



Evaluation of the 2008 Sacramento Region Spare The Air Campaign

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Evaluation of the 2008 Sacramento Region Spare The Air Campaign

BACKGROUND & METHODOLOGY

Background

Air pollution in the Sacramento region during the summer months is a major concern – the area is designated a severe ozone non-attainment area by the U.S. Environmental Protection Agency (US EPA). This means that the region fails to meet the federal health based 8-hour ozone standard¹, thus affecting the quality of life and health of residents. The Sacramento nonattainment area includes Sacramento County, Yolo County, and parts of Placer, Solano, El Dorado and Sutter Counties.

The Sacramento Metropolitan Air Quality Management District (SMAQMD) estimates that about 70% of the Sacramento region's air pollution is caused by emissions from vehicles and other mobile sources. Unhealthy levels of ground-level ozone are created when volatile organic compounds (VOC) and nitrogen oxides (NOx), primarily from cars, trucks, construction and agricultural equipment, lawn mowers, and other mobile sources, react in the presence of sunlight, and form ozone in hot weather conditions. The residential driving population is therefore a large contributor to the air quality problem in the region.

Spare The Air was created in 1995 as an outreach program to engage the general public in voluntarily helping to solve the problem of ozone air pollution. It provides residents in the Sacramento region with information and resources to protect their health during the summer smog season (May through October) by encouraging them to be aware of ozone levels and by asking motorists to reduce their driving on days when unhealthy air is predicted. The trigger for alerting the population of a Spare The Air day for the next day is based on forecasted estimates of the Air Quality Index (AQI), which are provided by Sonoma Technology Inc. Estimates are derived using mathematical predictive modeling procedures on actual measurements obtained by local air districts and the California Air Resources Board at air quality monitoring sites throughout the region. If it is estimated that the AQI will be 150 or higher the next day, a Spare The Air advisory is issued by the Sacramento Metropolitan AQMD by 12:00 p.m.

The public is notified through a variety of communication channels, including paid radio announcements, email Air Alerts, news broadcasts, the Spare The Air Web site, and the Weather Channel.

Spare The Air 2008 Season

There were two multi-day Spare The Air episodes during the summer of 2008: Monday, July 7 through Friday, July 11; and Thursday, August 14 through Saturday, August 16; for a combined total of **eight** Spare The Air days. However, the July episodes were confounded by wildfires in the region, causing difficulties due to haze and smoke – not just elevated levels of ozone. A decision was made not to interview on these days, as any driving reduction might be attributable to smoke rather than ozone. **Residents were therefore interviewed only about the three (3) Spare The Air days that occurred in August (14th, 15th, and 16th).**

¹ The latest federal ozone health standard is .075 parts per million averaged over 8 hours.

The maximum AQI in the region occurred on July 7, with a measuring station in El Dorado County recording the AQI equivalent of 210², which is considered “very unhealthy.” During August, a maximum AQI of 201 (also considered “very unhealthy”) was recorded in Sacramento County, on Wednesday, August 13, a Spare The Air day. Spare The Air days are called for the Sacramento nonattainment area as a whole, but all air quality districts within the area may not have the same conditions. For example, foothill districts (such as Placer and El Dorado) sometimes experience poorer air quality than central plain districts such as Yolo-Solano. To some extent this is due to the fact that ozone created by drivers in Yolo-Solano and Sacramento travels east into the foothills. It is, therefore, important that the Spare The Air message continues to involve everyone in the basin, although the air quality in individual districts on specific days may not be poor.

Media Buy

This year the media buy was the same as last year. Once again **only radio commercials** were aired the day before and during the Spare The Air days. Approximately \$36,000 was spent on these radio advisories, of which \$19,000 was spent for the three August Spare The Air days when interviewing took place.³ **No** episodic television advertising was used.

Research Objectives

Annual evaluations (with the exception of 1997) have been conducted since 1995 to assess the effectiveness of the Spare The Air program. Levels of awareness, driving behaviors, health issues, employer involvement, and estimated emission reductions have been measured and tracked. In the early 2000's, numerous discussions took place between the Cleaner Air Partnership and staff of the California Air Resources Board (ARB) to arrive at an evaluation procedure acceptable to both. In 2002 an ARB-suggested question about general awareness was incorporated into the questionnaire in order to be able to calculate their definition of what qualifies as a “reduced” trip.⁴ Specific research objectives are to:

1. measure general awareness and specific understanding of the Spare The Air program among drivers in the Sacramento nonattainment area,
2. measure the effectiveness of the Spare The Air program in terms of reduced driving among drivers who were aware of the program and purposefully reduced the number of trips they made due to air quality reasons,
3. estimate emission reductions from the trips reduced during Spare The Air episodes,⁵
4. compare awareness of the Spare The Air campaign and driving reduction among the individual air quality management districts,
5. track the health effects of poor air quality,

² AQI figures obtained from the Historical Data section at www.sparetheair.com.

³ Radio ozone media spending figures were provided by Lori Kobza, SMAQMD in an e-mail, dated November 13, 2008.

⁴ The ARB recommended that only trip reductions from drivers who were aware of the Spare The Air program and purposefully reduced the number of trips they made on Spare The Air days specifically for air quality reasons should be counted in the measurement of the emissions reductions attributable to the program. This is the definition of a purposeful reducer.

⁵ Methods for estimating ozone precursor reductions based on the survey data have been used in all evaluations conducted since 1999 but were based on different Emission Factor models over the years. Estimates for 2008 were based on summer EMFAC2007 V2.3 figures provided and confirmed by Bruce Katayama, SMAQMD, October 24, 2008. The total VOC tons for a combined total of light duty passenger cars and two categories of light duty trucks (9.54 + 2.38 + 4.6) were converted to pounds (multiplied by 2,000) and then to grams (multiplied by 454) before dividing by the combined total number of trips (i.e. 3,012,210 for light duty passenger cars + 624,730 for light duty trucks¹ + 1,347,020 for light duty trucks²) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (5.97 + 1.76 + 4.88) x 2000 x 454 / (3,012,210 + 624,730 + 1,347,020). VOC grams and NOx grams were then combined (3.01 + 2.30) to obtain 5.31 grams per trip of emission precursors in the region as a whole. These are the figures considered most accurate at the time the report was written.

6. measure the percentage of drivers who habitually drive less during the summer season in order to improve air quality, and estimate the emission reductions from this group of reducers, and
7. track awareness and behavioral changes over time.

Research Methodology

As has been done since the first evaluation in 1995, two groups of respondents were interviewed, one following Spare The Air days, and the other following non-Spare The Air (or Control) days, matched for the same day of the week as the Spare The Air days. This type of experimental design adjusts for any overstatements individuals might make about their reported driving reduction on Spare The Air days, by providing a means of calculating a correction or adjustment factor. More accurate estimates about the number of drivers and households impacted by the Spare The Air program and the amount of emissions reduced are therefore obtained by subtracting this correction factor from the results. Including Control day data provides the most conservative estimates of program effectiveness. Control day data also have provided other insights into driving behavior.

Interviewing Strategy

This year, in order to save costs, a slightly different sampling strategy from previous years was applied, in that the targeted number of completed interviews per air district was reduced. Using RDD (random-digit-dialed) procedures, telephone interviews were to be conducted with a maximum of 1,200 residents following Spare The Air days. The goal was to interview up to 400 drivers in Sacramento County (rather than 600 in previous years), 300 drivers in Yolo-Solano AQMD (instead of 500), 300 drivers in Placer County APCD (instead of 500), and 200 drivers in El Dorado County AQMD (instead of 400). Another group of 1,200 interviews (300 in each of the four air quality districts) were to be conducted on “matching” (same day of the week as the STA interviews) non-Spare The Air days. The margin of error associated with a sample of 1,200 is $\pm 2.5\%$, at a 95% confidence level. Quotas were set to respect geographic area,⁶ age, and gender. Additionally, respondents were screened so that only those who had driven within the last week were interviewed.

A continuing challenge in terms of methodology is trying to estimate the number of Spare The Air days each season so that interviewing days and the number of completed interviews can be representative of the season and still provide adequate statistical precision. A field house needs advance notification and a target of a certain minimum number of interviews on a given day in order to maximize efficiency and contain costs. Initially we were going to conduct approximately 150 interviews throughout the region (proportionally representative of the population in general by county), starting with every occurrence of a Spare The Air advisory, and then deciding on an episode-by-episode basis whether to conduct interviews, taking into consideration the month within the season, the day of the week, and whether the event was single or multi-day, until the maximum number of budgeted interviews and the best coverage was obtained. However, as has already been mentioned, the five Spare The Air days in July were confounded by wildfires, and no interviewing was conducted about those days. As the summer progressed into August, it was decided to increase the number of completed interviews to 300 following any Spare The Air episodes. In the end, we did not complete the targeted number of completed interviews as there were only three Spare The Air episodes following the wildfires of July.

⁶ In addition to interviewing only in the relevant zip codes within certain counties (i.e. in Placer County, zip codes north or east of Auburn were excluded as well as those west of Vacaville in Solano County and those east of Placerville in El Dorado County), quotas were set (based proportionally on current Census estimates) specifically in the Davis area so as to insure that Davis was not over-represented (previous research indicates that residents of Davis are more likely than those in other areas to participate in telephone surveys).

Respondents

Spare The Air interviewing took place the day following the three Spare The Air days in August: i.e. interviewing took place on August 15, 16, and 17 about the Spare The Air days of August 14, 15, and 16. Control day interviewing took place on non Spare The Air days that were matched in terms of the day of the week of the Spare The Air days: Sept 12, 13, 14, 19, 20, and 28; and October 3, 11, and 17. This year interviews were conducted with a representative sample of residents of four of the five air quality management districts⁷ within the Sacramento nonattainment area – Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD. [In the past, interviews with residents in El Dorado County AQMD were only conducted in 2004, 2006, and 2007; and were only conducted in 2006 in the Feather River AQMD.] Respondents included a total of 1,908 drivers. (Only respondents who had driven a car, truck or van within the last week were interviewed.) Results for the Sacramento nonattainment area as a whole were weighted proportionally.⁸ The next table lists the number of completed interviews for each group along with their affiliated margins of error (at the most conservative level).

<i>Number of Completed Interviews (unweighted)</i>	<i>Spare The Air Days</i>	<i>Margin of Error</i>	<i>Control Days</i>	<i>Margin of Error</i>	<i>Total</i>	<i>Margin of Error</i>
Sacramento Metropolitan	206	+/- 6.8%	300	+/- 5.7%	506	+/- 4.4%
Yolo-Solano AQMD	189	+/- 7.1%	303	+/- 5.6%	492	+/- 4.4%
Placer County APCD	183	+/- 7.3%	300	+/- 5.7%	483	+/- 4.5%
El Dorado County AQMD	127	+/- 8.7%	300	+/- 5.7%	427	+/- 4.7%

⁷ Quotas were established (using the latest 2008 estimates of population size from the 2000 Census) for the four air districts (Sacramento, Yolo-Solano, Placer and El Dorado) as well as for gender and age in order to ensure that respondents were representative of the population as a whole. It is well-known in survey research that certain groups (such as elderly females) are more likely to respond to telephone interviews than others (such as young males). In order to avoid potential unbalanced and biased samples and to better ensure generalizability, quotas were set. There are too few residents in Sutter County air district to interview.

⁸ Based on 2008 estimates from the 2000 US Census: State of California, Department of Finance, *E-1: State/County Population Estimates with Annual Percent Change-January 1, 2007 and 2008*. Sacramento, California, May 2008. Available online at: <http://www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E1/documents/E-1table.xls>, the total population in the entire Sacramento nonattainment area [including El Dorado AQMD] is 2,158,304: [Sacramento Metropolitan AQMD (66%) - 1,424,415; Yolo-Solano AQMD (15%) - 321,619 (this includes the total 199,066 from Yolo County and 122,553 from the Dixon, Rio Vista and Vacaville areas of Solano County); Placer County APCD (13%) - 290,059 (this figure represents the 87% of Placer County's 333,401 residents who do not live in zip codes north or east of Auburn), El Dorado AQMD (6%) - 122,211 (this figure represents 68% of El Dorado County's 179,722 residents, and includes residents from El Dorado Hills, Placerville, Shingle Springs, Georgetown, Cool, and the following unincorporated ZIP codes: 95613, 95619, 95623, 95633, 95635, 95651, 95664, and 95672). Weights were calculated, proportional to the population size of each county and based on 2008 estimates from the 2000 Census: SMAQMD: 66%; Yolo-Solano AQMD: 15%; Placer County APCD: 13%; and El Dorado County AQMD: 6%. The total number of completed interviews was weighted. Since the beginning evaluation in 1995, the methodology for weighting has been to set Sacramento County interviews as 1, and down-weight interviews from all other counties appropriately, depending on the size of their populations. This is why the weighted total of completed interviews (312) is less than the sum of the total number of interviews of all air districts (705).

Total Regional (Unweighted)	705	+/- 3.7%	1,203	+/- 2.8%	1,908	+/- 2.2%
Total Regional (Weighted)	312	+/- 5.6%	455	+/- 4.6%	767	+/- 3.5%

It can be seen in the previous table that a total of **705** interviews were conducted on days following Spare The Air episodes, which was 495 fewer than the budgeted target of 1,200. Control day interviewing completed the targeted number of **1,203** interviews. When weighted, the total number of completed interviews was 312 following Spare The Air days, and 455 on Control days in the Sacramento nonattainment area as a whole. In order to be able to compare current results with those from previous years' evaluations, El Dorado County results have been excluded from some of the year-to-year analyses, and the "**Sacramento Core Region**" is the term used for the combined air districts of Sacramento Metropolitan AQMD, Yolo-Solano AQMD, and Placer County APCD. Proportions and weights were appropriately re-calculated for these analyses.⁹

The Questionnaire

The main body of the questionnaire has remained the same for the past nine years in order to maintain consistency, although slight modifications have sometimes occurred, due to information needs. In 2002 a question about Spare The Air awareness that was worded by the Air Resources Board (ARB)¹⁰ was added and has been used every year since. All surveys were conducted using a Computer Assisted Telephone Interviewing (CATI) system. The average interview lasted approximately 4 minutes.

