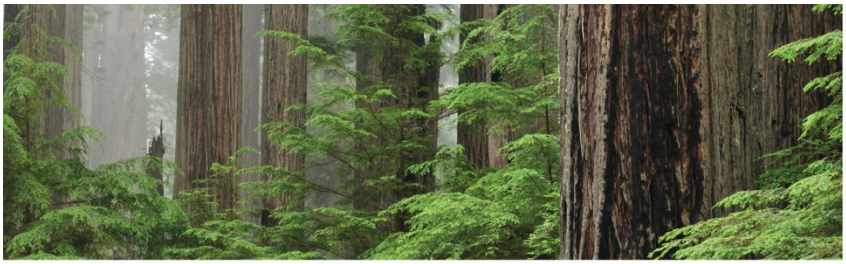

California's Progress Toward Clean Air

A Report by the
California Air Pollution
Control Officers' Association

April 2013

CAPCOA
CALIFORNIA AIR POLLUTION CONTROL OFFICERS ASSOCIATION

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Executive Summary

The California Air Pollution Control Officers' Association (CAPCOA) represents all 35 local air quality agencies throughout California. The purpose of this report is to provide objective information from these agencies on California's progress toward cleaner air as well as challenges that remain in meeting health-based air quality standards.

California and its individual air districts have made remarkable progress in cleaning the air during the past three decades in spite of dramatic increases in population and driving. From 1980 to 2010, the state's population increased by 65 percent and daily miles driven by all vehicles increased by 137 percent[1] (See figures 1 & 2). But thanks to a comprehensive air pollution control strategy, smog-forming pollutants were cut by 55 percent during the same period (See figure 3). California's largest industrial plants also cut their greenhouse gas emissions by 17 percent between 2008 and 2011.[2]

The air quality statistics in this report document an ongoing trend of air quality improvement across the state. These improvements have occurred in spite of the fact that neither the state nor local air districts have the authority to regulate federally controlled sources of air pollution including ships, locomotives and aircraft.

And yet daunting challenges remain to reach current air quality standards, especially for the San Joaquin Valley and Southern California's South Coast Air Basin, the two most severely polluted regions in the nation. Recent studies show that pollutants are harmful to our health at lower levels than previously thought. As a result, the U.S. Environmental Protection Agency (U.S. EPA) has revised key air quality standards to be more stringent and health-protective. This means that local air districts and the state have to develop clean air plans requiring significant further emission reductions from all sources including cars, trucks, businesses and consumer products.

Air quality this past year was also impacted from smoke from wildfires. In 2012, more than 140,000 acres burned in the state,[3] including the massive Chips Fire that burned 75,000 acres in northern California between July 29th and August 31st. Smoke from wildfires can elevate ambient air concentrations of fine particles (PM2.5) and ozone precursors, sometimes to unhealthy levels.

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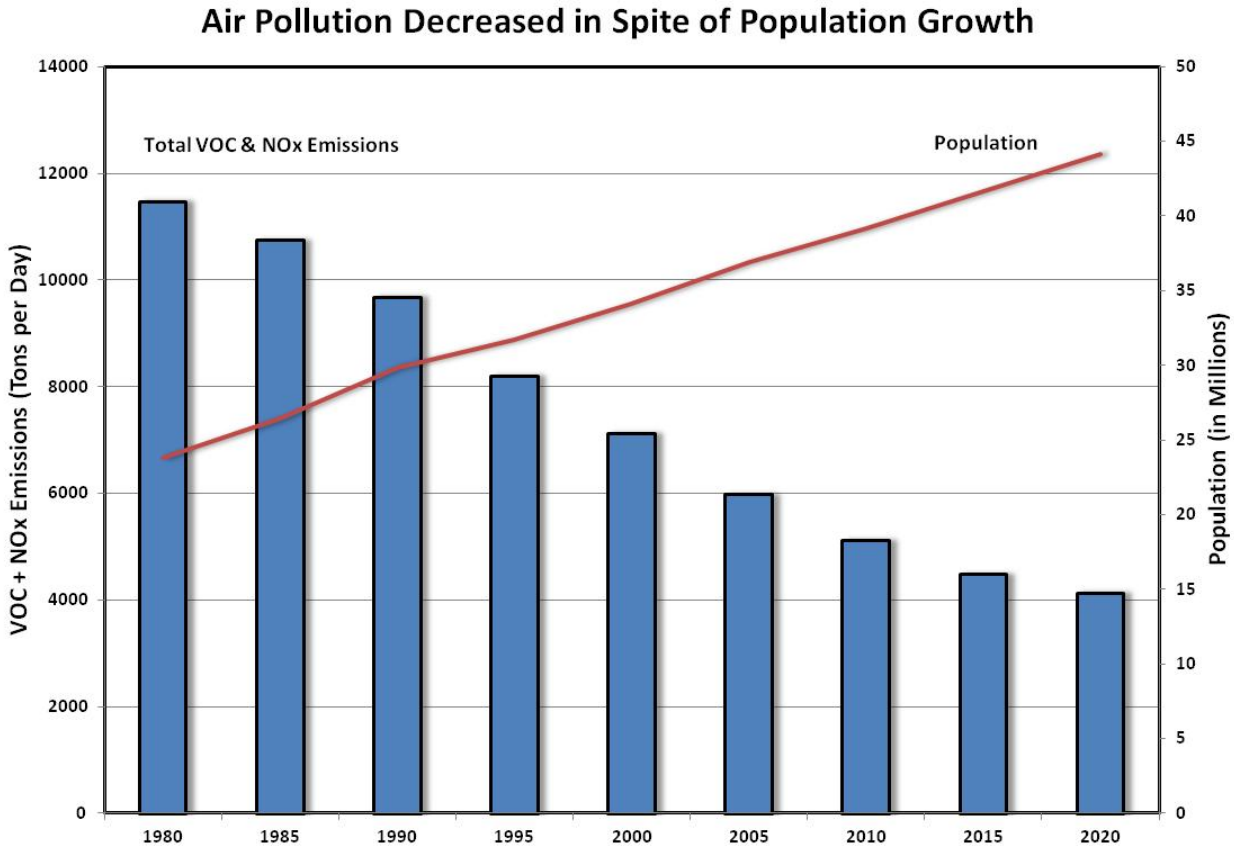
[1] http://www.arb.ca.gov/aqd/almanac/almanac09/almanac2009all.pdf, accessed February 20, 2013.

[2] http://www.arb.ca.gov/cc/reporting/ghg-rep/reported_data/2008_2011_ghg_trends_revised.pdf, accessed February 20, 2013.

[3] http://cdfdata.fire.ca.gov/incidents/incidents_statsevents, accessed January 29, 2013.

