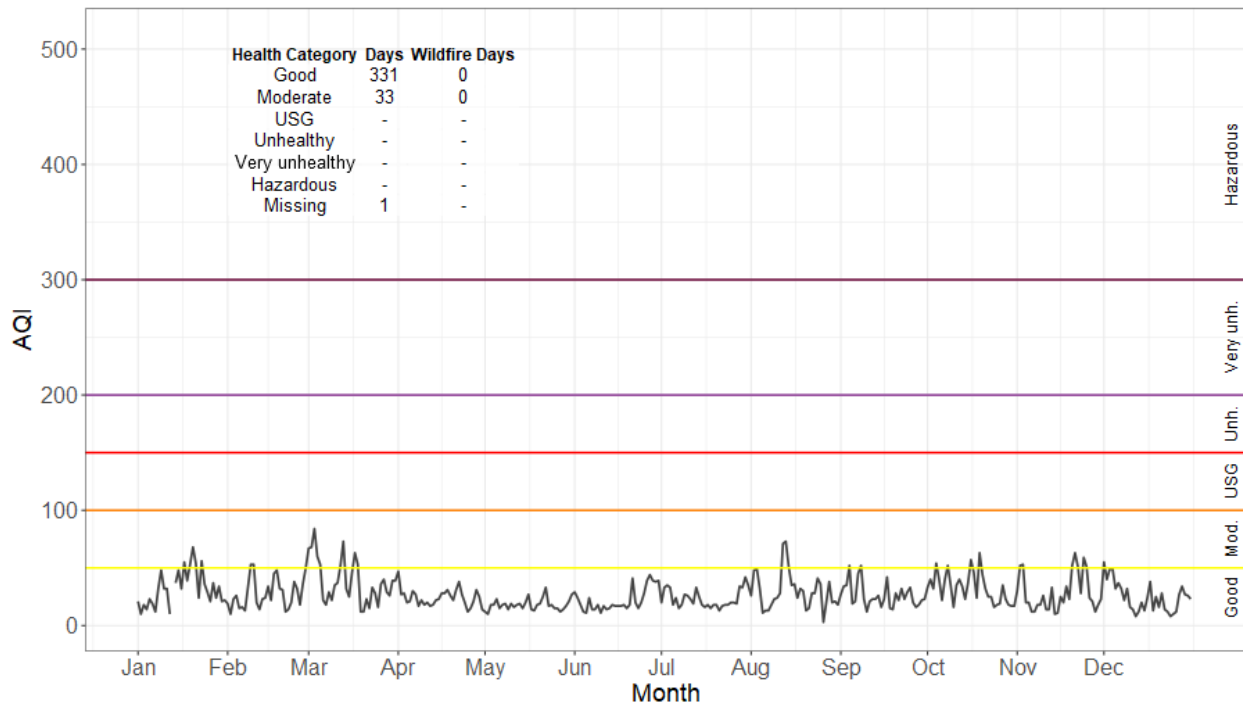


Figure 52. 2021 Tualatin Interstate-5 Near-Road Air Quality Index Summary

2021 Turner Air Quality Index

Based on PM2.5

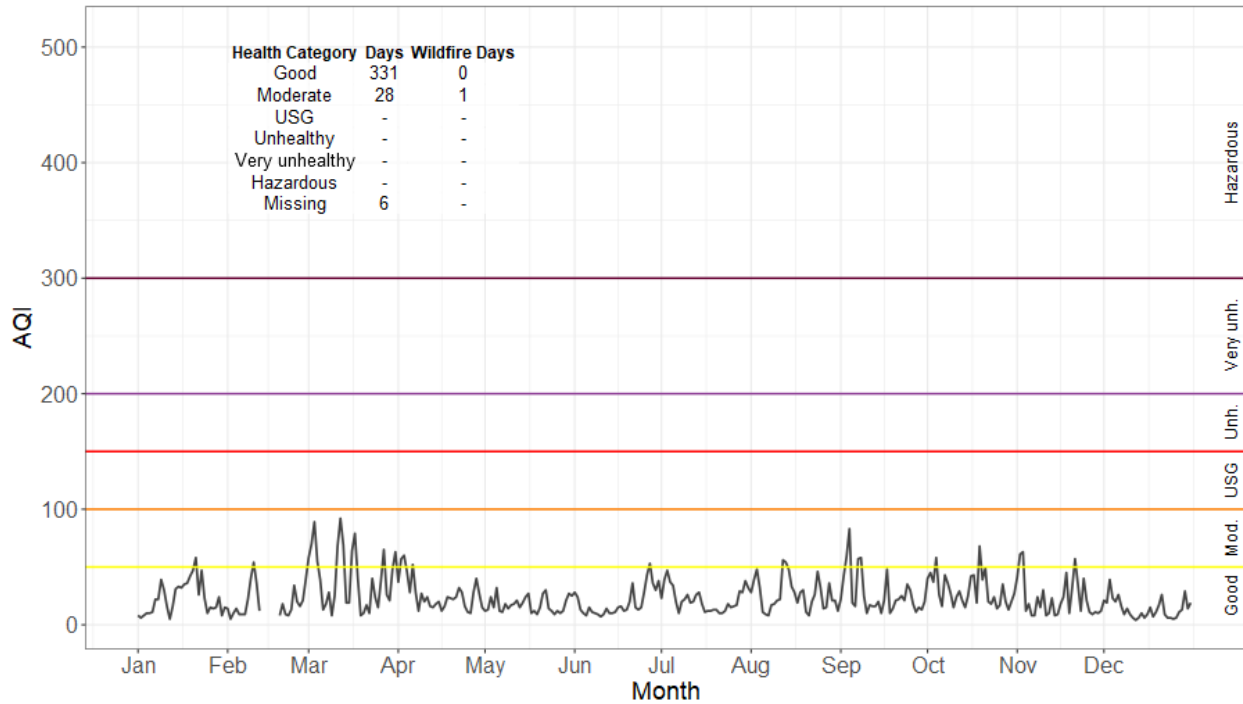


Figure 53. 2021 Turner Air Quality Index Summary

Table 4. Oregon 2021 AQI Summary.

2021 AQI Summary	Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days	Comment
Albany	346	19	0	0	0	0	0	
Ashland	303	32	11	19	0	0	0	
Baker City	312	47	1	4	0	0	1	
Beaverton	354	8	0	0	0	0	3	
Bend	314	27	9	8	1	1	5	
Brookings	216	2	1	0	0	0	146	
Burns	258	98	5	4	0	0	0	
Cave Junction	297	52	10	6	0	0	0	
Chiloquin	113	28	6	22	5	0	191	
Coos Bay	283	4	0	0	0	0	78	
Corvallis	338	1	0	0	0	0	26	
Cottage Grove	339	23	1	0	0	0	2	
Cove	298	31	5	2	0	0	29	
Crater Lake	32	24	15	21	0	0	273	Summer only
Dallas	329	3	0	0	0	0	33	
Detroit Lake	142	19	7	10	1	0	186	July through

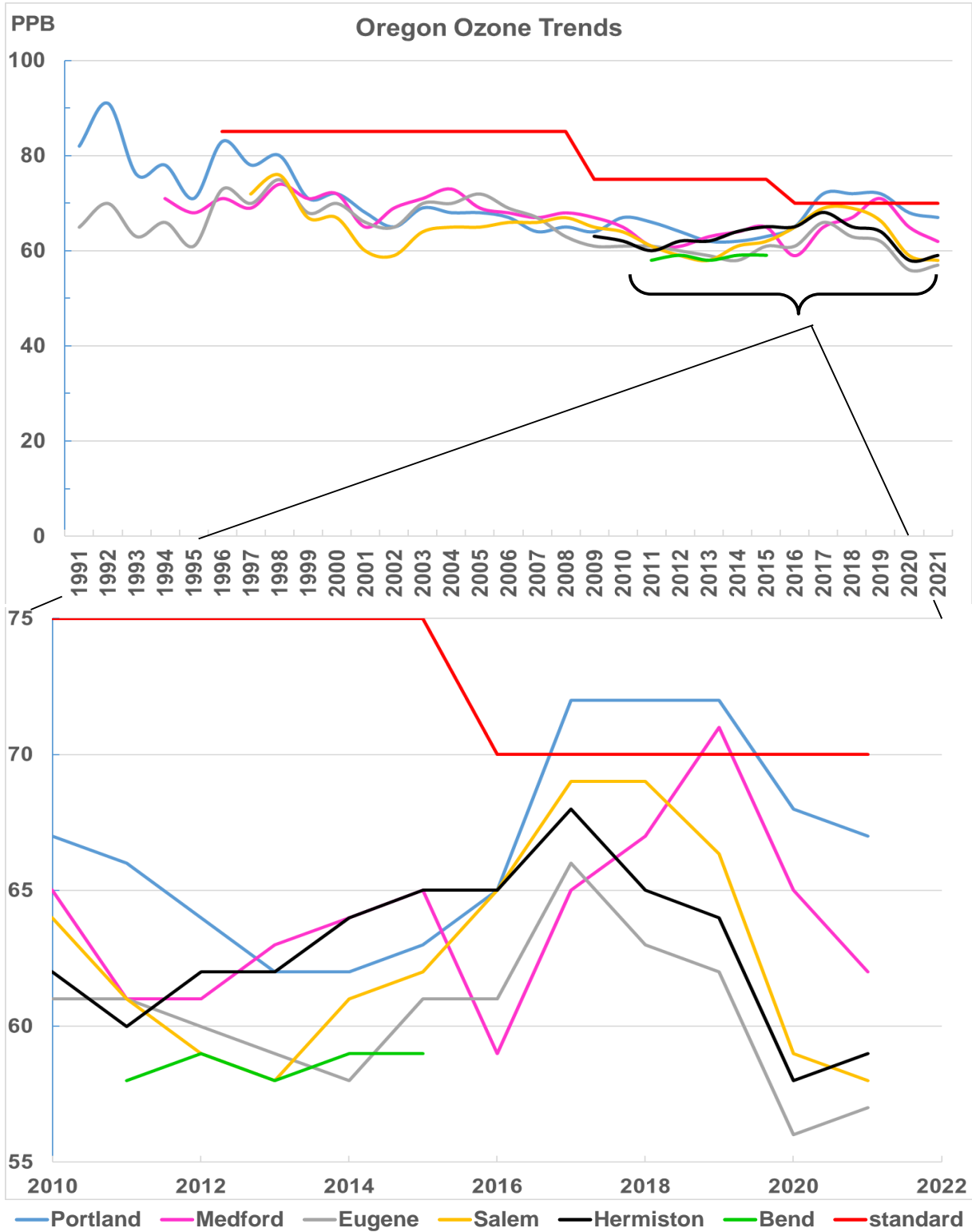
2020 AQI Summary	Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days	Comment
Enterprise	311	43	6	4	0	0	1	
Estacada	307	36	1	0	0	0	21	
Eugene/ Springfield	317	46	2	0	0	0	0	
Florence	363	0	0	0	0	0	2	
Forest Grove	340	14	0	0	0	0	11	
Grants Pass	303	47	6	8	0	0	1	
Gresham	314	20	0	0	0	0	31	
Hermiston	302	54	4	2	0	0	3	
Hillsboro	341	24	0	0	0	0	0	
Hood River	335	18	1	1	0	0	10	
John Day	236	119	5	5	0	0	0	
Klamath Falls	241	86	14	24	0	0	0	
La Grande	321	33	2	2	0	0	7	
Lakeview	278	64	17	6	0	0	0	
La Pine	186	51	7	8	6	2	105	
Lyons	321	39	1	0	0	0	4	
Madras	316	43	4	2	0	0	0	
Medford	253	83	10	19	0	0	0	
Mill City	293	36	1	0	0	0	36	
Mt. Hood	103	10	3	3	0	0	246	Summer only
Oakridge	302	42	10	9	0	0	2	
Ontario	272	53	4	0	0	0	36	
Pendleton	323	35	3	2	0	0	2	
Portland	304	60	0	1	0	0	0	
Prineville	311	45	7	2	0	0	0	
Redmond	322	22	5	5	1	0	10	
Roseburg	339	21	3	2	0	0	0	
Salem	317	45	0	0	0	0	3	
Sauvie Island	339	6	0	0	0	0	20	
Shady Cove	300	30	6	24	5	0	0	
Silverton	342	21	0	0	0	0	2	
Sisters	332	23	4	5	1	0	0	
Sweet Home	353	12	0	0	0	0	0	
The Dalles	305	12	1	1	0	0	46	
Tillamook	335	0	0	0	0	0	30	
Tualatin Interstate-5	331	33	0	0	0	0	1	
Turner	331	28	0	0	0	0	6	

Air Quality Trends

Ozone Trends

Ozone is a secondary pollutant formed when there are elevated levels of nitrogen dioxide (NO₂) and volatile organic compounds (VOCs) that undergo chemical reactions in the presence of high temperatures and sunlight. In Oregon, elevated ozone occurs in the summer and can be formed by human-caused pollution from fossil fuel combustion and also by naturally caused pollution from wildfire smoke, which contains NO₂ and VOCs. In 2017 and 2018, most of the state experienced elevated ozone because the wildfire smoke introduced natural precursors on top of the human-caused emissions.

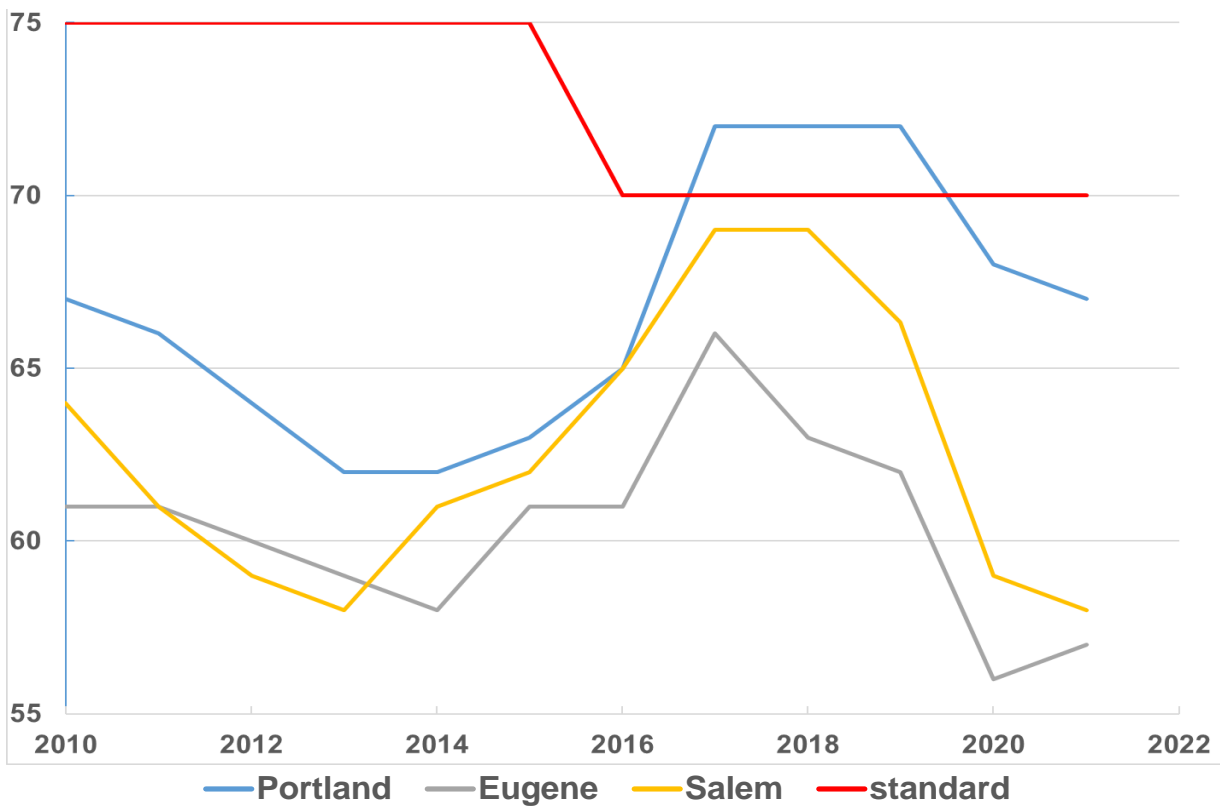
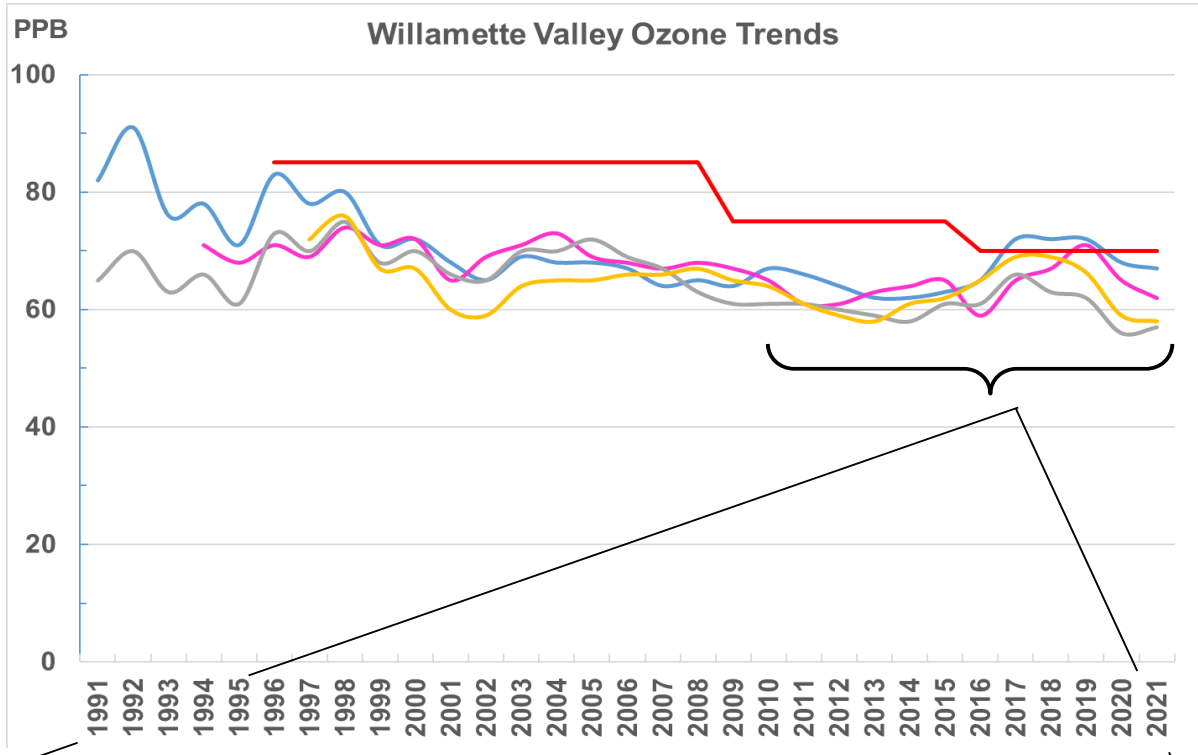
The graphs below show the air quality trends compared to the ozone National Ambient Air Quality Standard (NAAQS). Data with wildfire contributions are included because it is very difficult to determine if the ozone would have exceeded the NAAQS without the smoke from wildfires.



Three year average of the 4th highest daily maximum 8 hour average

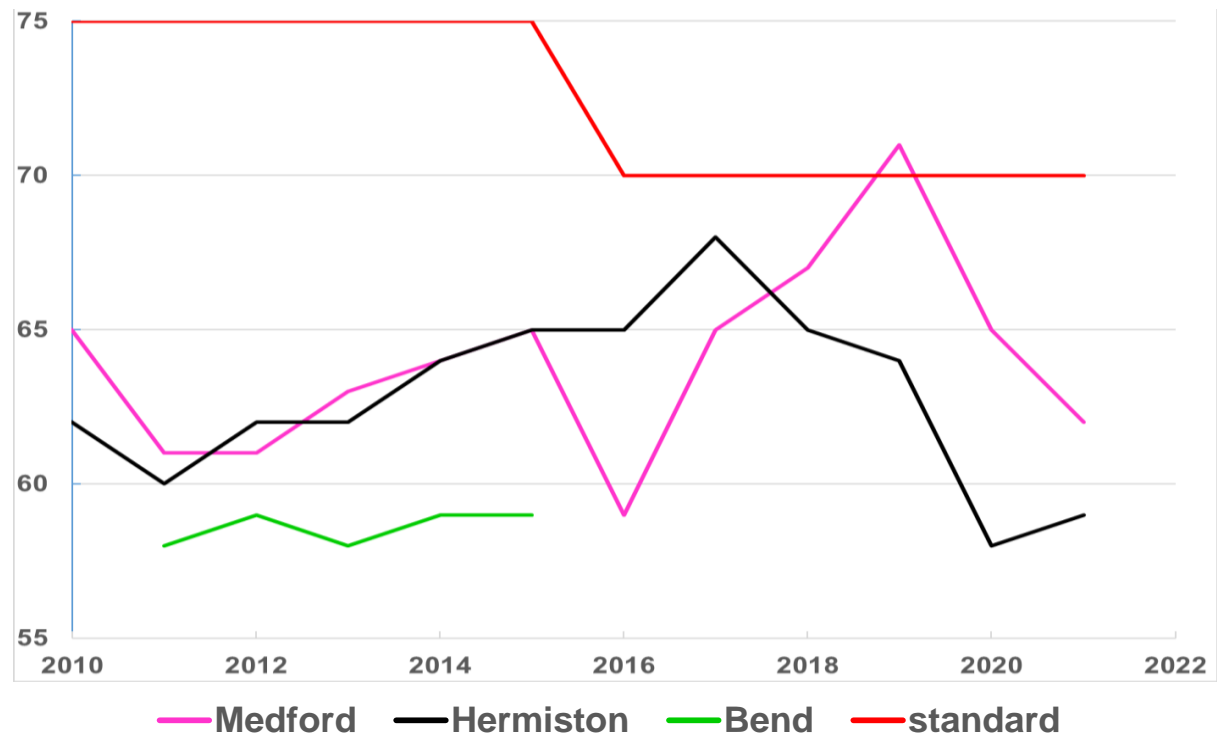
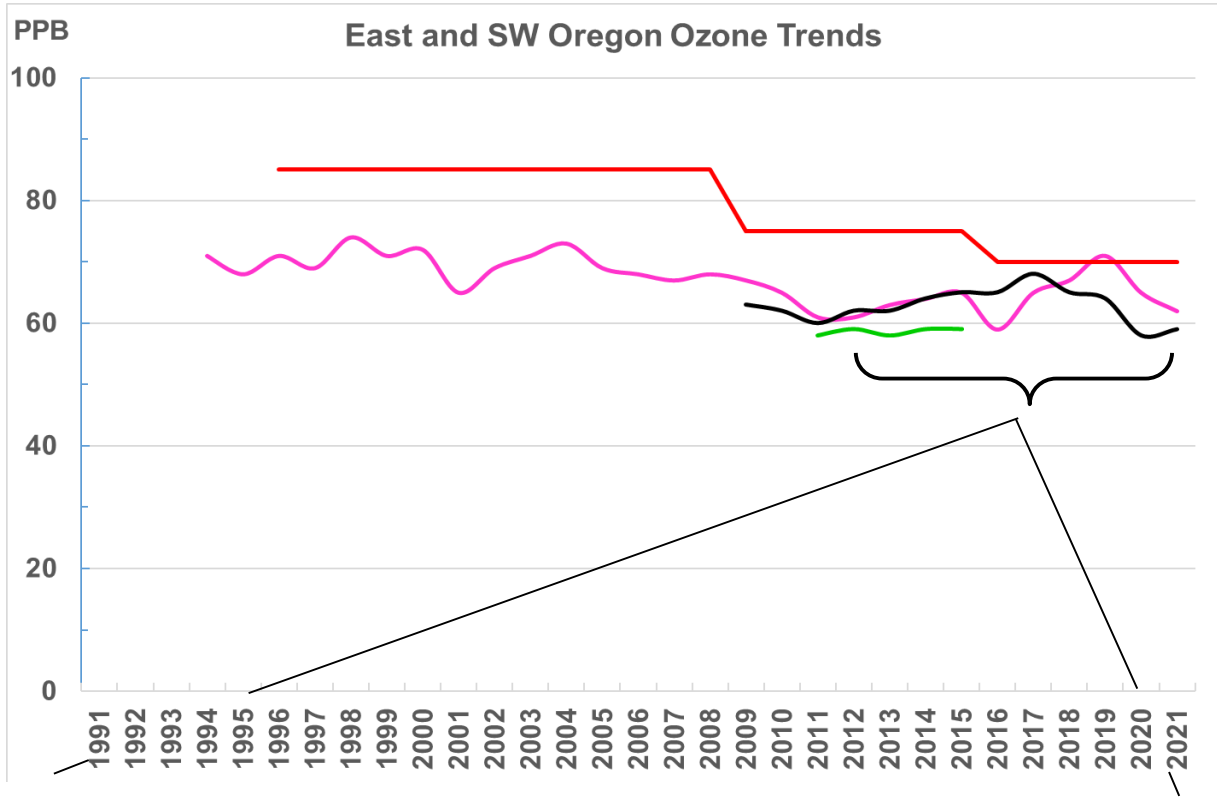
Figure 54. Oregon ozone trend.

For more detail, see the charts by region below.



Three year average of the 4th highest daily maximum 8 hour average

Figure 55. Willamette Valley ozone trends



Three year average of the 4th highest daily maximum 8 hour average

Figure 56. Southwest and Eastern Oregon ozone trends

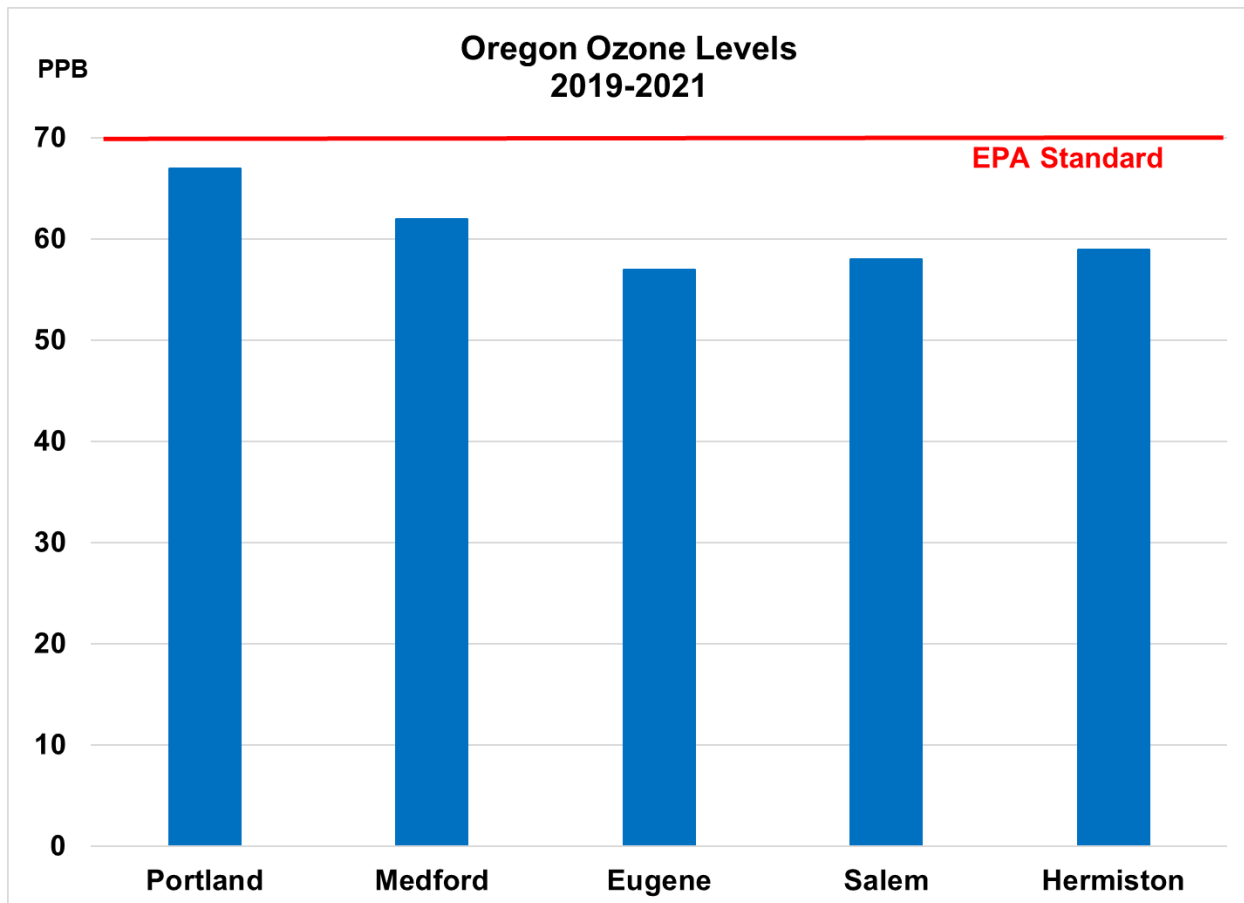


Figure 57. Oregon cities 2019-2021 Ozone Levels
The data is the three year average of the 4th highest annual daily 8 hour average.

Note that the wildfire smoke can contribute to ozone formation. However, since high ozone occurs in the summer months precisely when wildfire smoke impacts occur, it is very difficult to determine what the ozone level would have been without the presence of wildfire smoke.

PM2.5 Trends

The charts below show the trends for the 98th percentile and annual average PM2.5. The 98th percentile is the daily value out of a year of PM2.5 monitoring data below which 98 percent of all daily values fall. The 98th Percentile is used for comparison to the daily standard. The annual average is the weighted arithmetic mean, based on quarterly means. These calculations are explained in [40 CFR Part 50 Appendix N](#).

In the last decade wildfire smoke has impacted PM2.5 values. The charts below show data with and without wildfire smoke (WF) impacts.

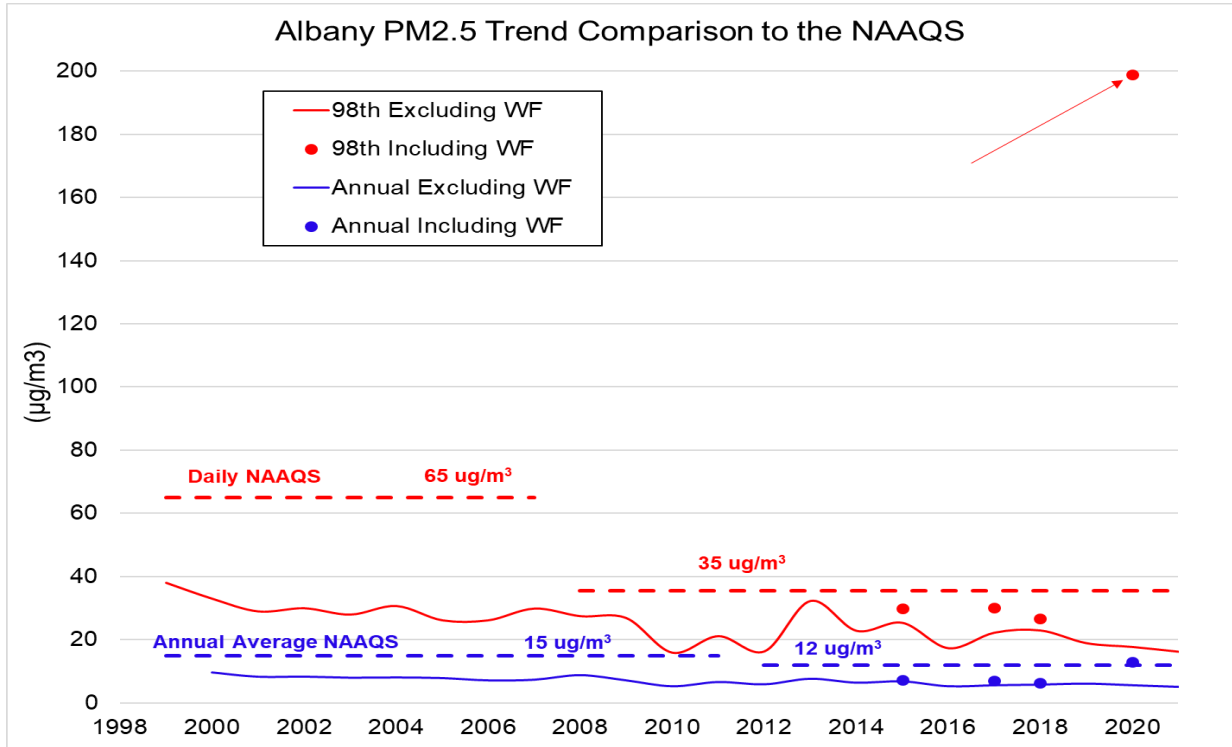


Figure 58. Albany PM2.5 trends

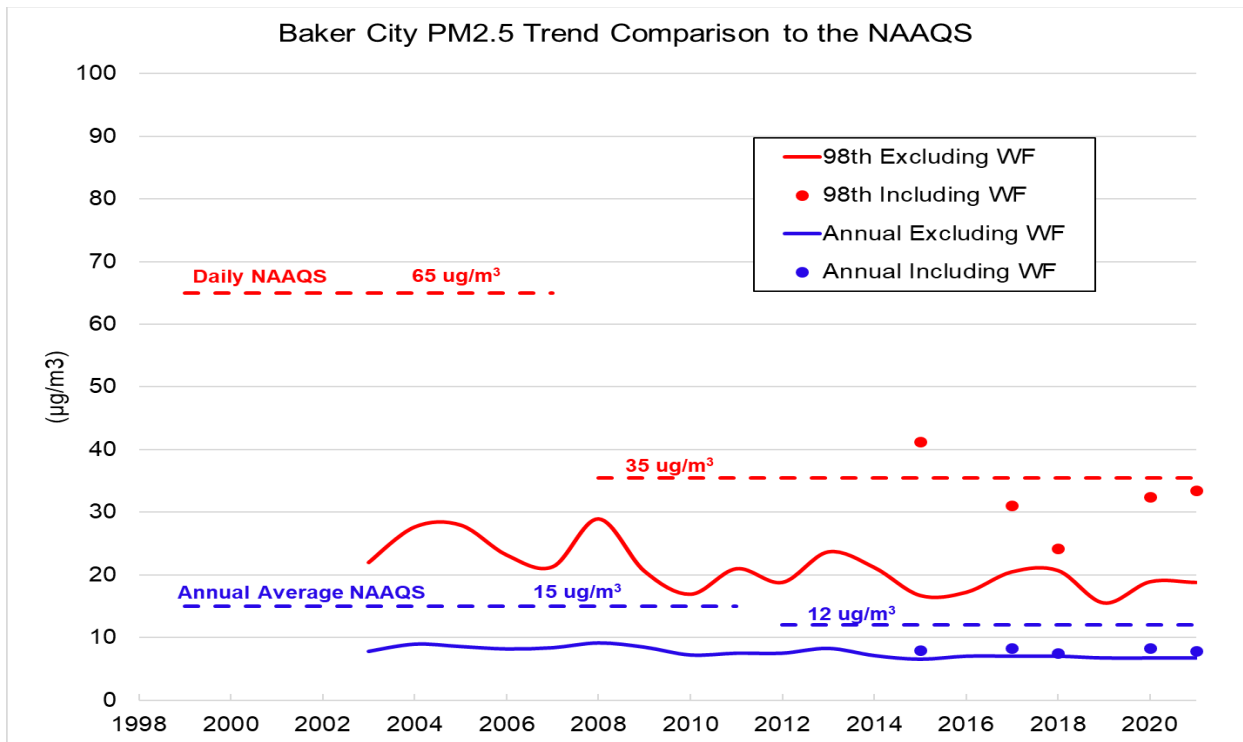


Figure 59. Baker City PM2.5 trends

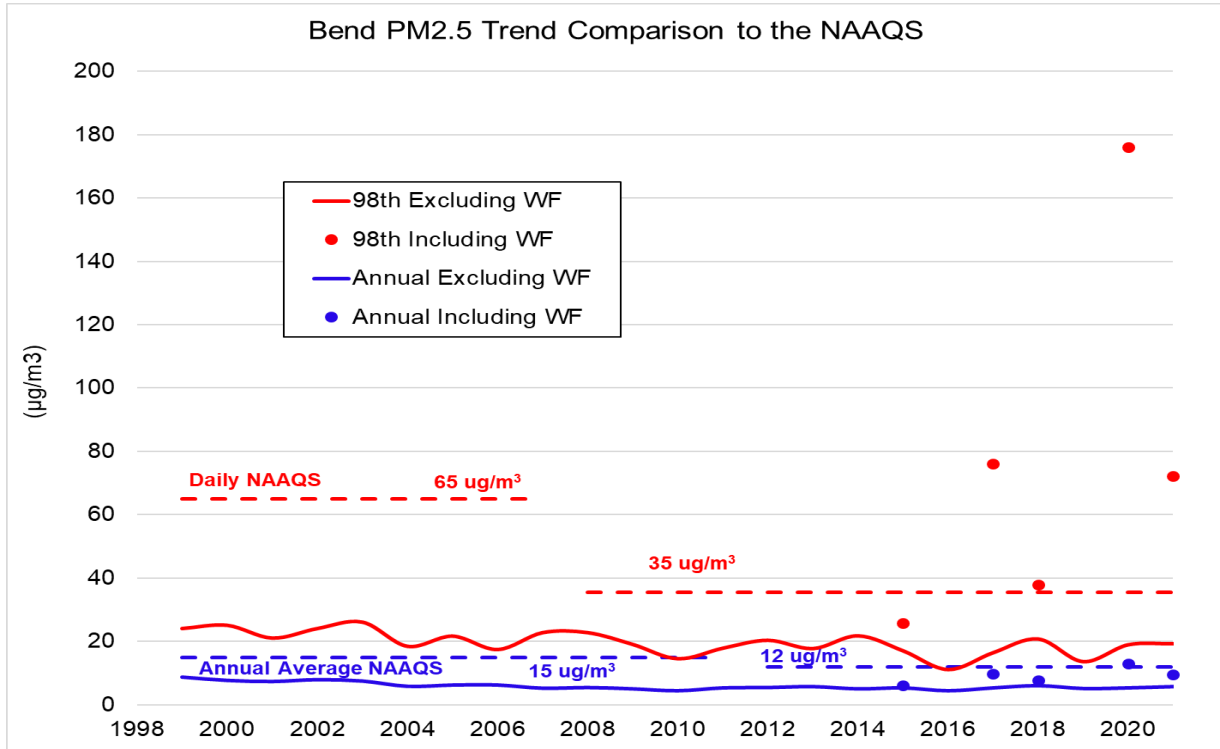


Figure 60. Bend PM2.5 trends

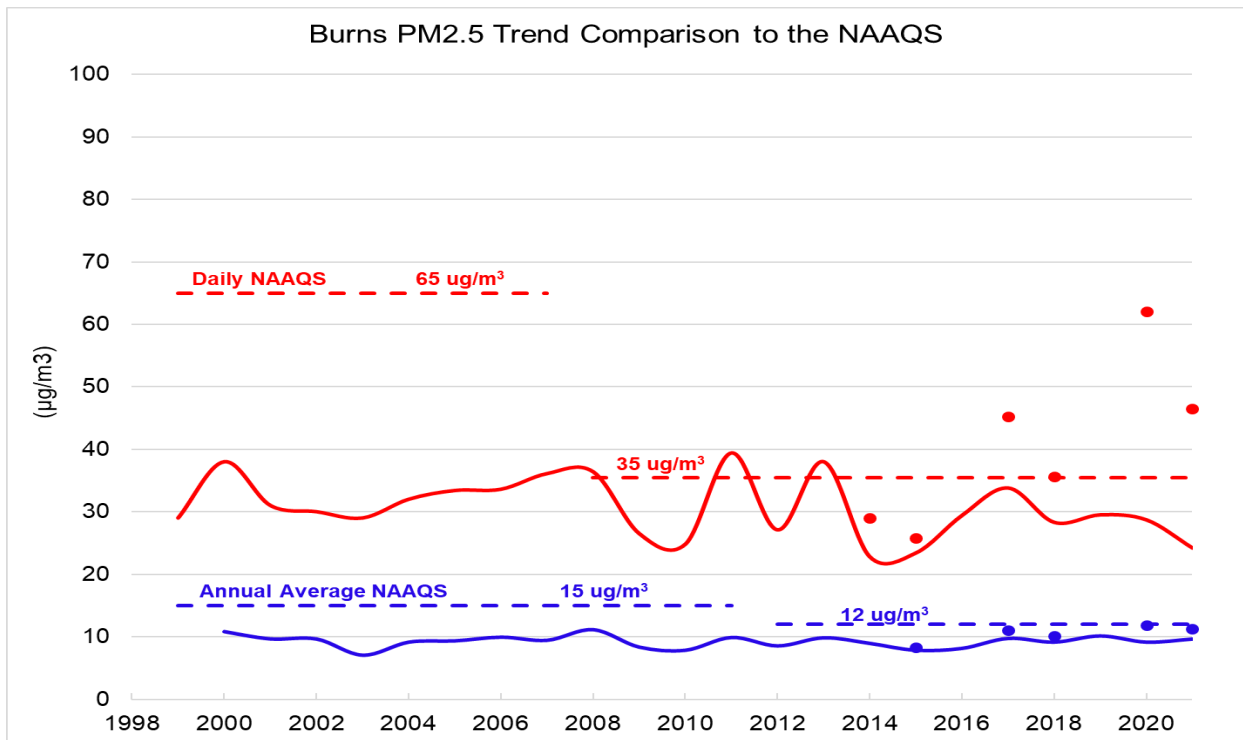


Figure 61. Burns PM2.5 trend.

