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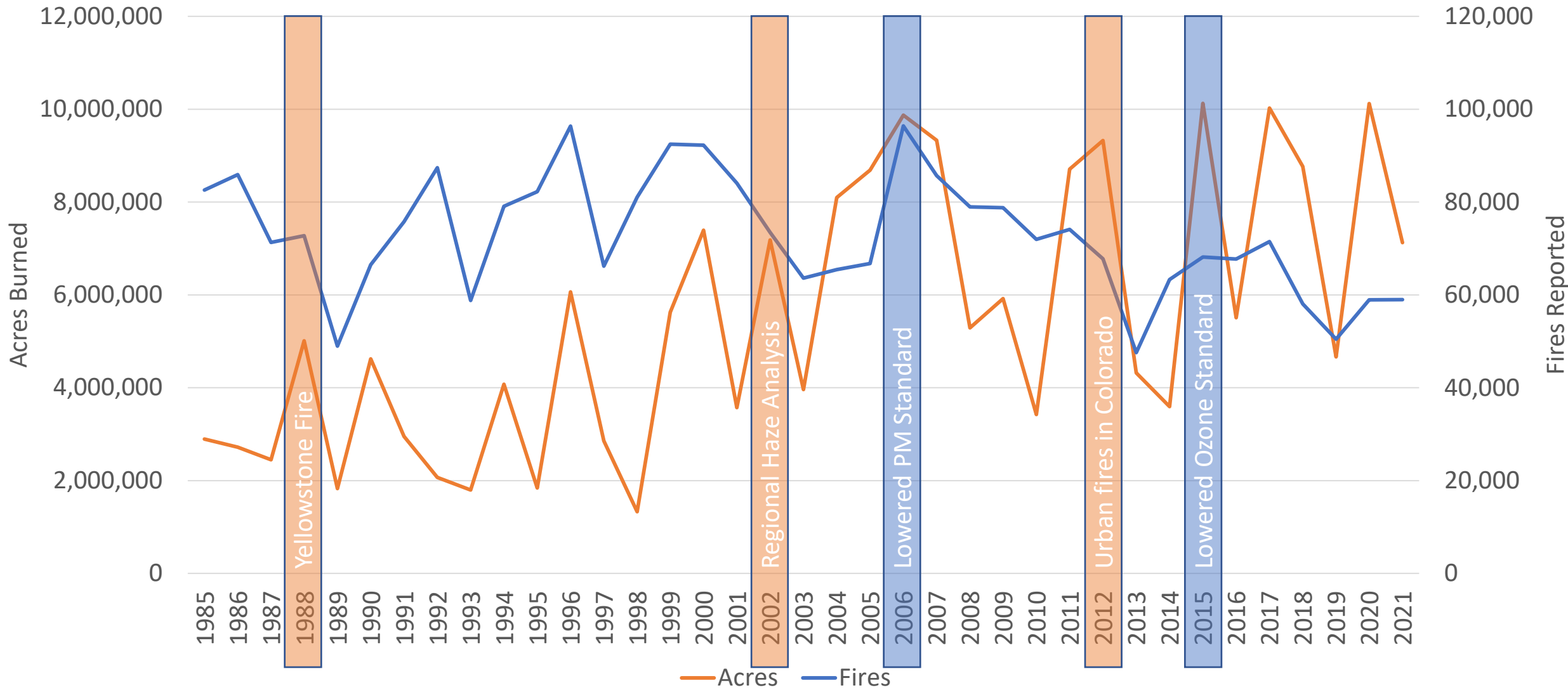
## 2021 Western Wildfire Season Impacts on Air Quality

PNWIS Annual Conference | October 12, 2022

Matt Mavko, Air Sciences, Inc. | Jay Baker, WESTAR/WRAP

# Prologue

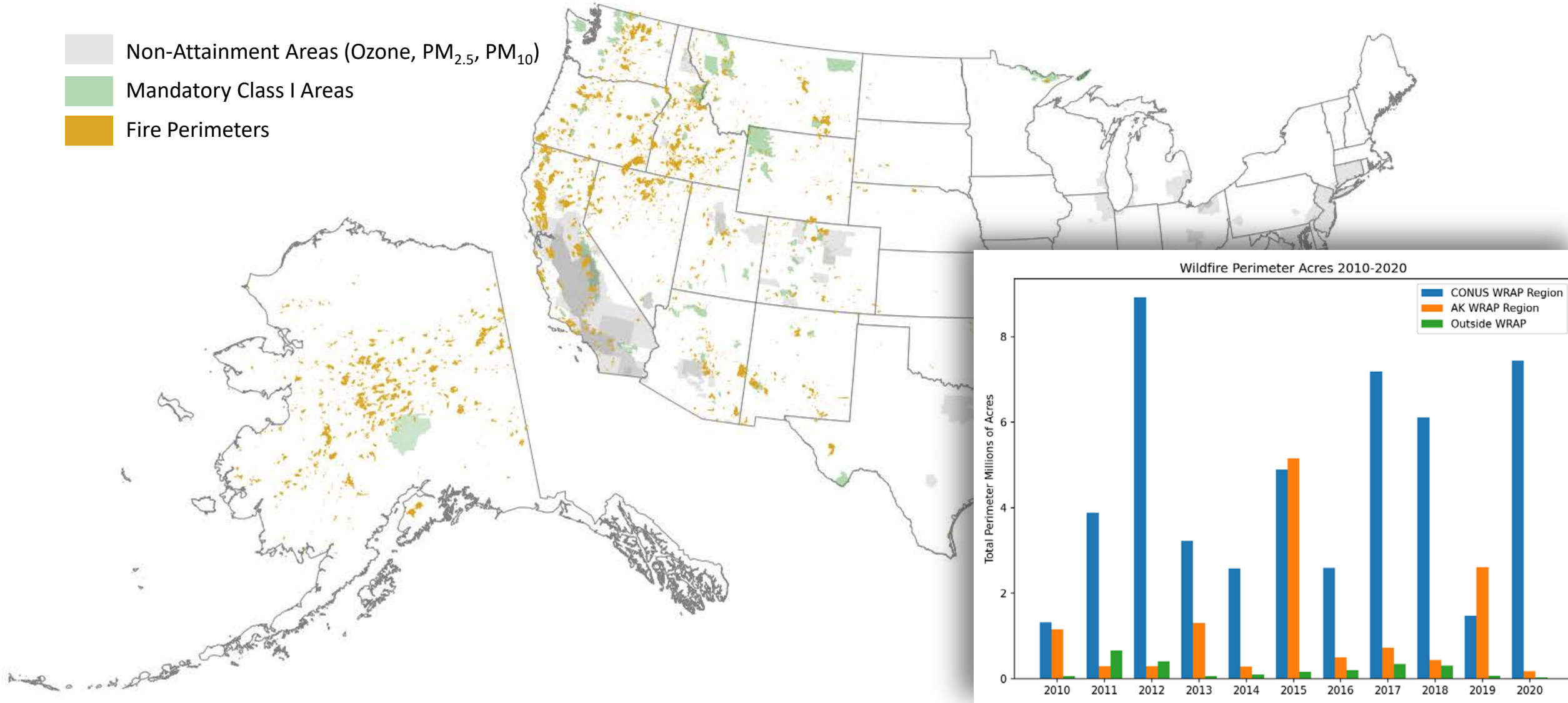
# CONUS + AK Wildfires & Acres, 1985-2021



