

# Wildfire Smoke Emergency Rule Stakeholder Meeting

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# Purpose

- Wildfire smoke health effects
- Sharing information from other agencies
- Sharing information on smoke history
- Discussion of proposed air quality thresholds.
- Discussion of interventions required.

Will be discussing threshold for required respirator use at a later meeting.

# Definitions

- **PM2.5:** Solid particles and liquid droplets suspended in air, known as particulate matter, with an aerodynamic diameter of 2.5 micrometers or smaller. Measured in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ).

# Definitions

- **Air Quality Index (AQI):** The method used by the U.S. Environmental Protection Agency (EPA) to communicate air quality hazards to the public.
- **Washington Air Quality Advisory (WAQA):** The method used by Washington Department of Ecology to communicate air quality hazards to the public.
- Both AQI and WAQA base their index off PM2.5 measurements.

# Wildfire Smoke: Immediate Health Effects

- Shortness of breath
- Chest tightness
- Eye, nose and throat irritation, headache
- May worsen COVID-19 symptoms
- Asthma attacks
- Worsening of other chronic conditions, especially of the heart, lung, and circulation
- May cause psychological stress

# Groups at increased risk

- People with pre-existing conditions, especially lung, heart, and circulatory problems
- People with respiratory infections such as COVID-19
- Older adults
- Children
- Pregnant individuals
- Outdoor workers

Other factors: Access to health care, and other social and economic disparities

# Short-term PM2.5 and Mortality

- Liu et al 2019: data from > 600 cities showed short-term PM2.5 exposure associated with worsening daily all-cause, respiratory, and cardiovascular mortality (death). On average, every additional 10  $\mu\text{g}/\text{m}^3$  of PM2.5 increased daily all-cause mortality by 0.68%.
- Orellano et al (2020 systematic review for WHO) also found short-term PM2.5 exposure worsened mortality.

Liu et al 2019: <https://www.doi.org/10.1056/NEJMoa1817364>

Orellano et al 2020: <https://doi.org/10.1016/j.envint.2020.105876>

# EPA on PM2.5 health effects

- **Mortality (death)**: causal relationship, short-term and long-term exposure
- **Cardiovascular effects**: causal relationship, short-term and long-term exposure
- **Respiratory effects**: likely causal relationship, short-term and long-term exposure
- **Lung cancer**: likely causal relationship with long-term exposure
- **Nervous system effects**: likely causal relationship with long-term exposure

United States Environmental Protection Agency (2020, December). Review of the national ambient air quality standards for particulate matter. 85 FR 82684.



# Additional hospitalizations from PM2.5 below 35 $\mu\text{g}/\text{m}^3$

- Four New York counties “>90% of excess cardiovascular hospital admissions attributable to PM2.5 exposure occur when air quality is reported as ‘good’ or ‘moderate’ according to the AQI” (under 35  $\mu\text{g}/\text{m}^3$ )

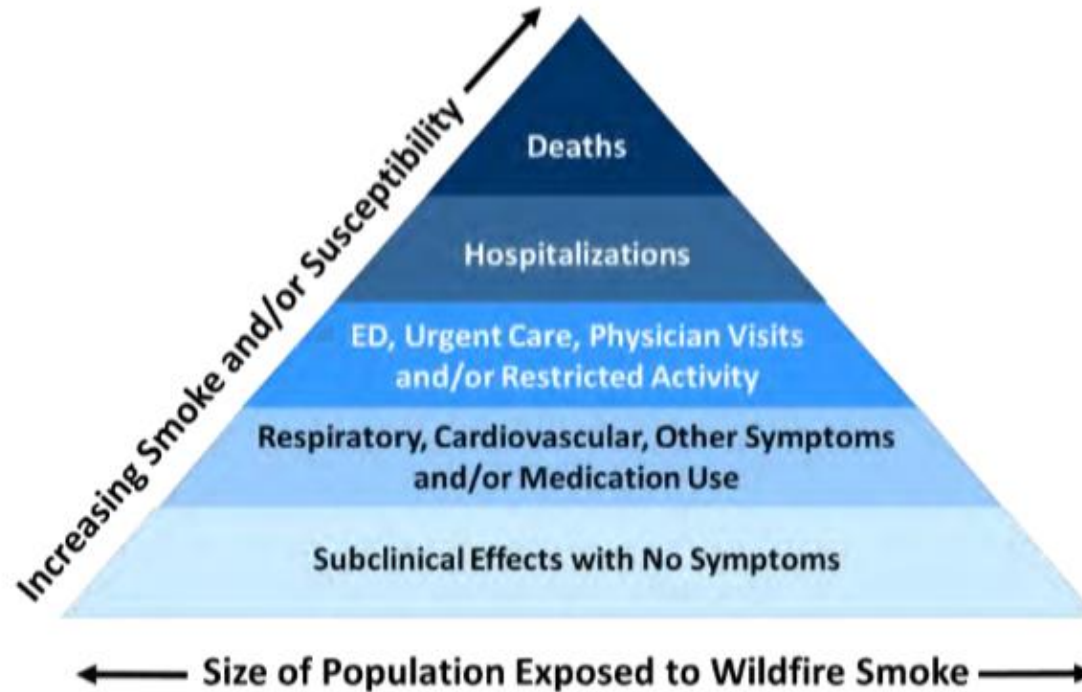
Perlmutter, L., D. Stieb, and K. Cromar (2017). Accuracy of quantification of risk using a single-pollutant air quality index. *Journal of Exposure Science & Environmental Epidemiology* 27(1), 24–32.

# Excess Wildfire Smoke Mortality in WA

- 2.0% increased odds of non-traumatic mortality (death) with Washington State wildfire smoke exposure day prior.
- Average PM2.5 on days with wildfire smoke: 26.4  $\mu\text{g}/\text{m}^3$

Doubleday, A., J. Schulte, L. Sheppard, M. Kadlec, R. Dhammapala, J. Fox, and T. B. Isaksen (2020, jan). Mortality associated with wildfire smoke exposure in washington state, 2006–2017: a case-crossover study. *Environmental Health* 19(1).

