



Wildfire and Incident Air Monitoring Response Coordination

Joseph McCormack

Incident Air Monitoring Section

Situational Awareness

Partners

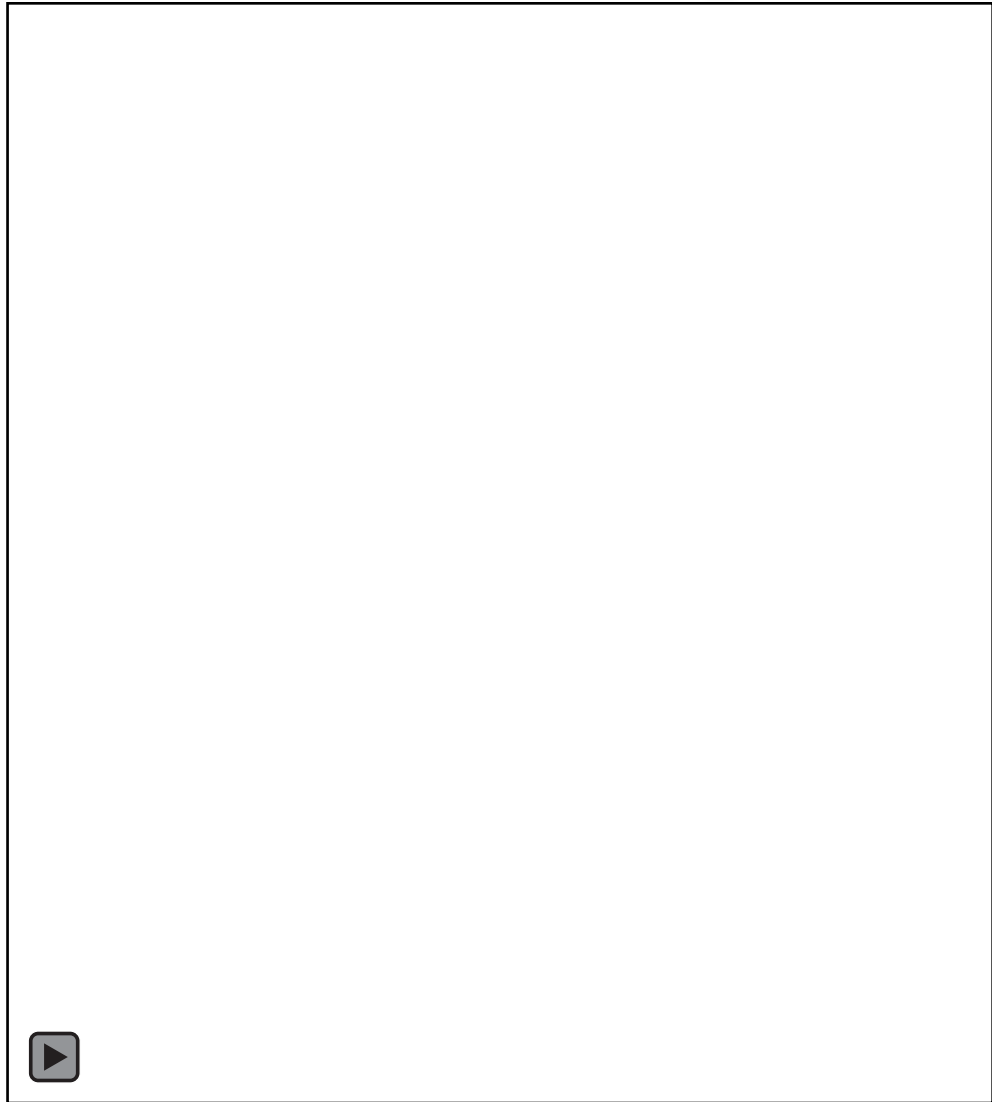
- US Department of Forestry
- CalFire
- US Forest Service
- Air Districts
- Public Health Officials

Wildfire Information

- InciWEB
- CalFire Current Incidents
- Social Media
- California Smoke Blog
- CalOES Daily Situation Report

