



Evaluation of the 2006 Spare the Air Campaign

Final Report

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BACKGROUND & METHODOLOGY

Project Background

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 standard for ozone. Unhealthy levels of ground-level ozone are created when volatile organic compounds (VOC) and nitrogen oxides (NO_x), 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. In terms of health problems, the effects of ground-level ozone are well-documented and include: aggravated respiratory disease such as emphysema, bronchitis and asthma; damage to deep portions of the lungs, even after symptoms such as coughing or a sore throat disappear; wheezing, chest pain, dry throat, headache or nausea; reduced resistance in infection, increased fatigue, and weakened athletic performance.

The Sacramento region has a federal 8-hour ozone standard attainment deadline of 2013. In order to meet the deadline, the air quality management districts in the Sacramento nonattainment area along with the California Air Resources Board (ARB) have implemented short and long-term plans to reduce air pollution in the region. These have included increased regulation of business, monitoring, enforcement, voluntary, and incentive programs.

For the past eleven years, the Sacramento Metropolitan Air Quality Management District has produced and implemented a public education program called Spare The Air on behalf of the five air districts in the Sacramento nonattainment area:¹ Sacramento County, Yolo County, and parts of Placer, Solano, El Dorado and Sutter Counties. The program was designed to engage the general public in helping to solve the problem of air pollution by informing them when air quality is unhealthy and encouraging them to voluntarily reduce their driving on those days. The Spare The Air program runs from May through October

¹ 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 and the Feather River AQMD of South Sutter 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 and Sutter County, and results will have been re-weighted appropriately. (See methodology section for further details.)



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of each year. 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 127² or higher the next day, a Spare The Air advisory is issued by the Sacramento Metropolitan AQMD.

The Spare The Air program features a Web site (www.SpareTheAir.com), television and radio commercials, free Air Alert notifications, tip cards & brochures distributed to the public, elementary school assemblies, employer networks, and participation in community events throughout the region. An example of one of the radio advisories used during the summer of 2006 was:

"This is a Spare The Air advisory from the Sacramento Metropolitan Air Quality Management District and the air districts of the Sacramento Region.

Tomorrow's air quality is forecast to be unhealthy with ground level ozone levels above 127 AQI.

Health risks may include respiratory problems and long term lung damage. Avoid any prolonged outdoor exertion.

Reduce your driving to cut down pollution.

For more information or to receive a personal Air Alert, visit sparetheair.com"

Project Methodology

Annual evaluations (with the exception of 1997) have been conducted since 1995 to assess the effectiveness of the program. This year for the first time, interviews were conducted with residents of all areas within the Sacramento nonattainment area.³ [In the past, interviews were generally not conducted in El Dorado AQMD (except for 2004) and they have never been previously conducted in the Feather River AQMD.] A sample of **1,762** (714⁴ when proportionally weighted to represent the **Sacramento nonattainment area** as a whole) randomly selected respondents was interviewed following all but one of the **fifteen** Spare The Air days⁵ (June 23 through June 26, July 16 through July 18, July 20 through July 25,

² If the next day's ozone forecast predicted a .095 parts per million level of ozone anywhere in the region for at least one hour, then a Spare The Air day was triggered. This is the equivalent of an AQI of 127.

³ Based on 2006 estimates from the 2000 US Census: State of California, Department of Finance, *E-1 Population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2005 and 2006*. Sacramento, California, May 2006. Available online at: 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 and, for the first time, Feather River AQMD] is 2,096,938: [Sacramento Metropolitan AQMD (66%) - 1,385,607; Yolo-Solano AQMD (15%) - 311,689 (this includes the total 190,344 from Yolo County and 121,345 from the Dixon, Rio Vista and Vacaville areas of Solano County); Placer County APCD (13%) - 275,362 (this figure represents the 87% of Placer County's 316,508 residents who do not live in zip codes north or east of Auburn), El Dorado AQMD (6%) - 119,819 (this figure represents 68% of El Dorado County's 176,204 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), and Feather River AQMD (0.2%) - 4,461 (includes residents in ZIP codes 95645, 95676, 95659, 95668, and 95674. [The population for Feather River AQMD in South Sutter County was obtained from a 2005 Geo-Demo ZIP code report from Scientific Telephone Samples. It represents approximately 5% of the total Sutter County population of 91,450].

⁴ 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 air districts appropriately, depending on the size of their populations. This is why the weighted totals of completed interviews are less than the sum of the raw totals.

⁵ Interviewing did not take place following the Tuesday, July 25 Spare The Air episode because there was no media buy to advertise that particular episode. (Air Alerts were still sent to registered subscribers.)

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September 2, and September 13) of the 2006 season, which ran from May through October. This included **470** completed interviews with residents in Sacramento Metropolitan AQMD, **482** with residents in Yolo-Solano AQMD, **397** with residents in Placer County APCD, **331** with residents in El Dorado AQMD, and **82** completed interviews with residents in Feather River AQMD.⁶

In order to be able to compare results with those from previous years' evaluations, the latter two air quality districts (El Dorado and Feather River) have been excluded from 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 recalculated⁷. The total number of interviews conducted on Spare The Air days for the Sacramento Core Region was 1349 (671 when weighted).

Control day interviewing took place on matched days of the week, but on non Spare The Air days (August 14, 15, 16, 18 through 23; and September 24, 25, 26, 28, 30; and October 1, 7, 15, and 16. A total of **1,692** (613 when weighted) Control interviews were conducted: **404** in Sacramento Metropolitan AQMD, **406** in Yolo-Solano AQMD, **405** in Placer County APCD, **405** in El Dorado County AQMD, and **72** in Feather River AQMD. When discussing the Sacramento nonattainment area as a whole, interview results will have been weighted appropriately. For annual comparisons, the total number of Control day interviews conducted in the Sacramento Core Region (excluding El Dorado County and Feather River AQMDs) was 1,215 (577 when weighted.)

All respondents were drivers: they were initially screened for having driven a vehicle (a car, truck, or van) within the last week.

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, Crocker/Flanagan, 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.

⁶ The entire number of households in Feather River AQMD is only 1,563 (the population is estimated to be 4,461). Every eligible phone number in this area was tried multiple times, and those who did not complete interviews on Spare The Air days were re-entered into the database to be contacted for Control interviews. The total number of completed interviews, though small, represents the most that could be obtained – each number was "touched."

⁷ Excluding the El Dorado and Feather River AQMDs, the new proportions for the smaller Sacramento Core Region for 2006 are: 70% in Sacramento Metropolitan AQMD, 16% in Yolo-Solano AQMD, and 14% in Placer County APCD.

RESULTS & CONCLUSIONS

Awareness of the 2006 Spare The Air Campaign

Objectives

Since 2002, two questions have been used in the annual evaluation to assess overall awareness of the Spare The Air campaign – one with wording that asks about awareness of Spare The Air advisories (proposed by the Air Resources Board), and the other with wording that has been used in the evaluation questionnaire for the past eleven years (measuring a more specific remembrance of the request not to drive, although not mentioning Spare The Air by name). They were asked in random order so as to eliminate any possible order-response bias:

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?” (ARB-worded question)
2. Specific Awareness: “Do you recall being asked not to drive yesterday because our area was experiencing a period of unhealthy air?” (existing question)

The specific objectives of the first section of the report are to:

- a. measure awareness of the 2006 Spare The Air campaign using two questions and determine if awareness was similar or different among drivers in the five air quality districts in the Sacramento nonattainment area (Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, El Dorado County AQMD and Feather River AQMD),
- b. determine if awareness during annual summer Spare The Air seasons has increased, decreased, or stayed the same from 2000 to the present in the Sacramento Core Region,
- 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** in the Sacramento nonattainment area who were aware of the 2006 Spare The Air campaign (correcting for Control days).

Results

OBJECTIVE A:

Significantly more respondents in 2006 were aware of Spare The Air in general (62%) than remembered the specific request to not drive on days of unhealthy air (30%), a finding that has been consistently replicated over time. There were no differences among the individual air quality districts.

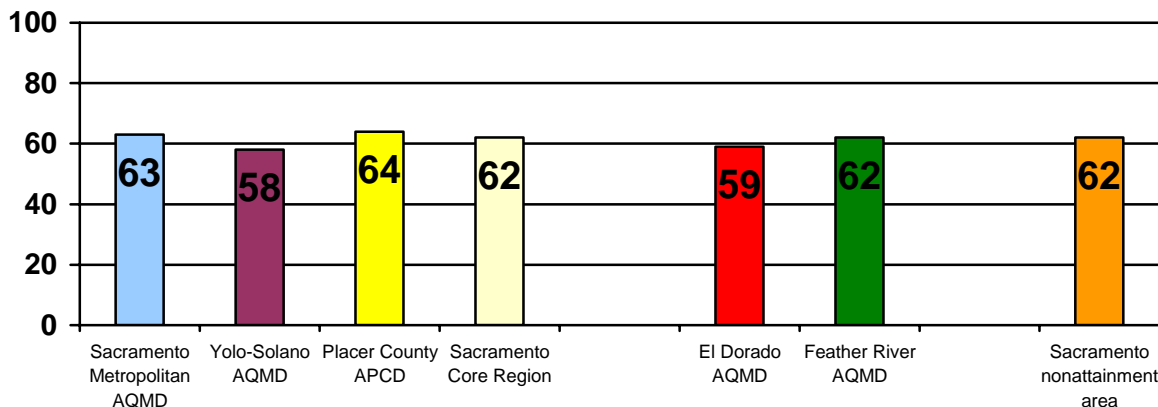
2006 General Awareness of Spare The Air (ARB Wording)

The following chart shows the percentage of respondents who were aware of Spare The Air 2006 summer advisories, that is, those who affirmed that in the past two days they had heard, read, or seen advertisements or news broadcasts about Spare The Air (the ARB worded question).⁸ It can be seen that 62% of respondents in the Sacramento nonattainment area as a whole (as well as the Sacramento Core Region which excludes El Dorado County and Feather River AQMDs) were aware of the Spare The Air advisories. Levels of general awareness in the individual air districts did not differ significantly from one

⁸ Responses of “don’t know/refused” were excluded from this analysis.

another, although awareness in Placer County AQMD was the highest at 64%, followed by Sacramento Metropolitan AQMD at 63%, followed by Feather River AQMD at 62%, then El Dorado AQMD and Yolo-Solano AQMD at 59% and 58%, respectively.

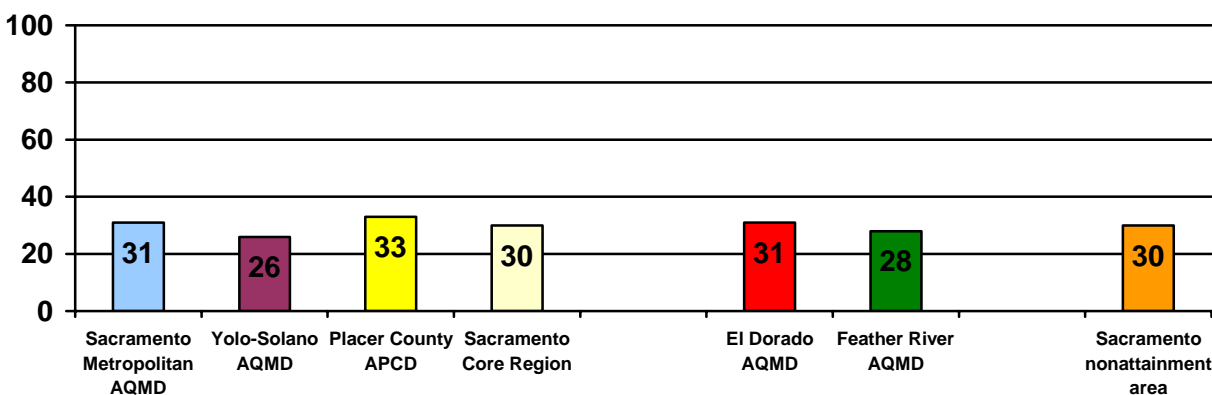
2006 General Awareness of Spare The Air (ARB wording)



2006 Specific Awareness: Heard Request to Not Drive

A more stringent criterion for measuring awareness of Spare The Air is to assess remembrance of the content of the message itself. The percentages of respondents who specifically recalled “being asked not to drive yesterday because our area was experiencing a period of unhealthy air” (the specific awareness question) are presented in the next chart. It can be seen that 30% of respondents in the Sacramento nonattainment area as a whole were specifically aware of the request not to drive, significantly fewer than the 62% who remembered hearing the Spare The Air advisory. This is consistent with previous years’ results – levels of general awareness of Spare The Air have always been greater than levels of specific awareness. Specific awareness, although highest in Placer County APCD (33%), was not significantly different among individual air districts in the area.

2006 Specific Awareness: Heard Request to Not Drive



Year-By-Year Comparisons of Awareness

OBJECTIVE B:

Levels of general awareness did not increase in 2006 relative to 2005, but in both these years more respondents were aware of the Spare The Air advisories than in 2004. However, general awareness was highest in the Sacramento Core Region in 2002, a very poor air quality season.

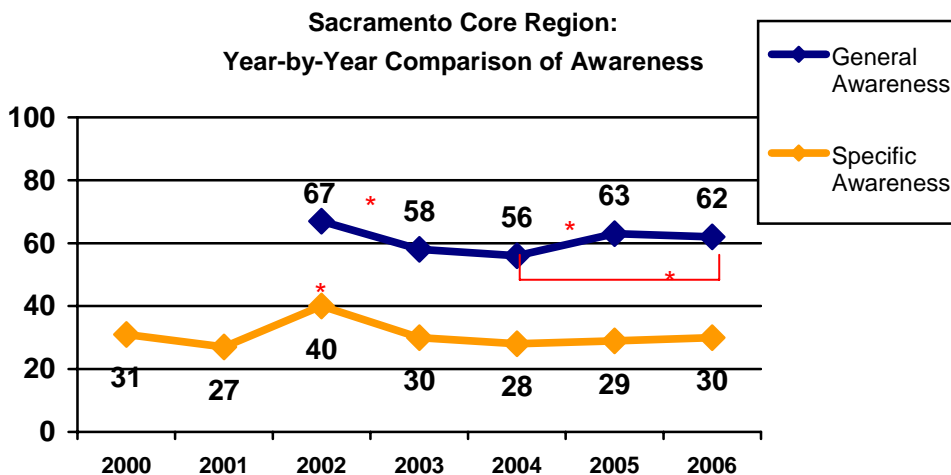
In terms of specific awareness, there was no significant increase this year compared with last year. In fact, with the notable exception of 2002, levels in the Sacramento Core Region have essentially stayed the same, with approximately 30% of respondents saying they heard the specific request not to drive on days of poor air quality.

There were a few noteworthy differences in levels of awareness within individual air districts over time.

Annual levels of both general and specific awareness of Spare The Air for the Sacramento Core Region (excluding El Dorado County and Feather River AQMDs) are presented in the next graph. Results of year-to-year tests of proportion indicate that this year's levels of awareness did not differ significantly from last year's levels.

General awareness has been tracked since the introduction of the ARB-worded question in 2002. Year by year tests of proportion indicate that, for the Sacramento Core Region, awareness was significantly highest in 2002 at 67%, a very poor air quality season:⁹ higher than the 58% in 2003; 56% in 2004, 63% in 2005, and the 62% in 2006. There was also a significant increase in general awareness both this year and last year, compared with 2004.

In terms of specific awareness, with the exception of 2002, results have been relatively stable since 2000, with approximately 30% of area drivers saying they heard the specific request not to drive on days of poor air quality.