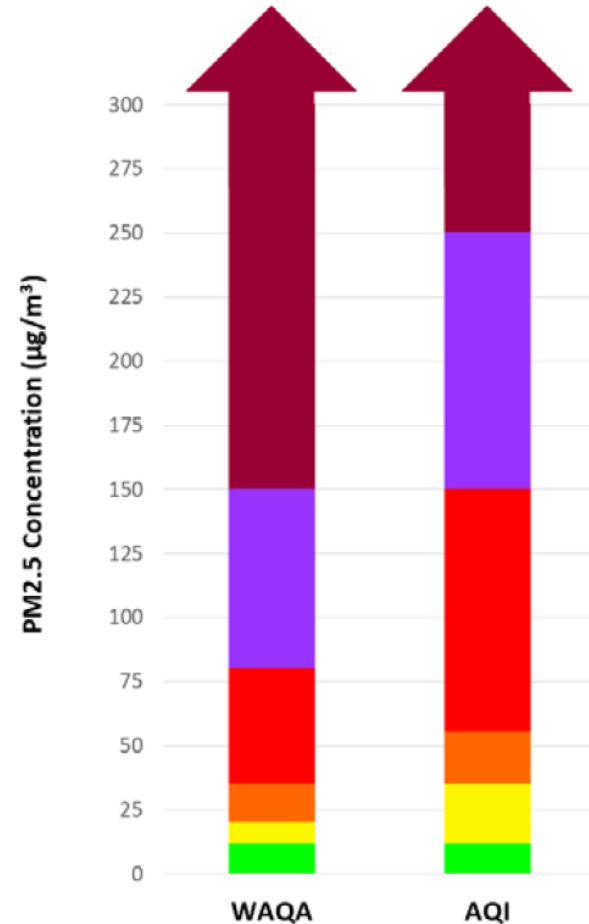
## Range of health effects from wildfire smoke exposure



*Figure adapted from Cascio 2018 [3]*

# Health Standards

- World Health Organization (WHO)
  - 25 $\mu\text{g}/\text{m}^3$  24-hour
- National Ambient air Quality Standard (NAAQS)
  - 35 $\mu\text{g}/\text{m}^3$  24-hour



**Health advisory category**  
Forecasted 24-hour average or  
NowCast PM2.5 concentration ( $\mu\text{g}/\text{m}^3$ )

**Washington State Department of Health Recommended Public Health Actions**  
For use with Washington Air Quality Advisory.

**Good: PM2.5 0 to 12.0**

If smoke incident is forecasted in your area, review the Washington Wildfire Response document for Severe Smoke Episodes and the Wildfire Smoke Guide for Public Health Officials.

**Moderate: PM2.5 12.1 to 20.4**

- Distribute information to public health partners and the public.
- Refer people to the WA Smoke Blog for more information about status of wildfires.

**Unhealthy for Sensitive Groups: PM2.5 20.5 to 35.4**

- Above recommendations, plus:
- **Issue press release, identify sensitive groups and encourage them to reduce exposure.**
  - **For extended duration of smoke recommend spending time in a cleaner air setting** in the community (air-conditioned library) or **leaving the area until air quality improves.**
  - For extended duration of smoke, open a cleaner air shelter for sensitive groups.

**Unhealthy: PM2.5 35.5 to 80.4**

- Above recommendations, plus:
- Recommend cancelling children's outdoor athletic events and practices, or moving them indoors or to an outdoor space with good air quality.
  - **Recommend the public limit strenuous outdoor activities.**
  - **Recommend that sensitive groups shelter-in-place, spend time in a cleaner air setting** in the community (air-conditioned library) or **leave the area until air quality improves.**
  - For extended duration of smoke, open and publicize cleaner air shelters for sensitive groups.

**Very Unhealthy: PM2.5 80.5 to 150.4**

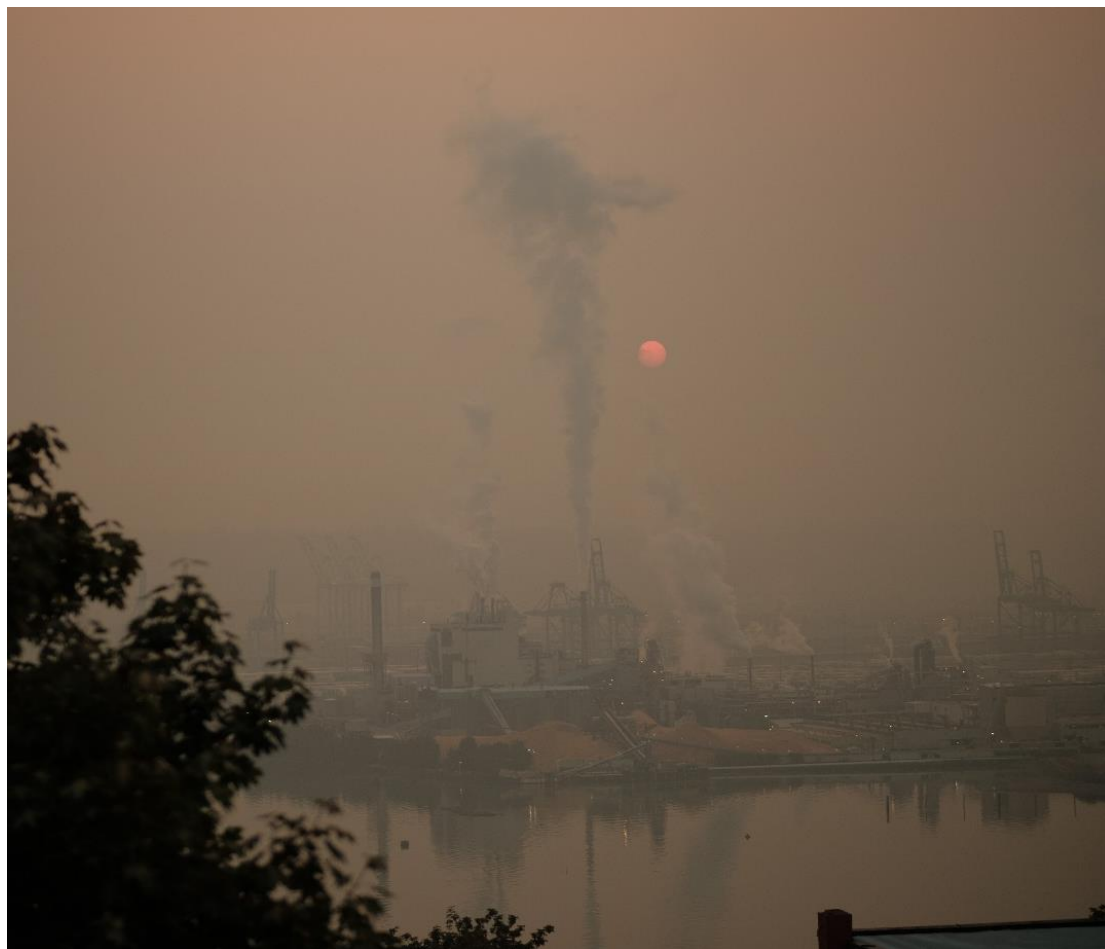
- Above recommendations, plus:
- **Consider cancelling outdoor public events and activities.**
  - **Recommend shelter-in-place for the general population.**
  - Share information about periods of improved air quality to guide essential outdoor activity and ventilation of dwellings.