Questions about Driving Behavior on the Previous Day

The questionnaire begins by asking respondent drivers how many times they entered a vehicle to drive the preceding day, and then whether they had driven the "same", "more" or "less" than usual. Respondents who reported driving less were then asked what they did instead of driving and why they reduced driving. Those who drove less for air quality reasons were then asked to describe how many single trips they avoided.

Questions about Air Quality

After the portion of the interview about driving, respondents were asked questions about air quality. Awareness of the Spare The Air program was asked in two questions, and the order of these two was randomized so as to eliminate any possible order-response bias. The two questions are:

- 1) *General awareness: "In the past two days have you heard, read, or seen any advertisements or news broadcasts about Spare The Air, or poor air quality, or requests to drive less in this area?" (the ARB-worded question)*
- 2) *Specific awareness of the request not to drive: "Do you recall being asked not to drive yesterday because our area was experiencing a period of unhealthy air?" (original question)*

Respondents were also asked whether they typically tried to reduce driving for air quality reasons in the summer. In addition, they were asked whether anyone in the household had had trouble breathing, or experienced headaches, coughing, or burning eyes because of poor air quality.

⁹ Excluding El Dorado AQMD, the new proportions for the smaller Sacramento Core Region for 2008 are: 70% in Sacramento Metropolitan AQMD, 16% in Yolo-Solano AQMD, and 14% in Placer County APCD.

¹⁰ ARB memo dated April 26, 2002 by J. Weir, J. Lu, & E. Schreffler sent to J. Lamare, Cleaner Air Partnership.



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Questions about Employment

Respondents who were employed were asked how they usually commute to work (by driving alone; carpooling, transit, biking, or walking; work out of the home; work out of vehicle (delivery, service or sales); or a combination of commuting with working out of vehicle.) Employed respondents were also asked if their employer encouraged them to drive less on poor air quality days, if their employer notified them of poor air quality days, and how that notification occurred (e-mail, signs, asking employees to sign up for Air Alert).

Caveat

The sole purpose of this report is to provide a collection, categorization and summary of public opinion data. Aurora Research Group intends to neither endorse nor criticize the Spare the Air program, Katz and Associates, the Sacramento Metropolitan Air Quality Management District (AQMD), Yolo-Solano AQMD, Placer Air Pollution Control District, or El Dorado AQMD; or their policies, products, or staff. The Clients shall be solely responsible for any modifications, revisions, or further disclosure/distribution of this report.

RESULTS & CONCLUSIONS

AWARENESS OF THE 2008 SPARE THE AIR CAMPAIGN

Objectives

The specific objectives of the current section are to:

- a. measure awareness of the 2008 Spare The Air campaign using two questions and determine if awareness was similar or different among drivers in four air quality districts in the Sacramento nonattainment area (Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD),
- b. determine if awareness during annual summer Spare The Air seasons has increased, decreased, or stayed the same from 2000 to the present,
- c. compare levels of awareness between respondents interviewed following Spare The Air days and those interviewed on Control (non-Spare The Air) days, and
- d. extrapolate the results to the population by estimating the number of **drivers** who were aware of the 2008 Spare The Air campaign (correcting for Control days).

Results

General Awareness

- 1 ➤ *In terms of general awareness, fifty-nine percent (59%) of respondents in the Sacramento region heard Spare The Air announcements. This means that over a million residents were aware of the Spare The Air campaign.*

Respondents interviewed following Spare The Air days were asked: “in the past two days have you heard, read, or seen any advertisements or news broadcasts about Spare The Air, or poor air quality, or requests to drive less in this area?”¹¹ In the Sacramento nonattainment area as a whole, 59% of respondents said “yes” (weighted results). This means that over a million (1,273,400) residents in the region¹² were aware of Spare The Air during the three August 2008 days (August 14, 15, and 16).¹³

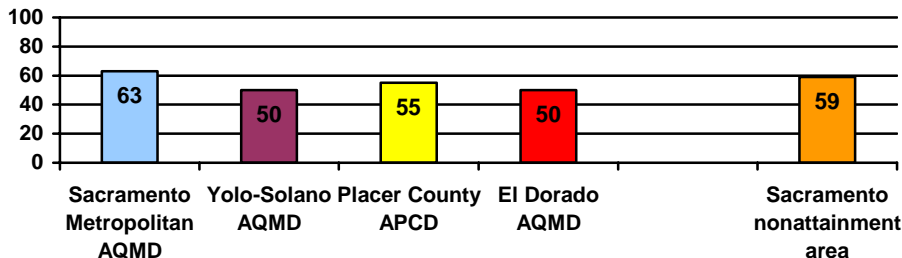
In the individual air district areas, general awareness ranged from 50% in El Dorado and Yolo/Solano Air Quality Management districts to 63% in Sacramento Metropolitan Air Quality Management District; as seen in the next chart.

¹¹ This question, suggested by the Air Resources Board (ARB), was introduced into the questionnaire in 2002.

¹² Based on 2008 estimates from the 2000 US Census: State of California, Department of Finance, *E-1: State/County Population Estimates with Annual Percent Change-January 1, 2007 and 2008*. Sacramento, California, May 2008. Available online at: <http://www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E1/documents/E-1table.xls>, the total population in the entire Sacramento nonattainment area [including El Dorado AQMD] is 2,158,304: [Sacramento Metropolitan AQMD (66%) - 1,424,415; Yolo-Solano AQMD (15%) - 321,619 (this includes the total 199,066 from Yolo County and 122,553 from the Dixon, Rio Vista and Vacaville areas of Solano County); Placer County APCD (13%) - 290,059 (this figure represents the 87% of Placer County's 333,401 residents who do not live in zip codes north or east of Auburn), El Dorado AQMD (6%) - 122,211 (this figure represents 68% of El Dorado County's 179,722 residents, and includes residents from El Dorado Hills, Placerville, Shingle Springs, Georgetown, Cool, and the following unincorporated ZIP codes: 95613, 95619, 95623, 95633, 95635, 95651, 95664, and 95672).

¹³ Although eight Spare The Air days were called during the entire 2008 summer season, interviewing took place only following the three days in August. The previous five days in July were confounded by heavy wildfires and the decision was made not to interview on those smoky days as results would not be indicative of ozone, but rather particulate matter. (See Methodology report.)

2008 General Awareness of Spare The Air (ARB wording)

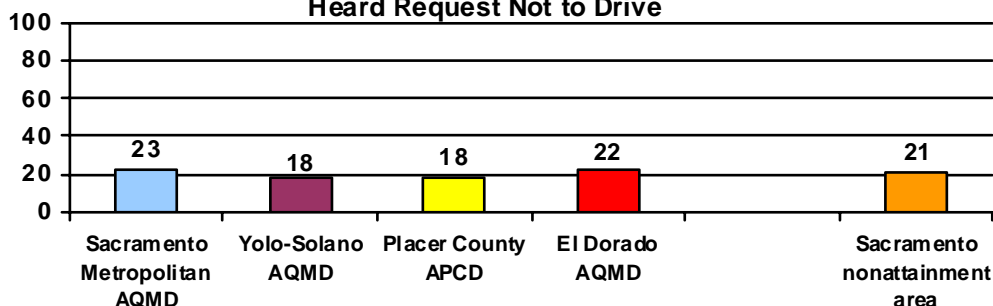


Specific Awareness: Request not to drive

- 2 ➤ **Only twenty-one percent (21%) of respondents in the Sacramento region were aware of the specific request not to drive on Spare The Air days.**

The question measuring specific awareness of the request not to drive that has been asked every year since 1995, is: "Do you recall being asked not to drive yesterday because our area was experiencing a period of unhealthy air?" As can be seen in the next chart, 21% of respondents in the region as a whole were aware of this specific request, significantly fewer than the 59% who said they heard Spare The Air announcements. This finding is consistent with previous years – specific awareness has always been found to be lower than general awareness.

2008 Specific Awareness: Heard Request Not to Drive

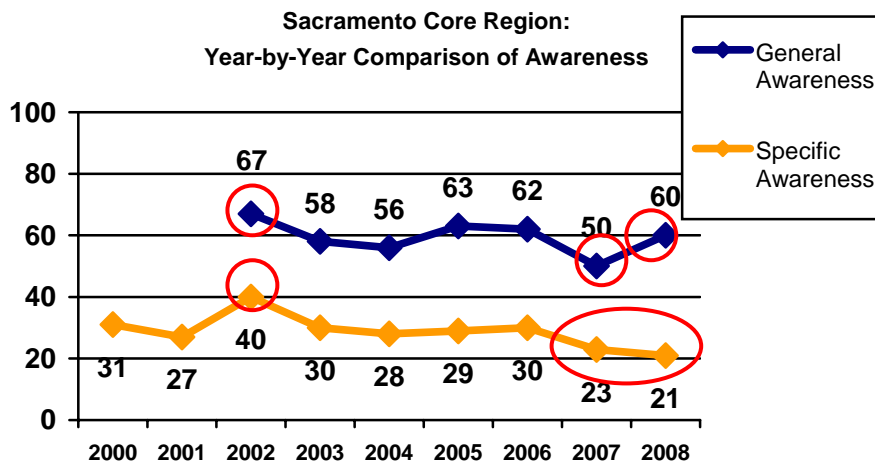


Year-To-Year Comparisons of Awareness: Sacramento Core Region

- 3 ➤ **General awareness of Spare The Air is up relative to last year but specific awareness, although the same as last year, is significantly lower than any of the previous seven years.**

The next graph plots annual levels of general as well as specific awareness of Spare The Air for the Sacramento Core Region (excluding El Dorado County AQMD in order to allow direct comparisons). Results of tests of comparison indicate that general awareness (60%) is up

significantly from last year (50%), but similar to previous years before that. Specific awareness, although not significantly different from 2007, is at its lowest level this year at 21% relative to all other years. This may be due to the relatively few number of Spare The Air days after which interviewing took place (only 3 in 2008, compared with 5 in 2007, 14 in 2006, 15 in 2008, etc.), or to fact that numerous wildfire smoky days focused residents' attention on visible smoke rather than ozone,¹⁴ or to the different media buy strategy that was initiated last year (radio advertisements alone, as opposed to radio and television ads).



Circled percentages represent significant highs and lows.

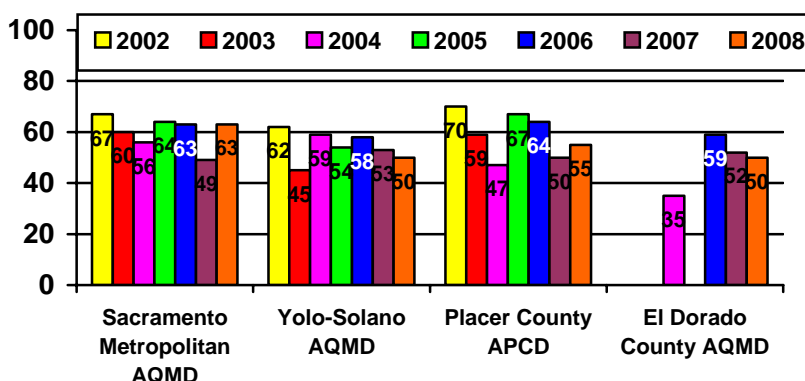
Year-To-Year Comparisons by Air District: General Awareness

- 4 ➤ *Levels of general awareness in SMAQMD are up this year relative to last year, but similar to most previous years. Year-to-year results in Placer County APCD have been the most variable.*

Annual levels of general awareness since 2002 (when the general awareness question was introduced) for the individual air quality management districts are presented in the next chart. (El Dorado County AQMD residents were not interviewed in 2002, 2003, or 2005). It can be seen, first of all, that general awareness in all air districts was the highest in 2002, a particularly poor year for air quality. Secondly, results in Sacramento Metropolitan AQMD were the lowest last year at 49% than in any previous year. Yolo-Solano AQMD results have been less variable than Placer County APCD and El Dorado County AQMD results.

¹⁴ Possible explanations discussed with, and provided by Lori Kobza, SMAQMD, e-mail November 13, 2008.

General Awareness: Individual Air Districts
 Year-by-Year Comparisons (Since 2002)

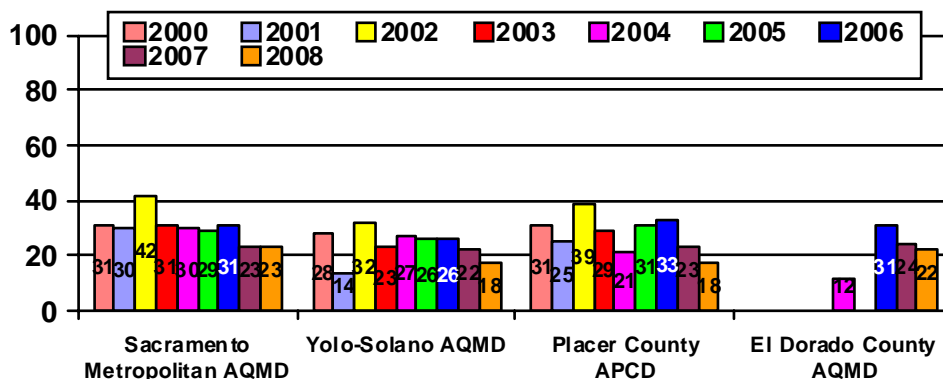


Year-To-Year Comparisons by Air District: Specific Awareness

- 5 ➤ *Levels of specific awareness in all air quality districts are similar to last year, but significantly lower than in 2006.*

Levels of specific awareness of Spare The Air since 2000 are presented in the next chart. Once again it can be seen that results were significantly higher in 2002, a very poor air quality season in all air districts. Although this year's results are not significantly different from last year's results, they are significantly lower than results in many previous years in all air quality districts.