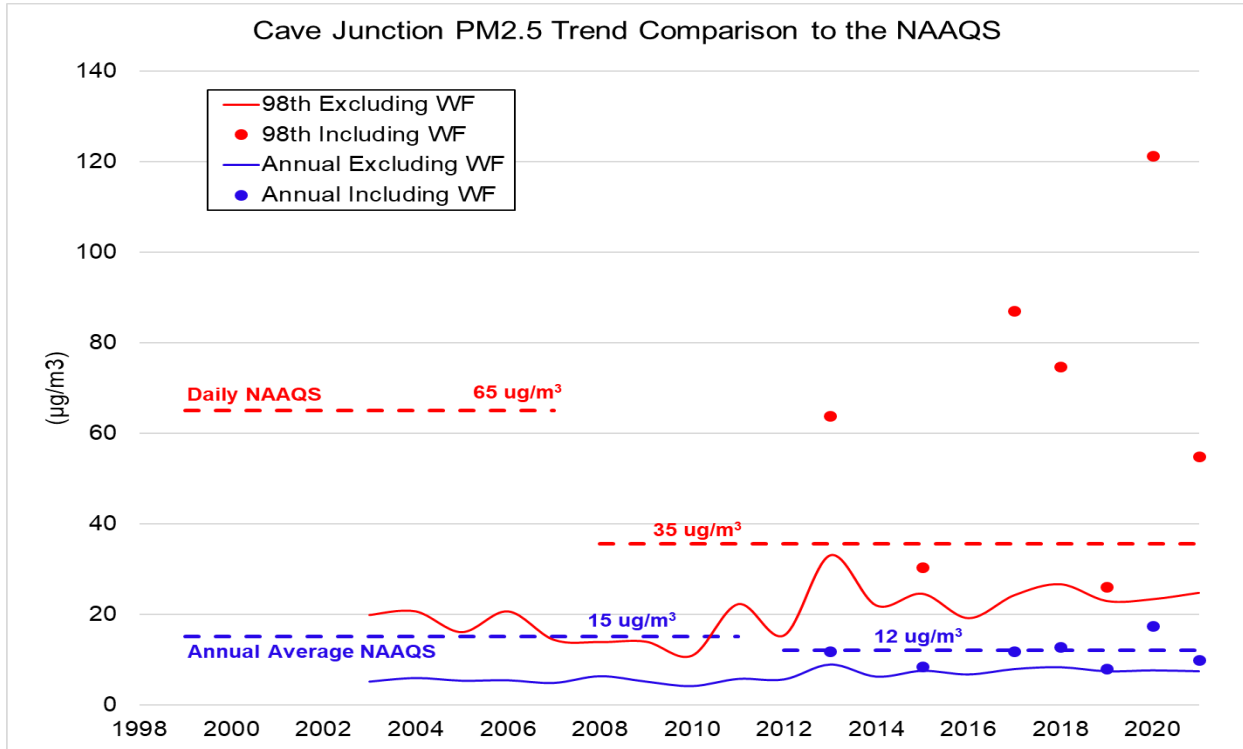


Figure 62. Cave Junction PM2.5 trend.

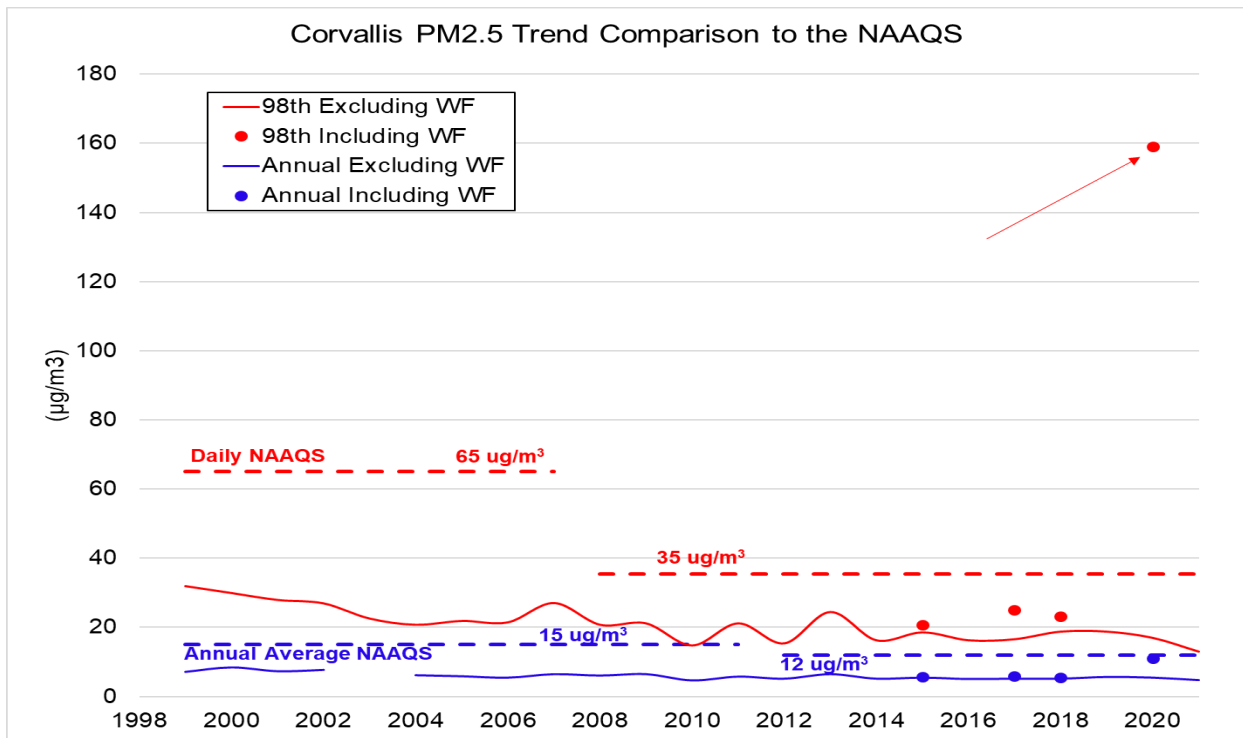


Figure 63. Corvallis PM2.5 trend.

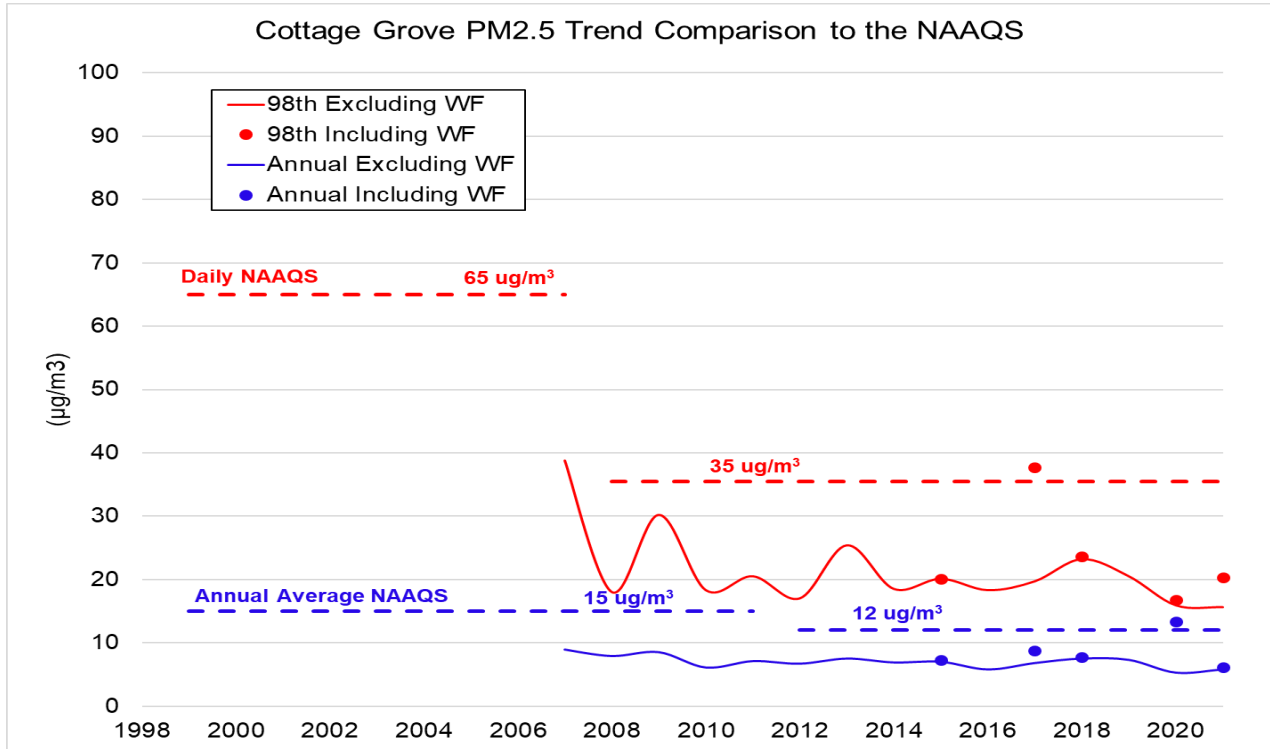


Figure 64. Cottage Grove PM2.5 trends.

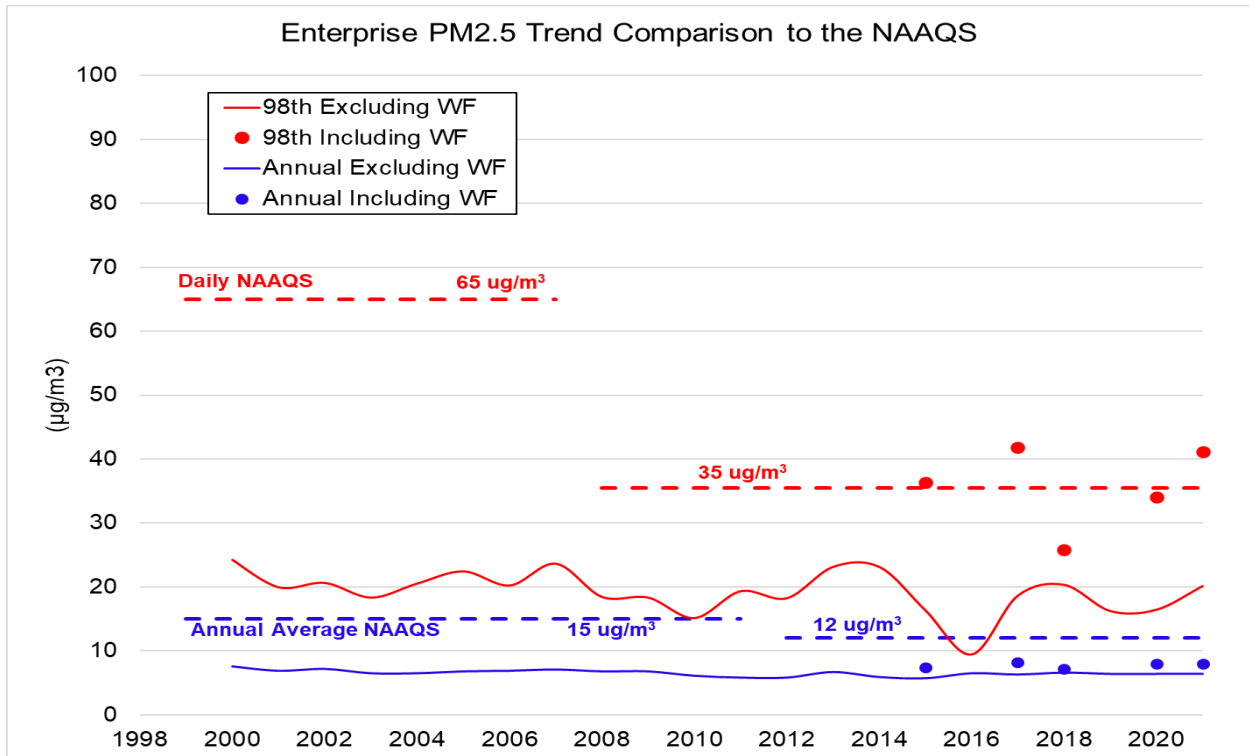


Figure 65. Enterprise PM2.5 trends.

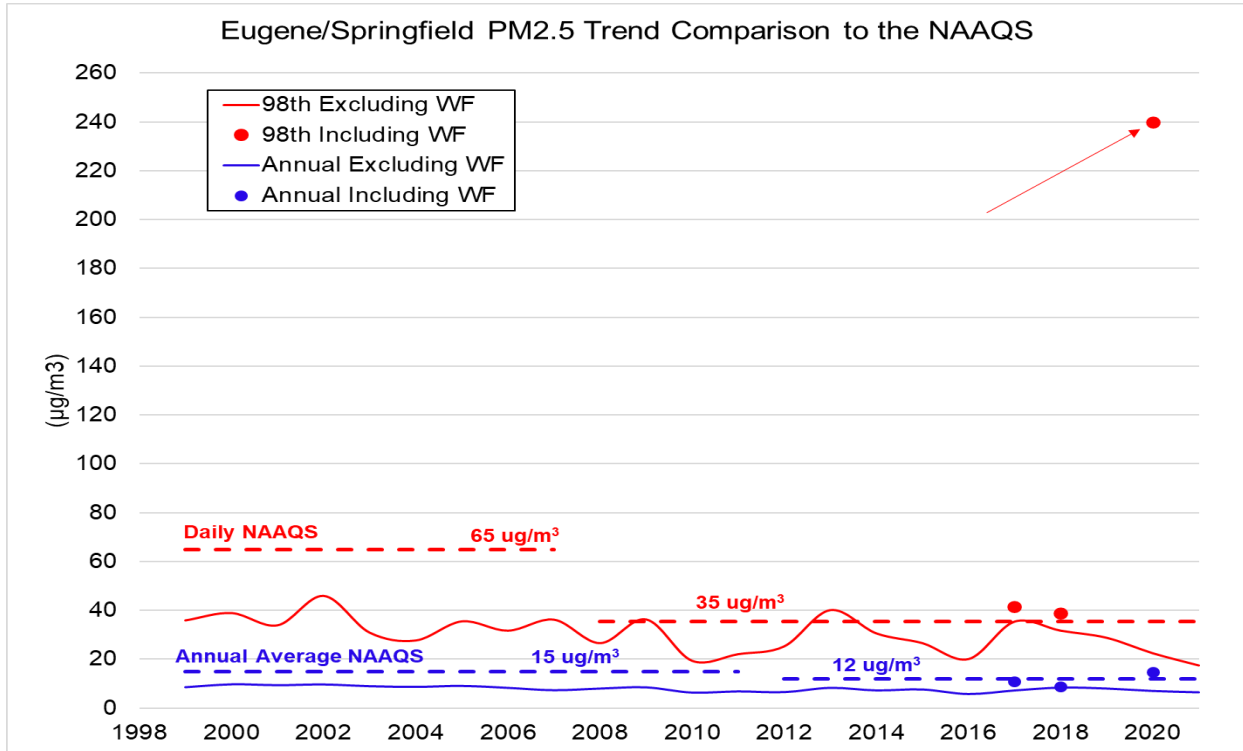


Figure 66. Eugene/Springfield PM2.5 trends.

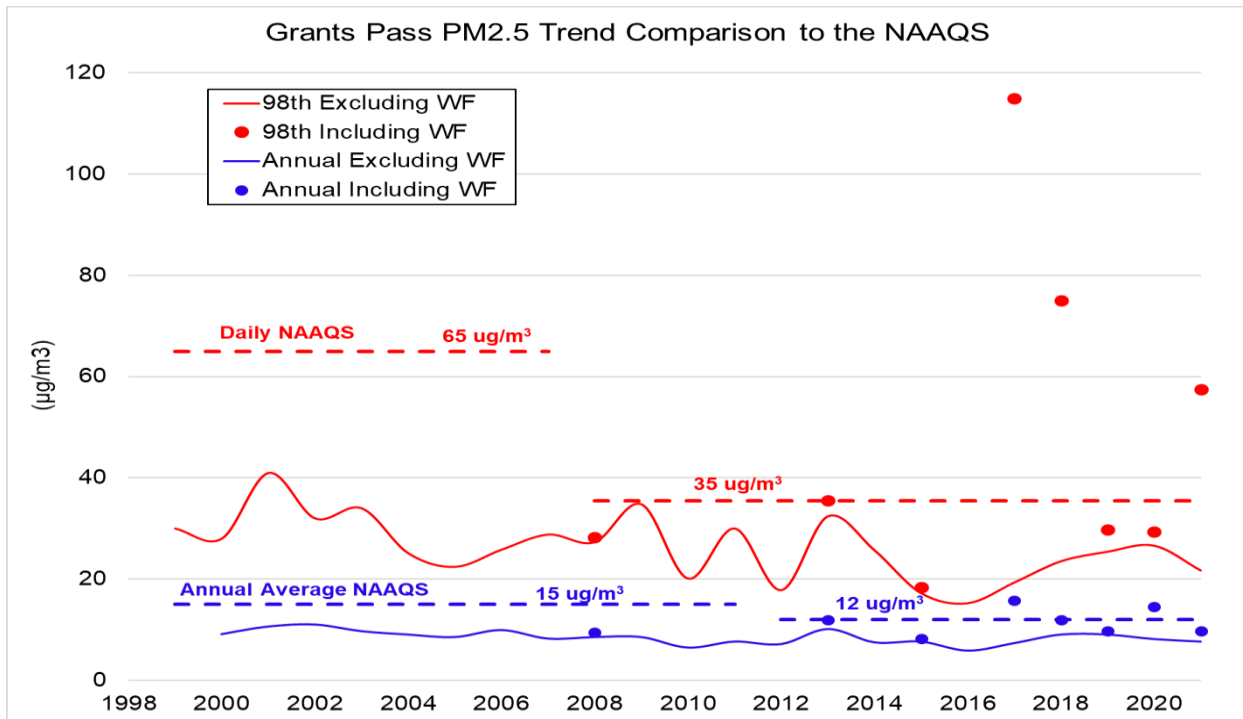


Figure 67. Grants Pass PM2.5 trends.

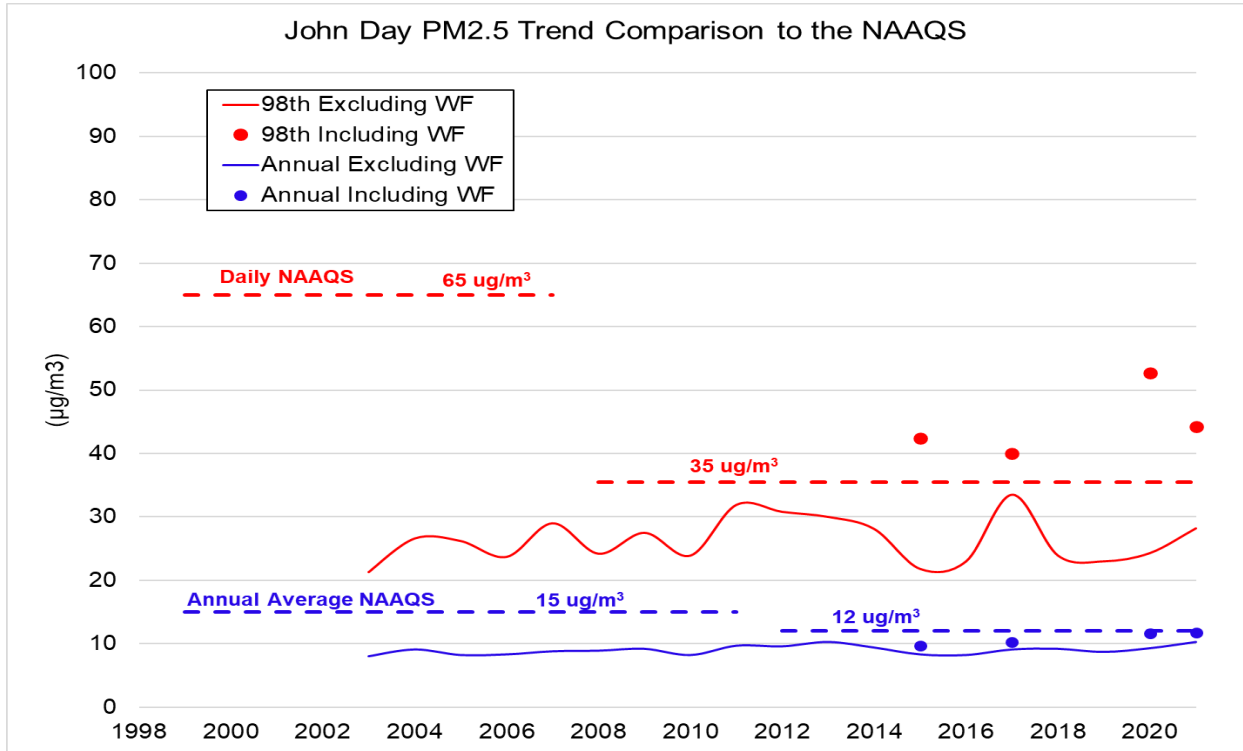


Figure 68. John Day PM2.5 trends.

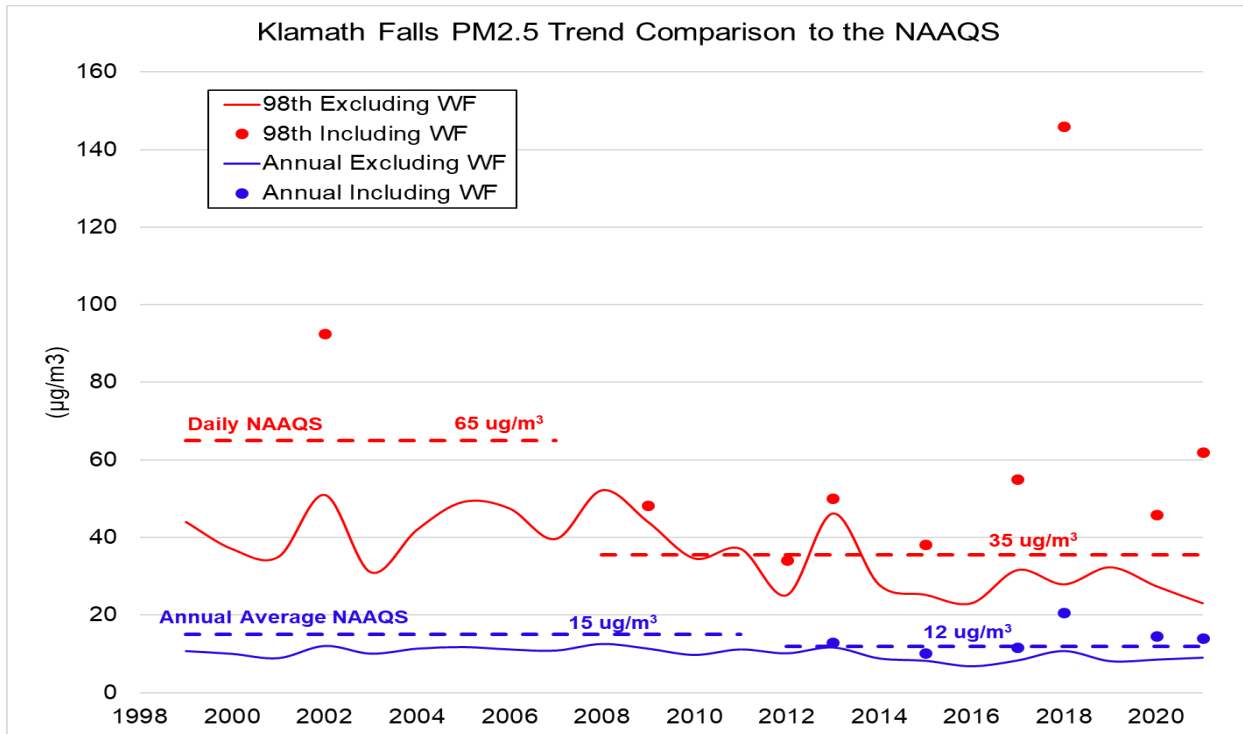


Figure 69. Klamath Falls PM2.5 trends.

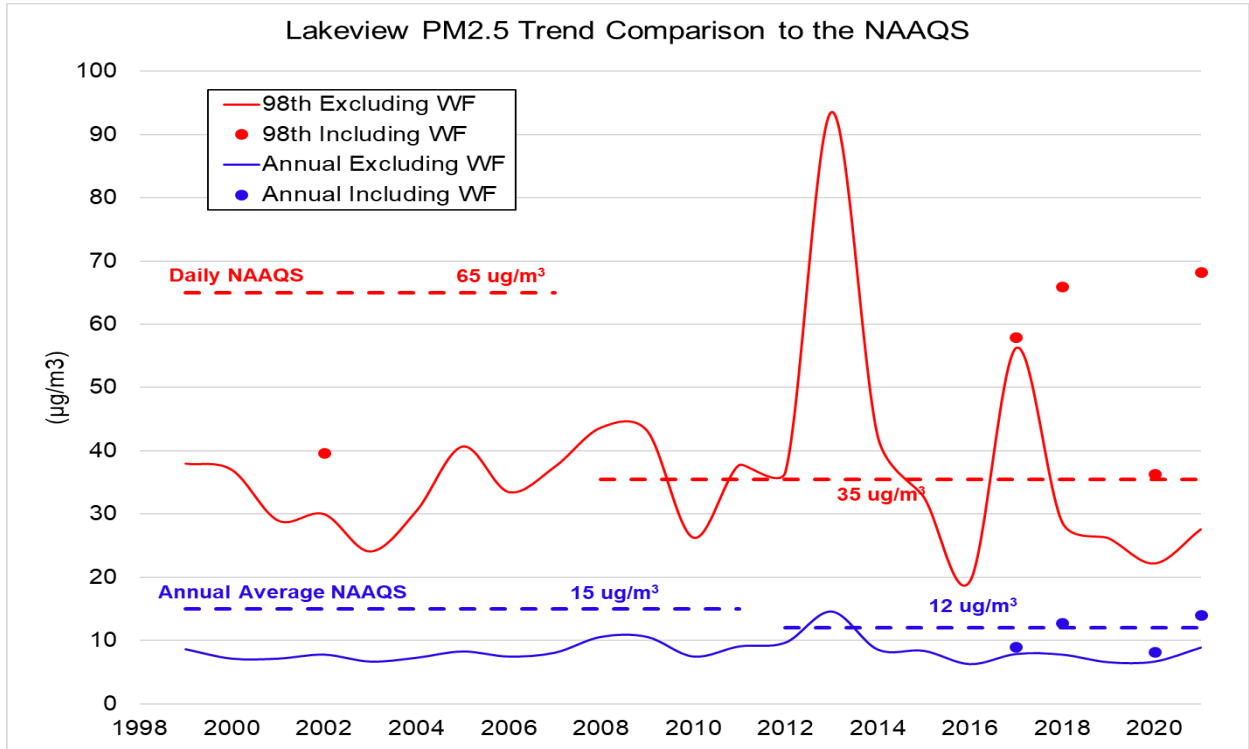


Figure 70. Lakeview PM2.5 trends.

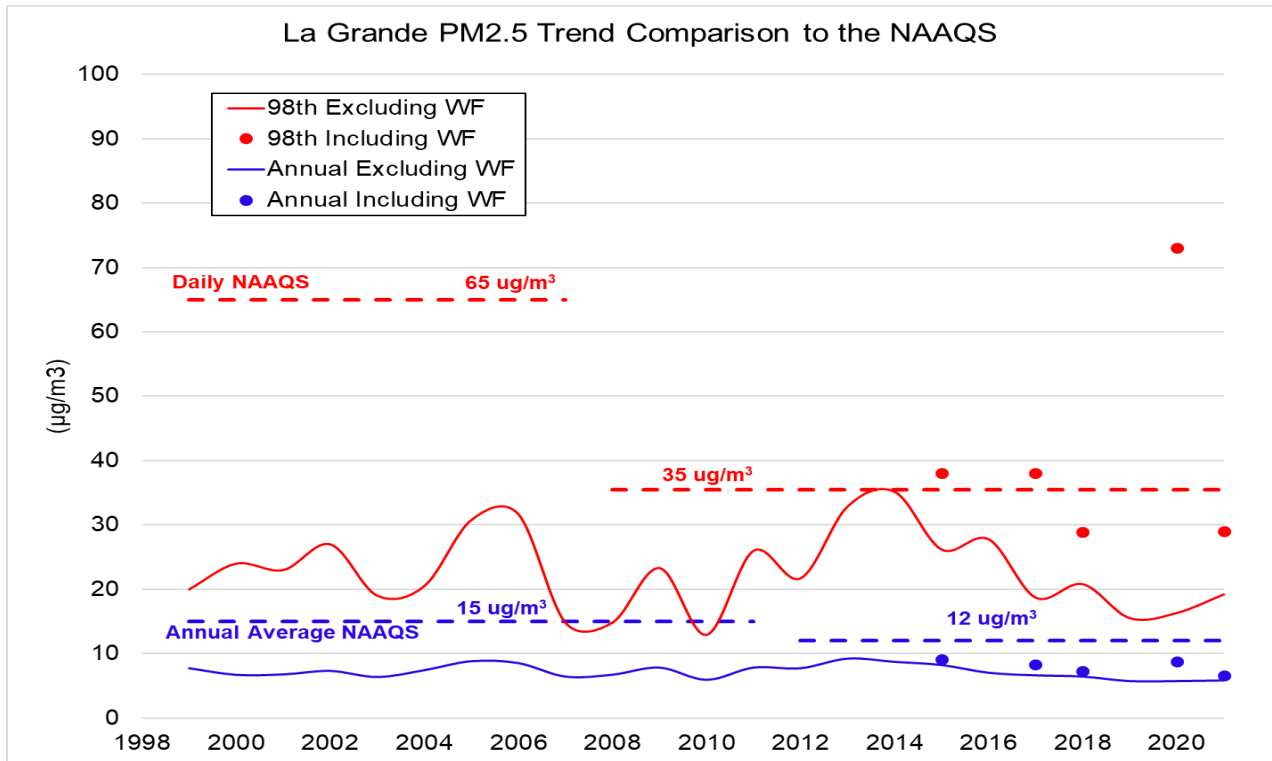


Figure 71. La Grande PM2.5 trends.

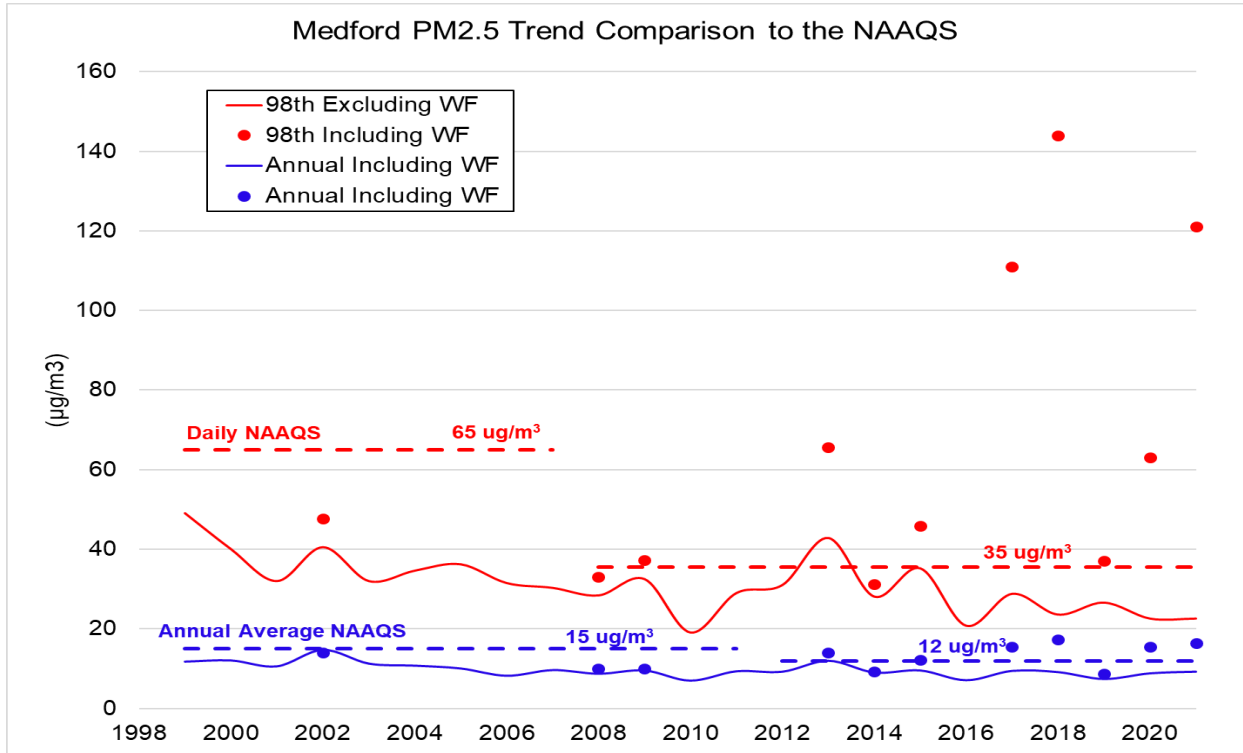


Figure 72. Medford PM2.5 trends.

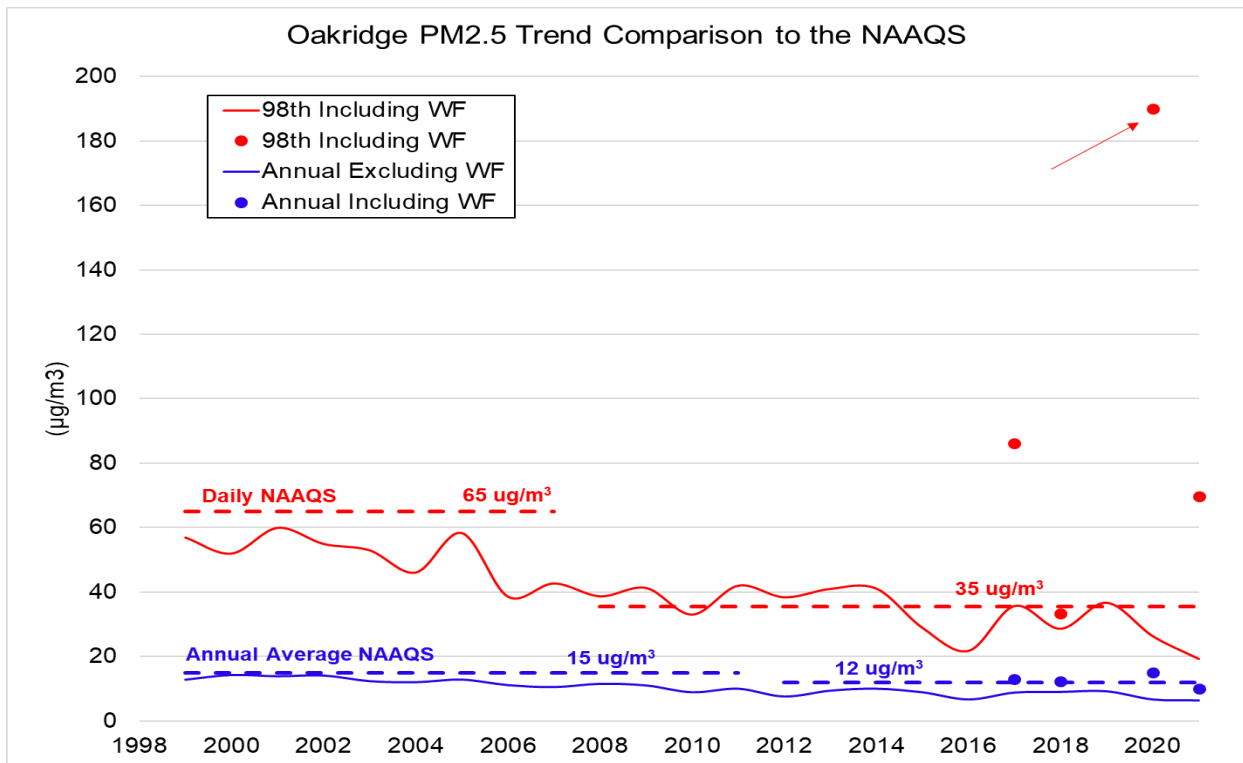


Figure 73. Oakridge PM2.5 trends.

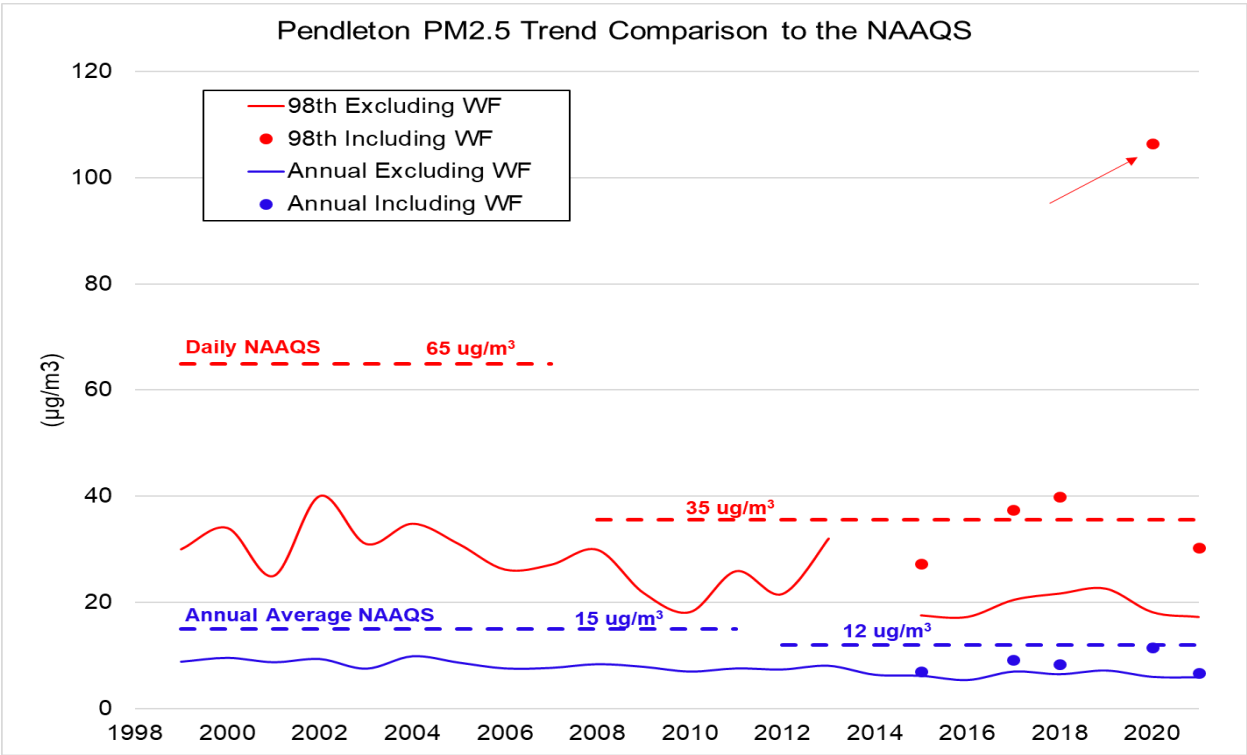


Figure 74. Pendleton PM2.5 trends.

