

INTERAGENCY WILDLAND FIRE AIR QUALITY RESPONSE PROGRAM



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Smoke and Wildfire

- Single wildfires to multiple regional wildfires causing significant impacts to millions
 - Health, Safety, Economics, Disruption of Life, Children/School/Athletics impacts
 - **Long durations** of high levels of pollutants
 - Can contribute to traffic accidents (fatal and injuries in NW)
 - Direct attribution of smoke contributing to deaths (media reports)
- **Public** impacts of smoke: 1 in 3 households has someone with respiratory issues, E.g. children with asthma, COPD, emphysema (communities will vary higher & lower)
 - 2018 findings of 2015 CA fires: age 65+ medical cardio and cerebro-vascular effects
 - \$11 to \$20 Billion Dollars estimated annual medical costs due to short term exposure based on 2008-2012 wildfire seasons (longer term is higher)
 - Annual mortality estimates based on PM2.5 impacts from biomass burning:
 - 2,500/yr in US based on global model
 - CSU Study now 15,000/yr to 40,000/yr (AGU 2018)
 - State study under review 200+ deaths/yr attributed 2016 to wildfire

Based on modeling...*“You are more likely to know someone who dies from wildfire smoke than directly from the fire”* from NW Fire Science Summit 5/21/2019



2018 & 2019 Smoke and Wildfire

- USDA Forest Service 2017, 2018 and 2019 Fire Year Key Messages:
 - “We work closely with our cooperators to manage wildfires and *predict and mitigate smoke impacts on individuals and communities during wildfires.*”
- 2018 Efforts to improve in-home air filtration and build capacity for clean air during wildfire incidents (also useful during prescribed fire)
 - American Lung Association in WA offering purifiers to qualified seniors
 - Missoula City-County efforts, started 2017 providing filter systems for vulnerable populations and effort to enact building ventilation standards for smoke and identify public clean air locations
- Focus of Congressional Hearing in Fall 2017 and 2018
- Wildlandfiresmoke.net (IWFAQRP site) – Outlooks 4+ million total views
- State Smoke Blogs (WA, OR, CA, ID) – 1.9 million views 2018 (pre-Camp)
- 2018 Launch – USFS-EPA and state/tribal/local Smoke-Ready Communities and a Smoke-Wise Public cooperative efforts, Many local efforts-OR, WA...

2017 and 2018 Wildfire Smoke Impacted Monitor Days (Larkin, 2018)