**Hazardous: PM2.5 More than 150.4**

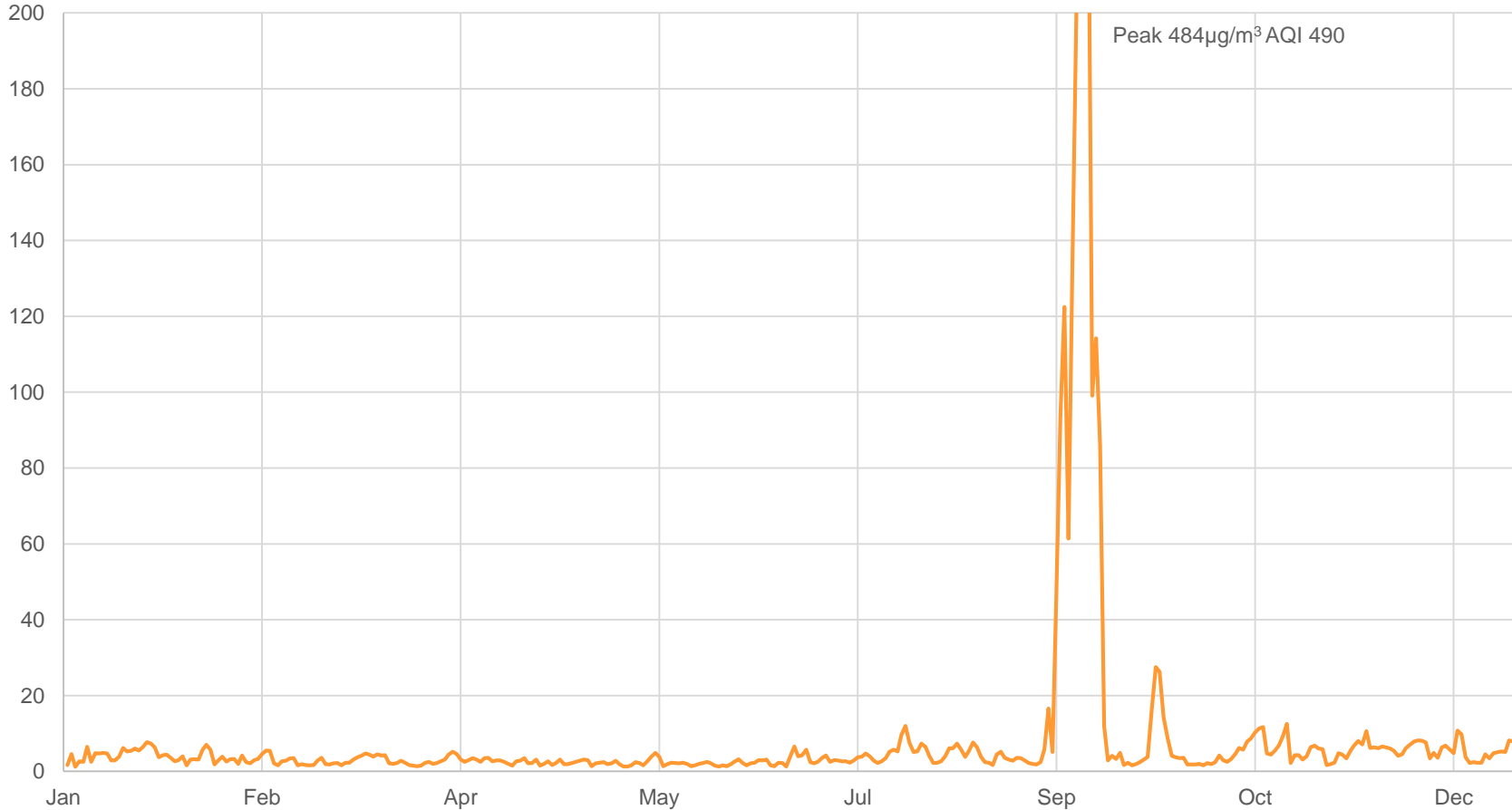
- Above recommendations, plus:
- **Cancel outdoor public events and activities.**
  - If school is in session, discuss school closure with administrators if indoor air cannot be kept cleaner.
  - **Recommend voluntary evacuation for sensitive groups.**

