# Targeted Data Visualization


# Know your Audience(s).

**General public** – anyone who breathes

**Public administrators** – city/county officials, school principals, PIOs, …

**Public health professionals** – hospital staff, doctors, senior care staff, …

**Air quality professionals** – those deploying/maintaining monitors & sensors

**Sensor network administrators** – those planning AQ sensor networks

# Know their questions.

What is my air quality right now?
When will the air quality get better?
What time of day should I walk the dog?
Where is the pollution coming from?
Where can I go for better air quality?

Should we cancel recess?
Should we cancel sports?
Should we cancel school?
Should we cancel large public events?

What is the cumulative smoke exposure?
How bad is this year compared to last?
How will new NAAQS change things?

Can I trust my sensor’s data?
Does it match regulatory data?

How many deployed sensors still work?
How long does each sensor last?
Are there outliers in my sensor network?

# Know your data visualization options.

**Point location map**

**Time series plot**

Time-of-day plot

Pollution rose

Calendar heat map

Cumulative exposure plot

Multi-parameter scatter plot

Multi-parameter time series

Correlation plot

Custom QC plot

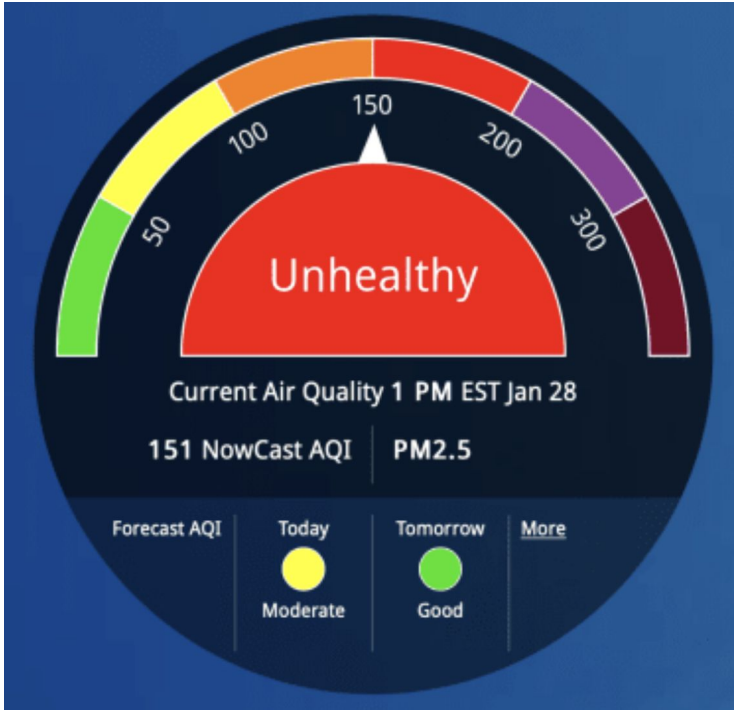
# What is my Air Quality right now?

**Air Quality Dial**

- Simple
- Uses words and colors

*Concerns*

- Needs location context



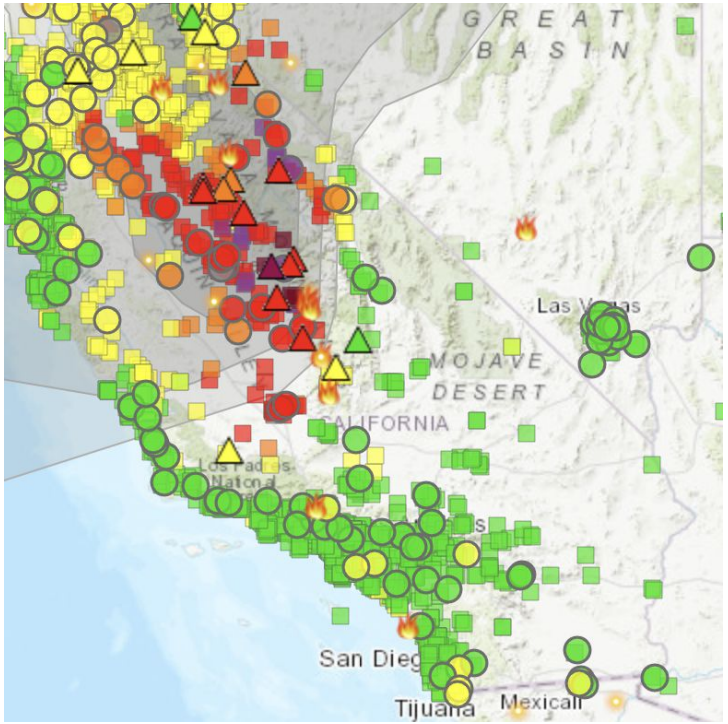
# Where is AQ good/bad right now?