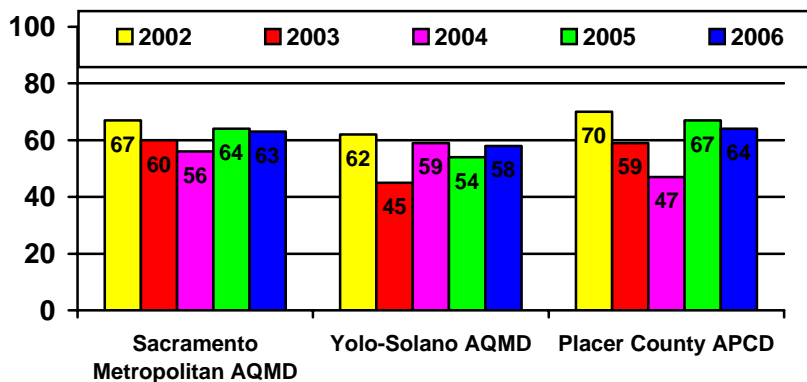
* indicates a statistically significant difference between the years

⁹ 2002 was an exceptional year with high temperatures, multiple-day Spare The Air episodes, and the greatest number of STA days (22) of all years.

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

Levels of awareness of Spare The Air in the individual air districts are presented in the next two charts. In terms of general awareness, results were highest for all three air districts in 2002. Within each air quality district, there were no significant differences between this year and last year's results, although most of the previous year-to-year differences within each district were significant.¹⁰

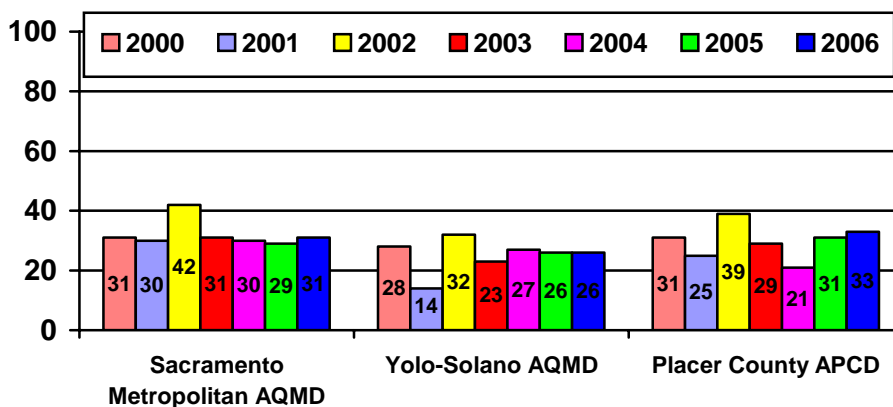
General Awareness: Individual Air Districts
 Year-by-Year Comparisons (Since 2002)



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

In terms of specific awareness among the individual air districts, results were fairly stable from one year to the next, with the notable exception of 2002, a very poor air quality season. It can be seen in the next chart that about three-in-ten respondents in the Sacramento Metropolitan AQMD were aware of the specific request not to drive in all years but 2002. In Yolo-Solano AQMD, there was an anomaly in 2001 when awareness was significantly lower at 14% than any other year. Results in Placer County APCD indicated that in 2004, the level of awareness was significantly lower at 21%.¹¹

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



¹⁰ One exception was in Sacramento Metropolitan AQMD, where the difference between 2003 and 2004 was not significant. Another exception occurred in Yolo-Solano AQMD, where the difference between 2004 and 2005 was not statistically significant.

¹¹ The reader is referred to the 2004 Spare The Air Evaluation Report for possible explanations.

Spare The Air Versus Control Days

OBJECTIVE C:

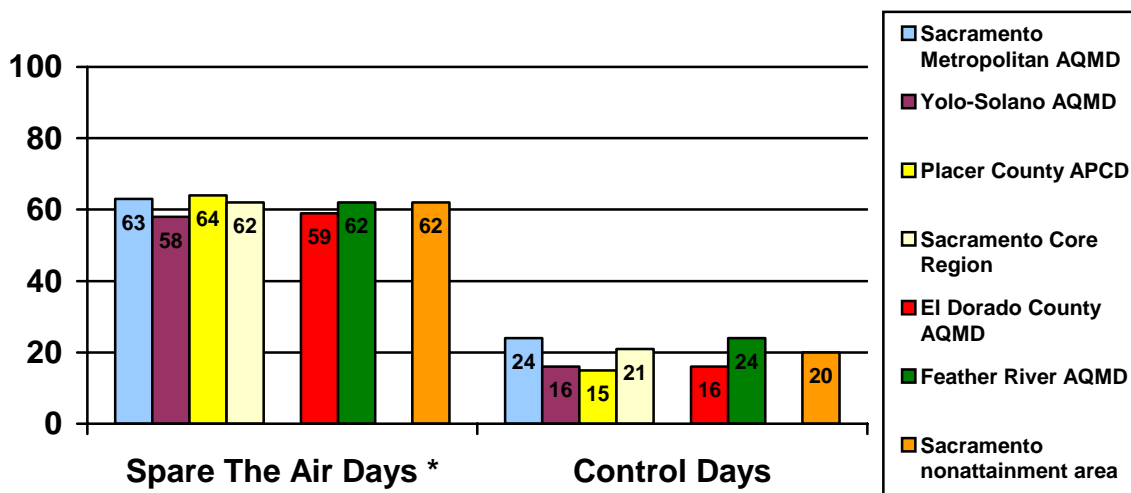
Control-day interviewing indicated that, while a few respondents were mistaken, the vast majority of those interviewed on Control days did not recall hearing or seeing a Spare The Air advisory. This attests to the effectiveness of the program -- we have further evidence that respondents interviewed following Spare The Air days are not simply giving "socially-acceptable" responses: levels of both types of awareness were significantly higher on Spare The Air days than on Control days in all districts.

One reason to conduct interviews on non-Spare The Air (Control days) is to test for a possible response bias – it is important to verify that the percentage of respondents who said they had heard or seen the Spare The Air announcements was significantly higher following Spare The Air days than on Control days.

Spare The Air vs. Control Days: 2006 General Awareness

General awareness results for each district, the Sacramento Core Region, and the entire nonattainment area are presented in the next chart. It can be seen that, although approximately 20% of area respondents interviewed on Control days said they had heard the Spare The Air advisories (and thus were wrong), 62% of area respondents interviewed after Spare The Air days said they had heard them (and thus were correct). Differences between Spare The Air and Control day interviewing in all individual air districts were likewise significant. **This indicates that, as in past years, the program is effective in reaching drivers about the specific alert days.**

Spare The Air vs. Control Days: 2006 General Awareness

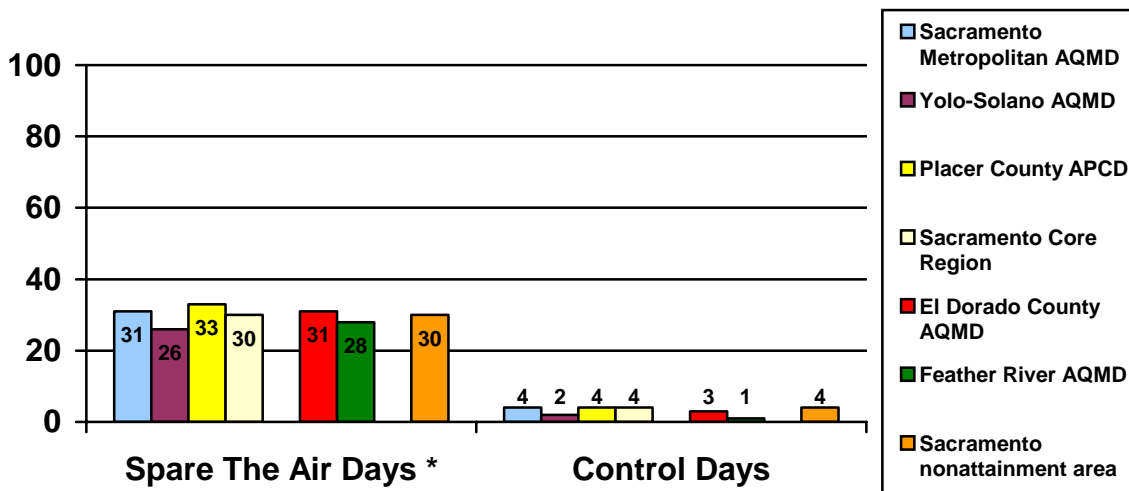


* indicates statistically significant differences between Spare The Air and Control percentages in all groupings.

Spare The Air vs. Control Days: 2006 Specific Awareness

In terms of specific awareness, the same differences between Spare The Air and Control day interviewing were found. As can be seen in the next chart, significantly more respondents in each air district and the region as a whole were aware of the specific request not to drive on Spare The Air days than on Control days:

Spare The Air vs. Control Days: 2006 Specific Awareness



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

Estimating the Number of STA-Aware Drivers

OBJECTIVE D:

The 62% of respondents who were aware of Spare The Air in general translates into 863,330 drivers in the entire area who noticed the advisory each Spare The Air day during the 2006 season. Correcting for Control day responses, that is, the percentage of respondents who said they noticed the advisory when one was not issued, means that 584,836 drivers were aware of the 2006 Spare The Air advisories.

In terms of specific awareness, and again correcting for Control day responses, this represented 362,041 drivers who, on an average Spare The Air day, noticed the specific request not to drive.

Estimating the Number of STA-Aware Drivers: 2006 General Awareness

In 2006, there were an estimated 1,392,467 drivers in the Sacramento nonattainment area.¹² As 62% of all respondents heard the Spare The Air advisories, extrapolating to the population of drivers means that approximately 863,330 drivers in the region were aware of Spare The Air in general. However, we also know that 20% of respondents interviewed on non-Spare The Air (Control days) also said they heard a Spare The Air advisory when in fact none had been issued. Therefore, correcting for Control day

¹² The number of drivers in the Sacramento nonattainment area for 2006 was estimated, using the number of driver licenses by county for 2005, obtained from the California Department of Motor Vehicles database at http://www.dmv.ca.gov/about/profile/dl_outs_by_county.htm, and calculating the percentage increase, based on county population figure increases from 2005 to 2006 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 2006, therefore, was 1,392,467: Sacramento Metropolitan AQMD: total 892,114 + Yolo-Solano: total of 196,387 (118,272 in Yolo County + Solano County: 269,360 * 29% for the proportion located within the Air Quality district = 78,115) + Placer County (238,298 * 87% for Air Quality district) = 207,319 + El Dorado County: (137,908 * 68% for Air Quality district) = 93,777 + Sutter County: (57,392 * 5% for Feather River Air Quality district) = 2,870.



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responses (through subtraction) indicates that **584,836 drivers in the Sacramento nonattainment are as a whole** were aware of the 2006 Spare The Air campaign in general. The table below indicates the calculations and the corrected 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	892,114	63% / 24%	562,032 – 214,107 = 347,924
Yolo-Solano AQMD	196,387	58% / 16%	113,904 – 31,422 = 82,483
Placer County APCD	207,319	64% / 15%	132,684 – 31,098 = 101,586
El Dorado County AQMD	93,777	59% / 16%	55,328 – 15,004 = 40,324
Feather River AQMD	2,870	62% / 24%	1,779 – 689 = 1,091
Sacramento Nonattainment Area	1,392,467	62% / 20%	863,330 – 278,493 = 584,836

Estimating the Number of STA-Aware Drivers: 2006 Specific Awareness

Results of specific awareness (i.e., "do you recall being asked not to drive yesterday because our area was experiencing a period of unhealthy air?") were also extrapolated in the same way, and are presented in the next table. It will be recalled that levels of specific awareness, although lower than levels of general awareness, have remained relatively stable over the course of the last seven years,¹³ at about 30%. For the entire Sacramento nonattainment area, and correcting for Control day responses, this translates into an estimated **362,041 drivers** who were specifically aware of the Spare The Air request not to drive.

¹³ The 2002 season was the exception, when 40% were aware of STA.

<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	892,114	31% / 4%	276,555 – 35,685 = 240,871
Yolo-Solano AQMD	196,387	26% / 2%	51,061 – 3,928 = 47,133
Placer County APCD	207,319	33% / 4%	68,415 – 8,293 = 60,123
El Dorado County AQMD	93,777	31% / 3%	29,071 – 2,813 = 26,258
Feather River AQMD	2,870	28% / 1%	804 – 29 = 775
Sacramento Nonattainment Area	1,392,467	30% / 4%	417,740 – 55,699 = 362,041

Purposeful Driving Reduction in the 2006 Spare The Air Season

Objectives

The 2006 Spare The Air¹⁴ television advisory messages remained the same as those used in 2005, focusing primarily on health issues related to high ozone and poor air quality and secondarily encouraging residents to drive less on summer days of particularly poor air quality. The STA radio advisories were only slightly modified from 2005, and again focused on the health risks associated with poor air quality but asked residents more directly to “reduce your driving to cut down pollution.”¹⁵

¹⁴ 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 and television announcements, e-mail based Air Alert notifications, and employer networks.

¹⁵ E-mail message from Lori Kobza, Sacramento Metropolitan Air Quality Management District, dated October 12, 2006.



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The percentage of Sacramento area residents who were aware of Spare The Air did not change significantly from last year to this year, with 62% of area residents in 2006 saying they noticed Spare the Advisories and 30% saying they heard a specific request to not drive because the area was experiencing a period of unhealthy air (see previous section - Awareness of the 2006 Spare The Air Campaign). Although the high percentage of residents who were aware of the Spare The Air advisories is obviously one indicator of the program's success, it is also important to show corresponding changes in behavior, and for the purposes of this report, **changes in driving behavior in particular.**

In the past, the Sacramento Metropolitan Air Quality Management District used the number of trip reductions reported by drivers who said they drove less than usual on Spare The Air days as a behavioral measure of success. This was consistent with the early project goal of reducing the number of trips made by residents in the area on Spare The Air days. In 2002, following discussions with the Air Resources Board (ARB), an even more stringent standard¹⁶ for measuring behavioral driving reductions was introduced – it required that drivers be aware of Spare The Air, that they made fewer vehicle trips on Spare The Air days, and further, that they said they did so purposefully to help reduce air pollution on Spare The Air days (“purposeful reducer”).

The main objective of the current report is to measure the success of the Spare The Air public education program by calculating purposeful driving reduction within the Sacramento nonattainment area¹⁷ using the strict ARB standard. Specific 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 five air quality districts in the Sacramento nonattainment area (Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, El Dorado County AQMD and Feather River 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 2006
- 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.

The following questions were used to calculate the percent of purposeful reducers and the number of trips they reduced:

- “Yesterday, did you drive your car, truck or van the same, more, or less frequently than you normally do on a [day of the week]?”

¹⁶ The ARB strict standard was first introduced in 2002 and has been applied in all subsequent evaluations of the Spare The Air program.

¹⁷ 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 and the Feather River AQMD of South Sutter 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 and Sutter County, and results will have been re-weighted appropriately. (See methodology section for further details.)

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- “Why did you make that change or those changes?” [This question was asked only of drivers who said they drove less the previous day.]
- “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?” [This question assessed general awareness of the Spare The Air program and was proposed by the ARB. It was added to the questionnaire in 2002.]
- “About how many SINGLE TRIPS in your car did you avoid driving yesterday to reduce air pollution? And by a SINGLE trip, I mean getting in your car, driving from one place to another and then stopping. For example, leaving your house and going to the store is one trip. Leaving the store and going to work or coming back home is another trip. (PROBE: Give me a reasonable approximation --a round number.)” [This question was asked only of drivers who said they drove less for air quality reasons.]

Results

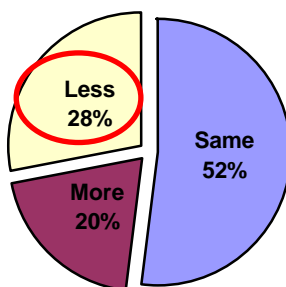
Driving Behavior On 2006 Spare The Air Days

OBJECTIVE E:

More residents drove “less” on Spare The Air days this year compared with previous years. In the Sacramento Core Region, 28% reported driving “less” on Spare The Air days in 2006 – significantly more than in each of the previous six years, and the highest percentage yet. There were no differences among the five air quality districts in terms of the proportion of drivers who reportedly drove less on Spare The Air days.