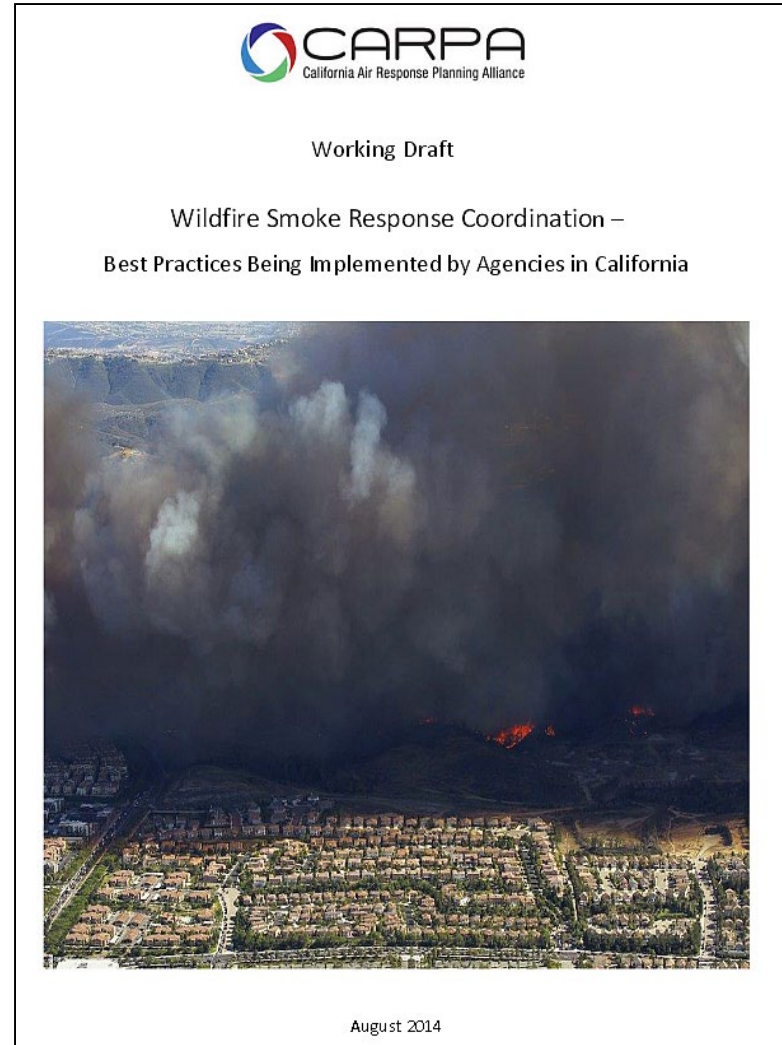
Model Smoke Transport

- BlueSky
- Probability where smoke is predicted to go
- Estimates PM concentration
- 72 hour outlook



Smoke Response Coordination Document

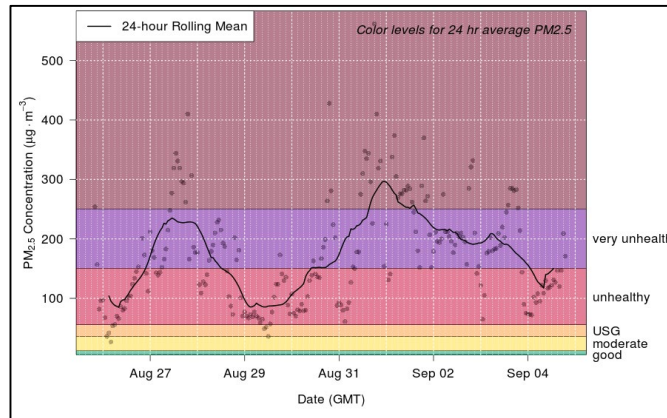
- Guide for smoke response coordination in California.
- Compilation of CA best practices and approaches.
- Describes agencies duties and roles.
- Concise: only 10 pages of content (includes examples, templates and contact information)
- <https://www.arb.ca.gov/carpa/cawildfiresmokeresponsecoordinationaug14.pdf>



Coordination

- Daily intelligence briefing (email & phone)
- 1300hrs smoke impact meeting
 - 12hr to 96hr outlook (regional reports, weather forecasts)
- 1400hrs response coordination call
 - Monitoring and Data Decisions
 - Air Resource Advisor Reports