## Tacoma Tideflats

- **54.9 $\mu\text{g}/\text{m}^3$  PM2.5**
- WAQA **Unhealthy**
- AQI 149



# Chelan 2020 PM2.5 Levels ( $\mu\text{g}/\text{m}^3$ )



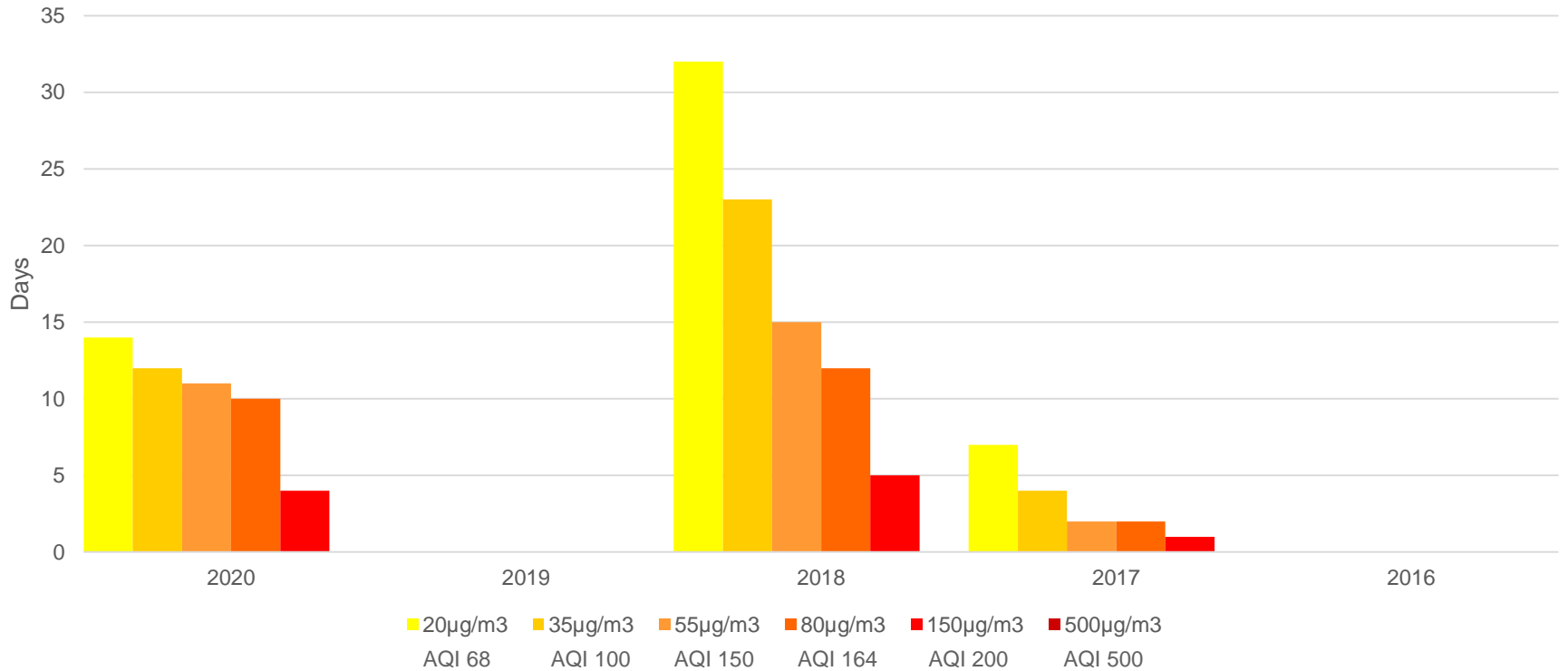
AQI 200

AQI 150

AQI 100

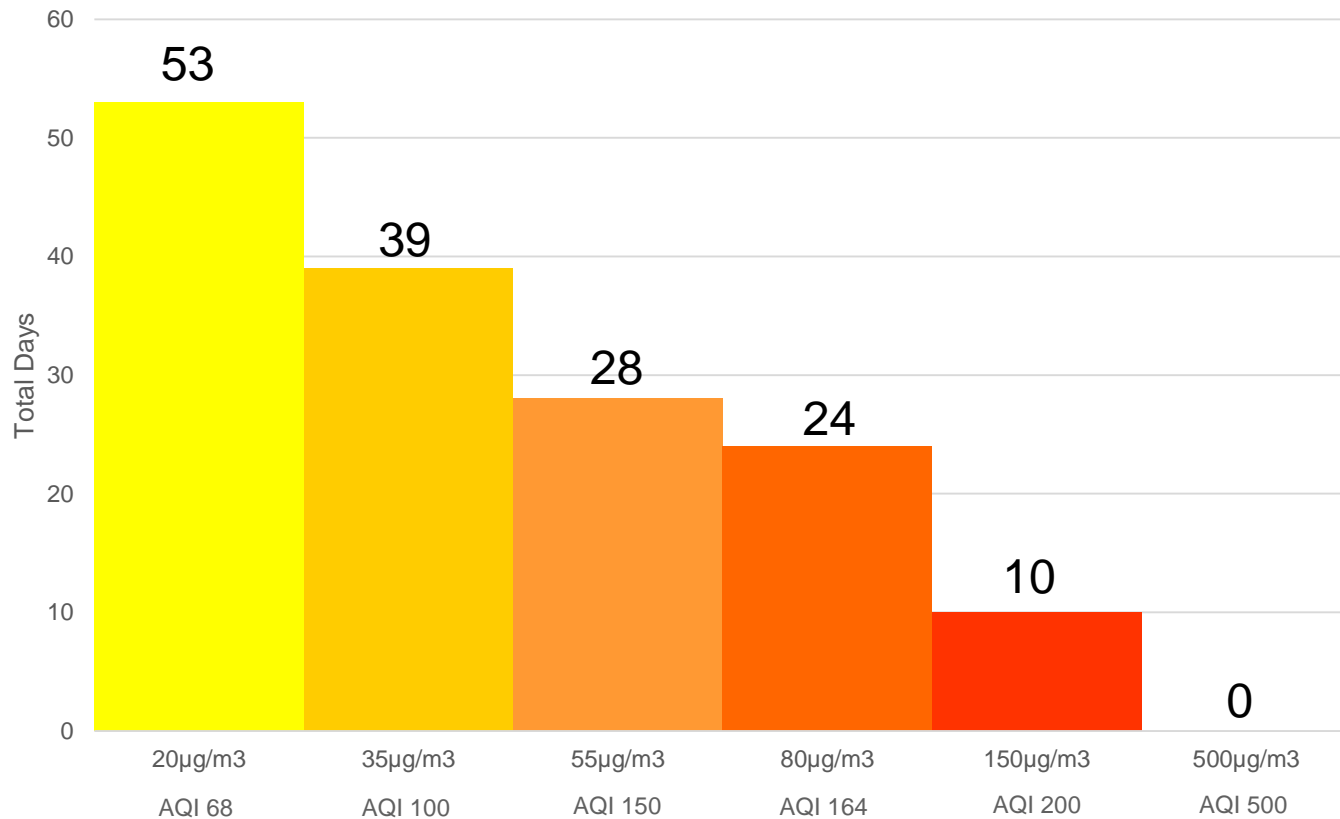
