Evaluation of the 2012 Sacramento Region Spare The Air Campaign

Prepared by

Joseph Hanson, M.A.

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meta research

www.metaresearch.us

(916) 325-1224

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BACKGROUND & METHODOLOGY

Background

The public outreach program **Spare The Air** was created in 1995 to engage the general public in voluntarily helping to solve the problem of ozone air pollution. The U.S. Environmental Protection Agency (EPA) designated the Sacramento region a **severe ozone nonattainment area** for the 1997 federal 8-hour ozone standard with an attainment deadline of June 2019. The region fails to meet the federal health based 8-hour ozone standard,[1] thus affecting the quality of life and health of area residents, particularly during the summer months. The Sacramento nonattainment area includes Sacramento County, Yolo County, and parts of Placer, Solano, El Dorado and Sutter Counties.

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

The Spare The Air program provides residents in the Sacramento region with information and resources to protect their health during the summer smog season (May to October) by encouraging them to be aware of ozone levels and by asking motorists to reduce their driving on days when unhealthy air is predicted. Outreach efforts included radio advertising featuring various air quality tips (buy local products, group and reduce trips, use electric lawn tools), a website (www.SpareTheAir.com) including "Scooter's Corner" for children, social media (Facebook and Twitter), as well as appearances at events, newsletter article placements, etc. 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 above the threshold of 127 the next day, a Spare The Air advisory is issued by the Sacramento Metropolitan AQMD by 12:00 p.m. In previous years the AQI estimate was required to reach a threshold of 150 before a Spare The Air announcement was issued. The reduction in AQI threshold reflects the most recent statement issued by the Obama administration enforcing the latest federal ozone health standard. The Spare The Air advisory involves notifying the public through a variety of communication channels, including paid radio and television announcements, email Air Alerts, news broadcasts, the Spare The Air website, and the Sacramento Bee.

Spare The Air days are called for the Sacramento Nonattainment Area as a whole, but all air quality districts within the area may not have the same conditions. For example, foothill districts (such as Placer and El Dorado) sometimes experience poorer air quality than central plain districts such as

[1] The latest federal ozone health standard is .075 parts per million averaged over 8 hours. This standard became effective May 27, 2008. From 1997 to May 2008, the federal 8-hour ozone standard was .08 parts per million averaged over 8-hours.

Yolo-Solano. To some extent this is due to the fact that ozone created by all drivers in the region travels east into the foothills. It is, therefore, important that the Spare The Air message continue to involve everyone in the basin, although the air quality in individual districts on specific days may not be poor.

Spare The Air 2012 Season

Air quality in the region is still improving. There were **six** Spare The Air days called during the summer smog season of 2012 which ran from May to October.[2] Comparatively, and considering the recent drop in AQI threshold for predicting a Spare The Air day, only six Spare The Air days is a significant indicator of improving conditions.

Further examination of the daily maximum Air Quality Index (AQI) for the nonattainment area revealed that the recorded actual AQI for ozone did not meet or exceed the 127 threshold on three of the six Spare The Air days. In other words, Spare The Air advisories were issued for days when the actual air quality turned out not to have been as poor as was expected, as can be seen in the table below.[3] In fact, the maximum AQI on August 15 was only 97, a level that is classified as "moderate." In contrast, three of the six Spare The Air days exceeded the 127 AQI threshold, with air quality on July 12 reaching 169, a level classified as "unhealthy," and the highest of any AQI on Spare The Air days this year. It can also be seen that the air district most likely to have experienced the maximum AQI was Sacramento Metropolitan Air Quality Management District (on four of the six days), followed by Placer (on two of the six days). In other words, Yolo-Solano AQMD and often Placer County APCD, and El Dorado County AQMD experienced better air quality than Sacramento on those six Spare The Air days.

Though the number of Spare the Air days declared, as well as the frequency of AQIs above the threshold, is greater than the 2011 season, this difference can be explained at least partially by the reduction of the AQI threshold from 150 to 127 between the 2011 and 2012 season. The forecast AQI for each Spare The Air day of the 2012 season did not meet or exceed the previous threshold of 150, and only one of the six actual AQIs meets or exceeds that threshold. It is clear then that air quality is still improving in the Sacramento Nonattainment Area.

Spare The Air date	*Forecast AQI*	*Actual Maximum AQI*	*Health Level for Actual AQI*	*Reporting Station of Actual Maximum AQI*
July 11	137	129	Unhealthy for Sensitive Groups	Sacramento
July 12	142	169	Unhealthy	Sacramento
August 1	127	119	Unhealthy for Sensitive Groups	Placer
August 11	132	129	Unhealthy for Sensitive Groups	Sacramento
August 14	137	114	Unhealthy for Sensitive Groups	Placer
August 15	127	97	Moderate	Sacramento

[2] The six Spare The Air Days were Wednesday, July 11; Thursday, July 12; Wednesday, August 1; Saturday, August 11; Tuesday, August 14; and Wednesday, August 15.

[3] AQI figures obtained from the Historical Data section at www.sparetheair.com .

Media Buy

The media buy involved general radio commercial announcements, online advertisements and specific radio and television episodic advisories about Spare The Air.

General Media Buy

In 2012, a total of $80,000 was spent on the general radio Spare The Air awareness campaign.[4] It ran from the first week of May to the second week of September,[5] and used four commercials. They were designed to create awareness of air quality issues. They provided air improvement tips such as cleaning air conditioners, keeping cars maintained and running clean, installing clean air filters in homes, and understanding the health effects of poor air quality.

Specific Episodic Media Buy

This year, a total of $44,668 was spent on episodic TV and radio commercials the six Spare The Air days.[6] The amount spent per episode was:

- July 11 episode = $7,530.00
- July 12 episode = $7,500.50
- August 1 episode = $7,500.00
- August 11 episode = $7,507.50
- August 14 episode = $7,150.00
- August 15 episode = $7,480.00

Research Objectives

Annual evaluations (with the exception of 1997) have been conducted since 1995 to assess the effectiveness of the Spare The Air program. Levels of awareness, driving behaviors, health issues, and estimated emission reductions have been measured and tracked. In the early 2000s, numerous discussions took place between the Cleaner Air Partnership and staff of the California Air Resources Board (ARB) to arrive at an evaluation procedure acceptable to both. In 2002 an ARB-suggested question about general awareness was incorporated into the questionnaire in order to be able to calculate their definition of what qualifies as a "reduced" trip.[7]

The specific evaluation objectives were to:

1. Measure general awareness and the specific episodic request not to drive on Spare The Air days among drivers in the Sacramento Nonattainment Area.
2. Measure the effectiveness of the Spare The Air program in terms of reduced driving among drivers who were aware of the program and purposefully reduced the number of trips they made due to air quality reasons.
3. Estimate emission reductions from the trips reduced during Spare The Air episodes.[8]

[4] Less money was spent on advertising this year than in the past. For example, the general media buy was $178K in 2008, compared to a general buy of only $80K in 2012. Further, the frequency of airing the spots has declined as the cost of advertising has risen.

[5] Email message from Lori Kobza, Assoc. Communications & Marketing Specialist, SMAQMD, October 24, 2012.

[6] Email message from Lori Kobza, Assoc. Communications & Marketing Specialist, SMAQMD, October 22, 2012.

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

[8] Methods for estimating ozone precursor reductions based on the survey data have been used in all evaluations conducted since 1999 but were based on different Emission Factor models over the years. Estimates were based on the Summer On-Road Inventory - EMFAC 2011 v 2.3 model, for the summer of 2012, provided by Charles Anderson, Program Coordinator, SMAQMD Planning & Emission Inventory in an email dated October 30, 2012. The total ROG tons for a combined total of light duty passenger cars and two categories of light duty trucks (6.3 + 1.93 + 2.53) were converted to pounds (multiplied by 2,000) and

4. Compare awareness of the Spare The Air campaign and driving reduction among the individual air quality management districts in the Sacramento Nonattainment Area.
5. Measure the percentage of drivers who habitually drive less during the summer season in order to improve air quality, and estimate the emission reductions from this group of seasonal reducers.
6. Track awareness and behavioral changes over time.

Research Methodology

Since 1995, two groups of respondents have been interviewed, one following Spare The Air days, and the other following non-Spare The Air (or Control) days, matched for the same day of the week as the Spare The Air interviews. A further control is that no interviews are conducted on rainy days. This type of experimental design adjusts for any overstatements individuals might make about their reported driving reduction on Spare The Air days (social desirability response bias), by providing a means of calculating a correction or adjustment factor. More accurate estimates about the number of drivers and households impacted by the Spare The Air program and the amount of emissions reduced are therefore obtained by subtracting this correction factor from the results. Including Control day data provides the most conservative estimates of program effectiveness. Control day data also have provided other insights into driving behavior.

Sampling Frames

In previous years, telephone interviews were conducted with samples of residents throughout the air basin, using Random Digit Dialing (RDD) procedures in which a computer generates phone numbers from known landline area codes and prefixes. Prior to 2011, these samples have only included landline numbers and not cell phone numbers, and, although Spare The Air interviewing has always set quotas based on geography, age, and gender, it is becoming more and more difficult to survey young adults in the U.S. aged 18 to 34 years via a landline-only frame. As cell phone use in the United States grows, the potential for coverage bias in RDD telephone surveys will also increase if they continue to exclude most cell phone numbers.

This potential for coverage error stemming from the growth of the cell phone-only population has led to the development of dual frame, random digit dial (RDD) surveys. In these dual frame designs, a traditional sample from the landline RDD frame is supplemented with an independent sample from the banks of numbers designated for cellular phones. However, the emergence of this new approach to telephone survey design has raised numerous statistical questions as well as operational ones for the entire survey industry.[9]

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then to grams (multiplied by 454) before dividing by the combined total number of trips (i.e. 3,040,786 for light duty passenger cars + 419,212 for light duty trucks1 + 1046,171 for light duty trucks2) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (4.03 +1.12 + 2.51) x 2000 x 454 / (3,040,786 + 419,212 + 1,046,171). ROG grams and NOx grams were then combined (2.17 + 1.54) to obtain 3.71 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. It should be noted that over the years, motor vehicle emissions have lowered, because cleaner burning vehicles produce fewer emissions.

[9] For example, a "critical decision that researchers need to make is about whether to choose an overlapping dual frame design (with no screening of the cell phone sample based on the respondent's telephone service type and usage) or a dual frame design with screening of the cell phone sample for cell phone-only status (and possibly for cell phone mostly/mainly status)." Screening for cell phone-only status will obviously increase costs as additional questions need to be asked, and many cell phone users will also have landline phones. There are also statistical weighting issues, particularly troublesome as there is a lack of accurate population parameters to use in weighting cell phone samples of regional, state and local areas. In addition, "due to federal telecommunication laws and regulations in the U.S., those who conduct surveys with people who are reached on a cell phone must avoid using auto dialers (including self-dialing modems and predictive dialers) to place calls, unless they have

Continuing the purpose of the 2011 evaluation, the following dual-frame sampling design was prepared for the 2012 evaluation -- namely, a replication of the previous sampling strategy using RDD landline frames in all air districts, and an additional "test" sample to supplement the landline sample from a cellular RDD frame in Sacramento County only, for interviews conducted following Spare The Air days. This type of overlapping design did not screen for cell phone-only persons/households, due to the extra costs involved. The sample therefore contained some households who have landlines in addition to cell phones, but questions about cell phone and regular/wired phone use were added to try and estimate the percentage of "cell phone-only" households. It must also be stated that in Yolo-Solano AQMD, Placer County APCD and El Dorado County AQMD persons residing in households with no landline telephone are not included in the results.[10]

In Sacramento Metropolitan AQMD, comparisons between the two groups of Spare The Air respondents (landline RDD sample versus cell phone RDD sample) on key questions revealed **no significant differences in responses**. Results from both **groups were therefore combined**, new weights for the entire nonattainment area were calculated and all results reported include the Sacramento cell phone sample responses. Results from the key comparisons are presented in Appendix A. Because no differences were found between landline RDD sample and cell phone RDD sample, and the cost of including cell phone samples far outweighs the cost of landline samples, it is suggested that RDD cell phone samples not be included in future surveys. The data from two years of comparisons suggest efforts are best spent on landline RDD samples only.