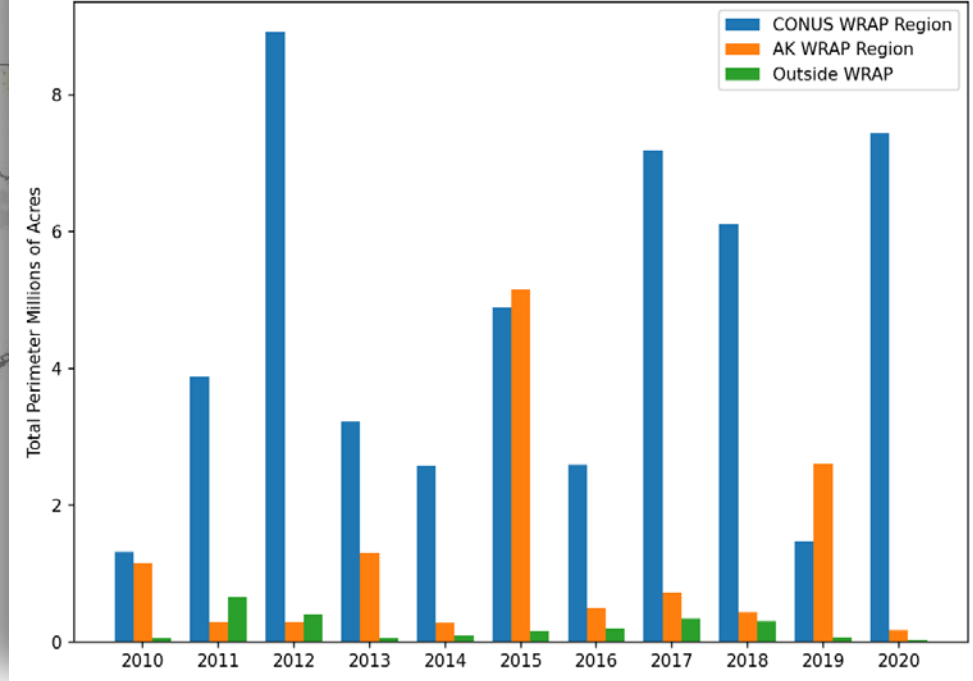
Source: nifc.gov

# Wildfire Perimeters 2010-2020

- Non-Attainment Areas (Ozone, PM<sub>2.5</sub>, PM<sub>10</sub>)
- Mandatory Class I Areas
- Fire Perimeters