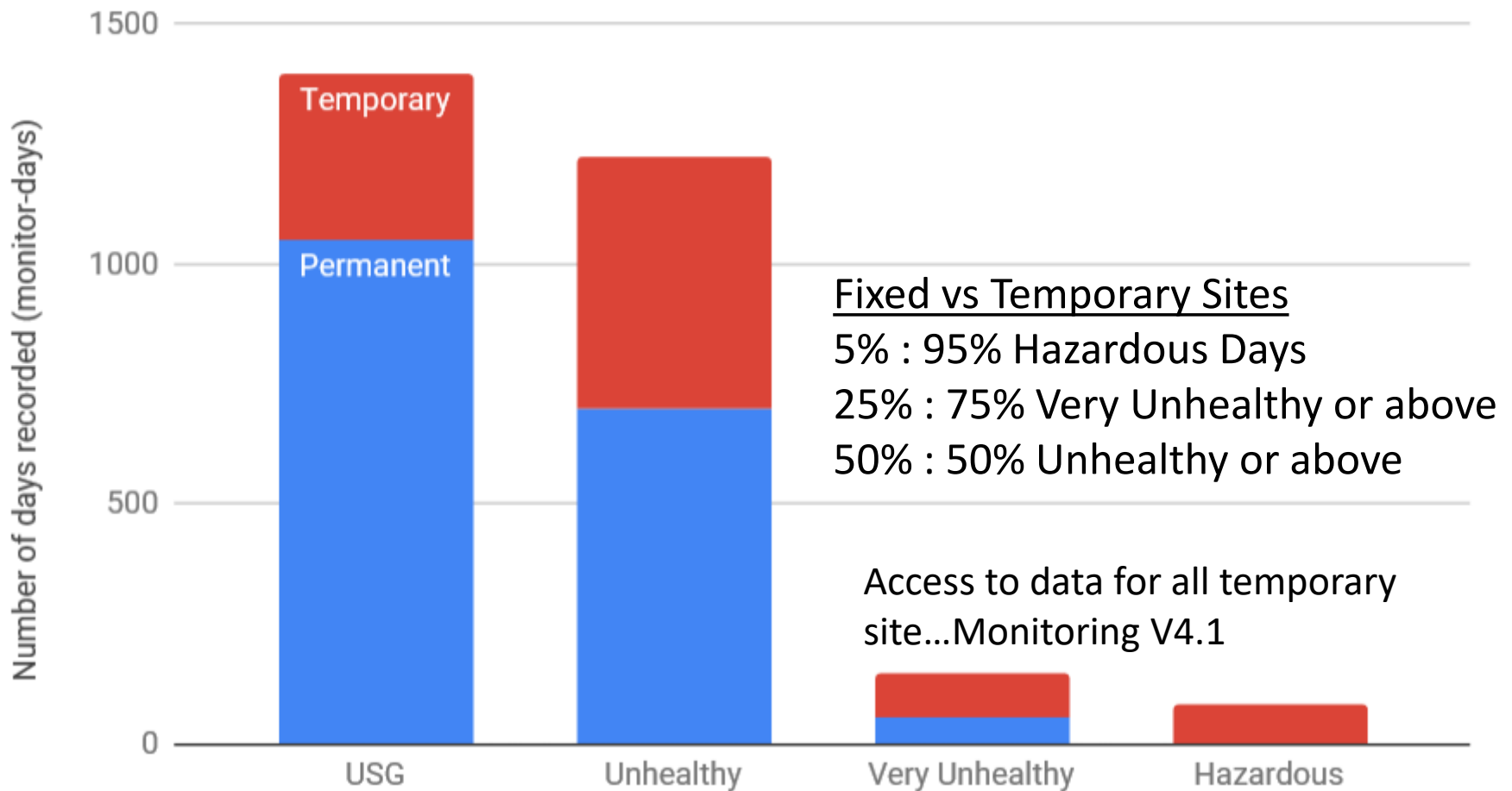


- Using Fixed and Temporary Monitors 2017 and 2018
- AQI Level At or Above PM2.5 Unhealthy for Sensitive Groups Levels

State	2017	2018
WA	555	631
OR	647	536
CA	684	2036
NV	9	39
ID	323	192
UT	12	33
AZ	4	8
NM	32	36
CO	18	62
WY	7	6
MT	436	105

- Days in 2018: 3730 USG (NAAQS), 1995 Unhealthy, 105 Hazardous
- 95% of all Hazardous days on Temporary Monitors (200x more likely)

2018 Exceedences Recorded by Network



Wildland Fire Air Quality Response Program



Air Resource Advisors - Smoke specialists deployed as part of an Incident Management Team

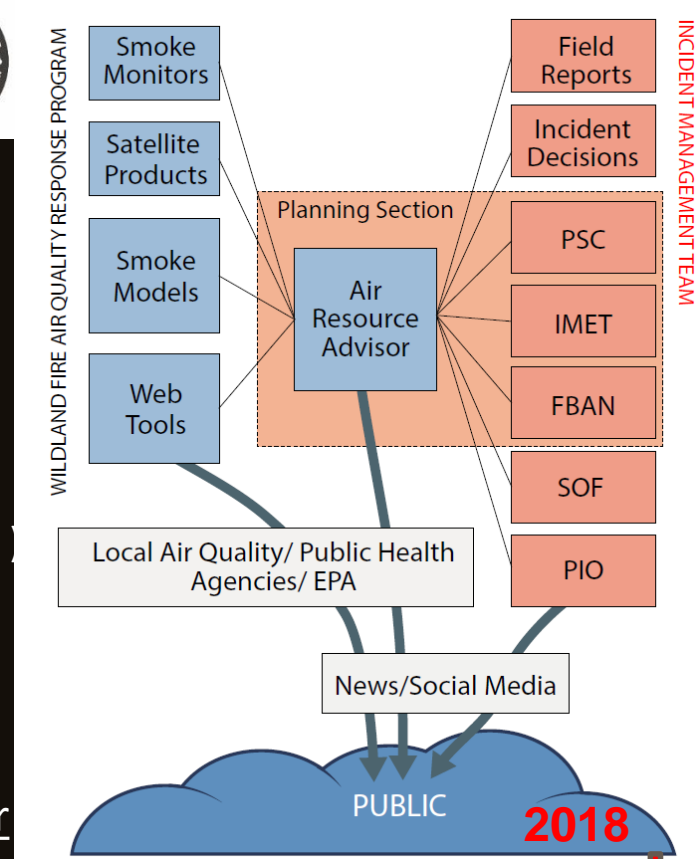
60 ARA's and 35 trainees highly diverse group:

FS, BLM, NPS, FWS, EPA, State Forestry (NC, GA, FL, OR, WA)
Tribes, NWS, NRCS, CDC, AD-Contract, State/County
Air Regulatory/Health (KS, NC, CO, Placer Cty, Washoe Cty,
and another class June 2019 in Boise...