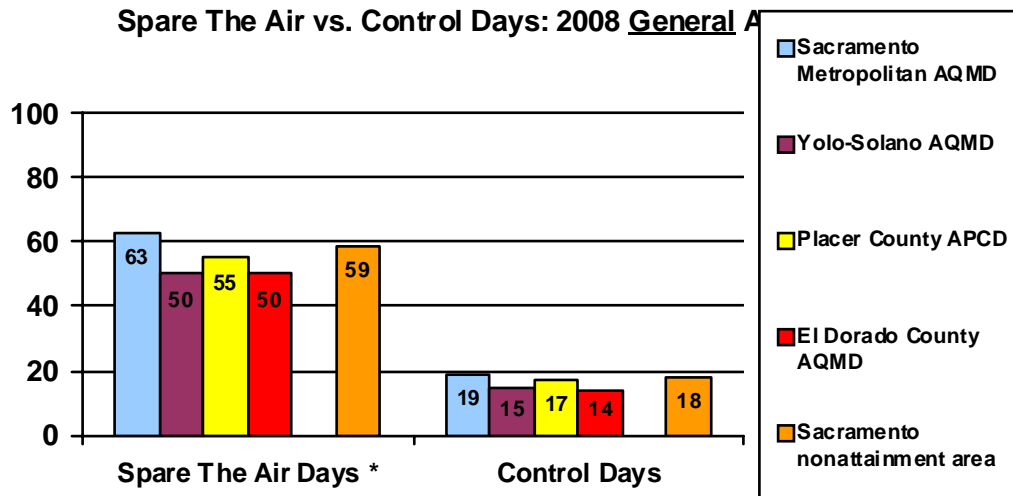
Specific Awareness: Individual Air Districts
 Year-by-Year Comparisons (Since 2000)



Spare The Air Versus Control Days

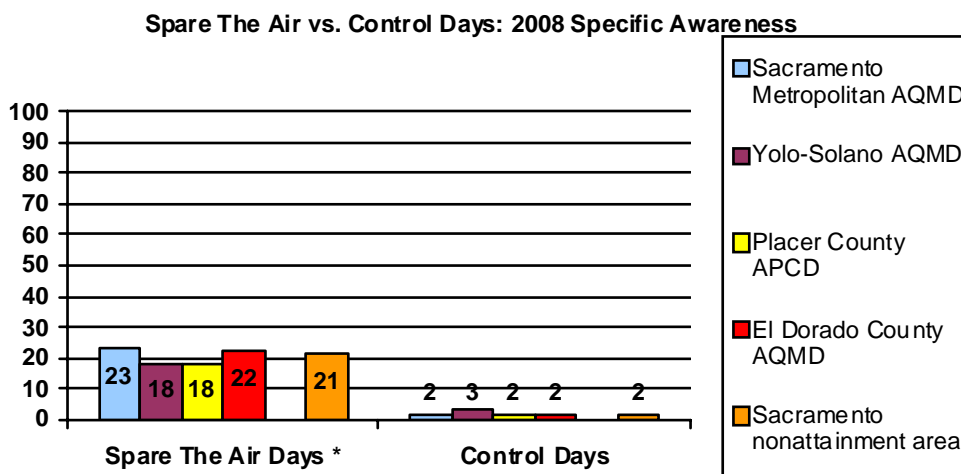
- 6 ➤ *Significantly more respondents interviewed following Spare The Air days were aware (according to both measures of awareness) of the Spare The Air advisories than were respondents interviewed on Control days, indicating that the program is still effective in reaching residents.*

Levels of general and specific awareness conducted on Control days are presented along with Spare The Air day results in the next two charts. In terms of general awareness, it can be seen that, although 18% of respondents in the entire nonattainment area who were interviewed on Control days incorrectly said they had heard the Spare The Air advisories, significantly more (59%) of those interviewed after Spare The Air days correctly remembered hearing the general advisories.



* indicates statistically significant differences between Spare The Air and Control percentages in all districts.

Similarly, 2% of Control day respondents incorrectly heard a specific request not to drive versus 21% of respondents interviewed about Spare The Air days. The difference between Spare The Air and Control day interviewing in each individual air district was likewise significant. This indicates that, as in past years, the **Spare The Air program is still effective in reaching residents.**



* indicates statistically significant differences between Spare The Air and Control percentages in all districts.

Estimating the Number of STA-Aware Drivers

- 7 ➤ *Adjusting for Control day responses, results indicate that just over half a million (591,263) drivers in the non-attainment area noticed the advisory each Spare The Air day during the 2008 season.*

There were an estimated 1,442,105 drivers in the Sacramento nonattainment area in the summer of 2008.¹⁵ As the level of general awareness of Spare The Air was 59%, this means that approximately 850,842 **drivers** in the region were aware of Spare The Air in the summer of 2008. However, we also know that 18% of respondents (or 259,579 drivers) interviewed on non-Spare The Air (Control days) said they heard a Spare The Air advisory when in fact none had been issued. Correcting for Control day responses through subtraction means that **591,263 drivers in the Sacramento nonattainment area as a whole were aware of the 2008 Spare The Air campaign in general.** The table below indicates the calculations and the estimated number of drivers who heard the advisories for each air district.

<i>Air District</i>	<i>Total Estimated Number of Drivers</i>	<i>Percent Aware of STA (General Awareness) STA / Control</i>	<i>Estimated Number of Drivers Aware of STA in General (STA - Control)</i>
Sacramento Metropolitan AQMD	921,457	63% / 19%	580,518 – 175,078 = 405,440
Yolo-Solano AQMD	203,649	50% / 15%	101,825 – 30,547 = 71,278
Placer County APCD	220,139	55% / 17%	121,077 – 37,424 = 83,653
El Dorado County AQMD	96,860	50% / 14%	48,430 – 13,560 = 34,870
Sacramento Nonattainment Area	1,442,105	59% / 18%	850,842 – 259,579 = 591,263

¹⁵ The number of drivers in the Sacramento nonattainment area for 2008 was estimated, using the number of driver licenses by county for 2007, obtained from the California Department of Motor Vehicles database at http://www.dmv.ca.gov/about/profile/dl_outs_by_county.pdf, and calculating the percentage increase, based on county population figure increases from 2007 to 2008 listed at: (www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E1/documents/E-1table.xls). The estimated number of licensed drivers for the total Sacramento nonattainment area in 2008, therefore, was 1,442,105: Sacramento Metropolitan AQMD: total 921,457 + Yolo-Solano: total of 203,649 (123,742 in Yolo County + Solano County: 275,543 * 29% for the proportion located within the Air Quality district = 79,907) + Placer County: total of 220,139 (253,033 * 87% for Air Quality district) + El Dorado County: total of 96,860 (142,442 * 68% for Air Quality district).

- 8 ➤ *In terms of specific awareness, and again correcting for Control day responses, this represented 274,000 drivers in the region who heard the specific request not to drive on Spare The Air days.*

The estimated numbers of drivers who were aware of the specific request not to drive are presented in the next table. For the entire Sacramento nonattainment area, and correcting for Control day responses, this translates into an estimated 274,000 drivers who were specifically aware of the requests not to drive on Spare The Air days.

<i>Air District</i>	<i>Total Estimated Number of Drivers</i>	<i>Percent Aware of STA(Specific Awareness) STA / Control</i>	<i>Estimated Number of Drivers Aware of STA Specific Request Not to Drive (STA - Control)</i>
Sacramento Metropolitan AQMD	921,457	23% / 2%	211,935 – 18,429 = 193,506
Yolo-Solano AQMD	203,649	18% / 3%	36,657 – 6,110 = 30,547
Placer County APCD	220,139	18% / 2%	39,625 – 4,403 = 35,222
El Dorado County AQMD	96,860	22% / 2%	21,309 – 1,937 = 19,372
Sacramento Nonattainment Area	1,442,105	21% / 2%	302,842 – 28,842 = 274,000

PURPOSEFUL DRIVING REDUCTION

Objectives

One measure of the effectiveness of the Spare The Air¹⁶ public education program in the Sacramento nonattainment area is to examine actual **changes in driving behavior**. Since 2002, following discussions with the Air Resources Board (ARB), the following standard for measuring behavioral driving reductions was implemented – it requires that drivers be aware of Spare The Air, make fewer vehicle trips on Spare The Air days, and further, that they do so purposefully to help reduce air pollution on Spare The Air days. These drivers are called “purposeful reducers.”

¹⁶ The Spare The Air program has been in place in the Sacramento Air Quality Basin since 1995. The trigger for alerting the population of a Spare The Air day for the next day is based on forecasted estimates of the Air Quality Index (AQI), recorded at different stations throughout the Sacramento nonattainment area. If it is estimated that the AQI will be 127 or higher the next day, a Spare The Air advisory is issued. The advisory involves radio announcements, e-mail based Air Alert notifications, and employer networks. A general television commercial stressing the negative impact on child lung development caused by poor air quality was also developed this year, although it did not announce specific STA episodes.



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The broad objectives of the current section are to calculate purposeful driving reduction within the Sacramento nonattainment area using the strict ARB standard, and to see whether driving reduction will be lower this year compared with previous years. Specifically, the objectives are to:

- e. report the percentage of respondents who reported driving “less” the previous day and statistically compare with annual results from 2000 to the present
- f. calculate the percentage of purposeful “reducer” drivers, that is, those who:
 - i. made fewer vehicle trips on Spare The Air days, and
 - ii. did so purposefully to help reduce air pollution in the region, and
 - iii. were aware of the Spare The Air advisories (general awareness).and determine if the percentage of reducers is similar or different among four air quality districts in the Sacramento nonattainment area (Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD)
- g. determine if the percentage of purposeful reducers in the Sacramento Core Region has increased, decreased, or stayed the same from 2000 to the present
- h. extrapolate to the population by estimating the number of **drivers** in the Sacramento nonattainment area who purposefully reduced the number of trips they made on Spare The Air days in 2008
- i. estimate the number of **single trips** avoided by purposeful reducers on Spare The Air days, and
- j. compare the percentage of reducers found in the group of respondents interviewed about Spare The Air days with that of the group interviewed on Control (non-Spare The Air) days.

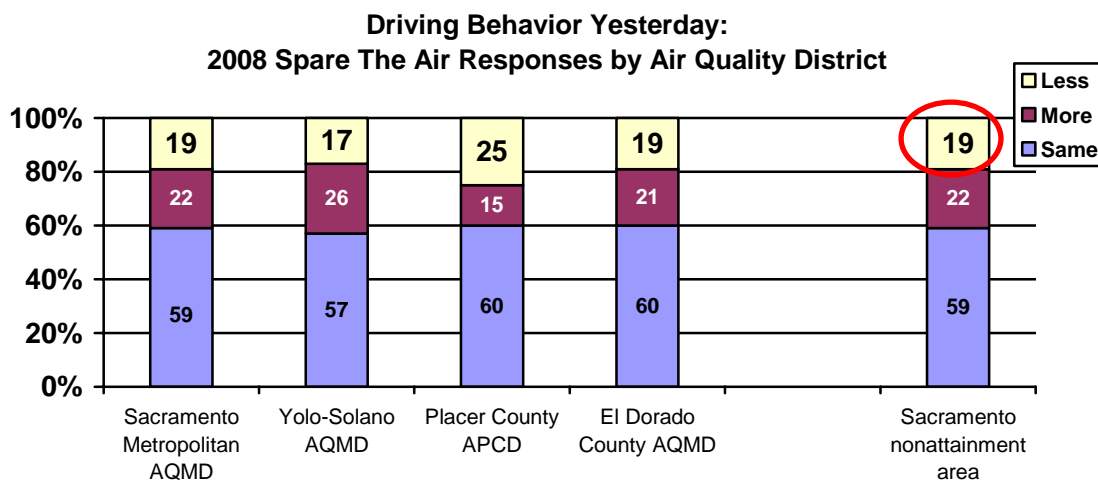
Results

Driving Behavior Yesterday

- 9 ➤ *About one-in-five respondents (19%) said they drove less on Spare The Air days in the region as a whole. Similar results were found in six of the nine years of data. Within the individual air quality districts, Placer County APCD respondents drove the least (25%), but the percentage was not significantly different from the other districts.*

Respondents interviewed following Spare The Air days were asked whether yesterday they drove their vehicle the same, more, or less frequently than they normally do on that particular day of the week. Results for the individual air quality districts as well as for the entire Sacramento nonattainment area (weighted results) are presented in the next chart. For the region as a whole, it can be seen that 59% of all respondents did not change their driving behavior on Spare The Air days – they said they drove the same as they normally do on that particular day of the week. Twenty-two percent (22%) said they drove “more” the previous day and 19% said they drove “less”. Results from each of the individual air quality districts were similar. Although the percentage of Placer County APCD respondents who drove less was greater at 25% than any other air district, the differences were not statistically significant.¹⁷

¹⁷ This is due in part to the smaller number of completed interviews (and greater margins of error) this year. In Placer County APCD only 183 interviews were completed following Spare The Air days, yielding a margin of error of +/- 7.2%.