Sampling Design

The next table summarizes the targeted maximum number of completed interviews for both Spare The Air and Control days.[11] The goal was to conduct up to 1,300 interviews (including up to 100 completed interviews with the RDD cell phone sample of Sacramento County drivers) following Spare The Air days and 1,200 following Control days. The margin of error associated with a sample of 1,200 is +/– 2.5%, at a 95% confidence level.

prior permission of the cell phone owner to do so. This increases the time and cost of processing RDD cell phone samples considerably." (AAPOR Cell Phone Task Force 2010 Report)

[10] The American Association for Public Opinion Research (AAPOR) recommends: "RDD surveys without a cell phone augmentation should include in their methods report and in the survey information that accompanies published findings that "persons residing in households with no landline telephone are not included in the results." Further, the report goes on to state: "If researchers believe that they have produced unbiased estimates without the cell phone only segment, this belief and the reason for it should be directly discussed in the report of findings, because the topic is no longer ignorable and should not be lightly dismissed." "New Considerations for Survey Researchers When Planning and Conducting RDD Telephone Surveys in the U.S With Respondents Reached via Cell Phone Numbers", AAPOR Cell Phone Task Force 2010, available online at http://aapor.org/Cell_Phone_Task_Force.htm. Unfortunately there is not an easy or inexpensive solution to this issue, but various combination-type samples are currently being studied by AAPOR. The reader is referred to the report which deals with Coverage and Sampling, Nonresponse, Measurement, Weighting, Legal and Ethical Issues, Operational Issues, and Costs.

[11] It should be noted that the sampling design is for the maximum number of interviews to be completed. Due to the uncertainty about the number of Spare The Air days in each season, the actual number of completed interviews is often less than the targeted maximum.

Air District	Spare The Air interviews	Control day interviews
Sacramento Metropolitan:	Up to	
RDD landline	400	300
RDD cell phone	100	
Yolo-Solano AQMD	300	300
Placer County APCD	300	300
El Dorado County AQMD	200	300
Maximum Total	1,300	1,200

Within each air district, quotas were set with respect to geographic area, age, and gender.[12] Additionally, respondents were screened so that only those who had driven within the last week were interviewed.

Interviewing Strategy

A continuing challenge in terms of methodology is trying to estimate the number of Spare The Air days each season so that interviewing days and the number of completed interviews can be representative of the season and still provide adequate statistical precision. A field house needs advance notification and a target of a certain minimum number of interviews on a given day in order to maximize efficiency and contain costs. The strategy adopted was to conduct approximately 150-200 interviews throughout the region (proportionally representative of the population in general by county), starting with every occurrence of a Spare The Air advisory, and then deciding on an episode-by-episode basis whether to conduct interviews, taking into consideration the month within the season, the day of the week, and whether the event was single or multi-day, until the maximum number of budgeted interviews and the best coverage was obtained.

Interviewing took place the day following each Spare The Air day. Control day interviewing took place only in in August and September. Control day interviews were matched in terms of the day of the week (Wednesday, Thursday, Friday, and Sunday) of the Spare The Air day interviews, and took place on August 16, 26, 29, 30, September 20, 27.

Respondents

In Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD interviews were conducted with a random representative sample of landline telephone residents (meaning that cell phone-only households were not included in the sample and were therefore not interviewed). In Sacramento Metropolitan AQMD interviews were conducted with a representative sample of landline residents, augmented with a random sample of cell phone users.

[12] Interviewing took place only in the relevant zip codes within certain counties (i.e. in Placer County, zip codes north or east of Auburn were excluded as well as those west of Vacaville in Solano County and those east of Placerville in El Dorado County). In order to avoid potential unbalanced and biased samples quotas were set for gender and age in order to ensure that respondents were representative of the population as a whole. It is well-known in survey research that certain groups (such as elderly females) are more likely to respond to telephone interviews than others (such as young males).: so, for example, no more than 13% of the 400 interviews conducted in Sacramento County were to have been with females aged 65 years and older; and no fewer than 10% were to be conducted with males aged 18 to 24. It has also been the case that residents in Davis are more likely to answer surveys than residents in other areas of the Yolo-Solano Air Quality Management District and so a quota of no more than 20% of interviews were to be conducted with Davis residents.

Respondents included a total of **2,032 drivers**, following both Spare The Air as well as Control days. Results for the Sacramento Nonattainment Area as a whole were weighted proportionally.[13] The next table lists the number of completed interviews for each group along with their affiliated margins of error (at the most conservative level).

It can be seen that a total of **976** interviews were conducted on days following Spare The Air episodes. Control day calling completed **1,056** interviews. When weighted,[14] the total number of completed interviews was 514 following Spare The Air days, and 587 on Control days in the Sacramento Nonattainment Area as a whole. In order to be able to compare current results with those from previous years' evaluations, El Dorado County[15] results have been excluded from some of the year-to-year analyses, and the "**Sacramento Core Region**" is the term used for the combined air districts of Sacramento Metropolitan AQMD, Yolo-Solano AQMD, and Placer County APCD. Proportions and weights were appropriately re-calculated for these analyses.[16]

[13] Based on 2012 estimates from the 2010 US Census: State of California, Department of Finance, *E-1 Population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2011 and 2012*. Sacramento,CA, May 2011. Available online at: http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/documents/E-1_2012_Internet_Version.xls The total population in the entire Sacramento nonattainment area [including El Dorado AQMD] is 2,187,097: [Sacramento Metropolitan AQMD (66%) - 1,435,153; Yolo-Solano AQMD (15%) - 319,925 (this includes the total 202,133 from Yolo County and 117,792 from the Dixon, Rio Vista and Vacaville areas of Solano County); Placer County APCD (14%) – 309,135 (this figure represents the 87% of Placer County's 355,328 residents who do not live in zip codes north or east of Auburn), El Dorado AQMD (5%) - 122,884 (this figure represents 68% of El Dorado County's 180,712 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).

[14] Weighted, includes El Dorado County AQMD. 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, 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 14%, and El Dorado County AQMD is 5%.) This is why the weighted total number of completed interviews (i.e. 514) is less than the sum of the total number of interviews conducted in all air districts (i.e. 976).

[15] Interviews with residents in El Dorado County AQMD were only conducted in 2004, 2006, 2007, 2008, 2009, 2011, and 2012.

[16] Excluding El Dorado AQMD, the new proportions for the smaller Sacramento Core Region for 2012 are: 70% in Sacramento Metropolitan AQMD, 15% in Yolo-Solano AQMD, and 15% in Placer County APCD.

Number of Completed Interviews (unweighted)	*Spare The Air Days*	*Margin of Error*	*Control Days*	*Margin of Error*
Sacramento Metropolitan AQMD: **Landline RDD** **Cellular RDD** **TOTAL**	 *299* *37* **336**	 +/- 5.3%	 **384**	 +/- 5.0%
Yolo-Solano AQMD	**236**	+/- 6.4%	**252**	+/- 6.2%
Placer County APCD	**224**	+/- 6.5%	**241**	+/- 6.3%
El Dorado County AQMD	**180**	+/- 7.3%	**179**	+/- 7.3%
Total Regional (Unweighted)	**976**	+/- 3.1%	**1056**	+/- 3.0
Total Regional (Weighted)	**514**	**+/- 4.3%**	**587**	+/- 4.0%

The Questionnaire

The main body of the questionnaire has remained the same in order to maintain consistency, although slight modifications have sometimes occurred, due to information needs or budget constraints. In 2002 a question about Spare The Air awareness that was worded by the Air Resources Board (ARB)[17] was added and has been included every year since. All surveys were conducted using a Computer Assisted Telephone Interviewing (CATI) system. In 2010 four questions that dealt with employer encouragement on Spare The Air days were deleted in order to save on costs. Questions about cell phone versus regular/wired phone use were added in 2011 and continued this year in order to try and estimate the percentage of cell phone-only households. The questionnaire was translated into Spanish and approximately 2% of all interviews were conducted in that language. The average interview lasted just under 4 minutes. A copy of the 2012 questionnaire is included as Appendix B.

Questions about Driving Behavior on the Previous Day

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

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

Questions about Air Quality

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

1) General awareness: "In the past two days have you heard, read, or seen any advertisements or news broadcasts about Spare The Air, or poor air quality, or requests to drive less in this area?" (the ARB-worded question)

2) Specific awareness of the request not to drive: "Do you recall being asked not to drive yesterday because our area was experiencing a period of unhealthy air?" (original question)

Respondents were also asked whether they typically tried to reduce driving for air quality reasons in the summer, and if so, what they had done specifically this past summer to avoid adding to air pollution.

Caveat

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

RESULTS & CONCLUSIONS

AWARENESS OF THE 2012 SPARE THE AIR CAMPAIGN

Objectives

The specific objectives of the current section are to:

a. Measure awareness of the 2012 Spare The Air campaign and determine if awareness was similar or different among drivers in four air quality districts in the Sacramento Nonattainment Area (Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD).
b. Determine if awareness during annual summer Spare The Air seasons has increased, decreased, or stayed the same from 2000 to the present.
c. Compare levels of awareness between respondents interviewed following Spare The Air days and those interviewed on Control (non-Spare The Air) days.
d. Extrapolate the results to the population by estimating the number of **drivers** who were aware of the 2012 Spare The Air campaign (correcting for Control days).
e. Identify which media outlets most noticeably disseminated Spare The Air information by using responses from participants regarding where each read/heard/saw notifications about air quality.