**Point location map**

- Familiar
- Works at different scales
- Shapes/icons add nuance

*Concerns*

- Filter out invalid data
- Use official colors



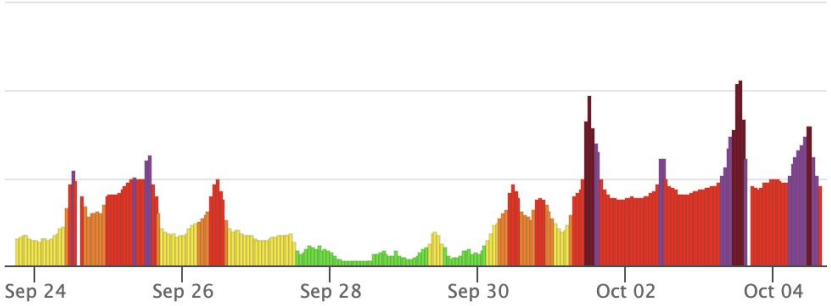
# When was AQ good or bad at my location?

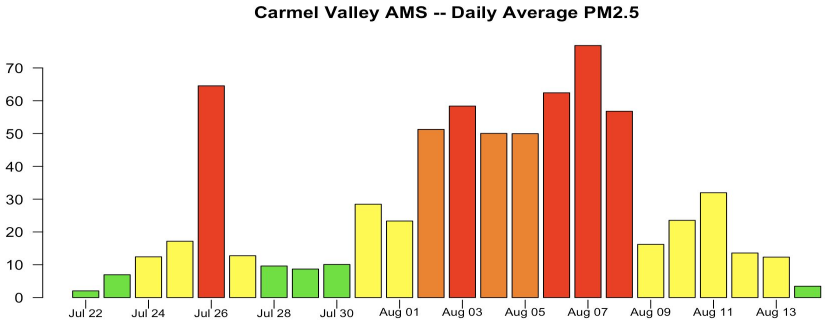
## Location time series

- Familiar
- Works at different scales

*Concerns*

- Use local-time time axis
- Choose hourly or daily bars



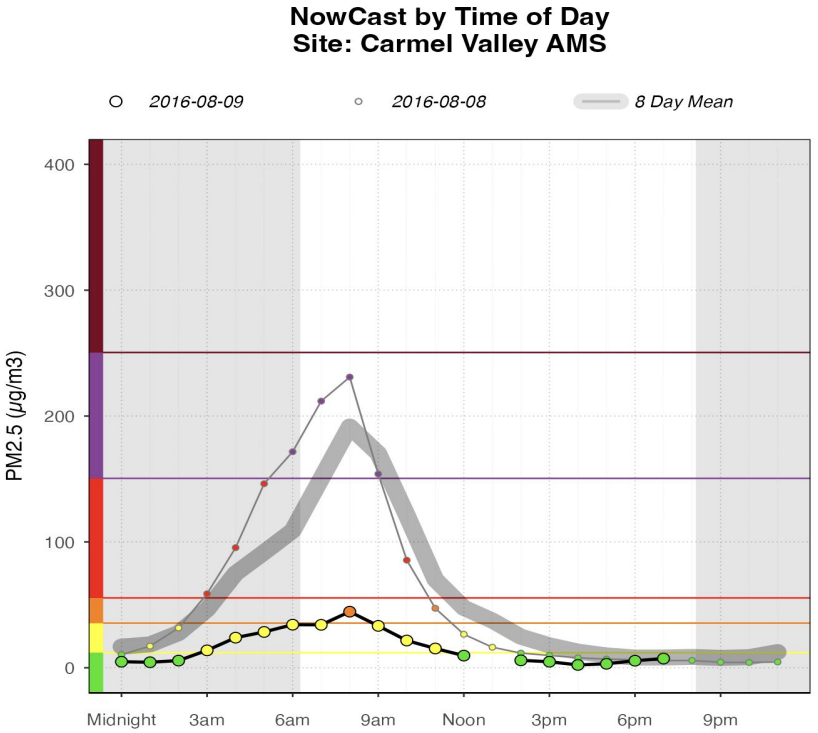
# What time of day should I go outside?