Respondents were asked whether they drove their vehicle the same, more, or less frequently than normal the previous day. Results for 2006 for the entire Sacramento nonattainment area were the same as those for the Sacramento Core Region¹⁸ and are presented in the next pie chart. It can be seen that about half (52%) 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 percent said they drove “more” the previous day and the remaining 28% drove “less”.

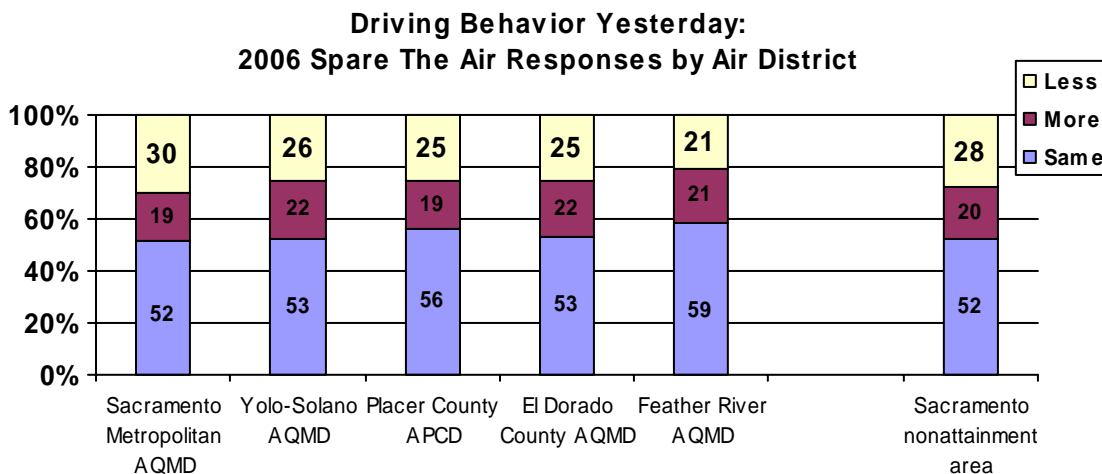
**Driving Behavior Yesterday:
2006 Spare The Air Responses in the
Sacramento Nonattainment Area and
Sacramento Core Region**



¹⁸ The Sacramento nonattainment area includes responses from residents in all five air quality districts: Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, El Dorado County AQMD, and Feather River AQMD. For comparison with previous years, the Sacramento Core Region refers to three air quality districts: Sacramento Metropolitan AQMD, Yolo-Solano AQMD and Placer County APCD. Responses in both cases have been weighted proportionally.

Driving Behavior on 2006 Spare The Air Days: By Air Quality District

Results from each of the individual air quality districts were similar and are presented in the next chart. There were no significant differences among the air quality districts. [It should be noted that the number of respondents in the Feather River AQMD was small relative to the other air districts and therefore even large percentage differences may not be statistically significant.]

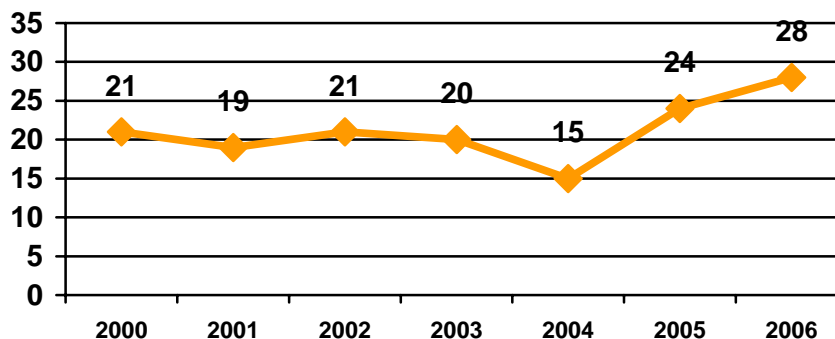


Driving Behavior On Spare The Air Days: Year-To-Year Comparison

The next analysis focused on just the percentage of drivers who said they drove less on Spare The Air days and compared annual results from 2000 to the present for the Sacramento Core Region (excludes El Dorado County and Feather River AQMDs).¹⁹ Results are presented in the next graph. Self-reported driving reduction on Spare The Air days from 2000 to 2003 was fairly stable, but the 15% of respondents who said they drove less in 2004 was significantly lower than any other year. (The 2004 season was cooler on Spare The Air days relative to other years -- milder in terms of temperature and poor ozone air quality. In fact the first Spare The Air advisory in the 2004 season was issued in August, although the season started in May.) Last year, the percentage who said they drove less on Spare The Air days (24%) was significantly higher than in 2001, 2003, and 2004. This year's 28% was significantly higher than all preceding six years.

¹⁹ The "Sacramento Core Region" includes residents in Sacramento Metropolitan AQMD, Placer County APCD, and Yolo-Solano AQMD and excludes El Dorado County AQMD and Feather River AQMD. El Dorado County AQMD residents were previously interviewed only in the 2004 evaluation and Feather River AQMD residents have never been included in previous evaluations. In order to make statistically valid comparisons from one year to the next, the same "base" (i.e. Sacramento Core Region) has been used.

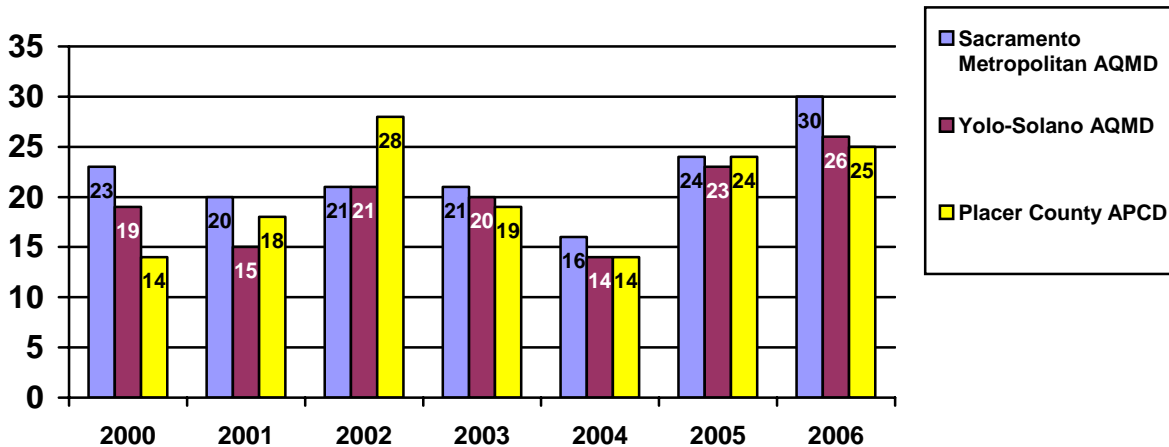
**Year-by-Year Comparison: Percent of Respondents Who Drove "Less" on Spare The Air Days:
 Sacramento Core Region**
 (excludes El Dorado AQMD and Feather River AQMD)



Driving Behavior On Spare The Air Days: Year-To-Year Comparison by Air District

The next analysis compared annual results for the past seven years in the three individual air quality districts of the Sacramento Core Region, and percentages of those who reported driving "less" are presented in the next chart. It can be seen that there was a little more fluctuation within Placer County APCD from one year to the next than there was in the other two air districts. This year, the percentage of respondents in Sacramento Metropolitan AQMD who reported driving less was significantly higher than all previous years. In Yolo-Solano AQMD, results from 2001 and 2004 were significantly lower than results in all other years. Also, this year's results were significantly higher than all other years, with the exception of 2005. In Placer County APCD, the percentage of drivers who said they drove less in both 2005 and 2006 was significantly higher than the percentage in 2000, 2001, and 2004. However, 2002 was the most notable year -- the percentage that said they drove less was the highest at 28%.

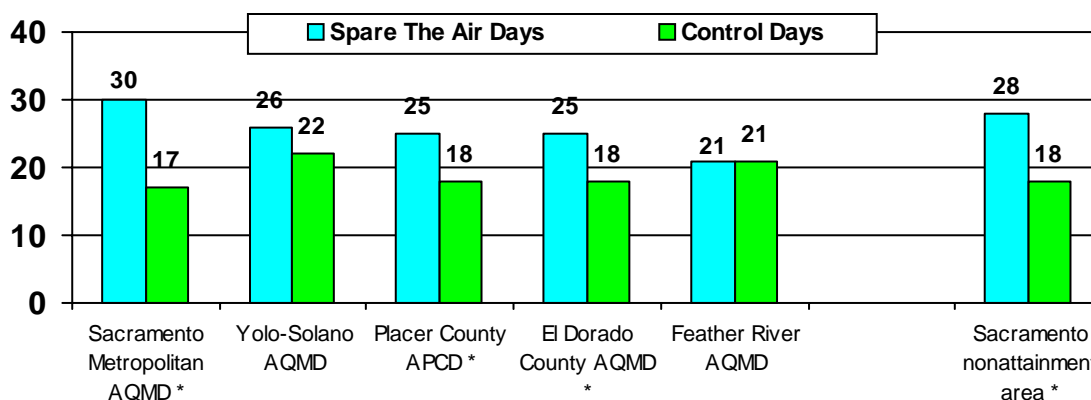
Year-by-Year Comparison of Percent of STA Respondents Who Drove "Less" on Spare The Air Days: Individual Air Districts



Driving Behavior: Spare The Air Days vs. Control Days by Air Quality District

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. This involved interviewing a group of respondents 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 in the season. For the next analysis, we were interested in seeing whether a higher percentage of respondents reported driving less on Spare The Air days than on matched Control days. The next chart shows the results. Statistical tests of proportion determined whether or not the differences between the two groups of respondents were significant. It can be seen that, with the exception of Yolo-Solano AQMD and Feather River AQMD, significantly more respondents in the Spare The Air groups said they drove less the previous day than in the Control groups. **This is considered one measure of the success of the program as it indicates that, regardless of whether drivers reduced for air quality reasons on Spare The Air days, more residents drove less on days of poor air quality (Spare The Air days) than on days of good air quality (Control days).**

**2006 Spare The Air vs. Control Days:
 Percent of Respondents Who Drove "Less" The Previous Day**



* indicates a statistically significant difference

Driving Behavior in Sacramento Metropolitan AQMD: Year-To-Year Comparison for Spare The Air Days vs. Control Days

These results continue to be encouraging. From 2000 to 2003, it appeared that the difference or “spread” between Spare The Air and Control percentages was declining²⁰ in the Sacramento Metropolitan AQMD. In 2003, it was even hypothesized that the effectiveness of the program might be fading. However, since 2004, there has been an increase in the spread, along with a concomitant significant difference between the two groups of respondents. The next table shows results in Sacramento Metropolitan AQMD from 2000 to the present.

²⁰ Percentage differences between STA and Control responses were nevertheless significant for all years except 2003.

<i>Percentage of Respondents Who Drove “Less” Yesterday: Sacramento Metropolitan AQMD</i>				
<i>Year</i>	<i>Spare The Air Day Respondents</i>	<i>Control Day Respondents</i>	<i>Difference (or “Spread”)</i>	<i>Statistically Significant Difference?</i>
<i>2000</i>	23%	12%	11%	Yes
<i>2001</i>	20%	14%	6%	Yes
<i>2002</i>	21%	17%	4%	Yes
<i>2003</i>	21%	18%	3%	No
<i>2004</i>	16%	10%	6%	Yes
<i>2005</i>	24%	16%	8%	Yes
<i>2006</i>	30%	17%	13%	Yes

Driving Behavior in Yolo-Solano AQMD: Year-To-Year Comparison for Spare The Air Days vs. Control Days

Results from Yolo-Solano AQMD have consistently been different. It can be seen in the next table that, with the exception of 2002, there were no significant differences between the two groups in any year, including this year. In other words, in Yolo-Solano AQMD, about the same number of respondents said they drove “less” the previous day, regardless of whether or not it had been a Spare The Air day. A possible explanation is that Yolo-Solano AQMD, as the furthest west, has long experienced better air quality than the other air districts of the Sacramento nonattainment area. This year was no exception – in terms of Federal 8-hour ozone standards, Yolo-Solano AQMD experienced only 4 exceedances, as compared with 30 in Sacramento Metropolitan AQMD, 31 in El Dorado County AQMD, and 34 in Placer County APCD.²¹ Further, there were no days in the 2006 summer season in Yolo-Solano AQMD when the Air Quality Index went above 150 and was therefore considered “unhealthy.”, and although there were 15 Spare The Air days during the summer for the Sacramento nonattainment area as a whole this year, the actual Air Quality Index (AQI) in Yolo-Solano AQMD never reached the trigger of 127 on any of those days. In other words, it may be that there were no differences between Spare The Air and Control percentages because residents in Yolo-Solano AQMD experienced fewer days of noticeably poor air quality.

²¹ Figures obtained from the Spare The Air website at: <http://www.sparetheair.com/Exceedances.cfm?v=Region&t=all&page=byRegion&q=Table>.



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<i>Percentage of Respondents Who Drove "Less" Yesterday: Yolo-Solano AQMD</i>				
<i>Year</i>	<i>Spare The Air Day Respondents</i>	<i>Control Day Respondents</i>	<i>Difference (or "Spread")</i>	<i>Statistically Significant Difference?</i>
<i>2000</i>	<i>19%</i>	<i>15%</i>	<i>4%</i>	<i>No</i>
<i>2001</i>	<i>15%</i>	<i>18%</i>	<i>-3%</i>	<i>No</i>
<i>2002</i>	<i>21%</i>	<i>13%</i>	<i>8%</i>	<i>Yes</i>
<i>2003</i>	<i>20%</i>	<i>17%</i>	<i>3%</i>	<i>No</i>
<i>2004</i>	<i>14%</i>	<i>14%</i>	<i>0%</i>	<i>No</i>
<i>2005</i>	<i>23%</i>	<i>20%</i>	<i>3%</i>	<i>No</i>
<i>2006</i>	<i>26%</i>	<i>22%</i>	<i>4%</i>	<i>No</i>

Driving Behavior in Placer County APCD: Year-To-Year Comparison for Spare The Air Days vs. Control Days

Results from Placer County APCD are presented in the next table. It can be seen that significantly more respondents said they drove less on Spare The Air days than on Control days in 2002, 2005 and 2006.

<i>Percentage of Respondents Who Drove "Less" Yesterday: Placer County APCD</i>				
<i>Year</i>	<i>Spare The Air Day Respondents</i>	<i>Control Day Respondents</i>	<i>Difference (or "Spread")</i>	<i>Statistically Significant Difference?</i>
<i>2000</i>	<i>14%</i>	<i>17%</i>	<i>-3%</i>	<i>No</i>
<i>2001</i>	<i>18%</i>	<i>15%</i>	<i>3%</i>	<i>No</i>
<i>2002</i>	<i>28%</i>	<i>19%</i>	<i>9%</i>	<i>Yes</i>
<i>2003</i>	<i>19%</i>	<i>15%</i>	<i>4%</i>	<i>No, but almost</i>
<i>2004</i>	<i>14%</i>	<i>12%</i>	<i>2%</i>	<i>No</i>
<i>2005</i>	<i>24%</i>	<i>17%</i>	<i>7%</i>	<i>Yes</i>
<i>2006</i>	<i>25%</i>	<i>18%</i>	<i>7%</i>	<i>Yes</i>

Percentage of Purposeful Reducers by Air Quality District

OBJECTIVE F:

During the summer of 2006, 2.2% 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 were aware of the Spare The Air advisories in general. There were significantly more purposeful reducers in Placer County APCD (4.3%) than in Sacramento Metropolitan or Yolo-Solano AQMDs (1.9%).