AQI 50

## Chelan WA: Number of days over air quality threshold June through September

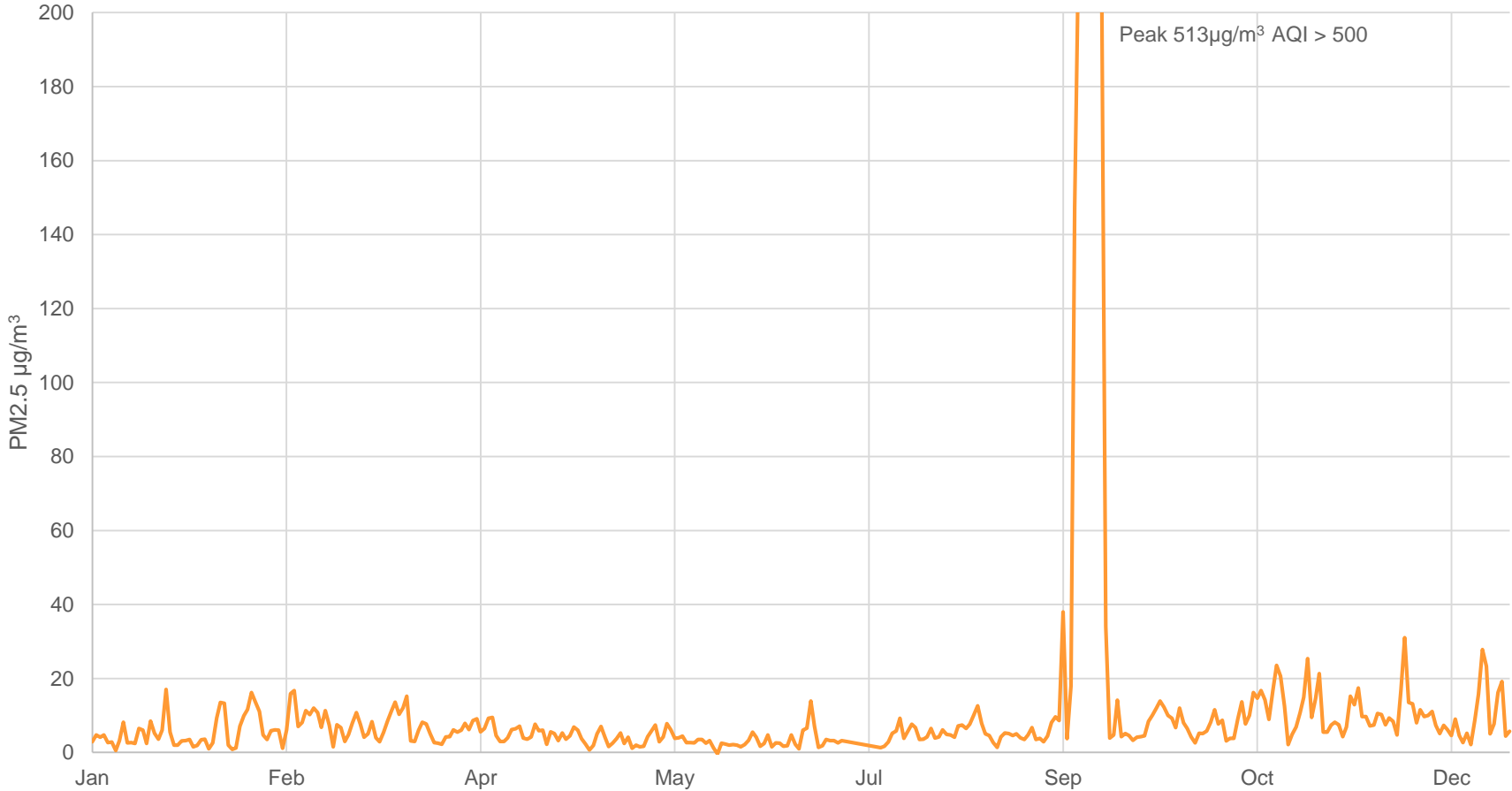




## Chelan WA: Total number of days over air quality threshold June through September 2016-2020



# Vancouver 2020 PM2.5 