Air Response Model



Data



Data to
Message



Message to
Audience

Data



Creating an Air Monitoring Network



Network/Existing Monitors



Portable Samplers

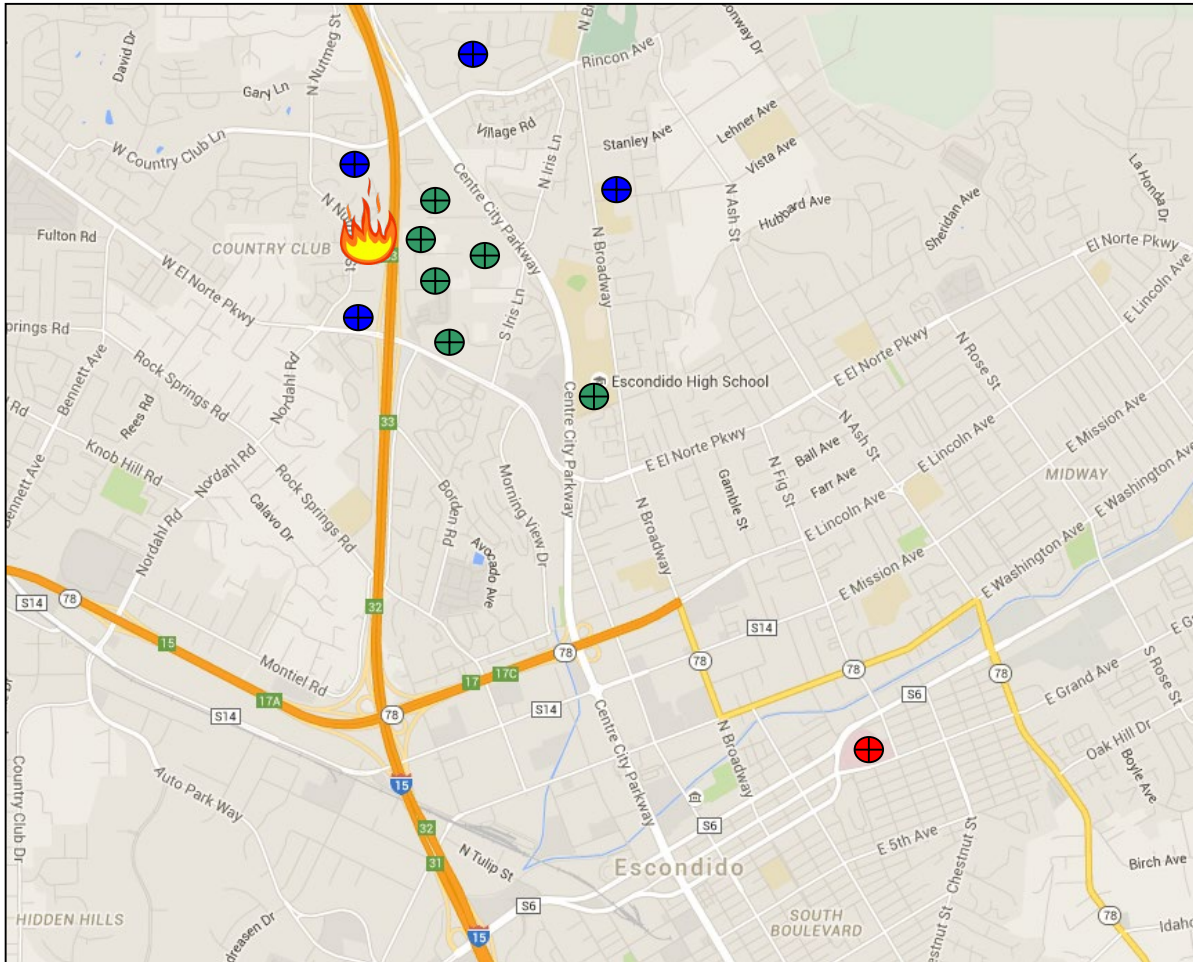





Mobile Equipment



Advanced Sensors

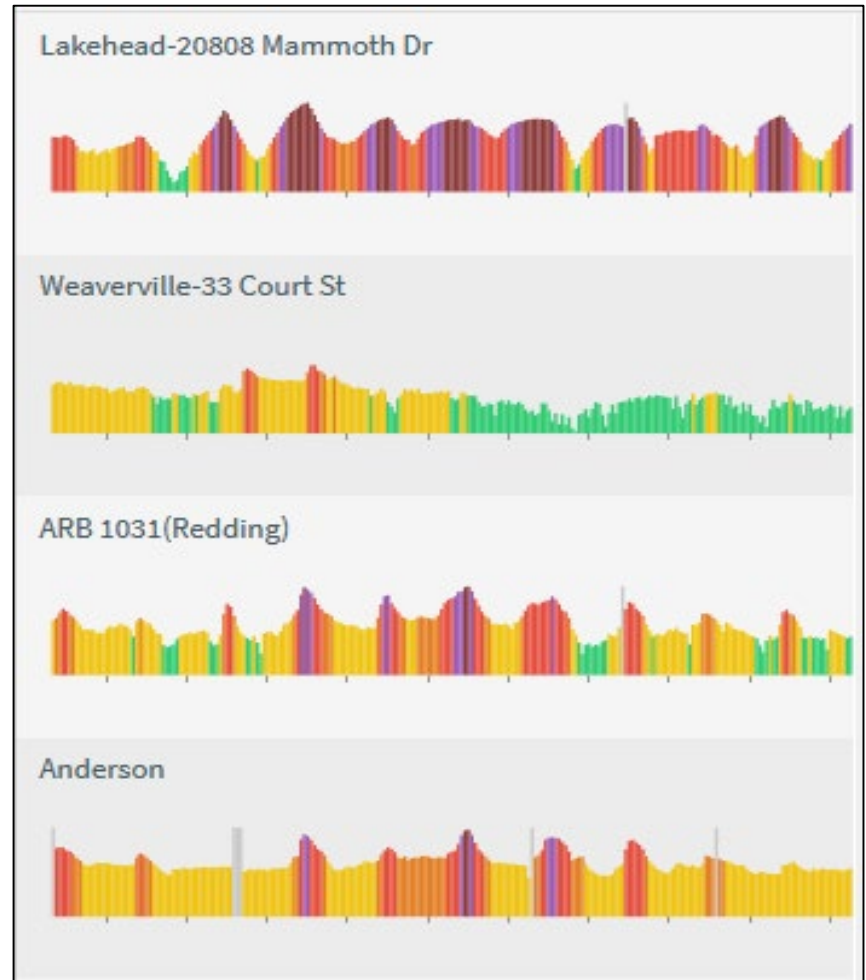
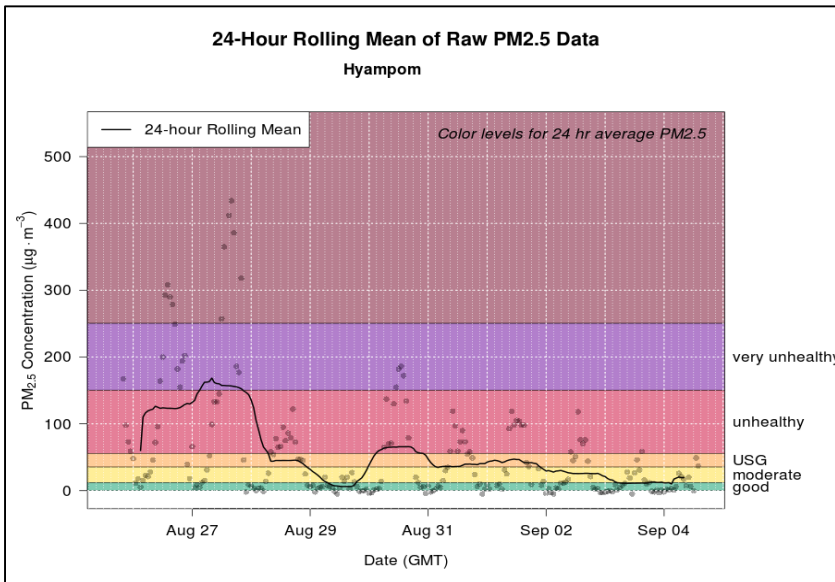
Layered Data Collection Strategy