The next step involved in measuring purposeful driving reduction was to calculate 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 question²²). Results from each air 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 Sacramento Core Region as well as the entire Sacramento nonattainment area, 2.2% of all Spare The Air respondent drivers (15 out of 671, and 16 out of 714, respectively) met the strict ARB standard for purposeful driving reduction. The highest percentage of purposeful reducers was found this year in Placer County APCD – the 4.3% of Spare The Air reducers was significantly higher than the 1.9% of reducers in both Sacramento Metropolitan and Yolo-Solano AQMDs. In El Dorado County AQMD, 2.1% of drivers were classified as purposeful reducers and in Feather River AQMD, no drivers (0%) met the criteria.

<i>Spare The Air: Purposeful Reducers in 2006</i>	<i>Number of Respondents Who Reduced Driving For Air Quality Reasons and Were Aware of STA Advisories</i>	<i>Total Number of Respondents Interviewed on Days Following Spare The Air</i>	<i>% of Total Respondents Who Reduced Driving for Air Quality Reasons and Were Aware of STA Advisories</i>
<i>Sacramento Metropolitan AQMD</i>	9	470	1.9%
<i>Yolo-Solano AQMD</i>	9	482	1.9%
<i>Placer County APCD</i>	17	397	4.3%
<i>Sacramento Core Region²³</i>	15	671	2.2%
<i>El Dorado County AQMD</i>	7	331	2.1%
<i>Feather River AQMD</i>	0	82	0.0%
<i>Sacramento Nonattainment Area²⁴</i>	16	714	2.2%

²² 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.

²³ Weighted, excludes El Dorado County and Feather River AQMDs.

²⁴ Weighted, includes El Dorado County and Feather River AQMDs.

Percentage of Purposeful Reducers: Year-To-Year Comparison By Air Quality District

OBJECTIVE G:

The percentage of purposeful reducers in the Sacramento Core Region has basically remained the same since 2000. This year's percentage, although higher at 2.2% than in most other years, is not significantly higher. Over the last seven years, an average of 1.8% of all drivers in the Sacramento Core Region purposefully reduced driving on Spare The Air days in order to help improve air quality.

In Sacramento Metropolitan AQMD, the percentage of reducers has also not changed from one year to the next, and the same is true in Yolo-Solano AQMD, with the exception of 2002. However, this year there was a significantly higher percentage of purposeful reducers in Placer County APCD at 4.3% compared with most other years.

Tests of proportion were run that compared the percentage of reducers²⁵ each year with every other year from 2000 to the present. Results are presented in the next table. It can be seen that the percentage of reducers has not changed significantly from one year to the next in terms of the Sacramento Core Region (which excludes El Dorado County and Feather River AQMDs) as a whole and Sacramento Metropolitan AQMD in particular. It can also be seen that, **averaged over seven years, 1.8% 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 percentages of reducers in Sacramento Metropolitan AQMD and the Sacramento Core Region as a whole were 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 this year and in 2002 than in most other years.

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

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 9 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.



Sacramento Core Region²⁶	1.8%	1.7%	2.7%	1.4%	1.5%	1.4%	2.2%	No	1.8%
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Estimated Number of Purposeful Reducers by Air Quality District

OBJECTIVE H:

*When extrapolated to the population of drivers, about **30,635** 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 are an estimated 1,392,467 drivers in the entire Sacramento nonattainment area²⁷ this year. Extrapolating to the population of drivers, the 2.2% of purposeful reducers just described means that approximately **30,635** 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 as a whole (both excluding and including El Dorado County & Feather River AQMDs) 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	892,114	1.9%	16,950
Yolo-Solano AQMD	196,387	1.9%	3,730
Placer County APCD	207,319	4.3%	8,915
Sacramento Core Region	1,295,820	2.2%	28,510²⁸
El Dorado County AQMD	93,777	2.1%	1,970
Feather River AQMD	2,870	0%	0
Sacramento Nonattainment Area²⁹	1,392,467	2.2%	30,635³⁰ purposeful reducers

²⁶ Excludes El Dorado County and Feather River AQMDs.

²⁷ The number of drivers in the Sacramento nonattainment area for 2006 was estimated, using the number of driver licenses by county for 2005, obtained from the California Department of Motor Vehicles database at http://www.dmv.ca.gov/about/profile/dl_outs_by_county.htm, and calculating the percentage increase, based on county population figure increases from 2005 to 2006 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 2006, therefore, was 1,392,467: Sacramento Metropolitan AQMD: total 892,114 + Yolo-Solano: total of 196,387 (118,272 in Yolo County + Solano County: 269,360 * 29% for the proportion located within the Air Quality district = 78,115) + Placer County (238,298 * 87% for Air Quality district) = 207,319 + El Dorado County: (137,908 * 68% for Air Quality district) = 93,777 + Sutter County: (57,392 * 5% for Feather River Air Quality district) = 2,870.

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%, El Dorado County AQMD is 6%, and Feather River AQMD is .02%.



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Estimated Number of Single Trips Avoided by Purposeful Reducers by Air District

OBJECTIVE I:

*In the entire Sacramento nonattainment area, drivers who purposefully reduced driving on Spare The Air days avoided making an average of 2.8 single trips each. This translates into a total of **85,780 trips** purposefully avoided on average each Spare The Air day during the 2006 season.*

Respondents who were classified as 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 by the purposeful reducer drivers in the entire Sacramento nonattainment area was 2.8.³¹ Extrapolated to the estimated 30,635 drivers who purposefully reduced their driving on Spare The Air days, this translates into an estimated **85,780 single trips** that drivers avoided making on Spare The Air days during the summer of 2006, 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 and Feather River AQMDs) are presented in the next table.

<i>Air District</i>	<i>Estimated Number of Purposeful Reducers</i>	<i>Mean # of Tips Avoided for Air Quality Reasons</i>	<i>Estimated Number of Single Trips Reduced</i>
<i>Sacramento Metropolitan AQMD</i>	16,950	2.9	49,155
<i>Yolo-Solano AQMD</i>	3,730	3.0	11,190
<i>Placer County APCD</i>	8,915	2.2	19,615
<i>Sacramento Core Region³²</i>	28,510	2.7	76,980
<i>El Dorado County AQMD</i>	1,970	4.2	8,275
<i>Feather River AQMD</i>	0	0	0
<i>Sacramento Nonattainment Area³³</i>	30,635	2.8	85,780 trips

²⁹ Includes El Dorado County and Feather River AQMDs.

³⁰ See footnote #20.

³¹ The mean was 2.8, with a standard deviation of 2.07, the median was 2, and the range was 1 to 10 trips avoided. There was 1 driver who was unable or refused to estimate the number of trips avoided and that individual was not included in this calculation.

³² Excludes El Dorado County and Feather River AQMDs.

³³ Includes El Dorado County and Feather River AQMDs.

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

OBJECTIVE J:

There were significantly more respondents who purposefully reduced driving on Spare The Air days than on Control days in Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, and the entire Sacramento nonattainment area as a whole. This means that, although the overall percentage of purposeful reducers is not high, the program has been successful in convincing at least some drivers to avoid trips they might otherwise have made, specifically on days of poor air quality.

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.³⁴

As shown in the next chart, the percentage of respondents who reduced the number of trips they made for air quality reasons on Control days was significantly less than the percentage who reduced on Spare The Air days in most individual air districts and in the Sacramento nonattainment area as a whole. In other words, this argues well for the continuation of the Spare The Air program, as it shows the impact the Spare The Air advisories have in terms of influencing driving reduction on days of poor air quality. Despite the relatively small overall percentage of purposeful reducers each summer, it is a consistent percentage, and represents drivers who specifically avoid making trips because they know it is a Spare The Air day and individually want to help improve air quality in the area.

<i>Air District</i>	<i>% of Total Respondents Who Reduced for Air Quality Reasons</i>		<i>Significant Difference?</i>
	<i>Who Were Aware On STA Days</i>	<i>On Control Days</i>	
<i>Sacramento Metropolitan AQMD</i>	1.9%	0.2%	Yes
<i>Yolo-Solano AQMD</i>	1.9%	0.5%	Yes
<i>Placer AQMD</i>	4.3%	1.0%	Yes
<i>Sacramento Core Region³⁵</i>	2.2%	0.3%	Yes
<i>El Dorado County AQMD</i>	2.1%	1.5%	No
<i>Feather River AQMD</i>	0%	1.4%	No
<i>Sacramento Nonattainment Area³⁶</i>	2.2%	0.5%	Yes

³⁴ 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.

³⁵ Excludes El Dorado County and Feather River AQMDs.

³⁶ Includes El Dorado County and Feather River AQMDs.



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Results in El Dorado County AQMD and Feather River AQMD indicated no significant difference between Spare The Air and Control day reducers. In part this may have been due to the smaller number of completed interviews in these air districts.

A final factor to consider regarding the relatively low percentage of purposeful reducers on Spare The Air days is that this is probably a very conservative estimate. Those individuals who already typically reduce the amount of driving they do during the summer months are not included in our calculations of purposeful reducers – only those who said they drove “less” enter into the calculation. In other words, seasonal reducers may have already limited the number of trips they make on hot days and are unable to drive even less on Spare The Air days. A further report will assess the impact of such seasonal driving reduction.

Estimated Emission Reductions During the 2006 Spare The Air Season

Objectives

The Sacramento Metropolitan Air Quality Management District has been administering a public education program called “Spare The Air” since 1995. It was designed to encourage the voluntary participation of drivers in the Sacramento nonattainment area³⁷ to improve the air quality by helping to reduce ozone in the air during summer days of particularly poor air quality³⁸ by driving less. The major focus of the program has been to issue advisories asking residents to drive less by delaying trips, working at home, carpooling, using transit, biking and walking. Other helpful suggestions include the proper maintenance of vehicles, including regular tune-ups and changing of air filters, as well as avoiding the use of gas-powered lawn mowers, leaf blowers, and chain saws.

The previous section (Purposeful Driving Reduction in the 2006 Spare The Air Season) demonstrated that **2.2% of all the drivers in the region** interviewed following 2006 Spare The Air days reported making fewer trips on those days because they had heard the advisories and specifically wanted to reduce air pollution. (This is a strict definition of purposeful driving reduction, and was proposed by the Air Resources Board (ARB) in 2002.) Although the percentage is small, when extrapolated to the population of drivers in the Sacramento nonattainment area as a whole, it means that about **30,635 drivers** purposefully made fewer trips on Spare The Air days in order to reduce air pollution.

The main objective of the current section is to take this information a step further and estimate how many tons of ozone precursor emissions [Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)] were reduced during the 2006 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.

Specifically, the calculation of emission reductions involves:

- k. subtracting the estimated number of single trips avoided by purposeful reducers on Control (non Spare The Air) days from the estimated number of single trips avoided by purposeful reducers on Spare The Air days,

³⁷ The Sacramento nonattainment area includes all of Sacramento County and Yolo County, and parts of Solano County, Placer County, El Dorado County and Sutter County. It has been deemed a nonattainment area because it violates federal 8-hour health standards for ozone.

³⁸ The Spare the Air program has been in place in the Sacramento nonattainment area 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 region. 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 and television announcements, e-mail based Air Alert notifications, and employer networks.

- I. using the latest approved standard EMFAC2002 model (V2.2) run on the 2006 summer season to calculate 2006 VOC and NOx starting and running emissions factors.³⁹ This will be used to estimate the number of tons of ozone precursors we can confidently say were reduced specifically due to the Spare The Air program,
- m. doing this for each air quality management district that showed a significant difference in terms of the percentage drivers who reported driving “less” the previous day between Spare The Air and Control days, as well as for the entire Sacramento nonattainment area, and
- n. comparing the estimated ozone precursor emissions reductions in the Sacramento Metropolitan AQMD from 2001 to the present.

Results

Calculation of Estimated Emission Reductions

The methodology that has been used for the last few years to estimate emission reductions due specifically to the Spare The Air program is conservative as it eliminates many respondents from consideration (such as those who reduced their driving for reasons other than air quality, those who drove less but had not heard the Spare The Air advisory, or those 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). The methodology also uses current season results from Control day interviewing as a correction factor.

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,⁴⁰ 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 **2.2%** ($16 / 714^{41}$) 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 **2.8** single trips avoided.⁴²
3. Extrapolate to the total number of drivers in the region⁴³ this year: the percentage of STA reducers therefore represents **30,635** drivers in the Sacramento nonattainment area, and the number of single trips avoided was **85,780** (30,635 drivers x 2.8 trips avoided on average).

³⁹ The emissions model was provided in a spreadsheet by Bruce Katayama, SMAQMD on October 16, 2006.

⁴⁰ Using the ARB-worded question for measuring general awareness of Spare the Air.

⁴¹ 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 is less than the sum of the total number of interviews of all air districts.

⁴² The mean was 2.8, with a standard deviation of 2.07, the median was 2, and the range was 1 to 10 trips avoided. There was 1 driver who was unable or refused to estimate the number of trips avoided and that individual was not included in this calculation.

⁴³ The number of drivers in the Sacramento nonattainment area for 2006 was estimated, using the number of driver licenses by county for 2005, obtained from the California Department of Motor Vehicles database at http://www.dmv.ca.gov/about/profile/dl_outs_by_county.htm, and calculating the percentage increase, based on county population figure increases from 2005 to 2006 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 2006, therefore, was 1,392,467: Sacramento Metropolitan AQMD: total 892,114 + Yolo-Solano: total of 196,387 (118,272 in Yolo County + Solano County: 269,360 * 29% for the proportion located within the Air Quality district = 78,115) + Placer County (238,298 * 87% for Air Quality district) = 207,319 + El Dorado County: (137,908 * 68% for Air Quality district) = 93,777 + Sutter County: (57,392 * 5% for Feather River Air Quality district) = 2,870.

4. Multiply the number of trips avoided by a per trip emission reduction average of **6.04 grams of ozone precursors**.⁴⁴ [This includes a total of VOC (3.30 grams per trip for light duty passenger cars plus two categories of light duty trucks) plus NOx (2.74 grams per trip for light duty passenger cars and light duty trucks) emissions.] EMFAC2002 V2.2 was the latest update to the EMFAC model at the time this report was prepared. It is used by California state and local governments to meet Clean Air Act (CAA) requirements. EMFAC2002 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 **518,111 grams** of ozone precursors (85,780 single trips avoided x 6.04 grams per trip).
5. Convert to tons.⁴⁵ For the Sacramento nonattainment area as a whole, this translates to an estimated total of **0.57 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 **3** individuals (or 0.5% of all Control day respondents) who reduced an average of **3.7**⁴⁶ driving trips on Control days for air quality reasons. Extrapolated to the total population, therefore, this means that **6,960** drivers on control days avoided a total of **25,750** single trips (6,960 drivers x 3.7 trips avoided). Multiplying the number of trips avoided by a per trip emission reduction average of 6.04 grams of ozone precursors indicates that 155,530 grams or **0.17** tons of emission precursors were reduced per Control day in 2006.
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 0.17 tons of ozone precursors, which, when subtracted from the 0.57 tons reduced on Spare The Air days, yields:
8. Result: **0.40 tons of ozone precursors reduced per Spare The Air day in 2006.**

2006 Emissions Reductions in the Nonattainment Area

The procedure described above for calculating the 2006 Emissions Reduction Estimate in the Sacramento nonattainment area is summarized in the table that follows:

⁴⁴ Based on summer 2006 EMFAC2002 V2.2 SMAQMD spreadsheet figures provided by Bruce Katayama, SMAQMD, October 16, 2006. Models were run for the summer of 2006. The total VOC tons for a combined total of light duty passenger cars and two categories of light duty trucks (10.52 + 4.48 + 3.60) 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. 3,269,970 for light duty passenger cars + 948,648 for light duty trucks¹ + 897,290 for light duty trucks²) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (7.72 + 3.45 + 4.24) x 2000 x 454 / (3,269,970 + 948,648 + 897,290). VOC grams and NOx grams were then combined (3.30 + 2.74) to obtain 6.04 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.