Levels ( $\mu\text{g}/\text{m}^3$ )



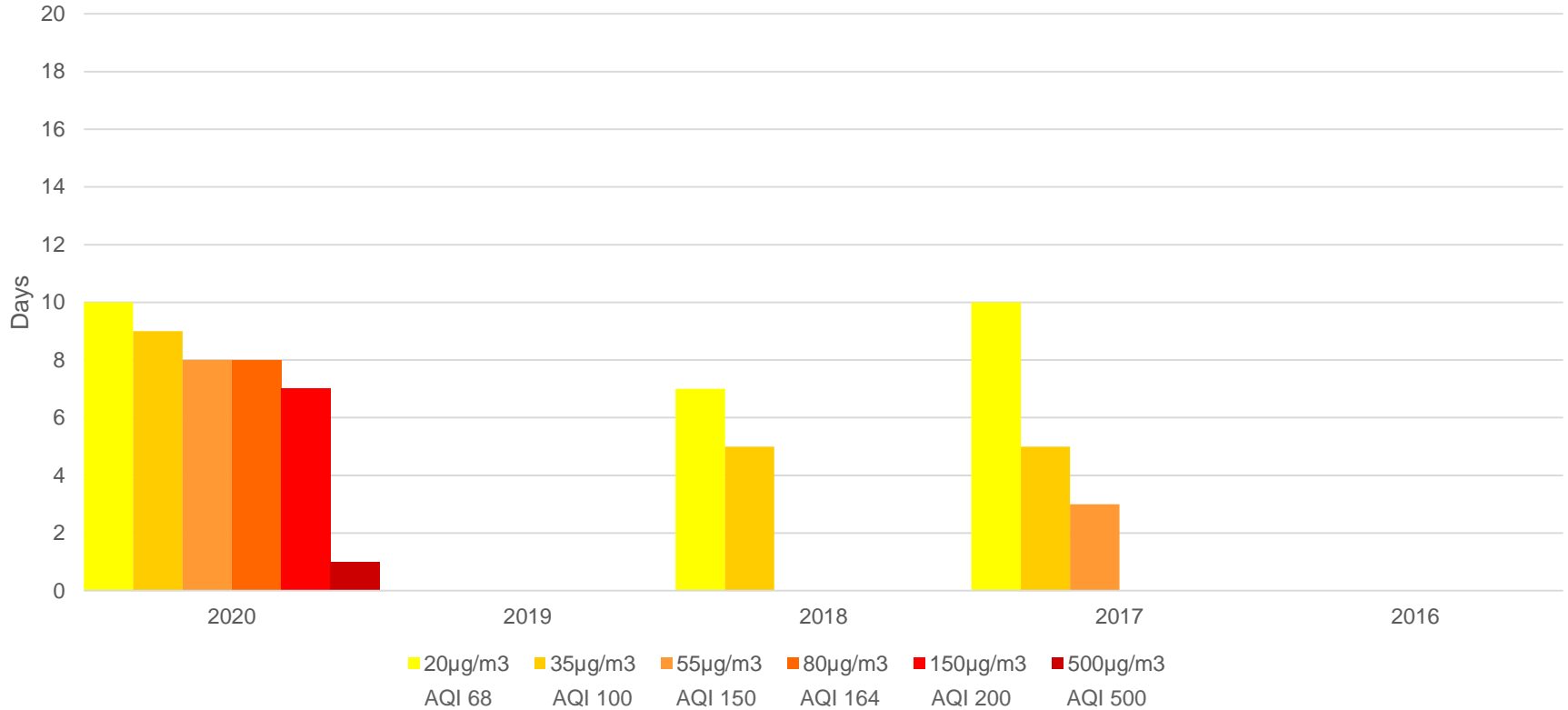
AQI 200

AQI 150

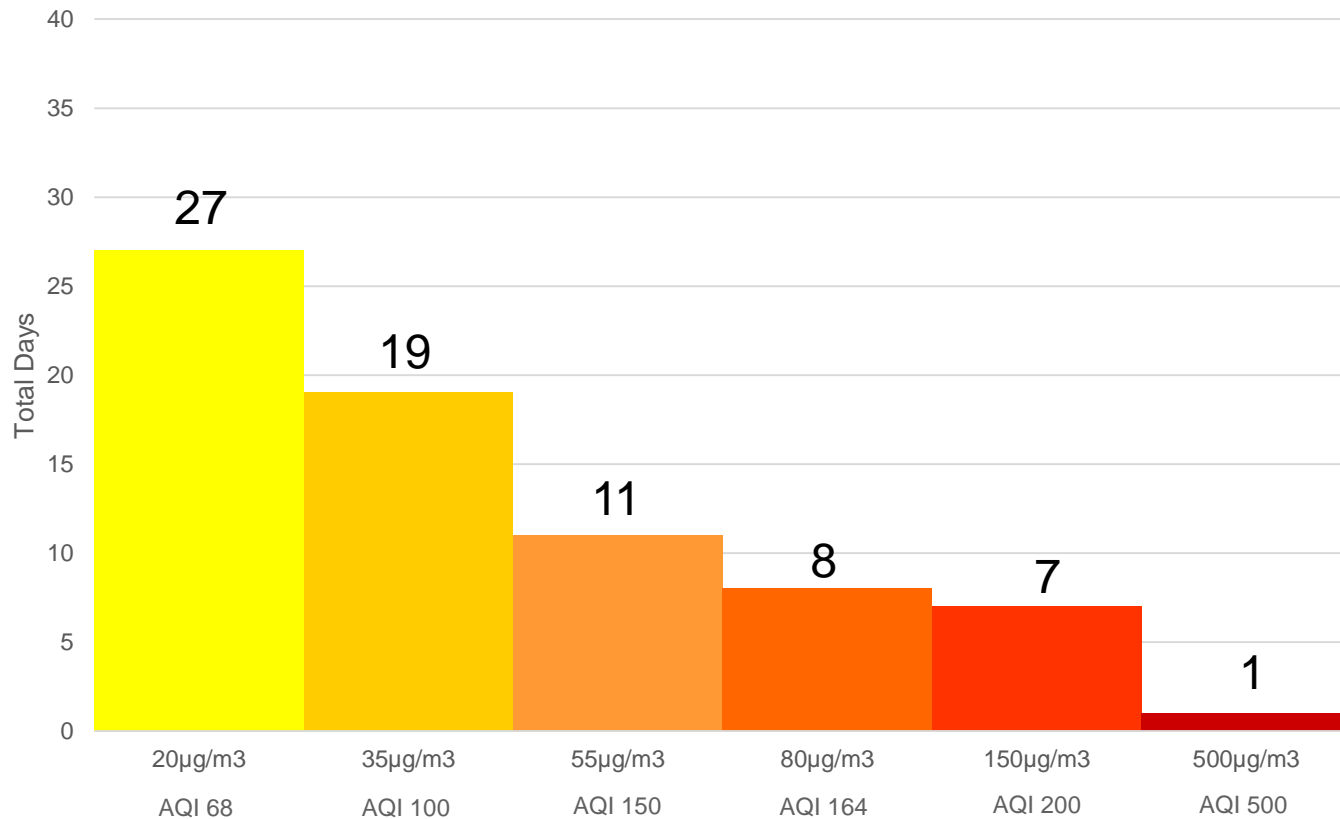
AQI 100

AQI 50

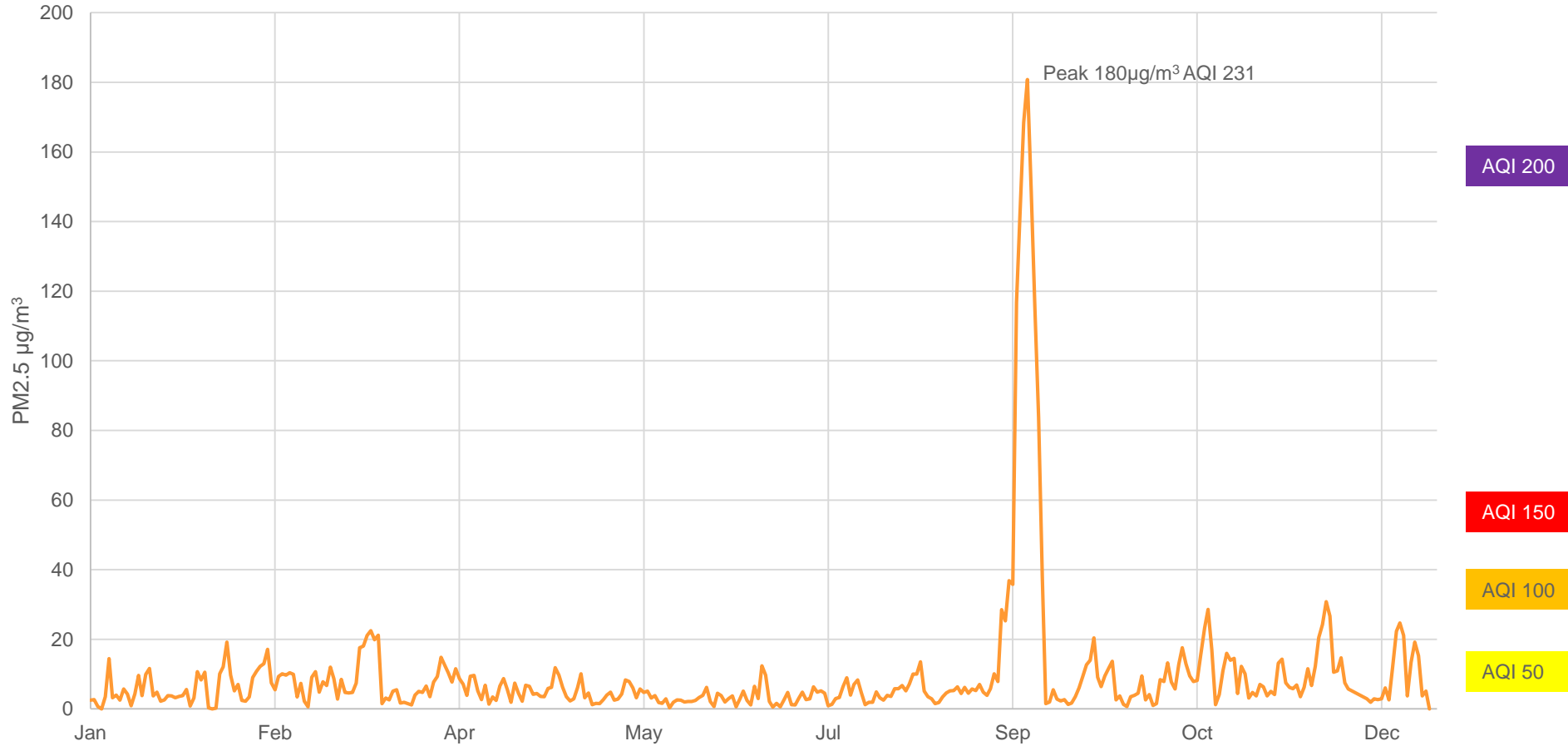
## Vancouver WA: Number of days over air quality threshold