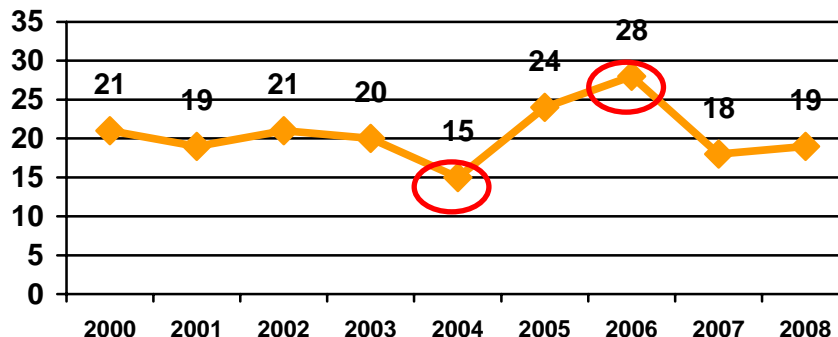
Year-to-Year Comparisons: Percent Who Drove Less

10 ➤ *Since 2000, the percentage of respondents who said they drove less on Spare The Air days has been fairly stable at about one-in-five, with three notable exceptions (2004, 2005, and 2006).*

The percentages of drivers from 2000 to the present who said they drove less on Spare The Air days are shown in the next graph.¹⁸ Year-to-year tests of proportion indicate that self-reported driving reduction on Spare The Air days from 2000 to 2003 was fairly stable, but declined significantly to 15% in 2004, a summer that experienced relatively good air quality and only six Spare The Air days. 2005 saw a significant increase (to 24%) in the percentage of respondents who said they drove less on Spare The Air days, and 2006 registered the highest percentage of all years, at 28%. 2006 was a poor air quality summer, with 15 Spare The Air days. This year's (19%) and last year's percentage (18%), while significantly lower than in 2005 or 2006, were not significantly different from any of the other five years (2000 to 2004).

¹⁸ Results are for the Sacramento Core Region (weighted) and exclude El Dorado County AQMD.

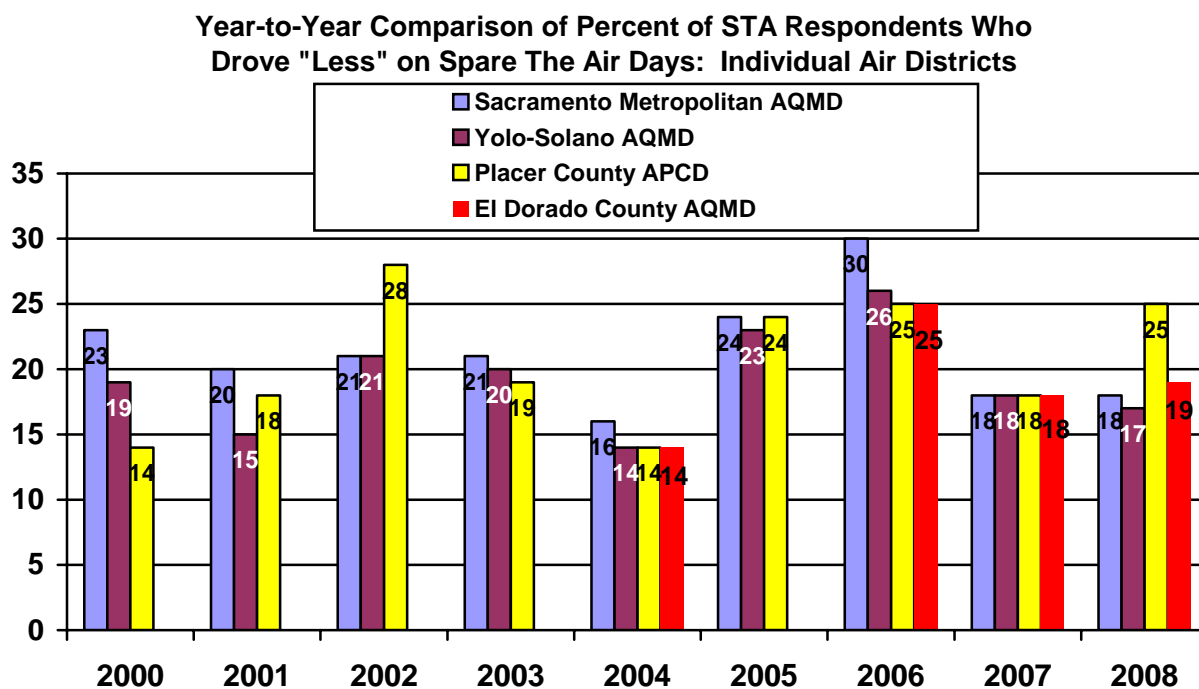
Year-by-Year Comparison: Percent of Respondents Who Drove "Less" on Spare The Air Days: Sacramento Core Region
 (excludes El Dorado County AQMD)



11 ➤ *Within the individual air quality districts, this year's results were generally similar to last year's. Placer County APCD has had the greatest fluctuations over time in terms of the percentages of residents who drove less on Spare The Air days.*

The percentages of drivers who said they drove less on Spare The Air days in the individual air districts over the years are presented in the next chart. Because Sacramento Metropolitan AQMD contains the largest proportion of residents, it is not surprising that results from **SMAQMD** are very similar to those of the core region: in 2006, results in SMAQMD were the highest (30%) and in 2004 results were the lowest (16%). For **Yolo-Solano** AQMD, it can be seen that the percentage of self-reported driving reducers also ranged from a low of 14% in 2004 to a high of 26% in 2006. In **Placer County** APCD results fluctuated more from one year to the next and the percentage who drove less in 2002 was the highest at 28%, followed by this year's results at 25%¹⁹. Drivers in **El Dorado County** AQMD were only interviewed in four of the eight years, and 2006 showed the highest percentage of residents who reported driving less (25%).

¹⁹ The difference between this year's percentage of 25% approaches, but is not statistically different from results in 2007 (18%).



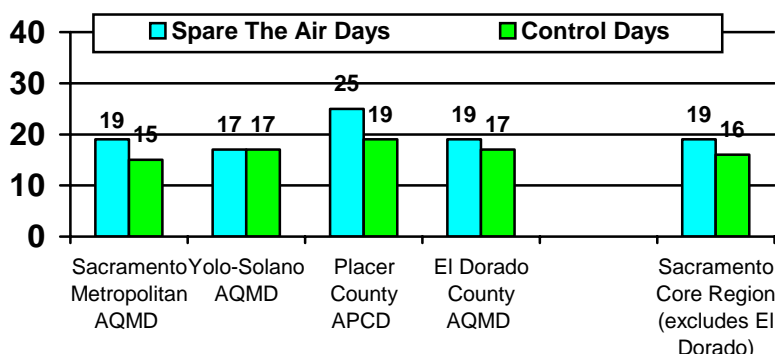
Spare The Air Days vs. Control Days

- 12 ➤ *Although the percentage of respondents in the Sacramento Core Region who said they drove less on Spare The Air days was higher (19%) than the percentage interviewed on Control days (16%), the difference was not statistically significant.*

Many years ago a control procedure was introduced into the evaluation methodology of Spare The Air. To correct for possible respondent exaggeration about driving behavior, a group of respondents were interviewed from the same areas on the same days of the week as the Spare The Air interviews, but on cooler, non Spare The Air days during the May to October season. The use of Control day interviewing provides a means of calculating a correction or adjustment factor to account for any tendency for individuals to overstate their driving reduction on Spare The Air days (social desirability effect), and, therefore, provides the most conservative (and probably more accurate) estimates of program effectiveness.

It can be seen in the next chart that although the percentage of respondents who said they drove less on Spare The Air days was greater than the percentage who drove less on Control days (in every air quality district except Yolo-Solano AQMD), the differences were not statistically significant.

**2008 Spare The Air vs. Control Days:
 Percent of Respondents Who Drove "Less" The
 Previous Day**



This is only the **third** time in nine years that we have not seen a significant difference between Spare The Air and Control groups in the Sacramento Core Region,²⁰ as can be seen in the next table.

Year	Percentage of Respondents Who Drove "Less" Yesterday: <u>Sacramento Core Region</u> (excludes El Dorado County AQMD)		Difference (or "Spread")	Statistically Significant Difference?
	Spare The Air Day Respondents	Control Day Respondents		
2000	21%	13%	8%	Yes
2001	19%	14%	5%	Yes
2002	21%	17%	4%	Yes
2003	21%	18%	3%	No
2004	15%	11%	4%	Yes
2005	23%	17%	6%	Yes
2006	28%	18%	10%	Yes
2007	18%	15%	3%	No
2008	19%	16%	3%	No

The lack of a significant difference between Spare The Air and Control day responses could be due to a number of factors, including cleaner air, wildfire smoke overload, the type of media buy and the amount spent; as well as the possibility that some respondents habitually drive less during the summer and therefore might not have further reduced their driving on Spare The Air days. Results should continue to be monitored.

²⁰ In terms of the individual air districts within the Sacramento Core Region, Sacramento Metropolitan AQMD showed significant differences in all years except 2003, 2007, and this year. Placer County APCD showed differences in three of the nine years (2002, 2005, and 2006); and in Yolo-Solano AQMD there has been only one year in which the difference was significant (2002). Yolo-Solano AQMD generally experiences better air quality than any of the other air districts in the nonattainment area.

Percentage of Purposeful Reducers

- 13 ➤ *During August of 2008, 0.6% of all respondent drivers in the entire Sacramento nonattainment area were classified as having purposefully driven less on Spare The Air days because they wanted to improve air quality in the region and also remembered hearing the Spare The Air advisories.*

Purposeful driving reduction is defined as the percentage of all drivers interviewed following Spare The Air days who not only said they drove less, but did so specifically for air quality reasons, and, further, were also aware of Spare The Air in general (using the ARB question²¹). Results from each air quality district and for the weighted Sacramento regions (Sacramento Core Region as well as the entire nonattainment area) are presented in the next table. It can be seen that for the entire Sacramento nonattainment area, 0.6% of all Spare The Air respondent drivers (2 out of 312) met the strict ARB standard for purposeful driving reduction. Placer County APCD had the highest percentage of purposeful reducers at 1.6%.²² Both Sacramento Metropolitan AQMD and Yolo-Solano AQMD showed 0.5% reducers. This year there were no purposeful reducers found in El Dorado County AQMD.

Spare The Air: Purposeful Reducers in 2008	Number of Respondents Who Reduced Driving For Air Quality Reasons and Were Aware of STA Advisories	Total Number of Respondents Interviewed on Days Following Spare The Air	% of Total Respondents Who Reduced Driving for Air Quality Reasons and Were Aware of STA Advisories
Sacramento Metropolitan AQMD	1	206	0.5%
Yolo-Solano AQMD	1	189	0.5%
Placer County APCD	3	183	1.6%
Sacramento Core Region²³	2	294	0.7%
El Dorado County AQMD	0	127	0.0%
Sacramento Nonattainment Area²⁴	2	312	0.6%

²¹ There were two questions in the survey that measured awareness of Spare The Air. The one referred to here measured general awareness and was proposed by the ARB (i.e. "In the past two days have you heard, read, or seen any advertisements or news broadcasts about Spare The Air, or poor air quality, or requests to drive less in this area?"). It was introduced in 2002. Comparisons of reducers with years prior to 2002 used another question to measure awareness, which was more specific (i.e. "Do you recall being asked not to drive yesterday because our area was experiencing a period of unhealthy air?") It has been included in all evaluations since 1999. Typically, more respondents indicate general awareness of Spare The Air than specific awareness of the request not to drive the previous day.

²² In Placer County APCD the percentage of purposeful reducers on Spare The Air days (1.6%) was significantly higher than on Control days (0%).

²³ Weighted, excludes El Dorado County AQMD.

²⁴ Weighted, includes El Dorado County AQMD.

Percentage of Purposeful Reducers: Year-To-Year Comparisons

- 14 ➤ *Although the percentage of purposeful reducers is lower this year than in any of the previous eight years, the difference is not statistically significant. Over the last nine years, an average of 1.6% of all drivers in the Sacramento Core Region purposefully reduced driving on Spare The Air days in order to help improve air quality.*

Tests of proportion compared the percentage of reducers²⁵ each year with every other year from 2000 to the present. Results, presented in the next table, indicate that although results are the lowest ever in Sacramento Metropolitan AQMD (0.5%) and the Sacramento Core Region (0.7%, excluding El Dorado County AQMD), the percentage of reducers has not changed significantly from one year to the next. It can also be seen that, **averaged over nine years, 1.6% of all drivers in the Sacramento Core Region purposefully reduced driving on Spare The Air days, specifically in order to help improve air quality.**

In Yolo-Solano AQMD the percentage of reducers was significantly higher in 2002 than in most other years. In fact, 2002 was an exceptional year with high temperatures and multiple-day Spare The Air episodes. [The percentage of reducers in Sacramento Metropolitan AQMD was also higher in 2002 than in other years; however, the differences were not statistically significant.] In Placer County APCD, the percentages of reducers were significantly higher in 2002 and 2006 than in most other years.

<i>Spare The Air: Purposeful Reducers</i>	2000	2001	2002	2003	2004	2005	2006	2007	2008	<i>Significant Difference Between Years?</i>	<i>Average</i>
Sacramento Metropolitan AQMD	2.0%	2.1%	2.3%	1.2%	1.6%	1.5%	1.9%	1.3%	0.5%	No	1.6%
Yolo-Solano AQMD	1.3%	0.2%	3.5%	1.2%	1.1%	1.3%	1.9%	1.6%	0.5%	Yes – 2002 significantly higher than 2001, 2003, 2004, 2005, 2007, and 2008	1.4%
Placer County APCD	1.0%	0.9%	3.9%	2.3%	1.4%	1.5%	4.3%	0.4%	1.6%	Yes – 2002 and 2006 significantly higher than 2000, 2001, 2004, 2005, and 2007	1.9%
Sacramento Core Region	1.8%	1.7%	2.7%	1.4%	1.5%	1.4%	2.2%	1.2%	0.7%	No	1.6%

²⁵ Results from 2000 and 2001 were recalculated but still are not directly comparable, as two of the questions were not the same. The measure of STA awareness was the stricter specific question (see footnote 8 above) and the number of round trips avoided was asked rather than single trips avoided. Single trips were therefore calculated by doubling responses from those two years. Results should therefore be treated with some caution.