Wildfire Perimeter Acres 2010-2020

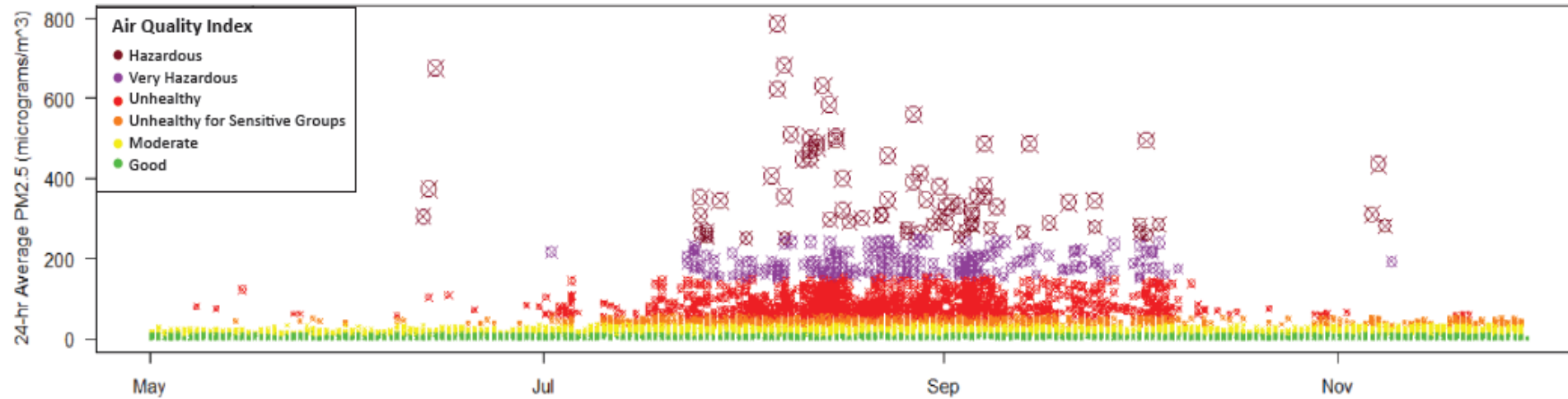


Source: Wildland Fire Open Data, <https://data-nifc.opendata.arcgis.com>

# Wildfire Smoke

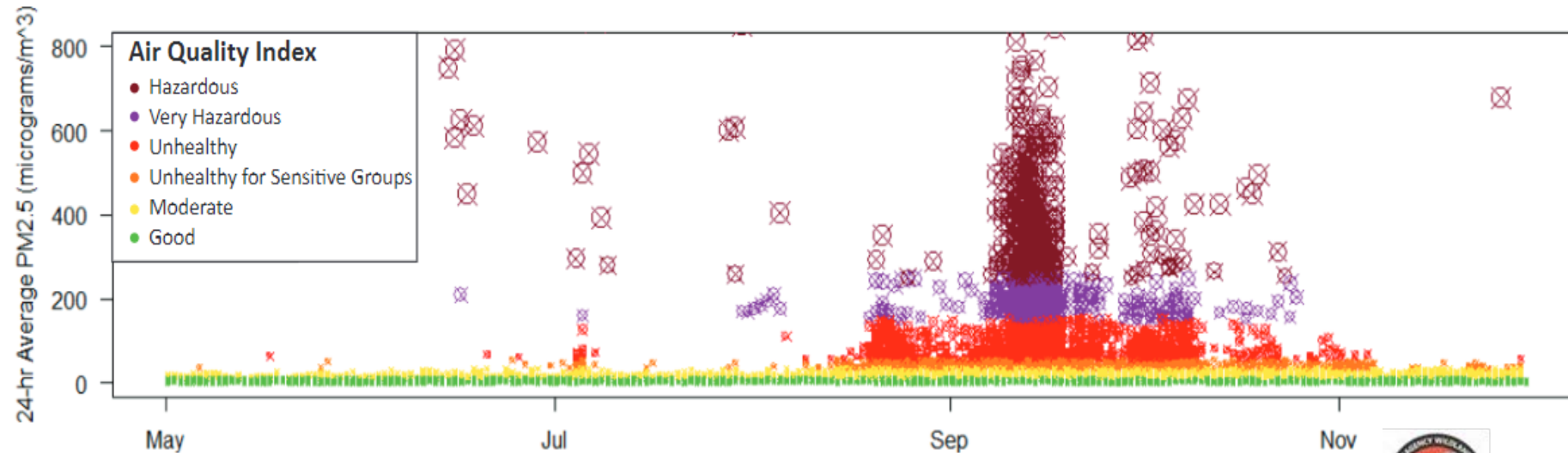
## Timing of 2021 Smoke Impacts at All Western US Monitors

(by Air Quality Index (AQI) Level)



## Timing of 2020 Smoke Impacts at All Western US Monitors

(by Air Quality Index (AQI) Level)



Graphic credit: Interagency Wildland Fire Air Quality Response Program



# 2021 Western Wildfire Impacts

Regional Monitoring Assessment

# How Does an Agency Account for Smoke?

- 2021 saw widespread smoke impacts throughout the western United States
- WRAP/WESTAR surveyed western states to understand the extent of monitored exceedances of the Nation Ambient Air Quality Standards (NAAQS) that were smoke-affected
- Recent years have seen more states filing *Exceptional Event* requests with EPA due to smoke impacts. Events with *regulatory significance* require air quality agencies to seek relief from EPA.

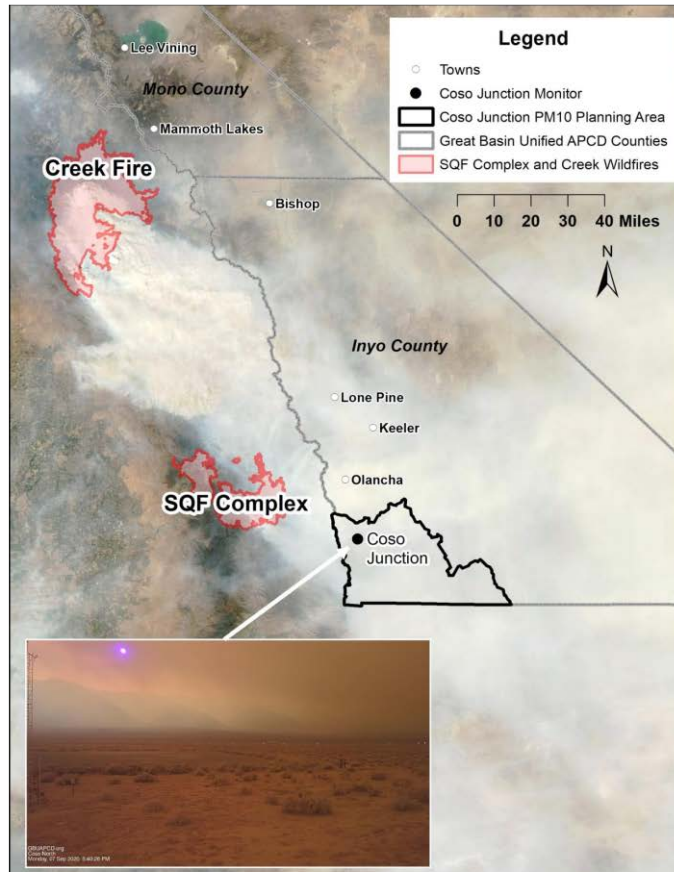
# What is an Exceptional Event?

- Regulatory monitors track compliance with the NAAQS
- Frequent exceedances of the NAAQS may require State agencies (or their delegates) to adopt control measures
- Exceedances that are *not reasonably controllable or preventable* may be excluded from these determinations
- Wildfires, (some) prescribed fires, windblown dust from natural deserts, 4<sup>th</sup> of July fireworks...
- States must *demonstrate* that the exceedances meets the regulatory criteria for being “exceptional”



# Exceptional Event Demonstrations

Exceptional Event Demonstration for Wildfire Smoke Impacts to the Coso Junction PM10 Monitor on September 7, 2020