Results

General Awareness

1 ➢ ***The level of general awareness of Spare The Air in 2012 increased from the previous two years – an average of 46% of respondents in the entire Sacramento region had heard, read, or seen the Spare The Air advertisements. Further analysis showed that awareness increased with cumulative exposure such that the closer together were two Spare The Air days, the greater the general awareness among residents. The 46% translates into an estimated 1,006,064 residents in the Sacramento Nonattainment Area who were aware of the 2012 Spare The Air campaign.***

The Spare The Air season runs from May to October of each year. This year there were six Spare The Air days, including two multi-day episodes.[18] Levels of general awareness of Spare The Air have been measured since 2002 with the following question:

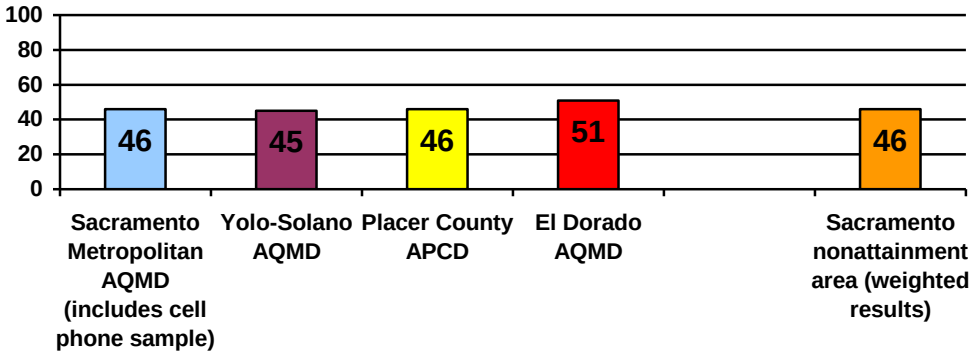
> "In the past two days have you heard, read, or seen any advertisements or news broadcasts about Spare The Air, or poor air quality, or requests to drive less in this area?"

The next chart indicates 2012 levels of general awareness for residents in the individual air districts as well as in the entire Sacramento nonattainment area as a whole (weighted results[19]). It can be seen that on average, 46% of respondents in the entire region were

[18] The six Spare Air Days were Wednesday, July 11; Thursday, July 12; Wednesday, August 1; Saturday, August 11; Tuesday, August 14; and Wednesday, August 15. Interviewing took place following each day.

aware of Spare The Air in general. **Translating to over one million residents (1,006,064)[20], this percentage indicates a step towards again achieving historical levels of awareness of the campaign (see a later section in this report for a year-to-year analysis).** In terms of the individual air quality districts, it can be seen that general awareness ranged from 45% in Yolo-Solano AQMD to 51% in El Dorado AQMD. However, the differences among individual air districts were not statistically significant.

2012 General Awareness of Spare The Air (ARB wording)



That general awareness in 2012 increased from the 2010-2011 seasons, but remains low compared to more historical data, requires explanation. One reason for the increase might be that air quality in 2012 was slightly worse than in 2011 and 2010. The average actual AQI for Spare The Air days in 2012 was slightly greater than that of both 2010 and 2011[21]. In addition, Spare The Air days occurred during the hot summer months, as compared to 2010 and 2011 when half or more of the Spare The Air days occurred in September.

Yet, compared to years prior to 2010, awareness is lower. This may be because air quality in the region continues to improve. The number of violations the region experiences now compared to five years ago has dropped and the Sacramento Nonattainment Area reached the federal one-hour ozone standard.[22] Additionally, the number of "unhealthy" and "unhealthy for sensitive groups" forecasts issued in 2012 is similar to that of 2007, but lower than years prior to 2007 when awareness was also generally low compared to earlier data.

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19 See methodology section for a complete description of weighting methods. Interviews were conducted with random digit dialed (RDD) samples of residents with landline phones in all counties, and an additional RDD cell phone sample of residents in Sacramento County (only).

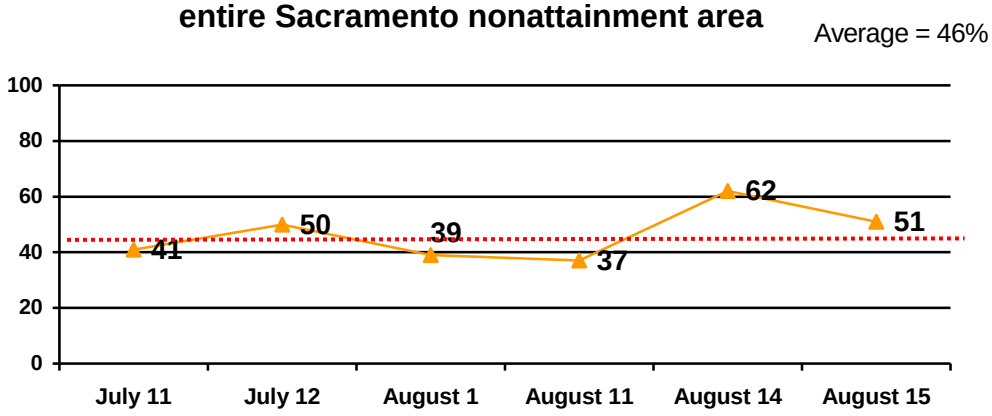
20 Based on 2012 estimates from the 2010 US Census: State of California, Department of Finance, *E-1 Population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2011 and 2012* available online at: http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/documents/E-1_2012_Internet_Version.xls The total population in the entire Sacramento nonattainment area [including El Dorado AQMD] is 2,187,097: [Sacramento Metropolitan AQMD (66%) - 1,435,153; Yolo-Solano AQMD (15%) - 319,925 (this includes the total 202,133 from Yolo County and 117,792 from the Dixon, Rio Vista and Vacaville areas of Solano County); Placer County APCD (14%) – 309,135 (this figure represents the 87% of Placer County's 355,328 residents who do not live in zip codes north or east of Auburn), El Dorado AQMD (5%) - 122,884 (this figure represents 68% of El Dorado County's 180,712 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).

21 Data retrieved from the Survey Results section of www.sparetheair.com

22 SMAQMD news release Oct 4, 2012. "This is a momentous milestone in improving air quality in the Sacramento Region," said Board Chair Phil Serna of the Sacramento Metropolitan Air Quality Management District. "The efforts of countless regional organizations, businesses and individuals working together have made it possible."

Another explanation involves a combination of consecutive poor air quality days with media penetration. The 2011 evaluation tested and confirmed the hypothesis that cumulative experience of hearing multiple days' worth of Spare The Air media advisories is needed to capture the attention of residents, thus increasing awareness. In contrast, data from the 2012 evaluation do not offer as much support for this hypothesis. We compared general awareness results on each Spare The Air day, and paid particular attention to the results on the second day (i.e. July 12 or August 15) of the two-day Spare The Air episodes. Results are presented in the next chart. The results of the analysis indicated **no significant increase in awareness on the second day of either multi-day episode** compared with all other days. However, respondents on August 14, the middle of three closely dated episodes, show a significantly larger degree of awareness than respondents of other days. Additionally, respondents of the most separately dated episodes, August 1 and 11, exhibited the lowest levels of awareness. These two significant relationships offer partial support for multi-day episodes resulting in greater awareness.

2012 General Awareness of Spare The Air on each Spare The Air day: weighted results for the entire Sacramento nonattainment area



In other words, this year's data suggest that cumulative exposure might not be as effective at increasing awareness as the 2011 data show, though some evidence does exist. Because of the contrast, future years' analyses should continue to probe this question in order to develop a more conclusive understanding of the cumulative effect of campaign exposure on awareness. Even so, that 62% of respondents were aware of Spare The Air on August 14 is similar to many previous years' levels of general awareness - years in which episodes occurred more frequently - is additional indication that frequency of episodes does impact awareness.

Specific Awareness: Request Not to Drive

2 ➢ ***23% of respondents in the Sacramento region were aware of the specific request not to drive on Spare The Air days. When extrapolated to the entire population, this means that an estimated 503,032 residents were aware of Spare The Air advisories.***

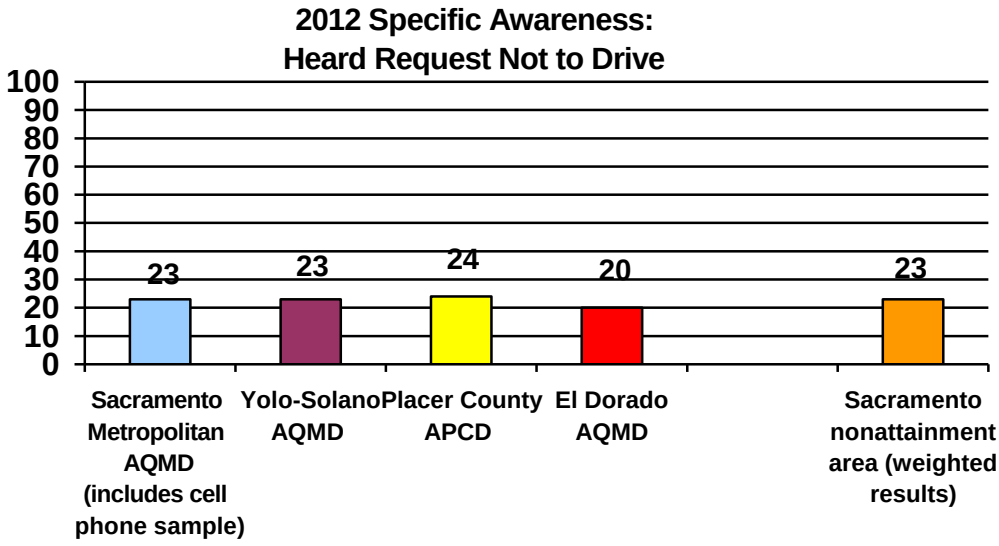
Since 1995, specific awareness of the request not to drive has been measured every survey year with the following question:

"Do you recall being asked not to drive yesterday because our area was experiencing a period of unhealthy air?"[23]

The specific episodic advisory that is sent to Air Alert subscribers and radio, television and print media says: "Drivers in the Sacramento region are asked to reduce driving or not drive at all during this period of unhealthy air quality. Carpool to sports and recreation activities, bike or walk in the morning hours when pollution levels are low, postpone errands or take the bus and light rail."

The next chart indicates that 23% of respondents in the region as a whole (weighted results) were aware of this specific request not to drive. [24] Specific awareness has always been statistically lower than general awareness. The 23% translates into an estimated **503,032** residents in the Sacramento region who heard the specific request not to drive on Spare The Air days.

There were no statistically significant differences among the individual air quality districts. Levels of specific awareness ranged from 20% among El Dorado AQMD respondents to 23% in Sacramento Metropolitan AQMD.



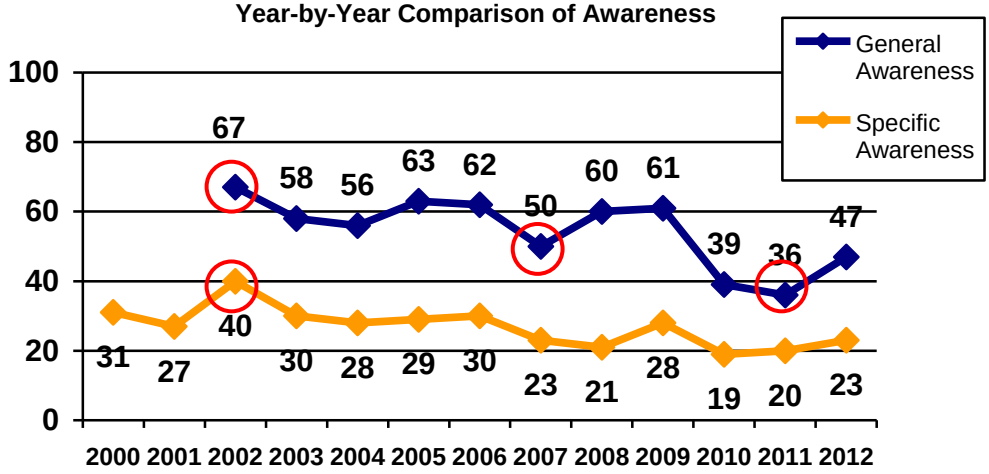
Year-To-Year Comparisons of Awareness: Sacramento Core Region

3 ➢ ***The level of general awareness in the Sacramento Core Region is lower at 47% than in most previous evaluation years, but higher than those years most recent.***

[23] The order of the specific and general awareness questions was randomized so as to eliminate any possible order-response bias.
[24] See methodology section for review of weighting procedures.