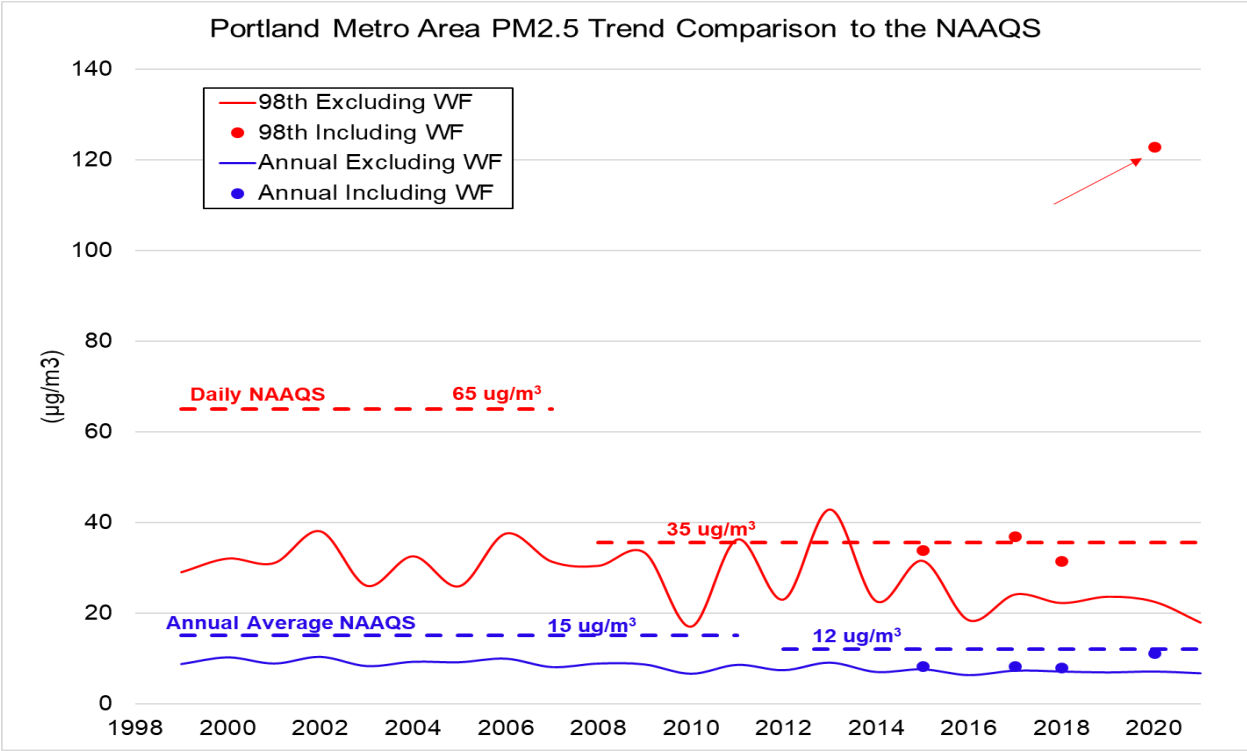


Figure 75. Portland Metro PM2.5 trends.

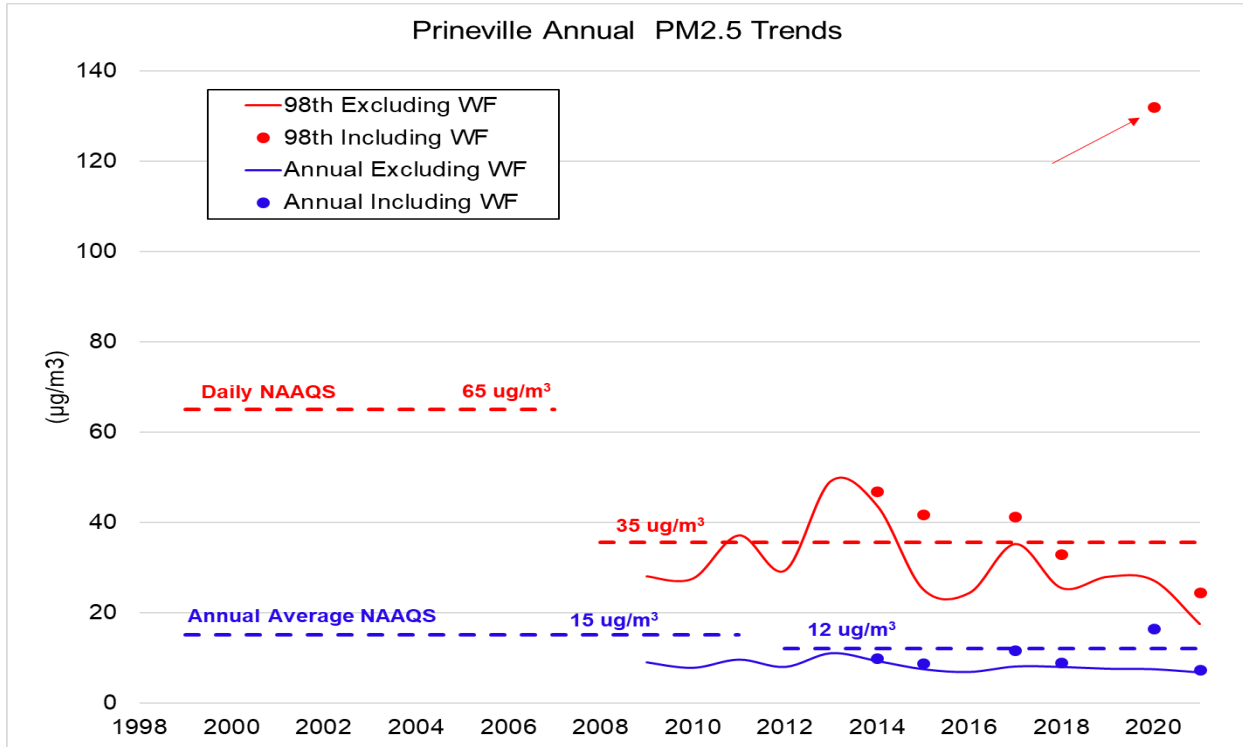


Figure 76. Prineville PM2.5 trends.

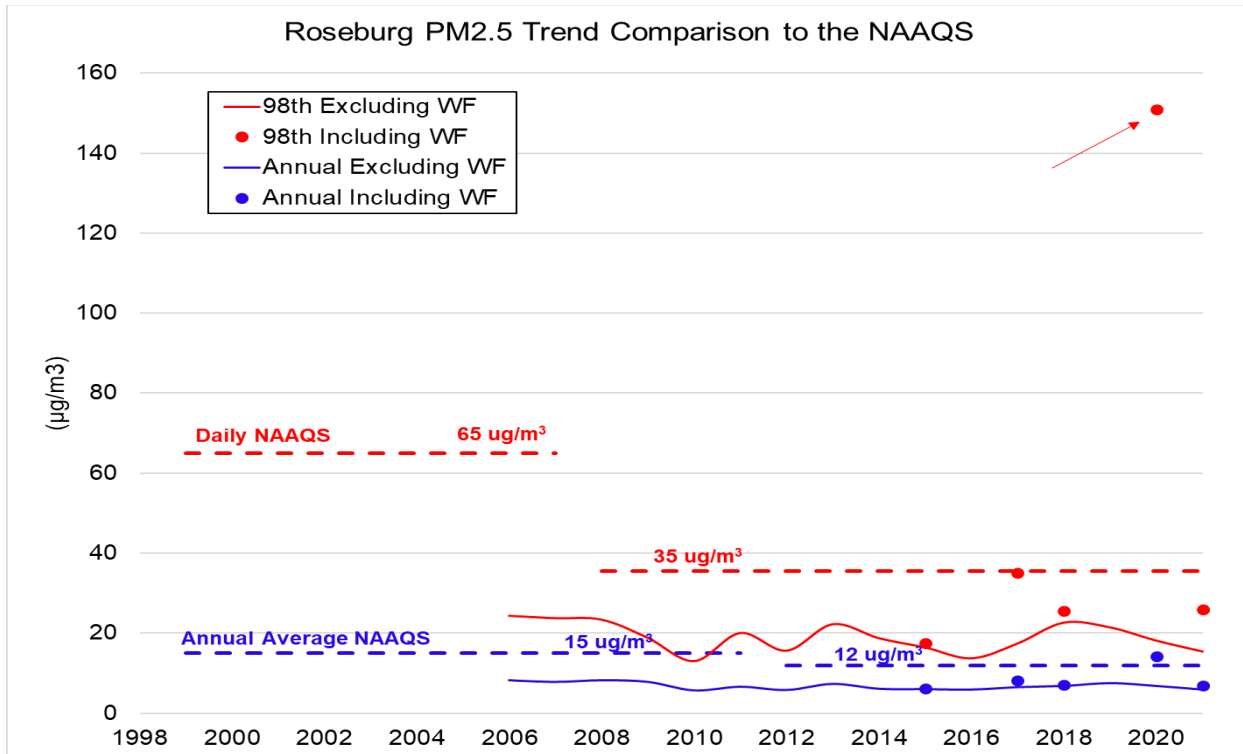


Figure 77. Roseburg PM2.5 trends.

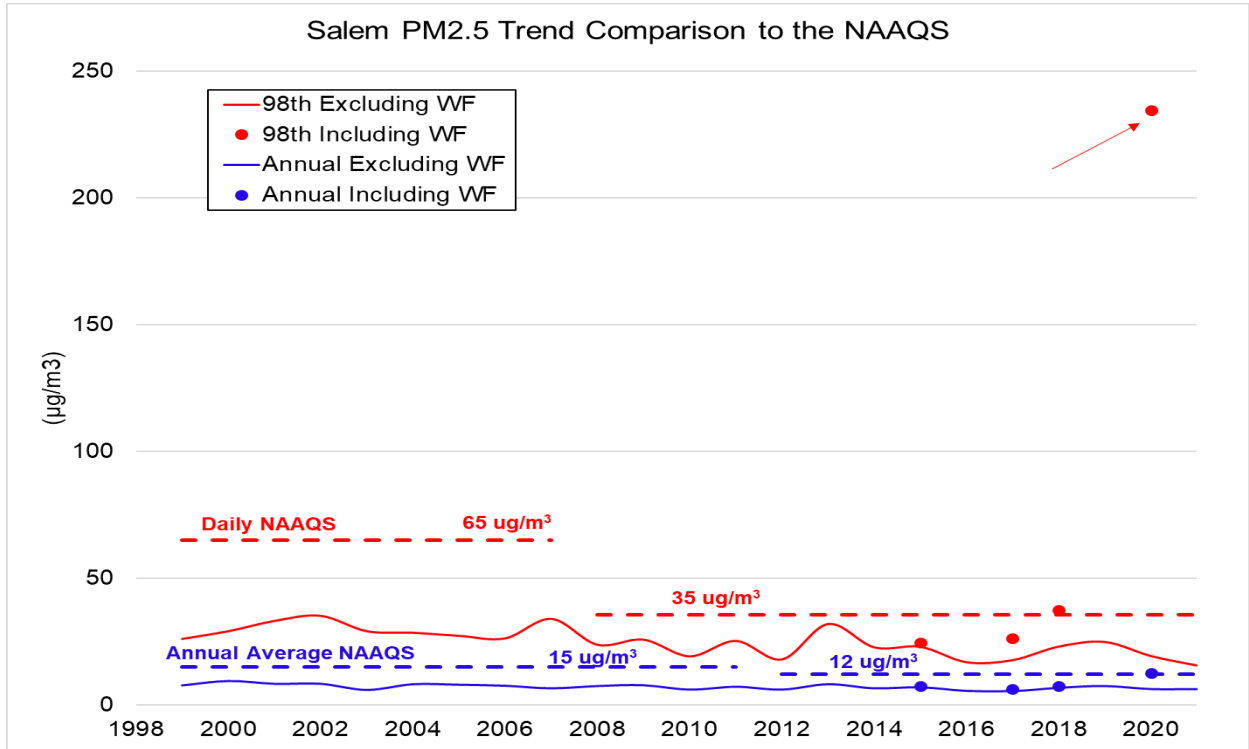


Figure 78. Salem PM2.5 trends.

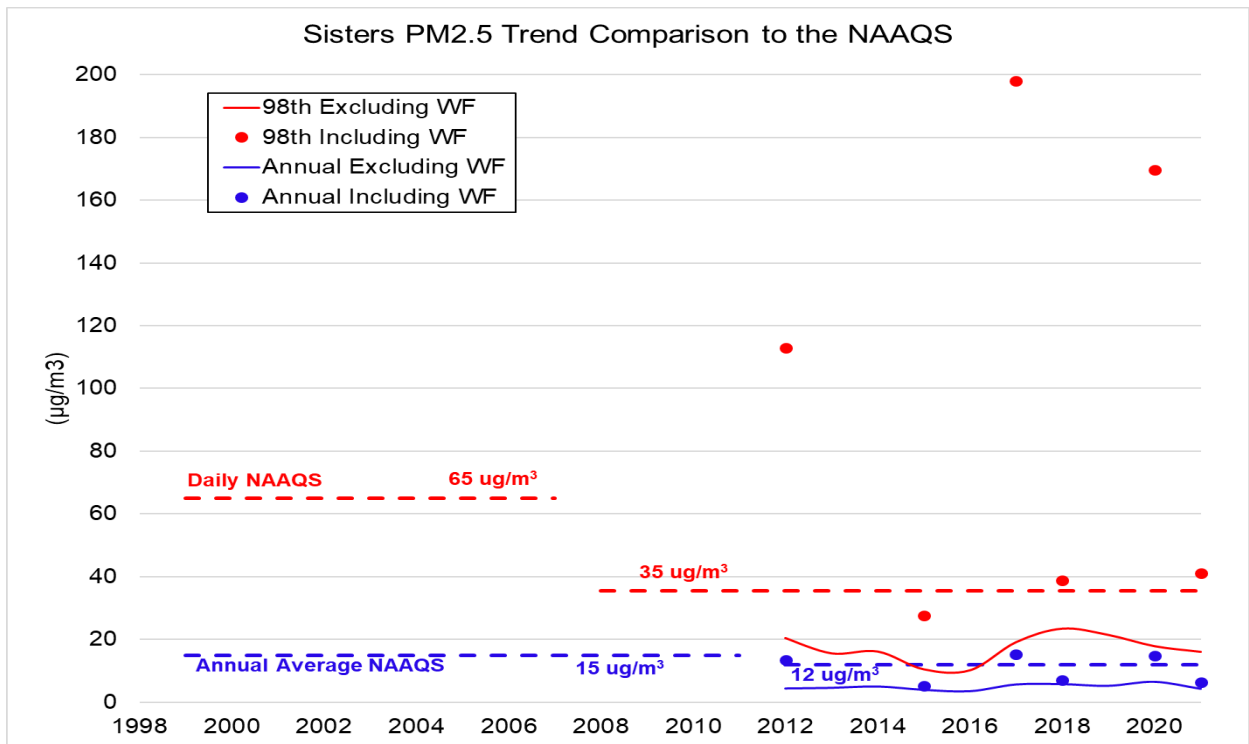


Figure 79. Sisters PM2.5 trends.

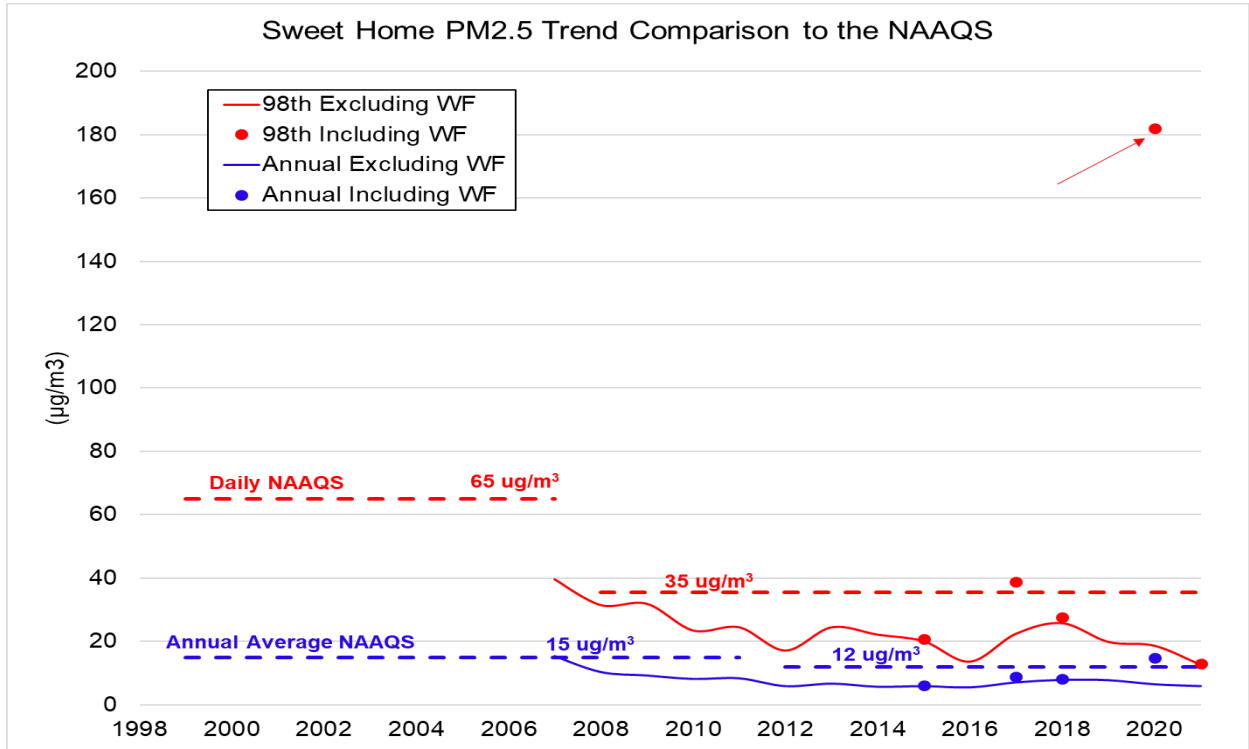


Figure 80. Sweet Home PM2.5 trends.

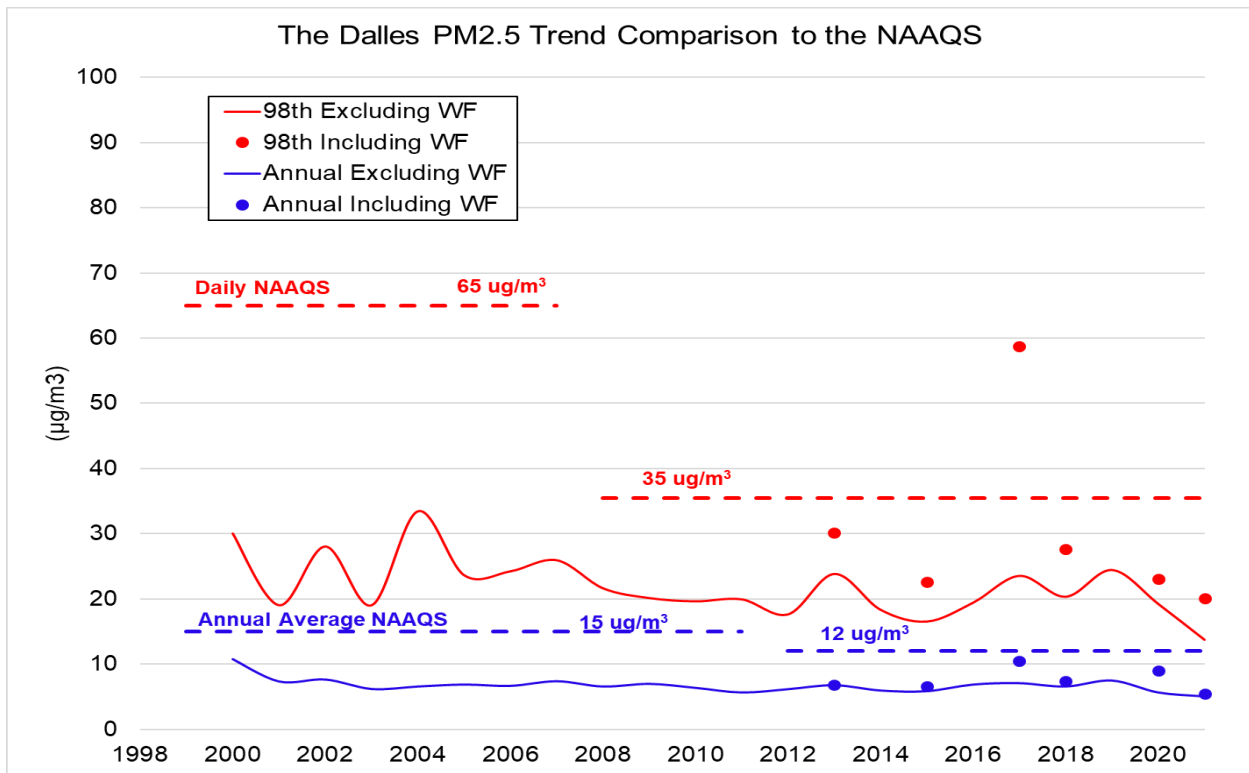


Figure 81. The Dalles PM2.5 trends.

PM2.5 Comparison to the NAAQS

The figures below show the three year average 98th Percentile PM2.5 (daily standard) and annual average PM2.5 (annual standard) levels with and without wildfire smoke impacts. It is useful to understand how much wildfire smoke contributed to raise PM2.5 concentrations above the National Ambient Air Quality Standard and what the levels would be with wildfire emissions excluded. Removing wildfire contributions show the effectiveness of local air quality improvement efforts in communities with PM2.5 reduction plans. Wildfire data would be excluded in determining airshed attainment status because it is considered an exceptional event that cannot be controlled locally.

EPA only allows data to be official excluded by using the exceptional events exception when doing so would have regulatory significance. Regulatory significance refers to a change in an airshed's attainment, non-attainment, or maintenance area status. For instance, Oakridge was a non-attainment area for PM2.5 but recently was changed to a maintenance area because its levels dropped below the National Ambient Air Quality Standards (NAAQS). To accomplish this transition, Oakridge had to have several days excluded as exceptional events due to wildfire smoke. In contrast, Medford which was also impacted by wildfire smoke, but since it is already in attainment, did not need to change status and there was no regulatory significance. The EPA would not grant official exceptional event status to Medford's wildfire smoke data.

DEQ calculates all areas with and without wildfires for informational purposes.

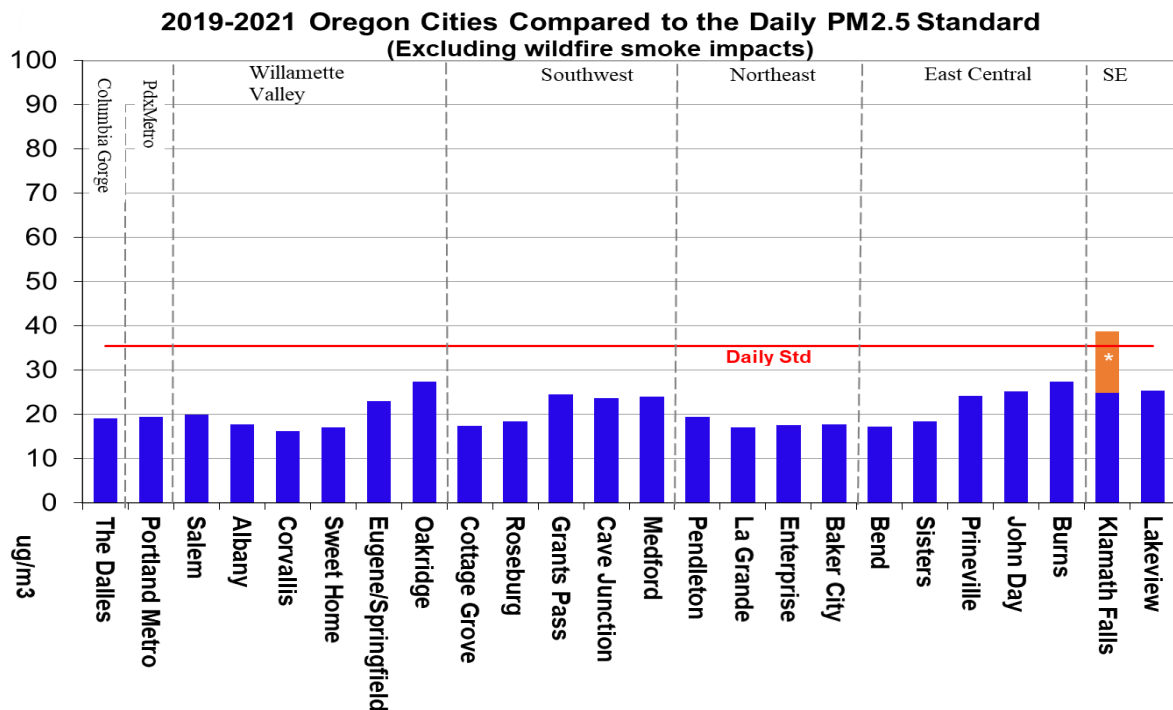
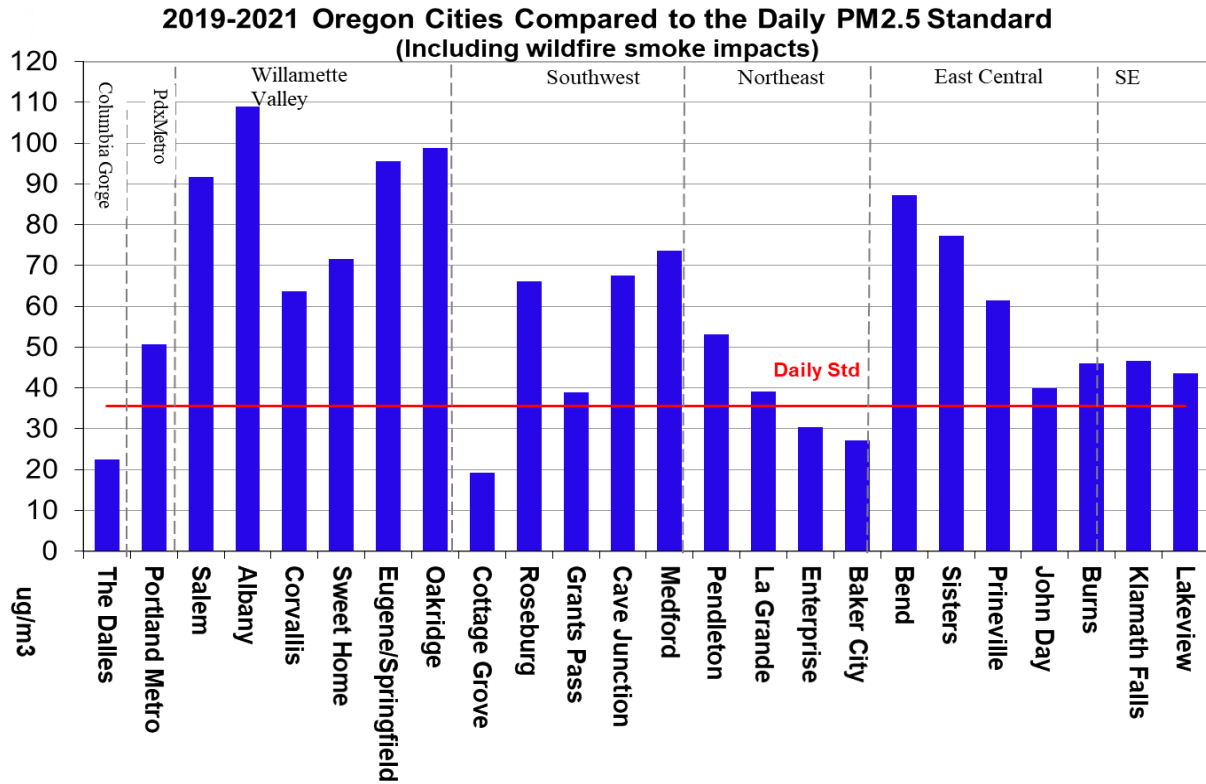


Figure 82. Oregon cities 2018-2020 daily PM2.5 comparison.

The chart shows the three year average 98th percentile. Wildfire data excluded and included.

*Exceptional Event value shown for Klamath Falls

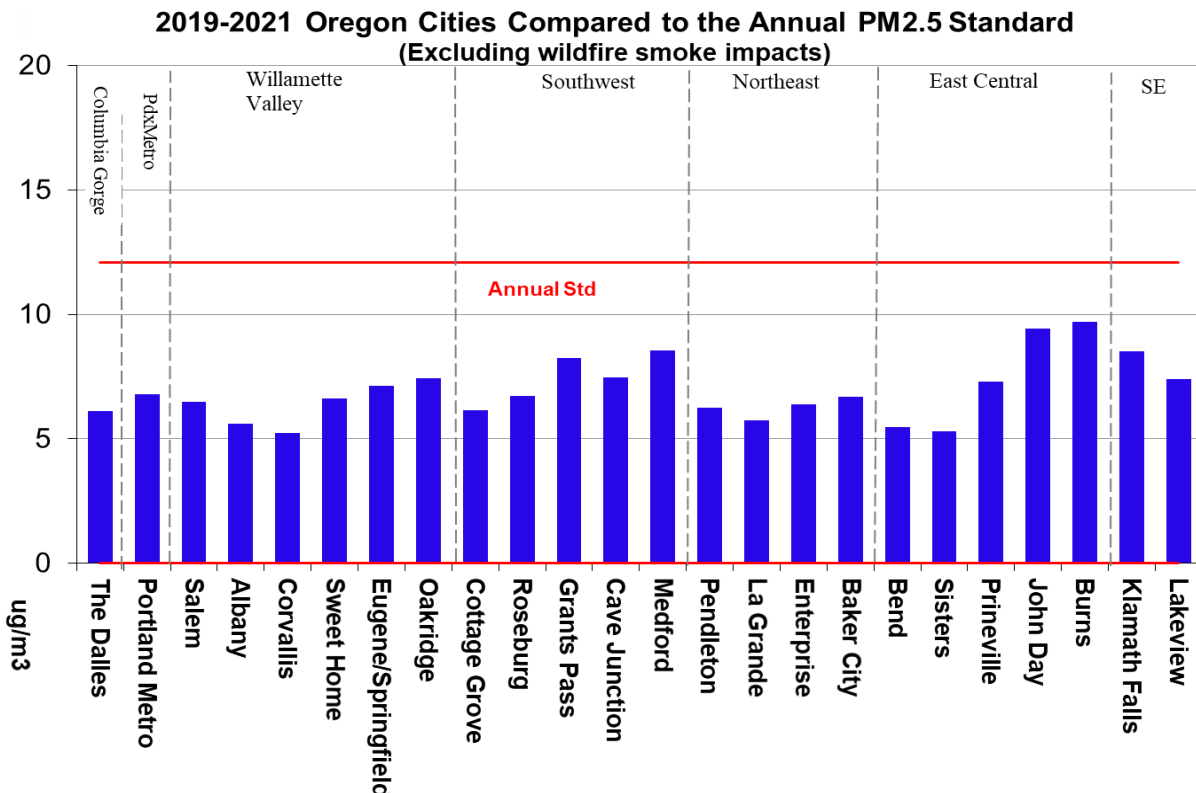
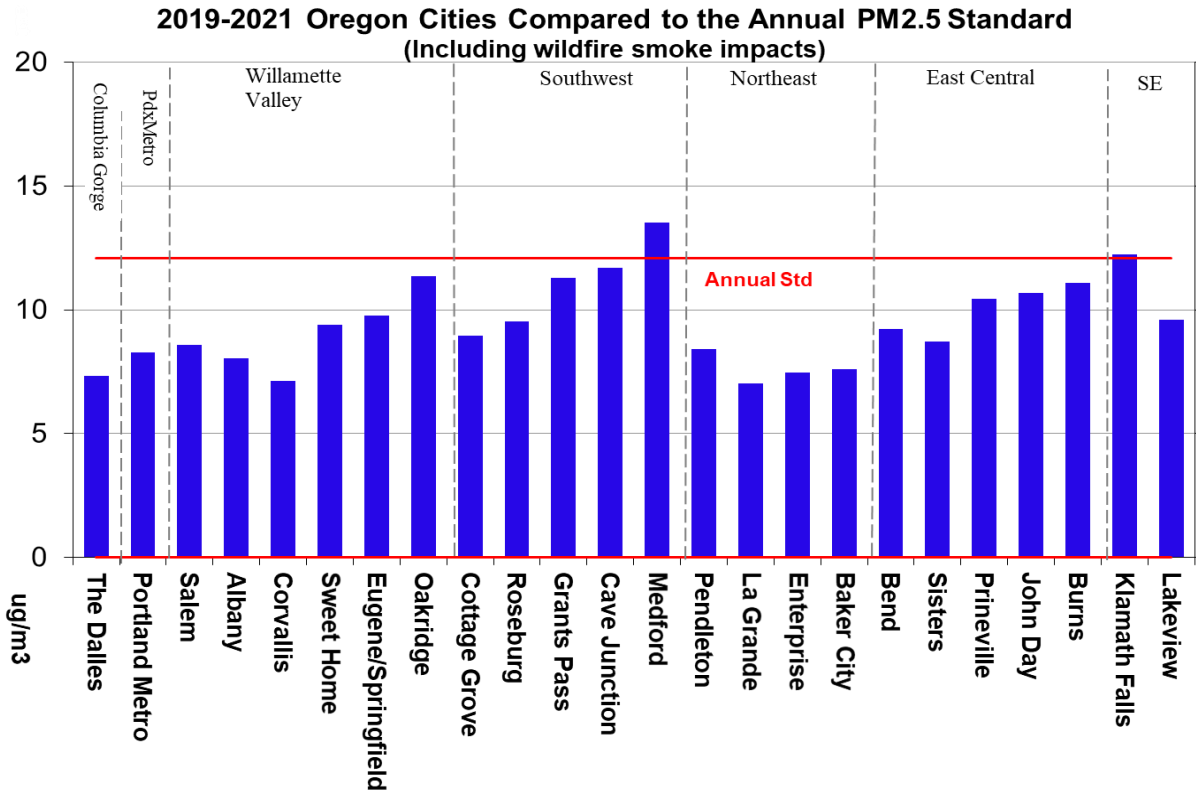


Figure 83. Oregon cities 2018-2020 annual average PM2.5 comparison.
The chart shows the three year average of the annual average with wildfire data included.

Wildfire smoke impacts

The long term impacts of wildfire smoke on the PM_{2.5} can be seen by calculating the PM_{2.5} AQI average number of days above the Unhealthy for Sensitive Groups health levels. The maps show the 11 year averages for 2002 through 2011 and the 10 year average for 2012 through 2021. The maps show the drastic increase in wildfire smoke impacts in the 2012 through 2021 span, especially in Southern Oregon. More detailed information about wildfire smoke AQI trends can be found in DEQ's annual Wildfire Smoke Trends report located at the bottom of the DEQ [Wildfire Response](#) web page or in the Library tab of [DEQ's AQI](#) web page.

Average Number of Days with USG or Above During Wildfire Season: 2002-2011

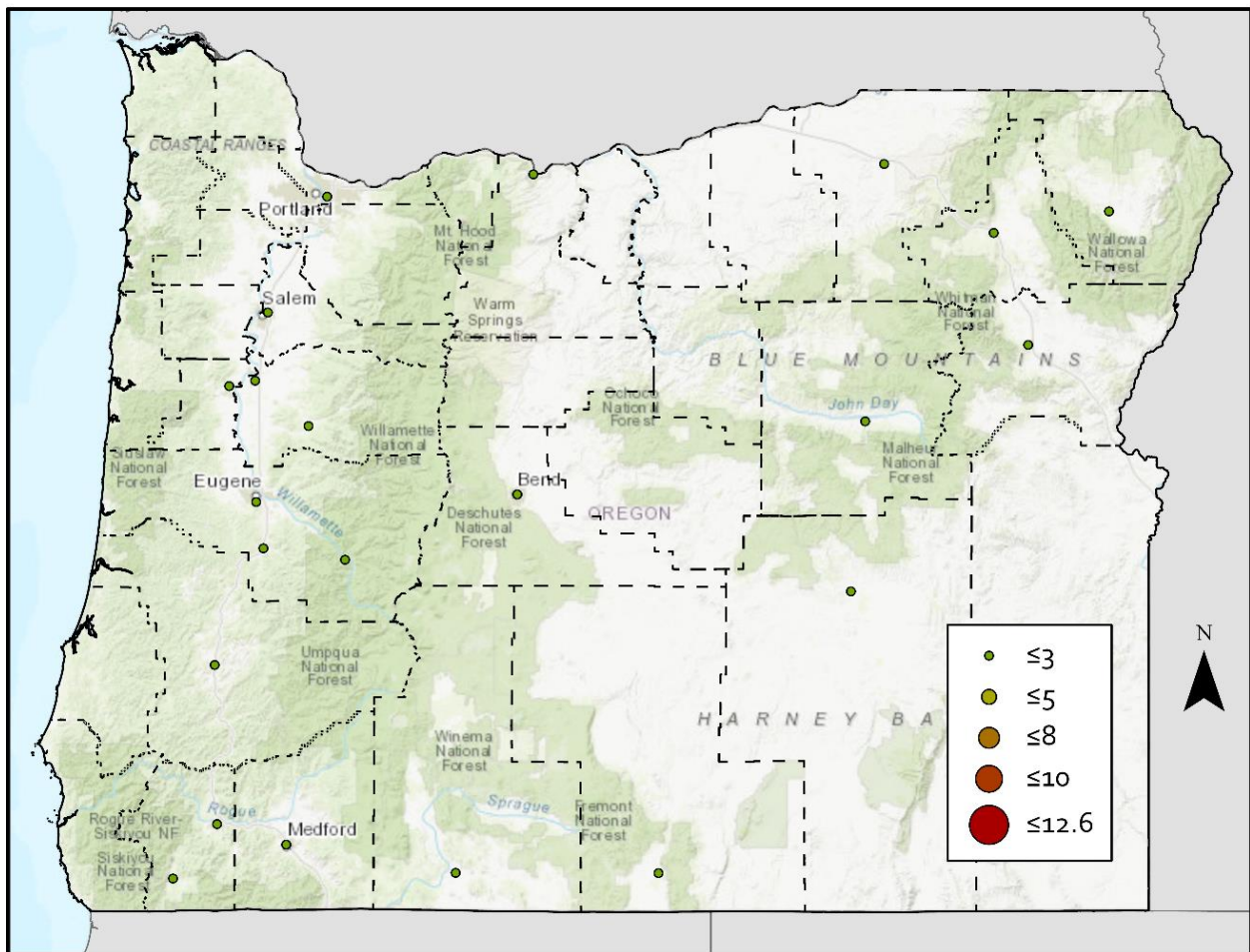


Figure 84. Average number of days >USG from wildfires smoke – 2002 through 2012.