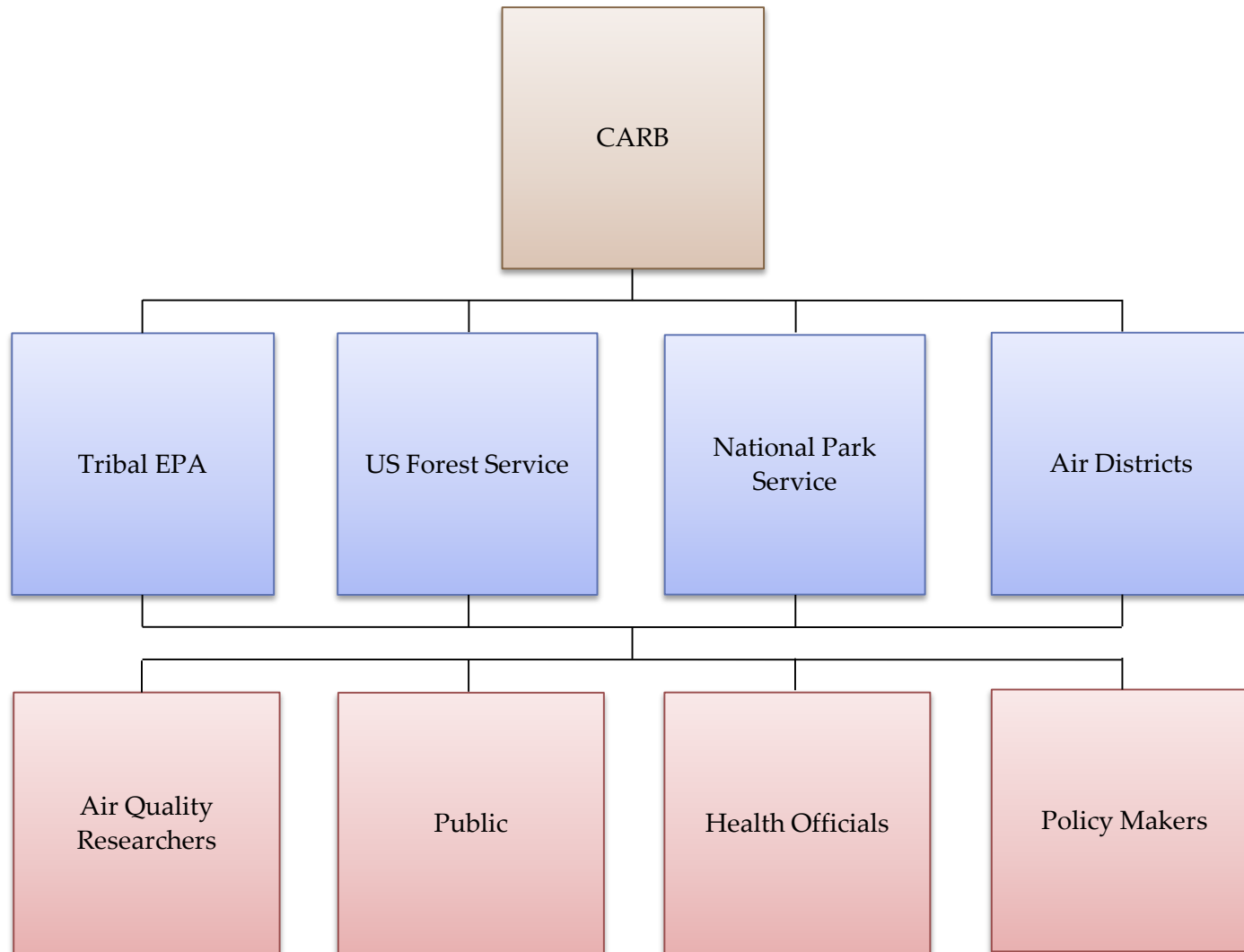
-  **Network Sites**
Fixed sites designed for compliance monitoring
-  **Portable Sites**
Set up quickly, left unattended, transmit data
-  **Mobile Sites**
Rapidly changing conditions, requires support staff

Messaging

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
<i>When the AQI is in this range:</i>	<i>..air quality conditions are:</i>	<i>...as symbolized by this color:</i>
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon



Data Flow



CARB/AIRSYS

All Units | EBAM Multi | Iridium - Ebam | Unit Locations Map | Administration | Export Data: Excel | ARB test | Log Off

Current Status - Iridium - Ebam

Unit Group:

Alias	Date/Time	Location	Date/Time/GMT	Start Date/Time (GMT)	COncRT	ConcHr	Flow	W/S	W/D	AT	RHx	RHi	BV	FT	Alarm
ARB 1005 (offline)	9/17/18 1:04PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	9/17/2018 8:00:00 PM	17-AUG-2018 19:00:0	0.011	0.017	16.7	2.0	98	24.4	21	7	13.9	37.0	0
ARB 1006 (offline)	12/3/18 2:04PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	12/3/2018 9:00:00 PM	15-OCT-2018 19:00:0	0.005	0.007	16.7	0.3	127	-0.5	67	32	14.3	7.8	0
ARB 1007 (offline)	8/20/18 9:04AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	8/20/2018 4:00:00 PM	14-MAY-2018 13:00:0	0.011	0.012	16.7	0.3	1	26.0	18	13	14.4	25.0	0
ARB 1008 (offline)	10/18/18 12:04PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	10/18/2018 7:00:00 PM		0.001	0.003	16.7	0.7	173	17.7	41	19	14.0	26.5	0
ARB 1009 (offline)	10/3/18 3:04PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	10/3/2018 10:00:00 PM	20-AUG-2018 21:00:0	0.004	0.001	16.7	0.9	269	26.1	45	18	14.4	36.3	0
ARB 1010 (offline)	11/20/18 2:04PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	11/20/2018 9:00:00 PM	15-NOV-2018 20:45:0	0.151	0.135	16.7	0.5	135	16.1	29	13	14.4	24.5	0
ARB 1011 (El Centro)	4/19/19 9:04AM	Lat: 32° 47' 31.63" N, Lon: 115° 33' 46.95	4/19/2019 4:00:00 PM	25-MAR-2019 23:00:0	0.008	0.007	16.7	1.3	287	26.6	24	16	14.4	30.6	0
ARB 1012 (offline)	8/21/18 11:09AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	8/21/2018 6:00:00 PM	18-JUL-2018 19:00:0	0.002	0.001	16.7	0.7	196	17.8	21	14	14.4	23.2	0
ARB 1013 (offline)	11/20/18 3:04PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	11/20/2018 10:00:00 PM	14-NOV-2018 22:00:0	0.140	0.134	16.6	1.0	167	27.2	0	12	14.4	25.3	0
ARB 1014 (offline)	8/20/18 1:04PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	8/20/2018 8:00:00 PM	18-JUL-2018 18:00:0	0.016	0.013	16.7	1.5	104	34.2	14	9	14.4	41.0	0
ARB 1015 (offline)	11/14/17 2:06PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	11/14/2017 9:00:00 PM	14-NOV-2017 14:00:0	0.023	0.023	16.7	0.3	1	18.0	0	39	14.2	23.6	0
ARB 1016 (offline)	12/19/18 11:09AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	12/19/2018 6:00:00 PM	20-NOV-2018 19:00:0	0.008	0.008	16.7	1.6	313	12.3	86	42	14.3	22.5	0
ARB 1017 (offline)	4/4/19 9:04AM	1943 13th St, Sacramento, CA 95814	4/4/2019 4:00:00 PM	09-JAN-2019 21:00:0	0.006	0.005	16.7	0.5	79	15.8	75	40	14.3	20.8	0
ARB 1018 (offline)	10/19/18 9:04AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	10/19/2018 4:00:00 PM	31-JUL-2018 16:00:0	-0.005	-0.005	16.7	0.5	79	2.6	66	37	14.3	7.8	0
ARB 1019 (offline)	9/14/17 9:01AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	9/14/2017 4:00:00 PM	13-SEP-2017 12:00:0	0.005	0.005	16.7	0.3	177	22.5	51	25	14.3	30.4	0
ARB 1020 (offline)	2/13/19 10:04AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	2/13/2019 5:00:00 PM		0.012	0.014	16.7	0.3	307	0.3	57	40	14.4	10.2	0
ARB 1021 (offline)	10/25/17 2:04PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	10/25/2017 9:00:00 PM	31-OCT-2016 10:00:0	0.008	0.008	16.7	1.0	132	22.0	41	18	14.1	31.3	0
ARB 1022 (offline)	8/21/18 8:04AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	8/21/2018 3:00:00 PM	21-JUL-2018 15:00:0	0.009	0.006	16.7	0.3	76	12.0	64	28	14.4	15.0	0
ARB 1023 (offline)	11/30/18 11:09AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	11/30/2018 6:00:00 PM	14-NOV-2018 21:00:0	0.004	-0.000	16.7	0.3	141	11.3	91	47	14.4	15.2	0
ARB 1024 (offline)	10/2/18 10:04AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	10/2/2018 5:00:00 PM	16-SEP-2018 06:00:0	0.009	0.013	16.7	0.4	302	18.0	92	40	14.3	25.9	0
ARB 1025 (offline)	12/3/18 9:04AM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	12/3/2018 4:00:00 PM	05-NOV-2018 19:00:0	0.292	0.010	0.0	0.3	95	-3.5	87	60	14.4	-2.3	16
ARB 1026 (offline)	11/6/17 3:04PM	Lat: 38° 34' 0.66" N, Lon: 121° 29' 46.32"	11/6/2017 10:00:00 PM	27-SEP-2017 08:00:0	0.003	0.001	16.7	0.9	125	19.9	30	14	14.4	30.8	0

EPA Current Wildfires

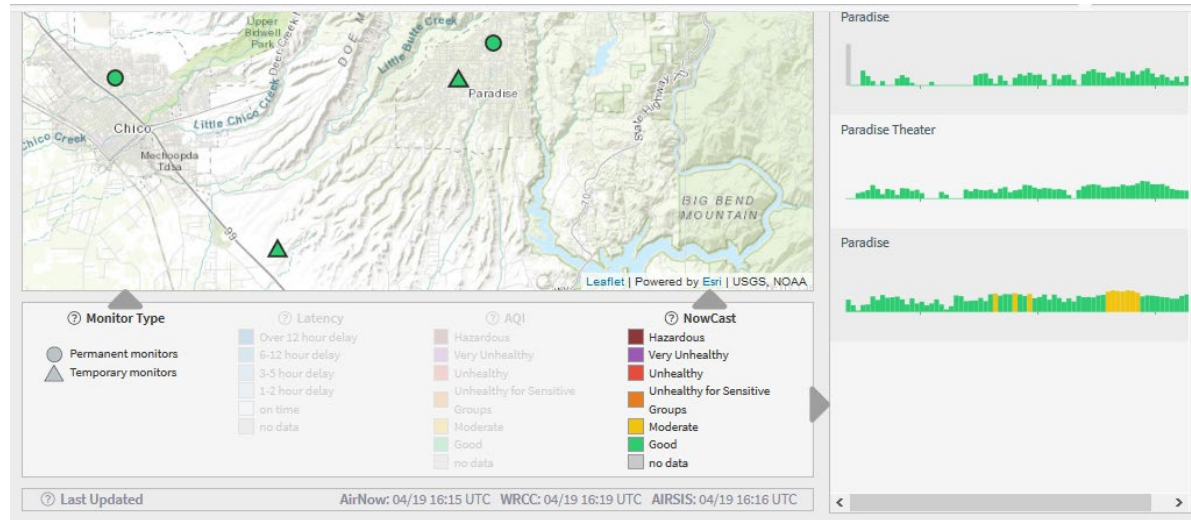
Dynamic map with selectable overlays:

- Current PM2.5 AQI (Network & Portable)
- Fire locations
- Smoke plumes
- Incident information