The next chart indicates annual percentages of general (since 2002) and specific awareness (since 2000) of Spare The Air in the Sacramento Core Region.[25] It can be seen that general awareness at 47% is a slight but statistically significant increase from the previous two years, but is still low in comparison to years 2009 and earlier. General awareness was highest in 2002 at 67%, a year when air quality was very poor and there were 22 Spare The Air days, including many multi-day episodes. As has already been discussed, this year's level can likely be attributed to a more consistent distribution of episodes (accounting for the increase from 2010 and 2011), and better air quality (accounting for the low level). Including results from this year, the average level of general awareness is 55%.

Sacramento Core Region (excludes El Dorado AQMD):
Year-by-Year Comparison of Awareness



Circled percentages represent significant highs and lows.

Over time, and including this year's results, the average of specific awareness is 28%. Improved air quality likely accounts for the lower 23% of respondents who heard the 2012 specific requests not to drive on Spare The Air days, as there is a precedent: it can be seen that 2007 was the first time a significant decline in awareness occurred – and 2007 was a comparatively mild season with relatively good air quality and the same number of Spare The Air days as this year. Additionally, and as was done for general awareness, further analysis of the specific awareness results for the two-day episodes indicated slight increases in awareness the more closely dated the episodes are.

Year-To-Year Comparisons by Air District

4 ➢ Levels of both types of awareness were highest in 2002 in all individual air districts, and at their lowest in 2010 and 2011. This year marks an increase in general awareness from the previous two years, though it is not statistically significant.

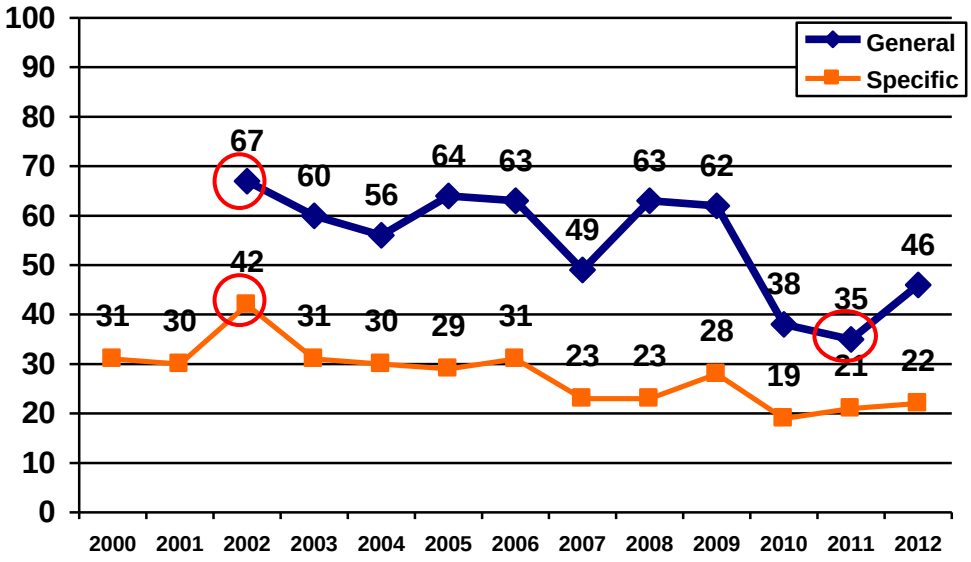
[25] Throughout this report, any references to the Sacramento Core Region exclude El Dorado County AQMD as it was not included in all the evaluation years. Weights were recalculated proportionally after excluding El Dorado responses. Results from the cell phone sample in Sacramento County were again included.

Year-to-year comparisons of the annual levels of general and specific awareness for the individual air districts are presented in the next four graphs. (El Dorado County AQMD residents were not interviewed in 2002, 2003, or 2005).

Sacramento Metropolitan AQMD

As can be seen in the next graph, in Sacramento Metropolitan AQMD the highest levels of general as well as specific awareness occurred in 2002. There was a significant drop in the two types of awareness in 2007; and again during 2010 as well 2011. The general awareness average over time in Sacramento Metropolitan AQMD is 56%; the average for specific awareness is 29%.

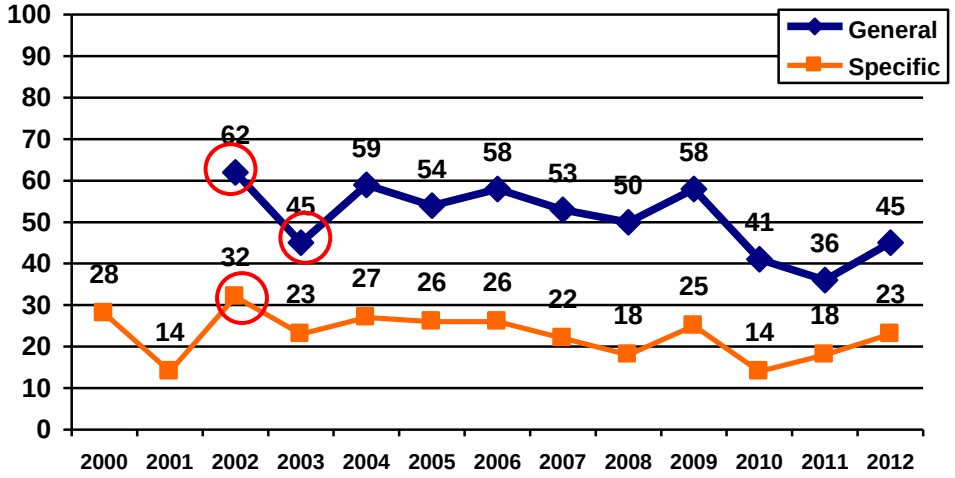
Awareness: Sacramento Metropolitan AQMD
Year-to-Year Comparisons



Yolo-Solano AQMD

In Yolo-Solano AQMD, this year's level of general awareness increased marginally from last year, though it is not statistically different. The average over time is 53%. In terms of specific awareness, this year's level of 23% did not differ from last year's, though again, it is a marginal increase. The average over time for specific awareness is 24%.

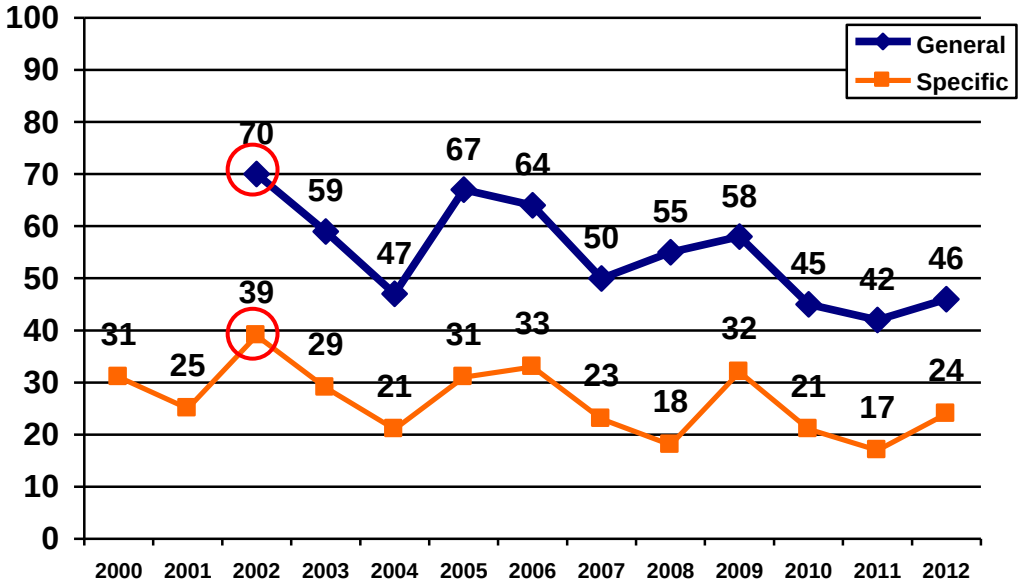
Awareness: Yolo-Solano AQMD
Year-to-Year Comparisons



Placer County APCD

Results have been the most variable in Placer County APCD from one year to the next. General awareness this year increased to 46% but was not statistically different from previous years. The average level of general awareness in Placer County APCD is 56%; and that of specific awareness is 27%. (Note that only the largest differences are circled in the following chart.)

Awareness: Placer County APCD
Year-to-Year Comparisons

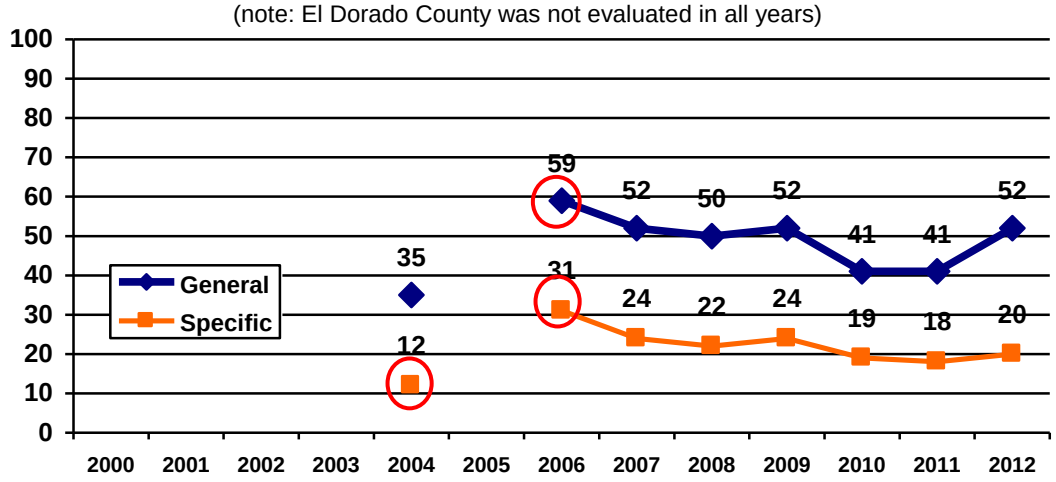


El Dorado County AQMD

In El Dorado County AQMD, with the exception of 2004 (when interviews were conducted following only one Spare The Air day and so are not representative of the entire season), it can be seen that results for both types of awareness are increasing from the steady decline since 2006. The average over time for general awareness is 48%; and the average for specific awareness is 21%.