Figure 1



Source: 2009 ARB Almanac

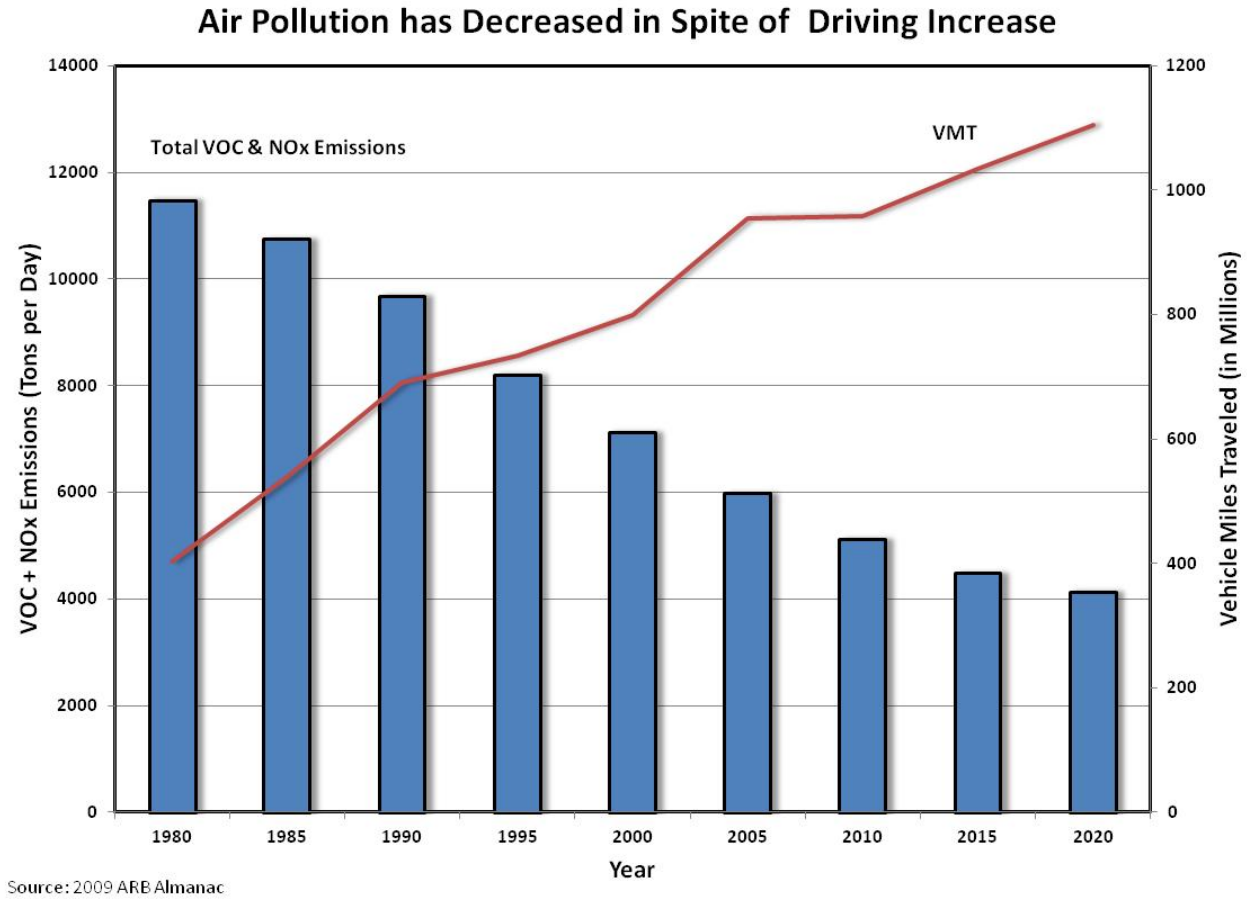
California's Comprehensive Air Quality Strategy

California employs a three-pronged comprehensive strategy aimed at reducing emissions from hundreds of sources of air pollution. The first prong relies on enforcement of existing regulations and adoption of new rules – some of the strictest in the nation – to reduce smog-forming and toxic emissions. The second uses voluntary incentive programs to accelerate the implementation of clean technologies. The statewide Carl Moyer Program and voter-approved Proposition 1B have provided hundreds of millions of dollars to replace dirty diesel engines with modern, cleaner diesel and natural gas engines in heavy-duty trucks, commercial boats, agricultural, construction and other types of equipment. The third prong uses public-private partnerships to research, develop, demonstrate and deploy clean-air technologies such as plug-in electric and fuel cell vehicles. The state's most severely polluted regions, including the San Joaquin Valley and the South Coast Air Basin, will need extensive deployment of zero- and near-zero emissions technologies to meet current and future clean-air standards.[4]

[4] For an in-depth discussion of the need for an integrated air quality, climate and energy strategy using advanced technologies, see http://www.aqmd.gov/aqmp/2012aqmp/VisionDocument/index.htm, and Powering the Future at http://www.aqmd.gov/pubinfo/Publications/PoweringTheFuture/powering_the_future.htm.

Thanks to California's highly innovative clean-air strategies, the state continues to serve as a model for the rest of the nation and countries throughout the world that are grappling with serious air pollution problems.

Figure 2

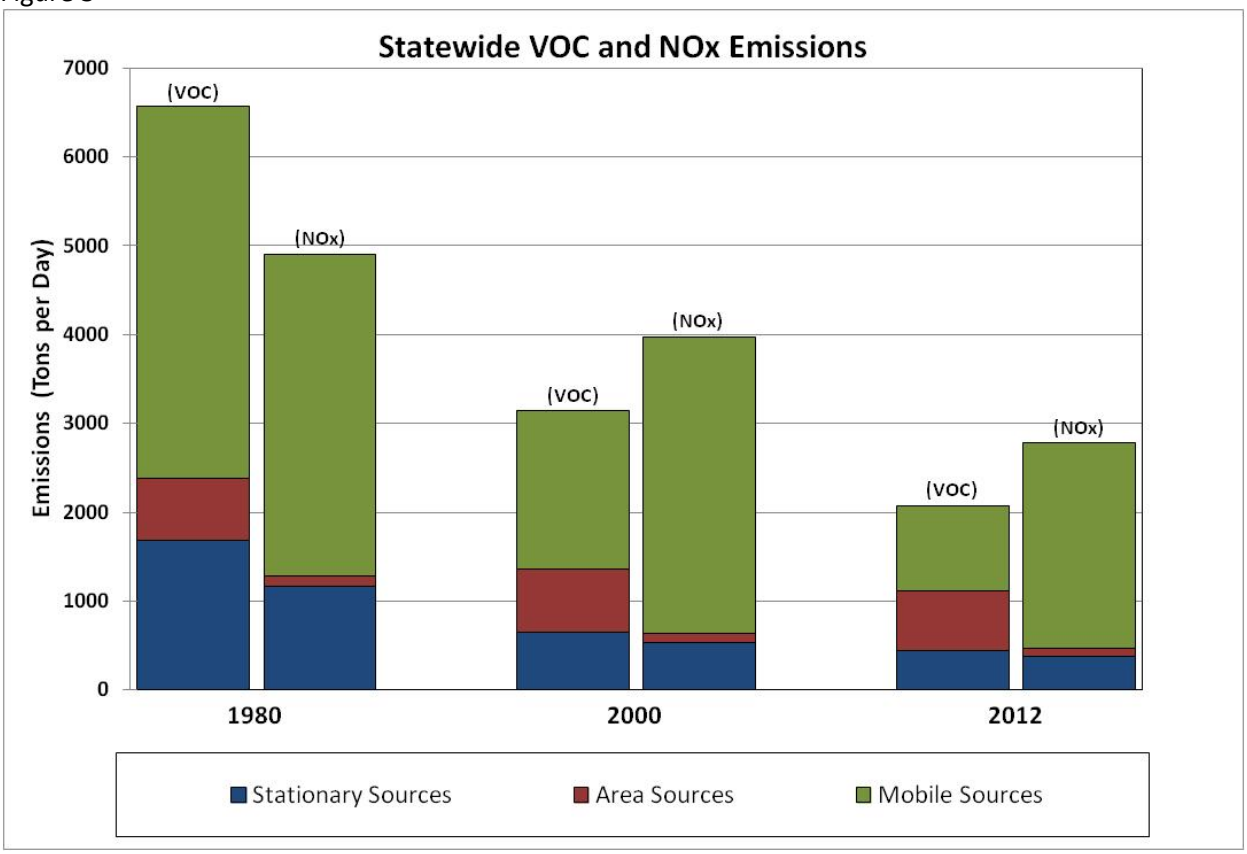


Air Districts' Successes in 2012

In addition to overall improvements in air quality, several air districts met health-based standards in 2012. The U.S. EPA determined in 2012 that the San Francisco Bay Area, Sacramento, Chico, and Yuba City-Marysville areas have met the 2006 24-hour PM2.5 federal air quality standard. The South Coast Air Basin and the San Joaquin Valley submitted plans at the end of 2012 demonstrating that their areas will attain the standard by 2014 and 2019, respectively.

The U.S. EPA also determined that the Central Mountain Counties (Amador and Calaveras), the Southern Mountain Counties (Mariposa and Tuolumne), Kern County, Chico, the Sutter Buttes, Western Nevada County, and Ventura County had all attained the 1997 8-hour federal ozone standard.

Figure 3



Tougher Air Quality Standards

As previously mentioned, U.S. EPA has significantly strengthened air quality standards in recent years due to scientific studies documenting pollutants' harm. U.S. EPA lowered the 8-hour federal ozone standard in 2008, and in April 2012[5] categorized the severity of air pollution in every county in the nation. Of 58 California counties, 35 were designated as whole or partial "non-attainment" areas, meaning they do not meet the new standard. California also has the only two "extreme non-attainment" regions for the new federal ozone standard, the South Coast Air Basin and the San Joaquin Valley. These regions are the most severely polluted in the nation.

In December 2012, U.S. EPA also made the annual PM2.5 standard more stringent.[6] U.S. EPA expects that seven California counties - Imperial, Kern, Los Angeles, Merced, Riverside, San Bernardino and Tulare - will not meet the new annual standard in 2020.[7] The net effect of these stricter standards is to raise the performance bar for California air basins.

