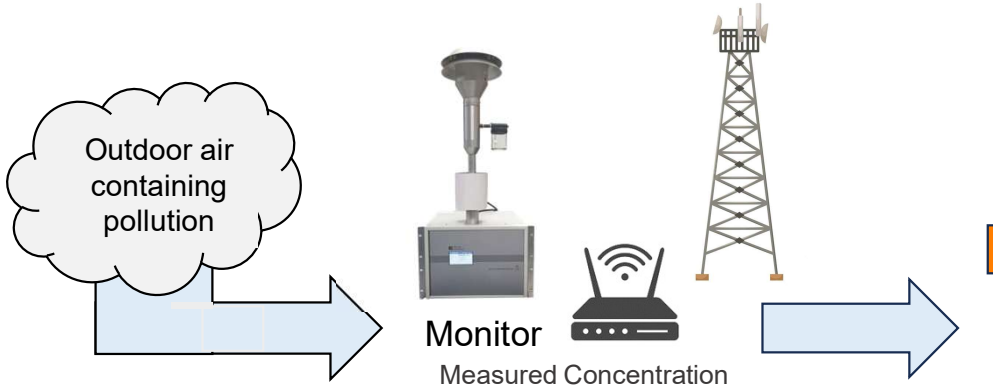
Air Quality Monitoring Overview

DEQ MONTANA

Bo Wilkins
bo.wilkins@mt.gov
Air Quality Bureau Chief

Air Quality Index (AQI) & Health Impacts



AQI is used to relate hourly measurements of pollutant concentration to a normalized unitless value and standardized color scale that indicates level of health concern.

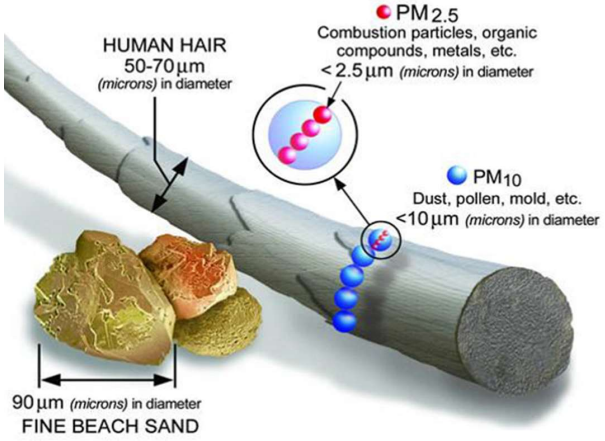
EPA establishes AQI breakpoints for all major air pollutants regulated by the Clean Air Act:

- Ground-level ozone (O_3)
- Particle pollution ($PM_{2.5}$ and PM_{10})
- Carbon monoxide (CO)
- Sulfur dioxide (SO_2)
- Nitrogen dioxide (NO_2)

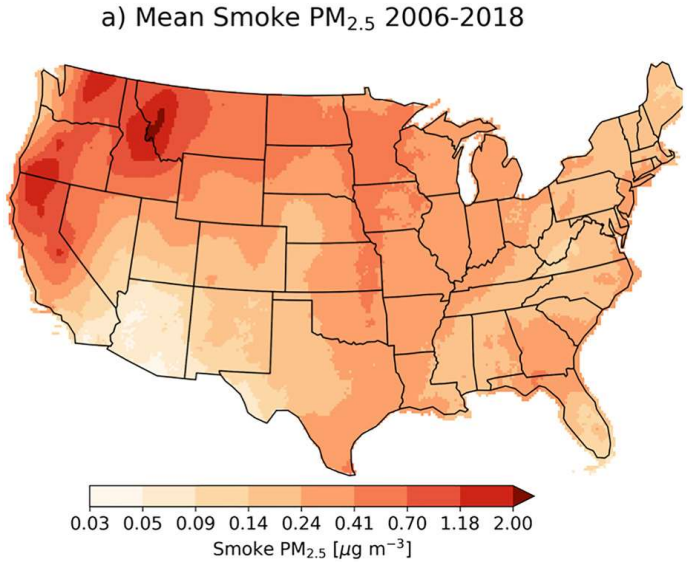
Levels of Concern	Description of Air Quality
Good (0-50)	Air quality is good.
Moderate (51-100)	Air quality is acceptable. People unusually sensitive to air pollution may begin to notice health impacts.
Unhealthy for Sensitive Groups (101-150)	Members of sensitive groups may experience adverse health effects. The general public is less likely to be affected. Sensitive groups include people with heart or lung conditions, older adults, children, pregnant women, and people who work outdoors.
Unhealthy (151-200)	Air pollution levels are unhealthy for all people. Health effects on sensitive populations can be serious.
Very Unhealthy (201-300)	The risk of negative health effects is increased for the entire population.
Hazardous (301+)	Air pollution levels are harmful to all people. Anyone could experience serious health effects.
Data Unavailable	Station is down due to instrument malfunction, power failure, calibration or maintenance.