Estimated Number of Purposeful Reducers

- 15 ➤ *When extrapolated to the population of drivers, **about 8,650** drivers in the entire Sacramento nonattainment area could be said to have purposefully made fewer trips on average each Spare The Air day, specifically in order to reduce air pollution.*

There were an estimated 1,442,105 drivers in the Sacramento nonattainment area in the summer of 2008.²⁶ Extrapolating to the population of drivers, the 0.6% of reducers means that approximately **8,650 drivers** purposefully made fewer trips on Spare The Air days for air quality reasons. Estimates for the individual air districts as well as for the region (both excluding and including El Dorado County AQMD) are presented in the next table.

<i>Air District</i>	<i>Total Number of Drivers</i>	<i>Percent of Purposeful Reducers</i>	<i>Estimated Number of Purposeful Reducers in 2006</i>
Sacramento Metropolitan AQMD	921,457	0.5%	4,610
Yolo-Solano AQMD	203,649	0.5%	1,120
Placer County APCD	220,139	1.6%	3,520
Sacramento Core Region	1,345,245	0.7%	9,415
El Dorado County AQMD	96,860	0.0%	0
Sacramento Nonattainment Area²⁷	1,442,105	0.6%	8,650²⁸ <i>purposeful reducers</i>

Estimated Number of Single Trips Avoided by Purposeful Reducers

- 16 ➤ *Drivers who purposefully reduced driving on Spare The Air days in the nonattainment area avoided making an average of 1.7 single trips. This translates into a total of 14,705 trips purposefully avoided on average each Spare The Air day during August of 2008.*

Purposeful reducers were asked how many single vehicle trips they had avoided on the Spare The Air day. The mean number of single trips avoided in the entire Sacramento nonattainment area was 1.7.²⁹ Multiplying by the estimated 8,650 drivers who purposefully reduced their driving on Spare The Air days, this translates into an estimated **14,705 single trips** that drivers

²⁶ The number of drivers in the Sacramento nonattainment area for 2008 was estimated, using the number of driver licenses by county for 2007, obtained from the California Department of Motor Vehicles database at http://www.dmv.ca.gov/about/profile/dl_outs_by_county.pdf, and calculating the percentage increase, based on county population figure increases from 2007 to 2008 listed at: (www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E1/documents/E-1table.xls). The estimated number of licensed drivers for the total Sacramento nonattainment area in 2008, therefore, was 1,442,105: Sacramento Metropolitan AQMD: total 921,457 + Yolo-Solano: total of 203,649 (123,742 in Yolo County + Solano County: 275,543 * 29% for the proportion located within the Air Quality district = 79,907) + Placer County: total of 220,139 (253,033 * 87% for Air Quality district) + El Dorado County: total of 96,860 (142,442 * 68% for Air Quality district).

²⁷ Includes El Dorado County AQMD.

²⁸ The total number of drivers estimated in the Sacramento Core Region and the Sacramento nonattainment area are not the simple sums of drivers in the individual air districts: the percentage of reducers was calculated using weighted results, adjusted proportionally to the population within each air district: Sacramento Metropolitan AQMD represents 66% of the entire population, Yolo-Solano AQMD is 15%, Placer County APCD is 13%, and El Dorado County AQMD is 6%.

²⁹ The mean was 1.7, the median was 2.0, and the range was 1 to 3 trips avoided.

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avoided making on Spare The Air days during August of 2008, specifically to help reduce air pollution in the region. Results for the individual air districts as well as for the region (both excluding and including El Dorado County AQMD) are presented in the next table.

<i>Air District</i>	<i>Estimated Number of Purposeful Reducers</i>	<i>Mean # of Trips Avoided for Air Quality Reasons</i>	<i>Estimated Number of Single Trips Reduced</i>
Sacramento Metropolitan AQMD	4,610	1.0	4,610
Yolo-Solano AQMD	1,120	3.0	3,360
Placer County APCD	3,520	2.3	8,096
Sacramento Core Region³⁰	9,415	1.7	16,005
El Dorado County AQMD	0	0	0
Sacramento Nonattainment Area³¹	8,650	1.7	14,705 trips

Percentage of Purposeful Reducers: Spare The Air Days vs. Control Days

17 ➤ There were no drivers who specifically avoided making trips for air quality reasons on Control days.

Respondents interviewed on Control days were also asked if they had reduced the number of trips they made the day before, and if so, why. If the same percentage of drivers claimed to have reduced their driving on Control days for air quality reasons as on Spare The Air days, it would be difficult to credit the Spare The Air program as the cause of driving reduction. Control day interviewing can, therefore, be used as a validation check.³²

Results indicated that there were **no (0%) respondents** interviewed on Control days who said they drove less the previous day for air quality reasons. This means that all the trips reduced on Spare The Air days will be used in the calculation of emissions reduced in a later report.

³⁰ Excludes El Dorado County AQMD.

³¹ Includes El Dorado County AQMD.

³² For Control day interviews, for the purpose of this analysis, reducers were classified as those respondents who said they drove less the previous day for air quality reasons.

ESTIMATED EMISSION REDUCTIONS

Objectives

The main objective of the current section is to estimate how many tons of ozone precursor emissions [Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)] were reduced during the 2008 season that could be attributed directly to the Spare The Air program. In order not to overestimate possible reductions, a correction factor based on Control day interviewing has been applied. Results, therefore, are conservative.

Results

Calculation of Estimated Emission Reductions

18 ➤ *Correcting for Control day interviewing, the 2008 Spare The Air program was successful in reducing air pollution in the entire Sacramento nonattainment area by an estimated 0.09 tons of ozone precursors (VOC and NOx) per day. Drivers specifically reduced the number of trips they took on Spare The Air days to improve air quality in the region.*

The methodology that has been used for the last nine years to estimate emission reductions due specifically to the Spare The Air program is conservative. It eliminates many respondents from consideration, such as seasonal reducers who generally make fewer trips during the summer to help air quality and so may not have been able to drive even less on specific STA days,³³ or those who reduced their driving for reasons other than air quality, or those who drove less but had not heard the Spare The Air advisory. The methodology also uses current season results from Control day interviewing as a correction factor.

Results from this year as well as last year were similar to last year, but different from most previous years' evaluations in that there were no significant differences between the percentages of respondents who reported driving less on Spare The Air days and on Control days.³⁴ This has been considered a necessary prerequisite for the calculation of emission reductions in any air district.³⁵ The lack of a significant difference could be due to a number of factors, including cleaner air, the type of media buy (i.e. radio only) and the amount spent; the Spare The Air "brand" becoming more focused on health rather than driving reduction; as well as the possibility that some respondents habitually drive less during the summer and therefore might not have further reduced their driving on Spare The Air days. Further, it could also have resulted from the fact that there were only eight (8) Spare The Air days called in 2008, and five (5) of them were called during wildfire smoke episodes that caused ozone levels to increase. Residents were very impacted by the smoke and the smoky conditions dominated the media airwaves for weeks. A decision was made not to interview on these days, as any driving

³³ These respondents will be examined in a later report on Seasonal Driving Reduction.

³⁴ In 2003 the percentage who said they drove "less" on Spare The Air days was not significantly different from the percentage who drove less on Control days, however, we found statistically significant differences between Spare The Air and Control groups in terms of higher percentages of purposeful reducers following Spare The Air episodes. Last year (2007) we found no differences between the two groups in terms of either self-reported driving reduction or the proportions of purposeful reducers. This year the only significant difference occurred in Placer County APCD – the proportion of purposeful reducers was significantly higher on Spare The Air days than on Control days.

³⁵ The prerequisite was introduced in 2000 by Jude Lamare, Ph.D.; formerly with the Cleaner Air Partnership.

reduction might be attributable to smoke rather than ozone. As a result, interviewing took place only on the three (3) Spare The Air days that occurred in August.

Despite these explanations, the necessary prerequisite driving reduction difference was not present, and the air quality districts might want to review whether it is still required. (The use of control day interviewing already acts as a correction factor.) In the current report, we will nevertheless report estimated emission reductions for the two largest areas – the nonattainment area as a whole and the Sacramento Metropolitan AQMD. In addition we will estimate reductions in Placer County APCD, as there were significantly more purposeful reducers on Spare The Air days versus Control days.³⁶

Results from the Sacramento nonattainment area as a whole are used to illustrate the procedure according to the following steps:

1. Calculate the percentage of purposeful reducers, that is, drivers who said they were aware of the Spare The Air advisories,³⁷ and who also said they drove less than usual on Spare The Air days, specifically for air quality reasons. For the nonattainment area as a whole, this was **0.6%** ($2 / 312^{38}$) of all respondents interviewed following Spare The Air days.
2. Record the mean (average) number of single trips they avoided for air quality reasons on Spare The Air Days. These purposeful reducers were asked to estimate the number of single trips they avoided making on the Spare The Air day. For the nonattainment area, the mean was **1.7** single trips avoided.³⁹
3. Extrapolate to the total number of drivers in the region⁴⁰ this year: the percentage of Spare The Air reducers therefore represents **8,650** drivers in the Sacramento nonattainment area, and the number of single trips avoided was **14,705** (8,650 drivers x 1.7 trips avoided on average).
4. Multiply the number of trips avoided by a per trip emission reduction average of **5.31 grams of ozone precursors**.⁴¹ [This includes a total of VOC (3.01 grams per trip for light duty passenger cars plus two categories of light duty trucks) plus NOx (2.30 grams per trip for light duty passenger cars and light duty trucks) emissions, based on 2008 models of

³⁶ In Placer County APCD although the percentage who drove less on Spare The Air days did not differ significantly from Control days, the percent of purposeful reducers on Spare The Air days (1.6%) was significantly higher than on Control days.

³⁷ Using the ARB-worded question for measuring general awareness of Spare The Air: ““In the past two days have you heard, read, or seen any advertisements or news broadcasts about Spare The Air, or poor air quality, or requests to drive less in this area?”

³⁸ The total number of completed interviews was weighted. Since the beginning evaluation in 1995, the methodology for weighting has been to set Sacramento County interviews as 1, and down-weight interviews from all other counties appropriately, depending on the size of their populations. This is why the weighted total of completed interviews (312) is less than the sum of the total number of interviews of all air districts (705).

³⁹ The mean was 1.7, the median was 2.0, and the range was 1 to 3 trips avoided.

⁴⁰ The number of drivers in the Sacramento nonattainment area for 2008 was estimated, using the number of driver licenses by county for 2007, obtained from the California Department of Motor Vehicles database at http://www.dmv.ca.gov/about/profile/dl_outs_by_county.pdf, and calculating the percentage increase, based on county population figure increases from 2007 to 2008 listed at: (www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E1/documents/E-1table.xls). The estimated number of licensed drivers for the total Sacramento nonattainment area in 2008, therefore, was 1,442,105: Sacramento Metropolitan AQMD: total 921,457 + Yolo-Solano: total of 203,649 (123,742 in Yolo County + Solano County: 275,543 * 29% for the proportion located within the Air Quality district = 79,907) + Placer County: total of 220,139 (253,033 * 87% for Air Quality district) + El Dorado County: total of 96,860 (142,442 * 68% for Air Quality district).

⁴¹ Estimates for 2008 were based on summer EMFAC2007 V2.3 figures provided and confirmed by Bruce Katayama, SMAQMD, October 24, 2008. The total VOC tons for a combined total of light duty passenger cars and two categories of light duty trucks (9.54 + 2.38 + 4.6) were converted to pounds (multiplied by 2,000) and then to grams (multiplied by 454) before dividing by the combined total number of trips (i.e. 3,012,210 for light duty passenger cars + 624,730 for light duty trucks1 + 1,347,020 for light duty trucks2) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (5.97 + 1.76 + 4.88) x 2000 x 454 / (3,012,210 + 624,730 + 1,347,020). VOC grams and NOx grams were then combined (3.01 + 2.30) to obtain 5.31 grams per trip of emission precursors in the region as a whole. These are the figures considered most accurate at the time this report was written.

EMFAC2007 V2.3.] EMFAC2007 V2.3 is the latest update to the EMFAC model. It is used by California state and local governments to meet Clean Air Act (CAA) requirements. EMFAC2007 defines trips as vehicle starts and calculates them separately as a function of vehicle population (derived from vehicle registration data), based on ARB and US EPA instrumented vehicle studies. For the Sacramento nonattainment area, this amounts to **78,084 grams** of ozone precursors (14,705 single trips avoided x 5.31 grams per trip).

5. Convert to tons.⁴² For the Sacramento nonattainment area as a whole, this translates to an estimated total of **0.09 tons of pollutants reduced** per Spare The Air day.
6. Repeat the process for Control day interviews: record the mean number of trips avoided by the respondents who drove less for air quality reasons on Control days. In the entire Sacramento nonattainment area, there were no (0) individuals, and therefore **0** trips were reduced as well. This finding has rarely occurred in the last nine years of evaluations.
7. Apply the correction factor. To ensure that only purposeful driving reduction due to the Spare The Air program is counted in the estimate of emission reduction, we subtract the Control day air quality emission reduction from the Spare The Air day reduction. The correction for the Control days in this instance is 0.0 tons of ozone precursors, which, when subtracted from the 0.09 tons reduced on Spare The Air days, yields:
8. Result: **0.09 tons of ozone precursors reduced per Spare The Air day in 2008.** The procedure just described is summarized in the following table:

Sacramento Nonattainment Area	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons ⁴³	X Number of Licensed Drivers in Sacramento Nonattainment Area (1,442,105 Total)	X Mean Number of Single Trips Reduced Per Day	x 5.31 Grams of Ozone Precursors Per Trip (EMFAC 2007 V2.3) 2008 Model	= Estimated Tons per Day of Ozone Precursors Reduced
Spare The Air Days	0.6% (2 / 312 ⁴⁴)	8,650	x 1.7 = 14,705	78,084 grams	0.09 tons
Control Days	0.0% (0 / 455)	0	0	0 grams	0 tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions – Control Day Reductions)					0.09 tons

⁴² There are 907,200 grams in a ton.