Awareness: El Dorado County AQMD
Year-to-Year Comparisons

(note: El Dorado County was not evaluated in all years)



Spare The Air Versus Control Days

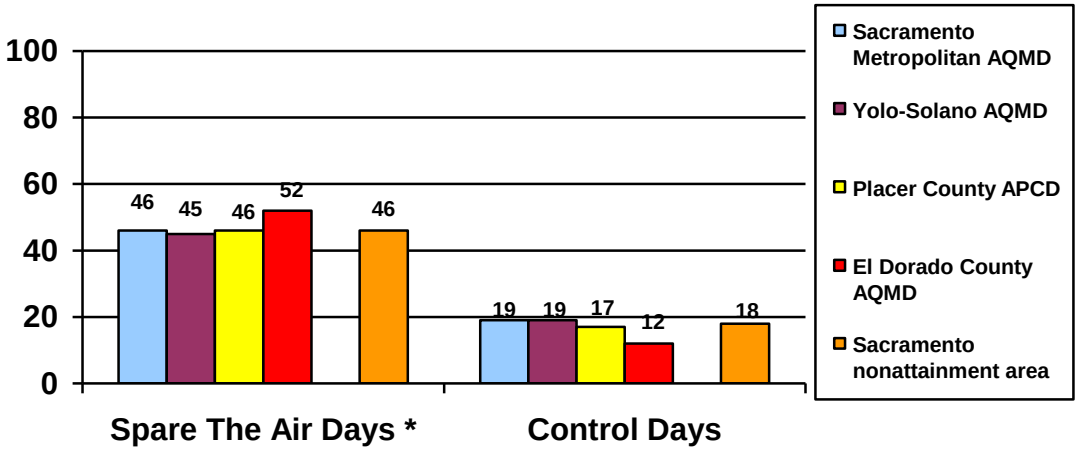
6 ➢ ***Levels of both general and specific awareness of Spare The Air were significantly higher when respondents were interviewed following Spare The Air days than on Control days, a further indication that the announcements are in fact being heard.***

Control day interviews were conducted on non Spare The Air days with random samples of landline residents representative of all air districts in the Nonattainment Area. The same questionnaire as that used following Spare The Air days was used for Control day calling. The use of a Control group insures that any positive results attributed to the Spare The Air program are indeed due to the program itself and not to a possible social desirability response bias. Control interviews took place on the same days of the week as the Spare The Air interviews, but on days when the Air Quality Index (AQI) was estimated to be good or moderate (0 - 100).

Results for general awareness are presented in the next chart and indicate that although 18% of area respondents interviewed on Control days said they had seen or heard Spare The Air announcements, significantly more (46%) of those interviewed after Spare The Air days remembered seeing or hearing them. Thus, the general media buy was effective at reaching Sacramento Area residents throughout the summer, particularly following Spare The Air days, when respondents also had the opportunity to witness an episodic

advertisement, which is included in the general awareness measure. Results in each of the individual air districts were similar. The **Spare The Air program is still able to use the media to effectively reach the Sacramento air basin population**.

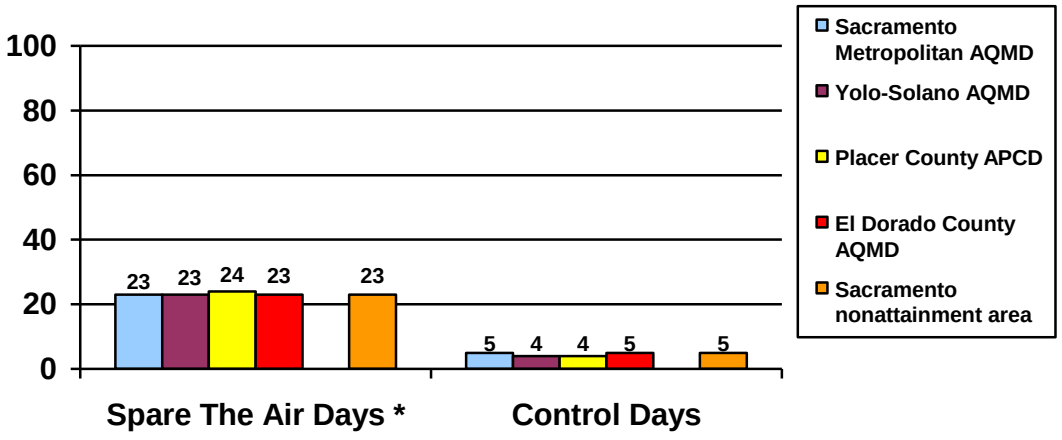
Spare The Air vs. Control Days: 2012 General Awareness



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

In terms of specific awareness, 5% of Control day respondents in the area as a whole incorrectly heard a request not to drive versus the 23% of respondents who correctly remembered the request following Spare The Air days. As can be seen in the following chart, the difference between Spare The Air and Control day interviewing in each individual air district was likewise significant. These results indicate once again that the **Spare The Air program is still effective in reaching area residents**.

Spare The Air vs. Control Days: 2012 Specific Awareness



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

Estimating the Number of STA-Aware Drivers

7 ➢ ***Adjusting for Control day responses, the percentage of respondents who were aware of Spare The Air in general translates into an estimate of 408,179 drivers in the Nonattainment Area who were aware of a Spare The Air day during the 2012 season.***

There were an estimated 1,457,782 drivers in the entire Sacramento Nonattainment Area in the summer of 2012.[26] With the level of general awareness of Spare The Air at 46%, this translates into an estimated 670,579 **drivers** in the region who were aware of Spare The Air. However, there were also 18% of Control day respondents (or 262,400 drivers) who thought they heard about Spare The Air when in fact no advertisement had been issued. Correcting then for Control day responses through subtraction means that **408,179 drivers in the Sacramento nonattainment area as a whole were aware of the 2012 Spare The Air campaign in general**. The next table indicates the calculations and the estimated number of drivers who heard the advisories in each individual air district.

Air District	*Total Estimated Number of Drivers*	*Percent Aware of STA (General Awareness) STA / Control*	*Estimated Number of Drivers Aware of STA in General (STA – Control)*
Sacramento Metropolitan AQMD	927,347	46% / 19%	***426,579 – 176,195= 250,384***
Yolo-Solano AQMD	203,656	45% / 19%	***91,645 - 38,694= 52,951***
Placer County APCD	231,220	46% / 17%	***106,361 – 39,307= 67,054***
El Dorado County AQMD	95,559	52% / 12%	***49,690 – 11,467= 38,223***
Sacramento Nonattainment Area[27]	1,457,782	46% / 18%	**670,579 - 262,400= *408,179***

[26] The number of drivers in the Sacramento nonattainment area for 2012 was estimated, using the number of driver licenses by county for 2012, obtained from the California Department of Motor Vehicles database http://www.dmv.ca.gov/about/profile/dl_outs_by_county.pdf , and calculating the percentage increase, based on county population figure increases from 2011 to 2012 listed at: http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/documents/E-1_2012_Internet_Version.xls. The estimated number of licensed drivers for the total Sacramento nonattainment area in 2012, therefore, was 1,457,782: Sacramento Metropolitan AQMD: total 927,347 + Yolo-Solano: total of 203,656 (124,762 in Yolo County + Solano County: 272,050 * 29% for the proportion located within the Air Quality district = 78,894) + Placer County: total of 231,220 (265,770 * 87% for Air Quality district) + El Dorado County: total of 95,559 (140,528 * 68% for Air Quality district). The proportion of drivers in each district also corresponds to the residential population proportions used in the calculation of weights for the region as a whole.

8 ➢ ***In terms of specific awareness, and again correcting for Control day responses, this means that over a quarter of a million (262,400) drivers in the region heard the episodic request not to drive on Spare The Air days in 2012.***

The estimated numbers of drivers who were aware of the specific request not to drive are presented in the next table. For the entire Sacramento Nonattainment Area, and correcting for Control day responses, this translates into an estimated 262,400 drivers who were specifically aware of the requests not to drive on Spare The Air days.

Air District	*Total Estimated Number of Drivers*	*Percent Aware of STA (Specific Awareness) STA / Control*	*Estimated Number of Drivers Aware of STA Specific Request Not to Drive (STA - Control)*
Sacramento Metropolitan AQMD	927,347	23% / 5%	***213,289 – 46,367= 166,922***
Yolo-Solano AQMD	203,656	23% / 4%	***46,840 - 8,146= 38,694***
Placer County APCD	231,220	24% / 4%	***55,492 – 9,248= 46,244***
El Dorado County AQMD	95,559	23% / 5%	***21,978 - 4,777= 17,201***
Sacramento Nonattainment Area[28]	1,457,782	23% / 5%	**335,289 – 72,889= *262,400***

Awareness of General Media Campaign

9 ➢ ***News or weather broadcasts were the most cited sources of air quality information in the Sacramento Nonattainment Area. Television and radio commercials followed far behind while online mediums and newspapers were rarely noted as sources of information.***

For the purpose of the 2012 Spare The Air evaluation, respondents were asked to identify the medium(s) through which they heard, read, or saw a message about air quality after indicating that they received such a message. That is, after stating yes to the general awareness item, respondents were asked:

"Where do you recall seeing/hearing/reading that information?" [29]

[27] The results for the Sacramento nonattainment area as a whole are not the simple sum of the individual air districts, but rather, are weighted results that reflect the relative proportional distribution of residents in the area.

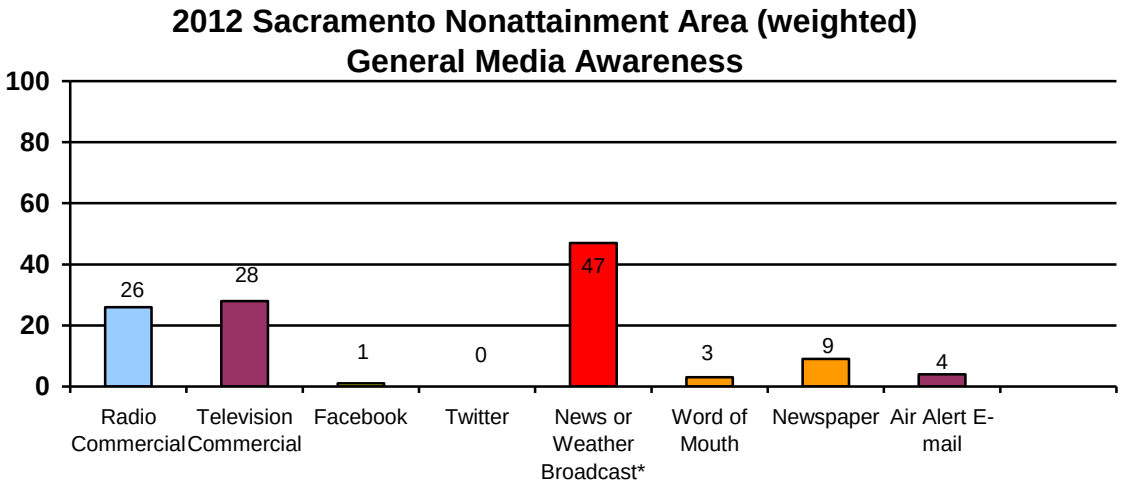
[28] The results for the Sacramento nonattainment area as a whole are not the simple sum of the individual air districts, but rather, are weighted results which reflect the relative proportional distribution of residents in the area.

[29] Seeing/hearing/reading syntax dependent upon answer to general awareness item.

The data resulting from this survey item may help coordinators better allocate funds and effort during subsequent seasons and maximize message dissemination. The next table illustrates the percentage of respondents who identified any of eight mediums through which they received a message about air quality in general for the Sacramento Nonattainment Area.

It can be seen in the table below that the most cited source of Spare The Air information is news or weather broadcasts selected by 47% of respondents who were aware of the campaign in general. The next most cited source was television, followed closely by radio. Facebook and other online media were recent additions to campaign efforts, and a small percentage of respondents cited information from those sources indicating that those mediums are possible avenues for dissemination in the future.