Smoke & $PM_{2.5}$

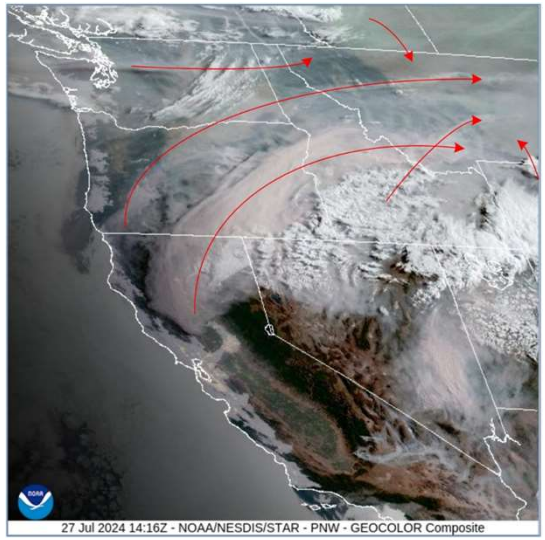
DEQ's smoke-ready monitoring network measures $PM_{2.5}$ at more sites than any other pollutant.



$PM_{2.5}$ is airborne particulate matter <2.5 µm in diameter. It is a primary constituent in wildfire smoke and used as a surrogate for tracking it.



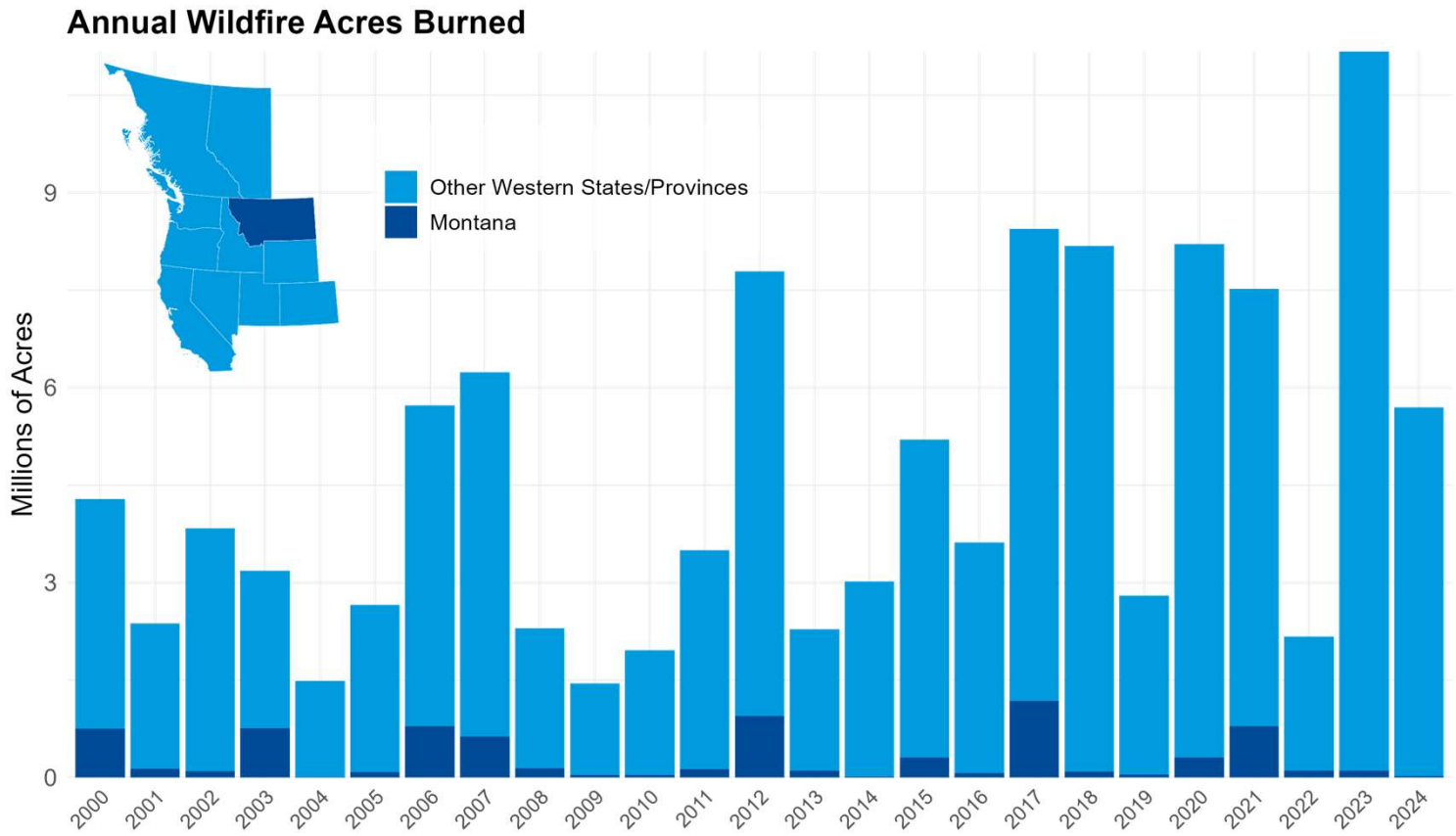
Montana a national outlier for mortalities attributable to smoke-derived $PM_{2.5}$