July 2021

Great Basin Unified Air Pollution Control District

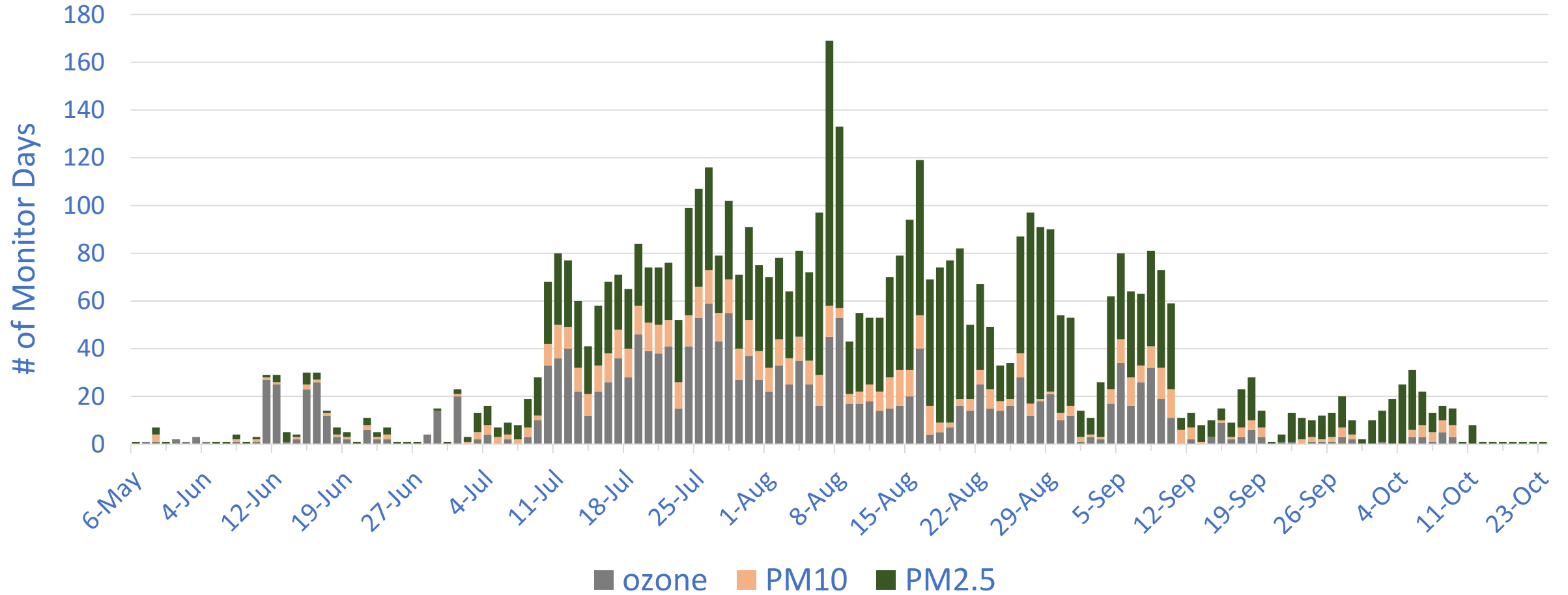
“It was smoky”

- Even on days that seem obvious, demonstrating impacts is a major effort
- Conceptual model of event
- Weight-of-evidence approach
- Complexity increases for secondary pollutants and/or areas with competing sources

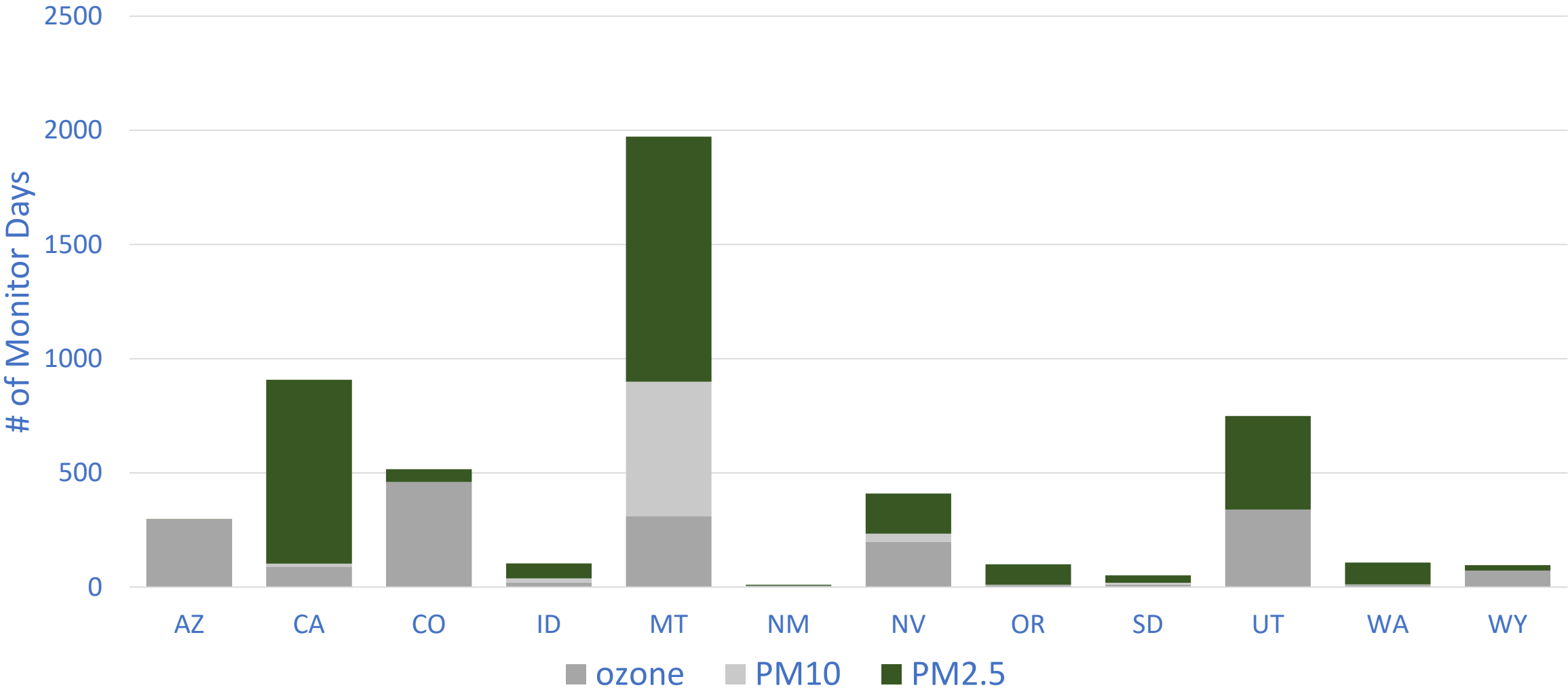
# WRAP Survey Results

- Variation in responses by agency that EE demonstrations will be submitted
  - Regulatory significance
  - Flagging requirements
  - Staffing/resources limitations
  - Upcoming reviews of PM and Ozone National Ambient Air Quality Standards – significance of 2021 data in future
- Data collected from WESTAR/WRAP member agencies:
  - Sites and days affected by smoke
  - Both PM and ozone