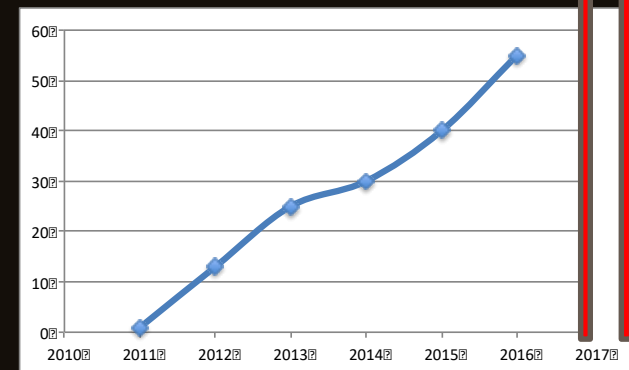
Backgrounds: Wildland Fire, Air Quality, Meteorology

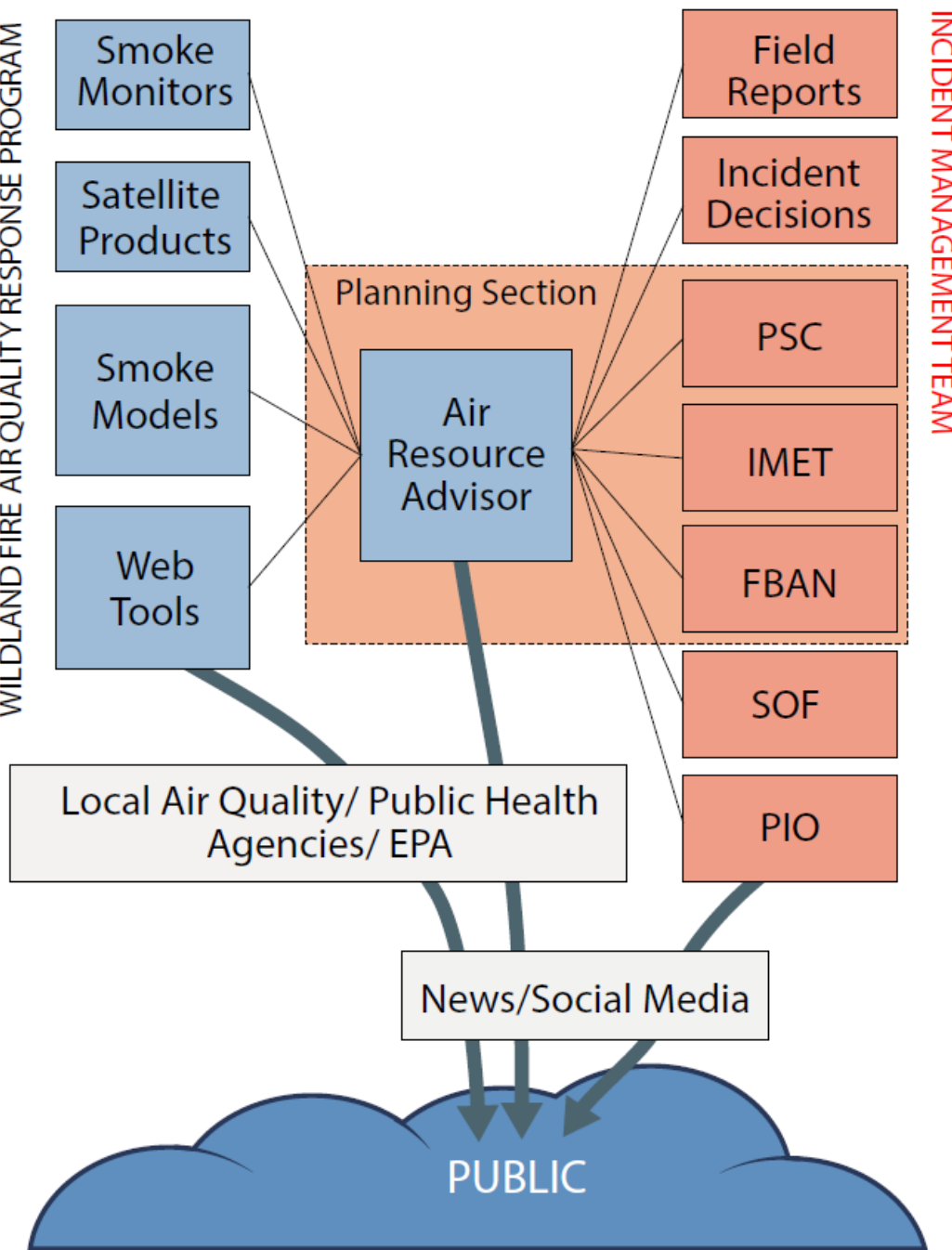
Enables: Reduction of smoke exposure through behavior modification messages (public or personnel) and provide roadway smoke forecasting (when needed)

- Modeling (BlueSky daily fire/smoke runs)
- Monitoring (National cache of 38+ PM2.5 units)
- Messaging - Daily Smoke Outlook AQI/Nowcast-
with peak and low impact timing information
- Coordination w/ state/tribal/local air quality regulatory agencies, public health dept. and impacted communities



2017
ARA Deployments by Year





PSC = Planning Section Chief
 IMET = Incident Meteorologist
 FBAN = Fire Behavior Analyst
 SOF = Safety Officer
 PIO = Public Information Officer
 Others: Liaison Officer, Medical Unit Leader, Incident Commander and Agency Administrator

Deployed to wildfire to help determine source emissions and strength as land managers know more of what the fire will do in terms of: fire size, growth rate, intensity, fuels, consumption, emissions, weather, duration, ...and impacts typically highest near the wildfire