Ground-level ozone is a colorless, odorless pollutant formed by a chemical reaction between volatile organic compounds (VOCs) and oxides of nitrogen (NOx) in the presence of sunlight. Fine particles

[5] http://www.epa.gov/ozonedesignations/2008standards/regs.htm, accessed January 29, 2013.

[6] From 15 to 12 micrograms per cubic meter ($\mu g/m^3$).

[7] http://www.epa.gov/airquality/particlepollution/2012/2020table.pdf, accessed January 29, 2013.

(PM2.5) are primarily formed in the atmosphere from gases such as SOx (sulfur oxides), NOx and VOCs. PM2.5 is also directly emitted into the air from fuel combustion and as fugitive dust. Ozone and PM2.5 are the two pollutants of greatest concern in the state because of the significant threats they pose to the public's health and welfare.

Although much progress has been made in cleaning the air we breathe, air districts across California that are now in attainment with the various federal air quality standards continue to strive to meet California's health-based ozone and PM2.5 air quality standards, which are more stringent and health protective than the federal standards adopted by the U.S. EPA.

Benefits of Clean Air

Recent state and federal assessments have provided an empirical yardstick for measuring the costs of unhealthy air and the benefits of meeting the federal air quality standards. For the South Coast and San Joaquin Valley areas the annual health costs of air pollution have been estimated to total $22 billion ($1,250 per person) and $6 billion ($1,600 per person), respectively.[8] Multiple studies have demonstrated that the economic benefits of achieving health-based air pollution standards are far greater than are the costs of attaining those standards.

As for the health risk posed by PM2.5 to California residents, a recent analysis conducted by the California Air Resources Board (CARB) using the U.S. EPA's methodology estimated that, on average, 9,200 annual cases of premature cardiopulmonary deaths can be attributed to PM2.5 exposure.[9]

[8] Hall, J., V. Brajer and F. Lurmann. (2008) The Benefits of Meeting Federal Clean Air Standards in the South Coast and San Joaquin Valley Air Basins. California State University-Fullerton, Institute for Economic and Environmental Studies. See http://business.fullerton.edu/centers/iees/

[9] California Air Resources Board. (2010) Estimate of Premature Deaths Associated with Fine Particle Pollution (PM2.5) in California Using a U.S. Environmental Protection Agency Methodology. Sacramento, CA, August 31. See http://www.arb.ca.gov/research/health/pm-mort/pm-report_2010.pdf

Air District Updates

The following summaries present the successes and future challenges of California's local air districts in meeting air quality standards.

Antelope Valley Air Quality Management District
In 2012, the air district had a year marked with air quality improvements, as exceedances of the 8-hour federal ozone standard (0.075 parts per million) declined by 20 percent in the Antelope Valley as compared to 2011. Maximum 8-hour concentrations continued to decline dramatically with 96 parts per billion (ppb) being the highest level recorded in 2012, as compared to 118 ppb in 2000, despite a minor decline in "Good" Air Quality Index (AQI) days logged district wide during the same years.

Renewable energy projects – which often encompass hundreds to thousands of acres of land – can become sources of fugitive dust, if not properly managed. To ensure optimum protection of air quality the air district made it a priority to work closely with project developers to implement reasonable, cost-effective practices that reduced the creation of airborne dust.

AB 32's (the Global Warming Solutions Act, 2006) added regulatory burdens continued to pose a looming threat to the Antelope Valley's economy, as did increasingly stringent state and federal regulations such as the current 8-hour federal ozone standard. The air district enforcement staff continued to implement and enforce applicable State Air Toxic Control Measures and Federal Maximum Achievable Control Technology Control Standards as developed, alongside all existing local rules.

The air district's public incentive programs continued to flourish. The air district's Voluntary Accelerated Vehicle Retirement Program scrapped 112 automobiles and residents traded in 74 gasoline-powered lawn mowers for zero-emission electric models during the 2012 lawn mower exchange.

Bay Area Air Quality Management District
Early 2012 brought dry, still weather conditions in the Bay Area that prompted more than 10 Winter Spare the Air Alert no-burn calls. Although stagnant weather conditions were just right to trap smoke in the air, the air district saw dramatic reductions in smoke build up when no-burn days were called, keeping particulate matter pollution below the federal health standard.

The air district continued with an aggressive grant funding program to reduce diesel pollution from port drayage trucks. These programs have resulted in over 5,000 separate truck inspections and the clean-up of over 2,000 trucks since the program launch in 2009.

In the area of air quality planning, the air district completed a comprehensive report titled *Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area*, illustrating the impacts of particulate matter. The air district continued to focus on alternatives to driving alone through its Spare the Air program. The passage of SB 1339, a state law that authorizes the air district and the Metropolitan Transportation Commission to develop a pilot commute benefits program for employers with more than 50 employees, promises to further encourage commuters to use transportation alternatives. The agencies will work together in the coming year to develop a program and take it to their respective boards for adoption.

In 2012, the air district approved a groundbreaking rule outlining the strictest limits in the nation on existing Portland Cement manufacturing facilities. Also approved was a rule to limit the emissions of organic compounds from the use of vacuum trucks and a series of air quality rule amendments that strengthen the air district's core air permitting regulations for New Source Review and Title V permitting programs.

An August large-scale fire at the Chevron refinery in Richmond sent thousands of residents to emergency rooms and prompted calls for the air district and other agencies to enhance monitoring, planning and procedures for emergency response situations. A work plan for actions related to accidental releases from industrial facilities was drafted and the air district began planning enhancements to its emergency response practices.

Development of a comprehensive Public Participation Plan has begun. The air district worked with external stakeholders and an internal staff team to develop a Public Participation Plan that will outline how the air district conducts public engagement work with interested stakeholders in its various decision-making processes. A proposed final document will go to the air district's Board of Directors in 2013 for adoption.

Butte County Air Quality Management District

The air district has a wintertime challenge with PM2.5 due to woodstove/fireplace smoke and has a voluntary county-wide curtailment program, *Check Before You Light*. The City of Chico implemented a mandatory program beginning with the 2011-12 season and it is managed by the city and is based on air quality forecasts by the air district. An increase in media attention and advisory notification requests indicate an increased public awareness of the problem. A woodstove change-out program is being developed for implementation in spring 2014.

Butte County was impacted by the Chips Fire Complex during the 2012 summer season and the air district collaborated with CARB to install temporary PM2.5 monitors in two foothill locations to track localized PM2.5 impacts.

The air district participates in the Carl Moyer Program and was able to receive unused funds from another air district to supplement its original disbursement, allowing more diesel repower projects. Most projects occur within the agricultural community.

The air district submitted its PM2.5 emissions inventory to CARB in October for its approval for the State Implementation Plan before forwarding it to U.S. EPA.

Colusa County Air Pollution Control District

The wildfires that burned in the western and northern portions of the Sacramento Valley contributed to higher than normal AQI values from July through September. The smoke from these wildfires impacts many California residents and will always be of great concern for the air district. The decrease in the number of "Good" AQI days from 2000 compared to 2012 may also be attributed to an air quality monitoring equipment malfunction. The monitoring equipment did not record data for a total of 30 days throughout 2012. These days could not be classified as either "Good" or "Unhealthy."

The air district continues to aid in the replacement of older stationary diesel agricultural engines with funding from the Carl Moyer Program. The air district also began implementing the Off-Road Voucher Incentive Program for off-road diesel equipment with funding from the Carl Moyer Program.

With the assistance of the San Joaquin Valley Air Pollution Control District, the air district was able to replace two school buses and retrofit six school buses with diesel particulate filters through funds provided by the Lower-Emission School Bus Program.

El Dorado County Air Quality Management District

El Dorado County is located east of Sacramento and is divided amongst two air basins - the Mountain Counties in the west and Lake Tahoe in the east. The county rises in elevation from 600 feet in the west to over 10,000 feet in the east, and approximately 73 percent of the land area is national forest. The Mountain Counties portion is non-attainment for the state and federal standards for ozone. Both the Mountain Counties and Lake Tahoe are in non-attainment for PM10 and the western portion of the county recently attained the PM2.5 federal standard.

Smoke from illegal open burning is a challenging problem. Prioritizing public education as a means to achieve compliance the air district recently created an *Online Burn Violators Training Course* for first-time violators of the open burning rule. Violators who successfully complete the course can reduce their violation penalty by up to $150. Usually, this completely covers most first-time burn violation penalties. The course can be viewed at http://edcapps.edcgov.us/AirQualityManagement/BurnRuleTraining/traininghome.html.