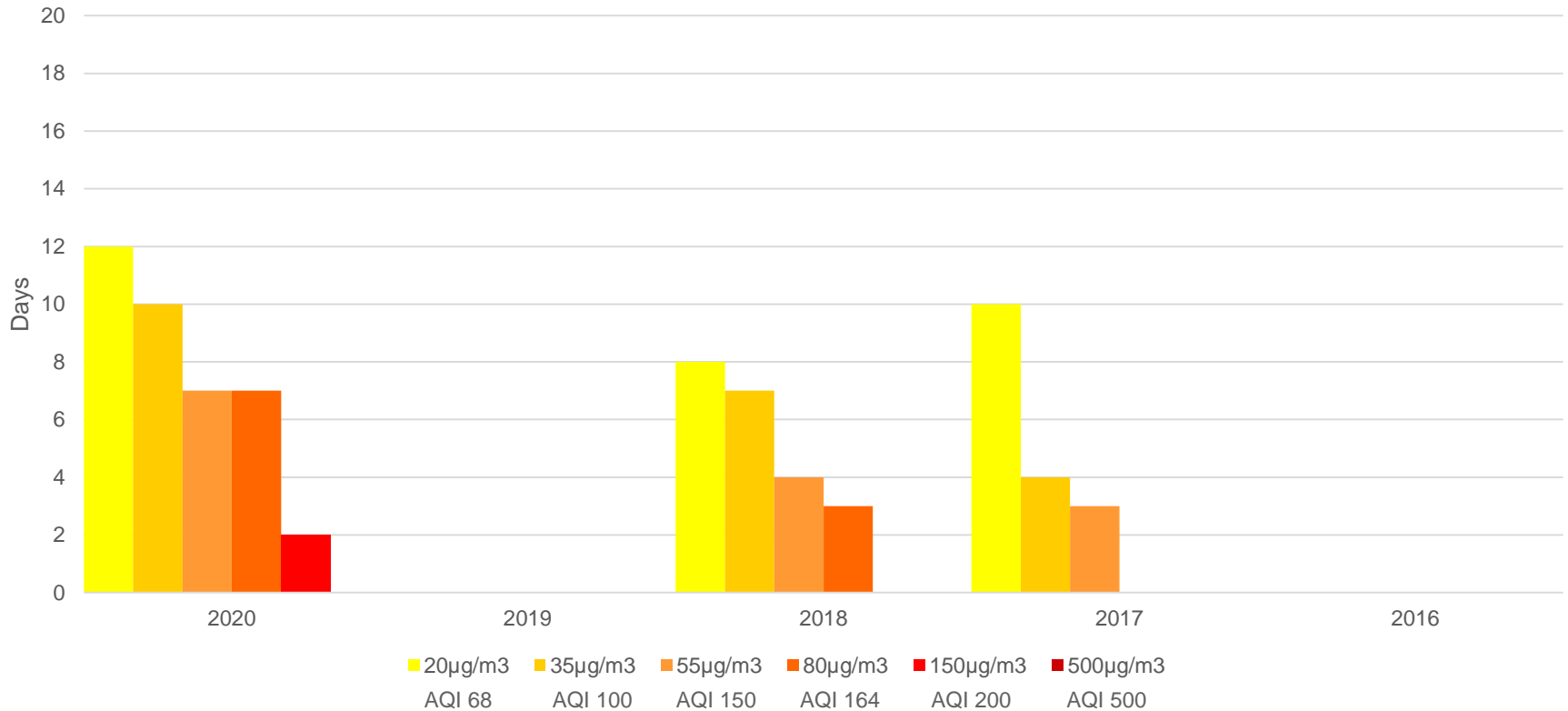
## Vancouver WA: Total number of days over air quality threshold From June-September 2016-2020



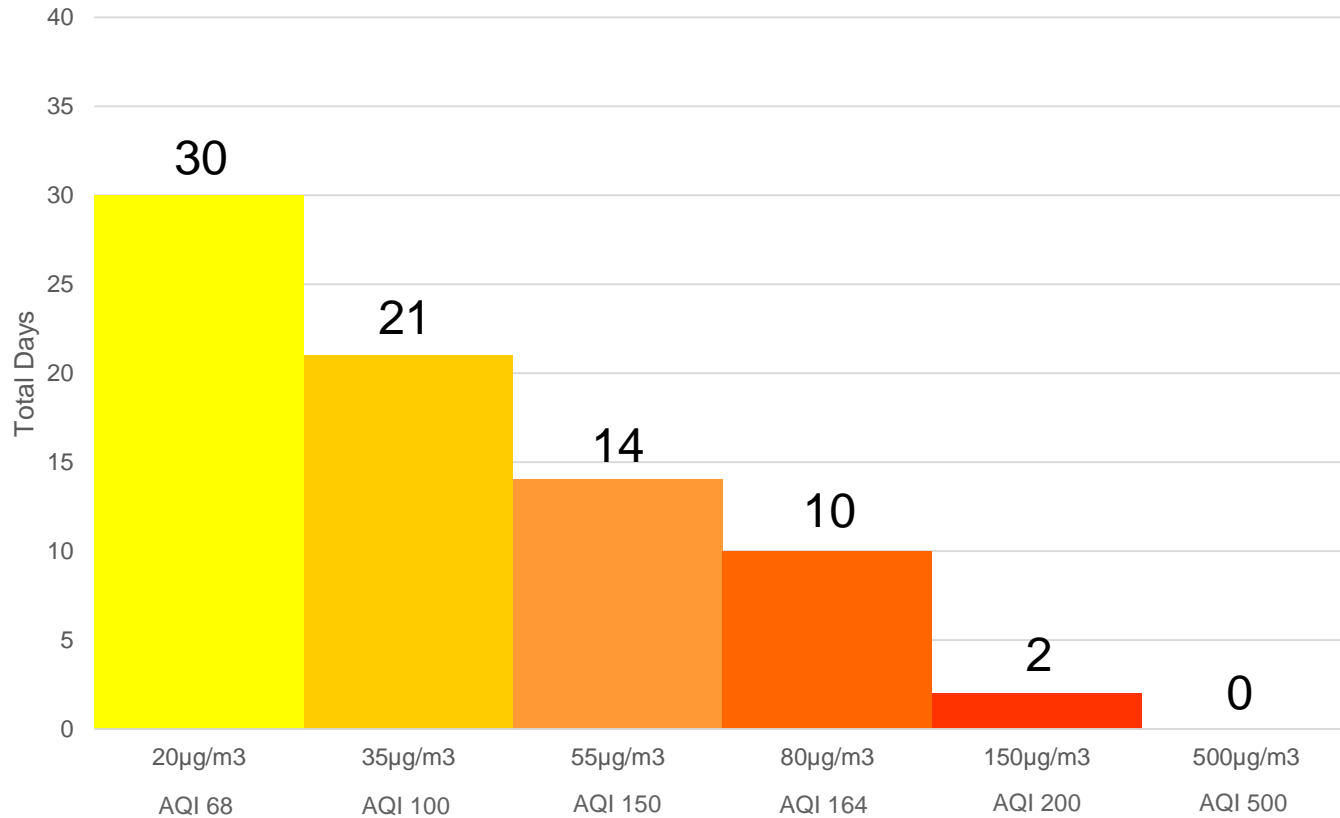
# Tacoma 2020 PM2.5 Levels ( $\mu\text{g}/\text{m}^3$ )