⁴⁵ There are 907,200 grams in a ton.

⁴⁶ The standard deviation was 2.68; and answers ranged from 1 to 6 single trips avoided.



2006 Spare The Air Evaluation

Final Report of the 2006 Spare The Air Campaign

December, 2006

Sacramento Nonattainment Area	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons ⁴⁷	x Number of Licensed Drivers in Sacramento Nonattainment Area (1,392,467 Total)	X Mean Number of Single Trips Reduced Per Day	x 6.04 Grams of Ozone Precursors Per Trip (EMFAC 2002 V2.2) 2006 Model	= Estimated Tons per Day of Ozone Precursors Reduced
Spare The Air Days	2.2% (16 / 714 ⁴⁸)	30,635	x 2.8 = 85,780	518,111 grams	0.57 tons
Control Days	0.5% (3 / 613)	6,960	x 3.7 = 25,750	155,530 grams	0.17 tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions – Control Day Reductions)					0.40 tons

OBJECTIVES K, L, & M

Correcting for control day interviewing, the 2006 Spare The Air program was successful in reducing air pollution in the entire Sacramento nonattainment area by an estimated 0.40 tons of ozone precursors per day. This is due specifically to drivers purposefully reducing the number of trips they took on Spare The Air days for air quality reasons. In the Sacramento Metropolitan AQMD, an estimated .26 tons of ozone precursors were reduced, in Placer County APCD, the reduction was .09 tons per Spare The Air day, and in El Dorado County AQMD the reduction was .05 tons.

One criterion for calculating emission reductions in the individual air quality districts has been to demonstrate that significantly more respondents in the Spare The Air group than in the Control group said they drove “less” the previous day. This year there were no significant differences in Yolo-Solano and Feather River AQMDs between the two groups of respondents.⁴⁹ (This has also been the case in Yolo-Solano AQMD for many years.) Therefore, emission reductions will be calculated only for Sacramento Metropolitan AQMD, Placer County APCD, and El Dorado County AQMD.

⁴⁷ 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).

⁴⁸ Please note that total number of completed interviews for the Sacramento nonattainment area as a whole (i.e. 714) is less than the total number of completed interviews within all air districts. 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%), and Feather River AQMD (.02%). 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.

⁴⁹ See the section on Purposeful Driving Reduction in the 2006 Spare the Air Season.

2006 Emissions Reduction Estimate: Sacramento Metropolitan AQMD

It can be seen in the next table that in Sacramento Metropolitan AQMD, air pollution was reduced by an estimated **0.26 tons of ozone precursors** per Spare The Air day, specifically due to residents driving less on Spare The Air days.

Sacramento Metropolitan AQMD	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons	x Number of Licensed Drivers in Sacramento Metropolitan AQMD (892,114 Total)	x Mean Number of Single Trips Reduced Per Day	x 6.04 Grams of Ozone Precursors Per Trip (EMFAC 2002 V2.2) 2006 Model	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	1.9% (9 / 470)	16,950	x 2.9 = 49,155	296,900 grams	0.33 tons
Control Days	0.2% (1 / 404)	1,785	x 6.0 = 10,710	64,690 grams	0.07 tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions – Control Day Reductions)					0.26 tons

2006 Emissions Reduction Estimate: Placer County APCD

The next table shows that in Placer County APCD, air pollution was reduced by an estimated **0.09 tons of ozone precursors** 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 Placer County APCD (207,319 Total)	x Mean Number of Single Trips Reduced Per Day	x 6.04 Grams of ozone precursors per trip (EMFAC 2002 V2.2) 2006 model	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	4.3% (17 / 397)	8,915	x 2.2 = 19,615	118,475 grams	0.13 tons
Control Days	1.0% (4 / 405)	2,075	x 2.80 = 5,810	35,090 grams	0.04 tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions – Control Day Reductions)					0.09 tons

2006 Emissions Reduction Estimate: El Dorado County AQMD

In El Dorado County AQMD, correcting for control days, air pollution was reduced by an estimated **0.05 tons of ozone precursors** per Spare The Air day:

El Dorado County AQMD	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons	x Number of Licensed Drivers in El Dorado County AQMD (93,777 Total)	x Mean Number of Single Trips Reduced Per Day	x 6.04 Grams of Ozone Precursors Per Trip (EMFAC 2002 V2.2) 2006 Model	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	2.1% (7 / 331)	1,970	x 4.2 = 8,275	49,980 grams	0.06 tons
Control Days	1.5% (6 / 405)	1,405	x 1.3 = 1,825	11,025 grams	0.01 tons
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)

OBJECTIVE N:

Estimates of emission precursor reductions since 2001 in the Sacramento Metropolitan AQMD vary from one year to the next.

A comparison of estimated emission reductions⁵⁰ from 2001 to the present in the Sacramento Metropolitan AQMD⁵¹ (only) are presented in the next table. It is important to point out that the factors that contribute to the estimates, including 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. **What is constant, however, is that the Spare The Air program has been successful each year in reducing the amount of ozone precursors in the air.**

⁵⁰ The estimated emissions reductions shown in the current table differ from those presented in the annual Spare the Air evaluation reports from 2001 to 2004, and were recalculated in 2005 in order to conform to the methodology established in the SMAQMD 2003 Triennial Report. They correspond to the estimates contained in Table 9-1 of the SMAQMD 2003 Triennial Report, Community Education Programs, Page 9-2 (www.airquality.org/stateplan/2003TriennialReportFinal.pdf). The detailed explanation was presented in last year's report, but the basic concept was that different ozone precursor grams per trip multiplication factors based on EMFAC models were used in the 2001 to 2004 reports. Mr. Bruce Katayama of the SMAQMD prepared Table 9-1 and responded to the comments and questions raised in the public inquiry in March 2005. The Report was finalized and tabled in April, 2005, in compliance with the California Clean Air Act.

⁵¹ Over the years, reductions could often not be calculated for Placer County APCD and Yolo-Solano AQMD as there were sometimes no significant differences between Spare the Air and Control day drivers who said they drove less.

<i>Estimated Tons of Ozone Precursors Reduced on Spare The Air Days</i>	2001	2002	2003	2004	2005	2006
Sacramento Metropolitan AQMD	1.32 tons (.69 VOC + .63 NOx)	0.99 tons (.52 VOC + .47 NOx)	0.26 tons (.14 VOC + .12 NOx)	0.42 tons (.23 VOC + .19 NOx)	0.25 tons (.13 VOC + .12 NOx)	0.26 tons (.14 VOC + .12 NOx)

Summer 2006 Health Issues

Objectives

Ground-level ozone is a strong irritant that aggravates respiratory diseases such as emphysema, bronchitis, and asthma. Children in particular are vulnerable. It also contributes to wheezing, chest pain, dry throat, headache or nausea. It reduces our resistance to infection, and can lead to premature death. Volatile organic compounds (VOC) and Nitrogen Oxide (NOx) emissions from the on-road mobile sources of residential cars, light-duty trucks, and vans cause nearly a third of the Sacramento region's ozone air pollution.⁵²

The U.S. Environmental Protection Agency has designated the Sacramento region as a "severe" ozone nonattainment area.⁵³ During summer months, the region fails to meet the federal 8-hour health standard for ozone. The region consists of all of Sacramento County, Yolo County, and parts of Placer County, El Dorado County, Solano County and Sutter County. For the past eleven years, the Sacramento Metropolitan Air Quality Management District has conducted a Spare The Air program to keep residents informed when air pollution levels increase and to encourage residents to drive less.⁵⁴ The Spare The Air television advisories were the same as those used last year and the radio advisories were only slightly modified from 2005. It can be seen in the example radio advisory below that health risks associated with poor air quality were first mentioned and then drivers were directly asked to "reduce your driving to cut down pollution."⁵⁵

⁵² Brigette Tollstrup, Sacramento Metropolitan Air Quality Management District.

⁵³ Throughout this report, the Sacramento nonattainment area refers to the regions in which interviews were conducted: Sacramento County, Yolo County, parts of Placer County and Solano County, as well as rural areas of El Dorado County and the Feather River AQMD of South Sutter 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 and Sutter County, and results will have been re-weighted appropriately. (See methodology section for further details.)

⁵⁴ The Spare The Air program has been in place in the Sacramento region 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 region. 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 and television announcements, e-mail based Air Alert notifications, and employer networks. The Spare The Air season runs from May through October of each year.

⁵⁵ E-mail message from Lori Kobza, Sacramento Metropolitan Air Quality Management District, dated October 12, 2006.

“This is a Spare The Air advisory from the Sacramento Metropolitan Air Quality Management District and the air districts of the Sacramento Region.

Tomorrow’s air quality is forecast to be unhealthy with ground level ozone levels above 127 AQI.

Health risks may include respiratory problems and long term lung damage. Avoid any prolonged outdoor exertion.

Reduce your driving to cut down pollution.

For more information or to receive a personal air alert, visit sparetheair.com”

The main objective of the current report is to document the relationship between poor air quality and the health effects experienced by households in the Sacramento nonattainment area during the summer of 2006.

Specific objectives of the current report are to:

- o. 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,
- p. 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 2006,
- q. 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 Feather River AQMD), and
- r. 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, El Dorado County AQMD, and Feather River AQMD).

Method

Household breathing problems during the Spare The Air season have been tracked since 2000 using the following question:

- “Did you or did anyone else in your household have difficulty breathing yesterday because of unhealthy air yesterday?”

Two years ago a few additional health-related questions were added:

- “And what about today?”
- “Did you or did anyone else in your household experience any of the following conditions either yesterday or today because of unhealthy air yesterday?”
 - a. Coughing?
 - b. Headache?
 - c. Burning eyes?”

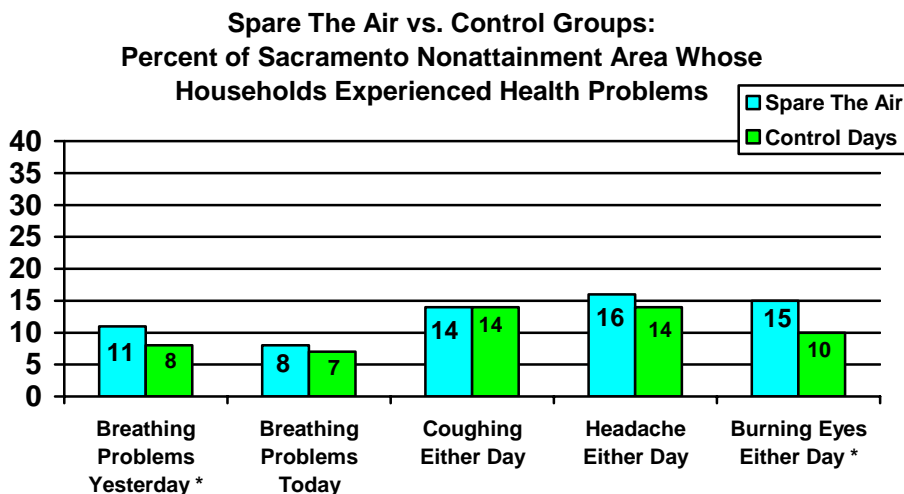
Results

Spare The Air Days vs. Control Days

OBJECTIVE O:

Poor air quality caused significantly more breathing difficulties and burning eyes in households interviewed about Spare The Air days than Control days in the Sacramento nonattainment area. It did not cause increases in either coughing or headaches.

It can be seen in the next chart that significantly more households experienced breathing problems on Spare The Air days (11%) and burning eyes (15%) on Spare The Air days than on Control days in the Sacramento nonattainment area as a whole.⁵⁶ There were no differences between Spare The Air and Control respondents in terms of the percentage of households who experienced breathing problems on the day of the interview, or coughing or headaches either the day before or the day of the interview.



* indicates a statistically significant difference

Estimated Number of Households

OBJECTIVE P:

Correcting for Control days, an estimated 24,795 additional households in the Sacramento nonattainment area experienced breathing problems during Spare The Air days specifically due to ozone air pollution. In addition, 41,325 households experienced burning eyes.

As can be seen in the next table, there are an estimated 826,507⁵⁷ households in the Sacramento nonattainment area; therefore, the 11% of respondents who claimed that someone in their household

⁵⁶ Excludes responses of don't know/undecided.

⁵⁷ The measure used for households was the number of housing units. Reference: State of California, Department of Finance, [E-5 City / County Population and Housing Estimates](http://www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E5/E5-06/documents/E-5a.xls), 2006, Revised 2001–2005, with 2000 Benchmark. Available online at: www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E5/E5-06/documents/E-5a.xls. The estimated number of households for the entire Sacramento nonattainment area is 826,507 ((Sacramento Metropolitan AQMD: 535,788) + (Placer County APCD: 140,330 * 87% = 122,087) + (Yolo-Solano AQMD: 111,664 (Yolo: 70,542; Solano (Dixon, Rio Vista & Vacaville: 41,122)) + (El Dorado County AQMD: 81,478 * 68% = 55,405) + (Feather River AQMD: 1,563)).

experienced breathing problems on a Spare The Air day translates into 90,915 households. The 8% of respondents who reported breathing problems on Control days translates into 66,120 households. Correcting for Control days through subtraction, this means that an additional **24,795 households experienced breathing problems due specifically to ozone air pollution on Spare The Air days.** The number of additional households who experienced burning eyes either the day before or the day of the interview was 41,325.

	<i>Number of Households Affected</i>		
	<i>Spare The Air Respondents</i>	<i>Control Respondents</i>	
<i>Sacramento Nonattainment Area (826,507 Households)</i>		-	=
<i>Breathing Difficulties Yesterday</i>	<i>11% = 90,915</i>	<i>8% = 66,120</i>	<i>24,795</i>
<i>Burning Eyes Yesterday or Today</i>	<i>15% = 123,975</i>	<i>10% = 82,650</i>	<i>41,325</i>

Year-To-Year Comparison

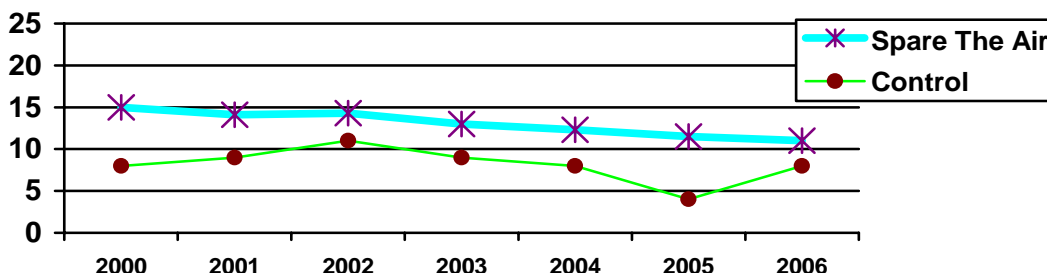
OBJECTIVE Q:

The percentage of households reporting breathing difficulties in the Sacramento Core Region on Spare The Air days has stayed the same from 2000 to the present, at an average of 13% of all households during the past seven years. An average of 8% of households interviewed on Control days experienced breathing difficulties.

The next graph plots the percentage of respondents in the Sacramento Core Region (excluding El Dorado County and Feather River AQMDs) who said someone in their household had trouble breathing on Spare The Air and Control days from 2000 to the present. Although it appears that there might be a downward trend in terms of households affected on Spare The Air days, the differences are not yet statistically significant.