No significant differences arose between geographic locations and, therefore, no data is presented for the individual air districts. The most accurate representation of media sources is accounted for by the Nonattainment Area as a whole.



PURPOSEFUL DRIVING REDUCTION

Objectives

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

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

a. report the percentage of respondents who reported driving "less" the previous day and statistically compare with annual results from 2000 to the present

b. calculate the percentage of purposeful "reducer" drivers, that is, those who:

   i. made fewer vehicle trips on Spare The Air days, and
   ii. did so purposefully to help reduce air pollution in the region, and
   iii. were aware of the Spare The Air advisories (general awareness)

   and determine if the percentage of reducers is similar or different among four air quality districts in the Sacramento nonattainment area (Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD)

c. determine if the percentage of purposeful reducers in the Sacramento Core Region (excluding El Dorado County AQMD) has increased, decreased, or stayed the same from 2000 to the present

d. 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 2011

e. estimate the number of **single trips** avoided by purposeful reducers on Spare The Air days, and

f. compare the percentage of reducers found in the group of respondents interviewed about Spare The Air days with that of the group interviewed on Control (non-Spare The Air) days.

Results

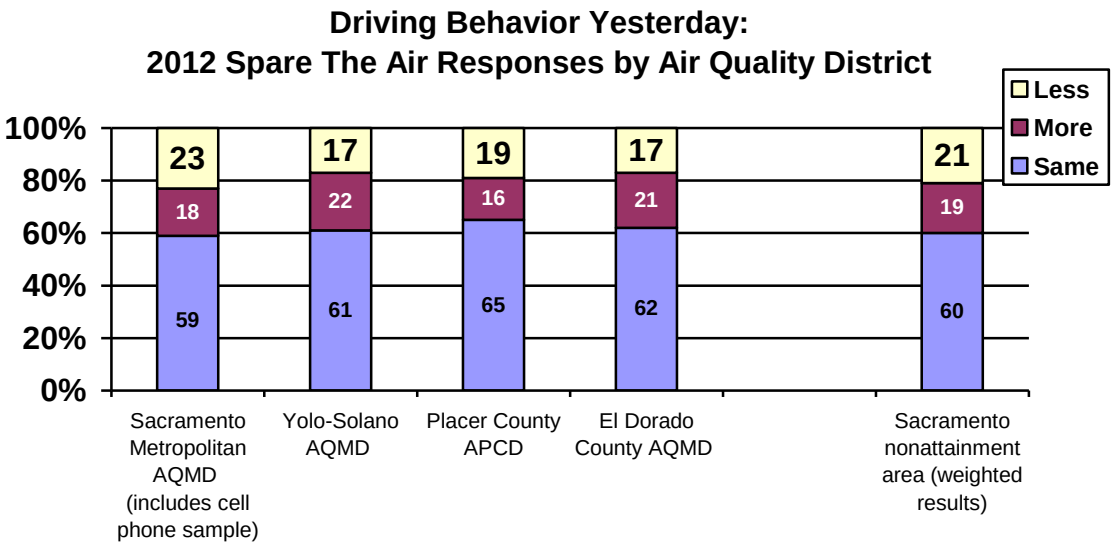
Driving Behavior Yesterday

10 ➢ Slightly over one in five (21%) of respondents in the Sacramento Nonattainment Area as a whole said they drove less on Spare The Air days. The percentage was highest among Sacramento Metropolitan residents (23%), and lowest among Yolo-Solano AQMD residents (17%) and El Dorado County AQMD residents (17%).

At the beginning of the survey, respondents interviewed following Spare The Air days were asked to think about their driving behavior the previous day and say whether they drove the "same, more, or less frequently" than they normally did on that particular day of the week. Results from each of the four individual air quality districts and the entire Sacramento Nonattainment Area (weighted results) are presented in the next chart.

It can be seen that the majority of respondents did not make any changes in their driving behavior – 60% in the area as a whole said they drove the same as usual the previous day. Close to twenty percent (19%) said they drove more, and the remaining 21% said they drove less. This pattern was seen within each of the individual air quality districts, where only slight differences arose between areas. Most notably, Placer County APCD respondents were the most likely to have not changed their driving behavior – approximately seven out of 10 (65%) said they drove the same as usual the previous day.

The highest percentage of those who said they drove less on Spare The Air days occurred in Sacramento Metropolitan AQMD (23%). In Placer County APCD, 19% drove less. In Yolo-Solano AQMD and El Dorado County AQMD, 17% of respondents drove less on Spare The Air days.

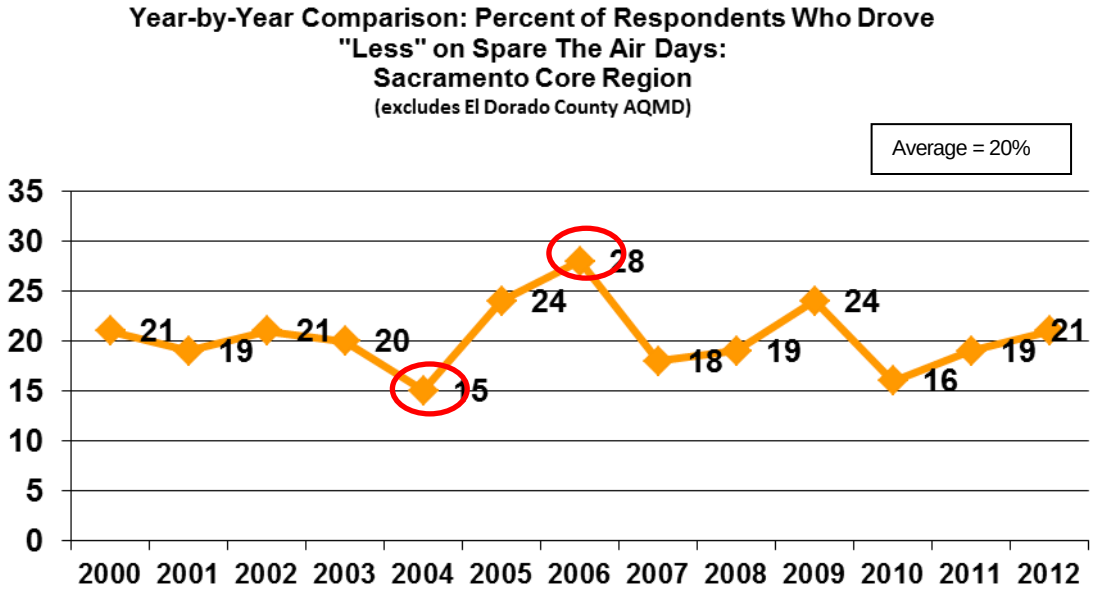


Year-to-Year Comparisons: Percent Who Drove Less

11 ➢ ***Over the last 13 years, the highest percentage of those who drove less on Spare The Air days in the Sacramento Core Region occurred in 2006 (28%), and the lowest percentage occurred in 2004 (15%). This year's 21% of respondents said they drove less on Spare The Air days is not significantly greater than the 13-year average of 20%.***

The next graph plots the percentages of drivers from 2000 to the present who said they drove less on Spare The Air days in the Sacramento Core Region (which excludes El Dorado County AQMD).[30] It can be seen that, with only a couple of exceptions, the percentage of respondents who said they drove less on Spare The Air days has remained relatively stable at about 20%, which is the 13 year average. In 2004 the level declined significantly to 15%, a summer with relatively good air quality and only six Spare The Air days. Rising significantly from 2004 levels, 2006 registered the highest percentage of all years, at 28%: 2006 was a poor air quality summer, with 15 Spare The Air days. Current results at 21% are not significantly different from the 13-year average.

[30] Results are for the Sacramento Core Region (weighted) and exclude El Dorado County AQMD because interviews were not conducted with El Dorado respondents in all survey years. Results include a cell phone sample of respondents in Sacramento County (only), which augmented the RDD landline sample for that district.

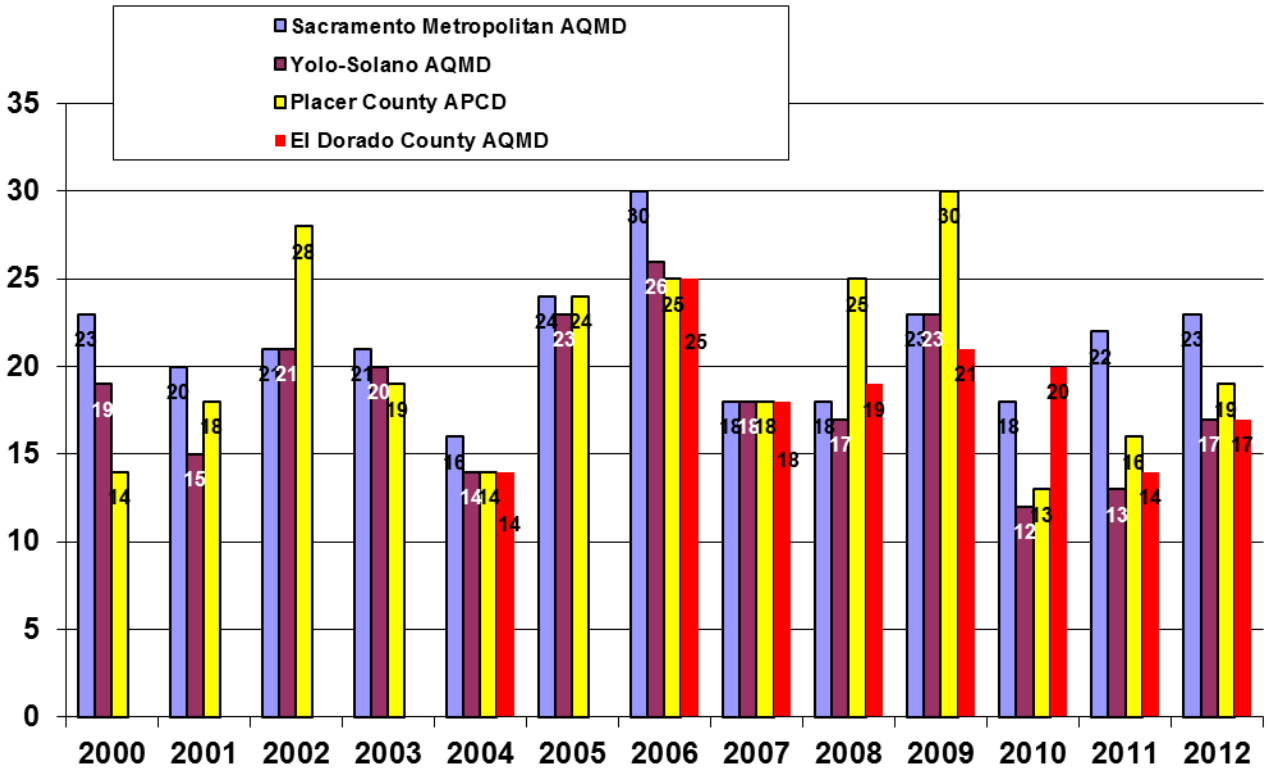


* circles indicate the highest and lowest percentages over time.

12 ➢ In the individual air districts, the percentage of respondents who drove less this year was not significantly different from each air district's average over time.