## Time-of-day plot

- Unfamiliar
- Answers an important question

*Concerns*

- Requires education
- Harder to code



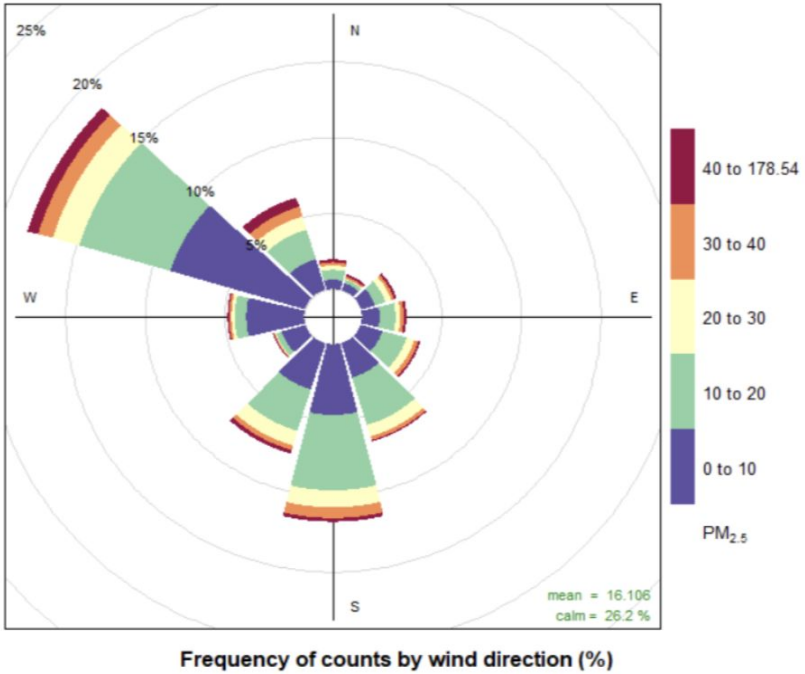
# Where is the pollution coming from?

**Pollution rose**

- Unfamiliar
- Answers an important question

*Concerns*

- Requires education
- Harder to read



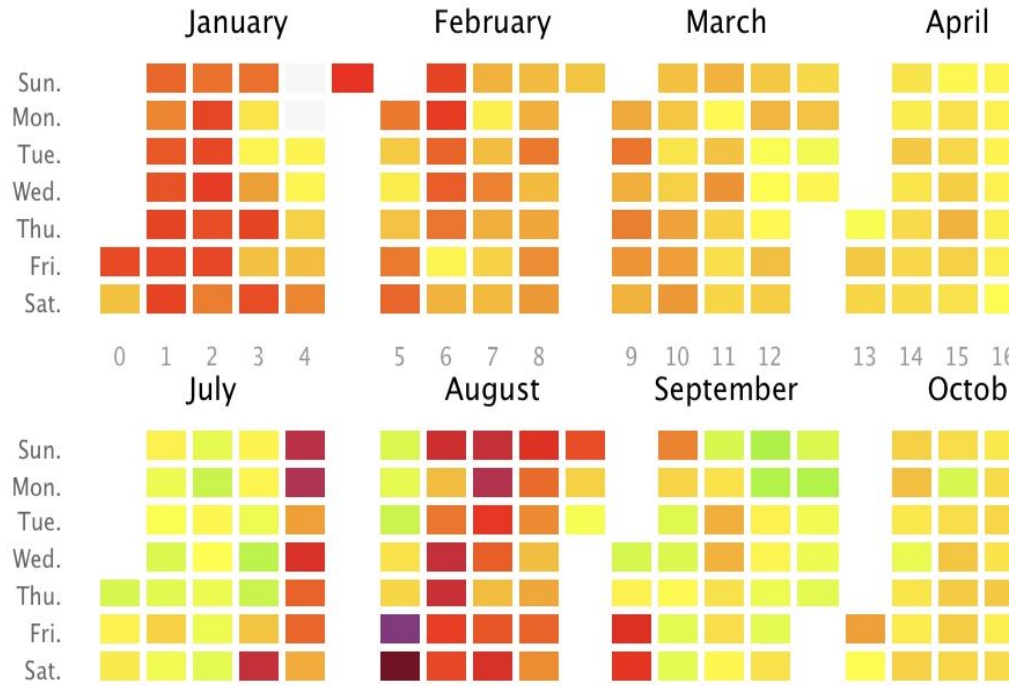
# How much smoke have we had this year?