Average Number of Days with USG or Above During Wildfire Season: 2012-2021

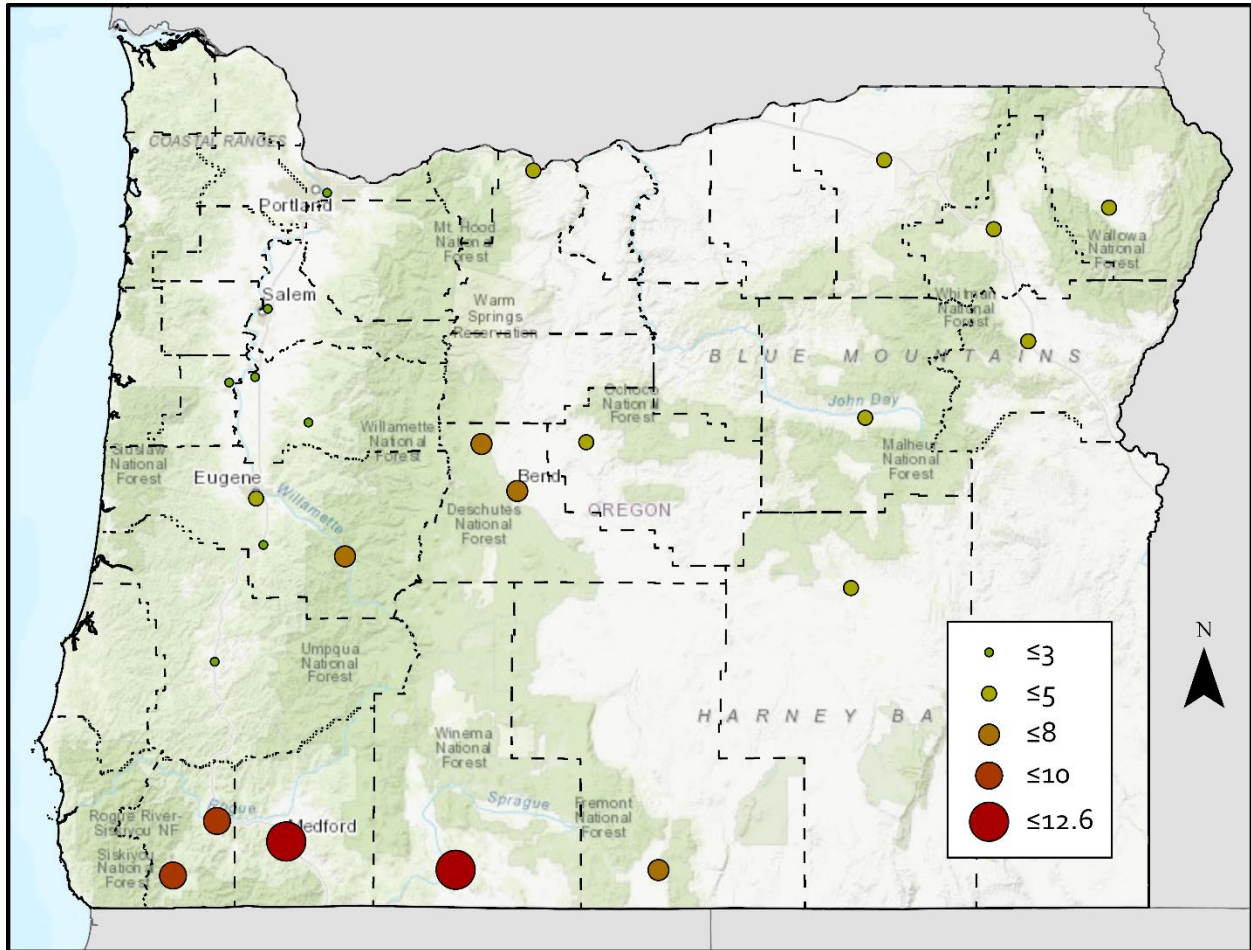


Figure 85. Average number of days >USG from wildfires smoke – 2002 through 2012.

PM10 Trends

The PM10 trend chart shows the values in cities with the highest, average, and lowest concentrations. All cities are well below the National Ambient Air Quality Standard except during recently bad wildfire smoke years.

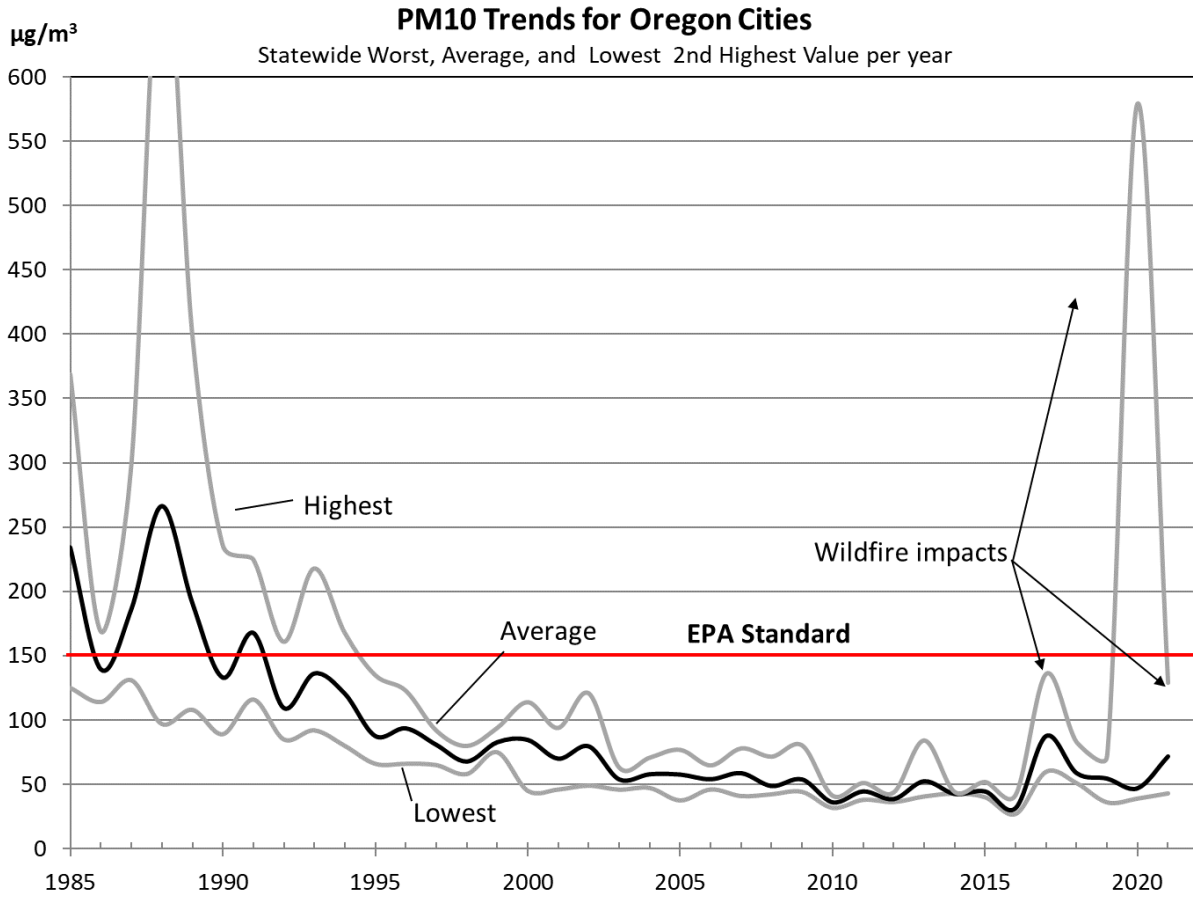


Figure 86. Oregon PM10 trends

Carbon Monoxide Trends

The figure below shows the CO trend in comparison to the National Ambient Air Quality Standard. The CO levels are well below the NAAQS except in 2020 during the September wildfire smoke event.

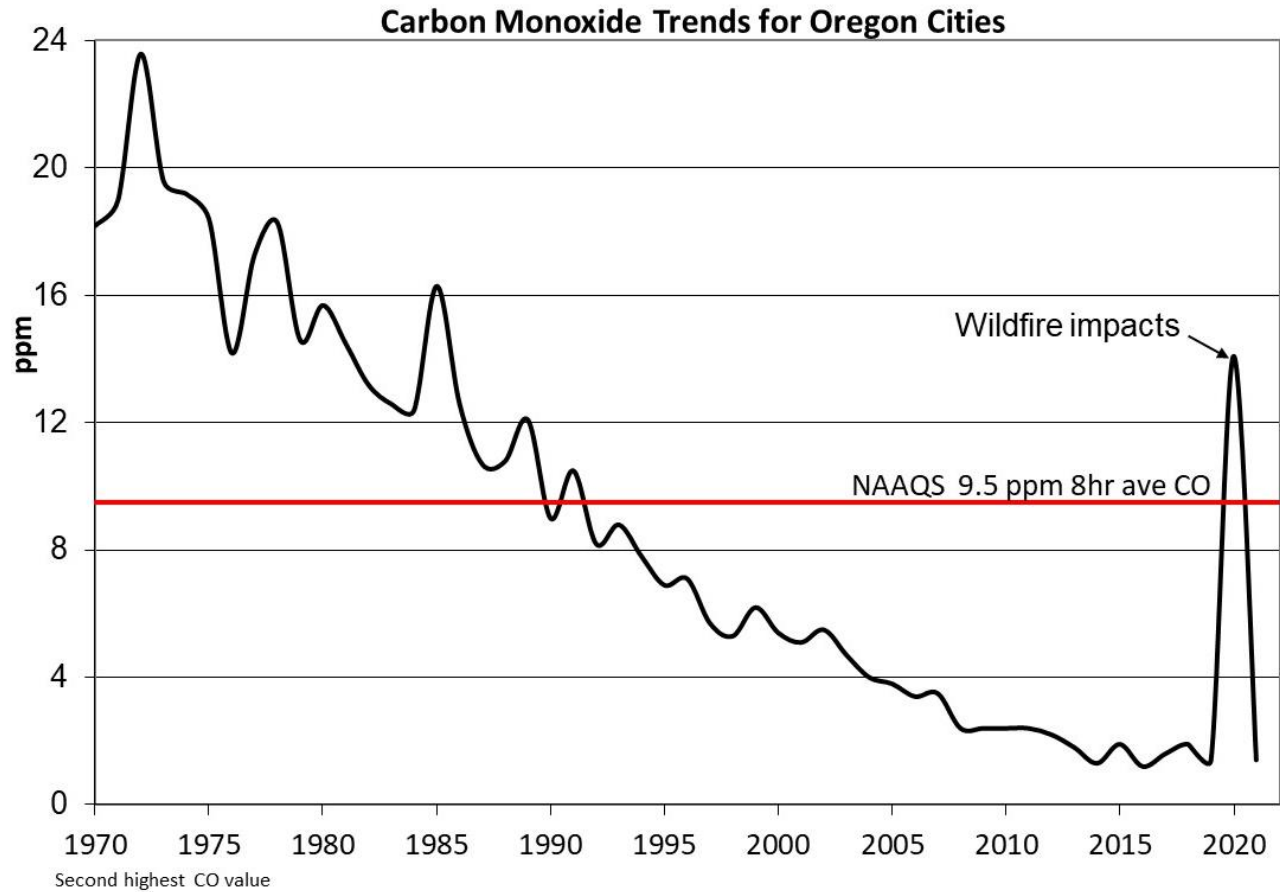


Figure 87. Oregon carbon monoxide Trend.
Trend chart uses the second highest annual, eight hour average.

Sulfur Dioxide Trends

The figure below shows the SO₂ trends in comparison to the federal standard. SO₂ is well below the NAAQS.

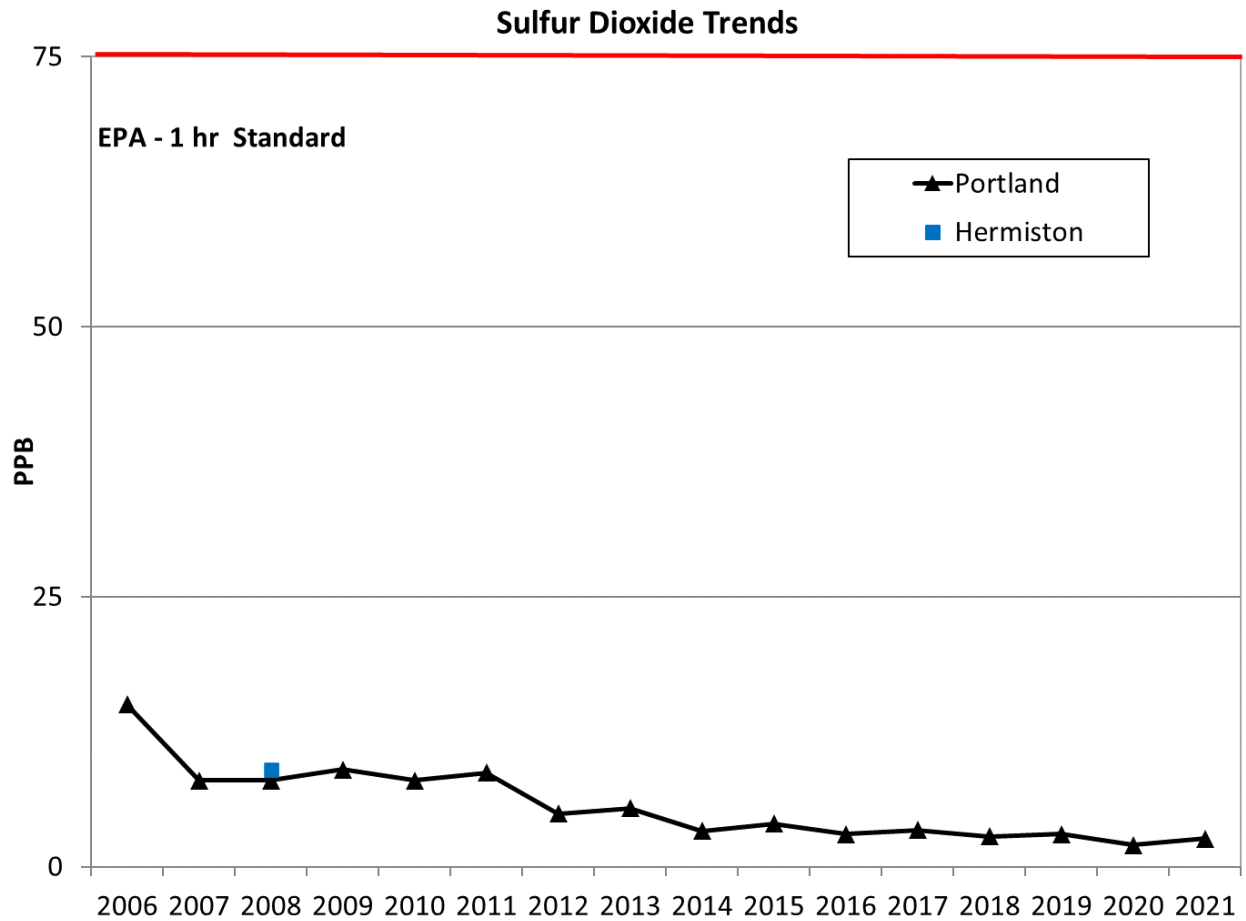


Figure 88. Oregon sulfur dioxide one hour average trends.

Nitrogen Dioxide Trends

The Figure below shows the NO₂ trends in comparison to the federal standard. NO₂ is well below the NAAQS.

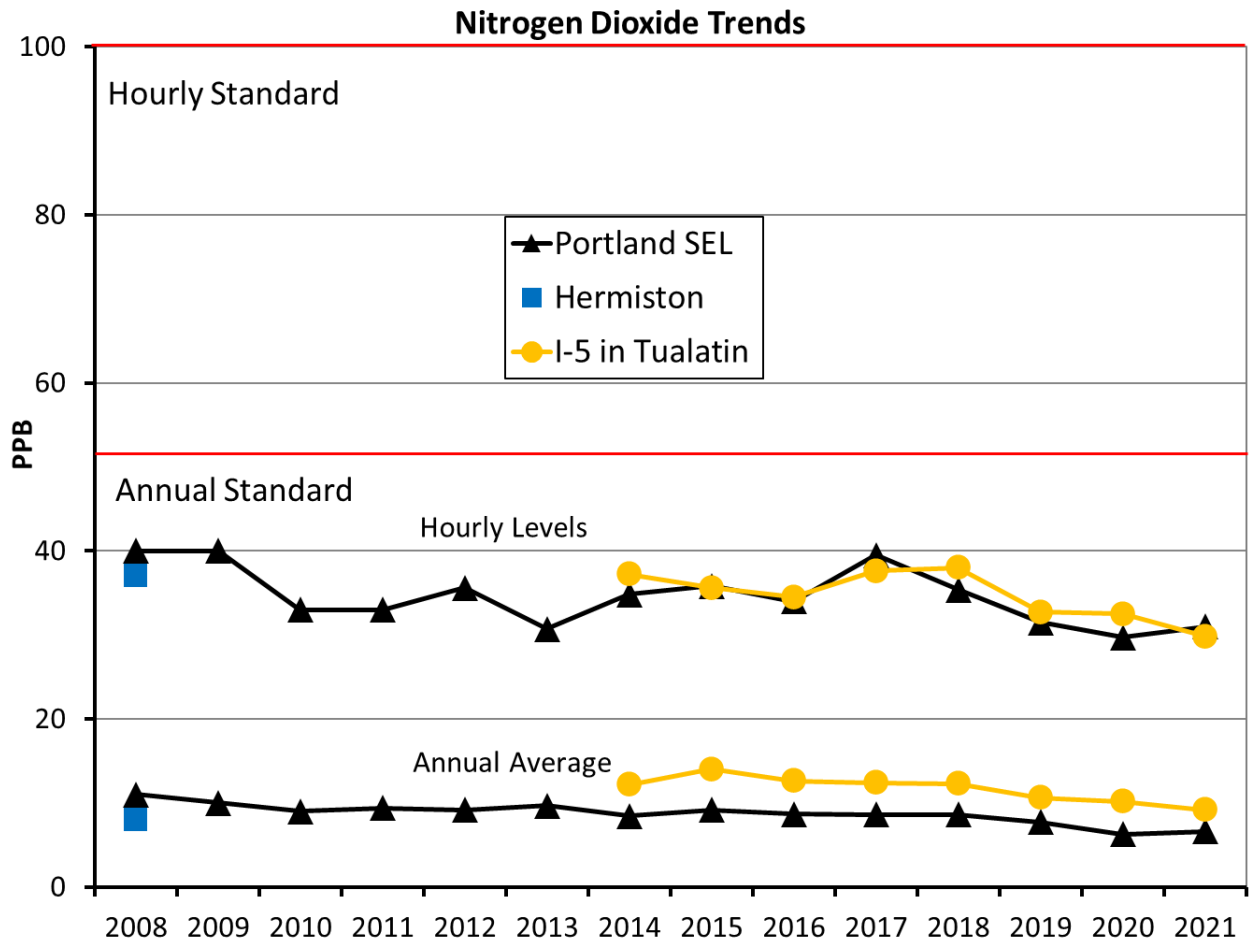


Figure 89. Oregon nitrogen dioxide one hour and annual average trends.

Air Toxics Trends

Oregon DEQ and LRAPA began sampling for air toxics in Oregon in 1999. The Figures below show the trends for some air toxics of concern. More air toxic information can be found at EPA's [Air Data](#) web site. The values are compared to the Oregon ambient concentration health benchmarks which are the levels where people exposed for a lifetime have an additional one in a million risk of cancer or of experiencing non-cancer health effects.

These graphs were made using the air toxics summary data from EPA's Air Data Web page which summarizes the air toxics data that the state and local agencies load into EPA's AQS database. Oregon DEQ loads all the sampled data below into EPA's database.

Note that years with <50% data completeness were not included. Years with data completion between 50% and 74% are denoted with an asterisk "*" in the graphs.

Note that **MDL** = Minimum Detection Limit. Values below the MDL are below the detection limit of the analysis method. EPA defines the MDL as "the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte".

Volatile organic compounds air toxics:

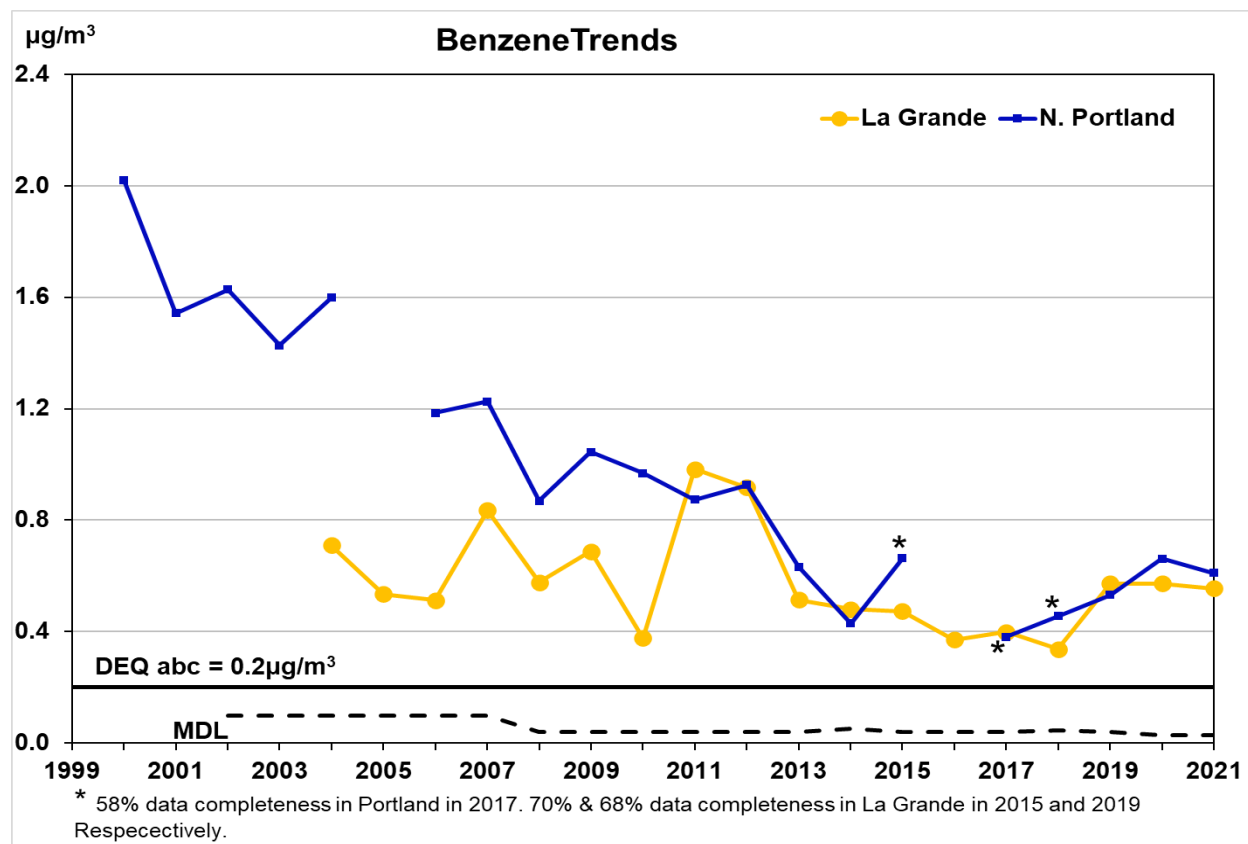


Figure 90. Benzene trends.

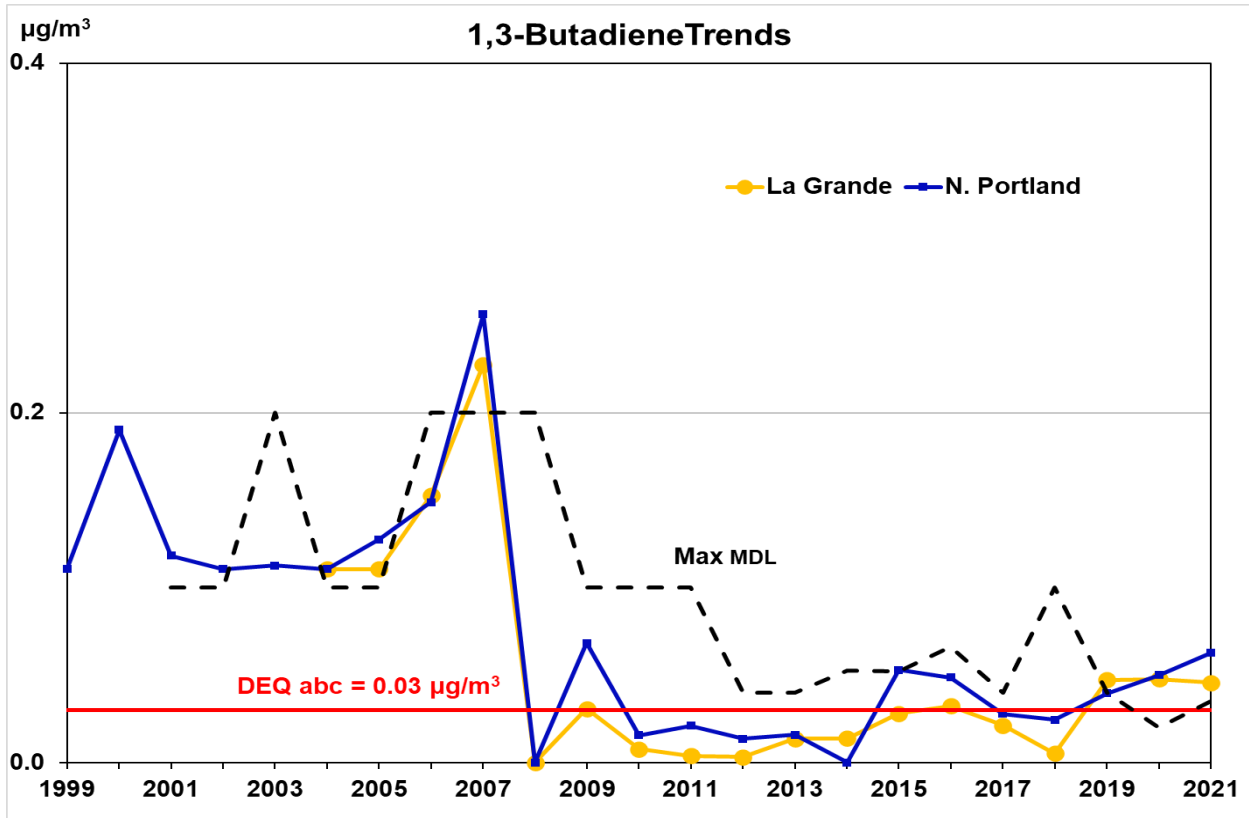


Figure 91. 1,3-Butadiene trends.

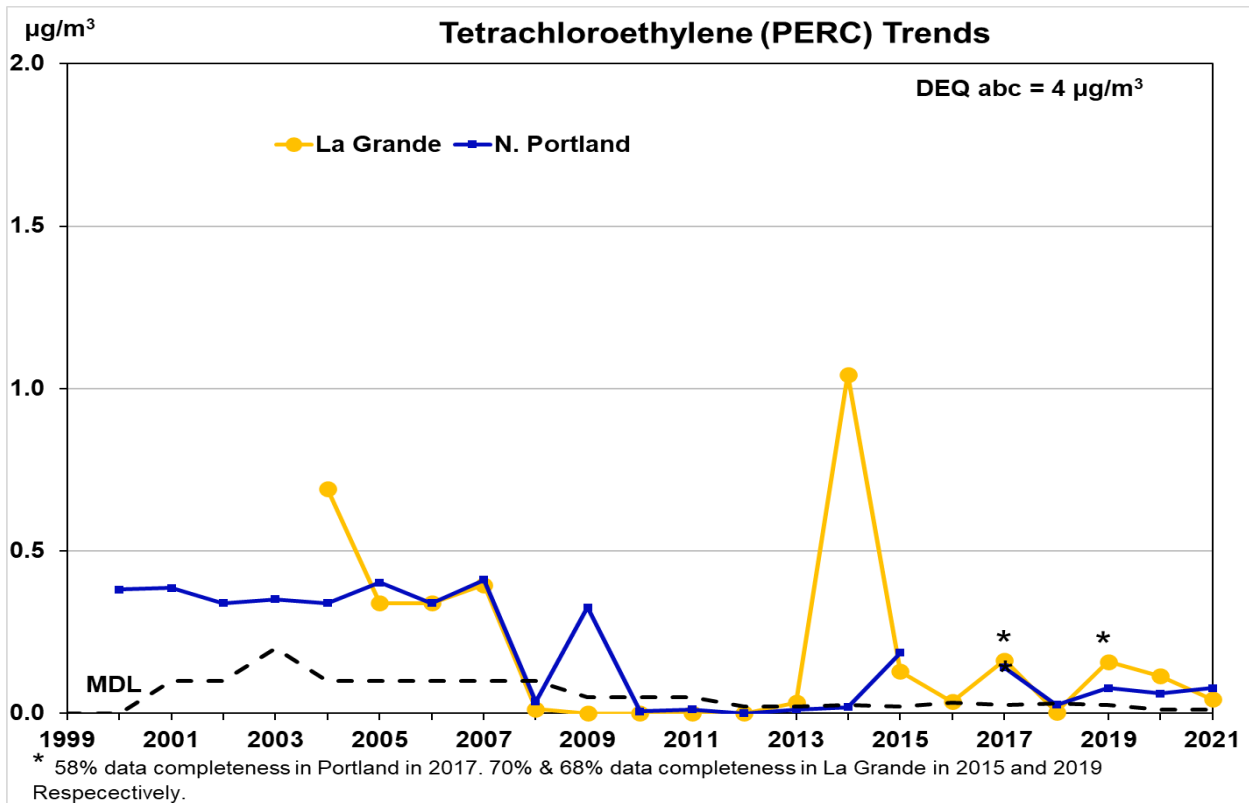


Figure 92. Tetrachloroethylene (PERC) trends.

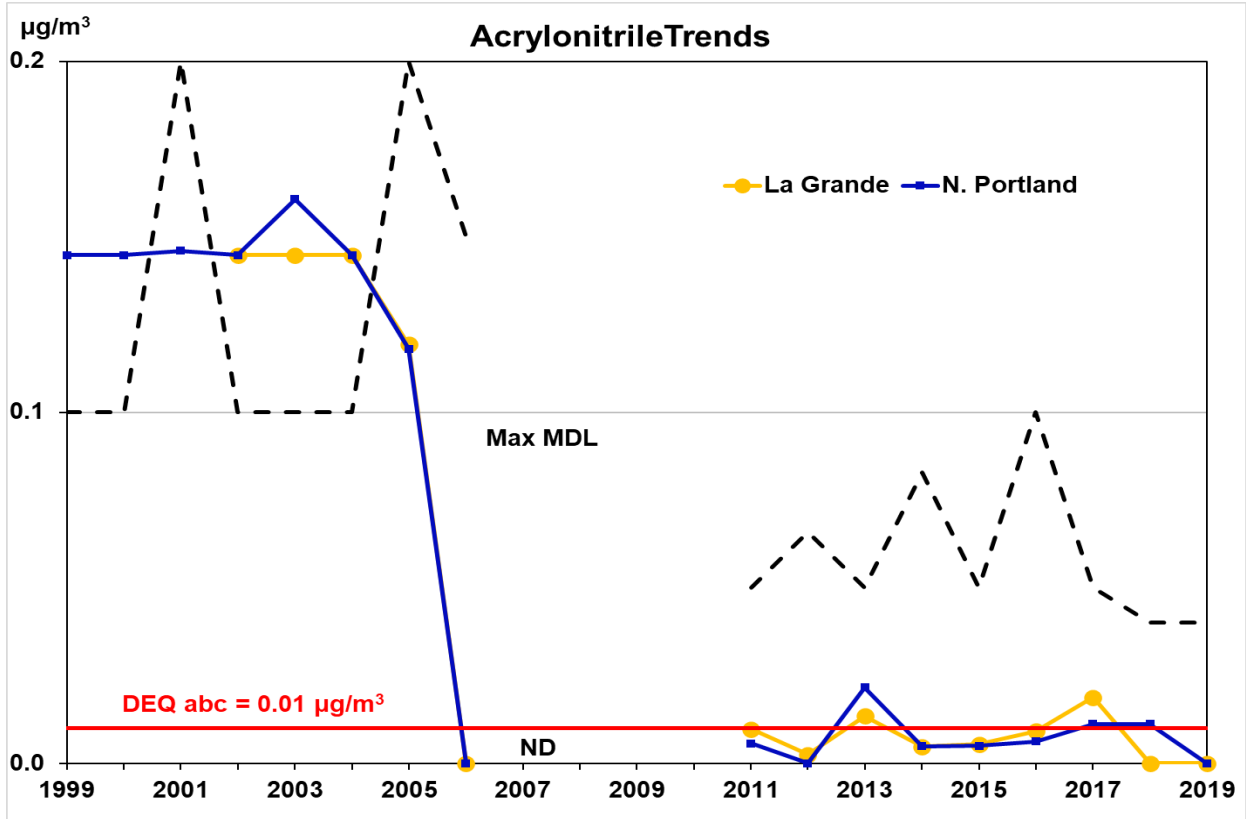


Figure 93. Acrylonitrile trends.

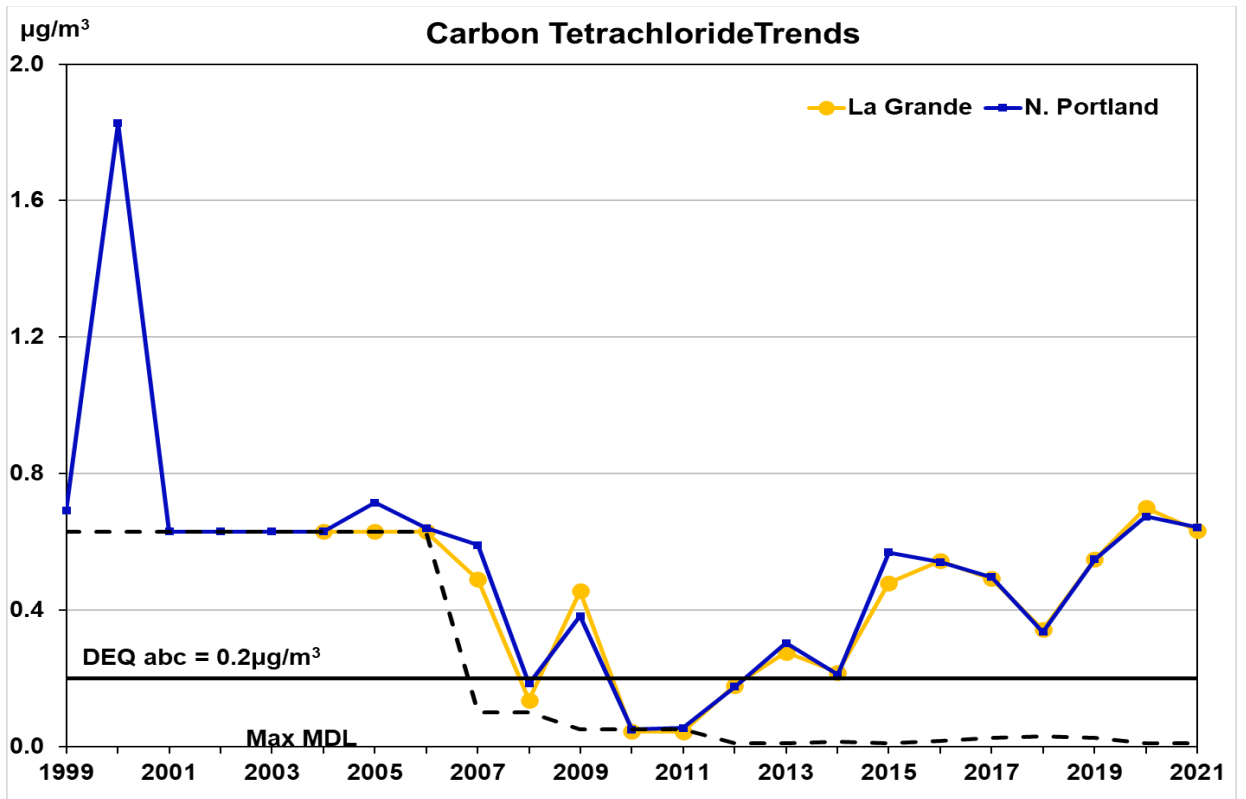


Figure 94. Carbon tetrachloride trends.

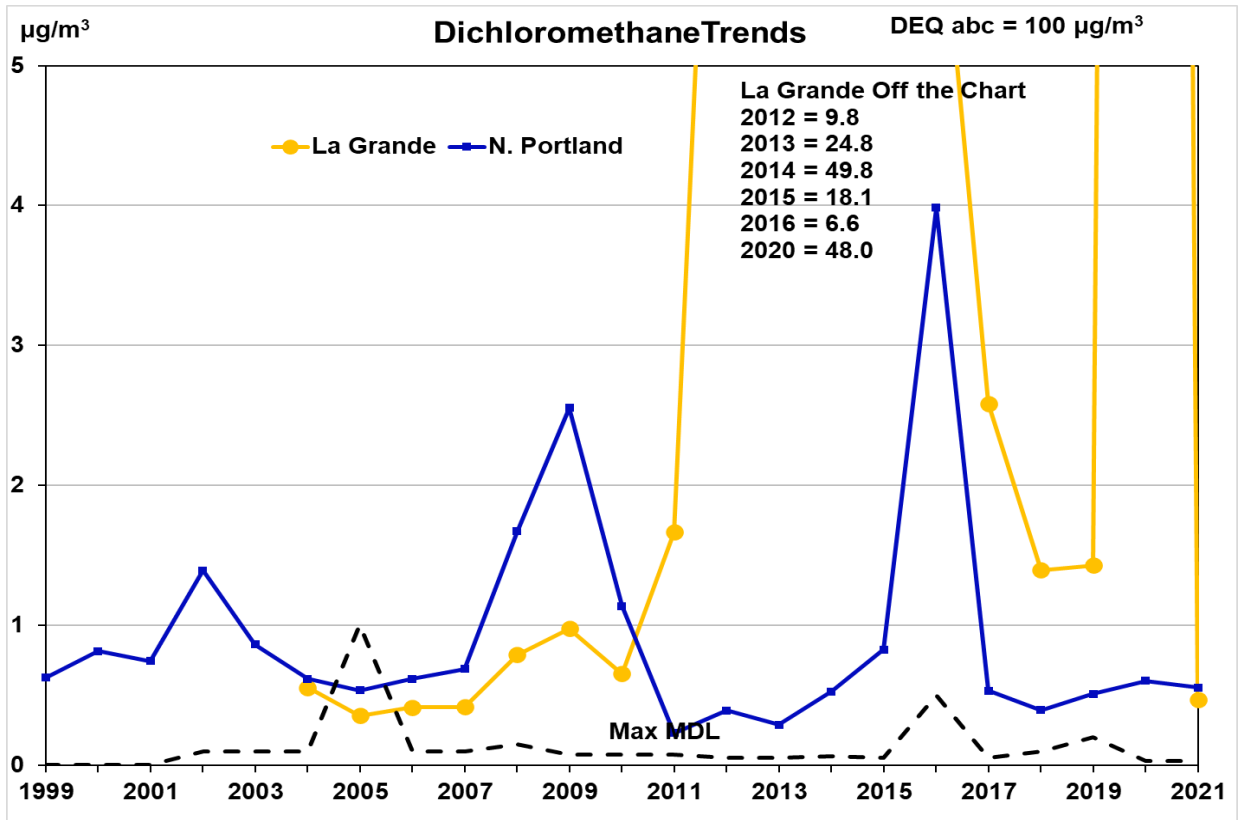


Figure 95. Dichloromethane (DCM) trends.