## Tacoma WA: Number of days over air quality threshold



# Tacoma WA: Total number of days over air quality threshold From June-September 2016-2020



# 1st level of intervention thresholds proposed:

## Three threshold options proposed:

- **20  $\mu\text{g}/\text{m}^3$  AQI 68:**
  - WAQA **Unhealthy for sensitive groups**
- **35  $\mu\text{g}/\text{m}^3$  AQI 100:**
  - WAQA-**Unhealthy**
- **55  $\mu\text{g}/\text{m}^3$  AQI 150:**
  - WAQA **Unhealthy**
  - California rule threshold AQI of 151 for PM2.5.

Comments on the proposed options?



# 1st level of interventions proposed:

- Worker training
- Written program
- Two way communication system
- Employers must provide respirators for voluntary use.
- Engineering and administrative controls at 1<sup>st</sup> or 2<sup>nd</sup> level.

# Wildfire Smoke Emergency Rule Stakeholder Meeting

***Dr. Nicholas Reul***

*Occupational Physician*

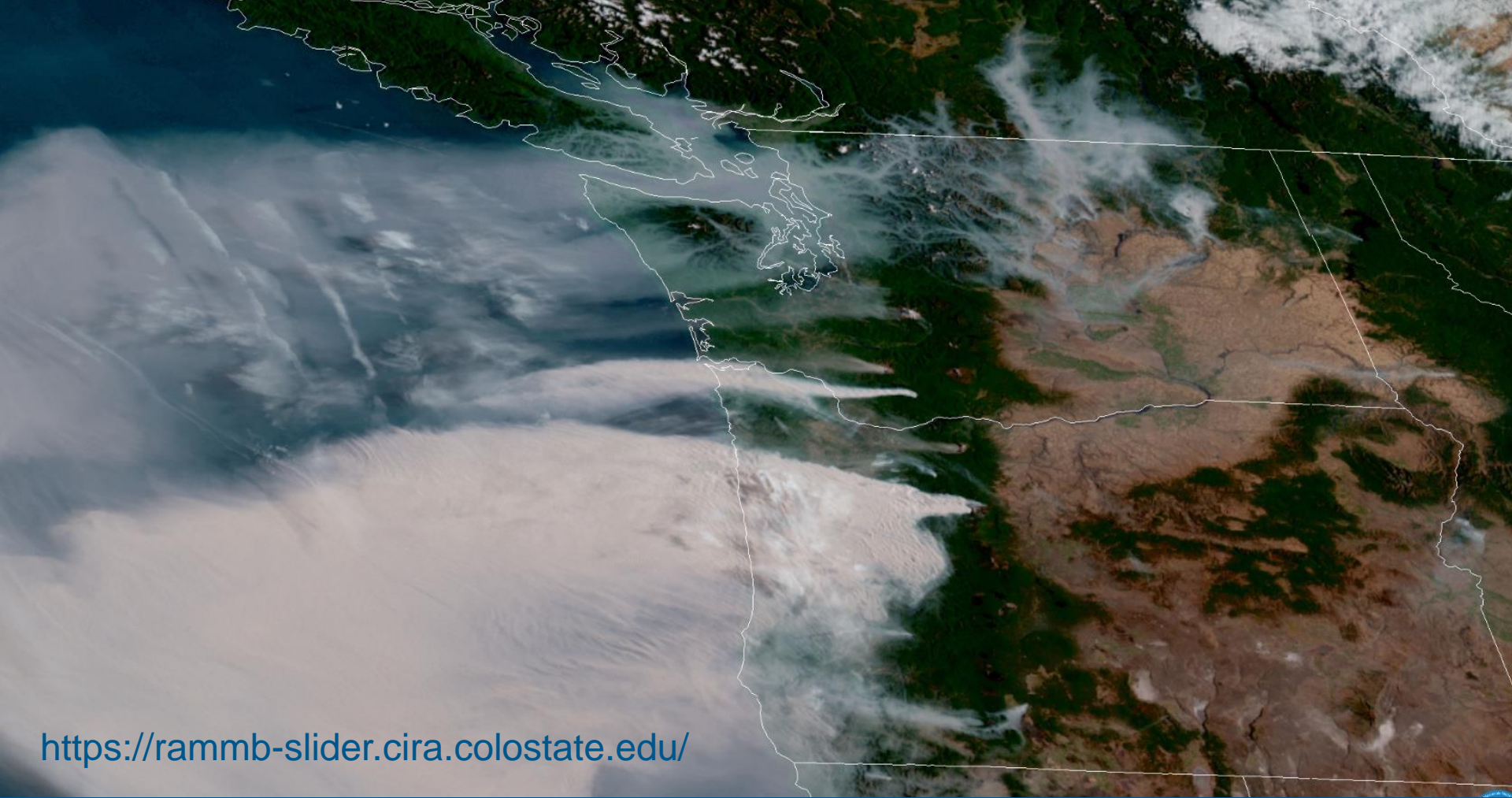
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