USFS AirFire

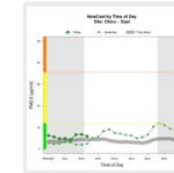
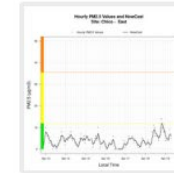
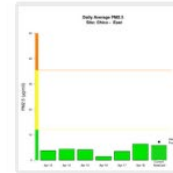
- Data for all permanent and portable monitors.
- Includes maps, PM concentration and daily trend data.
- Instrument ID
- Data Source
- Download QA/QC Data



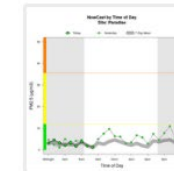
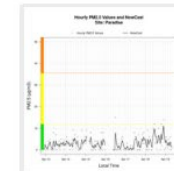
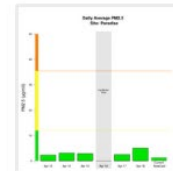
Selected Monitors: 4 monitors from 1 timezones.

[Data Report](#) [CSV File](#) [AQI-NowCast](#)

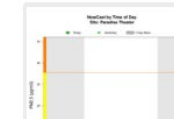
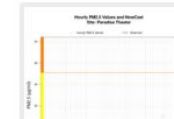
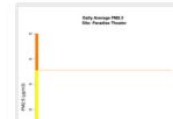
Chico - East
 Monitor ID: 060070008_01
 Source: AirNow
 Latest NowCast PM_{2.5}: 5.9 µg/m³
 Contains data through 2019-04-19 15:00:00 UTC
 Timezone: America/Los_Angeles
 QA/QC: by AirNow
[Show in Simple Interface](#)



Paradise
 Monitor ID: lon_121.614_lat_39.761_apcd.1029
 Source: AIRSIS
 Latest NowCast PM_{2.5}: 1.9 µg/m³
 Contains data through 2019-04-19 15:00:00 UTC
 Timezone: America/Los_Angeles
 QA/QC: [Report](#)
[Show in Simple Interface](#)



Paradise Theater
 Monitor ID: 060072002_01
 Source: AirNow
 Latest NowCast PM_{2.5}: 2 µg/m³
 Contains data through 2019-04-19 15:00:00 UTC
 Timezone: America/Los_Angeles



Smoke Sensors

- Create advanced smoke sensing network
- Inexpensive new technologies
- Complement existing monitoring networks
- Experimental, does not replace traditional monitors...yet.
- Collect indoor vs. outdoor measurements.
- Monitoring at schools (sensitive receptors):
 - ✓ Existing infrastructure (power/Wi-Fi)
 - ✓ Informational tool for reducing student exposure.
 - ✓ Educational resource for students about air quality, technology, measurement and health.

PurpleAir PM Sensor

The screenshot shows the PurpleAir website interface. At the top, there are navigation links for PurpleAir, Sensors, Map, Me, and Install. A search bar shows "Chico, CA, USA" and a status indicator "1468 online, 99 offline". The main map displays various sensor locations marked with green circles containing AQI values. A detailed view of a sensor is shown on the right, with the following information:

On Wed Mar 28 2018 15:23:41 GMT-0700 (Pacific Daylight Time)
Short-term PM2.5 is LOW at 0µg/m3
Enjoy your activities.

352 Saint Augustine Drive, Chico, CA 95928
Short-term AQI
0 **Good**

A color-coded legend shows the AQI scale: Good (green), Moderate (yellow), Warning (orange), Unhealthy (red), Very Unhealthy (purple), and Hazardous (dark red).

0-50: Air quality is considered satisfactory, and air pollution poses little or no risk

Trends | **Particles** | **Sensor** | **Current Weather**

Channel A Running Averages

Real Time	Short-term	30 minute	1 hour	6 hour	24 hour	One week
0	0	1	1	7	8	14
0µg/m3	0µg/m3	0µg/m3	0µg/m3	2µg/m3	2µg/m3	3µg/m3

Channel B Running Averages

Real Time	Short-term	30 minute	1 hour	6 hour	24 hour	One week
1	1	1	1	6	8	13
0µg/m3	0µg/m3	0µg/m3	0µg/m3	1µg/m3	2µg/m3	3µg/m3