It can be seen that seven years ago (in 2000), 15% of respondents had difficulty breathing, followed by two years where 14% experienced problems, followed by 13% in 2003; 12% in 2004 and 2005; and 11% this year. The six year average is 13% of households. Basically, the reported level of breathing difficulty caused by ozone air pollution on Spare The Air days has remained stable over the last seven years. In terms of Control day interviewing, the percent of households who reported breathing difficulties has also remained relatively stable at about 8%, with the notable exception of 2005, when the percentage significantly declined to 4%. There was no clear explanation for that decline and this year's increase to 8% would seem to indicate it was simply an anomalous result.

Year-by-Year Comparison of Percent of Respondents Whose Households Experienced Breathing Difficulties on Spare The Air Days: Sacramento Core Region



By Air Quality District

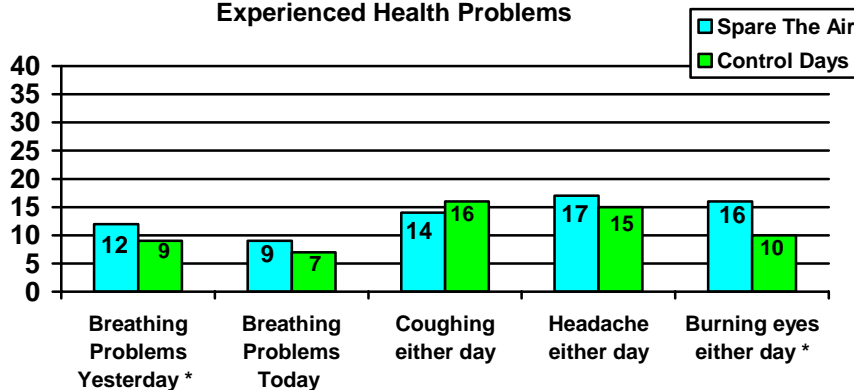
OBJECTIVE R:

With the exception of Yolo-Solano AQMD, households in the four other air quality districts of the Sacramento nonattainment area experienced significantly more breathing problems on Spare The Air days than on Control days. Other health effects attributable to poor air quality on Spare The Air days included burning eyes in Sacramento Metropolitan and El Dorado County AQMDs; headaches in Yolo-Solano AQMD and Placer County APCD; and coughing in Feather River AQMD households.

Perceived Health Effects: Sacramento Metropolitan AQMD

In terms of the individual counties, results from Sacramento Metropolitan AQMD indicated that more households experienced breathing problems on Spare The Air days and burning eyes in the Spare The Air group than in the Control group of respondents. There were no significant differences between the two groups in terms of breathing problems on the day of the interview, coughing, or headaches. Results are shown in the next chart.

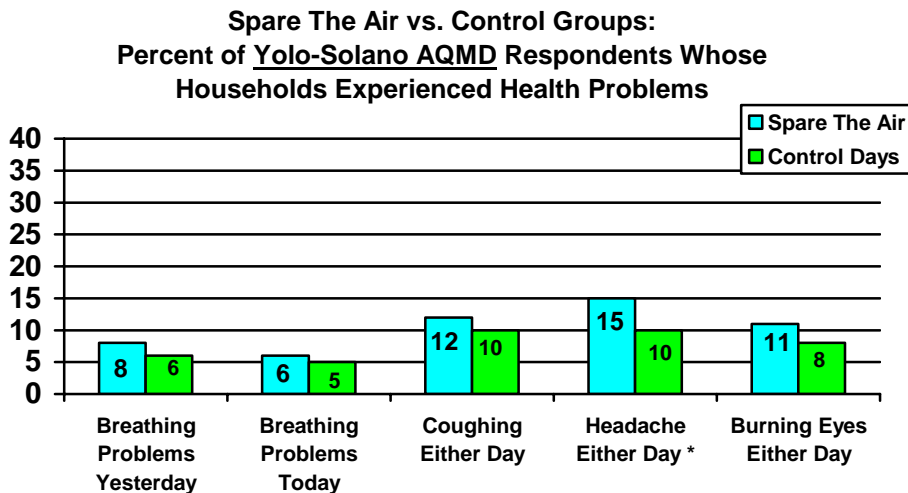
Spare The Air vs. Control Groups: Percent of Sacramento Metropolitan AQMD Respondents Whose Households Experienced Health Problems



* indicates a statistically significant difference

Perceived Health Effects: Yolo-Solano AQMD

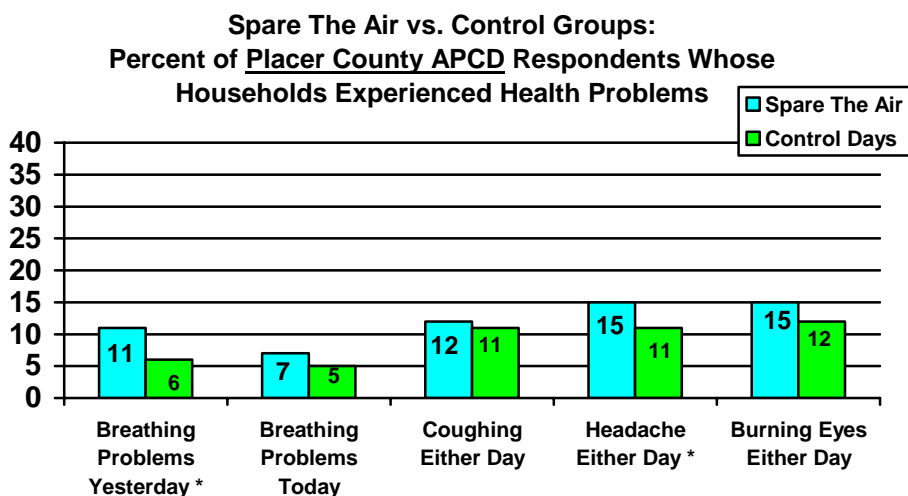
It can be seen in the next chart that in Yolo-Solano AQMD, significantly more households experienced headaches on Spare The Air days than on Control days. No other health-related differences were found.



* Indicates a statistically significant difference

Perceived Health Effects: Placer County APCD

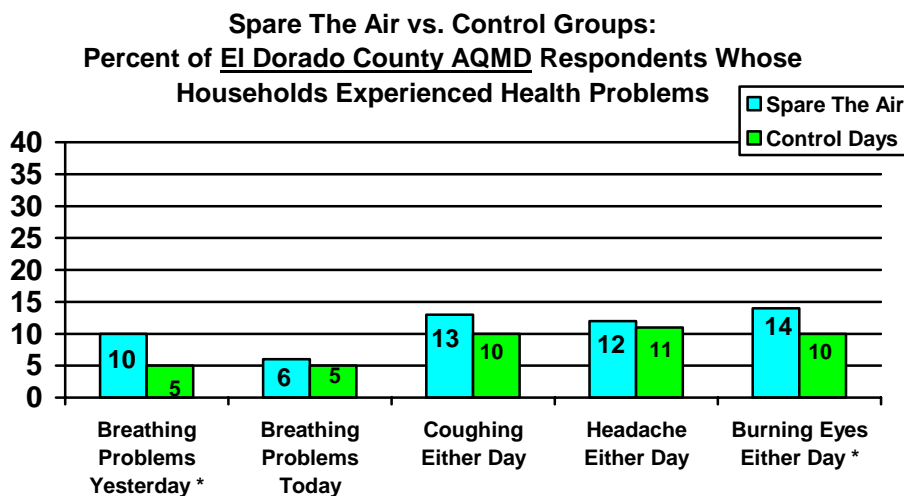
It can be seen in the next chart that Placer County APCD households experienced significantly more health problems in the Spare The Air group than in the Control group in terms of breathing problems on Spare The Air days and headaches on either the day of the interview or the day before.



* Indicates a statistically significant difference

Perceived Health Effects: El Dorado County AQMD

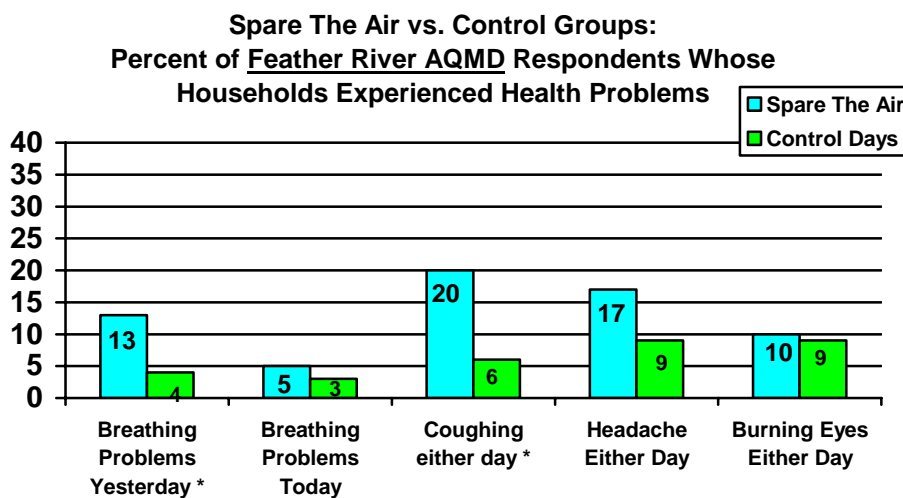
The next chart shows the results from El Dorado County AQMD, where it can be seen that significantly more Spare The Air than Control households experienced breathing problems on Spare The Air days and burning eyes.



* Indicates a statistically significant difference

Perceived Health Effects: Feather River AQMD

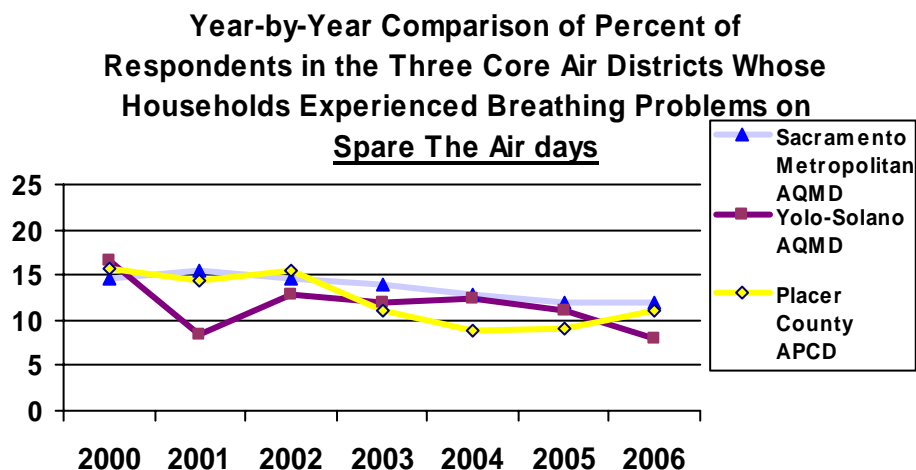
In Feather River AQMD households, there were significantly more health problems in the Spare The Air group than in the Control group in terms of breathing problems on Spare The Air days and coughing on either day.



* Indicates a statistically significant difference

By Air Quality District: Year-To-Year Comparison

Annual percentages of households experiencing breathing problems on Spare The Air days have been tracked for the past seven years. Results from each of the three air districts in the Sacramento Core Region are presented in the next graph. It can be seen that the percentage has remained relatively stable among the three air quality districts from one year to the next with the notable exception that in Yolo-Solano AQMD in 2001, significantly fewer households experienced breathing problems than in the other two districts. This year there was no significant difference among the three air quality districts.



Employer Participation in 2006 Spare The Air Program

Objectives

The Sacramento Metropolitan Air Quality Management District has administered a public education program called “Spare The Air” since 1995 on behalf of the five air quality districts in the Sacramento region.⁵⁸ It is designed to encourage drivers to drive less during summer days of particularly poor air quality⁵⁹ in order to reduce the ground-level ozone created by vehicle emissions. Sacramento region businesses are also encouraged to participate by belonging to the Spare The Air Employer Network. Member company representatives receive Spare The Air Advisories at their work sites via e-mail. The representative then notifies company employees when a Spare The Air day has been issued, directly through e-mail, or through signs about Spare The Air days, or by asking them to sign up individually with Air Alert.⁶⁰ Company-approved driving reduction includes carpooling, telecommuting, changing work hours, etc. Employees are therefore supported in helping to improve air quality.

⁵⁸ Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, El Dorado County AQMD and Feather River AQMD are the five air districts of the Sacramento nonattainment area. This includes all of Sacramento County and Yolo County, parts of Placer County, parts of Solano County, as well as the rural areas of El Dorado County and five ZIP codes in South Sutter County.

⁵⁹ 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 region. If it is estimated that the AQI will be 127 (the equivalent of a forecast predicting a .095 parts per million level of ozone anywhere in the region for at least one hour) or higher the next day, a Spare The Air advisory is issued. The advisory involves radio and television announcements, e-mail based Air Alert notifications, and employer networks.

⁶⁰ Air Alert is a free service that automatically notifies subscribers by their choice of e-mail, text pager, and/or digital cellular phone when a Spare The Air day has been forecast for the region ozone reaches unhealthy levels in the Sacramento region. In addition, the Air Alert program offers subscribers (www.myAir.Alert.net) the option to receive Daily Air Quality forecasts, real-time monitoring site readings at the Unhealthy for Sensitive Groups, Unhealthy, or Very Unhealthy levels, and even short Air Alerts for text pagers and digital cellular phones.

The objectives of the current report are to:

- s. 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,
- t. measure participation by information channel – e-mail, signs, or asking employees to sign up for Air Alert notifications, and
- u. test whether employer participation has increased, decreased, or stayed the same since 2003 (when we first started to track it).

Method

Questions about employer participation were introduced to the Spare The Air evaluation questionnaire in 2003. The following questions were asked of respondents who were employed (excluding those who were self-employed):

- “Does your employer encourage you to drive less on poor air quality days?”
- “I am going to read you a list and I’d like you to just tell me, yes or no, if your employer does any of the following **to inform you about poor air quality days**. Does your employer:
 - a. Send e-mails to employees about poor air quality days?
 - b. Post signs about poor air quality days?
 - c. Ask employees to sign up for Air Alert notification?”

For the purposes of the current report, results from Spare The Air and Control day interviewing were combined.

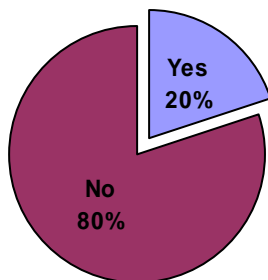
Results

OBJECTIVE S:

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

Seventy-one percent (71%) of all respondents interviewed on both Spare The Air and Control days were employed, a figure that has not changed significantly since 2000. As it is quite likely that many respondents live in one air district in the region, but work in another, only the weighted results for the Sacramento nonattainment area as a whole will be discussed because respondents were identified by where they resided, and not where they worked. This year, as can be seen in the next pie chart, 20%, or one-in-five of employed respondents in the region as a whole said their employer encourages them to drive less on poor air quality days.⁶¹

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



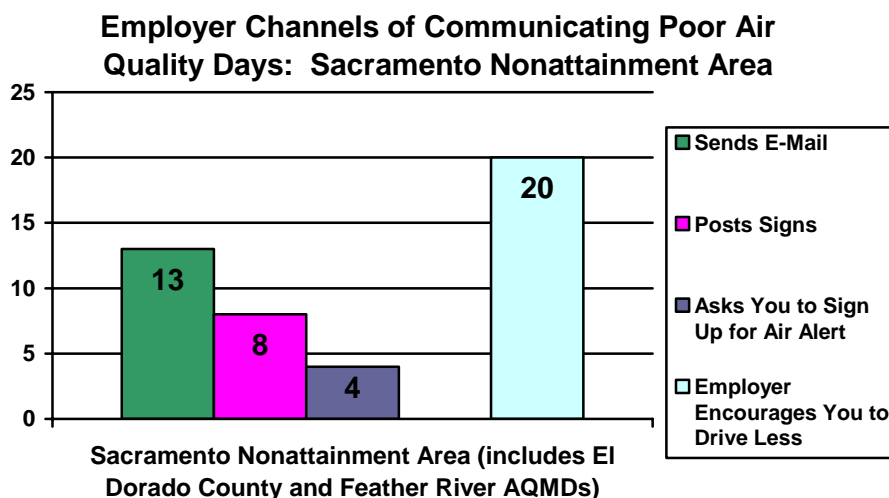
⁶¹ For this analysis, self-employed respondents and those who were undecided or refused to answer were excluded.