⁴³ In addition, in the case of Spare The Air respondents, these drivers had to say they had heard the Spare The Air advisory (the ARB general awareness question).

⁴⁴ Please note that the weighted total number of completed interviews for the Sacramento nonattainment area as a whole (i.e. 312) is less than the total number of completed interviews within all air districts (705 unweighted). Since the beginning evaluation in 1995, the methodology for weighting has been to set Sacramento Metropolitan AQMD interviews as 1, and down-weight interviews from all other counties appropriately, depending on the size of their populations. The Sacramento Metropolitan AQMD represents the largest percentage of the nonattainment area population at 66%, followed by Yolo-Solano AQMD (15% of area population), Placer County APCD (13%), El Dorado County AQMD (6%). In other words, the number of completed interviews for the entire Sacramento nonattainment area is not the simple sum of the number of completed interviews in each individual air district.

2008 Emissions Reduction Estimate: Sacramento Metropolitan AQMD

19 ➤ *Air pollution in Sacramento Metropolitan AQMD were reduced by an estimated 0.03 tons of ozone precursors per Spare The Air day.*

Sacramento Metropolitan AQMD	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons	X Number of Licensed Drivers in Sacramento Metropolitan AQMD (921,457 Total)	X Mean Number of Single Trips Reduced Per Day	x 5.31 Grams of Ozone Precursors Per Trip (EMFAC 2007 V2.3) 2008 Model	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	0.5% (1 / 206)	4,610	x 1.0 = 4,610	24,479 grams	0.03 tons
Control Days	0.0% (0 / 300)	0	0	0 grams	0tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions – Control Day Reductions)					0.03 tons

2008 Emissions Reduction Estimate: Placer County APCD

20 ➤ *In Placer County APCD, an estimated 0.05 tons of ozone precursors were reduced per Spare The Air day.*

Placer County APCD	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons	X Number of Licensed Drivers in Sacramento Metropolitan AQMD (220,139 Total)	X Mean Number of Single Trips Reduced Per Day	x 5.31 Grams of Ozone Precursors Per Trip (EMFAC 2007 V2.3) 2008 Model	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	1.6% (3 / 183)	3,520	x 2.3 = 8,096	42,990 grams	0.05 tons
Control Days	0.0% (0 / 300)	0	0	0 grams	0tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions – Control Day Reductions)					0.05 tons

Comparison with Previous Years: Sacramento Metropolitan AQMD (only)

A comparison of estimated emission reductions⁴⁵ from 2001 to the present in the Sacramento Metropolitan AQMD⁴⁶ (only) are presented in the next table. It is important to point out that the factors that contribute to the estimates (i.e. differences in yearly estimated VOC and NOx emission factors per trip, changes in the number of drivers, the percentage of purposeful reducers, the average number of trips reduced, the severity of conditions and the number of Spare The Air days experienced during each summer season) vary from one year to the next.

Although the last two years show the lowest estimated emissions reductions ever, they were also years that experienced fewer Spare The Air days (i.e. eight in 2008⁴⁷ and five 2007; compared with fifteen in 2006 and fourteen in 2005). **Looking across the years, it can be seen that the Spare The Air program has been successful in reducing the amount of ozone precursors in the air each year.**

Year	2001	2002	2003	2004	2005	2006	2007	2008
Sacramento Metropolitan AQMD	1.32 tons	0.99 tons	0.26 tons	0.42 tons	0.25 tons	0.26 tons	.06 tons	.03 tons

SUMMER 2008 HEALTH ISSUES

Objectives

The U.S. Environmental Protection Agency has designated the Sacramento region as a “severe” ozone nonattainment area. During summer months, the region fails to meet the federal 8-hour health standard for ozone. Even at relatively low levels, **ozone affects human health**. It may cause inflammation and irritation of the respiratory tract, particularly during physical activity and exercise. The resulting symptoms can include breathing difficulty, coughing, and throat irritation. Breathing ozone can affect lung function and worsen asthma attacks. It can also aggravate other respiratory diseases such as emphysema and bronchitis. Children in particular are vulnerable. Medical studies have shown that ozone damages lung tissue and complete recovery may take several days after exposure has ended.⁴⁸

Ground-level ozone is formed by a chemical reaction between volatile organic compounds (VOCs) and oxides of nitrogen (NOx) in the presence of sunlight. Sources of these emissions include, cars, light-duty trucks, and vans – in fact, mobile sources cause approximately 70% of the region's ozone pollution problem.

Ozone levels can reach unhealthy levels particularly during the summer months when the weather is hot and sunny with relatively light winds.

The main objective of the current section is to document the relationship between air quality and the health effects experienced by households in the Sacramento nonattainment area during the summer of 2007.

⁴⁵ The estimated emissions reductions shown in the current table were based on accepted EMFAC models for each year. This year, estimates were based on the EMFAC 2007 v 2.3 model, 2008 estimate, provided by Bruce Katayama, SMAQMD.

⁴⁶ Over the years, reductions could often not be calculated for Placer County APCD, Yolo-Solano AQMD, and El Dorado County AQMD as there were often no significant differences between Spare The Air and Control day drivers who said they drove less.

⁴⁷ In addition, we actually interviewed on only three of the eight Spare The Air days as we did not want the smoke caused by wildfires in the July episodes to influence results.

⁴⁸ US Environmental Protection Agency: <http://www.epa.gov>

Specific objectives of the current section are to:

- k. compare levels of perceived health effects due to poor air quality between respondents interviewed following Spare The Air days and those interviewed on Control (non Spare The Air) days,
- l. estimate the number of households in the Sacramento nonattainment area whose health was affected by poor air quality specifically due to ozone air pollution on Spare The Air days in 2008,
- m. determine if levels of reported health problems during summer Spare The Air seasons have increased, decreased, or stayed the same from 2000 to the present in the Sacramento Core Region (excluding El Dorado County AQMD), and
- n. compare the incidence of reported health problems among the five air quality districts in the Sacramento nonattainment area (Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD).

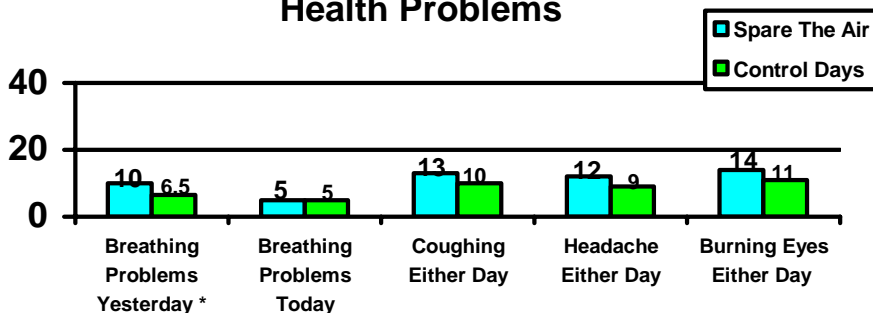
Results

Perceived Health Effects: Spare The Air Days vs. Control Days

21 ➤ *Approximately 10% of households in the Sacramento nonattainment area reported breathing difficulties on Spare The Air days in 2008, significantly higher than the 6.5% of households interviewed on Control days. Correcting for Control day responses, this translates into 29,794 additional households that were affected specifically by ozone pollution on Spare The Air days in the entire region.*

A significantly higher percentage of respondents interviewed about Spare The Air days said they, or someone in their household, had experienced breathing difficulties the day before (10%), compared with their counterparts interviewed on Control days (6.5%). It can be seen in the next chart that, although the differences were not significant, more households interviewed following Spare The Air days also experienced coughing, headaches and burning eyes than those interviewed on Control days. This has been found during most of the previous years' evaluations.

**Spare The Air vs. Control Groups:
 Percent of Households in Sacramento
 Nonattainment Area Who Experienced
 Health Problems**



* indicates a statistically significant difference

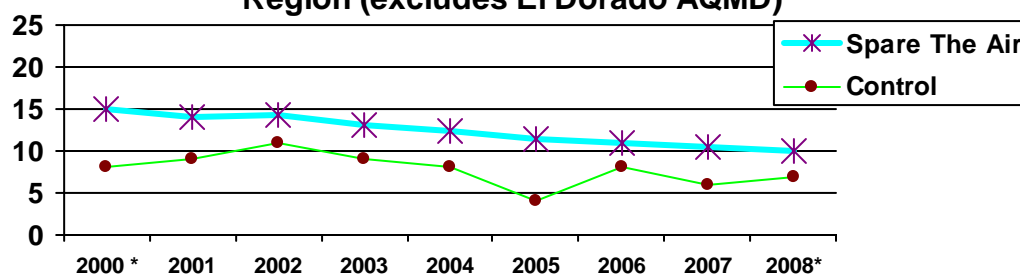
There are an estimated 851,261 households in the Sacramento nonattainment area,⁴⁹ therefore, the 10% of respondents who claimed that someone in their household experienced breathing problems on a Spare The Air day translates into 85,126 households. The 6.5% of respondents who reported breathing problems on Control days translates into 55,332 households. Correcting for Control days through subtraction, this means that **29,794 households experienced breathing problems due specifically to ozone air pollution on Spare The Air days.**

Year-To-Year Comparisons

22 ➤ The percentage of households reporting breathing difficulties in the Sacramento Core Region on Spare The Air days has declined when compared to the year 2000. From 2001 to the present, an average of 12% households have reported breathing difficulties on Spare The Air days, versus an average of 8% of households interviewed on Control days.

The annual percentages of respondents in the Sacramento Core Region (excluding El Dorado County AQMD) who said someone in their household had trouble breathing on Spare The Air and Control days from 2000 to the present are plotted in the next graph. This year's 10% of affected households on Spare The Air days is significantly less than the 15% who experienced breathing difficulties in 2000, but not significantly different from other years. Excluding 2000, **an average of 12%** of households experienced breathing difficulties due to ozone pollution on Spare The Air days. In terms of Control day interviewing, with the exception of 2005, the percent of households that reported breathing difficulties has remained consistently lower, and relatively stable at about 8%.

Year-to-Year Comparison of Percent of Respondents Whose Households Experienced Breathing Difficulties on Spare The Air Days: Sacramento Core Region (excludes El Dorado AQMD)



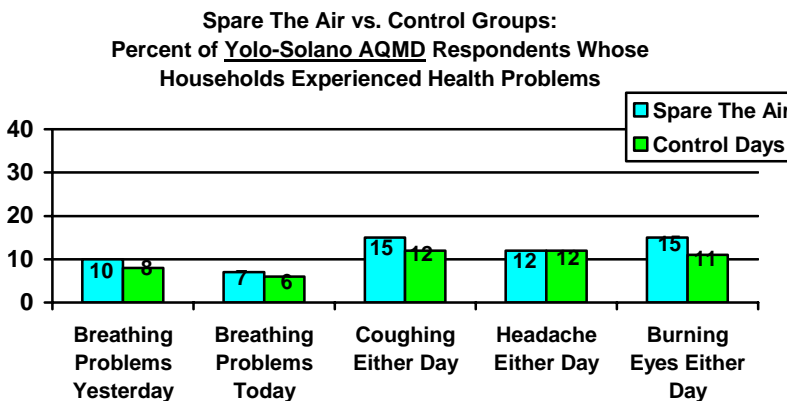
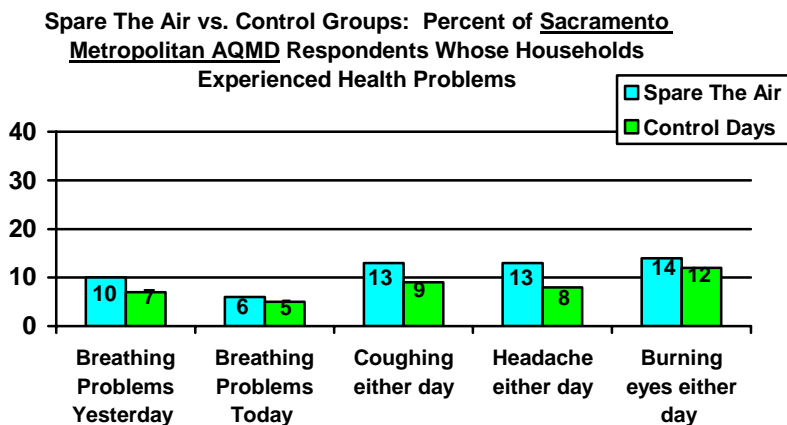
* significant difference between 2000 and 2008

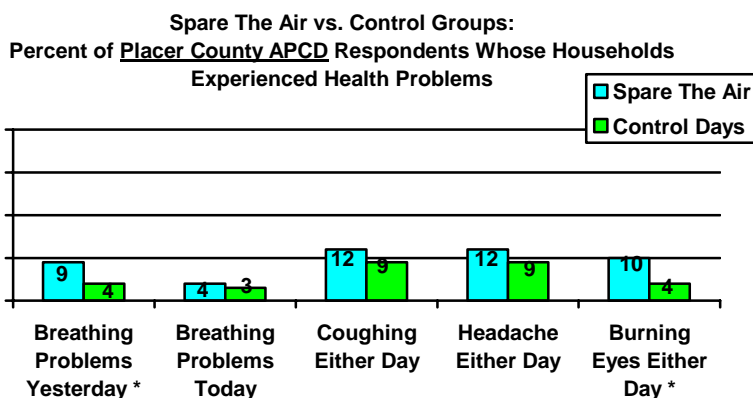
⁴⁹ The measure used for households was the number of housing units. Reference: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008. http://www.dof.ca.gov/research/demographic/reports/estimates/e-5_2001-06/documents/E-5_2008%20Internet%20Version.xls. The estimated number of households for the entire Sacramento nonattainment area is 851,261 ((Sacramento Metropolitan AQMD: 551,219) + (Placer County APCD: 147,408 * 87% = 128,245) + (Yolo-Solano AQMD: 115,170 (Yolo: 73,138; Solano (Dixon, Rio Vista & Vacaville: 42,032)) + (El Dorado County AQMD: 83,275 * 68% = 56,627)).