Coinciding with implementation of the training course, the air district has increased enforcement of the open burning rule by patrolling rural areas on no-burn days.

Smoke from fireplaces and old wood stoves is also challenging. The air district continues to enhance its Wood Stove Replacement Incentive Program by seeking to increase the reimbursement rate for new U.S. EPA Phase II certified stoves from a range of $250-$450 to a flat rate of $500.

The air district administers two grant programs aimed at reducing emissions. The DMV AB 2766 grant program provides funding for mobile source emission-reducing projects within the county. Over $500,000 was awarded for emission reduction projects in 2012. Those projects included four shuttle buses, a sidewalk near a grade school, paving a dusty gravel road and a teleconference system. The air district also administers the AB 923 grant program to retrofit or replace older polluting school buses and it hopes to retrofit over 40 school buses with grant funding of $800,000. The Sacramento Metropolitan Air Quality Management District administers the Carl Moyer Program for the air district. More information is available at http://www.edcgov.us/AirQualityManagement/

Feather River Air Quality Management District

The air district includes the counties of Yuba and Sutter in the Sacramento Valley Air Basin. The pending challenges for the air district include reducing emissions of PM2.5, PM10 and ozone precursors in order to achieve and/or maintain the state and federal standards. The southern portion of the air district is part of the Sacramento federal non-attainment area for ozone, and all of Sutter County and most of Yuba County were designated as non-attainment for the 2006 PM2.5 federal standard.

The air district has recently made significant achievements in improving air quality, including attaining the 2006 PM2.5 federal standard. The air district will be submitting a Redesignation Request and Maintenance Plan to the U.S. EPA in early 2013.

The air district has also made some improvements in reducing ozone. In 2010, CARB changed the designation for Sutter and Yuba counties from "non-attainment" to "non-attainment-transitional," demonstrating that the air district was moving closer to attaining the state standard. Also, the Sutter Buttes non-attainment area has been designated as attainment for the 8-hour federal ozone standard. The special purpose ozone monitor located on top of the Sutter Buttes records transport emissions from the metropolitan areas northward into the Sacramento Valley. The Sutter Buttes has been designated as a separate non-attainment area since the location, 2,000 feet above the valley floor, is not indicative of air quality conditions where the population of the county resides. The air district continues to work internally and with the Sacramento regional air districts to reduce ozone through planning, outreach and regulatory controls.

Glenn County Air Pollution Control District

The air district is an agriculturally based county located approximately 80 miles north of Sacramento. The air district is bounded by the Mendocino National Forest in the west, the Sacramento River in the east, and is bisected by Interstate 5. Outreach information, including Carl Moyer Program applications, is available in the air district's Willows office and on the air district's website at http://www.countyofglenn.net/govt/departments/air_pollution/

Great Basin Unified Air Pollution Control District

The pending challenges for the air district are uncontrolled sources of PM2.5 and PM10 from Owens Lake in Inyo County and Mono Lake in Mono County. Water diversions of these lakes' tributaries by the Los Angeles Department of Water and Power have resulted in reduced lake levels (almost complete drying in the case of Owens) resulting in the exposure of surfaces where particulate matter becomes airborne during high wind events. In addition to the PM2.5 data documented in this air quality report, the PM10 data is reported below for informational purposes only. To understand the pending challenges for the air district, PM10 AQI and exceedance trends are pertinent.

PM10 AQI Final Results Table

County	2012 Good AQI Days	2012 Unhealthy AQI Days
Inyo	294	14
Mono	327	19

24-hr PM10 Exceedance Counts

County	2012 150 micrograms per cubic meter (µg/m^3)
Inyo	52
Mono	24

Imperial County Air Pollution Control District

The air district saw air pollution successes in 2012 with the decline of PM10 concentration levels and a decrease in air pollution violations. With the adoption of Best Available Control Measures for PM10, the air district began the process of updating and installing a new data acquisition system. The system will be used to not only compile more robust data but to also provide the general public with actual visuals of events as they occur. This system will support data generation as well as real time video feed. The system is expected to be done in fall of 2013 and will allow the public the ability to log in and view data and air pollution events for specific areas of the county. Included in the system are web-based upgrades that will allow for future potential growth of the system. In addition to improvements in PM10 levels, the air district also saw improvements in PM2.5 levels. For both ozone and PM2.5 the greatest impact comes from international transport.

Pollutant	2000 Violations	2012 Violations
PM10 total	11	3
PM2.5	7	4

The air district is intimately involved in border issues through the Border 2020 program to help educate government and the general public in neighboring Mexico and the United States about the international impacts to both countries. Media campaigns continue to be directed toward Mexicali, Mexico. The educational campaign that began two years ago is now in full swing with news media coverage of cultural events that have been known to increase concentrations of pollutants. Awareness campaigns on the dangers and long-term effects associated with unhealthy air quality continue with advertisements both in newspapers and on television. These efforts are expected to continue for another three years in full force. As public support increases, demanding that both federal and local governments take a harder look at ways to curb pollution, the Border 2020 program participants expect to expand outreach and support.

Mojave Desert Air Quality Management District

Despite an extended summer season (even for the desert), Mojave Desert residents breathed easier during 2012 as exceedances of the 8-hour federal ozone standard dipped 15 percent from 2011. According to data collected at the six air monitoring stations located throughout the air district's 20,000 square mile jurisdiction, 68 days exceeded the current 8-hour federal ozone standard district wide, as

compared to 80 days in 2011. Maximum 8-hour concentrations also continued to decline dramatically, with 108 ppb being the highest level recorded in 2012, compared to 133 ppb in 2000.

The Mojave Desert solar boom continued as 17 projects totaling 3,140 MW of photovoltaic power were noticed for construction within the air district's boundaries. The air district responded to a 2012 audit of its Title V program and worked toward incorporating the U.S. EPA's recommendations into its program, which affects 41 facilities. Rulemaking activity focused on the development of Prevention of Significant Deterioration rules and amendments to Rule 1113 - Architectural Coatings.

The air district's public incentive programs continued to flourish, as the air district's Voluntary Accelerated Vehicle Retirement Program scrapped 169 automobiles, and residents traded in more than 150 gasoline-powered lawn mowers for zero-emission electric models during the 2012 lawn mower exchange.

Monterey Bay Unified Air Pollution Control District

The air district has local jurisdiction for air quality in the North Central Coast Air Basin. The air district was designated attainment for the 8-hour federal ozone standard in 2012; however, work still remains to achieve attainment of the 8-hour state ozone standard.

The air district is fortunate to experience good regional air quality, yet localized high PM2.5 concentrations continue to be a challenge. Special monitors in the San Lorenzo Valley (SLV) area near Santa Cruz continue to record exceedances of the 24-hour federal PM2.5 standard due to the topography of the area, the large number of homes heated with woodstoves, and intermittent outdoor burning of yard waste. The mountainous terrain of the SLV traps winter smoke, causing PM2.5 concentrations as well as smoke complaints to increase during the winter months. This past year, the air district continued funding for the Woodstove Change-Out Program and successfully changed out approximately 90 old woodstoves district wide. In fall 2012, the air district began a program to provide free yard waste recycling events for SLV residents and is looking for ways to support neighborhood chipping programs. Implementing these programs will help to reduce the localized increases in PM2.5 concentrations experienced in the SLV and district wide.

North Coast Unified Air Quality Management District

Located along the rugged northern coast of California, the air district encompasses approximately 7,753 square miles within Humboldt, Del Norte and Trinity counties. In general, the air district has some of the healthiest air in the nation. The terrain spans coastal, agricultural, forested, and mountainous regions, which creates hundreds of microclimates within the air district. To better examine those microclimates the air district has increased the number of air monitoring stations from three in 2006 to five in 2013.

The air district continues to provide public outreach in the form of grant administration to the community. Since the Carl Moyer Program began in 1998, the air district has provided incentive funding for 94 replacement engines which achieved project lifetime emission reductions of 70 tons of NOx, 5 tons of ROG, and 4.8 tons of diesel PM. Additionally, the air district has tripled the size of its woodstove change-out program; provided outreach during the wildfire events in the summer of 2012; and continues to host asbestos workshops and CARB trainings that are well attended by staff and members of the regulated community.

In 2012, the air district was the recipient of the Tom Cooke award which recognized the air district's outstanding example of a government agency working with regulated industry.