Modeling of PM2.5 - Research, Development, Application



<https://tools.airfire.org/websky/v1#status>

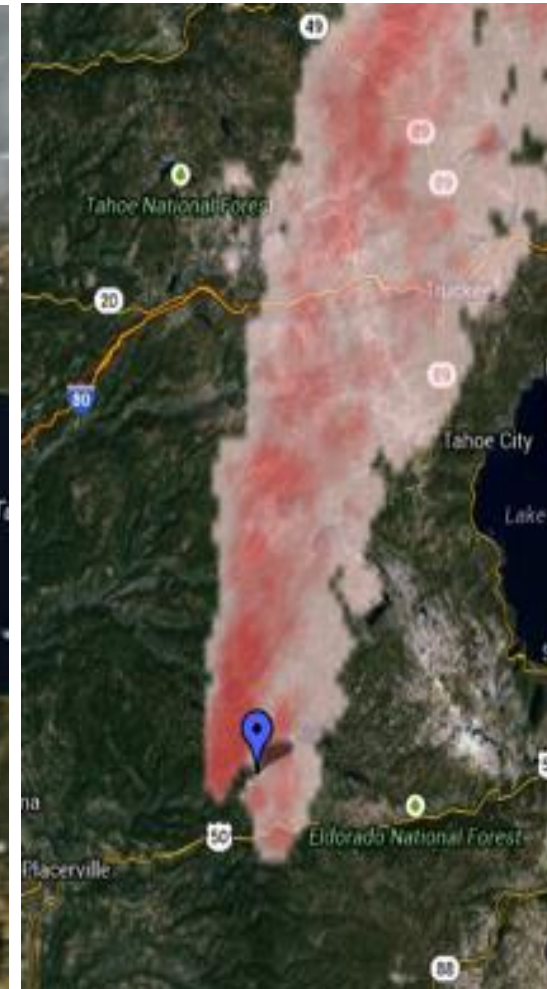
USFS PNW R&D AirFire Team -BlueSky smoke modeling framework

- 20+ daily regional runs to supplement national products
- Canadian wildfire added 2017
- New 1.8-km domains- CA,OR, AZ, NM & NWS 3-km CONUS
- 2018 CMAQ runs added
- Use of NWS mobile 1.3km grid from NOAA (6/15-9/15)
- On-incident support for ARA's high resolution & custom runs for best performance
- Use of FS, NOAA, NWS, NASA, CDC and Health-Canada winds & smoke products