Individual Air Quality Districts

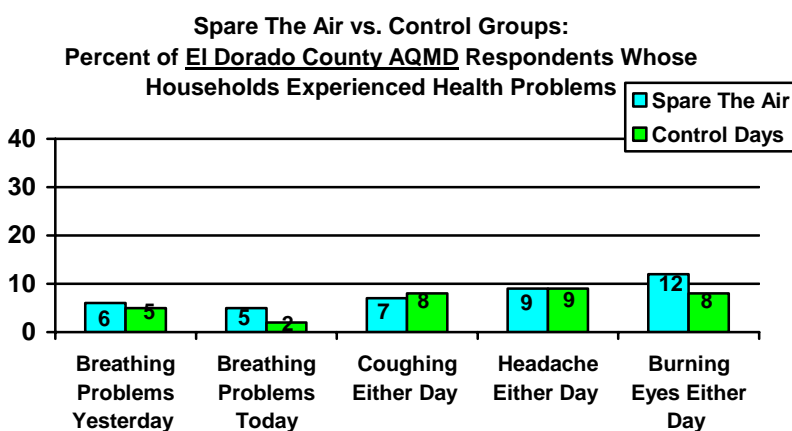
23 ➤ Statistically significant differences in terms of household health occurred only in Placer County APCD: more households experienced breathing difficulties and burning eyes on Spare The Air than on Control days. In the other air quality districts, although Spare The Air households experienced more health problems than Control households, the differences were not significant.

Results of household health problems between Spare The Air and Control day respondents for each air quality district are presented in the next four graphs. In SMAQMD, Yolo-Solano AQMD and El Dorado AQMD, although households interviewed following Spare The Air days generally experienced more breathing problems, coughing, and burning eyes than those interviewed on Control days, the differences tended not to be significant. Differences between the two groups in terms of headaches were even smaller. In Placer County APCD, significantly more households interviewed following Spare The Air days experienced breathing problems the previous day compared with Control day households (9% vs. 4%); as well as burning eyes the previous day or the day of the interview compared with Control day households (10% vs. 4%).





* Indicates a statistically significant difference

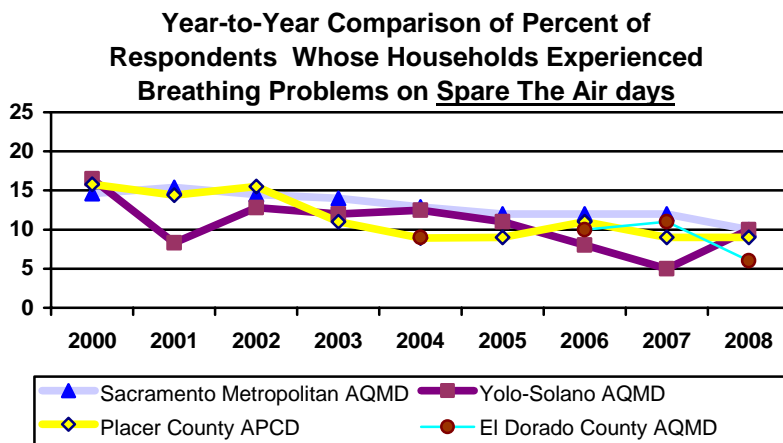


Air Quality Districts: Year-To-Year Comparisons

- 24 ➤ *Respiratory health appears to be improving: there are fewer households that experience breathing difficulties now than in the past. This could be a reflection of improved air quality in the region.*

The percentages of households experiencing breathing problems on Spare The Air days from 2000 to the present are presented in the next chart. El Dorado County AQMD results are only available for four years. Results indicate, first of all, that there would appear to be an overall decline in the percentage of households experiencing breathing difficulties, although year-to-year comparisons may not always be significant. This could be a reflection of improving air quality in the region. In SMAQMD, the 10% with problems this year is significantly lower than the 15% in 2000 and 2001. Similarly, in Placer County APCD, the 9% of breathing difficulties reported this year is significantly lower than the 16% in 2000. In El Dorado County AQMD, the 6% of households that experienced breathing difficulties this year is significantly lower than last

year (11%) or 2006 (10%). It can also be seen that results have fluctuated more in Yolo-Solano AQMD, the area that normally experiences better air quality than the others.



EMPLOYER PARTICIPATION IN 2008 SPARE THE AIR

Objectives

The objectives of the current section are to:

- o. assess employer participation in Spare The Air through the percentage of employed drivers who say their employer encourages them to drive less on days of poor air quality,
- p. measure participation by information channel – e-mail, signs, or asking employees to sign up for Air Alert notifications, and
- q. test whether employer participation has increased, decreased, or stayed the same since 2003 (when we first started to track it).
- r. Ask employees to sign up for Air Alert notification?”

Results

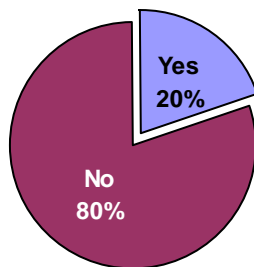
Employer Encouragement

25 ➤ Twenty percent (20%) of employed respondents in the Sacramento nonattainment area said their employer encourages them to drive less on days of poor air quality.

Sixty-nine percent (69%) of respondents interviewed on Spare The Air and Control days during the summer of 2008 were employed, a level that has been stable in evaluation reports for at least nine years (i.e. since 2000). In the questionnaire, respondents were identified by where they resided, and not where they worked. As it is quite likely that many live in one air district in the region, but work in another, only the weighted results for the Sacramento nonattainment area as a whole (including El Dorado County AQMD) will be discussed. Respondents were asked: “Does your employer encourage you to drive less on poor air quality days?” Results, presented in the next pie chart, indicate that 20% of employed respondents said their employer encourages them to drive less on poor air quality days.⁵⁰

⁵⁰ For this analysis, self-employed respondents and those who were undecided or refused to answer were excluded.

Does Your Employer Encourage You To Drive Less On Poor Air Quality Days?

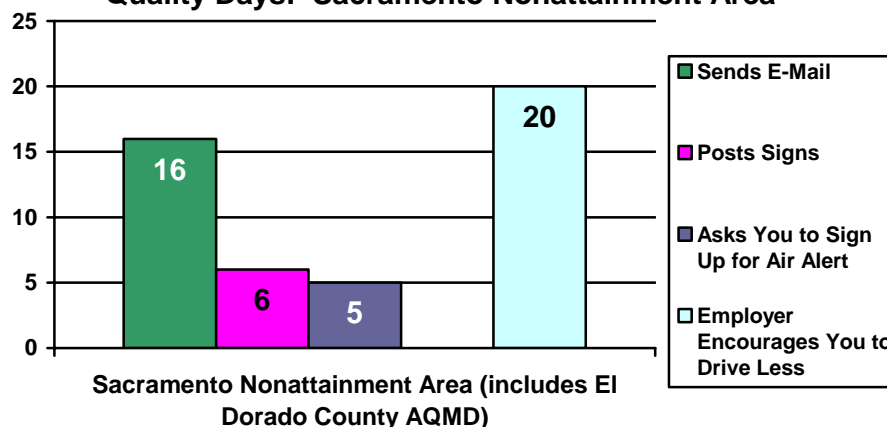


Employer Participation by Information Channel

26 ➤ *Employer participation involved notifying employees about Spare The Air days via e-mail (16%), by posting signs (6%), and by asking them to sign up for Air Alert notifications (5%).*

All employed respondents were asked how their employers notified them about Spare The Air days. Results indicated that 16% of regional employers use e-mail, 6% percent post signs about poor air quality days, and 5% said their employer encouraged to sign up for Air Alert notifications.

Employer Channels of Communicating Poor Air Quality Days: Sacramento Nonattainment Area

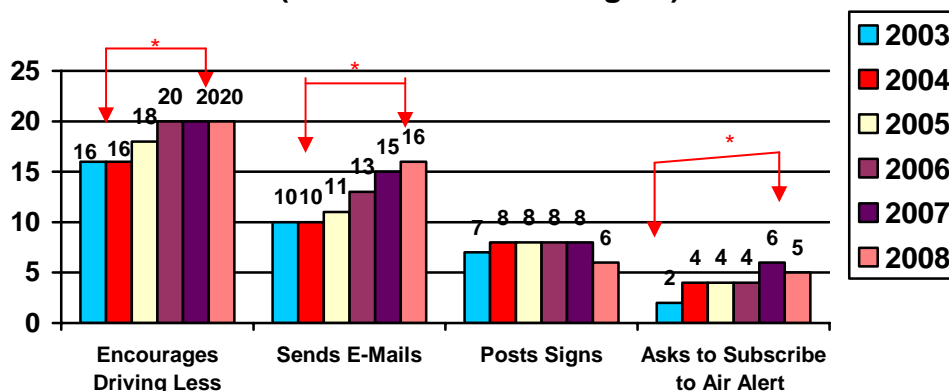


Employer Participation: Year-To-Year Comparison

27 ➤ *Employer participation in the Spare The Air program has remained at the same 20% level for the past three years. More employers are sending e-mails about poor air quality in the past two years than in 2003 and 2004. The percent who post signs has not changed in six years, and the percent that asks its employees to register to receive Air Alert notifications is relatively low at 5%.*

Respondent-reported employer participation in the Spare The Air program has been tracked since 2003. Annual results for the Sacramento Core Region (excluding El Dorado County AQMD) are presented in the next graph. Employer participation seems to have stabilized at 20% for the past three years. More employers are now sending e-mails about poor air quality days to their employees this year than in previous years, but the percent who post signs has not changed substantially from one year to the next. This year 5% percent of employers asked their employees to subscribe to Air Alert notifications, significantly higher than the 2% in 2003, but still a relatively low percentage. **It would appear that more work could be done to improve the number of potential employee subscribers to Air Alerts.**

**Employer Participation Since 2003
 (Sacramento Core Region)**



* indicates a statistically significant difference

2008 SUMMERTIME SEASONAL TRIP REDUCTIONS

Objectives

Developed in 1995, Spare The Air is a public education program that encourages residents in the Sacramento nonattainment area⁵¹ to voluntarily reduce the number of vehicular trips they make on days of particularly poor air quality during the summer months. Driving less reduces ozone and helps to improve the air quality in the region. Specific objectives are to:

- s. test whether those drivers who say they usually reduce the amount of driving they do during the summer to avoid adding to air pollution actually do report making fewer trips than those who say they do not seasonally reduce driving, and
- t. compare the percentage of seasonal trip reducers and the mean number of trips they have avoided over the past eight years.

Results

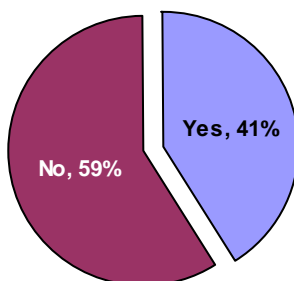
⁵¹ Throughout this report, the Sacramento nonattainment area refers to the regions in which interviews were conducted: Sacramento County, parts of Placer County, Yolo County, and parts of Solano County, as well as rural areas of El Dorado County. All results referring to the Sacramento nonattainment area will have been proportionally weighted. For comparisons with previous annual results, the term Sacramento Core Region will be used – these analyses will exclude El Dorado County AQMD, and results will have been re-weighted appropriately. (See methodology section for further details.)

Seasonal Driving Reducers

- 28 ➤** *Approximately four-in-ten (41%) of all respondents in the Sacramento nonattainment area are seasonal reducers – that is, they say they usually reduce the amount of driving they do during the summer to avoid adding to air pollution.*

Respondents interviewed on both Spare The Air as well as Control days were asked: “Do you usually reduce the amount of driving you do during the summer to avoid adding to air pollution?” It can be seen in the next pie chart that, in the entire Sacramento nonattainment area as a whole,⁵² 41% of all respondents said they usually reduce the amount of driving they do during the summer to avoid adding to air pollution. These can be considered seasonal driving reducers.

**Percent Who Reduce Driving in the Summer for Air Quality Reasons: 2008
 Results for the Sacramento Nonattainment Area**



Number of Reduced Trips

- 29 ➤** *Those who usually reduce the number of trips they make during the summer months entered their cars fewer times than those who do not usually reduce driving during the summer: on average, they made 0.4 fewer trips per day.*

Those who drive less during the summer because of air quality reasons (seasonal driving reducers) reported entering their cars the previous day an average of 2.9 times. Those who said they did not usually reduce the amount of driving they do during the summer reported entering their cars an average of 3.3 times. An analysis of variance indicated that these means were significantly different from each other.⁵³ In other words, drivers who said they usually drive less in the summer actually made fewer trips than those who did not. **On average, seasonal driving reducers made .4 fewer trips per day** than non-reducers (3.3 – 2.9 = 0.4 trips).

⁵² Includes El Dorado County AQMD.

⁵³ F (1,752) = 3.06, p < .10.