Northern Sierra Air Quality Management District

The Northern Sierra Air Quality Management District is comprised of the rural counties of Nevada, Sierra and Plumas. The western portion of Nevada County (west of the Sierra crest) occasionally experiences high ozone concentrations on hot summer days when the wind is out of the southwest. Most of this ozone is transported by wind from the Sacramento region and the Bay Area. Ozone data from the past few years demonstrate a dramatic improvement in western Nevada County's air quality. The town of Truckee, in eastern Nevada County, sometimes experiences elevated wintertime particulate matter concentrations from wood combustion and road sand but the situation has improved greatly over the past 14 years due to the town's successful Particulate Matter Air Quality Management Plan adopted in 1999.

Plumas and Sierra counties are separated from Nevada County and the Sacramento area by vast canyons that disrupt the transport of ozone, and PM2.5 is the main pollutant of concern in Plumas and Sierra County. It is mostly associated with localized wood combustion, in spite of open burning restrictions and wood stove change-out programs that have been administered by the air district. On a typical elevated PM2.5 day in Plumas County, temperatures are cold, residents are using their wood stoves and an atmospheric inversion is in place. The highest concentrations generally occur late at night (when wood stoves are damped down) and in the morning (when stoves are started up). However, wildfire events in 2012 resulted in PM2.5 concentrations in the "Moderate" AQI range on many days that otherwise would have been "Good" AQI days.

Northern Sonoma County Air Pollution Control District

The air district includes all of the coast of Sonoma and areas north of the town of Windsor, as well as the areas generally north of the Russian River valley. This includes all of the Known Geothermal Resource Area (KGRA) in Sonoma County – the largest direct-steam geothermal power generation installation in the world. Air monitoring stations are located in Cloverdale, Healdsburg and Guerneville, as well as stations operated cooperatively with Lake County in the KGRA. The southern portion of the county (including the monitoring stations in the cities of Santa Rosa and Sonoma) lies within the Bay Area Air Quality Management District.

The air district currently attains all of the federal and state standards. The air district's primary concerns are maintaining its clean air through a robust open burn permitting and enforcement program, maintaining its ozone and PM10 monitoring network, providing grant incentives for clean air projects and conducting its stationary source permitting and enforcement program. The air district works in partnership with other agencies, cities and the county of Sonoma to achieve reductions in greenhouse gases called for in the Climate Action Plan adopted by the county and all of its nine cities. Part of that program is a coordinated initiative - the *Sonoma County Electric Trail Project* - to support the introduction and use of plug-in electric vehicles. In 2012, the initiative was awarded the Governor's Economic and Environmental Leadership Award.

Placer County Air Pollution Control District

The air district's Clean Air Grant program was implemented continuously in 2012. This program provides incentives to projects which are designed to reduce criteria air pollutants from mobile sources

and other non-regulated sources. Funds used for this program are derived from DMV registration fees and land use air quality mitigation funds. Until 2012, a total of $13 million in funds had been awarded through the grant program with an estimated 950 tons of criteria pollutant emission reductions within the county.

Sacramento Metropolitan Air Quality Management District

The air district has completed its sixth *Check Before You Burn* season (as per Rule 421: *Mandatory Episodic Curtailment of Wood and Other Solid Fuel Burning* – which prohibits burning when weather conditions trap wood smoke at ground level). Since 50 percent of the particulate matter emissions in the winter can be attributed to wood burning, this rule reduces the number of days the air district exceeds the federal health standard. Due to advertising, outreach and enforcement efforts the air district attained the PM2.5 federal standard, which would not have been possible without the rule.

In 2012, the air district funded over $42 million in mobile on-road and off-road emission reduction projects, including modernizing 185 on-road heavy-duty trucks, modernizing or retrofitting 415 school buses and upgrading over 100 pieces of agricultural equipment. The air district reviews, provides guidance and develops comments on land use specific plans ranging from big box stores to very large planned community developments. In 2012, local agency Climate Action Plans, General Plans and regional Transportation Plans were also part of the required analysis process.

The *Spare The Air* program continues to encourage residents to use alternate forms of transportation on Spare The Air days. In 2012, the air district lowered the Spare The Air trigger from 150 AQI to 127 AQI. Through Spare The Air outreach, the air district's Communications Office increased Air Alert sign-ups by 2,280 subscriptions in 2012. Through outreach efforts the air district has 2,651 Spare The Air partners and 2,257 *Check Before You Burn* partners, which distribute air quality information to the public and 539 Twitter followers. Also, the Spare The Air annual survey shows that in 2012, residents who habitually drive less in the summer in an effort to improve air quality reduced 1.67 tons per day of ozone precursors.

San Diego County Air Pollution Control District

For the air district, 2012 proved to be the cleanest year on record. In 2011, the air district attained the 1997 8-hour federal ozone standard (based on monitoring data collected from 2009 – 2011). In 2012, the air district did not have a single day above the 1997 8-hour federal ozone standard, and the 8-hour design value continues its decades-long decline. Accordingly, in late 2012 the air district submitted a Redesignation Request and Maintenance Plan for this standard to the U.S. EPA.

The air district has been designated as a marginal non-attainment area for the more health-protective 2008 8-hour federal ozone standard, and monitoring data show continued progress toward achieving this standard (marginal non-attainment requires attainment by the year 2015). The air district continues to meet all air quality standards for PM2.5.

San Joaquin Valley Air Pollution Control District

The air district continues to see progress in improved air quality across the region through substantial reductions in the number of days that federal air quality standards are exceeded. Air quality in 2012 continued this trend toward attainment.

Based on preliminary data, during 2012 there were 45 days when an air monitoring site exceeded the 2006 24-hour federal PM2.5 standard of 35 µg/m^3. This represents a 52 percent reduction when compared to the 94 exceedances experienced in 2002. For the 1997 24-hour federal PM2.5 standard of 65 µg/m^3, the air district recorded just four days over this standard in 2012 – an 85 percent reduction in exceedances in 2002 (27 days).

Ozone levels in the air district have also continued to trend downward. In 2012, there was a 56 percent reduction in the number of days over the 1997 8-hour federal ozone standard of 84 ppb compared to 2002, and a 33 percent reduction in exceedances of the current 8-hour federal ozone standard.

Air district days over the 1-hour federal ozone standard are increasingly infrequent, occurring just twice in 2012. Exceedances of this standard occurred well over 30 times a year just 10 years ago and over 40 times each year 20 years ago. In fact, the air district may attain the 1-hour federal ozone standard in the near future if the trend in fewer exceedances continues.

San Luis Obispo County Air Pollution Control District

Located along the central coast of California, the air district encompasses approximately 3,299 square miles and a population of 273,231. The terrain spans coastal, agricultural, plains and low rolling hills, which creates air quality characteristics different for the regions within the air district. Ninety-nine percent of air district residents live in areas that are in attainment of the federal air quality standards. However, on the Nipomo Mesa (southern coastal region of the air district), the state air quality standard for PM10 is exceeded over 70 times per year and the eastern portion of the county was recently designated non-attainment for the 8-hour federal ozone standard.

State PM10 Standard

While the CAPCOA report focuses on the federal ozone and PM2.5 standards, the air district is designated non-attainment for the state PM10 standard, which was exceeded 72 days in 2012. The exceedances of the state PM10 standard occur mostly during the spring months when windblown dust from the Oceano Dunes recreation area impacts the Nipomo Mesa area of the air district. Rule 1001 was adopted to mitigate the particulate matter emissions from the coastal dune recreation areas.

Year	Exceedances of the State PM10 Standard
2000	48
2012	72

The increase in exceedances of the state PM10 standard from 2000 to 2012 was due to the addition of official PM10 monitoring stations, not due to deteriorating air quality.

Ozone Monitoring Network

The air district added several official monitoring stations after 2000. Two of the ozone stations are located in the eastern portion of the air district that is impacted by transported pollution originating from outside of the air district. These stations are high elevation sites located in remote agricultural areas in the sparsely populated eastern portion of the air district. The 2012 ozone statistics provided in this report include data from these stations, resulting in a reduced number of “Good” AQI days and an

increased number of days exceeding the standard as compared to 2000 data. The decrease in the number of "Good" days and increase in number of days exceeding the standard from 2000 to 2012 is not a result of deteriorating air quality, but rather an expanded ozone monitoring network that records air pollution transported into the region.

Santa Barbara County Air Pollution Control District

The air district notes that the county remains in attainment of the 8-hour federal ozone standard and 2012 was another clean year. The air district is also in attainment of the federal PM10 and PM2.5 standards and the state PM2.5 standards. Some PM10 state standard exceedances were recorded in 2012 in the northern portion of the county under high wind conditions.