# Reported Number of Monitors Impacted by Date

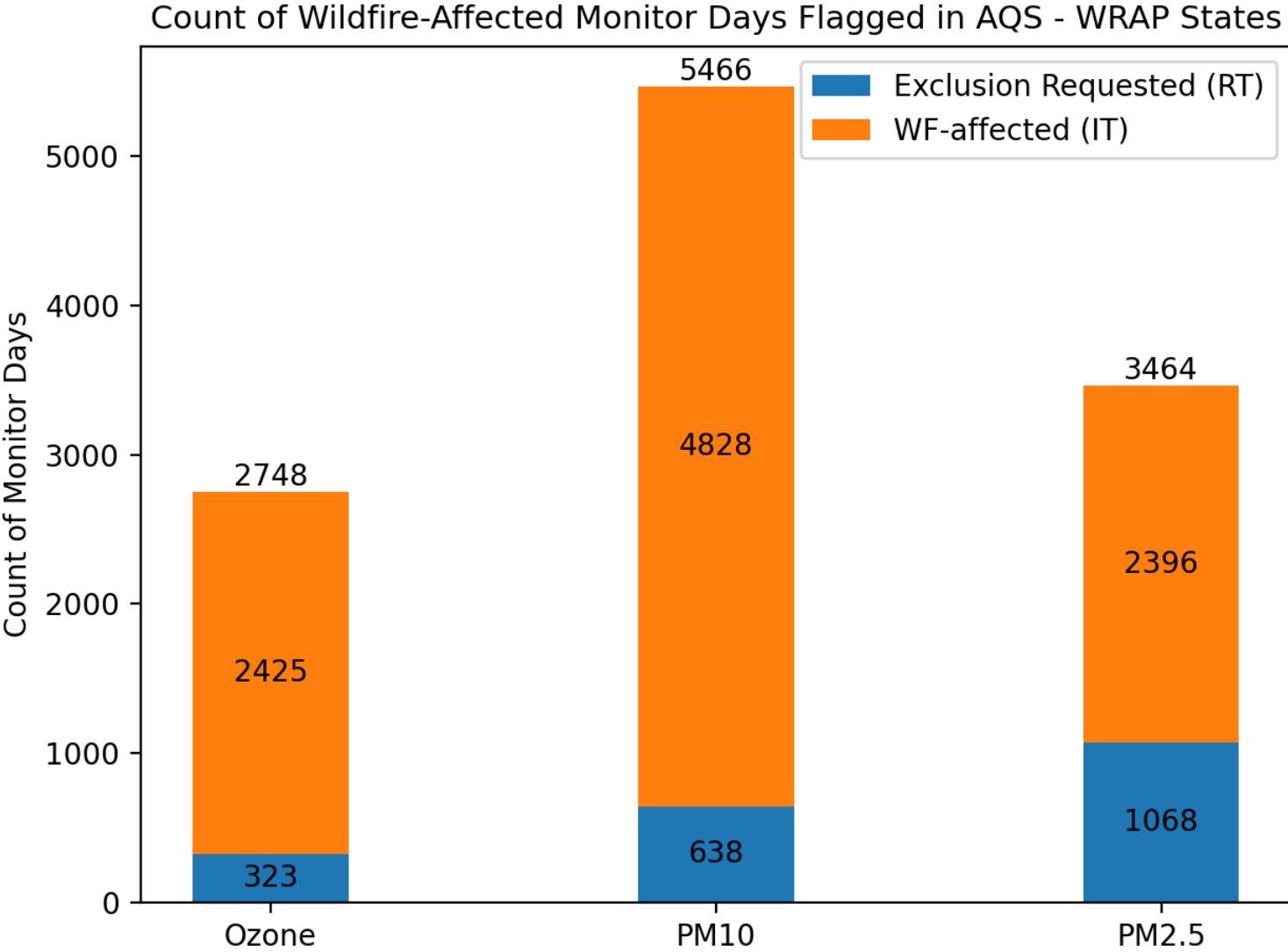


# Reported Smoke-Impacted Monitor Days by State



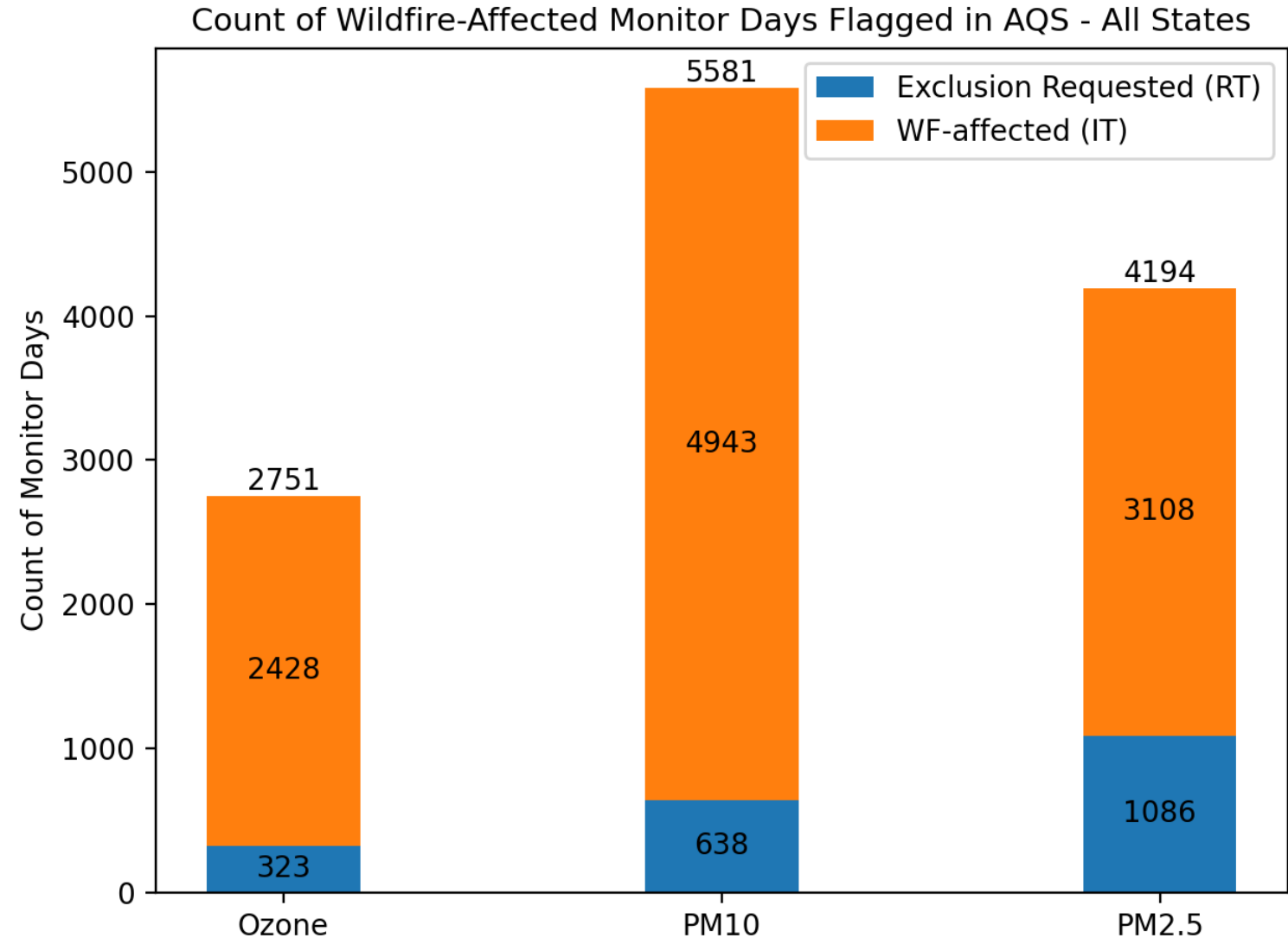
# 2021 Data Flagged in EPA's Air Quality System