Excellent Confidence * Laser Temperature: 61.0°C * Laser Humidity: 18%

Map data ©2018 Google Terms of Use Report a map error

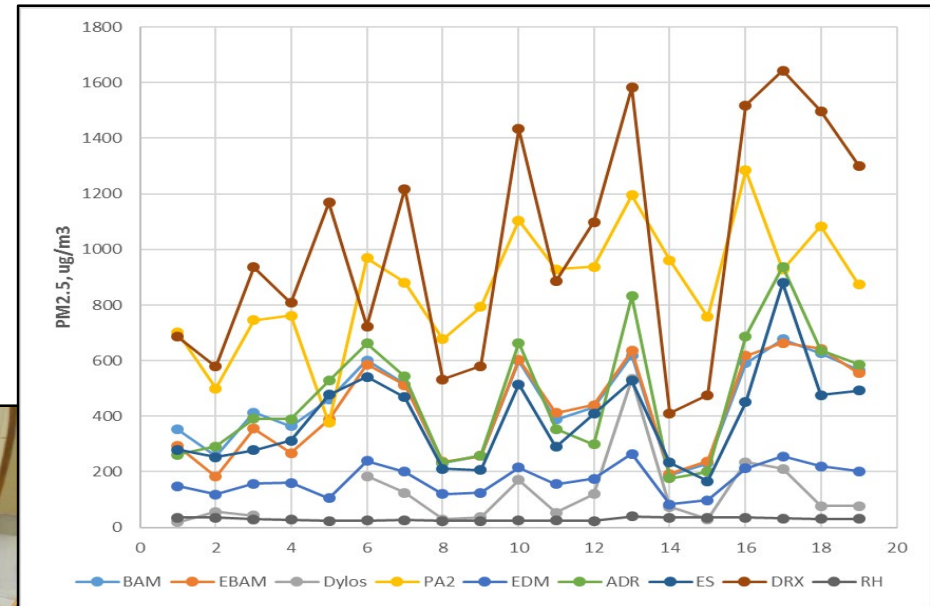
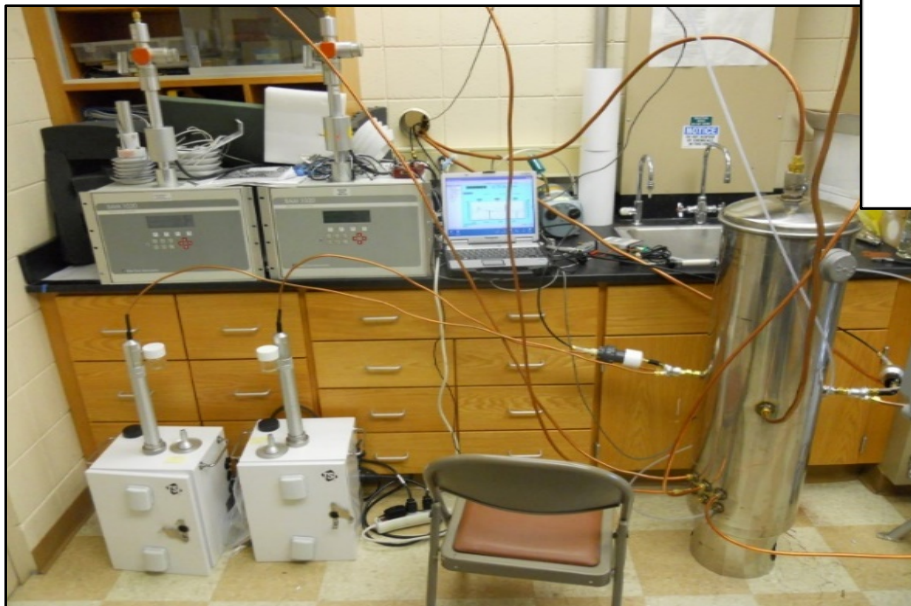
www.purpleair.com



Over 450 sensors distributed

Monitor and Sensor Evaluation

- Seven candidate instruments
- Evaluated in controlled chamber and monitoring station
- To identify instruments which can compliment existing network



Messaging

- Multimedia (TV, radio, paper, social media)
- California Smoke Blog
 - Air Quality Advisories
 - Weather Forecasts
- Public/Townhall meetings



California Smoke Information

This site is a voluntary effort by city, county, state, tribal and/or federal agencies to coordinate and aggregate information for California communities affected by wildfire smoke.

HOME | CURRENT AIR QUALITY | WHERE'S THE FIRE | SMOKE AND HEALTH | MAPPING - WEBCAMS - AIR QUALITY | SATELLITE IMAGERY

TUESDAY, SEPTEMBER 8, 2015

Tuesday, September 8, 2015 - North Coast Unified AQMD Smoke PSA

The North Coast Unified Air Quality Management District had issued a Public Service Announcement regarding smoke from current wildfires dated September 8, 2015. There are currently no Unhealthy Advisories or Hazardous Alerts issued in our area. See the [district's website](#) for additional information.

Posted by North Coast Air Quality at 10:36 AM No comments:

Recommend this on Google

Tuesday, September 8, 2015 - Rough Fire Air Quality Report

Air Quality Report Issue Date: 09/08/2015
 Rough Fire Prepared by: Josh Hall & Tod Johnson

Forecast conditions represent impacts from smoke from the Rough Fire. Contributions from ozone and other pollutants are not reflected.

Fire: Fire activity increased yesterday with warmer temperatures and lower relative humidity. Most of the smoke produced was from interior islands that ignited. Fire remains active in the Converse Basin, near Cedar Grove, and in the area north of Buck Rock. The fire is now 97,884 acres and is 31% contained.

Air Quality Today: Heavy concentrations of smoke are expected near the fire today. Smoke will be slow to lift and transport will primarily terrain and diurnally driven. Light and variable transport winds are expected primarily from the southeast, with increased impacts expected in the San Joaquin Valley foothills northwest of the fire. Residual smoke that has not cleared the area, will add to impacts from new smoke being produced. Unhealthy to Hazardous conditions are expected in communities near the fire.

Air Quality Tomorrow: Similar impacts are expected tomorrow, but with impacts expected in the Owens Valley.

Site	Yesterday Observed Midnight-Midnight 24-Hr AQI September 7, 2015	Today Forecast 24-Hr AQI September 8, 2015	Tomorrow Outlook 24-Hr AQI September 9, 2015	Worst Time of Day Impacts 3-Hour AQI and Period

BLOG ARCHIVE
[Blog Archive](#)

CALIFORNIA AIR DISTRICTS

- [Amador County APCD](#)
- [Antelope Valley AQMD](#)
- [Bay Area AQMD](#)
- [Butte County AQMD](#)
- [Calaveras County APCD](#)
- [Colusa County APCD](#)
- [Eastern Kern County APCD](#)
- [El Dorado County AQMD](#)
- [Feather River AQMD](#)
- [Glenn County APCD](#)
- [Great Basin Unified APCD](#)
- [Imperial County APCD](#)
- [Lake County AQMD](#)
- [Lassen County APCD](#)
- [Mariposa County APCD](#)
- [Mendocino County AQMD](#)
- [Modoc County APCD](#)
- [Mohave Desert AQMD](#)
- [Monterey Bay Unified APCD](#)
- [North Coast AQMD](#)
- [Northern Sierra AQMD](#)
- [Northern Sonoma APCD](#)
- [Placer County APCD](#)
- [Sacramento Metropolitan AQMD](#)
- [San Diego APCD](#)