In 2012, the air district launched a Marine Shipping Solutions Group with stakeholders to develop collaborative initiatives to reduce emissions from ships transiting in the Santa Barbara Channel. These emission reductions are key to the air district's ability to continue progress towards attainment of the state ozone standard and to maintaining attainment of the federal ozone standard.

In 2012, the air district initiated an Offsets Workgroup of stakeholders to discuss ways to address the scarcity of available emission offsets without impacting net air quality benefit goals. The air district also continued efforts with several popular programs including: the *Old Car Buy Back Program*, electric vehicle infrastructure partnership, diesel engine grant programs, and the *Care for Our Earth* teacher grants program, and continued to lead the award-winning Santa Barbara Car Free partnership. More information about the air district is available at www.OurAir.org.

Shasta County Air Quality Management District

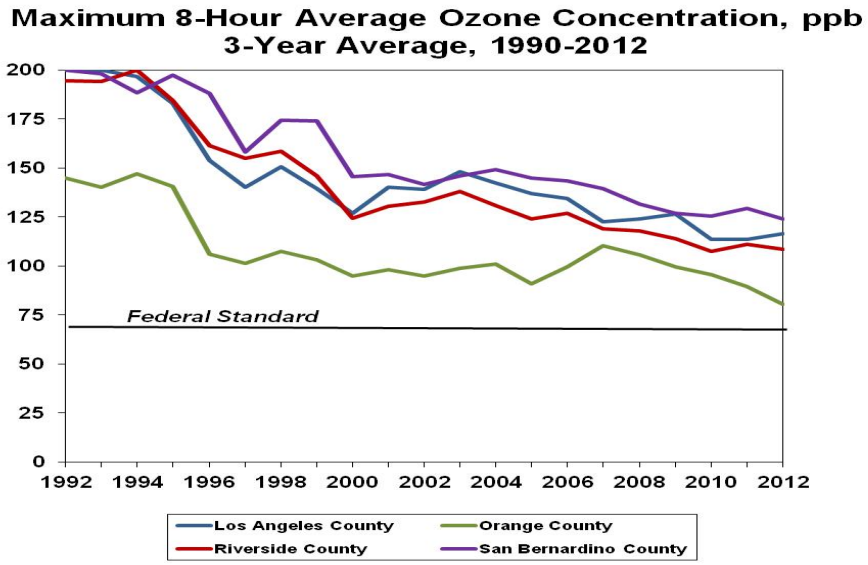
The air district encompasses the northernmost portion of the Sacramento Valley Air Basin. The air district is in attainment for all federal air quality standards.

Efforts to enhance air quality within the air district include grant opportunities and public outreach. Grants continue to be periodically available in the Lower Emission School Bus Program, the Carl Moyer Program and an annual Woodstove Replacement Program. Air district public outreach includes utilizing the U.S. EPA's *Enviroflash* service which can update individuals on ambient air quality levels via e-mail. The air district also maintains a webpage which displays the AQI values for ozone and PM2.5 monitors located throughout the Sacramento Valley. A visibility camera is also available at the air district's website at http://www.co.shasta.ca.us/index/drm_index/aq_index/aq_map.aspx

South Coast Air Quality Management District

Although the number of days each year in which the federal ozone standard was exceeded has fluctuated from year to year, due to weather and other conditions, air quality has shown a long-term trend of improvement. This is demonstrated by a steady decline in peak ozone concentrations (see chart below). In 2012, peak ozone concentrations were the lowest ever measured in the South Coast Air Basin.

In addition, air pollution controls have significantly reduced levels of PM2.5 across the region and preliminary 2012 data shows that the Southland is now close to achieving the 24-hour and 2006 annual PM2.5 federal standards.



The air district continues to face major air quality challenges, particularly in reducing mobile source emissions. NOx emissions must be further reduced by 65 percent to meet current federal health standards for ozone and fine particulates.

The air district achieved significant accomplishments in 2012, including:

- Adoption of its 2012 Air Quality Management Plan outlining measures to bring the South Coast Air Basin in attainment with the federal health standard for fine particulate pollution by 2015;
- Initiation of its fourth Multiple Air Toxics Exposure Study (MATES IV) to evaluate health risks of air toxics in the South Coast Air Basin;
- Initiation of rulemaking to address potential air quality impacts from hydraulic fracturing; and
- Creation of an historic agreement with the Cabazon Band of Mission Indians allowing the air district to enforce air quality rules on tribal land near Mecca in the Coachella Valley.

In 2013, the air district will continue to implement emission-reduction strategies, including:

- More stringent requirements for wood-burning devices and open burning;
- A backstop measure to ensure that the ports of Los Angeles and Long Beach meet their voluntary commitments to reducing pollution from port-related activities;
- Funding the replacement and/or retrofit of older diesel trucks and buses;
- Funding innovative clean-energy projects;
- Implementing the demonstration and deployment of a zero-emission cargo container moving system;
- Offering incentives to residents to switch to zero-emission lawn mowers and natural gas log sets; and
- Educating residents about the air quality problem and providing them with tools to help them be part of the solution.

Tehama County Air Pollution Control District

The air district was disproportionately affected by wildfires during the summer and fall of 2012, resulting in less days measured as healthy in 2012 as compared to 2000. Because of the air district's location in the Northern Sacramento Valley and the corresponding meteorology, July, August and September were typically "Moderate" air quality days due to impacts from 12 fires that were over 1,000 acres in size,

including the Chips Fire (75,000 acres), the North Pass Fire (42,000 acres), the Mill Fire (29,000 acres), the Reading Fire (28,000 acres), and the Ponderosa Fire (28,000 acres).

The air district began implementation of an Indirect Source Fee program on new construction of residential, commercial, and industrial developments designed to mitigate future impacts of additional ozone precursors and particulate matter. The air district will begin awarding grants through a grant program beginning in late 2013.

Tuolumne County Air Pollution Control District

The air district is a small rural district with a total population of approximately 56,000. Seventy-seven percent of land within the air district is federal land, either U.S. Forest Service land or Yosemite National Park land. Major air quality concerns are smoke impacts from wildfires, opening burning, and fireplaces and old woodstoves. To address these concerns and help reduce emissions, the air district extended its Green Waste Voucher and Woodstove Replacement programs for a second year in 2012. Although 2012 was a fairly mild year for wildfires in the U.S. Forest and National Park, the air district did utilize its newly purchased EBAM to monitor smoke impacts to the local communities that were affected from the few fires that did occur.

Tuolumne County's air quality continues to improve. In 2012, the U.S. EPA not only determined that Tuolumne County had attained the 1997 8-hour federal ozone standard, but designated the air district as attainment for the more stringent 2008 8-hour federal ozone standard.

The air district continues to participate in the Carl Moyer Program, although it is becoming more difficult to find projects that are eligible. In addition to the Carl Moyer Program, the air district administers its own grant program to help replace and retrofit diesel engines for county and city public works vehicles.

Ventura County Air Pollution Control District

The air district is designated non-attainment for the federal and state ozone standards and the state PM10 standard. On November 19, 2012, the air district achieved a major clean air milestone when U.S. EPA Region IX issued a final rule determining that the air district has attained the former 8-hour federal ozone standard. The air district now has attainment findings for two former federal ozone standards, one for the 1-hour 0.12 ppm standard and one for the 8-hour 0.08 ppm standard. Of course, the air district will need to continue working to further reduce air emissions to attain the current and more stringent 8-hour federal ozone standard. With respect to particulate matter, the CARB has redesignated Ventura County from non-attainment to attainment for the state PM2.5 standard. This improvement is another major step forward for public health in the air district, as fine particulate matter has significant adverse health effects.