The annual percentage of respondents who drove less the previous day in the individual air districts from 2000 to the present are presented in the next chart. In **Sacramento Metropolitan AQMD** the percentage of residents who said they drove less on Spare The Air days ranged from a low of 16% in 2004 to a high of 30% in 2006. This year's percentage of 23% is not statistically different from the 13-year average of 21% in the SMAQMD. Results in **Yolo-Solano AQMD** ranged from a low of 12% in 2010 to a high of 26% in 2006. This year's 17% is not significantly different from the 13-year average of 18% in that air district. In **Placer County APCD** results tended to fluctuate more from one year to the next. The 19% of residents this year who said they drove less was not significantly lower than the 13-year average of 20%. Respondents in **El Dorado County AQMD** were interviewed in eight of the 13 years, and this year's 17% of respondents who reported driving less is consistent with the 8-year average of 19%.

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



Spare The Air Days vs. Control Days

13 ➢ ***A significantly higher percentage of respondents in the Sacramento Core Region said they drove less on Spare The Air days (21%) than on Control days (15%), one indication of the continuing effectiveness of the program.***

Control day interviewing is an integral part of the evaluation methodology of Spare The Air. Samples of respondents were interviewed on the same days of the week as the Spare The Air interviews, but on cooler, non Spare The Air days in August and September.[31] The use of Control day interviewing provides a means of calculating a correction or adjustment factor to account for any tendency that some individuals might have to overstate their driving reduction on Spare The Air days (social desirability response bias), and, therefore, provides the most conservative estimates of program effectiveness.

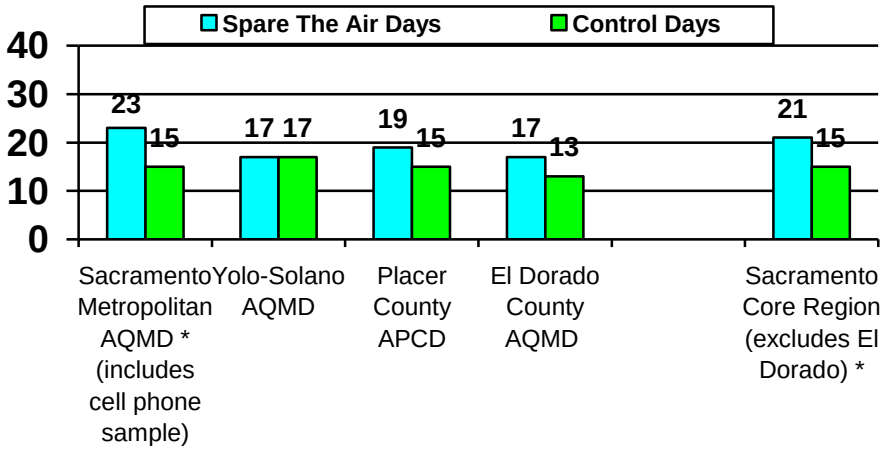
The next chart shows the results of Spare The Air and Control day interviewing for each individual air district and for the weighted Sacramento Core Region.[32] It can be seen that the percentage of respondents who said they drove less on Spare The Air days in the

[31] In order to know which days of the week to match, Control day interviews have to be conducted after Spare The Air days. See methodology section for a complete description of the sampling design.

[32] The Sacramento Core Region excludes El Dorado County AQMD in order to be able to make comparisons with previous years.

Sacramento Core Region was significantly greater at 21% than the 15% of respondents interviewed on Control days. This was also true in **Sacramento Metropolitan AQMD**, where the 23% of respondents interviewed following Spare The Air days was significantly higher than the 15% interviewed on Control days. The same percentage of respondents (17%) in **Yolo-Solano AQMD** drove less on Spare The Air days as on Control days. In **Placer County APCD** the difference was not significant (19% vs. 15%). In **El Dorado County AQMD**, more respondents on Spare The Air days (17%) drove less than on Control days (13%), although this difference was not significant.

2012 Spare The Air vs. Control Days: Percent of Respondents Who Drove Less The Previous Day



* Indicates a statistically significant difference between Spare The Air and Control responses.

Over the past 13 years, significant differences between the percentage of respondents who said they drove less on Spare The Air versus Control days have been found in all but four years – 2003, 2007, 2008, and 2010. (Within the individual air quality districts, however, there have been fewer years when the differences were significant.[33]) Results for the Sacramento Core Region are presented in the next table.

[33] In terms of the individual air districts within the Sacramento Core Region, Sacramento Metropolitan AQMD showed significant differences in 2000, 2001, 2002, 2004, 2005, 2006 and 2012. Placer County APCD showed differences in only four of the 13 years (2002, 2005, 2006, and 2009); and in Yolo-Solano AQMD there has been only one year in which the difference was significant (2002). Yolo-Solano AQMD generally experiences better air quality than any of the other air districts in the nonattainment area.

Year	Percentage of Respondents Who Drove Less Yesterday: Sacramento Core Region (excludes El Dorado County AQMD)		Difference (or "Spread")	Statistically Significant Difference?
	Spare The Air Day Respondents	Control Day Respondents		
2000	21%	13%	8%	Yes
2001	19%	14%	5%	Yes
2002	21%	17%	4%	Yes
2003	21%	18%	3%	No
2004	15%	11%	4%	Yes
2005	23%	17%	6%	Yes
2006	28%	18%	10%	Yes
2007	18%	15%	3%	No
2008	19%	16%	3%	No
2009	24%	19%	5%	Yes
2010	16%	17%	-1%	No
2011	19%	14%	5%	Yes
2012	21%	15%	6%	Yes

Although this year's results indicate a significant difference between the two groups of respondents, it has been suggested in the past and is reiterated again here that perhaps the time has come to drop this as a prerequisite to the calculation of emission reductions.[34]

Percentage of Purposeful Reducers

14 ➢ During the summer of 2012, no respondent drivers[35] in the entire Sacramento Nonattainment Area were classified "purposeful reducers" -- they drove less on Spare The Air days because they heard the Spare The Air advisories and wanted to improve air quality in the region.

15 ➢ Because this is the first time that the evaluation results have yielded no purposeful reducers, the data require significant explanation to contextualize results.

The definition of a purposeful driving reducer is quite strict: it includes only those interviewed following a Spare The Air day who said they drove less the previous day, specifically for air

[34] This requirement was introduced into the methodology in 2000 by Jude Lamare, Ph.D.; formerly with the Cleaner Air Partnership; and prior to discussions in 2002 with the Air Resources Board as to what would constitute a purposeful driving reducer. The definition of a purposeful reducer changed after these discussions, but the previous methodology requiring a significant difference between Spare The Air and Control drivers saying they drove less the previous day did not. The air districts might therefore want to reconsider whether this prerequisite is still necessary, given the fact that Control day interviewing already acts as a correction factor; that the sampling design change in 2008 of fewer completed interviews means that the margins of error in each air district are increased, that many drivers are seasonal reducers and have already reduced the amount of driving they do during the summer, and that other explanations are plausible.

[35] Weighted. It can be seen in the following tables that one respondent in the El Dorado County AQMD is classified as a purposeful reducer

quality reasons, and who had heard announcements about Spare The Air (general awareness using the ARB question.[36]) Results from each air quality district and for the weighted Sacramento regions (Sacramento Core Region as well as the entire Nonattainment Area) are presented in the next table. It can be seen that for the entire Sacramento Nonattainment Area, none of the Spare The Air respondent drivers (0 out of 513)[37] met the **strict ARB standard** for purposeful driving reduction. Individually, it can be seen that no respondents in **Sacramento Metropolitan AQMD** qualified as purposeful reducers; no respondents in **Yolo-Solano AQMD**; no respondents in **Placer County APCD**; but in **El Dorado County AQMD** there was one (.5%) purposeful reducer.

Because this is the first time that the evaluation results have yielded no purposeful reducers, the data require significant explanation to contextualize results. First, it is important to note the steady improvement in the Sacramento region's air quality over the past five years. Data show that the number of ground-level ozone exceedances have gradually declined since 1999.[38] Air quality in the summer of 2012 was especially good. Considering the U.S. EPA's lowering of the ground-level ozone standard in 2008, and a lower AQI threshold for forecasting Spare The Air days in 2012 (127 AQI,.086 parts per million in 2012 vs 150 AQI, .096 ppm in previous years), this season had only six Spare The Air days and only one day in one county reached the red Unhealthy level. In contrast, the 2002 season recorded 10 red Unhealthy days and one purple Very Unhealthy day. That year's evaluation yielded the greatest number of purposeful reducers of all evaluation years.

It is possible that a lack of perceived immediacy, typically derived from visible and experiential poor air quality, accounts for the absence of purposeful reducers this season. In addition, residents are able to view air pollution levels at www.SpareTheAir.com, and also view the latest hourly conditions at the region's monitoring sites on the website under Current Conditions. It is possible that Sacramento Area residents did not "see" high pollution readings or "feel" the need to modify their driving behavior for air quality reasons alone. In fact, further analysis of the data shows that 78% of respondents who said they drove less on a Spare The Air day cite reasons other than air quality such as gas prices, and/or weather, indicating that respondents are experiencing some alternative motivation for driving less on Spare The Air days other than air quality.

A second explanation involves sampling error, a statistical tool that estimates the likelihood that data resulting from the sample population used for surveying is representative of the total population from which the sample was drawn. When results from a data set are tabulated, final statistics and percentages are calculated at a certain level of confidence. Typically and in this case, calculations are made at a confidence level of 95%, meaning that the researchers are 95% confident that results from the sample would be accurate if the total population was surveyed. As stated, sampling error is an estimate of the degree to which results from a sample might be different from the population if the total population were surveyed (considered the "true" score). Calculations yield a percentage spread (e.g. +/- 4.5%), indicating the range of error possible in either direction for a given statistic. The sampling errors associated with the sample size of each Air Quality District, the Core Region, and the Nonattainment Area are displayed in the table below. As can be seen, it is

[36] 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 from 1999 to the present. Typically, more respondents indicate general awareness of Spare The Air than specific awareness of the request not to drive the previous day.

[37] Weighted. It can be seen in the following tables that one respondent in the El Dorado County AQMD is classified as a purposeful reducer

[38] Data from http://www.sparetheair.com/Exceedances.cfm.

possible that the percentages of purposeful reducers derived from these data are slightly inaccurate to the total population. **Consequently, surveying in the 2012 season may have reached an inordinate number of respondents who cannot be considered purposeful reducers, though purposeful reducers may still exist within the population as a whole.**

The reasons for error in sampling are manifold, and are most often explained by extraneous factors. Of considerable interest is that the 2012 surveying was conducted during a presidential election year, when persons are often contacted to respond to political surveys over the phone. It is possible that residents in the Sacramento Nonattainment Area who would typically have responded to the Spare The Air research were dissuaded from responding to phone surveys because of the election, not wanting to be bothered by another interviewer. Because of this, it is possible that the 2012 Spare The Air surveying reached a disproportionate number of respondents who, for extraneous reasons such as the election year, are not generalizable to the population that may contain more purposeful reducers than were recorded.

These two lines of reasoning are potential explanations of the 2012 data. A third explanation is offered in the next section and includes a discussion of the 2012 results in relation to previous years.