- States flag data in AQS to request exclusion under the Exceptional Events Rule
- EPA determines if requested exclusions are of *regulatory significance*.
- Information-only flags ("IT") are under-reported



# 2021 Data Flagged in EPA's Air Quality System

- 18 additional exclusion requests outside the WRAP region (PM<sub>2.5</sub> only)
- Many additional information-only flags
- Lowered PM<sub>2.5</sub> standard will expand the geographic scope of the problem
  - Small contributions from transported smoke become important
  - Complicates selecting design values



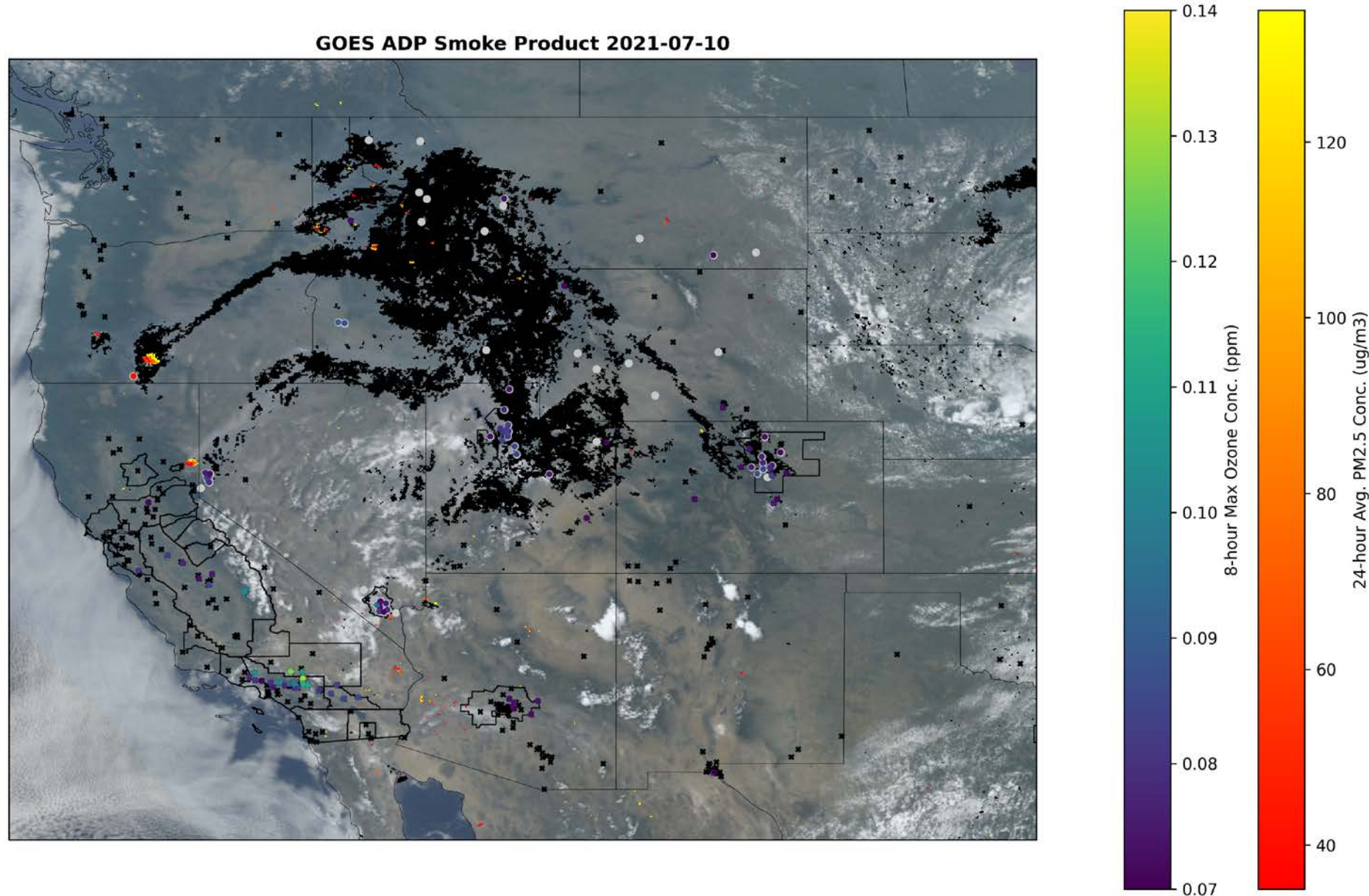
# An Intractable Problem

- “Exceptional” does not have to mean “rare” under EPA rules (A better term would be “excepted events”)
- Addressing frequent exceptional events under the current regulatory framework is burdensome
- When uncontrollable events become frequent, air quality can deteriorate while still meeting EPA standards\*

\*A nice recent analysis: <https://pubs.acs.org/doi/10.1021/acs.est.2c02934>

# Streamlining Exceptional Event Reporting

- WESTAR/WRAP is exploring ways to provide technical assistance to western states
- Standardizing data-gathering
- Coordinating across agencies on conceptual model building
- Sharing data and tools
- South Coast AQMD (CA) is building an app!