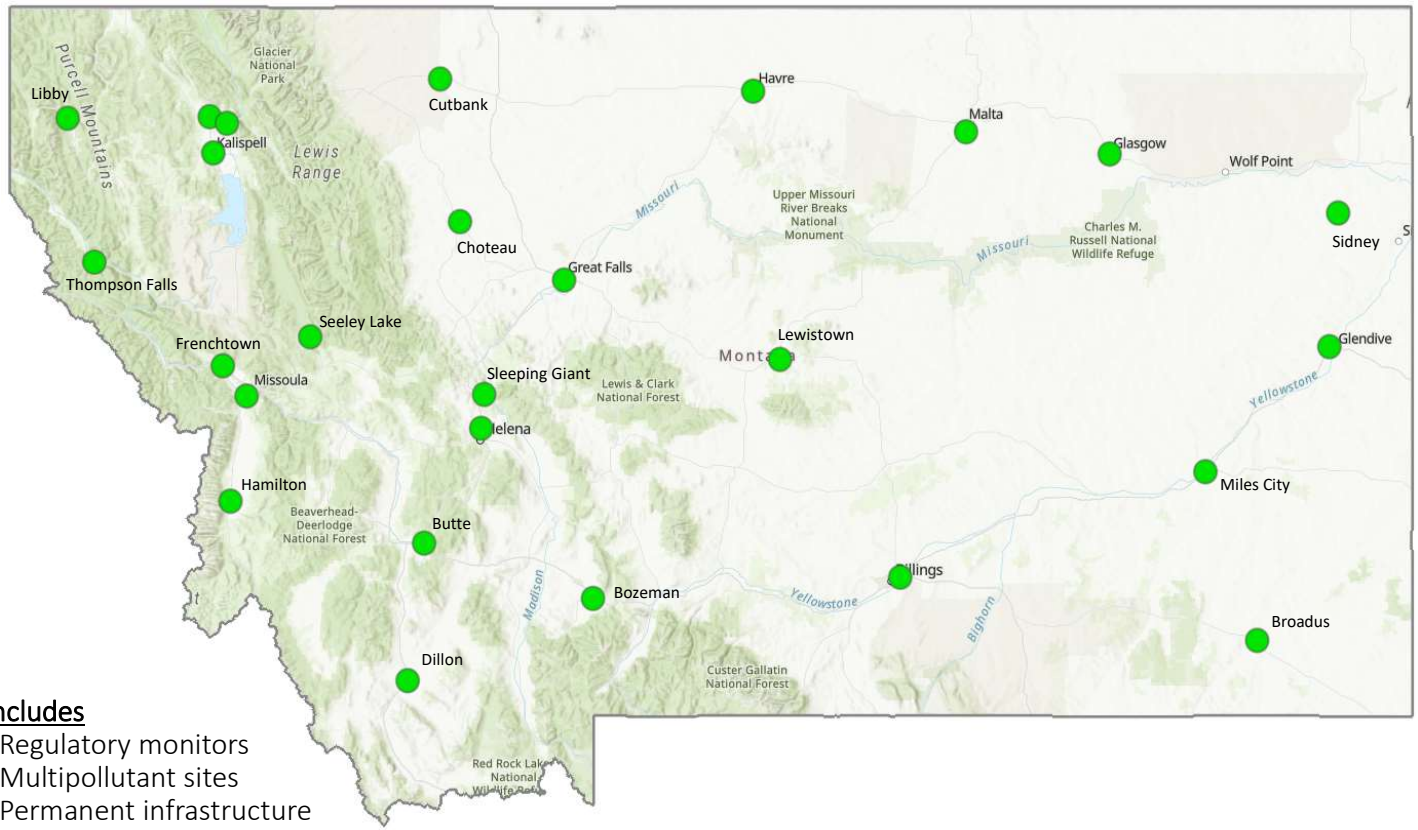
In addition to smoke generated inside Montana boarders, prevailing winds and weather patterns transport smoke into the state from other western states and Canada.