King Fire 2014



Earth Observatory 9/17/2014

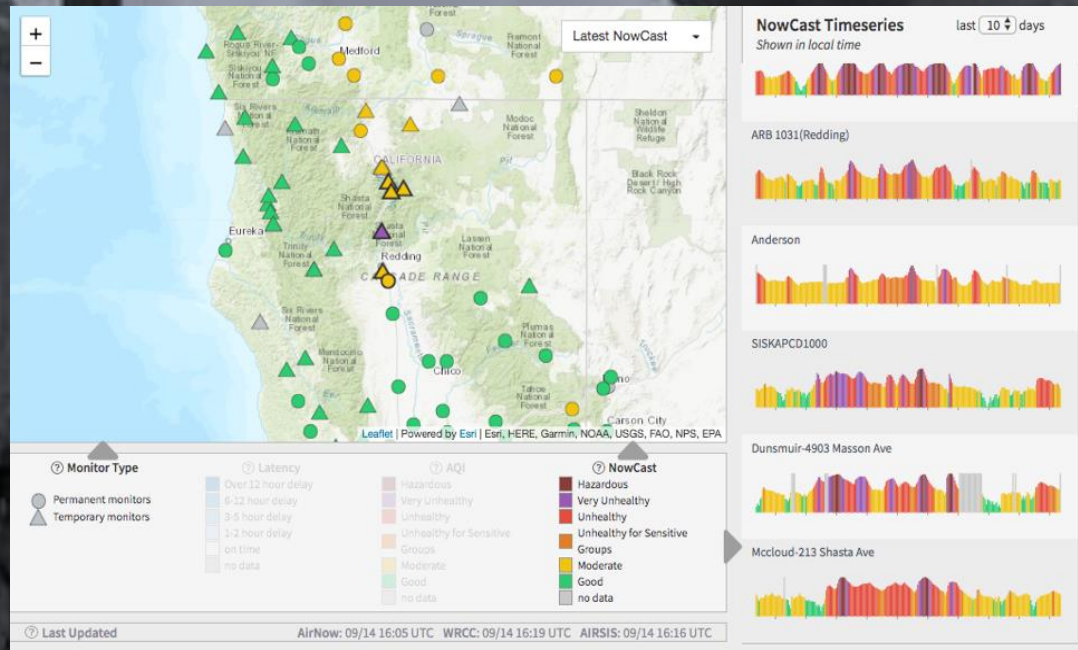


BlueSky Daily Run



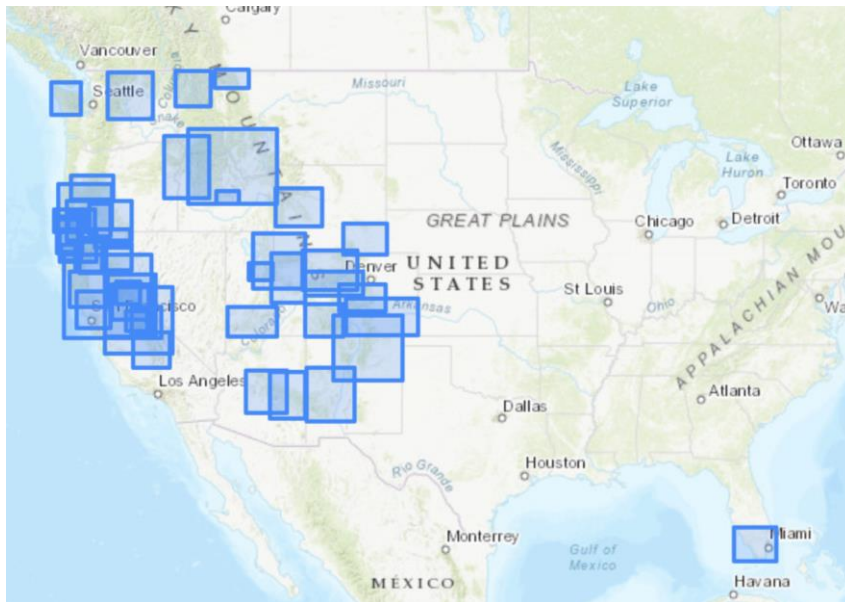
Monitoring

- 38 monitors in USFS national cache deployed to most impacted communities
- Monitor deployments affect underserved communities directly
- Web tool (USFS AirFire) aggregates and displays PM2.5 data across all sources
- Units deployed to CA in 2018
- In 2018 adopted by State of California when other sites challenged with heavy smoke



2018 Smoke Outlooks

- ~1000 Smoke Outlooks Issued
- Done in collaboration with local agencies



Smoke Outlook for 6/14 - 6/15
SW Colorado 416 and Burro Fires
Issued at: 2018-06-14 14:35 UTC

Outlook for SW Colorado

Fire

416 Fire is at about 32,000 acres, 15% containment. Burro Fire is about 3,000 acres at 0% containment. Predicted thunderstorms may bring strong outflow winds and increase the potential for extreme fire behavior.

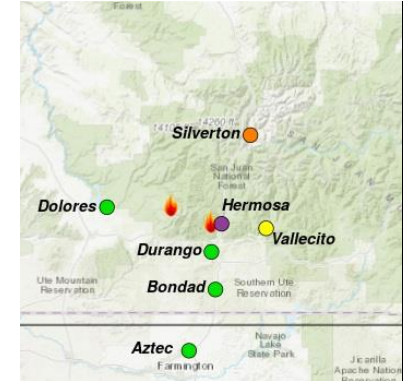
Smoke

Durango and Bondad should get a reprieve from smoke today. Hermosa will see smoke impacts at varying levels throughout today. Silverton and Lake City will see greater smoke impacts today and tomorrow. Vallecito may see smoke drifting in late this afternoon as well tomorrow morning. Dolores and Aztec should not see much smoke impacts today.

One way to reduce smoke exposure

Consider using a HEPA air filtration unit to help keep a room in your home less smoky. For more information see: <https://www.missoulacclimate.org/hepa-air-filtration.html>

Daily AQI Forecast for Jun 14, 2018



Station	Yesterday hourly	Wed 6/13	Forecast	Thu 6/14	Fri 6/15
Bondad			Generally clear today, smoke returning tomorrow morning before clearing around noon.		
Dolores			Generally clear today		
Hermosa			Heavy smoke drift mid-afternoon, some clearing tonight, returning at heavy levels early tomorrow morning, persisting to noon.		
Durango			Generally clear today with heavy smoke returning early tomorrow morning before clearing late morning.		
Silverton			Smoke drifting in late this morning, persisting overnight with heaviest concentrations after midnight and clearing late tomorrow morning.		
Vallecito			Smoke drifting in late this afternoon, clearing tonight. Smoke returning tomorrow morning, clearing before noon.		
Aztec			Generally clear today		

Issued 2018-06-14 14:35 UTC by Andrea Holland, Julie Hunter (t)