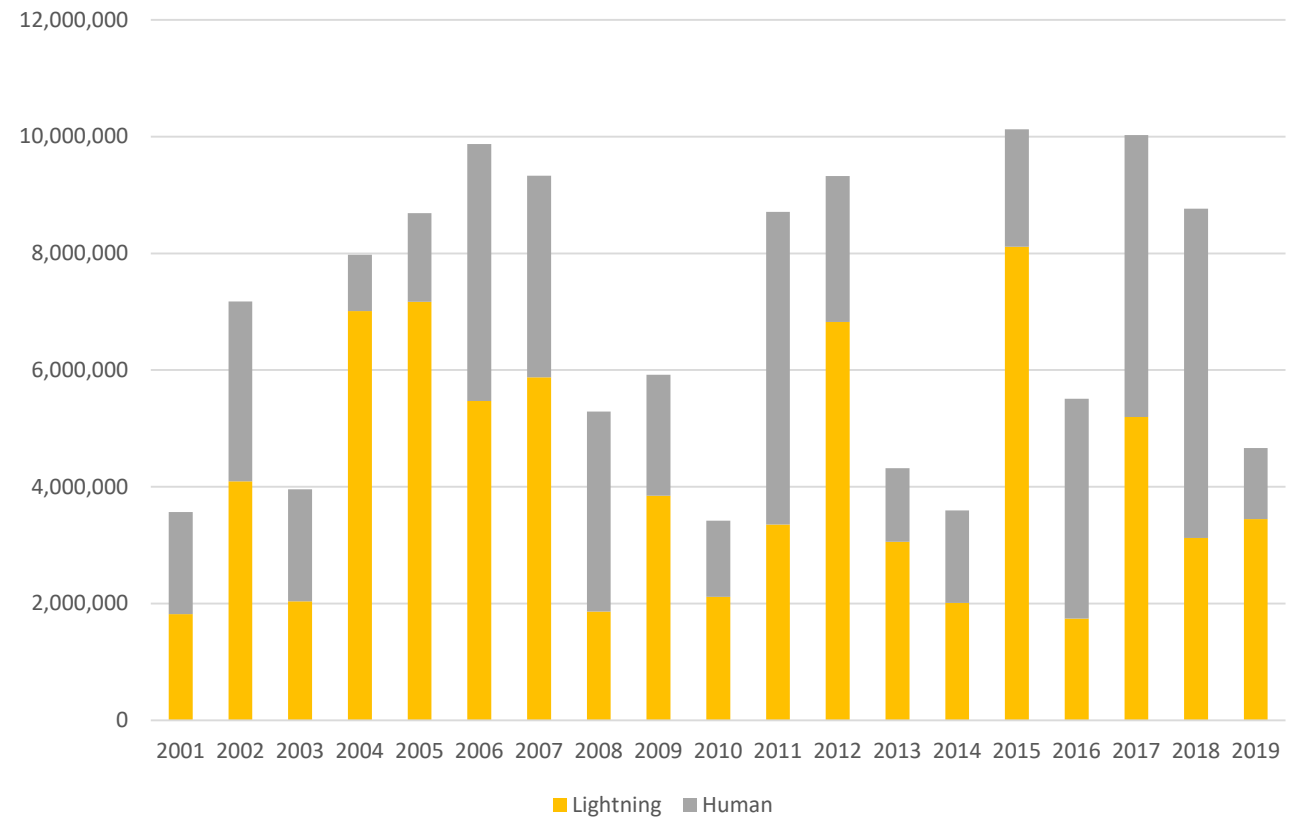




# Efforts to Address Wildfire Air Quality Impacts

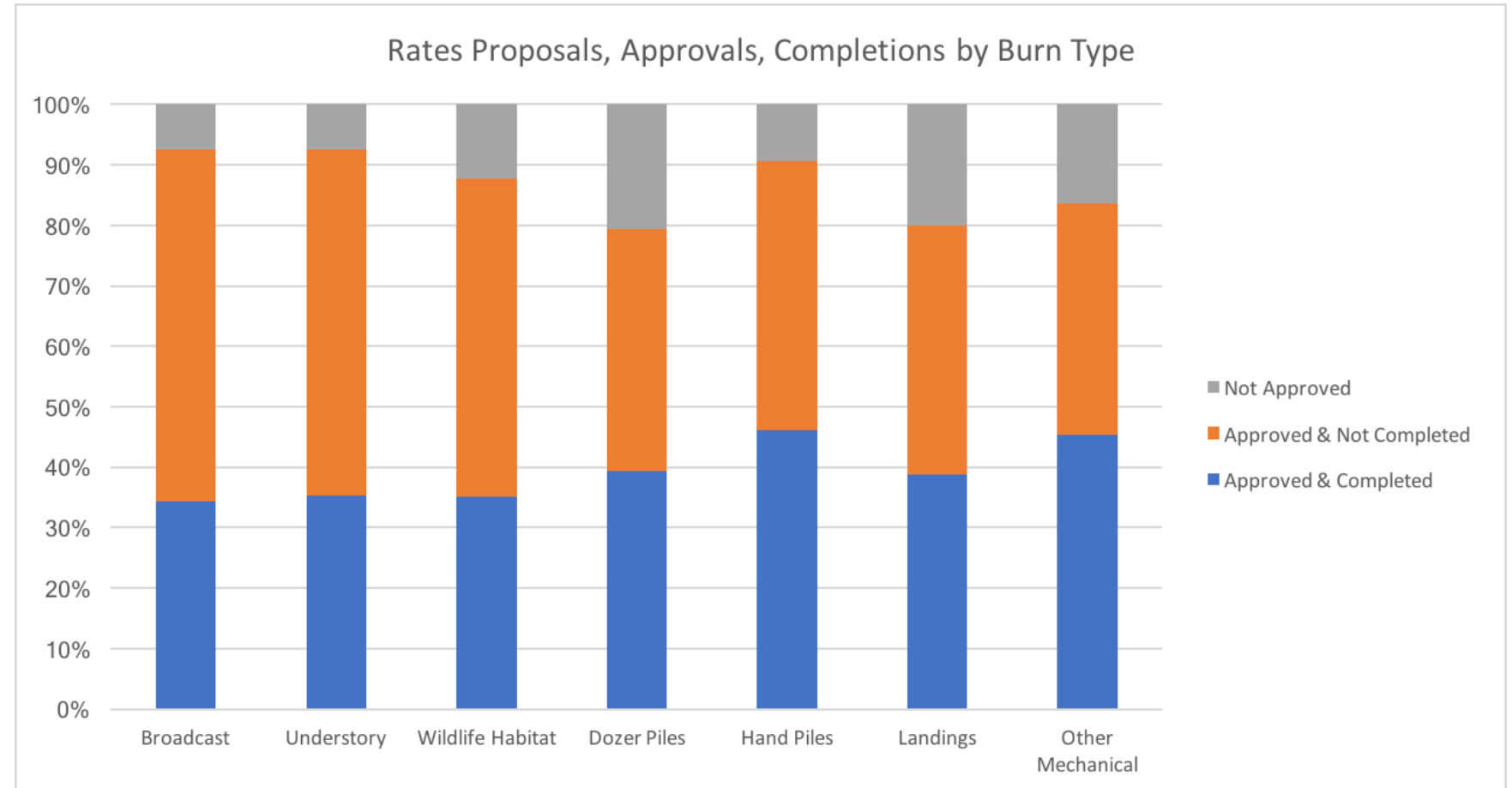
- Air Resource Advisor program (USDA Forest Service)
  - Liaison between firefighters and air quality/health agencies
  - Can inform
    - Operational decisions at the fire (resource objectives versus AQ impact)
    - Emergency response in communities experiencing smoke
- Increasing opportunities for Prescribed Burning
  - Unlikely to reduce *total* emissions, but increases control over when, where, and how much
  - Limited by resources, fuel conditions, and meteorology