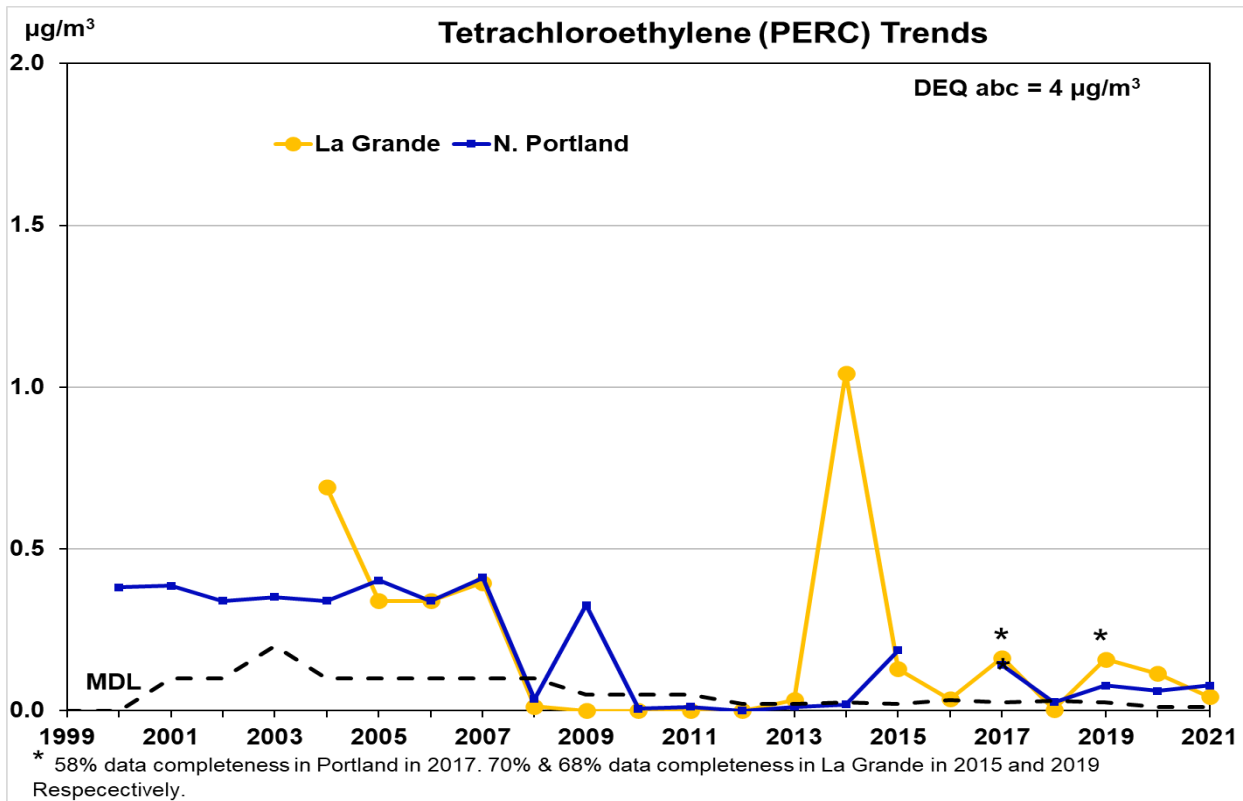


Figure 96. Tetrachloroethylene (PERC) trends.

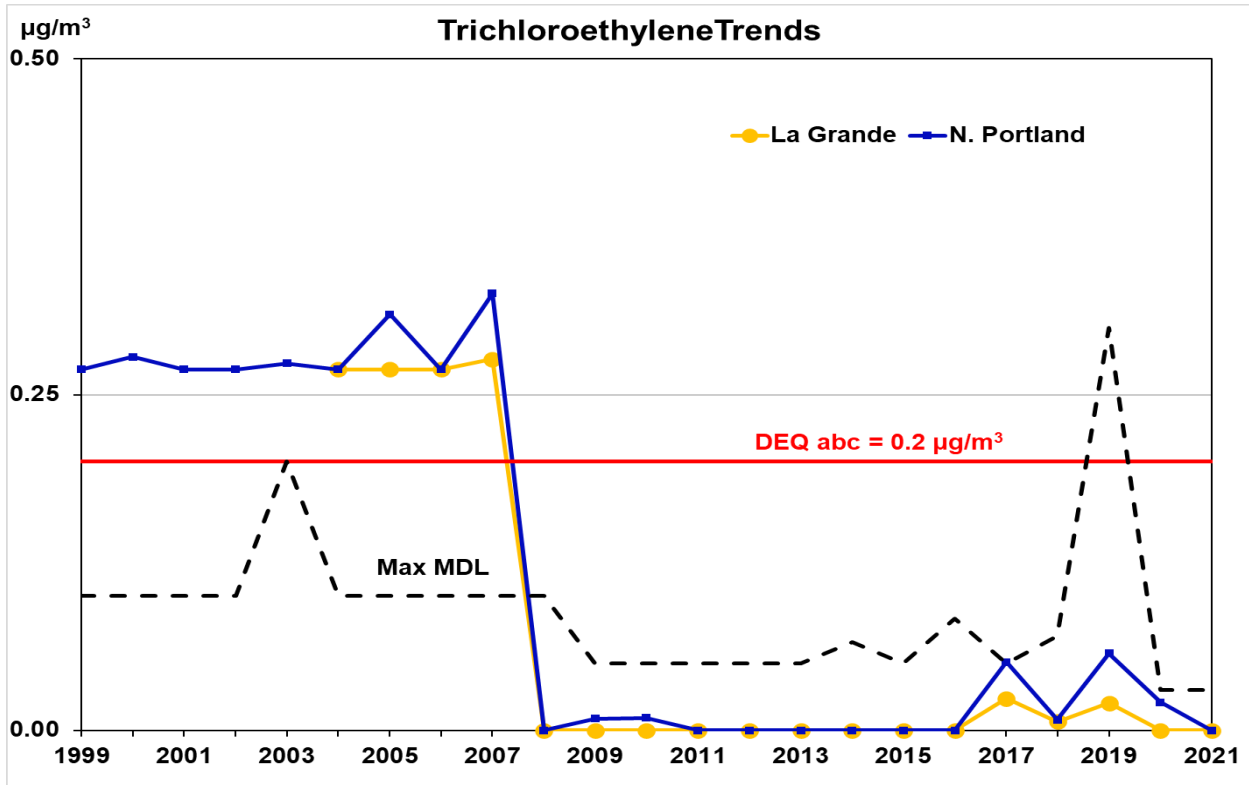


Figure 97. Trichloroethylene trends

Carbonyl air toxics:

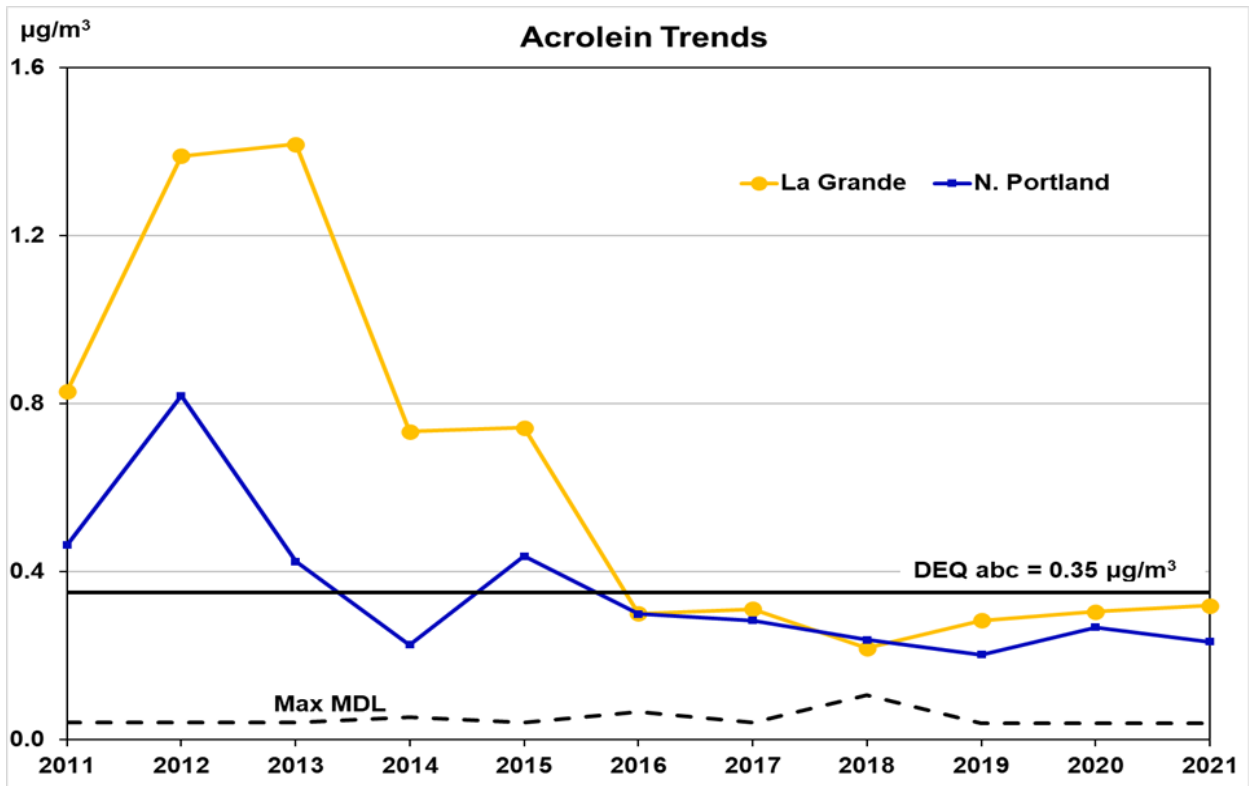


Figure 98. Acrolein trends.

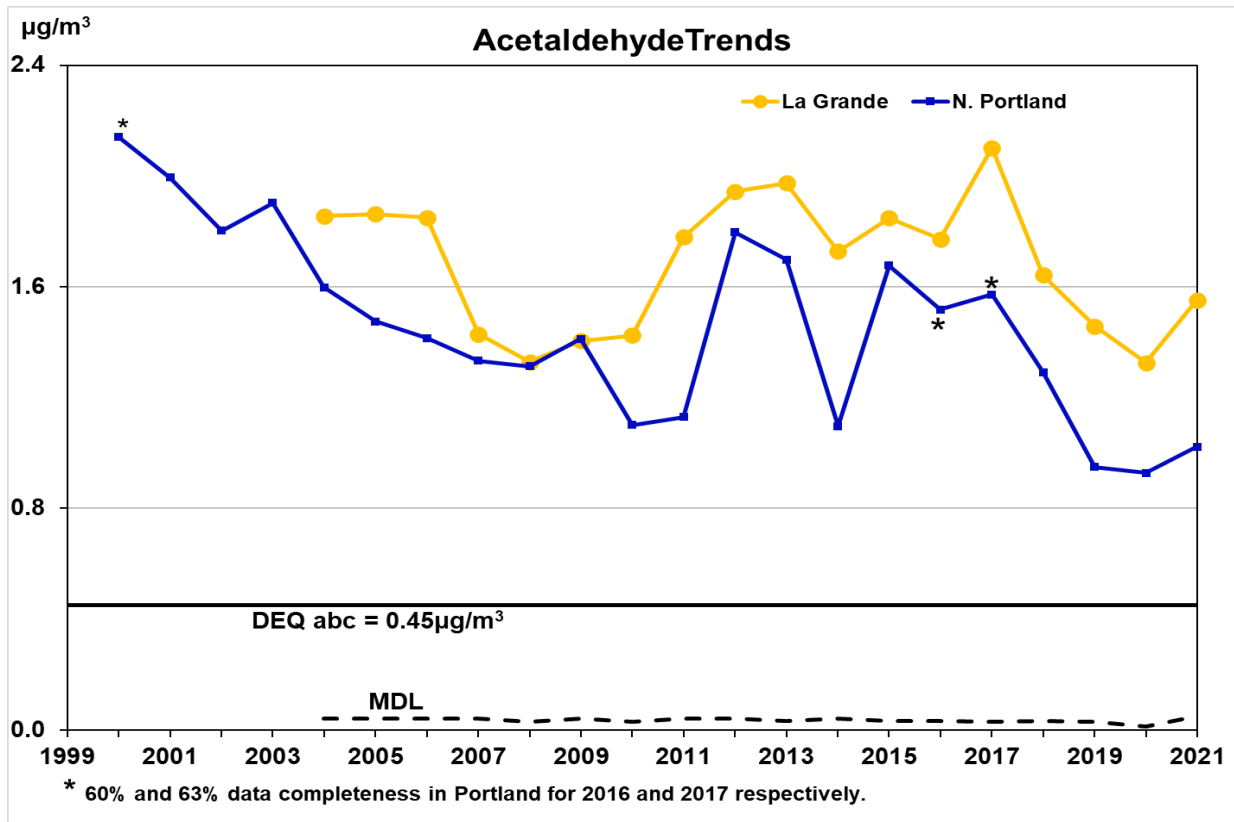


Figure 99. Acetaldehyde trends.

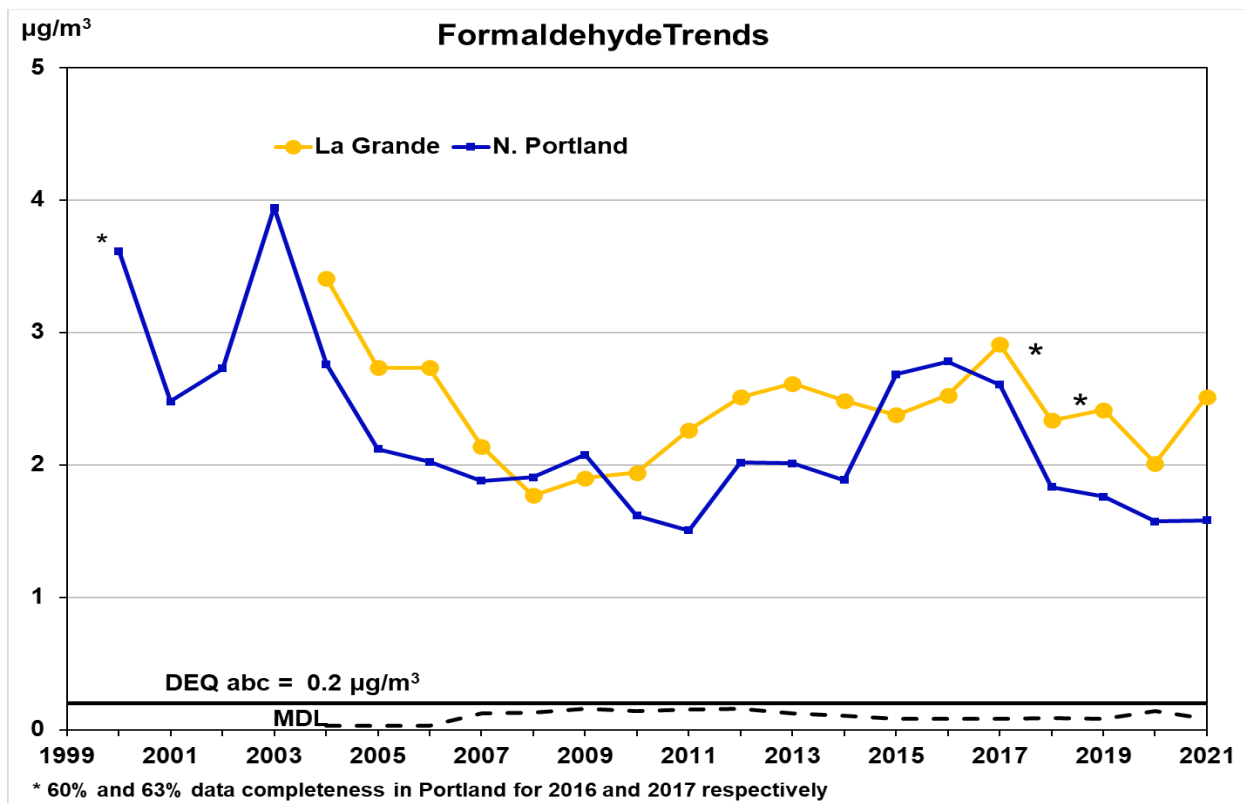


Figure 100. Formaldehyde trends.

Polyaromatic hydrocarbon air toxics:

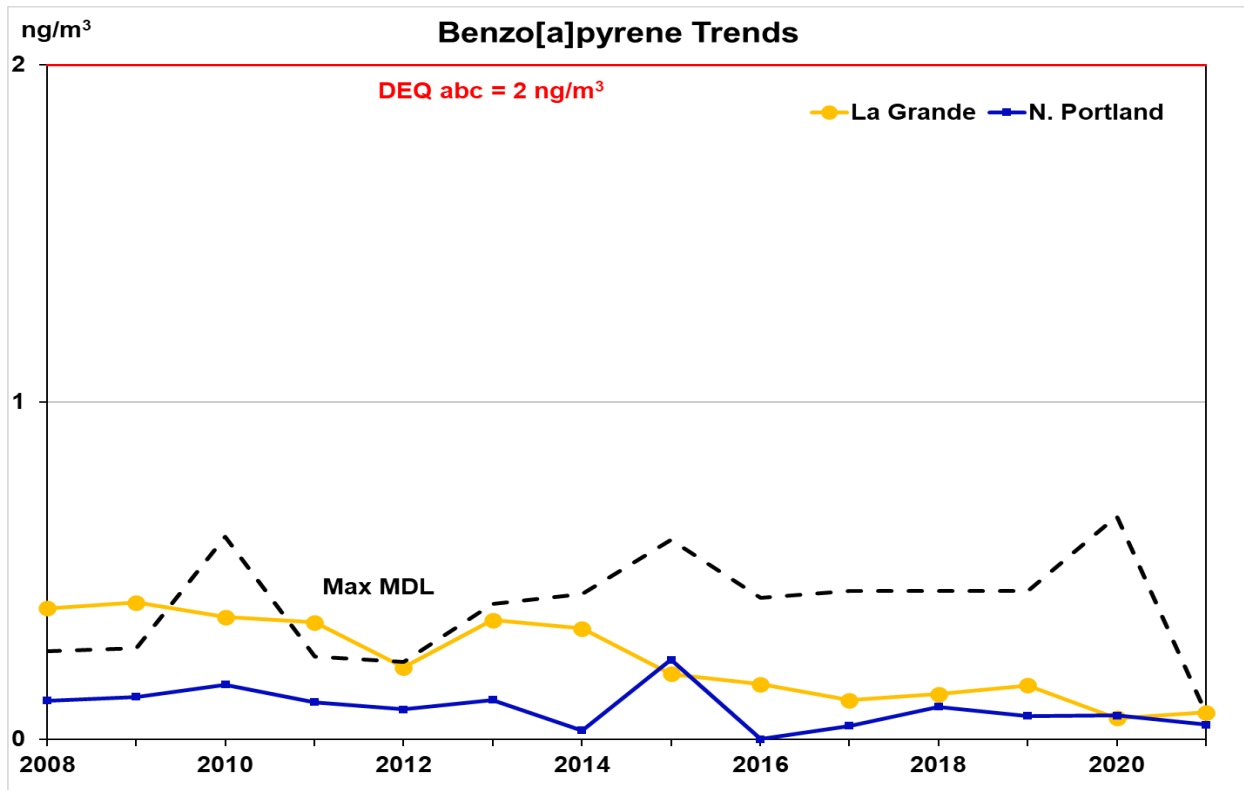


Figure 101. Benzo[a]pyrene trends.

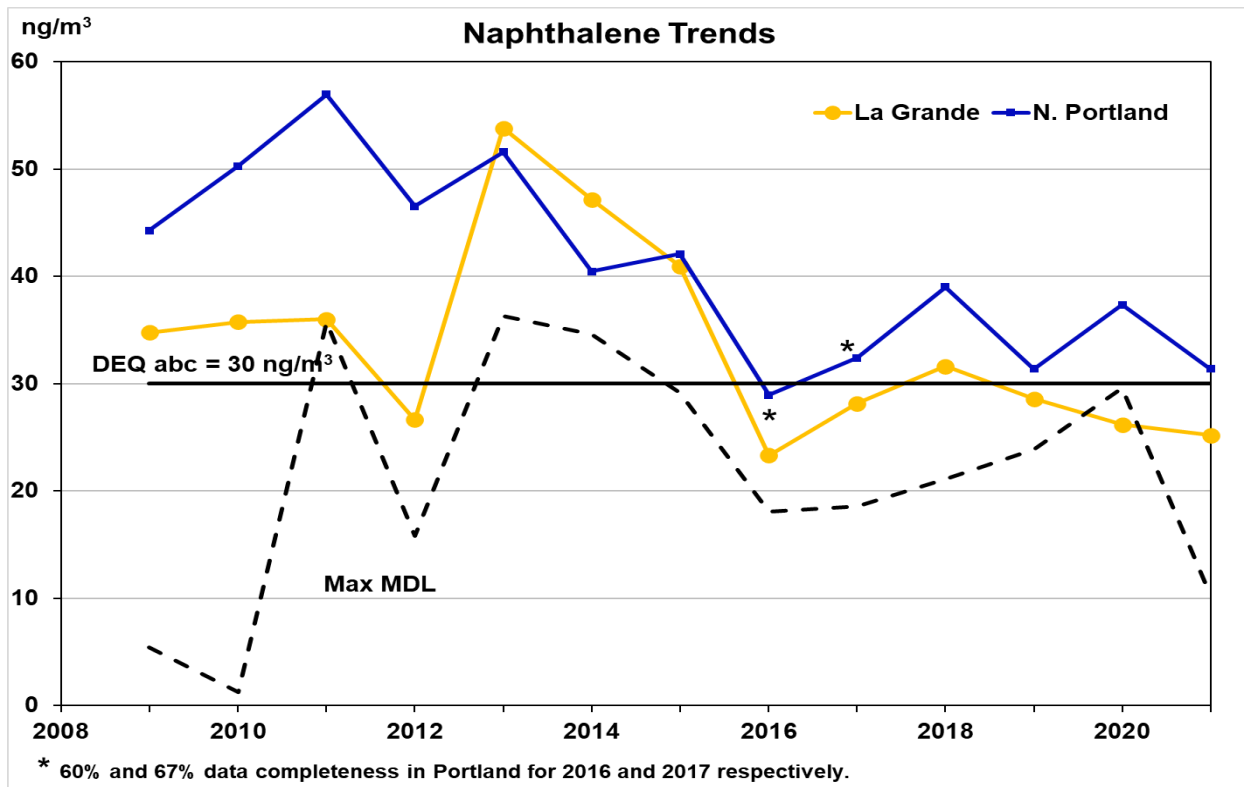


Figure 102. Naphthalene total suspended particulate trends.

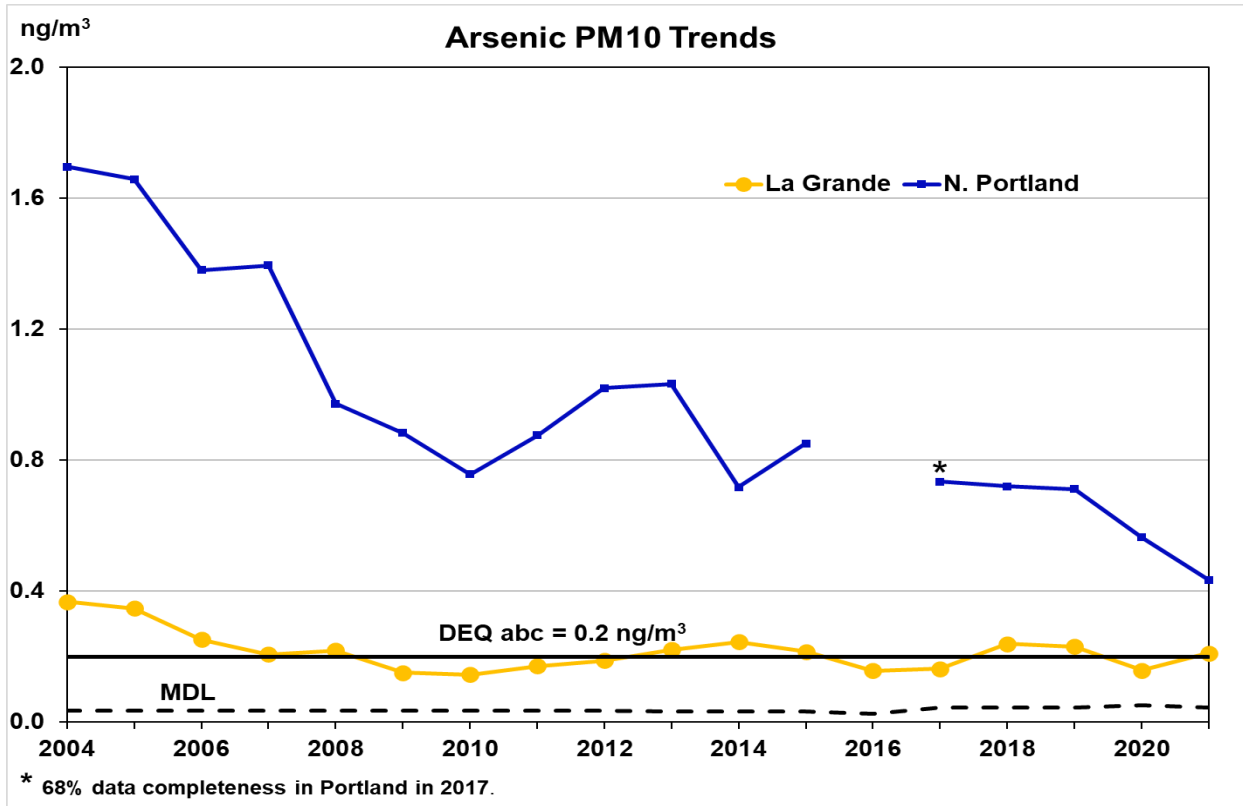


Figure 103. PM10 arsenic trends.

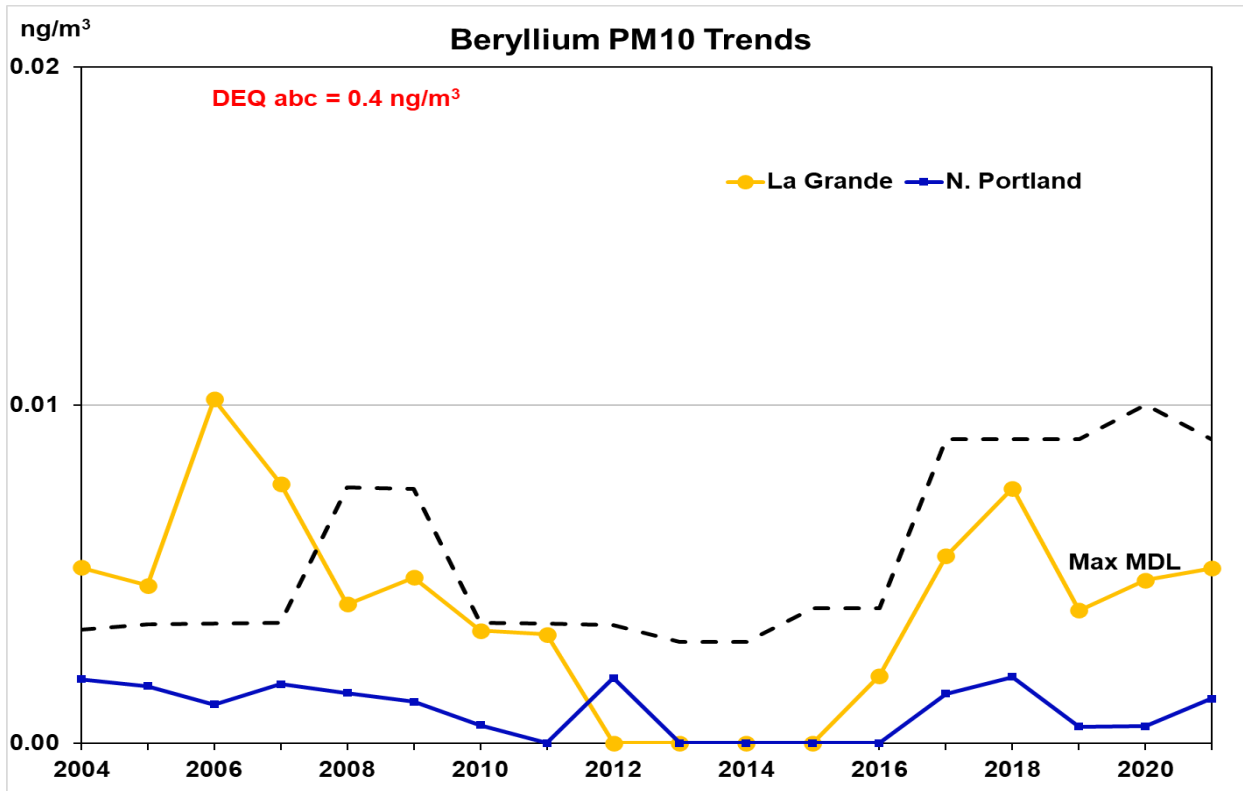


Figure 104. PM10 beryllium trends.

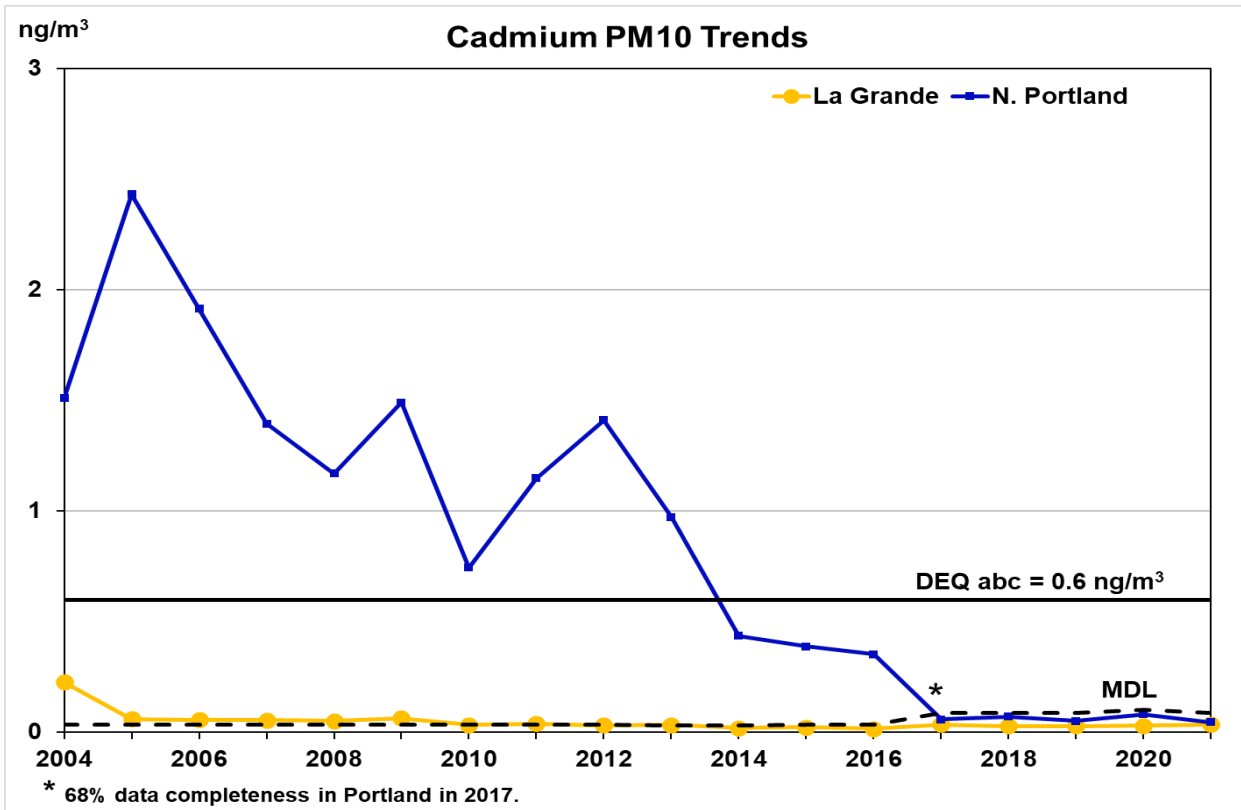


Figure 105. PM10 cadmium trends.

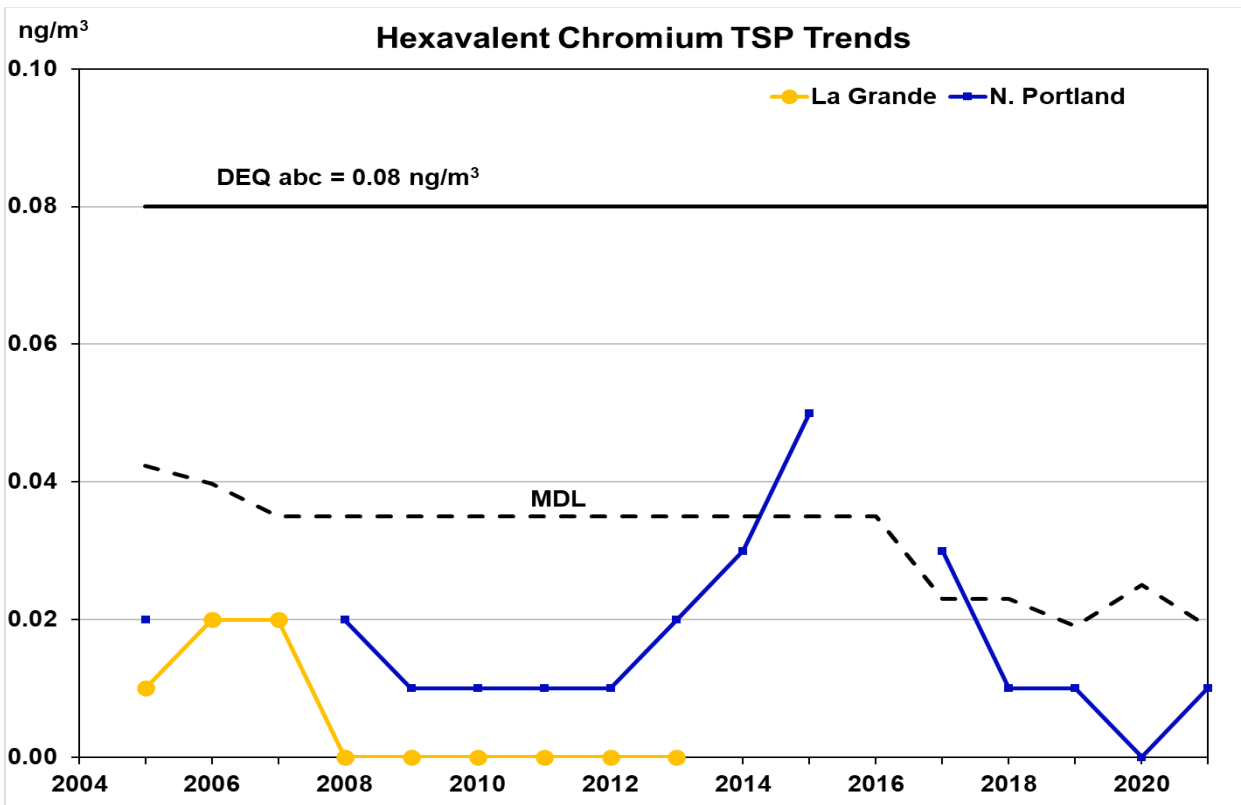


Figure 106. Hexavalent chromium total suspended particulate trends.

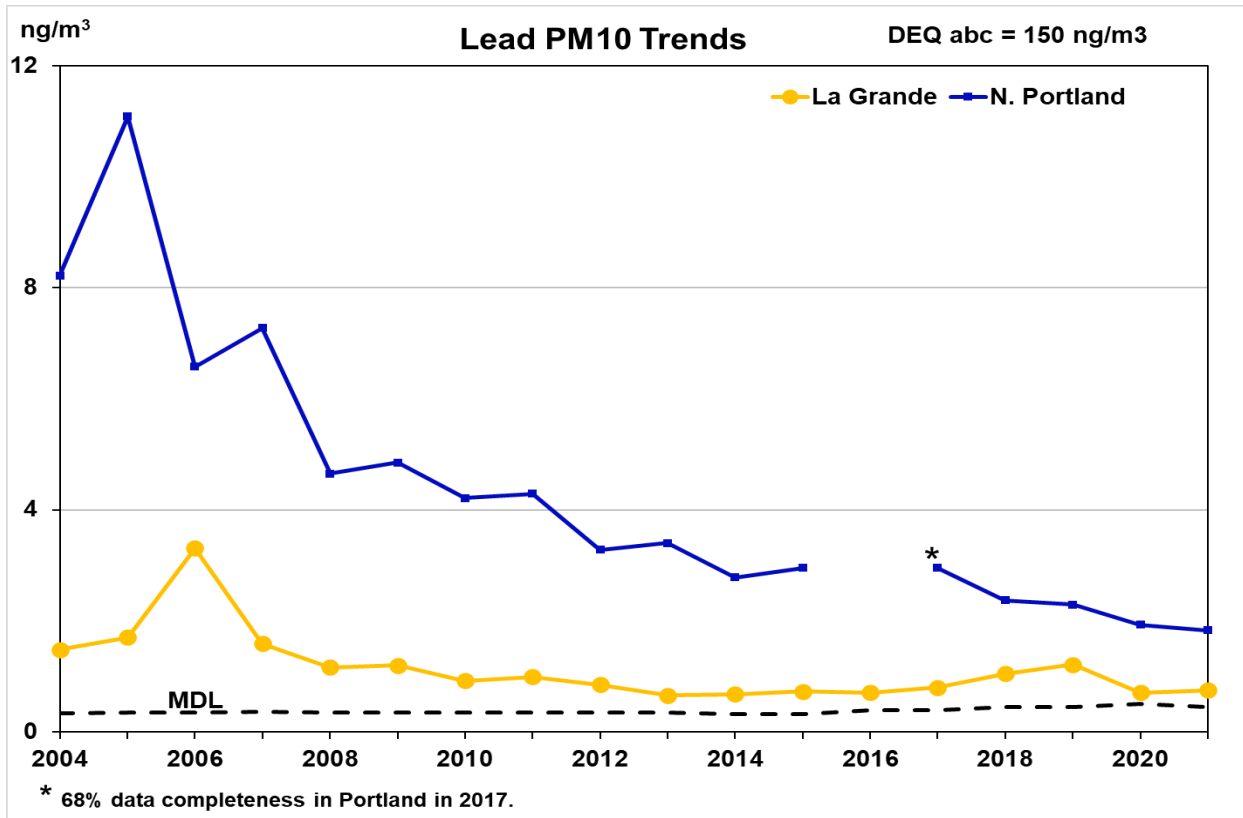


Figure 107. PM10 lead trends.