Map from O'Dell, Katelyn, et al. "Estimated mortality and morbidity attributable to smoke plumes in the United States: Not just a western US problem." *GeoHealth* 5.9 (2021): e2021GH000457.

A “Good” Fire Year Can Still Be a “Bad” Smoke Year



Primary Air Monitoring Sites

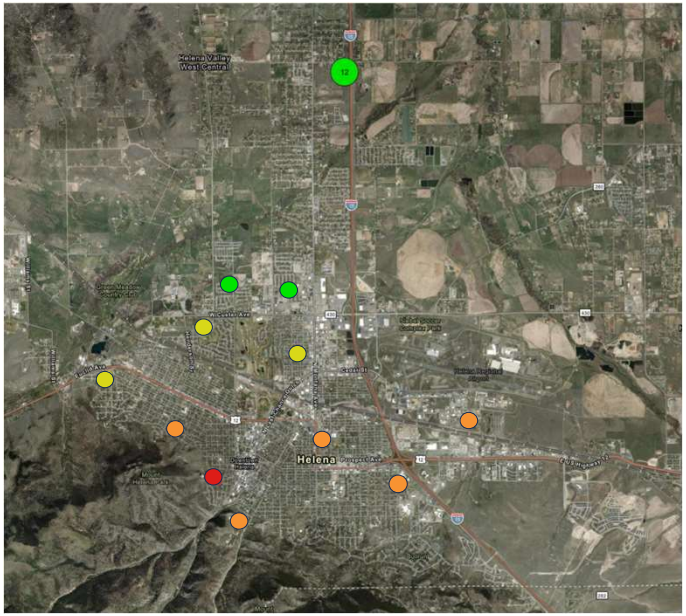


<u>Includes</u>
- Regulatory monitors
- Multipollutant sites
- Permanent infrastructure
- Most resource intensive sites

Low-cost $PM_{2.5}$ Sensors Can Fill Network Gaps in Rural Communities!

PurpleAir

QuantAQ MODULAIR



PurpleAirs in Schools Program: 125 schools have PurpleAirs, 76 schools have installed the sensors and are reporting real-time data. Not just schools benefit! Sensor data is publicly available.