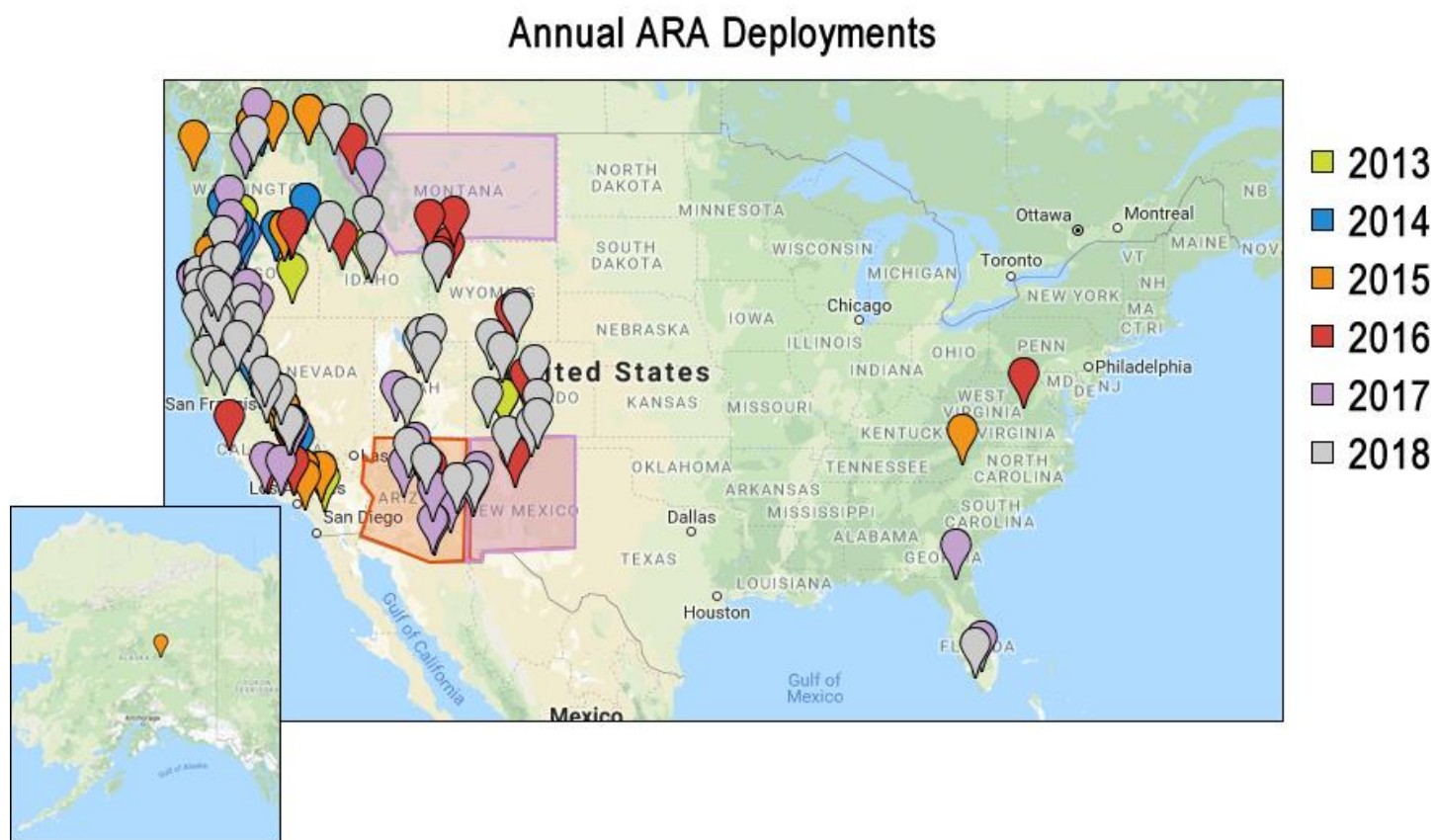
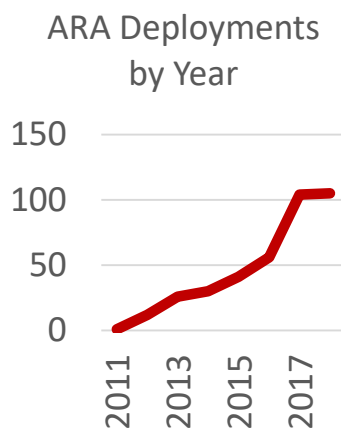
Air Quality Index (AQI)	Actions to Protect Yourself
Good	None
Moderate	Unusually sensitive individuals should consider limiting prolonged or heavy exertion.
USG	People within Sensitive Groups* should reduce prolonged or heavy outdoor exertion.
Unhealthy	People within Sensitive Groups* should avoid all physical outdoor activity.
Very Unhealthy	Everyone should avoid prolonged or heavy exertion.
Hazardous	Everyone should avoid any outdoor activity.

Disclaimer: Forecasts may be wrong; use at own risk. Use caution as conditions can change quickly. See your health professional as needed. Smoke sensitive groups should take appropriate precautions.



Issued by USFS Wildland Fire Air Quality Response Program -- www.wildlandfiresmoke.net
SW Colorado Updates -- tools.airfire.org/production-outlooks/SWColorado
Smoke and Health Info -- www.airnow.gov/index.cfm?action=smokeindex

Air Resource Advisor Deployments over Time



Evolution of the IWFAQRP - March 2019 Authorized by US Congress S.47 - John D. Dingell, Jr. Conservation, Management, and Recreation Act

SEC. 1114. WILDFIRE TECHNOLOGY MODERNIZATION.