**Calendar heat map**

- Familiar
- Maps on to lived experience

*Concerns*

- Requires historical data



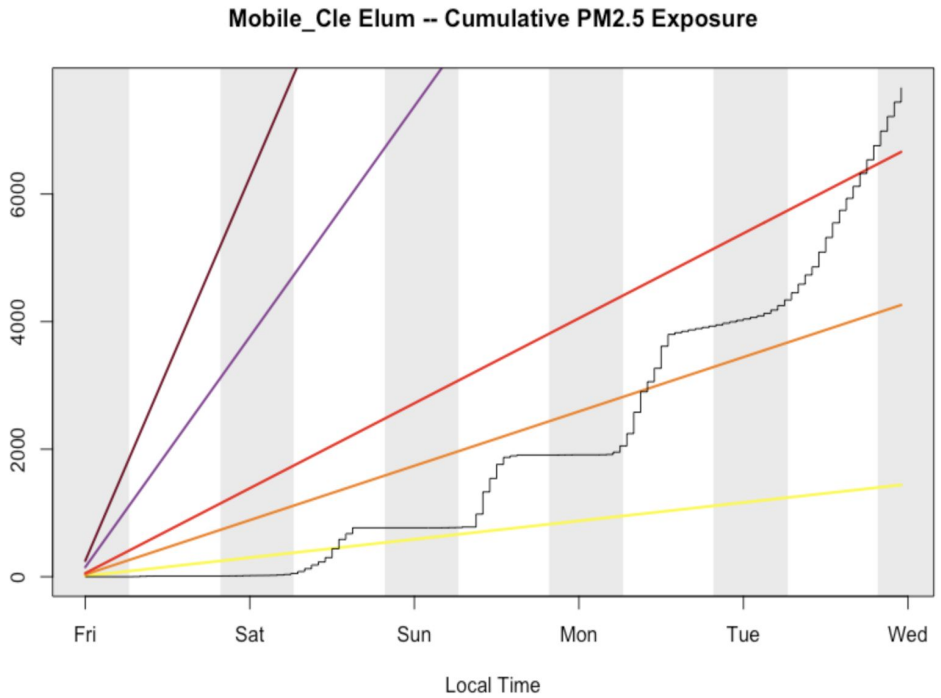
# What is the recent cumulative exposure?

**Hourly cumulative exposure**

- Unfamiliar
- For health professionals

*Concerns*

- Requires interpretation



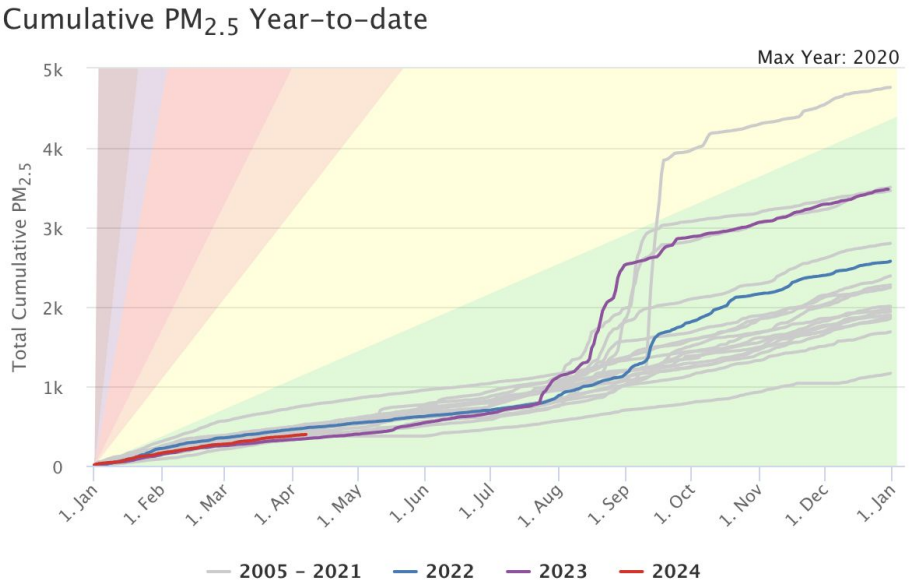
# How does this year compare to other years?