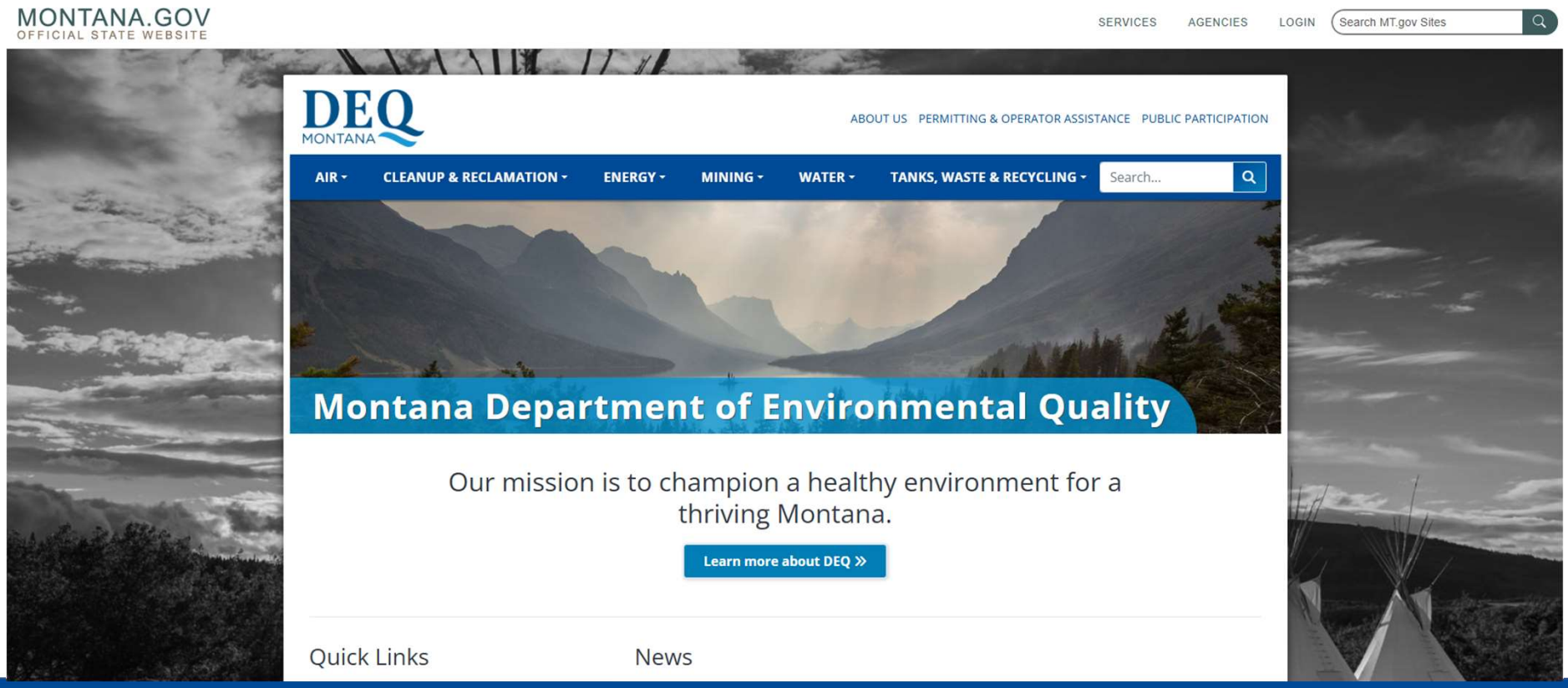
Making a difference: DEQ's low-cost sensor network near Helena, MT (small dots) captures hyper-local smoke impacts, such as smoke drainage from a prescribed burn.

Please help us get the word out about PurpleAirs in Schools! We are actively recruiting schools!

Funding: ARP/IRA Enhanced Air Quality Monitoring for Communities Grant

Public Resources

deq.mt.gov/air/Programs/monitoring



Types of Smoke

100X

Wildfire

- Largest source of air pollution in Montana.
- **120,931** tons of PM2.5 per year

10X

Prescribed Fire

- **10,387** tons of PM2.5 per year

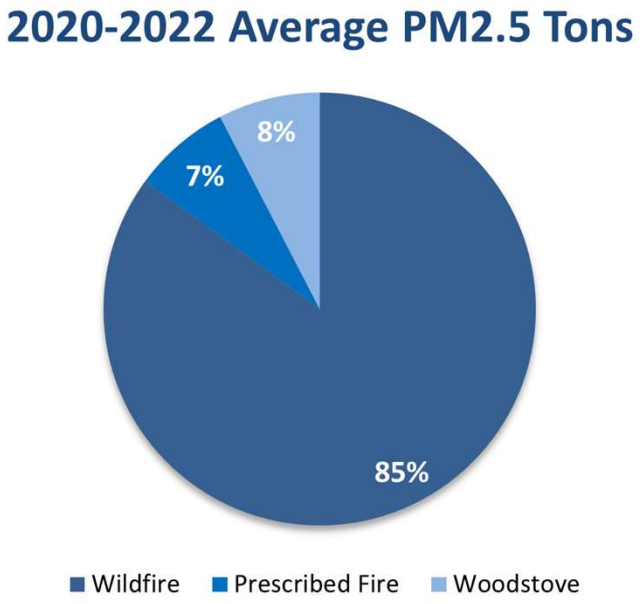
Wood Stove

- **10,832** tons of PM2.5 per year

10X

Largest Industrial Source

- **1,250** tons of PM2.5 per year



*PM2.5 data is Montana's National Emissions Inventory and the Emissions Modeling Platform.

The importance of prescribed burning.