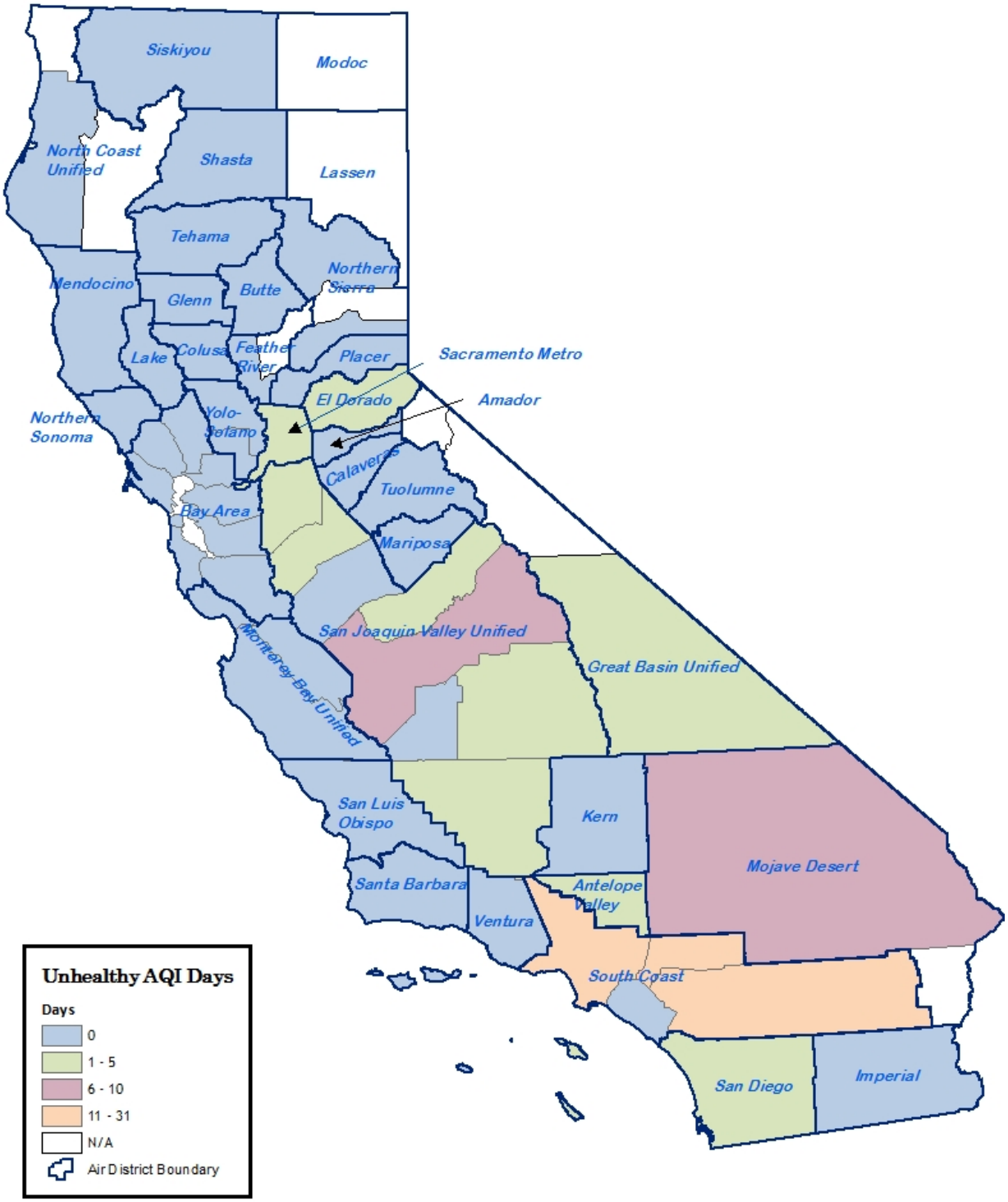
Yolo-Solano Air Quality Management District

The air district published its first annual report, *Yolo-Solano Air 2012*, in an effort to advance the conversation with the public about air pollution. The publication was followed up with extensive press coverage and presentations to local elected officials. The air district has also increased publication of its general air quality newsletter *Air Aware* to six times annually, added an educator-focused newsletter called *Clean Air Classrooms,* with five annual issues, and opened social media channels. The air district continued its long-running wood smoke abatement program, specifically working to expand subscription to e-mail and text alerts through *EnviroFlash*. The air district's subscription base increased 74 percent in

2012. The air district also collaborated with the air districts of the Sacramento region on the Spare The Air driving curtailment program and ran a lawn mower exchange program to reduce emissions from lawn and garden equipment. Through incentive programs, the air district funded several showings of a locally produced play aimed at teaching elementary school students about carbon emissions, as well as two after-school programs focused on air quality education with a specific focus on ground-level ozone.

Unhealthy AQI days by county in 2012

Unhealthy days are those with an AQI from 151-200



Appendix A -- Understanding the Air Quality Index

The Air Quality Index (AQI) is a tool for reporting daily air quality levels. It tells you how clean ("Good") or polluted ("Unhealthy") the air is using colors and a scale from zero to 500 and lets people know the steps they should take to protect their health.

The AQI is calculated for the major air pollutants regulated by the federal Clean Air Act: ground-level ozone, PM2.5, PM10, nitrogen dioxide, carbon monoxide and sulfur dioxide. For each of these pollutants the federal U.S. EPA has established federal air quality standards to protect public health. The AQI is revised whenever these health-based standards are changed.

When the AQI is in this range:	Heed this health advice:
Good (0-50)	Air quality is considered satisfactory, and air pollution poses little or no risk
Moderate (51-100)	Unusually sensitive people should consider limiting prolonged outdoor exertion.
Unhealthy for Sensitive Groups (101-150)	The following groups should limit prolonged or heavy outdoor exertion: People with lung disease, such as asthma People with heart disease Children and older adults People who are active outdoors
Unhealthy (151-200)	The following groups should avoid prolonged or heavy outdoor exertion: People with lung disease, such as asthma People with heart disease Children and older adults People who are active outdoors Everyone else should limit prolonged outdoor exertion.
Very Unhealthy (201-300)	The following groups should avoid all outdoor exertion: People with lung disease, such as asthma People with heart disease Children and older adults People who are active outdoors Everyone else should limit outdoor exertion.
Hazardous (over 300)	Indicates a health warning of emergency conditions. The entire population is more likely to be affected. Everyone should avoid all physical activity outdoors.

Appendix B – Overall Air Quality

This table shows the number of "Good" air quality (AQI 0-50) and "Unhealthy" air quality (AQI 151-200) days in each county for 2000 and 2012 for all AQI pollutants (ozone and PM2.5). Fourth-quarter 2012 data may not be complete for some air districts and all data should be treated as preliminary and subject to change when validated. In addition, some air districts may have changed the number of stations or frequency of monitoring between 2000 and 2012. Please refer to your local air district for more specific information.

County	Air District	2000		2012	
		Good AQI Days	Unhealthy AQI Days	Good AQI Days	Unhealthy AQI Days
Alameda	Bay Area	289	1	317	0
Alpine	Great Basin	N/A	N/A	N/A	N/A
Amador	Amador	258*	3*	291*	0*
Butte	Butte	204	12	248	0
Calaveras	Calaveras	240*	4*	286*	0*
Colusa	Colusa	265	0	241	0
Contra Costa	Bay Area	275	0	327	0
Del Norte	North Coast	N/A	N/A	N/A	N/A
El Dorado	El Dorado	230*	12*	240*	1*
Fresno	San Joaquin Valley	64	66	119	8
Glenn	Glenn	317*	0*	335*	0*
Humboldt	North Coast	N/A	N/A	366	0
Imperial	Imperial	194	6	143	0
Inyo	Great Basin	268	6	269	3
Kern	Eastern Kern	207	0	224	0
Kern	San Joaquin Valley	96	63	112	4
Kings	San Joaquin Valley	101	25	154	0
Lake	Lake	365	0	359	0
Los Angeles	Antelope Valley	244	8	218	2
Los Angeles	South Coast	76	30	154	11
Madera	San Joaquin Valley	255*	1*	164	2
Marin	Bay Area	366*	0*	366*	0*
Mariposa	Mariposa	237*	2*	235*	0*
Mendocino	Mendocino	365*	0*	361*	0*
Merced	San Joaquin Valley	133	17	232	0
Modoc	Modoc	N/A	N/A	N/A	N/A
Mono	Great Basin	42**	0**	N/A	N/A
Monterey	Monterey	354*	0*	360	0
Napa	Bay Area	361*	0*	364*	0*
Nevada	Northern Sierra	171	6	310	0
Orange	South Coast	181	7	282	0