Employer Participation by Information Channel

OBJECTIVE T:

Employers notified employees about Spare The Air days via e-mail (13%), by posting signs (8%), and by asking them to sign up for Air Alert notifications (4%).

It can be seen in the next chart that the most common method used by regional employers to notify their employees about Spare The Air days was via e-mail (13%). Eight percent of employed respondents said their employer posted signs about poor air quality days, and 4% said they were encouraged to sign up for Air Alert notifications.



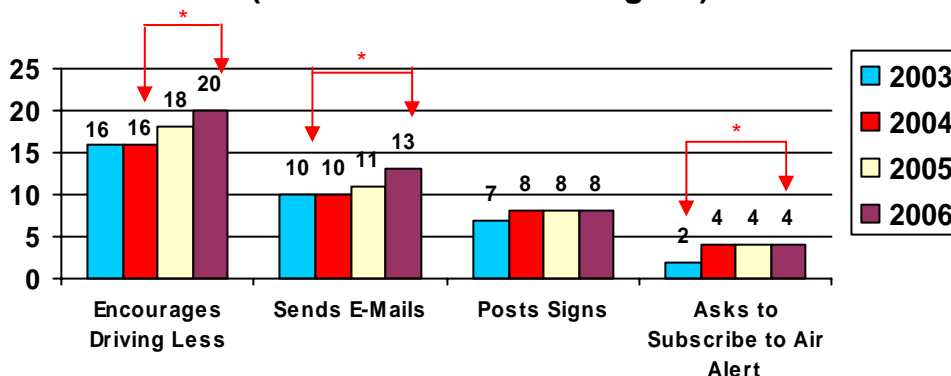
Employer Participation: Year-To-Year Comparison

OBJECTIVE U:

Employer participation in the Spare The Air program is increasing: it is significantly higher this year at 20% than it was in 2003 and 2004 (16%). Significantly more employers are using e-mail to tell their employees about poor air quality days now than in 2003 and 2004. However, the percent of employers who post signs about Spare The Air days has not changed in four years. The percent of employers who ask their employees to register to receive Air Alert notifications has not increased in three years and remains low at only 4%.

Employer participation in the Spare The Air program has been tracked since 2003. Annual results for the Sacramento Core Region (excluding El Dorado County and Feather River AQMDs) are presented in the next graph. It can be seen that employer participation is increasing and the participation of 20% of employers this year is significantly higher than the 16% in both 2003 and 2004. In terms of communication channels, significantly more employers are sending e-mails about poor air quality days to their employees this year (13%) than in 2003 and 2004. The percent who post signs has not changed from one year to the next and the percent of employers who asked their employees to subscribe to Air Alert notifications has not increased since 2003. Stable for the last three years at only 4%, further efforts should be made to encourage employers to have their workers subscribe to Air Alerts.

Employer Participation Since 2003 (Sacramento Core Region)



* indicates a statistically significant difference

2006 Summertime Seasonal Trip Reductions

Objectives

Spare The Air is a public education program that encourages residents in the Sacramento nonattainment⁶² area to reduce driving on days of particularly poor air quality during the summer months. A previous section of this report (Estimated Emission Reductions during the 2006 Spare The Air Season in the Sacramento Region) indicated that drivers who purposefully drove less on Spare The Air days reduced air pollution by an estimated **.40 tons** of ozone precursors per day. This is a measure of driving reduction that is **directly** attributable to the Spare The Air program.

However, there is another group of drivers who help contribute to improved air quality in the region – those who routinely drive less during the summer months. They are not counted in the above estimate of ozone precursors reduced because our evaluation methodology specifically asks whether the driver drove less than usual on the previous day.⁶³ **In other words, drivers who already cut back on their driving during the summer may have already adjusted their driving behavior to drive less, and so a Spare The Air day would not necessarily trigger a greater reduction in terms of the number of trips these respondents took.**

The significance of such summertime seasonal driving avoidance is that reductions on the average summer day can have an impact on the build-up of the pollution load in the region, thus slowing the formation of ozone leading to Spare The Air conditions. We have been looking more closely at the issue of seasonal driving reduction since 2004, with a view to estimating emission reductions from this particular group of

⁶² 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 and the Feather River AQMD of South Sutter 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 and Sutter County, and results will have been re-weighted appropriately. (See methodology section for further details.)

⁶³ The methodology for calculating purposeful driving reducers was episode-specific and included only those drivers who: said they drove “less” on Spare The Air days, had heard the Spare The Air advisory (according to an Air Resources Board worded-question), and drove less specifically for reasons of air quality. This is the strict ARB definition of purposeful driving reduction, and has been used in annual Spare The Air evaluations.

drivers. The main objective of the current report is to assess the impact of seasonal driving reduction in the Sacramento nonattainment area in the summer of 2006.

Specific objectives are to:

- v. 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
- w. compare the percentage of seasonal trip reducers and the mean number of trips they have avoided over the past seven years.

Method

The following questions from the Spare The Air evaluation survey were used to describe seasonal trip reduction. First, the number of self-reported vehicle trips made by respondent drivers in the region was assessed using the following question:

“Thinking just about yesterday, how many different TIMES did you get into a car, truck, or van to drive?”

[Probe: “Give me a reasonable approximation – a round number.”]

[INTERVIEWER – IF NEEDED: for this question, we are interested in just how many times the respondent opened the door and got into the car as the driver, not in how many trips they may have made while driving.]

The percentage of seasonal (summer) trip reducers was measured by asking:

“Do you usually reduce the amount of driving you do during the summer to avoid adding to air pollution?”

Followed by:

IF YES, “And how have you reduced driving this summer to decrease air pollution?”

For the purposes of the current report, results from Spare The Air and Control day interviewing were combined.

Results

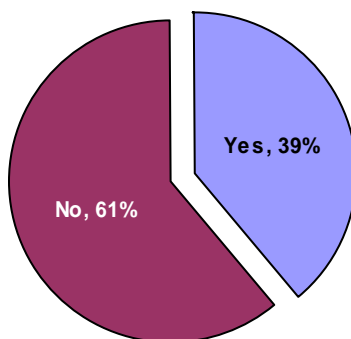
OBJECTIVE V:

Nearly four-in-ten (39%) of all respondents in the Sacramento Nonattainment Area are seasonal reducers -- they say they usually reduce the amount of driving they do during the summer to avoid adding to air pollution. These reducers reported entering their cars significantly fewer times than those respondents who said they did not usually reduce driving during the summer, making on average, three-quarters of a trip less per day than non-reducers. This could translate into 2.8 tons per day of emission precursor reductions.

Seasonal Trip Reduction: Percentage Who Reduce Driving in the Summer for Air Quality Reasons

Results from residents interviewed on both Spare The Air as well as Control days have been combined, as the seasonal trip reduction questions were not dependent on the specific interviewing days. The next pie chart indicates that in the entire Sacramento nonattainment area as a whole, 39% of all respondents said they usually reduce the amount of driving they do during the summer to avoid adding to air pollution.

**Percent Who Reduce Driving in the Summer
 for Air Quality Reasons: 2006 Results for the
 Sacramento Nonattainment Area**



Seasonal Trip Reduction: Number of Reduced Trips

As can be seen in the next table, the respondents who usually reduce driving during the summer for air quality reasons (seasonal driving reducers) reported entering their cars the previous day an average of 2.86 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 3.62 times. An analysis of variance indicated that these means were statistically different from each other.⁶⁴ In other words, drivers who said they usually drive less in the summer actually reported making significantly fewer trips than those who did not. **On average, then, seasonal driving reducers made three-quarters of a trip less per day than non-reducers (3.62 – 2.86 = 0.76 trips).**

	<i>Seasonal Driving Reducers: Mean # Times Entered Vehicle</i>	<i>Non-Reducers: Mean # Times Entered Vehicle</i>	<i>Statistically Significant Difference?</i>
<i>Sacramento Nonattainment Area⁶⁵</i>	2.86	3.62	Yes

Seasonal Trip Reduction: Estimated Emission Reductions

This could translate into substantial emission reductions. Although the methodology would have to be agreed upon, one way of estimating the tons of ozone precursors reduced is to apply a similar methodology to that used to estimate emission reductions on Spare The Air days,⁶⁶ and is summarized in the next table. It can be seen that the three-quarters (.76) of a trip per day on average that seasonal reducers avoided could translate into an estimated **2.8 tons of ozone precursors reduced** per summer day.

⁶⁴ F (1,1291) = 11.55, p < .001.

⁶⁵ Includes El Dorado County & Feather River AQMDs.

⁶⁶ For a full explanation of the methodology, refer to the section titled "Estimated Emission Reductions during the 2006 Spare The Air Season", Naomi E. Holobow, November 2006.

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 (1,392,467 Total ⁶⁷)	x Mean Number of Trips Reduced Per Day Compared to Non-Reducers	x 6.04 Grams of Ozone Precursors Per Trip (EMFAC 2002 V2.2) 2006 Model ⁶⁸	= Estimated Tons ⁶⁹ Per Day of Ozone Precursors Reduced
Spare The Air and Control Day Interviews Combined	39%	543,060	x 0.76 = 412,725	2,492,860 grams	2.8 tons

Seasonal Trip Reduction: Ways They Drive Less

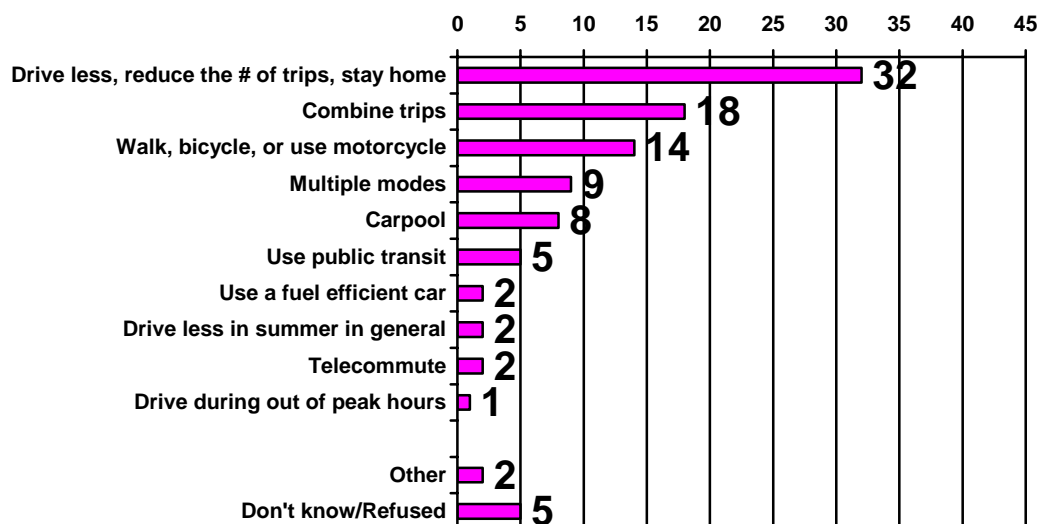
All respondents who claimed they reduced the amount of driving they did during the summer to avoid adding to air pollution were then asked to specify exactly how they reduced driving this summer. Their comments were entered, categorized, and results are presented in the next graph. It can be seen that approximately a third (32%) of these respondents said they made fewer trips or just stayed home. Another 18% said they regularly planned their days to consolidate trips and so avoid multiple excursions; and a further 14% said they walked, bicycled, or drove a motorcycle instead of driving a car. Nine percent (9%) did a combination of things, 8% said they carpooled, and a further 5% used public transit.

⁶⁷ The number of drivers in the Sacramento nonattainment area for 2006 was estimated, using the number of driver licenses by county for 2005, obtained from the California Department of Motor Vehicles database at http://www.dmv.ca.gov/about/profile/dl_outs_by_county.htm, and calculating the percentage increase, based on county population figure increases from 2005 to 2006 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 2006, therefore, was 1,392,467: Sacramento Metropolitan AQMD: total 892,114 + Yolo-Solano: total of 196,387 (118,272 in Yolo County + Solano County: 269,360 * 29% for the proportion located within the Air Quality district = 78,115) + Placer County (238,298 * 87% for Air Quality district) = 207,319 + El Dorado County: (137,908 * 68% for Air Quality district) = 93,777 + Sutter County: (57,392 * 5% for Feather River Air Quality district) = 2,870.

⁶⁸ Based on summer 2006 EMFAC2002 V2.2 SMAQMD spreadsheet figures provided by Bruce Katayama, SMAQMD, October 16, 2006. Models were run for the summer of 2006. The total ROG tons for a combined total of light duty passenger cars and two categories of light duty trucks (10.52 + 4.48 + 3.60) 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. 3,269,970 for light duty passenger cars + 948,648 for light duty trucks1 + 897,290 for light duty trucks2) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (7.72 + 3.45 + 4.24) x 2000 x 454 / (3,269,970 + 948,648 + 897,290). ROG grams and NOx grams were then combined (3.30 + 2.74) to obtain 6.04 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.

⁶⁹ There are 907,200 grams in a ton.

How Have You Reduced Driving This Summer?



A few representative comments⁷⁰ from those who said they drove less, reduced the number of trips, or stayed home are listed below. Note that quite a few comments indicate that the implicit message of the Spare The Air campaign of educating residents to understand the impact of driving on air pollution has been learned:

- “By just not using the car, for the air.
- By about 20 percent.
- By not making any unnecessary trips. That's the main thing.
- By not using the car often. I just stay in the house.
- Doing more stuff around where I live, not driving, and staying home more.
- Don't go out on bad air days. That's it.
- During my lunch break, I don't go out as much, and I cut the number of trips to the grocery stores. I don't drive that much, to begin with. Those are the two main ways.
- I'm not going places as often as I prefer. I avoid going on really polluted days.
- I've quit taking unnecessary trips. I only drive when it's necessary. Now, I would drive less frequently if the regional transit bus line ran more frequently, and had better connections. I would use more public transportation if it was more convenient.
- I've stayed home more. I can't change my work location. So primarily, it's staying home, and not making unnecessary trips. I plan my trips.
- I avoid driving on the weekends, normally. I stay in the house, and go in my swimming pool. I just stay home and do things around the house. I have not made any trips to the mountains, unfortunately. I think gas prices have an influence with it, as well.
- I don't drive as much on the weekends.
- I don't go as many places I normally go.
- I don't go out if I don't have to. We went through a terribly hot spell, which is uncommon for us. I just tried not to go out and do my shopping.
- I don't run as many errands.
- I drive with one car. Sometimes I drive, and sometimes my wife does. We take one car instead of two, whenever we can.
- I haven't gone on any weekend trips.

⁷⁰ The complete transcripts of all responses are available in the statistical file.