(a) PURPOSE.

—The purpose of this section is to promote the use of the best available technology to enhance the effective and cost-efficient response to wildfires—

(1) to meet applicable protection objectives; and

(2) to increase the safety of—

(A) firefighters; and

(B) the public.

(f) SMOKE PROJECTIONS FROM ACTIVE WILDLAND FIRES.

—The Secretaries shall establish a program, to be known as the “Interagency Wildland Fire Air Quality Response Program”, under which the Secretary concerned

— (1) to the maximum extent practicable, shall assign 1 or more air resource advisors to a type 1 incident management team managing a Federal wildland fire; and

(2) may assign 1 or more air resource advisors to a type 2 incident management team managing a wildland fire.



Evolution of the IWFAQRP -

- ARA's have been with many incident mgmt. teams...
 - Ordering-Modeled after IMET (Incident Meteorologist) Program
 - Name request via ROSS and all ARA's are in IQCS
 - Order info in most Regional Mob Guides & 2014 NICC memo
 - Type 1 Teams are heavy users...Type 2 and 3 still new to ARAs
 - Challenges -
 - State Forestry are slow but starting to utilize ARA's
 - Cadre – many are professionals in other jobs not related to fire so “unable to fill” orders do happen
- Evolving interagency program where all who participate has the opportunity to bring new ideas and approaches that build on their individual expertise
 - Diverse backgrounds and experience
 - Extensive fire experience as overhead, PhD's, weather, fire ecology, air quality modeling and monitoring, etc.



Smoke and Wildland Fire

- **Wildfires** single largest source of high-level air quality impacts (in U.S.)
 - 2011 – Biomass burning 34% of the fine particulate (PM2.5) national emission inventory: wildfire 15%, prescribed fire 13%, agricultural burning 1%, RWC 4%
 - 2014 – Biomass burning 28% of the fine particulate (PM2.5) national emission inventory: wildfire 14%, prescribed fire 13%, agricultural burning 1%
 - 2017 Preliminary data - Biomass Burning could exceed 50% of total US PM2.5

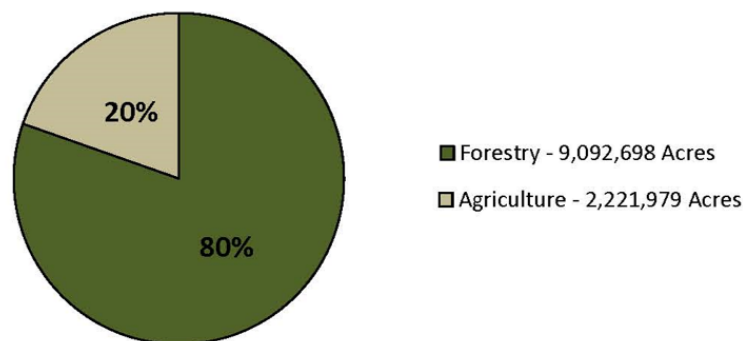
2017 National Prescribed Fire Activity

- Corresponds with EPA's National Emission Inventory

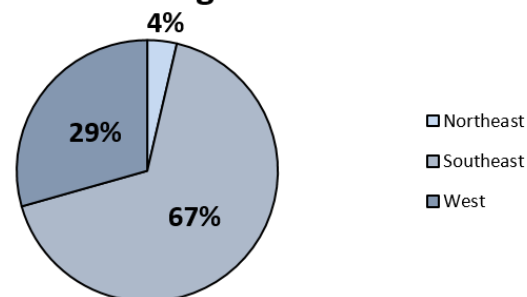
11,314,677 Acres

96% Occurred in Southeast and West

2017 National Prescribed Burning Activity by Resource Objective



2017 Forestry & Agricultural Prescribed Fire Activity by Region



NWCG Smoke Committee (SmoC) Resources

Videos

- “Smoke Management and Air Quality for Land Managers” (2-hr) (certificate) (PIO and Agency Admin)
- “Smoke: Knowing the Risks” (12 min) released 5/14 (SmoC with G. Broyles)
 - <https://www.nwcg.gov/publications/training-courses/rt-130/hazards/haz508> (16,479 views since 2014)
- NEW: “Smoke, Roads and Safety: Check Before they Wreck” (13 min) released 12/18
 - <https://www.youtube.com/watch?v=aEO2F2rk3s0> (4500 views since 12/18)

Publications

- 2018 NWCG Prescribed Fire Smoke Management Guide PMS 420-2
 - New: Communication, Public Perceptions and Smoke Tolerance
 - <https://www.nwcg.gov/tags/pms-420-2>
- Smoke and Roadway Safety Guidebook (coming Summer 2019)