	<i>Seasonal Driving Reducers: Mean # Times Entered Vehicle</i>	<i>Non-Reducers: Mean # Times Entered Vehicle</i>	<i>Statistically Significant Difference?</i>
Sacramento Nonattainment Area	2.9	3.3	Yes

Seasonal Trip Reduction: Estimated Emission Reductions

- 30 ➤ *Seasonal driving reduction for the summer of 2008 translates into a reduction of 1.4 tons per day of ozone precursors. Air quality management districts may want to consider measuring and tracking the substantial emission reductions represented by this group of seasonal driving reducers in future evaluations.*

These seasonal driving reducers represent a substantial proportion of the general population who are helping to improve air quality in the region by reducing emissions. Although not officially sanctioned, it is possible to estimate the amount of ozone precursors that have been reduced due to respondents habitually driving less during the summer for air quality reasons. The methodology is the same as that used to estimate emission reductions on Spare The Air days⁵⁴ and is summarized in the next table. **It can be seen that the average of .4 of a trip per day that seasonal reducers avoided translates into an estimated 1.4 tons of ozone precursors reduced per summer day in 2008.**

⁵⁴ For a full explanation of the methodology, see report titled "Estimated Emission Reductions during the 2008 Spare The Air Season", Naomi E. Holobow & Dawn Morley-Chavero, November 2008.

Sacramento Nonattainment Area	Percent of Respondent Drivers Who Usually Drive Less During the Summer for Air Quality Reasons	x Number of Licensed Drivers in Sacramento Nonattainment Area (1,442,105 Total ⁵⁵)	x Mean Number of Trips Reduced Per Day Compared to Non-Reducers	x 5.31 Grams of Ozone Precursors Per Trip (EMFAC 2007 V2.3) 2008 Model ⁵⁶	= Estimated Tons ⁵⁷ Per Day of Ozone Precursors Reduced
Spare The Air and Control Day Interviews Combined	41%	591,263	x 0.4 = 236,505	1,255,840 grams	1.4 tons

How They Reduce Driving

31 ➤ The majority of seasonal reducers say they make fewer trips, stay home, walk, bike, or take public transportation in order to reduce the amount of driving they do during the summer.

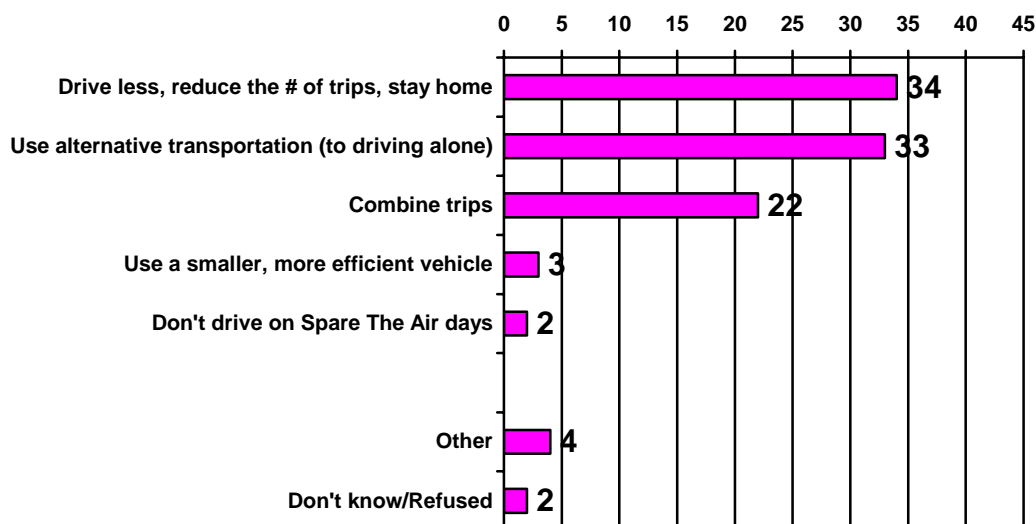
Respondents who said they reduced the amount of driving they did during the summer to avoid adding to air pollution were then asked to specify exactly how they reduced driving this summer. Comments were captured, then categorized, and the results are presented in the next graph. It can be seen that over a third (34%) of these respondents said they made fewer trips or just stayed home. Another third (33%) used alternative transportation to driving alone, which included carpooling, walking, cycling, taking transit, or telecommuting. An additional 22% said they regularly planned their days to consolidate trips and avoid multiple excursions; and a further 3% used a more fuel efficient vehicle. Two percent (2%) specifically mentioned that they avoided driving on Spare The Air days, 4% gave other responses and 2% did not answer.

⁵⁵ The number of drivers in the Sacramento nonattainment area for 2008 was estimated, using the number of driver licenses by county for 2007, obtained from the California Department of Motor Vehicles database at http://www.dmv.ca.gov/about/profile/dl_outs_by_county.pdf, and calculating the percentage increase, based on county population figure increases from 2007 to 2008 listed at: (www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E1/documents/E-1table.xls). The estimated number of licensed drivers for the total Sacramento nonattainment area in 2008, therefore, was 1,442,105: Sacramento Metropolitan AQMD: total 921,457 + Yolo-Solano: total of 203,649 (123,742 in Yolo County + Solano County: 275,543 * 29% for the proportion located within the Air Quality district = 79,907) + Placer County: total of 220,139 (253,033 * 87% for Air Quality district) + El Dorado County: total of 96,860 (142,442 * 68% for Air Quality district).

⁵⁶ Estimates for 2008 were based on summer EMFAC2007 V2.3 figures provided and confirmed by Bruce Katayama, SMAQMD, October 24, 2008. The total VOC tons for a combined total of light duty passenger cars and two categories of light duty trucks (9.54 + 2.38 + 4.6) were converted to pounds (multiplied by 2,000) and then to grams (multiplied by 454) before dividing by the combined total number of trips (i.e. 3,012,210 for light duty passenger cars + 624,730 for light duty trucks1 + 1,347,020 for light duty trucks2) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (5.97 + 1.76 + 4.88) x 2000 x 454 / (3,012,210 + 624,730 + 1,347,020). VOC grams and NOx grams were then combined (3.01 + 2.30) to obtain 5.31 grams per trip of emission precursors in the region as a whole. These are the figures considered most accurate at the time this report was written.

⁵⁷ There are 907,200 grams in a ton.

How Have You Reduced Driving This Summer?



A few representative comments⁵⁸ from those who said they drove less, reduced the number of trips, or stayed home are listed below.

- “Don't drive. It has to be necessary to go do it. I use internet more for shopping.
- Driving less and not taking a long trip. I think it hasn't helped dramatically, but it all adds up. Just not as much car emissions, that helps a lot.
- I'm just not driving as much and I never use my air conditioner.
- I'm working at home more often. Reducing trips I have to take.
- I actually drive to a closer gym and run to school.
- I did more stuff at home than going places, and didn't go on any day trips or vacations.
- I didn't drive to Los Angeles where my family lives. I took a plane instead. I didn't take any vacations in my car at all. I just stayed in because of the price of gas and the air pollution.
- I didn't go to all the places I wanted to go.
- I don't drive as far. I don't go as many times.
- I don't drive into the office. I work from home. Rarely stop at a store. I have my husband make stops on the way home.
- I don't go anywhere, just to work and back, I try and stay home.
- I don't leave unless I absolutely have to.
- I don't take any country-road trips anymore. I used to like doing that, but now I realize it's not necessary. I don't want to add to the pollution.
- I drive 4 days a week instead of 5.
- I drive inside the city within 4 miles and don't go out of town.
- I haven't driven nearly as much as I usually do.
- I just don't drive as many miles. Actually I keep my car tuned up. I just reduce the speed because then the car doesn't produce as much pollution.
- I just take the car out 2 to 3 times per week, as opposed to how I used to drive 10 or 12 times per week. I have my girlfriend drive, her car gets better gas mileage.
- I rearranged my route so I wouldn't have to drive all over the place for my business.
- By staying at home more. Probably six to eight times. Just for the future of my children. Just overall air quality for human life.

⁵⁸ The complete transcripts of all responses are available in the statistical file.

- We just haven't gone to as many places.”

A few comments from those who said they use alternative transportation (to driving alone) are listed below. Note specific reference to Spare The Air days in some of them:

- “By riding my bicycle and walking. Because I live in a small town and work there, so I don't have a large commute. Just about 1 mile long.
- By walking the kids to school, and by walking to get them from school. Carpooling to and from soccer practice and games.
- Carpooling or my kids do public transportation.
- Carpool to work, take the bus, or the commuter bus.
- Carpooling for one. Staying at home or riding a bike.
- Carpooling. My girlfriend and I share driving responsibilities during the week. She drives two days and I drive two. I've reduced my driving by two days a week.
- I've ridden my bike and rollerbladed. Walk, sometimes. I think decreasing air pollution is good.
- I bike to work and take rail transit. Walk to the store.
- I ride my bike everywhere and take the bus. I carpool probably every day. It reduces the gas usage and pollution. I think if you use public transit, you give them a reason to keep working or else they will just shut it down if you don't use it.
- I ride with someone else whenever possible. I walk and bike three times a week.
- I take public transit to work. I drive to a park-and-ride lot, then ride the bus to work. I walk from the bus stop to work.
- I usually designate one day at least as a non-driving day. I take light rail, that's what we call it here. Public transit. And walking.
- Taking the train, bus, and biking.

A few representative comments by those who combine trips include:

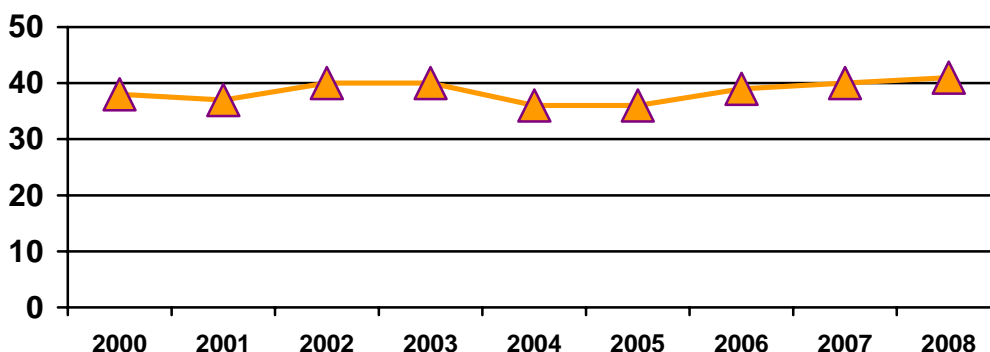
- “By combining errands and basically saving up my errands for the same time, and also shopping closer to home even if it is more expensive.
- By organizing my errands, also by slowing down.
- Combined trips. If I have to run errands, I combine them all together instead of coming and going all day.
- Combining errands so I only need to get in the car 1 time to get everything done.
- Consolidate some of my trips and plan, so I don't have to run back and forth too often.
- I accumulate my errands to one drive and I will not drive after 2:00, particularly on bad air days. If I have to run errands, it'll be on one day. I won't drive back and forth. I'm very disciplined about that.
- I choose one day a week to do all the running around. I don't just take long driving trips anymore and I drive a Prius.
- I have combined my trips and I have downgraded to a scooter. I am very concerned about air quality and the amount of fossil fuels in my life. I want to reduce the amount of fossil fuels I use down to zero. That would be ideal.
- I organize my trips out and I just do one big loop instead of going three times a day. I just do one big loop. I'm just more organized about where I want to go.
- Make a list of where I have to go and where I go, and avoid unnecessary trips.
- We have eliminated all frivolous trips to the grocery store. I don't just go on one errand, I wait until I have multiple.
- What we do is we plan our routes and we don't go from A to B to Z, we go in a circular pattern to catch every place we have to go and we don't do any extra driving.”

Year-To-Year Comparisons

- 32 ➤ *The proportion of seasonal driving reducers has remained stable over the past nine years. These drivers have consistently made fewer trips than those who said they don't reduce their driving during the summer.*

El Dorado County AQMD respondents are not included in the year-to-year analysis as they were not interviewed in evaluations prior to 2004. Results representing the remaining Sacramento Core Region (SMAQMD, Yolo-Solano AQMD and Placer County APCD) have been appropriately re-weighted. It can be seen in the next graph that the percentage of respondents who said they usually reduce the amount of driving they do during the summer to avoid adding to air pollution has remained relatively stable at approximately four-in-ten from 2000 to the present.

Year-To-Year Comparison of Percent of Respondents Who Seasonally Reduce Driving to Avoid Adding to Air pollution: Sacramento Core Region



- 33 ➤ *The average number of trips avoided on an average summer day by seasonal reducers varied from .4 trips this year to a high of 1.1 trips in 2001 and 2003.*

The average numbers of trips made by respondents⁵⁹ are presented in the next table. In every year since 2000, seasonal reducers reported making significantly fewer trips than the group who said they do not usually reduce driving during the summer. It can be seen that the average number of additional trips avoided by seasonal reducers (that is, the difference between reducers and non-reducers) ranged from .4 of a trip per day to just over 1 trip per day. **In other words, a substantial subset of the population of respondents in the Spare The Air evaluations habitually reduce the amount of driving they do during the summer months.** Some of these individuals may not qualify as episodic reducers on specific Spare The Air days for methodological reasons (i.e. they may not have driven "less" on a specific Spare The Air day because they already have reduced their driving).

⁵⁹ Excludes El Dorado County AQMD results.

<i>Year</i>	<i>Seasonal Driving Reducers: Mean # Times Entered Vehicle</i>	<i>Non-Reducers: Mean # Times Entered Vehicle</i>	<i>Difference (Mean Number of Daily Single Trips Avoided by Seasonal Reducers)</i>	<i>Statistically Significant Difference?</i>
2000	3.6	4.1	0.5	Yes
2001	3.1	4.2	1.1	Yes
2002	3.1	4.1	1.0	Yes
2003	3.1	4.2	1.1	Yes
2004	3.4	3.9	0.5	Yes
2005	3.0	3.5	0.5	Yes
2006	2.9	3.6	0.7	Yes
2007	3.2	3.8	0.6	Yes
2008	2.9	3.3	0.4	Yes