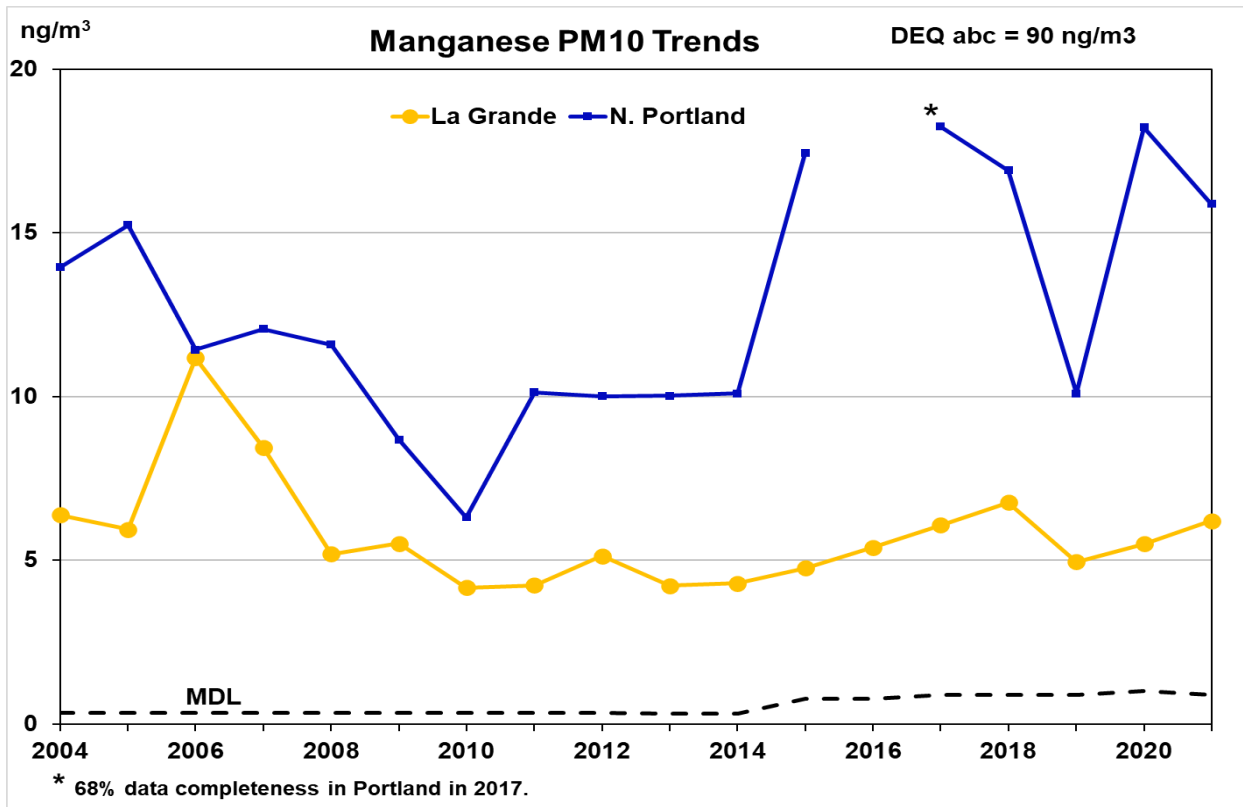


Figure 108. PM10 manganese trends.

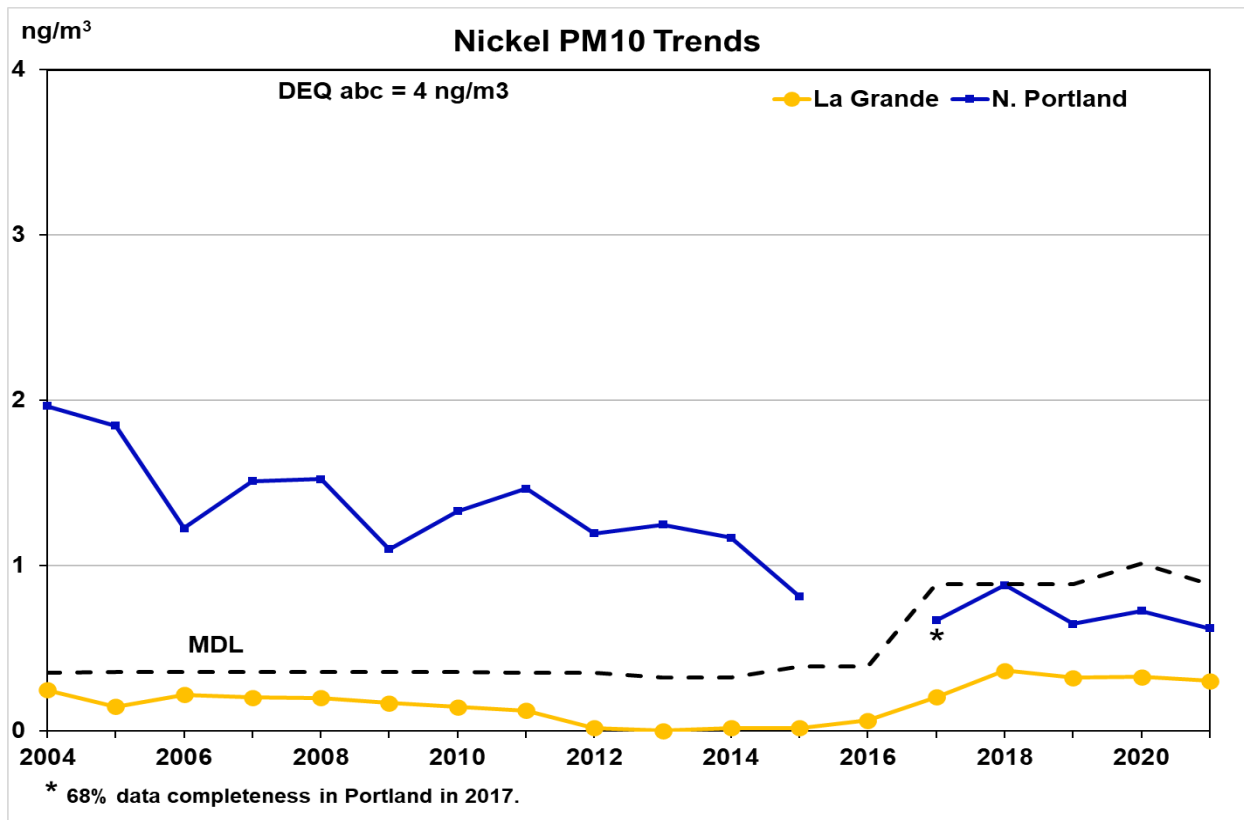


Figure 109. PM10 nickel trends.

Oregon Greenhouse Gas (GHG) Emissions Trends

Oregonians produce greenhouse gas emissions directly from activities like driving cars and heating homes. We also indirectly contribute to greenhouse gas emissions when we purchase electricity, goods or food manufactured in other states or countries. These emissions are contributing to global climate change.

DEQ divides statewide greenhouse gas emissions into two categories:

- **Sector-based Emissions:** Emissions produced in Oregon from transportation, residential, commercial, industrial, and agriculture sectors, including electricity produced elsewhere but used in state.
- **Consumption-based Emissions:** Emissions produced around the world due to Oregon's consumption of energy, goods and services. Over half of Oregon's consumption-based emissions occur in other states or nations but still impact Oregonians because climate change is a global problem.

Trends:

Oregon's sector-based emissions are 10 percent above 1990 levels. Consumption-based emissions are 42 percent above 1990 levels. See chart below. Oregon has goals to reduce emissions 10 percent below 1990 levels by 2020 and 75 percent by 2050.

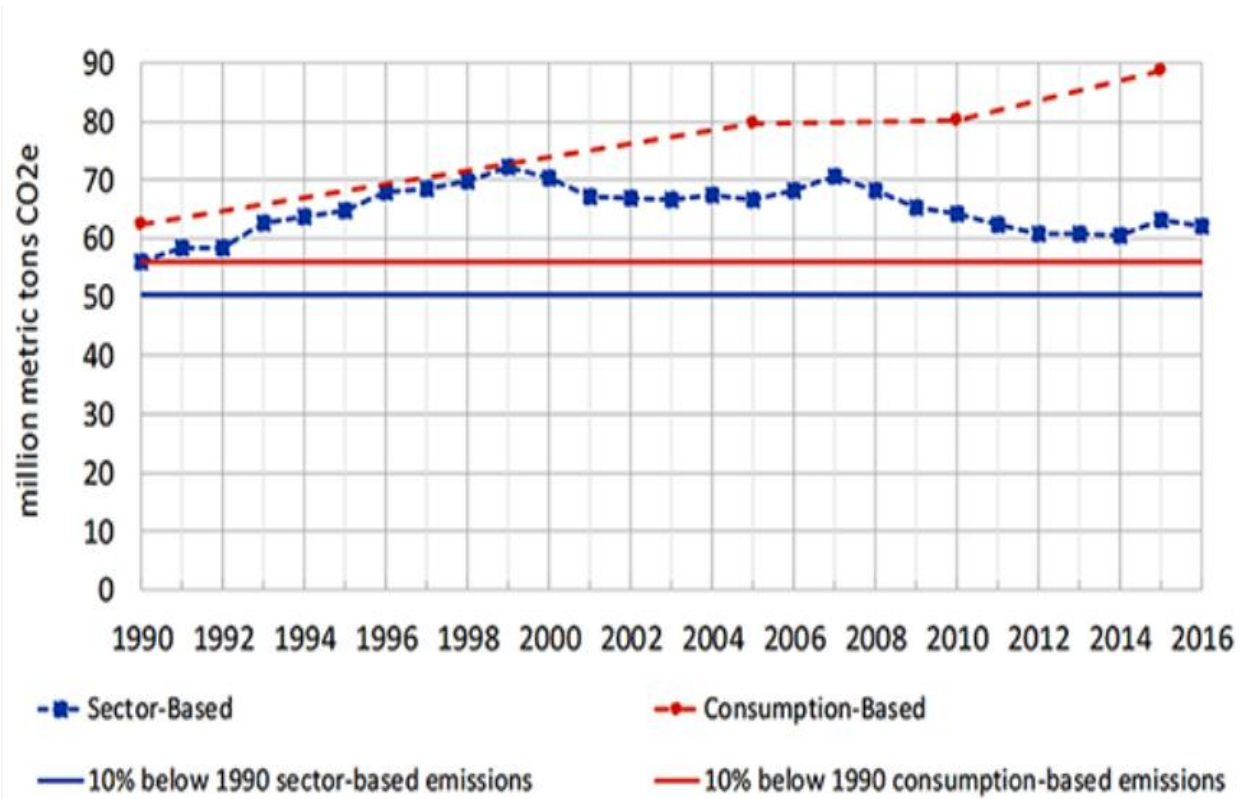


Figure 110. Oregon total greenhouse gas emissions by sector 1990-2016

Chart from: <https://www.oregon.gov/deq/ghgp/Pages/GHG-Oregon-Emissions.aspx>

DEQ publishes a comprehensive report every five years that evaluates Oregon’s greenhouse gas emissions with data from the sector-based and consumption-based inventories. The latest report is the [Oregon’s Greenhouse Gas Emissions through 2015](#) published May 2018. This report and more information can be found on DEQ’s [Oregon Greenhouse Gas Reporting](#) web page.

Sector-based GHG Emission Trends:

Oregon's Sector-based emissions are human-caused greenhouse gas emissions produced within Oregon by economic sector. These emissions also includes the emissions associated with the electricity used in Oregon regardless of where it is generated. The chart below shows the Sector based greenhouse gas emissions for Oregon.

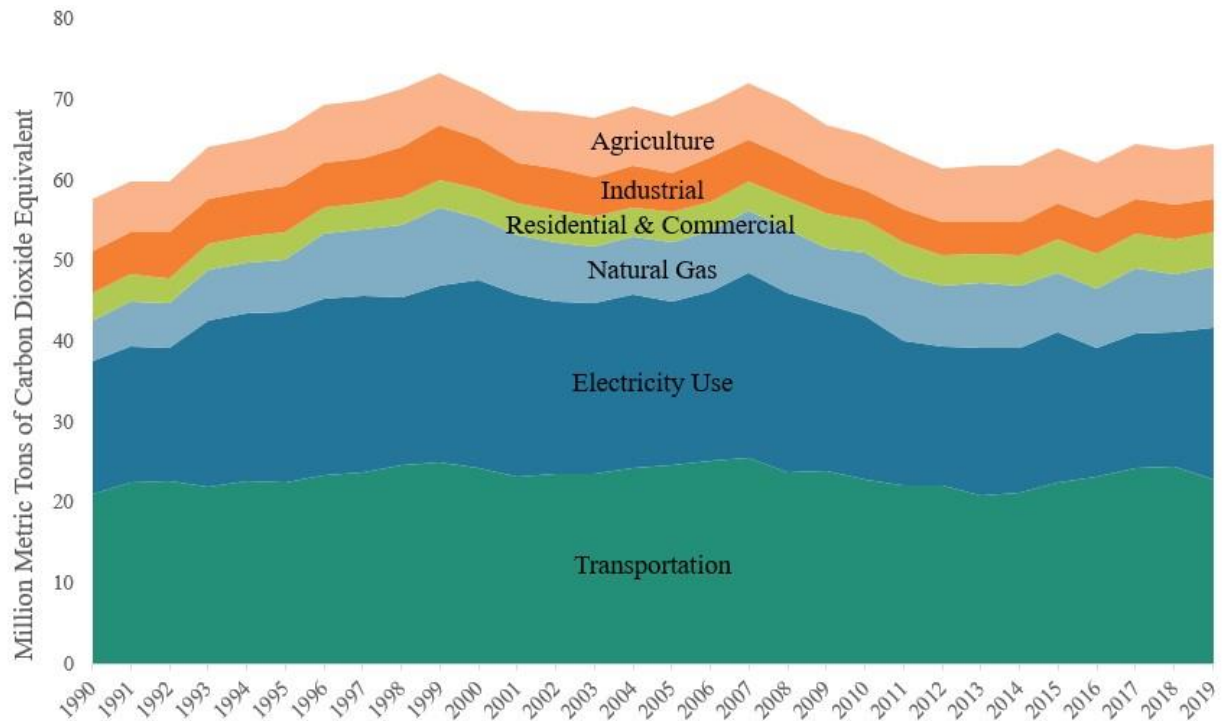


Figure 111. Oregon total Sector-based emissions by economic sector.

Emissions from transportation and electricity use are Oregon's largest sources of greenhouse gas emissions.

Chart from: <https://www.oregon.gov/deq/ghgp/Pages/GHG-Inventory.aspx>

Consumption-based GHG Emission Trends:

Oregon’s consumption-based greenhouse gas emissions are produced to meet the state’s consumption of goods and services like cars, food, fuels, appliances and clothing—most of which are produced in other states or overseas. This inventory accounts for total emissions from producing, using and disposing of a product. More than half of the consumption-based emissions occur in other states or nations but are driven by Oregon consumption. The chart below shows the Oregon emissions by consumption type.

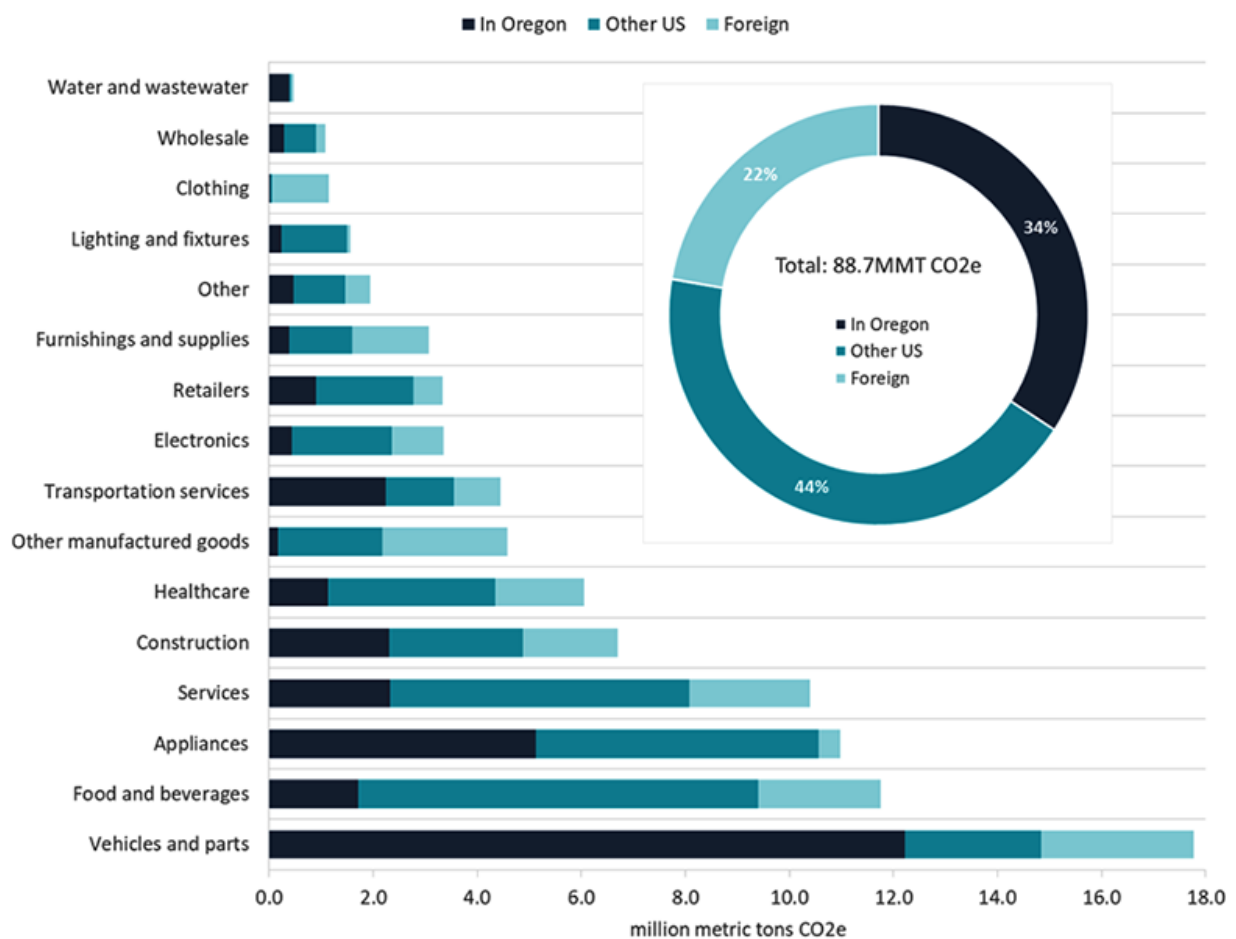


Figure 112. Oregon total Consumption-based GHG emissions by consumption type.

The consumption-based greenhouse gas emissions inventory tracks emissions produced in Oregon and around the world due to the products and services Oregonians consume.

Chart from: <https://www.oregon.gov/deq/mm/Pages/Consumption-based-GHG.aspx>

National Ambient Air Quality Standards (NAAQS)

The EPA has established primary NAAQS to protect public health and secondary NAAQS to protect public welfare such as agriculture. The following Table has the NAAQS standards for the criteria pollutants. EPA summarizes the NAAQS at: <https://www.epa.gov/criteria-air-pollutants/naaqs-table>

Table 5. 2017 National Ambient Air Quality Standards (NAAQS).

Pollutant	Aver. Time	NAAQS Violation Determination	Exceedance Level	
			Primary	Secondary
Carbon monoxide	1-hour	Not to be exceeded more than once per year.	35 ppm	-
	8-hour		9 ppm	-
Lead	3 months	Rolling 3-month average	0.15 µg/m ³	0.15 µg/m ³
Nitrogen dioxide	Annual	Annual arithmetic mean	53 ppb	53 ppb
	1-hour	3yr average of the maximum daily 98 th percentile one hour average.	100 ppb	-
Ozone	8-hour	3-year average of the annual 4th highest daily maximum 8-hour average.	70 ppb	70 ppb
PM _{2.5}	24-hour	3-year average of the 24hour average daily 98th percentile.	35 µg/m ³	35 µg/m ³
	Annual Average	3-year average of the annual arithmetic mean.	12 µg/m ³	12 µg/m ³
PM ₁₀	24-hour	Not to be exceeded more than once per year on average over 3 years.	150 µg/m ³	150 µg/m ³
Sulfur dioxide	1-hour	3yr average of the maximum daily 99 th percentile one hour average.	75 ppb	-
	3-hour	Not to be exceeded more than once per year.	-	0.5 ppm

Notes: µg/m³ = micrograms of pollutant per cubic meter of air

ppm = parts per million

ppb = parts per billion

Exceedances vs. Violation

Exceedances occur when the NAAQS is surpassed but is not necessarily violated. Violations occur when the standards described in the table above are surpassed. An area can have multiple exceedances without violating the NAAQS. For example, an ozone violation is the three year average of the fourth highest, maximum daily eight hour average. For one year the fourth highest day may exceed the NAAQS but the other two years in the average may be below the NAAQS, bringing the three year average below the NAAQS. During wildfires or other events outside of the control of the community, EPA may excuse a violation as an exceptional event.

Recent NAAQS Exceedances.

The following Tables summarize Oregon's NAAQS exceedances for the last 10 years for PM2.5, PM10, CO, and Ozone. PM2.5 comparison to the NAAQS is determined by the 98th percentile.

Table 6. PM2.5 98th Percentile – Eastern Oregon.

Year	Bend	Burns	Klamath Falls	La Grande	Lakeview	Pendleton	Prineville	The Dalles
2012	<i>20.3</i>	27.1	34.1	<i>21.7</i>	36.7	<i>21.6</i>	29.3	<i>17.6</i>
2013	<i>17.7</i>	38.0	46.5	<i>32.9</i>	93.6	<i>32.0</i>	49.2	<i>30.1</i>
2014	<i>21.7</i>	29.0	29.6	<i>35.2</i>	42.3	<i>23.0</i>	46.8	<i>18.3</i>
2015	<i>17.0</i>	25.8	25.2	<i>26.2</i>	32.7	<i>17.6</i>	41.7	<i>16.7</i>
2016	<i>11.1</i>	29.4	23.0	<i>27.8</i>	19.4	<i>17.3</i>	24.3	<i>19.4</i>
2017	<i>16.4</i>	33.8	31.6	<i>18.7</i>	56.3	<i>20.5</i>	35.2	<i>23.5</i>
2017 ^{fb}	<i>76.2</i>	45.3	55.1	<i>38.1</i>	57.9	<i>37.4</i>	57.6	<i>58.7</i>
2018	<i>20.7</i>	28.3	27.9	<i>20.8</i>	28.7	<i>21.7</i>	25.4	<i>20.3</i>
2018 ^{fb}	<i>37.8</i>	35.6	146	<i>28.9</i>	65.9	<i>39.9</i>	32.9	<i>27.6</i>
2019	<i>13.6</i>	29.5	32.3	<i>15.5</i>	26.2	<i>22.6</i>	27.9	<i>24.4</i>
2020	<i>18.9</i>	28.7	27.4	<i>16.3</i>	22.2	<i>18.2</i>	27.1	<i>19.2</i>
2020 ^{fb}	<i>176.0</i>	62.1	45.8	<i>73.1</i>	36.3	<i>107.0</i>	132.0	<i>23.1</i>
2021	<i>19.2</i>	24.2	23.0	<i>19.2</i>	27.6	<i>17.3</i>	17.4	<i>13.7</i>
2021^{fb}	<i>72.2</i>	46.5	61.9	<i>29.0</i>	68.2	<i>30.3</i>	24.4	<i>20.1</i>

Table 7. PM2.5 98th Percentile – Western Oregon.

Year	Albany	Beaverton	Corvallis	Grove Cottage	Springfield	Eugene/ Springfield	Grants Pass	Hillsboro	Medford	Oakridge	Portland	Salem
2012	<i>16.4</i>	<i>17.9</i>	<i>15.4</i>	17.0	25.4	17.8	17.8	31.0	38.4	15.7	<i>18</i>	
2013	<i>32.3</i>	<i>27.3</i>	<i>24.5</i>	31.1	40.2	32.4	42.8	65.6	41.0	35.6	<i>31.8</i>	
2014	<i>22.9</i>	<i>20.4</i>	<i>16.3</i>	21.3	31.6	25.7	27.7	31.3	41.1	22.1	<i>22.7</i>	
2015	<i>25.4</i>	<i>17.8</i>	<i>18.6</i>	20.1	26.7	18.4	33.9	35.2	28.9	29.9	<i>22.9</i>	
2016	<i>17.1</i>	<i>12.8</i>	<i>16.3</i>	18.3	25.9	15.2	18.4	20.8	21.7	13.6	<i>16.9</i>	
2017	<i>22.3</i>	<i>16.8</i>	<i>16.6</i>	19.7	37.0	19.3	24.1	28.8	35.7	22.2	<i>17.7</i>	
2017 ^{fb}	<i>30.2</i>	<i>34.5</i>	<i>25.0</i>	37.7	41.6	115	33.0	111	86.2	25.7	<i>26.1</i>	
2018	<i>23.0</i>	<i>16.6</i>	<i>18.8</i>	23.2	31.8	23.5	22.2	23.6	28.6	17.4	<i>23.0</i>	
2018 ^{fb}	<i>26.2</i>	<i>23.7</i>	<i>23.1</i>	23.7	38.9	75.1	31.5	144	33.2	20.3	<i>37.4</i>	
2019	<i>19.0</i>	<i>17.0</i>	<i>18.8</i>	20.5	28.9	25.4	23.6	26.6	36.7	20.0	<i>24.8</i>	
2019 ^{fb}	-	-	-	-	-	29.7	-	37.0	-	-	-	
2020	<i>17.8</i>	<i>14.5</i>	<i>17.0</i>	15.9	22.6	26.6	17.7	22.6	26.3	22.5	<i>19.3</i>	
2020 ^{fb}	<i>199.</i>	<i>123.</i>	<i>159.</i>	16.8	240.0	29.4	29.5	63.1	190.	30.5	<i>235.</i>	
2021	<i>16.3</i>	<i>12.3</i>	<i>13.0</i>	15.6	17.6	21.7	15.2	22.6	19.2	15.9	<i>15.6</i>	
2021^{fb}	<i>16.4</i>	<i>12.3</i>	<i>13.0</i>	20.3	19.1	57.5	15.2	121.	69.7	15.9	<i>15.6</i>	

Notes:

1. *Blue, italicized* values are from a non-Federal Reference Method and are informational.
2. ^{fb}Wildfire smoke impact data included
3. NAAQS is 35.5 µg/m³

Table 8. PM10 Number of Exceedances per year.

Year	Klamath Falls	La Grande	Eugene	Grants Pass	Medford	Oakridge	Portland	Year	Klamath Falls	La Grande	Eugene	Grants Pass	Medford	Oakridge	Portland
2012	0	0	0	0	0	0	0	2018	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	2019	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	2020	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	2020 ^{fb}	6	0	10	6	0	9	0
2016	0	0	0	0	0	0	0	2021^{fb}	0	0	0	0	6	1	0
2017	0	0	0	0	0	0	0								
2017 ^{fb}	0	0	3	0	1	4	0								

^{fb}Wildfire smoke impact data included

Table 9. Carbon Monoxide Number of Exceedances per year.

Year	Portland	Year	Portland
2012	0	2018	0
2013	0	2019	0
2014	0	2020	0
2015	0	2020 ^{fb}	3
2016	0	2021	0
2017	0		

^{fb}Wildfire smoke impact data included

Table 10. Ozone Number of Exceedances per year.

Year	Bend	Eugene	Medford	Portland	Salem	Hermiston	The Dalles
2012	0	0	0	0	0	0	-
2013	0	0	0	0	0	0	-
2014	0	0	0	1	1	0	-
2015	0	1	1	0	1	0	-
Standard lowered from 0.075 to 0.070ppm							
2016	-	0	0	0	0	1	0
2017	-	5	5	9	6	7	1
2018	-	0	6	4	0	0	0
2019	-	0	1	1	0	0	-
2020	-	0	0	3	0	0	-
2021	-	1	2	1	0	1	-

Appendix 1. Data Summaries

Oregon's uses EPA Federal Reference Methods/Federal Equivalence Methods (FRM/FEM) monitors to measure criteria pollutant concentrations for comparison to the NAAQS. Oregon also uses non FRM/FEM monitors for the Air Quality Index and air toxics monitors. These methods are discussed below and the monitored data is summarized in the Appendices below.

DEQ Air Monitoring Methods:

Appendix 1 -A&B. Particulate (PM10 and PM2.5)

- A. The PM2.5 annual average is determined by averaging the quarterly means of the daily averages.
- B. The PM2.5 maximum daily sample is the highest 24-hour average sample for the year.
- C. The PM2.5 98th percentile is the value on the 98th percent highest day. E.g. 120 sample days*0.98 = 118; 120 is the highest day, 118th day is the third highest day.
- D. The PM10 maximum daily sample is the highest 24-hour average sample for the year.
- E. The PM10 2nd highest daily sample is the 2nd highest 24-hour average sample for the year.

Appendix 1-C. Ozone (O3)

- A. Maximum daily, 8-hour ozone average is calculated using a rolling eight hour average.
- B. Fourth highest 8-hour average is determined from the data in in A.

Appendix 1-D. Oxides of Nitrogen (NO2 and NO)

- A. The 1-hour value is calculated using the 98th percentile of the maximum daily, hourly average.
- B. The annual standard is determined by averaging the annual, 1-hour values.

Appendix 1-E. Sulfur Dioxide (SO2)

- A. The 1-hour value is calculated using the 99th percentile of the maximum daily, hourly average.
- B. The maximum 3-hour average is calculated using three consecutive hours.

Appendix 1-F. Carbon Monoxide (CO)

- A. Maximum 8-hour CO average is determined by calculating an 8-hour rolling average.
- B. Second highest 8-hour average CO is determined from the data in A. Only one maximum per CO episode is used to count to the second highest.

Appendix 1-G. Air Quality Index based on PM2.5 and ozone

- A. PM2.5 FRM filter data is used first if available.
- B. Where PM2.5 FRM filter data is unavailable, nephelometer data is used to estimate PM2.5.
- C. The maximum 8-hour average daily ozone is used to calculate the daily ozone AQI.
- D. Where ozone and PM2.5 are both available, the higher AQI of the two is used for the day.

Appendix 1-H. Air Toxics (Hazardous Air Pollution)

- A. Air toxic levels are compared to benchmark levels.
- B. The annual averages are determined by taking the arithmetic mean of the quarterly averages. Where the values are below the minimum detection limit (MDL), [EPA's ProUCL 5.1](#) annual average calculation program is used.

The lists of the Federal Reference Methods and codes are at: <http://www.epa.gov/ttnamti1/>

Table 11. Ambient Air Quality Monitoring Methods

Pollutant	Method Code	Method Description
PM2.5	117, 118, 145	Low volume filter sampler and pre and post filter weighing.
	170, 209	FEM Beta Attenuation
	238	FEM Light Scattering
PM10	127	Low volume filter sampler and pre and post filter weighing.
	141	High volume filter sampler and pre and post filter weighing.
	122	FEM Beta Attenuation
	239	FEM Light Scattering
PM10 Lead	811	Low volume filter sampler and XRF analysis
Ozone	047, 087,214	Ultraviolet photometry (214 method starting in 2019)
NO2	590, 186, 200	Chemiluminescent Detection
SO2	592, 100	Ultraviolet fluorescence spectrometer
CO	588, 093	Nondispersive infrared trace monitor
Visibility	027	Beta Light Scattering
PM2.5 Est	027/145	Beta Light Scattering correlated with PM2.5 filter sampling
	791/145	
Air Toxics		
Carbonyls	156	Cartridge-DNPH-Silica-SEP-PAK/ HPLC photodiode Array
Volatile Organic Compounds	176	6L Sub-ambient Canister sampling, GC/MS analysis
Poly Aromatic Hydrocarbon	118	TSP High Volume sampling on PUF/XAD media, Soxhlet Extraction, GCMS analysis.
PM10 Metals	501	High Volume PM10 with ICP/MS analysis on a Quartz Filter
Diesel Particulate	886	Aethalometer (optical absorption) black carbon surrogate

Appendix 1A. PM2.5

PM2.5 Data Summary

Portland Area					
City and Station	Year	Sample days: Actual/ Expected	Arithmetic mean	Maximum (µg/m ³)	98th Percentile (µg/m ³)
Hillsboro (HHF) Hare Field EPA # 410670004 ^{FB} Wildfire data included * Wildfire flagged data removed	2012	109/122	7.2	39 (01/13)	22 (11/11)
	2013	119/122	9.1	55 (12/12)	43 (11/30)
	2014	117/122	7.0	37 (01/26)	23 (12/31)
	2015 ^{FB}	120/121	8.3	58 (08/22)	34 (11/29)
	2015*	119/121	7.6	34 (11/29)	32 (01/03)
	2016	120/122	5.9	21 (12/17)	18 (10/12)
	2017 ^{FB}	119/122	8.2	40 (08/02)	33 (08/08)
	2017*	115/122	7.3	36 (01/13)	24 (01/16)
	2018 ^{FB}	116/122	8.0	52 (08/21)	32 (11/13)
	2018*	114/122	7.2	32 (11/13)	22 (12/22)
	2019	114/121	6.7	36 (12/05)	24 (11/02)
	2020 ^{FB}	117/122	10.9	297 (09/15)	30 (09/18)
	2020*	114/122	6.1	28 (11/02)	18 (12/08)
2021	120/122	5.1	24 (10/16)	15 (10/19)	
S.E. Portland (SEL) SE Lafayette and 57 th EPA # 410510080 ^{FB} Wildfire data included * Wildfire flagged data removed	2012	118/122	7.4	35 (01/28)	23 (09/18)
	2013	120/122	8.7	42 (11/30)	36 (01/19)
	2014	120/122	6.3	30 (02/10)	15 (01/17)
	2015 ^{FB}	121/121	7.2	56 (08/22)	29 (01/03)
	2015*	120/121	6.8	30 (11/23)	24 (01/24)
	2016	122/122	5.6	28 (12/26)	14 (02/21)
	2017 ^{FB}	119/122	7.9	53 (09/16)	34 (08/29)
	2017*	115/122	6.8	24 (12/21)	22 (10/16)
	2018 ^{FB}	120/122	7.4	48 (08/21)	20 (11/13)
	2018*	118/122	6.8	20 (11/13)	17 (11/07)
	2019	121/121	6.5	30 (11/23)	20 (11/05)
	2020 ^{FB}	120/122	10.7	334 (09/15)	31 (11/02)
	2020*	118/122	7.1	31 (11/02)	23 (03/22)
2021	117/122	6.1	23 (10/16)	16 (10/19)	
Tualatin Bradbury Court (I-5 site) EPA # 410670005 ^{FB} Wildfire data included * Wildfire flagged data removed	2016	108/122	6.3	22 (10/12)	18 (12/17)
	2017 ^{FB}	118/122	7.9	50 (09/16)	36 (08/29)
	2017*	115/122	6.9	24 (12/15)	20 (10/31)
	2018 ^{FB}	121/122	7.7	47 (08/21)	19 (11/13)
	2018*	119/122	7.1	19 (11/13)	17 (10/20)
	2019	120/121	6.8	32 (11/23)	21 (11/08)
	2020 ^{FB}	119/122	11.2	373 (09/15)	28 (11/02)
	2020*	117/122	6.8	28 (11/02)	18 (09/09)
2021	98/122	6.7	20 (03/02)	18 (03/17)	

Appendix 1A. PM2.5

Eugene Area					
City and Station	Year	Sample days: Actual/ Expected	Arithmetic mean	Maximum (µg/m ³)	98 th Percentile (µg/m ³)
Eugene Amazon Park (AMZ) EPA # 410390060 ^{fb} <i>Wildfire data included</i> <i>* Wildfire flagged data removed</i>	2012	121/122	6.4	32 (01/13)	25 (02/06)
	2013	122/122	7.8	52 (12/09)	39 (11/27)
	2014	123/122	7.2	36 (01/26)	31 (11/16)
	2015 ^{fb}	121/121	7.4	55 (08/22)	27 (11/26)
	2016	122/122	5.4	38 (01/01)	20 (01/04)
	2017 ^{fb}	119/122	9.0	145 (09/04)	42 (01/16)
	2017*	115/122	6.9	42 (01/06)	37 (12/12)
	2018 ^{fb}	121/122	7.5	40 (08/21)	32 (11/13)
	2018*	120/122	7.2	34 (12/07)	29 (11/10)
	2019	120/121	7.3	30 (11/23)	25 (12/05)
	2020 ^{fb}	121/122	14.9	528 (09/12)	240 (09/09)
	2020*	118/122	6.2	26 (12/05)	17 (02/21)
	2021	120/122	5.5	22 (09/04)	14 (02/09)
Eugene Hwy 99 (E99) Pacific Hwy 99 N EPA# 410390059 ^{fb} <i>Wildfire data included</i> <i>* Wildfire flagged data removed</i>	2012	118/122	6.5	30 (02/06)	21 (10/18)
	2013	122/122	8.3	55 (12/09)	40 (11/24)
	2014	120/122	7.2	44 (01/26)	31 (11/16)
	2015 ^{fb}	122/121	8.0	55 (08/22)	27 (11/26)
	2016	119/122	5.7	18 (01/04)	16 (02/09)
	2017 ^{fb}	120/122	10.9	330 (09/04)	43 (01/16)
	2017*	117/122	7.2	43 (01/16)	32 (12/12)
	2018 ^{fb}	122/122	8.7	46 (11/13)	39 (11/19)
	2018*	121/122	8.4	46 (11/13)	32 (12/07)
	2019	121/121	8.0	31 (01/12)	29 (11/02)
	2020 ^{fb}	121/122	14.9	454 (09/12)	218 (09/09)
	2020*	118/122	7.0	31 (11/02)	23 (12/05)
	2021 ^{fb}	360/365	6.6	37 (09/03)	19 (03/12)
2021*	357/365	6.4	32 (01/20)	18 (07/04)	

Appendix 1A. PM2.5

Western Oregon					
City and Station	Year	Sample days: Actual/ Expected	Arithmetic mean	Maximum (µg/m ³)	98 th Percentile (µg/m ³)
Cottage Grove City Shops (CGS) EPA # 410399004 ^{Pb} Wildfire data included * Wildfire flagged data removed	2012	119/122	6.7	25 (01/13)	17 (11/02)
	2013	120/122	7.5	38 (12/09)	25 (11/27)
	2014	124/122	6.9	34 (11/19)	21 (12/04)
	2015 ^{Pb}	118/121	7.3	40 (08/22)	20 (02/23)
	2016	121/122	5.8	26 (01/01)	18 (11/02)
	2017 ^{Pb}	117/122	8.8	116 (09/04)	38 (09/07)
	2017*	111/122	6.8	28 (01/16)	20 (12/28)
	2018 ^{Pb}	123/122	7.8	44 (08/21)	24 (11/13)
	2018*	122/122	7.5	26 (12/07)	23 (11/19)
	2019	120/121	7.3	29 (12/11)	21 (11/23)
	2020 ^{Pb}	121/122	13.4	499 (09/12)	17 (10/27)
	2020*	119/122	6.5	17 (10/27)	16 (11/26)
	2021 ^{Pb}	357/365	6.2	45 (09/07)	20 (08/11)
	2021*	352/365	5.8	26 (07/04)	16 (12/03)
Grants Pass Parkside School (GPP) EPA # 410330114 ^{Pb} Wildfire data included * Wildfire flagged data removed	2012	61/61	7.1	19 (01/04)	18 (11/17)
	2013 ^{Pb}	61/61	11.9	90 (08/02)	36 (11/24)
	2013*	59/61	10.1	36 (11/24)	32 (12/12)
	2014	61/61	7.4	43 (11/19)	26 (01/05)
	2015 ^{Pb}	57/60	8.2	24 (08/28)	18 (08/22)
	2016	61/61	5.8	17 (12/20)	15 (10/21)
	2017 ^{Pb}	58/61	15.8	283 (09/04)	115 (08/29)
	2017*	54/61	7.4	24 (01/01)	19 (08/11)
	2018 ^{Pb}	61/61	11.9	99 (08/06)	75 (07/25)
	2018*	58/61	9.0	31 (11/16)	24 (11/10)
	2019 ^{Pb}	59/60	9.7	46 (07/26)	30 (01/15)
	2019*	60/61	9.0	30 (01/15)	25 (12/17)
	2020 ^{Pb}	60/61	14.5	395 (09/12)	29 (10/06)
	2020*	59/61	8.1	29 (10/06)	27 (11/23)
2021 ^{Pb}	54/61	9.7	81 (09/07)	58 (08/14)	
2021*	52/61	7.6	29 (11/18)	22 (09/01)	