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- I just didn't go to as many places as normal.
- I just do not make unnecessary trips into town.
- I just don't drive very much. I just do what I have to do. I plan my day, depending on the weather. I just don't like to drive in any bad conditions. Usually, if it's too hot, I don't want to drive too great of a distance.
- I just don't drive. I cut back on shopping. If it's too hot, I just don't go out. The gas is too expensive. That is pretty much it.
- I just don't make special trips. I drive to work and back, and in the course of my job, I make sure I do as few trips as possible. I don't comparative shop. I just get things at one location.
- I just haven't taken the trips we had planned. Driving trips. That is because of the heat or air quality. We stay at home.
- I make less frequent trips.
- I must make a priority of what has to be done, and the gym was a priority because of my water therapy class. I go get gas, and come home. Because the air quality affects my health. I listen to the news reports, and I listen to the Spare The Air reports.
- I only drive when I have to. Because if I don't have to go somewhere, I don't.
- I stay at home more often.
- I tend not to go out on high-polluting days. I am retired, so I can do whatever I please. I heard about it on TV.
- I try to reschedule appointments if the air is too bad.
- Just instead of driving on the freeway, I don't drive at all. If I have to go somewhere on a bad pollution day, I try not to go that often. Sometimes I go, but usually I cut it short.
- My business allows me to. Some of the contracts I have, don't go in the summertime, so I don't drive there. I probably cut down 50 percent in the summer.
- Not taking drives. We just don't do that anymore. Only because of the pollution factor.
- Quite simply, I just take fewer trips.
- Stayed home a lot more.
- Taking fewer unnecessary trips.
- To drive a little less altogether. We all live here, so we have to be careful with pollution. I don't want to get poisoned. I don't want to poison anybody else, either.
- We've not gone on as many trips, and have not gone as far distances. When we go out to do stuff we do all of it together, so we don't have to do more trips.
- We haven't gone on any driving vacations."

A few representative comments by those who combine trips include:

- "Basically, I consolidated the places I needed to go, and do it all at one time.
- By putting all of my trips together, and doing one run.
- By trying to do all of my out-of-town errands on one day, instead of during the week. I always try to make sure someone is with us. We combine errands. That's probably about it. Besides, no optional trips on Spare The Air days.
- Combine trips out. If I have to go out to run errands, then I try to make all the trips at once.
- Combining more of my trips to the store. Planning out a route when I go. Trying to do my shopping at stores in the same vicinity.
- Combining trips, instead of going out twice. I go out once and get everything in that trip, or I buy several things I might need, instead of going back out later.
- Consolidating what I do in one trip out. Unfortunately I don't live near public transport, otherwise I would. I also plan on moving closer to public transport.
- I'm doing more errands on one day, not just running to the store one day and the next.
- I've just been smarter about driving. Combining trips, and that sort of thing.
- I've organized myself better. I just really took a look at what was a want, versus a need. We evaluated with the temperature and air quality outside, especially with the bad air days.
- I've tried to combine my errands, and not go out as many times."
- I've tried to do all my trips. I make a list of things I need to do for the week, and then I drive accordingly. I try to do them all at one time.
- I combine my trips. Because I know that the Earth is important, and the environment. If we don't save the environment, how do we expect others to do the same thing.

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December, 2006

- I consolidate all my trips into one, when I have to go into the city. Instead of going two or three times a week, I go once.
- I consolidate my chores, and I wait. I make lists, and I wait. I don't go out every time I need something. I may wait two or three weeks. As long as there is food in the house, I never feel I have to. I try to pace my needs.
- I consolidate trips. I drive all my errands at one time, so I don't have to do a second trip.
- I just plan a little more carefully, I guess. Consolidate my errands. I did it all in one shot, without having to go back out again.
- I make a list, and go to places that are closer to me. I don't backtrack, or anything.
- I tend to cluster things that I have to do. I cluster errands, and whatnot. Whenever I'm going out, I make a list of the things that I have to do, and put them in order in a route, and set it up that way. So, fewer trips.
- Instead of going out two or three times, I went out once, did everything I needed to do, and went back home. I think it reduces pollution. We live at least three to seven miles from where we shop, and by doing everything at once, it reduces driving.
- Plan the trips a little more carefully, so that I only have to go out once or twice, instead of all the time. I anticipate needs, by deciding what needs to be bought.
- We just try to double-up on our trips and put all our errands together."

Finally, a few comments from those who said they walk, bicycle, or drive a motorcycle include:

- "Because I walk to a lot of places. I drive less.
- By not driving. Walking instead of driving. And bicycling.
- By walking or riding my bike.
- I'm a mile from the post office, so I just ride my bike instead of driving. I also walk instead of drive.
- I bicycle to work.
- I drive less, and walk more. I use the internet to buy things with, rather than going to the store. That's about it.
- I have a motorcycle. So I try to drive that a little more. When I'm out, I think about what I need to get done.
- I ride a bicycle or motorcycle.
- I ride a bike to work. I want to save the air. I want to save the children.
- I ride a motorcycle instead of driving a car. That's probably my biggest contribution. I try to drive a more fuel-efficient vehicle, rather than our truck. Me doing it by myself, it's not significant, but obviously it takes a lot of people to have any kind of impact.
- I use my bike. I just wanted to slow the greenhouse effect on the atmosphere. I think it's increasing the temperature, in the long run.
- I walk. Ride a bike. That's about it.
- Kept things more local, within walking distance.
- Try to walk to the store, instead of driving. Ride my bike to the store, instead of driving.
- We walk, and we bicycle. We just basically don't drive unless we have to."

Seasonal Trip Reduction Year-To-Year Comparison

OBJECTIVE W:

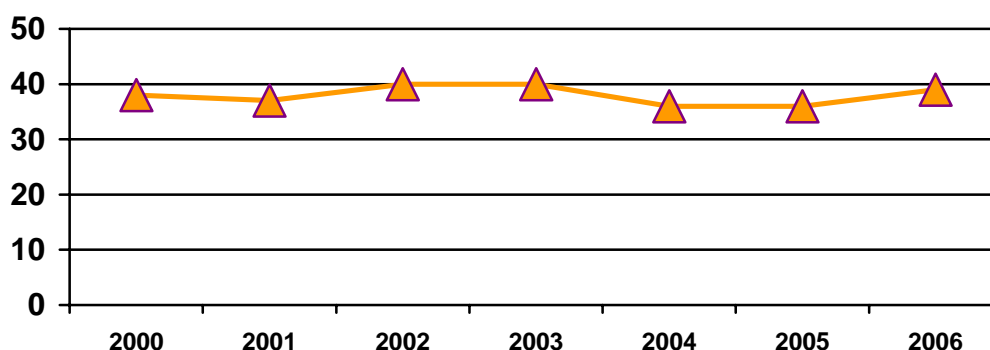
For the past seven years, the percentage of seasonal trip reducers in the Sacramento Core Region has remained relatively stable, at just under four-in-ten of all respondents. Over the years, drivers who said they usually reduced the amount of driving they did during the summer to avoid adding to air pollution reported making significantly fewer trips than those who said they did not generally reduce their driving.

During the past seven years, seasonal driving reducers made between half a trip to just over one trip per day less than non-reducers. 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.

Seasonal Trip Reduction Year-To-Year Comparison: Percentage of Seasonal Reducers

For the purpose of the year-to-year analysis, results from interviews conducted with El Dorado County AQMD and Feather River AQMD residents have been excluded, and results representing the remaining Sacramento Core Region have been appropriately re-weighted. It can be seen in the next graph that the percentage of respondents in the Sacramento Core Region 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 just under 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



Seasonal Trip Reduction Year-To-Year Comparison: Number of Daily Single Trips Avoided

The next table shows the average number of trips reported by seasonal driving reducers and non-reducers in the Sacramento Core Region since 2000. It can be seen, first of all, that in every year seasonal reducers reported making significantly fewer trips on the day prior to the interview than the group who said they do not usually reduce driving during the summer. It can also be seen that the average number of additional trips avoided by seasonal reducers (that is, the difference between reducers and non-reducers) ranged from half a trip per day to just over 1 trip per day. **These results again support the idea that it may be beneficial to try to quantify the emission reductions by these drivers who may not qualify as episodic reducers on Spare The Air days for methodological reasons.**

<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

<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>
2004	3.4	3.9	0.5	Yes
2005	3.0	3.5	0.5	Yes
2006	2.9	3.6	0.7	Yes

SUMMARY CONCLUSIONS

Over the years, results have been relatively stable and positive in terms of public awareness of the campaign and a corresponding reduction in driving on Spare The Air days. **This indicates that, despite an increasing population (18% since 2000 in the Sacramento nonattainment area⁷¹), not only has the effectiveness of the program not declined, but it has managed to maintain its public visibility, even to newcomers to the area.**

Awareness

- ❖ Significantly more respondents in 2006 were aware of Spare The Air in general (62%) than remembered the specific request to not drive on days of unhealthy air (30%), a finding that has been consistently replicated over time. There were no differences among the individual air quality districts.
- ❖ Levels of general awareness this year did not increase in 2006 relative to 2005, but in both these years more respondents were aware of the Spare The Air advisories than in 2004. However, general awareness was highest in the Sacramento Core Region in 2002, a very poor air quality season.
- ❖ In terms of specific awareness, there was again no significant increase this year compared with last year. In fact, with the notable exception of 2002, levels in the Sacramento Core Region have essentially stayed the same, with approximately 30% of respondents saying they heard the specific request not to drive on days of poor air quality.
- ❖ There were a few noteworthy differences in levels of awareness within individual air districts over time.
- ❖ Control-day interviewing indicated that while a few respondents were mistaken, the vast majority of those interviewed on Control days had not seen or heard a Spare The Air advisory. This attests to the effectiveness of the program -- we have evidence that respondents interviewed following Spare The Air days are not simply giving "socially-acceptable" responses: levels of both types of awareness were significantly higher on Spare The Air days than on Control days in all districts.
- ❖ The 62% of respondents who were aware of Spare The Air in general translates into 863,330 drivers in the entire area who noticed the advisory each Spare The Air day during the 2006 season. Correcting for Control day responses, that is, the percentage respondents who said they noticed the advisory when one was not issued, means that 584,836 drivers were aware of the 2006 Spare The Air advisories.
- ❖ In terms of specific awareness, and again correcting for Control day responses, this represented 362,041 drivers who, on an average Spare The Air day, noticed the specific request not to drive.

⁷¹ Based on US Census estimates, and calculated from the Department of Finance spreadsheets in 2000 and 2006.



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Purposeful Driving Reductions

- ❖ More residents drove “less” on Spare The Air days this year compared with previous years. In the Sacramento nonattainment area as a whole, 28% reported driving “less” on Spare The Air days in 2006 -- significantly more than in each of the previous six years, and the highest percentage yet. There were no differences among the five air quality districts in terms of the proportion of drivers who reportedly drove less on Spare The Air days.
- ❖ Significantly more respondents in the Sacramento nonattainment area said they had driven less on Spare The Air days than on non Spare The Air days, one measure of the success of the program.
- ❖ That being said, however, only 2.2% of all respondent drivers in the entire Sacramento nonattainment area could be classified as having purposefully driven less on Spare The Air days because they wanted to improve air quality in the region and were aware of the Spare The Air advisories in general. The percentage of reducers did not differ significantly among air districts.
- ❖ The percentage of reducers has basically remained the same since 2000: although higher this year at 2.2%, the percentage is not significantly higher than in each of the previous six years in Sacramento Metropolitan AQMD or the Sacramento Core Region (excluding El Dorado County and Feather River AQMDs). However, the percentage of purposeful reducers was significantly higher this year in Placer County APCD than in most previous years.
- ❖ Over the last seven years, an average of 1.8% of all drivers in the Sacramento Core Region purposefully reduced driving on Spare The Air days in order to help improve air quality.
- ❖ When extrapolated to the population of drivers, about 30,635 drivers in the nonattainment area could be said to have purposefully made fewer trips on average each Spare The Air day in order to reduce air pollution. They avoided making an average of 2.8 single trips each. This translates into a total of 85,780 trips purposefully avoided on Spare The Air days during the 2006 season.
- ❖ There were significantly more respondents who purposefully reduced driving on Spare The Air days than on Control days in Sacramento Metropolitan AQMD, Yolo-Solano AQMD, and Placer County APCD. This means that although the overall percentage of reducers is not high, the program has been successful in convincing at least some drivers to avoid trips they might otherwise have made, specifically on days of poor air quality.

Estimated Emissions Reductions

- ❖ Correcting for control day interviewing, the 2006 Spare The Air program was successful in reducing air pollution in the entire Sacramento nonattainment area (the proportional representation of Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, El Dorado County AQMD and Feather River AQMD) by an estimated 0.40 tons of ozone precursors per day. This is due specifically to drivers purposefully reducing the number of trips they took on Spare The Air days for air quality reasons.
- ❖ In terms of reductions in individual air quality districts, in Sacramento Metropolitan AQMD an estimated .26 tons of ozone precursors were reduced. In Placer County APCD the reduction was .09 tons per Spare The Air day. In El Dorado County AQMD the reduction was .05 tons. Reductions in Yolo-Solano AQMD and Feather River AQMD were not estimated as the percentage of drivers who said they drove less on Spare The Air days was not significantly higher than the percentage interviewed on Control days.

Health Issues

- ❖ Poor air quality caused significantly more breathing difficulties and burning eyes in households interviewed about Spare The Air days than Control days in the Sacramento nonattainment area. It did not cause increases in either coughing or headaches.
- ❖ The 11% of respondents in the Sacramento nonattainment area who reported breathing difficulties on Spare The Air days translates into 90,915 affected households.



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- ❖ However, because 8% of households also reported breathing problems on Control days, it is necessary to adjust the estimate. Correcting for Control days, then, an estimated 24,795 additional households in the Sacramento nonattainment area experienced breathing problems during Spare The Air days specifically due to ozone air pollution. In addition, 41,325 households experienced burning eyes.
- ❖ The percentage of households reporting breathing difficulties in the Sacramento Core Region on Spare The Air days has stayed the same from 2000 to the present, at an average of 13% of all households during the past seven years. An average of 8% of households interviewed on Control days experienced breathing problems.
- ❖ Despite differences among the air districts in terms of peak ozone concentrations, the adverse health effects of ozone air pollution are experienced throughout the entire area. With the exception of Yolo-Solano AQMD, households in the four other air quality districts of the Sacramento nonattainment area experienced significantly more breathing problems on Spare The Air days than on Control days. Other health effects attributable to poor air quality on Spare The Air days included burning eyes in Sacramento Metropolitan and El Dorado County AQMDs; headaches in Yolo-Solano AQMD and Placer County APCD; and coughing in Feather River AQMD households.

Employer Participation

- ❖ This year 20% of employed respondents in the Sacramento nonattainment area said their employer encourages them to drive less on days of poor air quality.
- ❖ Employers notified employees about Spare The Air days via e-mail (13%), by posting signs (8%), and by asking them to sign up for Air Alert notifications (4%).
- ❖ Employer participation in the Spare The Air program is increasing: it is significantly higher this year at 20% than it was in 2003 and 2004 (16%). Significantly more employers are using e-mail to tell their employees about poor air quality days now than in 2003 and 2004. However, the percent of employers who post signs about Spare The Air days has not changed in four years. The percent of employers who ask their employees to register to receive Air Alert notifications has not increased in three years and remains low at only 4%. Further efforts to increase employer participation are warranted.

Seasonal Trip Reductions

- ❖ Nearly four-in-ten (39%) of all respondents in the Sacramento Nonattainment Area are summertime seasonal driving reducers -- they said they usually reduce the amount of driving they do during the summer to avoid adding to air pollution. They did so mainly by making fewer trips, staying home, consolidating trips, walking, bicycling, carpooling, and using public transit.
- ❖ These reducers reported entering their cars significantly fewer times than those respondents who said they did not usually reduce driving during the summer, making on average, three-quarters of a trip less per day than non-reducers.
- ❖ This could translate into an estimated 2.8 tons of emission precursor reductions per summer day in 2006.
- ❖ For the past seven years, the percentage of seasonal trip reducers in the Sacramento Core Region has remained relatively stable, at just under four-in-ten of all respondents.
- ❖ Since 2000, drivers who said they usually reduced the amount of driving they did during the summer to avoid adding to air pollution reported making between half a trip to just over one trip per day less than non-reducers.
- ❖ These results again support the idea that air quality management districts may want to document and use the additional estimated emission reductions by these drivers who may not qualify as episodic reducers on Spare The Air days for methodological reasons.