Air Resources Advisor Reports

Smoke Impact Summary # 11 – King Fire, September 26, 2014

Prepared by T.Johnson, (NPS) and Charles Sams (USFS)

Key Points for Consideration:

1. Last night drainage flows transported smoke overnight into the local nearby communities in the lower mountains and foothills. This diurnal dispersion flow or “bath tub slosh effect” will be a repetitive pattern while heavy interior fuels continue to burn. Yesterday’s rainfall of 0.5 to 0.8 inches assisted crews with mop up and overall fire control, regardless, wildfire smoke will still persist for some time.

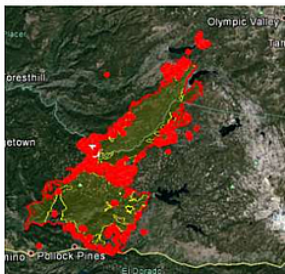


Figure1
Reviewing MODIS & infra-red flight information very little intense heat was indicated, but was noted on the W and E sides of fire perimeter.

The red dots represent isolated heat which is reflective of large down smoldering fuels. Suppression efforts were aided by yesterday’s rainfall however, mop up will be very labor intensive to secure fireline and reduce smoke production which is now dominated by smoldering combustion versus flaming combustion.

- 2.
3. This morning’s weather is dominated by clear sky, high humidity and cool temperatures. This afternoon, cloud cover, rainfall and potential thunderstorms and highs in the 50’s will continue to aid firefighters to meet suppression objectives and prevent fire spread. There is no expectation of fire growth outside of perimeter lines today, as fire behavior is dominated by smoldering combustion. **These weather conditions are expected through the weekend.**
4. Yesterday’s fire growth was minimal and was interior to control lines. Total acreage burned to date is 97,099 with 68% containment.
5. The Blue-Sky dispersion model runs estimates 2000 acres of interior smoldering combustion.
6. Light amounts of smoke were detected in fire camp this morning as a result of down drainage overnight smoke transport. The trend for fewer smoke impacts to firefighters in camp continues in a positive direction.

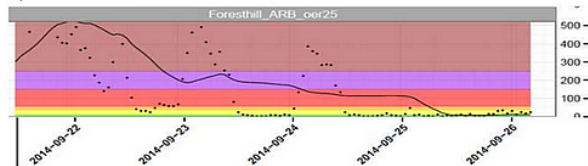


Figure 1 Blue-Sky Smoke model projection for September 26th @ 2:01pm. Yesterday’s rains greatly abated fire spread and the production of smoke. Overnight, smoke remained in the drainages, slowly exiting, and moving to the E in the afternoon.



Smoke Outlook for 8/21 - 8/22 Sierra-Inyo National Forest Lions Fire Issued at: 2018-08-21 08:56 PDT

Outlook for Sierra-Inyo National Forest

Special Statement

This forecast is for particulate matter not ozone.

Lions Fire

The fire is 11,606 acres and 75% contained. Forested weather with low relative humidity, high temperatures, and gusty winds could help increase fire behavior. Uncontained line is located along the western and northwestern portion of the fire east of North Fork San Joaquin River. Fire activity may pick up again today during late afternoon hours and overnight within the uncontained portion of the fire.

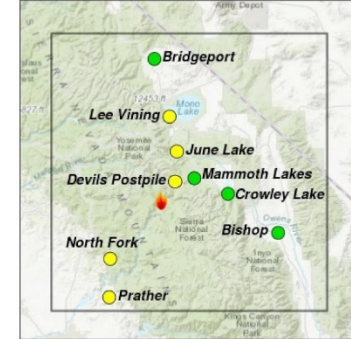
Lions Fire Smoke

Impacts are expected to be mostly Good and Moderate today depending on fire activity. Westward fire growth could create smoke impacts to Prather and North Fork areas. Northern fire growth could create smoke impacts to Devils Postpile, Lee Vining, and June Lake recreation sites and communities.

Other

This forecast is for the Lions Fire, for a regional forecast, go to: <https://wildlandfiresmoke.net/outlooks/SouthernSierra>

Daily AQI Forecast for Aug 21, 2018



Station	Yesterday			Forecast	Tue 8/21	Wed 8/22
	6a	noon	6p			
Bridgeport				●	●	●
Lee Vining				●	●	●
June Lake				●	●	●
Devils Postpile				●	●	●
Mammoth Lakes				●	●	●
Crowley Lake				●	●	●
Bishop				●	●	●
North Fork				●	●	●
Prather				●	●	●

Issued 2018-08-21 08:56 PDT by Air Resource Advisor Jinny Reed; lionsfireinformation@gmail.com

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.

Additional Links

Great Basin Unified Air Pollution Control Division -- <http://www.gbapcd.org>
 Bishop Peak Cam -- <http://www.bishopweather.com>
 National and Regional Fire Information -- <http://www.incidweb.nrcg.gov>
 Mammoth Mountain Cam -- <https://www.mammothmountaincams.com>
 California Fire Blog Spot -- <http://www.californiafireinfo.blogspot.com>

Issued by USFS Wildland Fire Air Quality Response Program -- www.wildlandfiresmoke.net
 Sierra-Inyo National Forest Updates -- tools.airfire.org/outlooks/Sierra-InyoNationalForest
 Smoke and Health Info -- www.airnow.gov/index.cfm?action=smoke_index

For More Information



Charles Pearson



(916) 322-7054



charles.pearson@arb.ca.gov