Appendix 1A. PM2.5

Southwestern Oregon						
City and Station	Year	Sample days: Actual/ Expected	Arithmetic mean	Maximum ($\mu\text{g}/\text{m}^3$)	98 th Percentile ($\mu\text{g}/\text{m}^3$)	
Medford Grant & Belmont (MGB) 902 Grant Ave. EPA # 410290133 Welch & Jackson EPA # 410292129 Moved to Welch and Jackson In 2018	2012	119/122	9.3	33 (01/28)	31 (01/13)	
	2013 ^{fb}	121/122	14.2	157 (07/30)	66 (12/12)	
	2013*	118/122	12.0	66 (12/12)	43 (01/19)	
	2014 ^{fb}	122/122	9.3	39 (01/02)	31 (01/20)	
	2014*	121/122	9.1	39 (01/02)	28 (12/31)	
	2015 ^{fb}	119/121	12.1	112 (08/01)	46 (08/22)	
	2015*	115/121	9.6	36 (11/23)	35 (11/14)	
	2016	120/122	7.2	25 (12/17)	21 (01/04)	
	2017 ^{fb}	117/122	15.5	151 (09/04)	111 (08/29)	
	2017*	110/122	10.2	37 (12/15)	29 (01/16)	
	2018 ^{fb}	120/122	17.4	180 (08/09)	144 (08/06)	
	2018*	105/122	9.2	26 (01/14)	24 (11/16)	
	2019 ^{fb}	117/119	8.7	105 (07/26)	37 (01/03)	
	^{fb} Wildfire data included	2019*	119/121	7.5	37 (01/03)	27 (12/29)
	* Wildfire flagged data removed	2020 ^{fb}	120/122	15.5	526 (09/12)	63 (10/09)
		2020*	112/122	8.9	25 (12/05)	23 (11/20)
	2021 ^{fb}	93/122	16.4	141 (08/14)	121 (09/04)	
	2021*	83/122	9.3	23 (09/16)	23 (11/21)	
Oakridge Willamette Cntr. (OAK) School St. EPA # 410392013 ^{fb} Wildfire data included * Wildfire flagged data removed	2012	116/122	7.6	50 (01/13)	38 (02/06)	
	2013	120/122	9.8	55 (12/09)	41 (01/19)	
	2014	122/122	10.0	46 (01/05)	41 (11/16)	
	2015	121/121	8.9	39 (11/29)	29 (02/23)	
	2016	120/122	6.7	31 (12/08)	22 (02/24)	
	2017 ^{fb}	125/122	13.0	200 (09/04)	86 (09/01)	
	2017*	116/122	8.8	42 (12/12)	36 (01/07)	
	2018 ^{fb}	114/122	12.2	62 (08/21)	33 (11/13)	
	2018*	114/122	9.0	35 (02/13)	29 (12/07)	
	2019	354/365	9.2	42 (01/12)	37 (10/30)	
	2020 ^{fb}	340/366	14.9	577 (09/12)	190 (09/09)	
	2020*	329/366	6.7	39 (12/03)	26 (10/08)	
	2021 ^{fb}	361/365	10.0	134 (09/07)	70 (09/06)	
2021*	332/365	6.4	24 (08/06)	19 (01/21)		

Appendix 1A. PM2.5

Eastern Oregon					
City and Station	Year	Sample days: Actual/	Arithmetic mean	Maximum (µg/m3)	98th Percentile (µg/m3)
<u>Burns</u> Washington Park (BWS) EPA # 410250003 ^{PB} Wildfire data included * Wildfire flagged data removed	2012	121/122	8.6	49 (09/21)	27 (11/11)
	2013	119/122	9.9	39 (12/12)	38 (12/09)
	2014 ^{PB}	119/122	9.0	61(08/06)	29 (12/04)
	2015 ^{PB}	360/365	8.3	46 (08/29)	26 (01/28)
	2016	118/122	8.2	30 (11/17)	29 (11/05)
	2017 ^{PB}	122/122	11.1	90 (09/07)	45 (09/04)
	2017*	119/122	9.8	52 (01/16)	34 (12/27)
	2018 ^{PB}	116/122	10.1	88 (08/21)	36 (01/05)
	2018*	115/122	9.2	36 (12/16)	28 (11/16)
	2019	350/365	10.2	48 (02/01)	30 (01/31)
	2020 ^{PB}	352/366	11.8	254 (09/12)	65 (09/17)
	2020*	342/366	9.2	38 (12/08)	30 (12/03)
	2021 ^{PB}	344/365	11.3	104 (09/09)	47 (09/10)
2021*	330/365	9.7	29 (12/19)	24 (07/16)	
<u>Klamath Falls</u> Peterson School (KFP) 4856 Clinton St. EPA # 410350004 ^{PB} Wildfire data included * Wildfire flagged data removed	2012	115/122	10.7	43 (08/28)	34 (08/31)
	2013*	112/122	11.6	50 (01/16)	46 (12/09)
	2014	118/122	8.8	31 (08/03)	30 (01/20)
	2015 ^{PB}	112/121	10.2	85 (08/01)	44 (08/19)
	2015*	108/121	8.2	38 (11/29)	25 (11/14)
	2016	118/122	6.8	29 (12/08)	23 (01/07)
	2017 ^{PB}	122/122	11.7	102 (09/04)	55 (08/20)
	2017*	115/122	8.5	32 (12/12)	32 (12/15)
	2018 ^{PB}	117/122	20.6	156 (08/03)	146 (07/31)
	2018*	103/122	10.7	28 (12/13)	22 (02/13)
	2019	63/63		27 (10/12)	25 (01/03)
	2020 ^{PB}	61/61	14.6	300 (09/12)	46 (08/25)
	2020*	57/61	8.5	29 (11/29)	25 (01/22)
2021 ^{PB}	59/61	13.7	132 (08/14)	62 (08/26)	
2021*	55/61	9.0	24 (11/24)	23 (11/20)	

Appendix 1A. PM2.5

Eastern Oregon					
City and Station	Year	Sample days: Actual/ Expected	Arithmetic mean	Maximum (µg/m3)	98th Percentile (µg/m3)
Lakeview Center and M Street (LCM) EPA # 410370001 ^{fb} Wildfire data included * Wildfire flagged data removed	2012	113/122	9.7	42 (11/15)	37 (01/10)
	2013	121/122	14.6	104 (01/19)	94 (01/16)
	2014	120/122	8.6	47 (01/20)	42 (01/14)
	2015	115/121	8.4	45 (11/29)	33 (01/06)
	2016	106/122	6.3	70 (12/29)	19 (02/09)
	2017	108/122	11.0	64 (12/12)	58 (09/04)
	2017	107/122	8.3	64 (12/12)	56 (12/08)
	2018	101/122	12.8	112 (07/31)	66 (08/24)
	2018	91/122	7.8	30 (11/13)	29 (12/07)
	2019	121/121	6.6	38 (01/03)	26 (01/30)
	2020	110/122	8.2	67 (09/15)	36 (09/06)
	2020	106/122	6.7	26 (12/08)	22 (10/30)
	2021	95/122	13.8	87 (08/26)	68 (08/17)
	2021	84/122	8.9	30 (12/21)	28 (12/18)
Prineville Davidson Park (PDP) EPA # 410130100 ^{fb} Wildfire data included * Wildfire flagged data removed	2012	119/122	8.0	37 (11/26)	29 (09/21)
	2013	122/122	11.0	56 (12/27)	49 (11/27)
	2014 ^{fb}	119/122	9.9	69 (07/19)	47 (02/10)
	2014*	118/122	9.4	48 (01/17)	44 (11/16)
	2015 ^{fb}	108/121	8.9	83 (08/13)	42 (08/22)
	2015*	104/121	7.5	42 (01/06)	25 (01/21)
	2016	116/122	6.9	41 (12/17)	24 (12/11)
	2017 ^{fb}	112/122	11.7	131(09/07)	58 (09/04)
	2017*	107/122	8.5	50 (12/15)	35 (12/18)
	2018 ^{fb}	113/122	8.9	60 (08/21)	33 (10/17)
	2018*	110/122	8.0	33 (10/17)	25 (11/19)
	2019	116/121	7.6	33 (09/06)	28 (12/05)
	2020 ^{fb}	115/122	16.4	593 (09/12)	132 (09/18)
	2020*	112/122	7.5	30 (12/29)	27 (11/29)
	2021 ^{fb}	106/122	7.3	54 (09/04)	24 (09/07)
2021*	104/122	6.8	24 (09/07)	17 (08/26)	

Appendix 1B. PM10

PM10 Data Summary

City and Station	Year	Sample days: Actual/ Expected	Days >150	24-Hour Averages ($\mu\text{g}/\text{m}^3$)	
				Maximum	2nd Highest
Eugene	2012	61/61	0	47 (08/13)	43 (09/06)
Eugene Hwy 99 N (E99)	2013	60/61	0	59 (08/20)	42 (11/24)
EPA# 410390059	2014	61/61	0	46 (11/19)	37 (09/08)
^{fb} Wildfire data included	2015 ^{fb}	60/60	0	97 (08/22)	53 (07/29)
* Wildfire flagged data removed	2016	60/61	0	57 (08/22)	42 (09/13)
	2017 ^{fb}	355/365	3	239 (09/04)	226 (09/03)
	2017*	338/365	0	57 (01/16)	52 (12/09)
	2018 ^{fb}	339/365	0	134 (08/21)	83 (08/20)
	2019	354/365	0	77 (08/26)	31 (08/27)
	2020 ^{fb}	356/366	11	588 (09/13)	579 (09/12)
	2020*	344/366	0	59 (08/14)	58 (09/02)
	2021	359/365	0	66 (09/03)	64 (08/04)
La Grande	2012	57/61	0	37 (08/07)	36 (08/13)
Ash Street (LAS)	2013	62/61	0	76 (01/22)	35 (12/06)
EPA # 410610119	2014	60/61	0	50 (11/19)	43 (11/13)
^{fb} Wildfire data included	2015 ^{fb}	60/60	0	69 (08/22)	41 (08/28)
Moved to Hall and N Street (Sept.	2016	45/61	0	45 (11/02)	27 (12/20)
Hall and North St. (LHN)	2017 ^{fb}	56/61	0	64 (08/11)	55 (08/05)
EPA # 410610123	2018 ^{fb}	61/61	0	54 (07/14)	51 (08/06)
	2019	61/61	0	48 (03/16)	36 (11/05)
	2020	58/61	0	49 (08/25)	39 (02/21)
	2021	58/61	0	82 (08/14)	43 (08/20)
Klamath Falls					
Peterson School (KFP)	2019	361/365	0	62 (10/12)	58 (10/15)
EPA # 410350004					
Medford	2012 ^{fb}	44/61	0	37 (01/28)	36 (08/13)
Welch & Jackson (MWJ)	2013 ^{fb}	58/61	0	91 (08/08)	84 (08/14)
EPA # 410292129	2014	54/61	0	41 (01/05)	35 (12/31)
^{fb} Wildfire data included	2015 ^{fb}	57/60	0	61 (08/22)	52 (08/28)
* Wildfire flagged data removed	2016	53/61	0	33 (12/20)	28 (01/07)
	2017 ^{fb}	58/61	1	175 (09/04)	136 (08/29)
	2017*	53/61	0	47 (01/31)	39 (12/09)
	2018 ^{fb}	55/61	0	99 (07/25)	66 (07/19)
	2019 ^{fb}	58/61	0	118 (07/26)	54 (01/03)
	2020 ^{fb}	60/61	0	62 (10/06)	46 (09/18)
	2021 ^{fb}	58/61	1	154 (08/14)	108 (09/07)

Appendix 1B. PM10

City and Station	Year	Sample days: Actual/ Expected	Days >150	24-Hour Averages (µg/m3)	
				Maximum (date)	2nd Highest (date)
Oakridge	2012	63/61	0	47 (02/03)	44 (01/04)
Willamette Center Trailer (OAK)	2013	61/61	0	53 (12/30)	41 (01/22)
EPA# 410392013	2014	61/61	0	55 (01/05)	43 (08/27)
* Wildfire flagged data removed	2015	60/60	0	37 (02/17)	32 (02/23)
[Ⓡ] Wildfire data included	2016	60/61	0	30 (12/08)	25 (02/24)
	2017*	336/365	0	55 (12/07)	44 (12/13)
	2017 [Ⓡ]	352/365	4	210 (09/04)	173 (09/05)
	2018 [Ⓡ]	354/365	0	76 (08/21)	60 (08/22)
	2019	354/365	0	53 (05/04)	49 (06/14)
	2020 [Ⓡ]	351/366	8	592 (09/12)	424 (09/13)
	2020*	341/366	0	40 (12/03)	38 (02/20)
	2021 [Ⓡ]	352/365	1	157 (09/07)	129 (08/14)
Portland Area	2012	111/122	0	45 (01/28)	34 (09/18)
SE Portland (SEL)	2013	120/122	0	44 (12/12)	43 (12/12)
SE Lafayette	2014	120/122	0	37 (02/10)	30 (09/11)
EPA# 410510080	2015 [Ⓡ]	119/121	0	68 (08/22)	33 (11/24)
	2016	119/122	0	34 (08/19)	32 (12/26)
	2017 [Ⓡ]	120/122	0	70 (09/16)	59 (08/02)
[Ⓡ] Wildfire data included	2018 [Ⓡ]	117/122	0	54 (08/15)	27 (02/07)
	2019	119/122	0	33 (11/23)	29 (12/05)
	2020	119/122	0	35 (09/09)	35 (11/02)
	2021	116/122	0	32 (03/17)	29 (03/02)
N. Portland (PNR)	2012	58/61	0	36 (01/28)	35 (09/18)
N. Emerson (N. Roselawn)	2013	61/61	0	43 (11/30)	40 (12/12)
EPA # 410510246	2014	60/61	0	18 (09/14)	17 (11/19)
Site shut down, restarted as PHS in	2015 [Ⓡ]	58/60	0	73 (08/22)	45 (11/24)
2017	2017 [Ⓡ]	46/61	0	52 (09/16)	29 (08/29)
N. Portland (PHS)	2018	61/61	0	29 (02/07)	27 (10/17)
Humboldt School	2019	61/61	0	29 (11/23)	28 (12/05)
EPA # 410512010	2020	58/61	0	21 (12/29)	20 (02/03)
[Ⓡ] Wildfire data included	2021	59/61	0	27 (03/17)	25 (10/19)
Hillsboro (HHF)					
Hare Field	2019	56/61	0	35 (12/05)	32 (07/14)
EPA # 410670004					
Gresham (GLC)					
Learning Center	2017 [Ⓡ]	57/61	0	90 (09/16)	62 (09/04)
EPA # 410512008	2017*	54/61	0	34 (12/21)	34 (01/07)

Appendix 1C. Ozone

Ozone Data Summary

Station Location and Number	Year	Sample days: Actual/ Expected	8-hour Aver. Maximum (ppb)	4th Highest 8hr Aver. (ppb)	# of Days >Std	3-year Aver. of 4th High (ppb)
Eugene Area	2012	153/153	65 (08/12)	59 (05/13)	0	58
Eugene	2013	153/153	57 (07/09)	53 (05/03)	0	57
Amazon Park (AMZ)	2014	153/153	61 (07/15)	58 (08/26)	0	56
EPA# 410390060	2015 [Ⓡ]	152/153	78 (07/02)	68 (07/30)	1	59
[Ⓡ] Wildfire smoke – this can elevate ozone concentrations	2016	153/153	64 (08/19)	57 (08/13)	0	61
	2017 [Ⓡ]	153/153	91 (08/02)	70 (08/08)	3	65
	2018 [Ⓡ]	148/153	65 (07/25)	60 (08/21)	0	62
	2019	153/153	62 (08/27)	54 (05/10)	0	61
The monitor malfunctioned during the extreme smoke	2020	142/153	66 (08/15)	55 (07/27)	0	56
	2021	153/153	71 (08/13)	62 (08/12)	1	57
Saginaw (SAG)	2012	152/153	65 (09/17)	62 (09/13)	0	60
79980 Delight Valley	2013	153/153	59 (07/09)	56 (07/26)	0	59
School Road	2014	153/153	62 (07/15)	58 (08/01)	0	58
EPA# 410391007	2015	153/153	80 (07/02)	71 (08/19)	1	61
[Ⓡ] Wildfire smoke – this can elevate ozone concentrations	2016	153/153	63 (08/19)	56 (07/28)	0	61
	2017 [Ⓡ]	153/153	91 (08/02)	73 (08/01)	4	66
	2018 [Ⓡ]	153/153	68 (07/25)	60 (07/12)	0	63
	2019	153/153	65 (08/27)	55 (07/25)	0	62
The monitor malfunctioned during the extreme smoke	2020	139/153	62 (08/15)	52 (08/14)	0	55
	2021	153/153	68 (07/30)	59 (08/13)	0	55
Hermiston	2012	150/153	73 (05/15)	68 (08/07)	0	63
Municipal	2013	151/153	66 (07/19)	62 (05/07)	0	62
Airport (HMA)	2014	146/153	67 (07/12)	64 (08/03)	0	64
EPA # 410591003	2015	151/153	73 (07/03)	70 (08/19)	0	65
[Ⓡ] Wildfire smoke – this can elevate ozone concentrations	2016	137/153	74 (06/07)	63 (07/14)	1	65
	2017 [Ⓡ]	153/153	80 (08/08)	73 (08/09)	7	68
	2018 [Ⓡ]	97/153	66 (07/13)	60 (05/22)	0	65
	2019	152/153	65 (08/06)	59 (06/01)	0	64
The monitor malfunctioned during the extreme smoke	2020	141/153	60 (07/30)	56 (09/10)	0	58
	2021	153/153	74 (08/04)	66 (08/15)	1	60

Appendix 1C. Ozone

Station Location and Number	Year	Sample days: Actual/ Expected	8-hour Aver. Maximum (ppb)	4th Highest 8hr Aver. (ppb)	# of Days >Std	3-year Aver. of 4th High (ppb)
Medford Area	2012	153/153	73 (08/14)	66 (07/11)	0	61
Talent (TAL)	2013	149/153	70 (07/09)	67 (08/06)	0	63
7112 Rapp Lane	2014	152/153	64 (07/16)	59 (07/10)	0	64
EPA# 410290201	2015 [Ⓡ]	140/153	86 (08/01)	69 (07/03)	1	64
[Ⓡ] Wildfire smoke – this can elevate ozone concentrations	2016	131/153	50 (05/13)	49 (05/11)	0	58
	2017 [Ⓡ]	150/153	83 (08/02)	78 (08/03)	5	65
	2018 [Ⓡ]	153/153	76 (07/23)	74 (07/24)	6	67
	2019 [Ⓡ]	153/153	80 (07/26)	62 (06/15)	1	71
The monitor malfunctioned during the extreme smoke	2020	146/153	67 (09/15)	60 (09/06)	0	65
	2021	153/153	78 (08/13)	69 (09/04)	2	63
Salem Area	2012	150/153	68 (09/14)	63 (08/04)	0	59
Cascade Jr High (CJH)	2013	150/153	62 (08/21)	55 (05/10)	0	58
Turner	2014	145/153	81 (09/15)	62 (07/12)	1	59
EPA# 410470004	2015	153/153	78 (08/18)	65 (06/27)	1	60
[Ⓡ] Wildfire smoke – this can elevate ozone concentrations	2016	150/153	69 (08/18)	65 (08/12)	0	64
	2017 [Ⓡ]	152/153	85 (08/03)	78 (08/28)	6	69
	2018 [Ⓡ]	150/153	70 (08/14)	66 (07/25)	0	69
	2019	149/153	66 (08/28)	55 (08/27)	0	66
The monitor malfunctioned during the extreme smoke	2020	142/153	63 (05/28)	57 (07/30)	0	59
	2021	151/153	69 (07/30)	64 (08/05)	0	58
State Hospital (SSH)	2018 [Ⓡ]	109/153	58 (07/16)	55 (07/15)	0	-
EPA# 410470041	2019	151/153	64 (08/28)	52 (08/27)	0	-
The monitor malfunctioned during the extreme smoke	2020	142/153	68 (07/27)	53 (07/26)	0	53
	2021	145/153	63 (07/31)	59 (07/30)	0	54
Portland Metro Area	2012	153/153	73 (08/17)	65 (05/13)	0	64
Carus (SPR)	2013	153/153	65 (09/11)	59 (05/06)	0	62
13575 Spangler Road	2014	153/153	72 (08/11)	62 (09/14)	0	62
Canby	2015	147/153	73 (08/18)	69 (07/30)	0	63
EPA# 410050004	2016	153/153	63 (08/19)	64 (07/28)	0	65
[Ⓡ] Wildfire smoke – this can elevate ozone concentrations	2017 [Ⓡ]	147/153	116 (08/03)	83 (08/28)	8	72
	2018 [Ⓡ]	149/153	76 (08/22)	70 (08/07)	3	72
	2019	152/153	71 (08/28)	65 (08/05)	1	72
The monitor malfunctioned during the extreme smoke	2020	139/153	77 (08/15)	70 (07/30)	3	68
	2021	149/153	90 (08/12)	63 (06/26)	1	66

Appendix 1C. Ozone

Station Location and Number	Year	Sample days: Actual/ Expected	8-hour Average Maximum (ppb)	4th Highest 8- hour Average (ppb)	# Of Days >Std**	3-Year Avg Of 4th High (ppb)
SE Portland (SEL) SE 57 & SE Lafayette EPA# 410510080 <i>Wildfire smoke – this can elevate ozone concentrations</i>	2012	364/366	63 (08/16)	61 (05/14)	0	57
	2013	359/365	58 (06/30)	53 (05/06)	0	57
	2014	364/365	75 (08/11)	55 (05/01)	0	56
	2015	363/365	62 (08/18)	57 (08/01)	0	55
	2016	357/366	60 (08/12)	55 (08/12)	0	55
	2017 [Ⓜ]	317/365	87 (08/02)	68 (08/09)	1	60
	2018 [Ⓜ]	353/365	76 (08/08)	67 (07/15)	2	63
	2019	330/365	66 (08/28)	58 (07/21)	0	64
	2020*	355/366	75 (07/27)	59 (07/30)	1	61
2021	363/365	72 (08/13)	61 (06/30)	1	59	
Sauvie Island (SIS) Social Security Beach EPA# 410090004 <i>Wildfire smoke – this can elevate ozone concentrations</i>	2012	144/153	57 (05/13)	53 (05/14)	0	51
	2013	150/153	52 (08/21)	47 (05/04)	0	50
	2014	153/153	56 (05/01)	50 (05/13)	0	50
	2015	150/153	63 (07/30)	58 (07/01)	0	52
	2016	152/153	58 (08/18)	51 (08/12)	0	54
	2017 [Ⓜ]	149/153	86 (08/02)	64 (08/04)	2	57
	2018 [Ⓜ]	152/153	55 (08/21)	53 (08/08)	0	56
	2019	150/153	65 (06/12)	51 (08/04)	0	56
	2020*	144/153	57 (07/30)	51 (05/27)	0	51
2021	153/153	58 (07/30)	55 (07/31)	0	52	
Tualatin Near Road I-5 EPA# 410670005 <i>Wildfire smoke – this can elevate ozone concentrations</i> <i>The monitor malfunctioned during the extreme smoke</i>	2014	231/365	72 (08/11)	53 (09/07)	1	-
	2015	361/365	67 (08/23)	52 (07/04)	0	-
	2016	355/366	57 (06/05)	48 (04/18)	0	51
	2017 [Ⓜ]	315/365	85 (08/03)	71 (08/02)	4	57
	2018 [Ⓜ]	336/365	56 (07/15)	54 (08/15)	0	57
	2019	152/153	65 (08/28)	50 (05/11)	0	58
2020*	140/153	76 (07/27)	59 (07/30)	1	54	
2021	362/365	70 (08/13)	56 (08/14)	0	55	

Appendices 1D Nitrogen Dioxide, 1E Sulfur Dioxide

Nitrogen Dioxide Data Summary

Station Location and Number	Year	Sample days: Actual/ Expected	Annual Arithmetic Mean (ppb)	98th Percentile of Daily Maximum (ppb)	3Yr Aver. of 98 th Percentile Daily Max (ppb)
Portland SE Lafayette at 57th (SEL) EPA # 410510080	2012	348/366	9	36	34
	2013	351/365	10	33	33
	2014	340/365	8	35	34
	2015	365/365	9	36	34
	2016	366/366	9	34	35
	2017	346/365	9	40	36
	2018	337/365	9	35	36
	2019	352/365	8	32	36
	2020	354/366	6	30	32
	2021	350/365	7	31	31
Tualatin Bradbury Ct. (TBC) (25meters from I-5) EPA# 410670005	2015	332/365	14	36	-
	2016	363/366	13	35	-
	2017	361/365	12	38	36
	2018	341/365	12	38	37
	2019	326/365	11	33	36
	2020	342/366	10	30	34
	2021	348/365	9	30	31

Sulfur Dioxide Data Summary

Station Location and Number	Year	Sample days: Actual/ Expected	1 Hr Aver. 99th Percentile (ppb)	3 Hr Aver. Maximum (ppb)	3 Hr Aver. 2nd Highest (ppb)
Portland SE Lafayette at (SEL) EPA # 410510080	2012	334/366	10	5	5
	2013	342/365	5	6	6
	2014	343/365	3	4	4
	2015	359/365	4	8	8
	2016	353/366	3	3	3
	2017	332/365	3	4	4
	2018	330/365	3	3	3
	2019	345/365	3	3	3
	2020	351/366	2	2	2
	2021	355/365	3	3	3

ppm - parts per million
ppb – parts per billion

Appendix1F Carbon Monoxide

Carbon Monoxide Data Summary

Station Location and Number	Year	Sample days: Actual/ Expected	Days > std	8-Hr Aver.		
				Maximum (ppm)	2 ND Highest (ppm)	
Portland SE Lafayette at 57th (SEL) EPA # 410510080	2012	349/366	0	2.3	2.2	
	2013	337/365	0	2.0	1.8	
	2014	356/365	0	1.3	1.3	
	2015	365/365	0	2.0	1.9	
	2016	311/366	0	1.5	1.5	
	2017	215/365	0	1.7	1.6	
	[Ⓕ] Wildfires smoke includes elevated carbon monoxide	2018	361/365	0	1.6	1.6
		2019	244/365	0	1.6	1.4
	* Wildfire data removed	2020 [Ⓕ]	360/366	3	14.2	14.1
		2020*	351/366	0	1.5	1.4
		2021	358/365	0	1.7	1.4
Tualatin Bradbury Ct. (TBC) (25meters from I-5) EPA# 410670005	2015	336/365	0	1.3	1.3	
	2016	317/366	0	1.3	1.3	
	2017	296/365	0	1.4	1.3	
	2018	325/365	0	1.0	1.0	
	[Ⓕ] Wildfires smoke includes elevated carbon monoxide	2019	355/365	0	1.0	1.0
		2020 [Ⓕ]	337/366	3	14.3	12.9
	* Wildfire data removed	2020*	328/366	0	1.0	0.9
	2021	349/365	0	1.0	0.9	

ppm - parts per million
ppb – parts per billion

Appendix G AQI

Air Quality Index Summary (Number of days in each health category by year)

Portland Metro		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Portland (Includes: PM2.5, Ozone, CO, NO2 & SO2)	2012	330	35	0	0	0	0	1
	2013	282	77	5	0	0	0	1
	2014	332	32	1	0	0	0	0
	2015	305	58	0	2	0	0	0
	2016	340	26	0	0	0	0	0
	2017	309	41	9	5	1	0	0
	2018	301	54	9	1	0	0	0
	2019	320	44	1	0	0	0	0
	2020	305	50	3	0	2	6	0
	2021	304	60	0	1	0	0	0
Beaverton (PM2.5 only)	2012	354	12	0	0	0	0	0
	2013	307	53	5	0	0	0	0
	2014	349	16	0	0	0	0	0
	2015	338	24	1	1	0	0	1
	2016	357	9	0	0	0	0	0
	2017	334	23	7	0	0	0	1
	2018	328	28	6	0	0	0	3
	2019	345	17	0	0	0	0	3
	2020	343	14	1	1	4	3	0
	2021	354	8	0	0	0	0	3
Forest Grove (PM2.5 only)	2019	141	39	0	0	0	0	185
	2020	317	23	0	3	4	1	18
	2021	340	14	0	0	0	0	11
Gresham (PM2.5 only)	2020	139	10	1	2	2	4	208
	2021	314	20	0	0	0	0	31
Hillsboro (PM2.5 only)	2011	308	50	7	0	0	0	0
	2012	334	29	1	0	0	0	2
	2013	281	71	8	1	0	0	4
	2014	324	40	1	0	0	0	0
	2015	309	54	1	1	0	0	0
	2016	331	33	0	0	0	0	2
	2017	298	60	5	0	0	0	2
	2018	306	51	6	0	0	0	2
	2019	316	46	1	0	0	0	2
	2020	328	29	0	2	2	3	1
2021	341	24	0	0	0	0	0	
Estacada	2021	307	36	1	0	0	0	21

Appendix G AQI

		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Coast								
Brookings	2020	109	8	1	4	0	0	244
	2021	216	2	1	0	0	0	146
Coos Bay	2020	323	13	1	6	0	0	23
	2021	283	4	0	0	0	0	78
Florence	2019	262	4	0	0	0	0	99
	2020	350	7	1	5	0	2	1
	2021	363	0	0	0	0	0	2
Tillamook	2020	144	5	2	4	0	0	211
	2021	335	0	0	0	0	0	30
Columbia Gorge								
Hood River (PM2.5 only)	2020	99	20	0	1	5	2	239
	2021	335	18	1	1	0	0	10
The Dalles (PM2.5 only)	2012	350	15	0	0	0	0	1
	2013	322	35	3	1	0	0	4
	2014	331	33	1	0	0	0	0
	2015	326	30	0	2	0	0	7
	2016	319	31	0	0	0	0	16
	2017	287	59	6	8	1	0	4
	2018	293	33	4	2	0	0	33
	2019	297	53	0	0	0	0	15
	2020	323	31	0	0	3	4	5
	2021	305	12	1	1	0	0	46

Appendix G AQI

		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Willamette Valley								
Albany (PM2.5 only)	2012	354	12	0	0	0	0	0
	2013	305	56	4	0	0	0	0
	2014	335	28	2	0	0	0	0
	2015	305	43	2	3	0	0	12
	2016	343	23	0	0	0	0	0
	2017	320	39	3	3	0	0	0
	2018	328	34	3	0	0	0	0
	2019	322	43	0	0	0	0	0
	2020	325	30	0	1	6	4	0
	2021	346	19	0	0	0	0	0
Corvallis (PM2.5 only) *Site closed in summer	2012	348	7	0	0	0	0	11
	2013	302	52	1	0	0	0	10
	2014	344	19	1	0	0	0	1
	2015	333	30	1	1	0	0	0
	2016*	185	9	0	0	0	0	172*
	2017	319	36	2	0	0	0	8
	2018	340	23	2	0	0	0	0
	2019	332	33	0	0	0	0	0
	2020	330	25	0	3	5	3	0
	2021	338	1	0	0	0	0	26
Dallas (PM2.5 only)	2021	329	3	0	0	0	0	33
Lyons (PM2.5 only)	2020	283	58	0	1*	0*	6*	18
	*Wildfire caused the site to be shut down for three weeks							
	2021	321	39	1	0	0	0	4
Mill City (PM2.5 only)	2021	293	36	1	0	0	0	36
Eugene/ Springfield (PM2.5 and Ozone)	2012	333	32	1	0	0	0	0
	2013	282	69	0	1	0	0	0
	2014	301	59	5	0	0	0	0
	2015	282	77	4	2	0	0	0
	2016	335	30	0	0	0	0	1
	2017	290	57	10	5	2	1	0
	2018	290	69	6	0	0	0	0
	2019	292	71	2	0	0	0	0
	2020	289	66	1	0	2	8	0
	2021	317	46	2	0	0	0	0

Appendix G AQI

Willamette Valley		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Salem (PM2.5 and Ozone)	2012	340	24	0	0	0	0	2
	2013	283	71	5	0	0	0	6
	2014	322	42	1	0	0	0	0
	2015	311	51	1	2	0	0	0
	2016	326	35	0	0	0	0	5
	2017	301	53	6	2	0	0	3
	2018	294	37	7	1	0	0	26
	2019	300	56	0	0	0	0	9
	2020	303	53	0	1	1	8	0
	2021	317	45	0	0	0	0	3
Silverton (PM2.5 only)	2020	180	23	1	1	1	8	152
	2021	342	21	0	0	0	0	2
Sweet Home (PM2.5 only)	2012	355	9	0	0	0	0	2
	2013	284	70	5	0	0	0	6
	2014	336	27	0	0	0	0	2
	2015	332	31	0	2	0	0	0
	2016	346	19	0	0	0	0	1
	2017	299	57	4	5	0	0	0
	2018	299	65	1	0	0	0	0
	2019	297	68	0	0	0	0	0
	2020	320	36	1	1	2	6	0
	2021	353	12	0	0	0	0	0
SW Oregon								
Cottage Grove (PM2.5 only)	2012	348	18	0	0	0	0	0
	2013	296	65	3	0	0	0	1
	2014	323	40	1	1	0	0	0
	2015	329	34	1	1	0	0	0
	2016	346	20	0	0	0	0	0
	2017	295	60	3	7	0	0	0
	2018	318	45	1	0	0	0	1
	2019	311	53	0	0	0	0	1
	2020	314	42	0	1	2	7	0
	2021	339	23	1	0	0	0	2

Appendix G AQI

SW Oregon		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Oakridge (PM2.5 only)	2012	339	19	6	0	0	0	2
	2013	272	80	13	0	0	0	0
	2014	277	75	13	0	0	0	0
	2015	286	71	6	1	0	0	1
	2016	330	36	0	0	0	0	0
	2017	267	74	13	8	2	0	1
	2018	286	74	2	1	0	0	2
	2019	283	73	4	0	0	0	5
	2020	297	57	3	1	4	4	0
	2021	302	42	10	9	0	0	2
Roseburg (PM2.5 only)	2012	354	8	0	0	0	0	4
	2013	301	64	0	0	0	0	0
	2014	330	34	0	0	0	0	1
	2015	326	35	1	0	0	0	3
	2016	314	14	0	0	0	0	27
	2017	303	49	4	3	0	0	6
	2018	293	43	2	0	0	0	27
	2019	288	59	0	0	0	0	18
	2020	313	43	1	1	2	6	0
	2021	339	21	3	2	0	0	0
Grants Pass (PM2.5 only)	2012	343	20	0	0	0	0	3
	2013	262	91	2	6	2	1	1
	2014	323	40	2	0	0	0	0
	2015	307	55	2	1	0	0	0
	2016	322	39	0	0	0	0	5
	2017	265	81	2	9	4	1	3
	2018	252	85	9	14	0	0	5
	2019	264	55	3	2	0	0	41
	2020	285	44	2	6	1	4	24
	2021	303	47	6	8	0	0	1

Appendix G AQI

SW Oregon		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Cave Junction (PM2.5 only)	2012	357	7	0	0	0	0	2
	2013	267	83	6	7	1	1	0
	2014	327	38	0	0	0	0	0
	2015	275	71	3	1	0	0	15
	2016	337	29	0	0	0	0	0
	2017	273	75	4	7	4	0	2
	2018	261	71	18	15	0	0	0
	2019	293	69	3	0	0	0	0
	2020	282	59	5	12	0	7	1
	2021	297	52	10	6	0	0	0
Shady Cove (PM2.5 only)	2012	364	0	0	0	0	0	2
	2013	308	46	4	5	0	0	2
	2014	341	20	1	0	0	0	3
	2015	333	15	9	6	1	1	0
	2016	346	5	0	0	0	0	15
	2017	294	32	9	11	1	0	18
	2018	303	25	9	27	1	0	0
	2019	358	7	0	0	0	0	0
	2020	329	23	1	4	1	1	7
	2021	300	30	6	24	5	0	0
Medford (PM2.5 and Ozone)	2012	286	79	1	0	0	0	0
	2013	222	126	10	5	2	0	0
	2014	276	88	1	0	0	0	0
	2015	248	99	11	7	0	0	0
	2016	312	54	0	0	0	0	0
	2017	238	98	14	9	5	1	0
	2018	232	87	8	22	3	0	13
	2019	295	63	3	4	0	0	0
	2020	270	83	2	4	3	4	0
	2021	253	83	10	19	0	0	0
Ashland (PM2.5 only)	2016	163	8	0	0	0	0	195
	2017	300	43	7	11	1	2	1
	2018	300	26	11	20	4	0	4
	2019	351	9	1	4	0	0	0
	2020	322	32	1	4	3	4	0
	2021	303	32	11	19	0	0	0
Crater Lake (PM2.5 only)	2020	43	15	4	5	1	0	298
	2021	32	24	15	21	0	0	273

Appendix G AQI

Central OR		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Bend (PM2.5 only)	2012	343	15	3	0	0	0	5
	2013	332	33	0	0	0	0	0
	2014	335	29	1	0	0	0	0
	2015	329	33	2	1	0	0	0
	2016	335	5	1	0	0	0	25
	2017	291	48	4	8	3	0	11
	2018	307	47	5	4	0	0	2
	2019	345	13	0	0	0	0	7
	2020	320	33	5	0	2	6	0
	2021	314	27	9	8	1	1	5
La Pine (PM2.5 only)	2020	103	45	2	1	6	1	208
	2021	186	51	7	8	6	2	105
Prineville (PM2.5 only)	2012	313	45	2	0	0	0	6
	2013	255	97	11	2	0	0	0
	2014	289	66	4	6	0	0	0
	2015	290	63	6	2	0	0	4
	2016	288	59	1	0	0	0	18
	2017	260	81	8	8	0	0	8
	2018	289	71	3	2	0	0	0
	2019	296	69	0	0	0	0	0
	2020	297	61	0	2	3	3	0
	2021	311	45	7	2	0	0	0
Redmond (PM2.5 only)	2020	325	18	0	0	3	5	15
	2021	322	22	5	5	1	0	10
Detroit Lake (PM2.5 only)	2021	142	19	7	10	1	0	186

Appendix G AQI

Central Oregon		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Sisters (PM2.5 only)	2012	334	10	1	11	2	3	4
	2013	348	16	0	0	0	0	1
	2014	350	15	0	0	0	0	0
	2015	332	31	0	2	0	0	0
	2016	346	1	0	0	0	0	19
	2017	286	29	2	15	8	0	22
	2018	317	33	7	3	0	0	5
	2019	351	9	4	1	0	0	0
	2020	307	25	3	1	1	7	22
	2021	332	23	4	4	5	1	0
Madras Summer (PM2.5 only) Annual	2012	63	7	0	0	0	0	0
	2013	76	16	0	0	0	0	0
	2014	61	19	0	2	0	0	0
	2015	75	13	3	1	0	0	0
	2016	119	1	0	0	0	0	2
	2017	58	25	5	3	1	0	0
	2018	135	46	6	1	0	0	177
	2019	290	73	2	0	0	0	0
	2020	297	53	3	0	3	5	5
	2021	316	43	4	4	2	0	0
John Day (PM2.5 only)	2012	302	58	2	1	0	0	3
	2013	221	127	3	0	0	0	14
	2014	266	91	1	1	0	0	6
	2015	279	75	4	5	0	0	2
	2016	285	56	0	0	0	0	25
	2017	257	89	9	3	0	0	7
	2018	251	104	1	2	0	0	7
	2019	255	93	1	0	0	0	16
	2020	248	109	1	5	1	1	1
	2021	236	119	5	5	0	0	0

Appendix G AQI

SE Oregon		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Burns (PM2.5)	2012	314	49	1	0	0	0	2
	2013	266	89	8	0	0	0	2
	2014	277	83	3	2	0	0	0
	2015	282	80	3	0	0	0	0
	2016	279	77	1	0	0	0	8
	2017	248	109	6	2	0	0	9
	2018	251	104	1	2	0	0	7
	2019	265	95	5	0	0	0	0
	2020	251	102	2	8	0	1	2
	2021	258	98	5	4	0	0	0
Klamath Falls (PM2.5)	2012	280	70	9	0	0	0	7
	2013	220	118	21	3	0	0	3
	2014	274	89	2	0	0	0	0
	2015	263	92	8	2	0	0	0
	2016	292	71	0	0	0	0	3
	2017	246	93	13	8	1	0	4
	2018	219	105	11	25	3	0	2
	2019	287	78	0	0	0	0	0
	2020	264	75	12	3	1	1	10
	2021	241	86	14	24	0	0	0
Chiloquin (PM2.5)	2020	236	17	2	4	4	0	103
	2021	113	28	6	22	5	0	191
Lakeview (PM2.5)	2012	292	48	8	2	0	0	16
	2013	262	63	18	20	0	0	2
	2014	302	48	12	1	0	0	2
	2015	294	68	3	0	0	0	0
	2016	318	41	0	1	0	0	6
	2017	288	57	17	1	0	0	2
	2018	277	59	13	9	0	0	7
	2019	311	51	1	0	0	0	2
	2020	293	55	13	4	0	0	1
	2021	278	64	17	6	0	0	0

Appendix G AQI

NE Oregon		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days	
The Dalles (PM2.5 only)	2012	350	15	0	0	0	0	1	
	2013	322	35	3	1	0	0	4	
	2014	331	33	1	0	0	0	0	
	2015	326	30	0	2	0	0	7	
	2016	319	31	0	0	0	0	16	
	2017	287	59	6	8	1	0	4	
	2018	293	33	4	2	0	0	33	
	2019	297	53	0	0	0	0	15	
	2020	323	31	0	0	3	4	5	
	2021	305	12	1	1	0	0	46	
Hermiston (Ozone - summer only)	2012	130	19	0	0	0	0	4	
	2013	140	11	0	0	0	0	2	
	2014	132	11	0	0	0	0	10	
	2015	133	18	0	0	0	0	2	
	2016	115	19	1	0	0	0	18	
	2017	103	43	6	1	0	0	0	
	2018	90	7	0	0	0	0	56	
	2019*	143	11	0	0	0	0	1	
	PM2.5 & ozone	2020	214	23	0	0	0	1	128
	2021*	302	54	4	2	0	0	3	
Pendleton (PM2.5 only)	2012	339	24	0	0	0	0	3	
	2013	298	58	6	0	0	0	3	
	2014	312	40	0	0	0	0	13	
	2015	312	47	2	2	0	0	2	
	2016	341	25	0	0	0	0	0	
	2017	279	74	7	2	1	0	2	
	2018	276	40	5	3	1	0	40	
	2019	298	60	1	0	0	0	6	
	2020	324	34	0	1	3	4	0	
	2021	323	35	3	2	0	0	2	
La Grande (PM2.5 only)	2012	332	31	1	0	0	0	2	
	2013	286	73	6	0	0	0	0	
	2014	291	66	6	0	0	0	2	
	2015	285	59	8	3	0	0	10	
	2016	329	35	0	0	0	0	2	
	2017	308	49	5	3	0	0	0	
	2018	322	35	5	1	0	0	2	
	2019	344	19	0	0	0	0	2	
	2020	334	23	1	5	3	0	0	
	2021	321	33	2	2	0	0	7	

Appendix G AQI

NE Oregon		Good	Moderate	USG	Unhealthy	Very Unhealthy	Hazardous	Missing days
Cove (PM2.5 only)	2021	298	31	5	2	0	0	29
Enterprise (PM2.5 only)	2012	340	13	1	0	0	0	12
	2013	323	41	0	0	0	0	1
	2014	329	33	3	0	0	0	0
	2015	322	34	3	5	0	0	1
	2016	318	31	0	0	0	0	17
	2017	291	50	6	3	0	0	15
	2018	272	46	2	0	0	0	45
	2019	333	29	1	0	0	0	2
	2020	323	36	0	7	0	0	0
	2021	311	43	6	4	0	0	1
Baker City (PM2.5 only)	2012	349	15	2	0	0	0	0
	2013	302	63	0	0	0	0	0
	2014	317	48	0	0	0	0	0
	2015	326	29	8	2	0	0	0
	2016	339	27	0	0	0	0	0
	2017	307	52	3	3	0	0	0
	2018	313	35	1	1	0	0	15
	2019	328	32	0	0	0	0	5
	2020	327	32	2	5	0	0	0
	2021	312	47	1	4	0	0	1
Ontario (PM2.5 only)	2020	62	59	1	6	0	0	238
	2021	272	53	4	0	0	0	36

Appendix 1H Air Toxics

Air Toxics

Here is a list of the main air toxics and some additional compounds not classified as air toxics that DEQ measures. Summary data for all air toxics can be found in EPA's "air data" web site which you can access from EPA AIRNow. DEQ publishes an annual air toxics trends report which will show the data.