## Annual cumulative exposure

- Unfamiliar
- For health professionals

*Concerns*

- Requires historical data



# How will new NAAQs change things?

## Table and bars

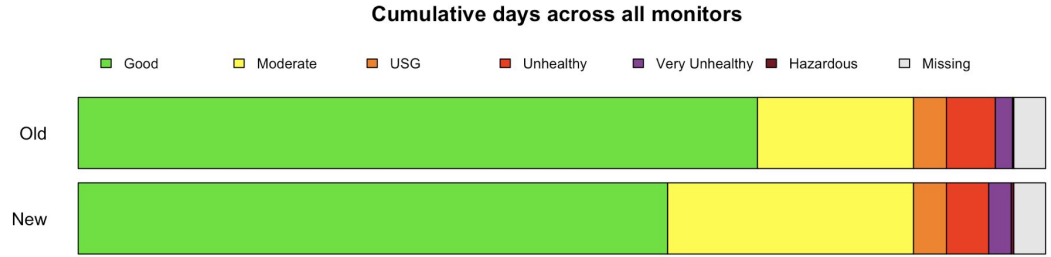
- Simple summary
- For health professionals

*Concerns*

- Requires historical data

**Using New (2024) $PM_{2.5}$ NAAQS**

| | Good | Moderate | USG | Unhealthy | Very Unhealthy | Hazardous | Missing |
|---|---|---|---|---|---|---|---|
| Wenatchee | 107 | 11 | 2 | 2 | 0 | 0 | 0 |
| Leavenworth | 83 | 12 | 1 | 3 | 0 | 0 | 23 |
| Twisp | 64 | 36 | 6 | 12 | 4 | 0 | 0 |
| Winthrop | 61 | 38 | 2 | 8 | 10 | 2 | 1 |
| Omak | 31 | 72 | 11 | 5 | 3 | 0 | 0 |
| Chelan | 100 | 17 | 3 | 2 | 0 | 0 | 0 |



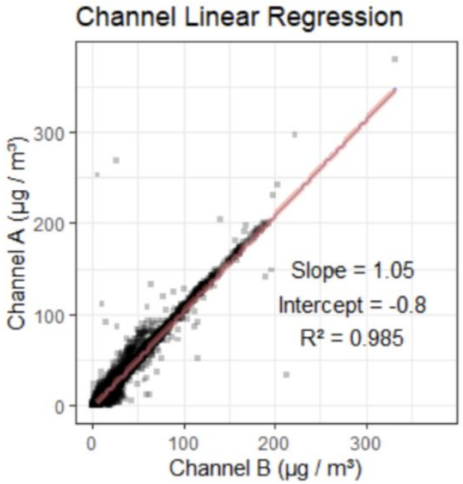
# Is my sensor working?