Human vs Lightning-Caused Wildfire Acres, 2001-2019



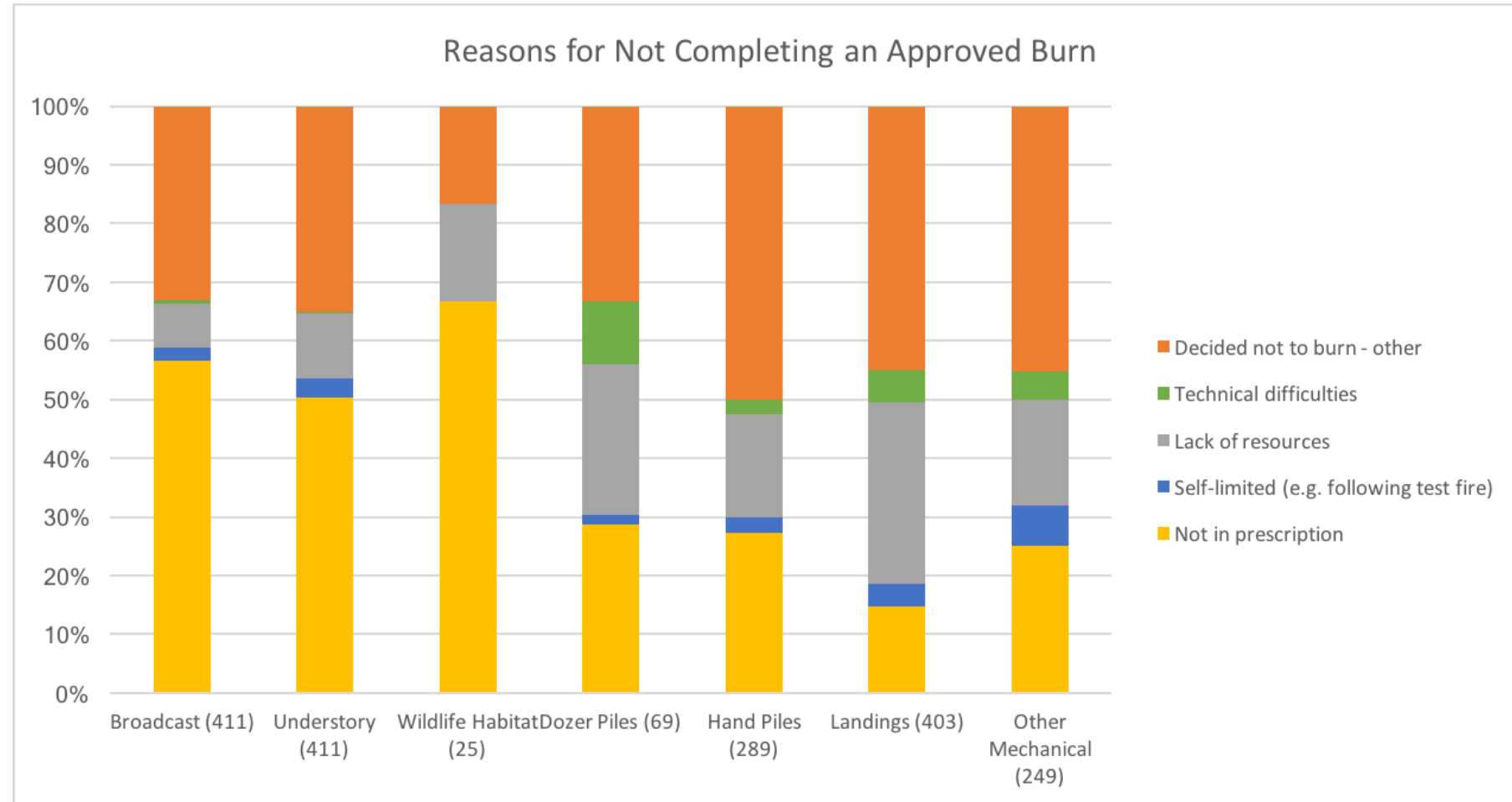
# Managing Smoke from Prescribed Fire

- MT/ID Airshed Group reviews and approves controlled burns during spring and fall
- Meteorology and clearing potential are considered, accounting for elevation, terrain features, and burn characteristics
- 85% are approved, but only 40% are lit



# Managing Smoke from Prescribed Fire

- Lack of resources and safety are the two biggest reasons for not burning



# Managing Smoke from Prescribed Fire

- Utah recently passed a law to increase prescribed burning opportunities (HB92)
- Requires real-time monitoring and additional reporting
- From Nov 2020 – Apr 2022, 220 potential additional burn days over 13 months
- 4,500 additional acres “treated” to date