Carbonyl		PAH	
Parameter	CAS #	Parameter	CAS #
Acetaldehyde	75070	Acenaphthene	83329
Benzaldehyde	100527	Acenaphthylene	208968
Butyraldehyde	123728	Anthracene	120127
Crotonaldehyde	123739	Benzo(a)anthracene	56553
Formaldehyde	50000	Benzo(a)pyrene	50328
Heptaldehyde	111717	Benzo(a)pyrene-d12	
Hexaldehyde	66251	Benzo(b)fluoranthene	205992
Isovaleraldehyde	590863	Benzo(e)pyrene	197972
m-Tolualdehyde	620235	Benzo(g,h,i)perylene	191242
o-Tolualdehyde	529204	Benzo(k)fluoranthene	207089
Propionaldehyde	123386	Chrysene	218019
p-Tolualdehyde	104870	Coronene	191071
Valeraldehyde	110623	Dibenzo(a,h)anthracene	53703
Metals		Dibenzofuran	132649
Antimony, Total		Dibenzothiophene	132650
Arsenic, Total		Fluoranthene	206440
Beryllium, Total		Fluoranthene-d10	
Cadmium, Total		Fluorene	86737
Chromium, Total		Fluorene-d10	
Cobalt, Total		Indeno(1,2,3-cd)pyrene	193395
Hexavalent Chromium [Cr(VI)]		Naphthalene	91203
Lead, Total		Perylene	198550
Manganese, Total		Phenanthrene	85018
Nickel, Total		Pyrene	129000
Selenium, Total		Pyrene-d10	

Appendix 1H Air Toxics

VOC			
Parameter	CAS #	Parameter	CAS #
1,1,1-Trichloroethane	71556	Carbon disulfide	75150
1,1,2,2-Tetrachloroethane	79345	Carbon tetrachloride	56235
1,1,2-Trichloroethane	79005	Chlorobenzene	108907
1,1-Dichloroethane	75343	Chloroethane	75003
1,1-Dichloroethylene	75354	Chloroform	67663
1,2,4-Trichlorobenzene	120821	Chloromethane	74873
1,2,4-Trimethylbenzene	95636	cis-1,2-Dichloroethene	156592
1,2-Dibromoethane (EDB)	106934	cis-1,3-Dichloropropene	10061015
1,2-Dichlorobenzene	95501	Cyclohexane	110827
1,2-Dichloroethane (EDC)	107062	Dibromochloromethane	124481
1,2-Dichloropropane	78875	Dichlorodifluoromethane (Freon 12)	75718
O-Xylene	95476	Dichlorotetrafluoroethane (Freon 114)	76142
1,3,5-Trimethylbenzene	108678	Ethylbenzene	100414
1,3-Butadiene	106990	Hexachloro-1,3-butadiene	87683
1,3-Dichlorobenzene	541731	Isopropanol	67630
p-Xylene + m-Xylene	106423 +	Methyl tert-butyl ether (MTBE)	1634044
2,5-Dimethylbenzaldehyde	5779942	Methylene chloride	75092
2-Butanone (MEK)	78933	Methylmethacrylate	80626
Chloroprene	126998	n-Heptane	142825
2-Hexanone	591786	n-Hexane	110543
4-Ethyltoluene	622968	1,4-Dichlorobenzene	106467
Methyl Isobutyl Ketone (MIBK)	108101	Perchloroethylene (Perc)	127184
Acetonitrile	75058	Styrene	100425
Acrolein	107028	Tetrahydrofuran	109999
Acrylonitrile	107131	Toluene	108883
Benzene	71432	trans-1,2-Dichloroethene	156605
Benzyl chloride	100447	trans-1,3-Dichloropropene	10061026
Bromodichloromethane	75274	Trichloroethylene	79016
Bromofluorobenzene	460004	Trichlorofluoromethane (Freon 11)	75694
Bromoform	75252	Trichlorotrifluoroethane (Freon 113)	76131
Bromomethane	74839	Vinyl chloride	75014

Appendix 2 Ambient Air Monitoring Network

Appendix 2 Ambient Air Monitoring Network

The following tables and map describe the air quality monitoring network.

The following abbreviations are used in the network location tables and maps:

BP	Barometric pressure
CO	Carbon monoxide
DT	Delta temperature (inversion indicator)
HAPS	Air Toxics (Hazardous Air Pollutants)
IMPROVE	EPA visibility program
Lead	Lead sampling
NADP	National Atmospheric Deposition Program
NO ₂	Nitrogen dioxide
O ₃	Ozone
PM2.5	Fine particulate (2.5 microns) based on filter sampling
PM2.5 Estimate	PM2.5 estimate based on light scattering.
PM2.5 Spec	PM2.5 chemically speciated
PM10	Fine particulate (10 micron)
RH	Relative humidity
SO ₂	Sulfur dioxide
SR	Solar radiation
Temp	Temperature
WS/WD	Wind direction and speed

Appendix 2 Ambient Air Monitoring Network

Table 12. Oregon Ambient Air Monitoring Network.

City	Address	Site Code	EPA#	SO ₂	CO	NO ₂	Ozone	PM2.5	PM2.5 Est	PM2.5 Spec	PM10	HAPS	Lead	WS/WVD	TEMP	DT	BP	RH	SR
Albany	Calapooia School	ACS	410430009						x										
Applegate	Provolt	PSO	410330011						x										
Bend	Bend Pump Station	BPS	410170120						x										
	Bend High School	BEE	410170123						x			x							
	Road Department	BRD	410140121											x	x			x	x
Baker City	Forest Service	BFS	410010004						x										
Brookings	Coos Forest PA	BDF	410150002						x										
Burns	Washington St.	BWS	410250003					x	x	x				x	x		x		
Cave Junction	USFS Station	CJFS	410330036						x										
Chiloquin	Duke Dr	CDD	410352040						x										
Coos Bay	Marshfield HS	CBM	410110003						x										
Corvallis	FD #3, Circle Blvd	CCB	410030013						x										
	EPA ORD Office	CJT	410030014						x										
Cottage Grove	City Shops	CGC	410399004					x	x										
Crater Lake	Lodge at Rim	CLM	410351002						x										
Dallas	LeCreole Middle	DLM	410530004						x										
Detroit Lake	USFS Station	DFS	410470123						x										
Eugene (Saginaw)	Pacific Highway	E99	410390059					x	x		x								
	Amazon Park	AMZ	410390060				x	x	x										
	Wilkes Drive	EWD	410390101						x					x					
Enterprise	Forest Service	EFS	410630001						x										
Estacada	Clackamas River	ECR	410050011						x										
Florence	Forestry	FDL	410390100						x										
Grants Pass	Parkside School	GPP	410330114					x	x					x	x				
Hermiston	Municipal Airport	HMA	410591003				x	x						x	x				
Hood River	WS FD #2	HRF	410270001						x										
John Day	Davidson Street	JDD	410230002						x										
Klamath Falls	Peterson School	KFP	410350004					x	x					x	x	x	x		
La Grande (Cove)	N Hall Ave & E N St	LHN	410610123						x		x	x	x	x	x			x	x
	City Hall	CCH	410610120						x					x					
Lakeview	Center & M Streets	LCM	410370001					x	x					x	x		x		
La Pine	Rural Fire Station	LFD	410172002						x										
Lyons	Mari-lynn School	LMS	410432003						x										

Appendix 2 Ambient Air Monitoring Network

Oregon Ambient Air Monitoring Network. (Continued)

City	Address	Site Code	EPA#	SO2	CO	NO2	Ozone	PM2.5	PM2.5 Est	PM2.5 Spec	PM10	HAPS	Lead	WS/WMD	TEMP	DT	BP	RH	SR	
Madras	Westside School	MWS	410310007						x											
Medford (Ashland)	Rapp Rd Talent	TAL	410290201				x		x											
	Rossanley Drive	MTV	410291002											x	x	x	x	x	x	
	Welch & Jackson	MWJ	410292129					x	x		x	x								
	Fire Department	AFD	410290203						x											
Mill City	High School	MCS	41043010						x											
Mt. Hood	Multorpor	MUL	41005010						x											
Oakridge	School Street	OAK	41039201					x	x		x			x						
Ontario	May Roberts	OMR	41045000						x											
Pendleton	SW Marshall	PMC	41059012						x											
Portland (Beaverton) (Carus) (Hillsboro) (Forest) (Gresham) (Sauvie Is)	57 th & SE	SEL	41051008	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	
	Tualatin – I-5	TBC	41067000		x	x	x	x	x					x	x				x	
	Humboldt	PHS	41051201								x	x	x							
	Jefferson High	PJH	41051119											x						
	Highland Park	BHP	41067011						x											
	Spangler Rd.	SPR	41005000				x		x					x	x					
	NE Grant Street	HHF	41067000					x	x			x	x							
	Pacific	FGP	41067000						x											
	Centennial HS	GCH	41051003						x											
	NW Sauvie	SIS	41009000				x		x					x	x					
Prineville	SE Court Street	PDP	41013010					x	x					x	x		x	x	x	
Redmond	Redmond HS	RHS	41017100						x											
Roseburg	NW Garden	RGV	41019000						x											
	Douglas Co. FD	RFD	41019000						x											
Salem (Turner)	Salem State	SSH	41047004				x		x											
	Cascade Jr.	CJH	41047000				x							x	x					
Shady Cove	Shady Cove	SCS	41029001						x											
Sisters	USFS office	SFS	41017000						x											
Springfield	City Hall	SCH	41039100						x					x						
Sweet Home	Fire Department	SFD	41043200						x											
Tillamook	ODF office	TDF	41057000						x											
The Dalles	Cherry Heights	TDC	41065000						x											
Toledo	Police Station	TPS	41041000						x											

Appendix 2 Ambient Air Monitoring Network

Table 13. Oregon Ambient Air Monitoring Visibility and Forest Health Network.

Region	Location	EPA & IMPROVE Code	PM2.5 est.	IMPROVE	WS/WD
Visibility Sites					
Crater Lake NP	Park HQ	CRLA	X	X	X
Eagle Cap Wild.	Strawberry	STAR		X	
Kalmiopsis Wild.	Kalmiopsis	KALM		X	
Mt Hood Wild.	Multopor	410050102/ MOHO	X	X	
Three Sisters Wild.	Three Sisters	THIS		X	
Ag Burning Sites					
Willamette Valley	Carus,	410050004	X		X
Willamette Valley	Silverton	410470007	X		X
Willamette Valley	Lyons	410432003	X		
Willamette Valley	Mill City	410430104	X		
Willamette Valley	Detroit Lake	410470123	X		
Willamette Valley	Salem	410470041	X		
Union County	Cove	410610120	X		X

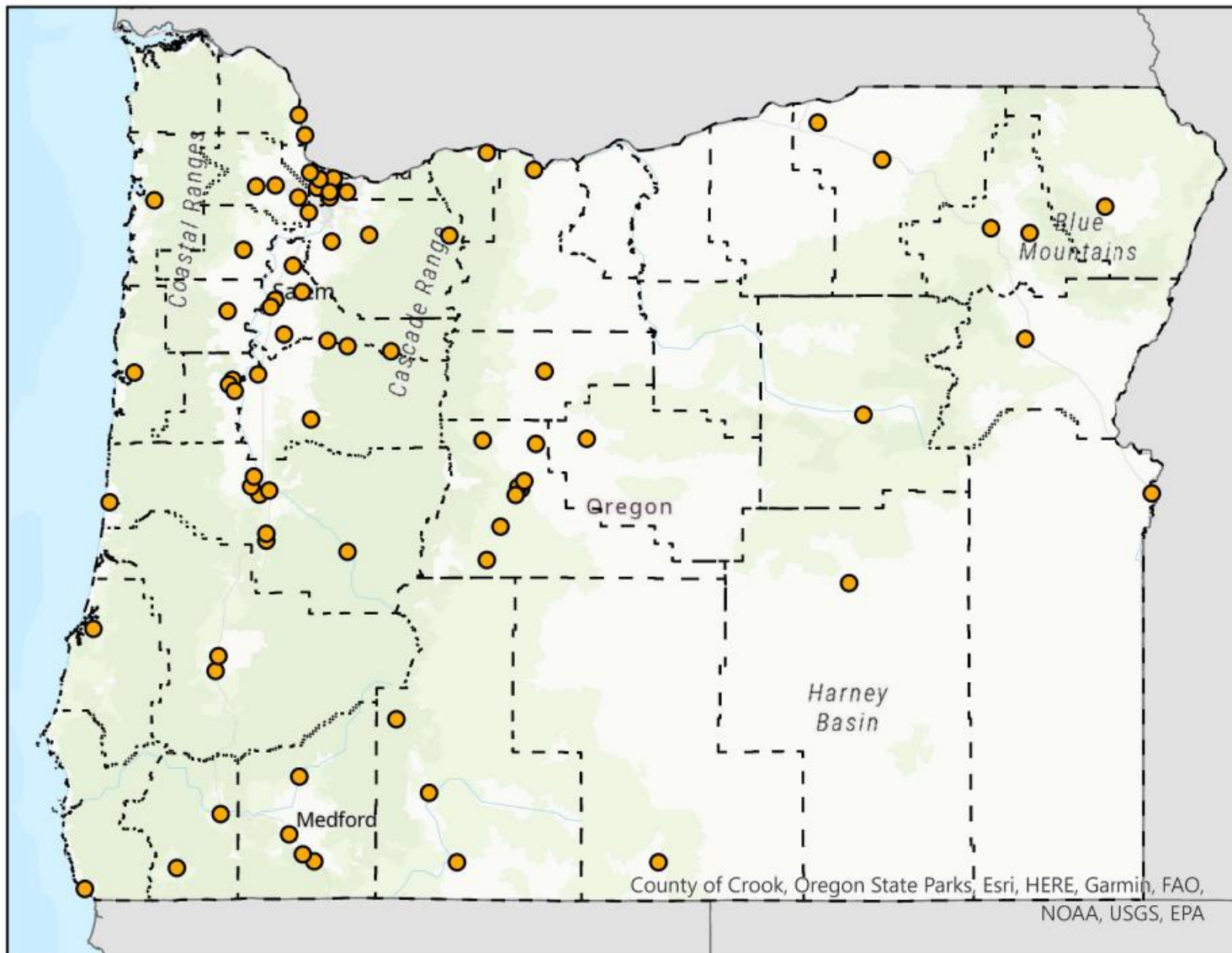


Figure 113. 2020 Ambient Air Quality Monitoring Network.

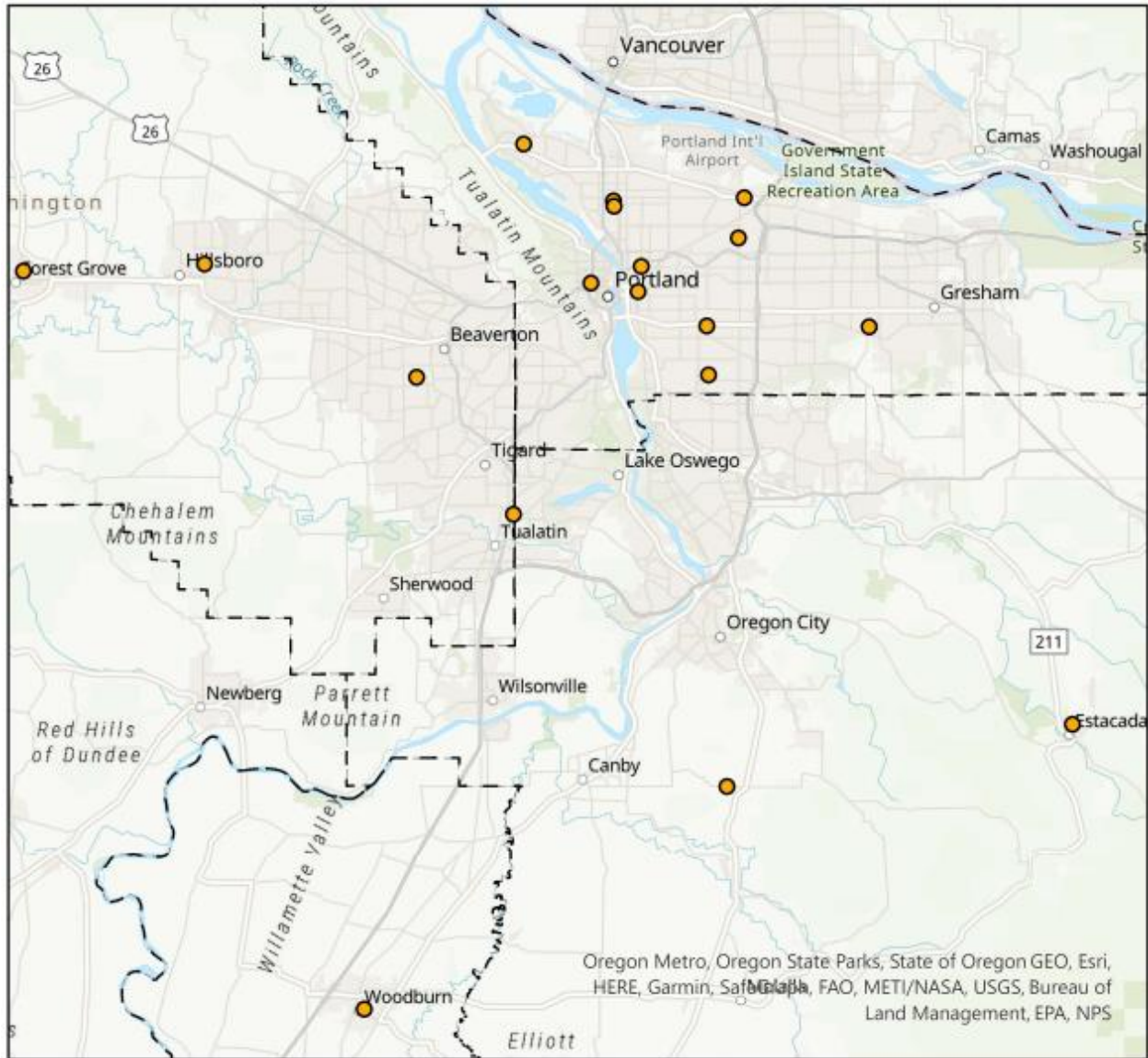


Figure 114. 2020 Portland Metro Ambient Air Quality Monitoring Network

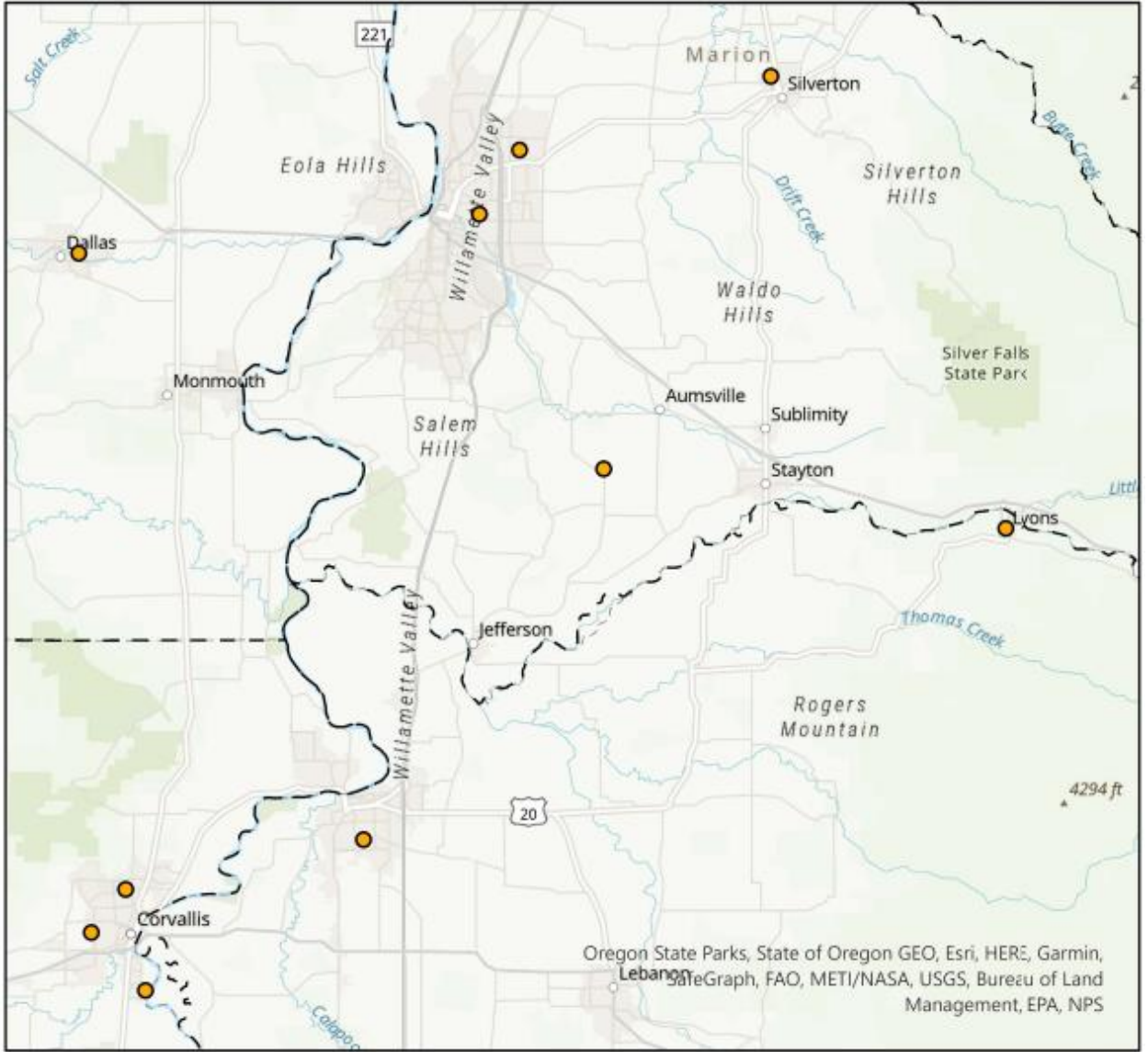


Figure 115. 2020 Mid Willamette Valley Ambient Air Quality Monitoring Network

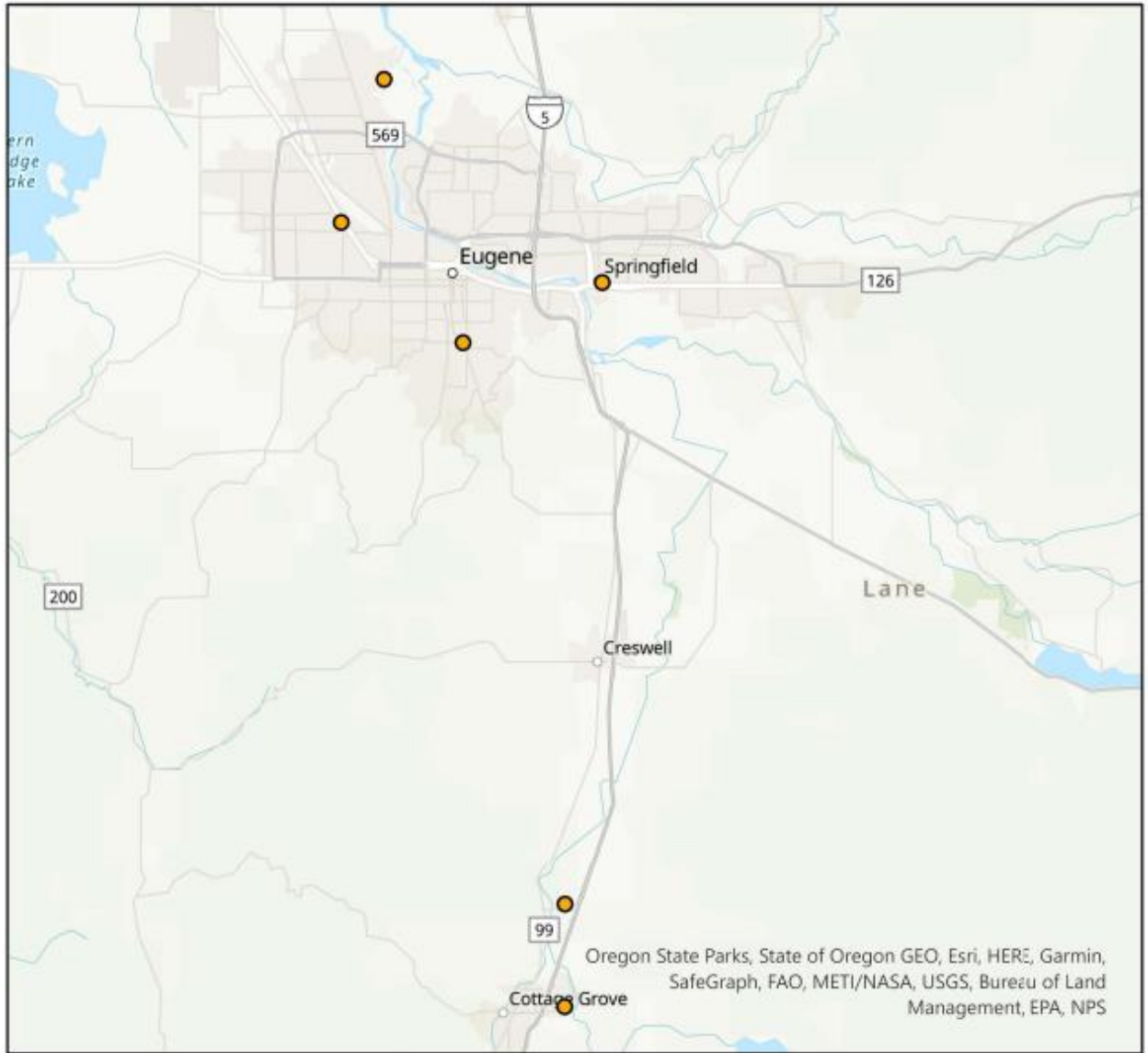


Figure 116. 2020 Eugene-Springfield Ambient Air Quality Monitoring Network

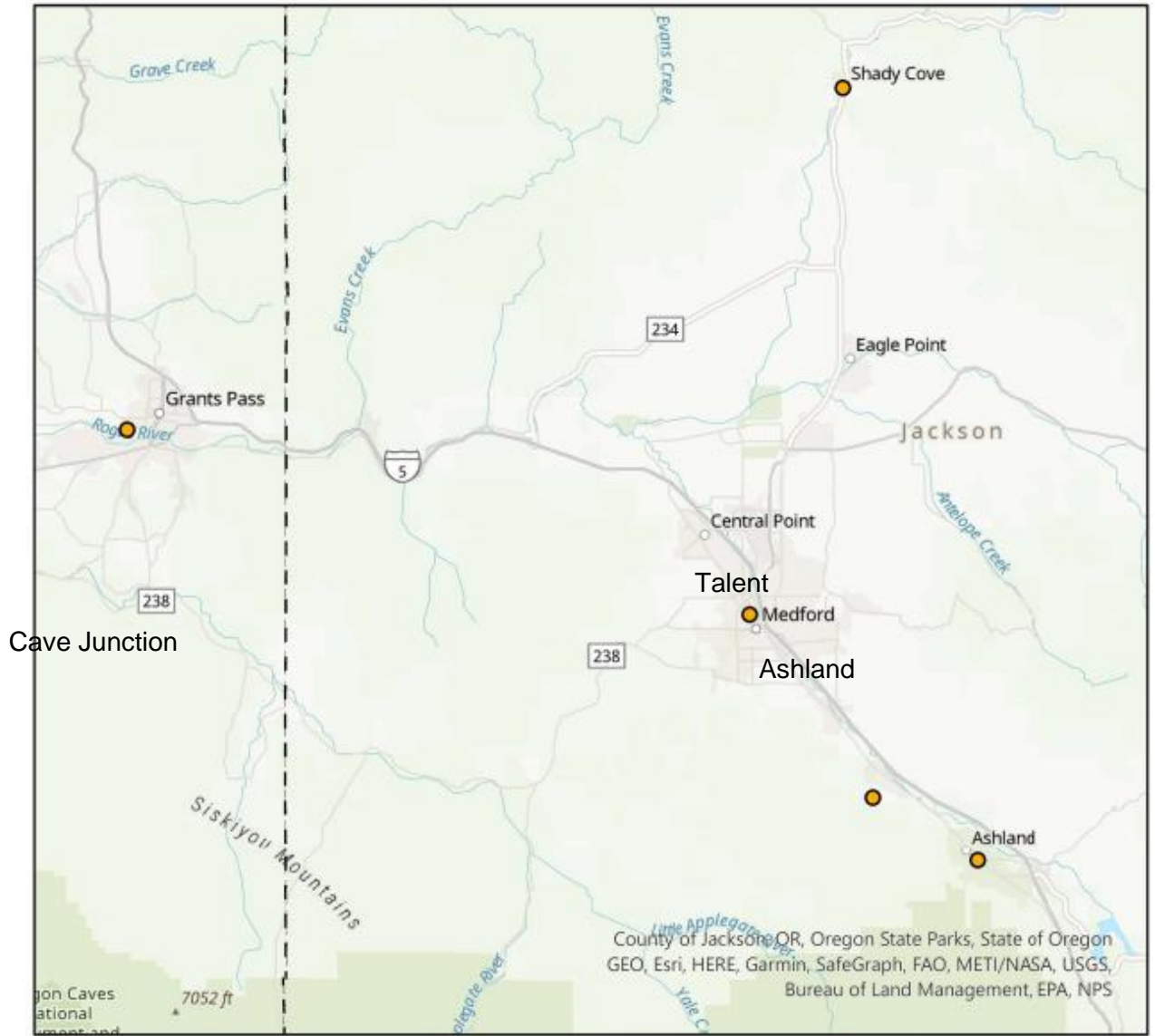


Figure 117. 2020 SW Oregon Ambient Air Quality Monitoring Network

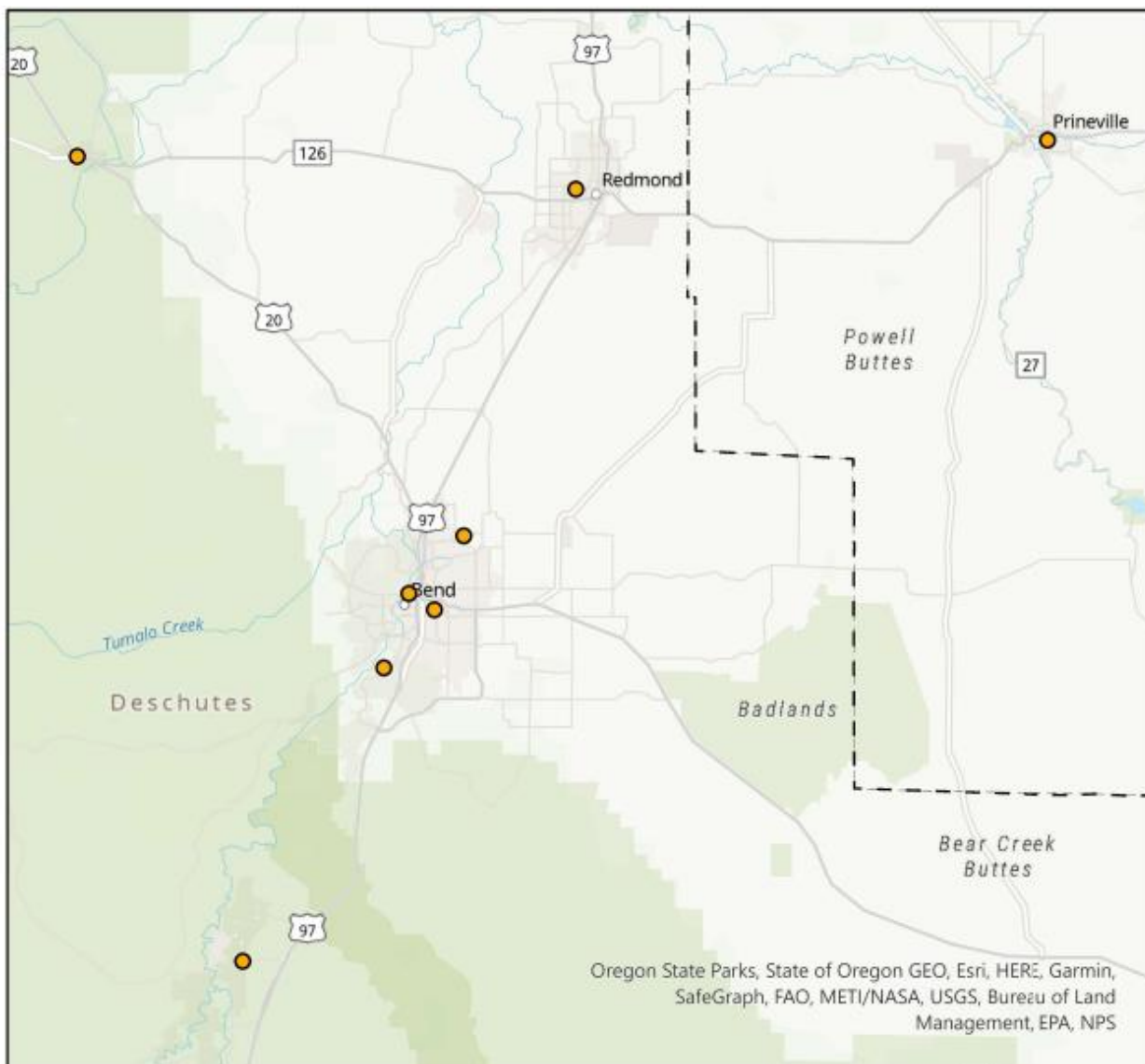


Figure 118. 2020 Bend Ambient Air Quality Monitoring Network

Appendix 3 Data Quality

Quality Assurance

It is a policy of DEQ that all data used by the Department will be of sufficient quality to support the regulatory decisions based upon them. The minimum quality assurance requirements set by EPA are consistently met or exceeded by DEQ.

The continued assurance of data quality requires carrying out the two complimentary tasks discussed below:

Quality Control

The ambient air quality monitoring and sampling done by the Department follows a number of procedures intended to maintain the system within control. Standard operating procedures are documented and followed throughout. Federal Reference or Equivalent Methods are used wherever applicable. Care in using accepted methodology is what makes the Department's air quality data representative and also comparable to the data collected in other states. Routine preventative maintenance and periodic calibrations, using National Institute of Standards Technology gases or other primary standards, are used to achieve a database sufficient in quantity and quality to meet the needs of the Air Quality Program.

Quality Assessment

Evaluations of data quality are made in several ways. At least each quarter, DEQ conducts a system audit in which each sampling and monitoring site is visited to evaluate whether the site location is still appropriate, whether procedures are being followed, and to ensure that documentation is complete. Data quality is assessed in terms of precision, accuracy, and completeness. Precision, or repeatability, is determined by analysis of a known control sample or by replicate analyses. Accuracy, or the ability to measure a "true" value, is assessed by quarterly audits of analyzer performance or sampler flow. DEQ reports these assessments to EPA as summary statistics. Completeness is measured by the amount of data actually captured relative to the amount which ideally could have been collected. EPA also hires independent contractors to evaluate Oregon's sites for accuracy.

For more information, refer to [Quality Assurance Project Plan Air Quality Monitoring for the Measurement of Criteria Air Pollutants, April 2018 \(DEQ09-LAB-0004-QAP Version 2.0\)](#). This is available upon request.

If you have further questions, contact us at: AQM.Questions@deq.state.or.us.