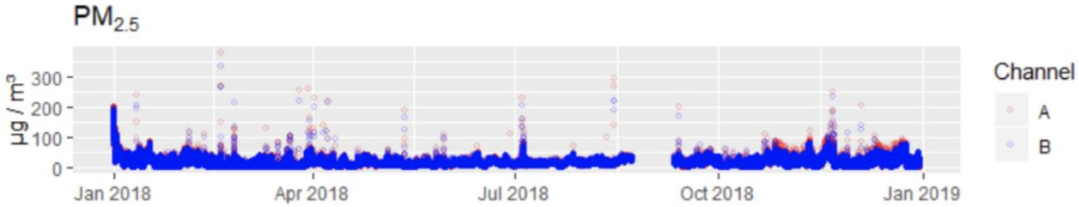
## Channel comparison

- Technical
- For sensor professionals

*Concerns*

- For experts only



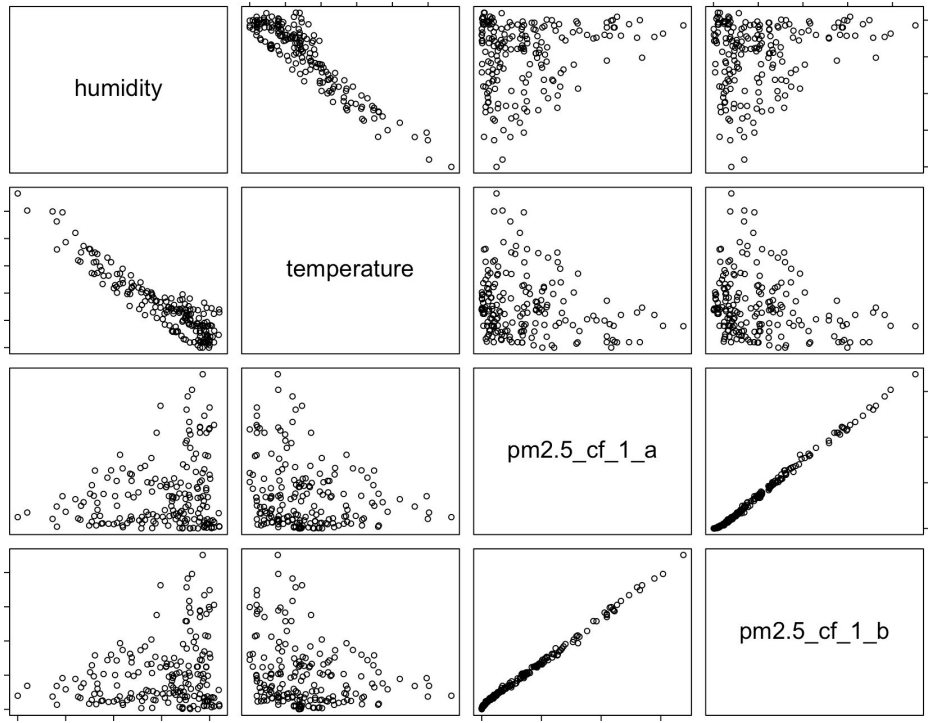
# Is my sensor working?

**Multi-parameter scatter plots**

- Technical
- For sensor professionals

*Concerns*

- Requires interpretation



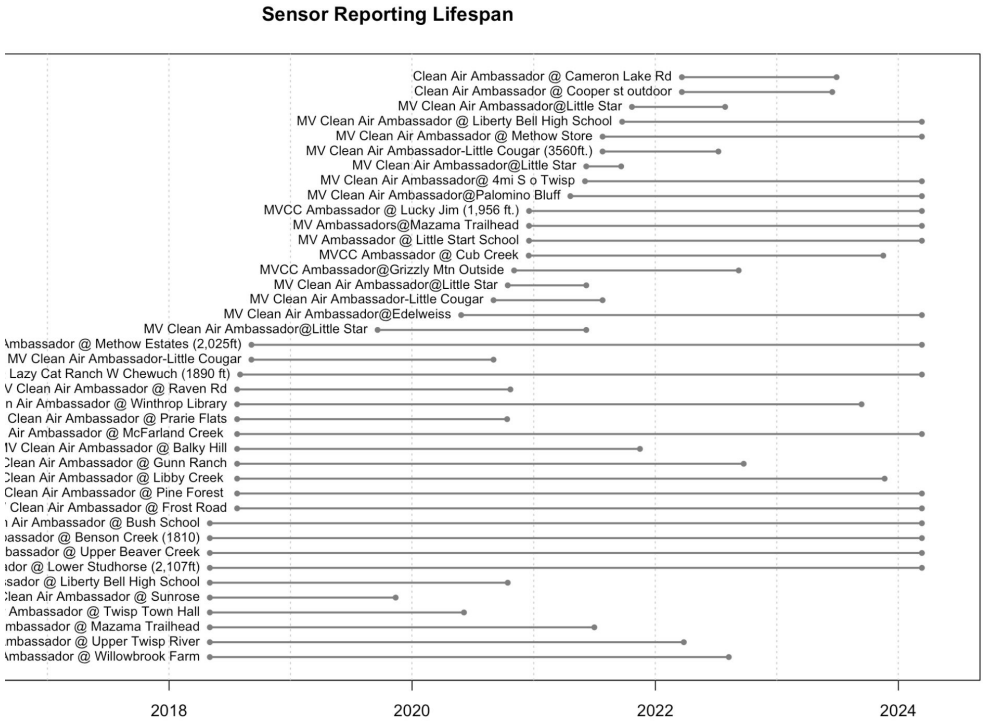
# How is my network doing?

## Reporting Lifespan

- Simple summary
- For network managers

*Concerns*

- Requires interpretation



# Design your visualization for a target audience.

**Identify your audience**

- Where do they live?
- What languages do they speak?
- What do they care about?
- What specific questions do they have?
- What visualization would speak to them?

**Create your data visualization**

- Is it static or interactive?
- What software do you need?
- What expertise do you need?
- What data do you need?
- How much labeling should you add?

*When done well, data visualization can quickly answer people's questions.*