Recent posted webinars, see <http://www.frames.gov/smoke>

- 1) “Emerging Technologies, Communicating Air Quality in a Changing World: Air Quality Sensors, Performance and Networks”
- 2) “Wildland Fire Smoke and Roadway Visibility: Predict, Prepare and Avert Accidents”
- 3) “Indoor Air Quality During Wildfires: Experience and Research”
- 4) “Fire & Smoke Model Evaluation Experiment (FASMEE)”
- 5) “PB-Piedmont Model Web– Smoke & Fog model”
- 6) “Southern Integrated Prescribed Fire Information System for Air Quality and Health Impacts”



Labor Law

Cal/OSHA - Safety & Health

Workers' Comp

Self Insurance

Apprenticeship

Director's Office

Boards



[Cal/OSHA](#) : [Advisory Meetings](#) : Worker Protection from Wildfire Smoke

Advisory Meeting for Proposing an Emergency Regulation to Protect Workers from Wildfire Smoke

General Industry Safety Orders
Chapter 4, subchapter 7, new section

Cal/OSHA

Quick Links

- ▶ [File a workplace safety complaint](#)
- ▶ [Obtain a free consultation](#)
- ▶ [Important Cal/OSHA updates](#)
- ▶ [Public records requests](#)

Cal/OSHA Branches & Units

Branches

- ▶ [Enforcement](#)
- ▶ [Consultation Services](#)

Units

- ▶ [Amusement Ride and Tramway](#)
- ▶ [Asbestos and Carcinogen](#)
- ▶ [Census of Fatal Occupational Injuries](#)
- ▶ [Communications Program](#)
- ▶ [Crane](#)
- ▶ [Elevator](#)
- ▶ [Heat and Agriculture Coordination Program](#)
- ▶ [High Hazard](#)
- ▶ [Labor Enforcement Task Force](#)
- ▶ [Legal and BOI](#)
- ▶ [Mining and Tunneling](#)
- ▶ [Pressure Vessel](#)

May 8, 2019
10:00 am - 3:00 pm

Harris State Building
1515 Clay St., 2nd Floor, Room 1
Oakland, CA

In response to the Occupational Safety and Health Standards Board's [decision](#) on March 21, 2019 to GRANT in part Petition No. 573, the Division of Occupational Safety and Health (Cal/OSHA) will convene an advisory meeting seeking input on the development of an emergency rulemaking proposal addressing worker exposure to wildfire smoke. Cal/OSHA plans to hold this advisory committee meeting on May 8th, 2019 in Oakland.

Persons interested in receiving announcements and updates pertaining to the advisory meeting, and persons interested in providing information and scientific data on employee exposure to wildfire smoke, control measures, feasibility, or costs may contact Deputy Chief of Health [Eric Berg](#) at (510) 286-7010 or Senior Safety Engineer [Amalia Neidhardt](#) at (916) 263-1944.

Meeting Documents

- [Post-meeting Comments](#)
- [Pre-meeting Comments](#)
- [Agenda](#)
- [Draft Regulatory Text including both Appendices - 5/21/2019](#)
- [Draft Regulatory Text for Discussion - 5/8/2019](#)

Background Documents

- [Petition 573](#)
- [Gavin Newsom, Governor of California, Executive Order N-05-19](#)
- [About the Emergency Rulemaking Process](#)
- [Flow Chart on Emergency Rulemaking](#)





Challenges and Opportunities

- Varying messages regarding:
 - N-95 Masks – recommended or ???
 - Box Fans and Filters – recommended or ???
 - Multiple Agencies issuing air quality alerts or advice-coordination always needed
 - Air Quality Index and Nowcast indices and other thresholds
 - Non-fire worker exposure and concerns
 - Agricultural worker and crop impacts
 - Messaging about indoor air quality during a wildfire smoke impact – not always the clean spot!
 - Role for cache of air quality sensors for inside schools, public facilities, vulnerable populations?
- Public understanding of models and smoke output (publicly accessed)
 - Recent examples in FL of an online weather provider forecasting smoke (what monitor information and validation???)
 - Resulted in weather website showing model values considerably higher than FL DEP FRM/FEM monitors in same area
- Carbon Monoxide in communities adjacent to the fire and other pollutants (Ozone)



Challenges

- Wildland Urban Interface wildfire (human-made materials) emission factors and messages
 - Prepared in NW? Camp Fire in CA had extremely dense smoke...
 - Air Quality Sensors and other networks into tool and websites.
 - QA-QC and calibration values
 - data integration and messages
 - Performance across NW from coastal to dry interior
 - Many seem measure high for wildfire smoke (may be acceptable for some situations)
 - Use of ARA's and Program tools for state fires – status on capability for ID, WA & OR fires?
 - Use growing by state forestry elsewhere
 - Interagency sharing of all temporary and non-regulatory monitoring data
 - Post-fire emissions and clean-up exposure preparation
 - International and regional smoke impacts
 - Cross-boundary forecasting and messaging???
- (adjacent states to cross-country and cross-border– fine scale vs long-range synoptic scales) – who and when?

April 20-24, 2020 – **International Smoke Symposium 3** hosted by NWCG Smoke Committee & International Association of Wildland Fire
Raleigh, North Carolina with satellite site at UC Davis.