County	Air District	2000		2012	
		Good AQI Days	Unhealthy AQI Days	Good AQI Days	Unhealthy AQI Days
Placer	Placer	180	9	212	0
Plumas	Northern Sierra	306**	0**	212**	0**
Riverside	Mojave Desert	N/A	N/A	N/A	N/A
Riverside	South Coast	91	45	112	12
Sacramento	Sacramento	213	11	216	5
San Benito	Monterey	307*	0*	323	0
San Bernardino	Mojave Desert	173	18	184	6
San Bernardino	South Coast	155	43	178	31
San Diego	San Diego	135	7	222	1
San Francisco	Bay Area	313	0	333	0
San Joaquin	San Joaquin Valley	223	3	216	1
San Luis Obispo	San Luis Obispo	276	0	227	0
San Mateo	Bay Area	325	0	340	0
Santa Barbara	Santa Barbara	264	0	316	0
Santa Clara	Bay Area	281	2	308	0
Santa Cruz	Monterey	355*	0*	363	0
Shasta	Shasta	279	2	305	0
Sierra	Northern Sierra	N/A	N/A	N/A	N/A
Siskiyou	Siskiyou	262*	0*	358*	0*
Solano	Bay Area/Yolo-Solano	269	0	306	0
Sonoma	Bay Area	321	0	344	0
Sonoma	Northern Sonoma	364*	0*	366*	0*
Stanislaus	San Joaquin Valley	190	16	170	2
Sutter	Feather River	214	0	290	0
Tehama	Tehama	322*	0*	262	0
Trinity	North Coast	N/A	N/A	N/A	N/A
Tulare	San Joaquin Valley	97	62	125	5
Tuolumne	Tuolumne	256*	0*	276*	0*
Ventura	Ventura	204	6	229	0
Yolo	Yolo-Solano	257	0	293	0
Yuba	Feather River	N/A	N/A	N/A	N/A

* Based on ozone only
**Based on PM2.5 only
***No ozone data to report; did not begin measuring ozone until 2005. No exceedances of federal PM2.5 standards for last 11 years.
N/A -- Data not available

Appendix C – Ozone Air Quality

This table shows the number of days in each county exceeding the 8-hour ozone standard in 2000 and 2012. Fourth-quarter 2012 data may not be complete for some air districts and all data should be treated as preliminary and subject to change when validated. In addition, some districts may have changed the number of stations or frequency of monitoring between 2000 and 2012. Please refer to your local air district for more specific information.

County	Air District	Number of days exceeding the ozone standard[10]	
		2000	2012
Alameda	Bay Area	4	3
Alpine	Great Basin	N/A	N/A
Amador	Amador	32	5
Butte	Butte	24	5
Calaveras	Calaveras	32	2
Colusa	Colusa	2	0
Contra Costa	Bay Area	6	2
Del Norte	North Coast	N/A	N/A
El Dorado	El Dorado	53	22
Fresno	San Joaquin Valley	118	71
Glenn	Glenn	2	0
Humboldt	North Coast	N/A*	0
Imperial	Imperial	13	17
Inyo	Great Basin	8	1
Kern	Eastern Kern	58	40
Kern	San Joaquin Valley	115	74
Kings	San Joaquin Valley	91	7
Lake	Lake	0	1
Los Angeles	Antelope Valley	58	45
Los Angeles	South Coast	51	69**
Madera	San Joaquin Valley	30	29
Marin	Bay Area	0	0
Mariposa	Mariposa	45	12
Merced	San Joaquin Valley	66	10
Modoc	Modoc	N/A	N/A
Mono	Great Basin	N/A	N/A
Monterey	Monterey	0	0

[10] 2008 ozone standard, 75 parts per billion

County	Air District	Number of days exceeding the ozone standard[10]	
		2000	2012
Monterey	Monterey	0	0
Napa	Bay Area	0	0
Nevada	Northern Sierra	56	2
Orange	South Coast	12	5**
Placer	Placer	48	19
Plumas	Northern Sierra	1	N/A***
Riverside	Mojave Desert	N/A	N/A
Riverside	South Coast	112	104**
Sacramento	Sacramento	41	40
San Benito	Monterey	8	1
San Bernardino	Mojave Desert	84	68
San Bernardino	South Coast	104	104**
San Diego	San Diego	46	10
San Francisco	Bay Area	0	0
San Joaquin	San Joaquin Valley	10	15
San Luis Obispo	San Luis Obispo	1	11**
San Mateo	Bay Area	0	0
Santa Barbara	Santa Barbara	21	2
Santa Clara	Bay Area	2	1
Santa Cruz	Monterey	0	0
Shasta	Shasta	14	0
Sierra	Northern Sierra	N/A	N/A
Siskiyou	Siskiyou	N/A	0
Solano	Bay Area/Yolo-Solano	4	1
Sonoma	Bay Area	1	0
Sonoma	Northern Sonoma	1	0
Stanislaus	San Joaquin Valley	29	35
Sutter	Feather River	8	0
Tehama	Tehama	5	5
Trinity	North Coast	N/A	N/A
Tulare	San Joaquin Valley	120	84
Tuolumne	Tuolumne	26	3
Ventura	Ventura	57	16
Yolo	Yolo-Solano	9	2
Yuba	Feather River	N/A	N/A

*No Year 2000 ozone data to report; did not begin measuring ozone until 2005.
**The number of stations and the frequency of monitoring increased between 2000 and 2012
***No ozone monitor in 2012

Appendix D – $PM_{2.5}$ Air Quality

This table shows the number of days in each county exceeding the 24-hour $PM_{2.5}$ standard in 2000 and 2012. Fourth-quarter 2012 data may not be complete for some air districts and all data should be treated as preliminary and subject to change when validated. In addition, some districts may have changed the number of stations or frequency of monitoring between 2000 and 2012. Please refer to your local air district for more specific information.

County	Air District	Number of days exceeding the $PM_{2.5}$ standard[11]	
		2000	2012
Alameda*	Bay Area	18	0
Alpine	Great Basin	N/A	N/A
Butte*	Butte	48	20
Colusa	Colusa	0	0
Contra Costa	Bay Area	16	0
Del Norte	North Coast	N/A	N/A
El Dorado	El Dorado	N/A	N/A
Fresno	San Joaquin Valley	87	30
Glenn	Glenn	N/A	1
Humboldt**	North Coast	0	0
Imperial*	Imperial	21	6
Inyo*	Great Basin	4	1
Kern	Eastern Kern	3	N/A
Kern	San Joaquin Valley	66	26
Kings	San Joaquin Valley	71	24
Lake*	Lake	0	N/A
Los Angeles	Antelope Valley	0	0
Los Angeles**	South Coast	70	7
Madera	San Joaquin Valley	N/A	15
Marin	Bay Area	N/A	N/A
Mariposa	Mariposa	N/A	N/A
Merced	San Joaquin Valley	55	8
Modoc	Modoc	N/A	N/A
Mono*	Great Basin	0	N/A
Monterey	Monterey	0	0
Napa	Bay Area	N/A	N/A
Nevada*	Northern Sierra	0	0
Orange**	South Coast	38	4

[11] 2006 PM2.5 standard – 35 micrograms per cubic meter, averaged over 24 hours

County	Air District	Number of days exceeding the $PM_{2.5}$ standard[11]	
		2000	2012
Placer*	Placer	21	0
Plumas*	Northern Sierra	10	4
Riverside	Mojave Desert	N/A	N/A
Riverside**	South Coast	81	9
Sacramento*	Sacramento	17	0
San Benito	Monterey	N/A	0
San Bernardino	Mojave Desert	0	0
San Bernardino**	South Coast	26	2
San Diego*	San Diego	24	2
San Francisco	Bay Area	6	1
San Joaquin	San Joaquin Valley	42	7
San Luis Obispo*	San Luis Obispo	18	3
San Mateo*	Bay Area	15	0
Santa Barbara	Santa Barbara	0	0
Santa Clara	Bay Area	26	2
Santa Cruz	Monterey	0	0
Shasta*	Shasta	0	0
Sierra	Northern Sierra	N/A	N/A
Solano*	Bay Area/Yolo-Solano	15	1
Sonoma*	Bay Area	18	0
Sonoma*	Northern Sonoma	0	0
Stanislaus	San Joaquin Valley	45	25
Sutter*	Feather River	12	2
Tehama	Tehama	N/A	N/A
Trinity	North Coast	0	0
Tulare	San Joaquin Valley	74	22
Tuolumne	Tuolumne	N/A	N/A
Ventura	Ventura	5	1
Yolo	Yolo-Solano	9	0
Yuba	Feather River	N/A	N/A

*District used data from Federal Reference Method (FRM) monitors to estimate PM2.5 exceedances. FRM monitors are manual filter-based monitors where samples are collected on either a one-in-six day sampling schedule or a one-in-three day sampling schedule.

**The number of stations and the frequency of monitoring increased between 2000 and 2012

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