Spare The Air: Purposeful Reducers in 2012	*Number of Respondents Who Reduced Driving For Air Quality Reasons and Were Aware of STA Advisories*	*Total Number of Respondents Interviewed on Days Following Spare The Air*	*Sampling Error*	*% of Total Respondents Who Reduced Driving for Air Quality Reasons and Were Aware of STA Advisories*
Sacramento Metropolitan AQMD	**0**	**336**	**+/- 5.3%**	**0.0%**
Yolo-Solano AQMD	**0**	**236**	**+/- 6.4%**	**0.0%**
Placer County APCD	**0**	**224**	**+/- 6.5%**	**0.0%**
Sacramento Core Region[39]	**0**	**480**	**+/- 4.5%**	**0.0%**
El Dorado County AQMD	**1**	**179**	**+/- 7.3%**	**0.5%**
Sacramento Nonattainment Area[40]	**0**	**513**	**+/- 4.3%**	**0.0%**

[39] Weighted, excludes El Dorado County AQMD.

[40] Weighted, includes El Dorado County AQMD. 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, 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 14%, and El Dorado County AQMD is 5%.) This is why the weighted total number of completed interviews (i.e. 514) is less than the sum of the total number of interviews conducted in all air districts (i.e. 976).

Percentage of Purposeful Reducers: Year-To-Year Comparisons

15 ➢ ***The percentage of purposeful reducers in the Sacramento Core Region is significantly lower than the 13-year average, but not significantly different from the last two years' percentage of drivers who reduced driving on Spare The Air days in order to help improve air quality.***

The next table lists the annual proportions of purposeful reducers from 2000 to the present. Tests of proportion were used to compare year-to-year results. In the Sacramento Core Region (which excludes El Dorado County AQMD, where the only purposeful reducer was recorded this year), this year's result were significantly lower at **0.0%** than in some previous years, and significantly different from the 13-year average of **1.3%** of all drivers who purposefully reduced driving on Spare The Air days, specifically in order to help improve air quality.

In terms of the **Sacramento Metropolitan AQMD**, although annual results have varied slightly, the percentage of reducers has not changed significantly from one year to the next. In **Yolo-Solano AQMD** the percentage of reducers was significantly higher in 2002 than in most other years. The percentage of reducers in **Sacramento Metropolitan AQMD** was also higher in 2002 than in other years; however, this peak is not significantly different from the average. In **Placer County APCD**, the percentages of reducers were significantly higher in 2002 and 2006 than in most other years.

The 0.0% of purposeful reducers in all areas during the 2012 season is a surprise. The Spare The Air program has consistently seen success from 2000 to 2011. Consequently, the 2012 data require explanation in relation to years prior.

Because of the lack of statistical difference between any years in the Sacramento Metropolitan AQMD, and between the last three years in each other area, it is possible that the consistency in years prior is a better estimation of the percentage of purposeful reducers present in the total population during 2012 than the sample data from 2012 suggest. This explanation is consistent with the previously described concept of sampling error. That is, it may be that respondents in the 2012 survey year are not generalizable to the population, and the consistency in percentages from years prior better predict the number of purposeful reducers present in the total population of 2012.

In contrast, assuming Purposeful Reducer data from 2012 is as accurate as previous years, this year's data may be indicative of the changing media and economic environment we now live in, along with the Sacramento region's improving air quality. In order to determine if this is the case, we recommend that next year's evaluation probe areas unexplored during 2012 such as including inquiries into health effects experienced by respondents as well as reasons for driving **more** on Spare The Air days. Additionally, including a demographic inquiry into household income will allow for more accurate generalizability. Finally, items regarding driving behavior, such as mileage and number of trips should be added as well. Each of these items will help generate a clearer picture of the environment in which respondents are deciding and acting on driving habits.

Spare The Air: Purposeful Reducers	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*Significant Difference Among Years? (see footnotes)*	*13-year Average*
Sacramento Metropolitan AQMD	**2.0%**	**2.1%**	**2.3%**	**1.2%**	**1.6%**	**1.5%**	**1.9%**	**1.3%**	**0.5%**	**1.2%**	**0.5%**	**0.8%**	**0.0%**	**No**	**1.3%**
Yolo-Solano AQMD	**1.3%**	**0.2%**	**3.5%**	**1.2%**	**1.1%**	**1.3%**	**1.9%**	**1.6%**	**0.5%**	**2.7%**	**0.0%**	**0.0%**	**0.0%**	**Yes[41]**	**1.2%**
Placer County APCD	**1.0%**	**0.9%**	**3.9%**	**2.3%**	**1.4%**	**1.5%**	**4.3%**	**0.4%**	**1.6%**	**2.6%**	**0.3%**	**0.4%**	**0.0%**	**Yes[42]**	**1.6%**
Sacramento Core Region	**1.8%**	**1.7%**	**2.7%**	**1.4%**	**1.5%**	**1.4%**	**2.2%**	**1.2%**	**0.7%**	**1.7%**	**0.36%**	**0.5%**	**0.0%**	**Yes[43]**	**1.3%**

Estimated Number of Purposeful Reducers

16 ➢ ***After weighting, an estimated 0 drivers in the entire Sacramento Nonattainment Area purposefully made fewer trips each Spare The Air day in 2012, in order to reduce air pollution.***

There were an estimated 1,457,782 drivers[44] in the entire Sacramento Nonattainment Area in 2012. Estimates of the number of purposeful reducers for the individual air districts as well as for the region (both excluding and including El Dorado County AQMD) are presented in the next table. Because the only purposeful reducer was recorded in El Dorado County AQMD, results for the Core Region (excluding El Dorado) and the Nonattainment Area (including El Dorado, but weighted to reflect a proportionate 5% of the population) analyses result in no purposeful reducers for the Core Region or Nonattainment Area.

[41] In Yolo-Solano AQMD, 2002 was significantly higher than 2001, 2003, 2004, 2005, 2007, 2008, 2010, 2011, and 2012; 2009 was higher than 2001, 2010, 2011 and 2012; 2006 and 2007 were higher than 2010, 2011 and 2012.

[42] In Placer County APCD, 2002 and 2006 results were significantly higher than 2000, 2001, 2004, 2005, 2007, 2010, 2011 and 2012; and 2003 and 2009 were higher than 2007, 2010 and 2011, 2012.

[43] In the Sacramento Core Region, results in 2002 and 2006 were significantly higher than 2008, 2010, 2011 and 2012; and 2000, 2001 and 2009 were higher than 2010 and 2012.

[44] The number of drivers in the Sacramento Nonattainment Area for 2012 was estimated, using the number of driver licenses by county for 2012, obtained from the California Department of Motor Vehicles database http://www.dmv.ca.gov/about/profile/dl_outs_by_county.pdf , and calculating the percentage increase, based on county population figure increases from 2011 to 2012 listed at: http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/documents/E-1_2012_Internet_Version.xls. The estimated number of licensed drivers for the total Sacramento nonattainment area in 2012, therefore, was 1,457,782: Sacramento Metropolitan AQMD: total 927,347 + Yolo-Solano: total of 203,656 (124,762 in Yolo County + Solano County: 272,050 * 29% for the proportion located within the Air Quality district = 78,894) + Placer County: total of 231,220 (265,770 * 87% for Air Quality district) + El Dorado County: total of 95,559 (140,528 * 68% for Air Quality district). The proportion of drivers in each district also corresponds to the residential population proportions used in the calculation of weights for the region as a whole.

Air District	*Total Number of Drivers*	*Percent of Purposeful Reducers*	*Estimated Number of Purposeful Reducers in 2012*
Sacramento Metropolitan AQMD (includes cell phone sample)	927,347	**0.0%**	***0***
Yolo-Solano AQMD	203,656	**0.0%**	***0***
Placer County APCD	231,220	**0.0%**	***0***
Sacramento Core Region[45]	**1,362,223**	**0.0%**	***0***
El Dorado County AQMD	95,559	**0.5%**	***447***
Sacramento Nonattainment Area[46]	1,457,782	**0.0%**	***0***[47] ***purposeful reducers***

Estimated Number of Single Trips Avoided by Purposeful Reducers

17 ➢ ***In the Sacramento Nonattainment Area, no trips were avoided by purposeful reducers.***

Purposeful driving reducers were asked how many single vehicle trips they had avoided on the Spare The Air day. The mean number of single trips avoided in the entire Sacramento Nonattainment Area was **0**. It can be seen, however, that an estimated total of **447** trips were avoided in El Dorado County AQMD. Weighting reduces the value of these trips to the total of **0** trips for the Nonattainment region as a whole. Results for the individual air districts as well as for the weighted regions are presented in the next table.

45 Excludes El Dorado County AQMD.
46 Includes El Dorado County AQMD.
47 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. For the Core Region, Sacramento Metropolitan AQMD represents 69% of the population, Yolo-Solano AQMD is 16%, and Placer County APCD is 15%. For the entire nonattainment area, Sacramento Metropolitan AQMD represents 66% of the entire population, Yolo-Solano AQMD is 15%, Placer County APCD is 14%, and El Dorado County AQMD is 5%.

Air District	*Estimated Number of Purposeful Reducers*	*Mean # of Trips Avoided for Air Quality Reasons*	*Estimated Number of Single Trips Reduced*
Sacramento Metropolitan AQMD (includes cell phone sample)	***0***	**0**	**0**
Yolo-Solano AQMD	***0***	**0**	**0**
Placer County APCD	***0***	**0**	**0**
Sacramento Core Region[48]	***0***	**0**	**0**
El Dorado County AQMD	***447***	**1**	**447**
Sacramento Nonattainment Area[49]	***0***	**0**	**0 trips**

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

18 ➢ ***Control day interview results indicated that there were no respondents who specifically avoided making trips for air quality reasons on non Spare The Air days. However, because of the low percentage of purposeful reducers on Spare The Air days, there is no significant difference between Spare The Air and Control percentages this year.***

Control day respondents were also asked if they had reduced the number of trips 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 is harder to credit the Spare The Air program as the cause of driving reduction.[50]

The next table indicates the results from Control interviews in all the air districts. It can be seen that in the entire Nonattainment Area, no respondents reduced the number of trips for air quality reasons on Control days. Still, the difference between Spare The Air and Control groups was not statistically significant; due largely to the small number of purposeful reducers on Spare The Air days during this past summer.

48 Excludes El Dorado County AQMD.

49 Includes El Dorado County AQMD.

50 This year the same methodology as was adopted last year was used for Control day interviews: namely, reducers were classified as those respondents who said they drove less the previous day for air quality reasons, and who were not seasonal driving reducers (see 2010 Seasonal Driving Reduction Report for a complete description.)

Air District	*% of Respondents Who Reduced for Air Quality Reasons*		*Significant Difference?*
	Who Were Aware On STA Days	*On Control Days*	
Sacramento Metropolitan AQMD	0.0%	0.0%	No
Yolo-Solano AQMD	0.0%	0.0%	No
Placer AQMD	0.0%	0.0%	No
Sacramento Core Region	0.0%	0.0%	No
El Dorado County AQMD	0.5%	0.0%	No
Sacramento Nonattainment Area	0.0%	0.0%	No

ESTIMATED EMISSION REDUCTIONS

Objective

The main objective of the current section is to estimate how many tons of ozone precursor emissions [Reactive Organic Gas (ROG) and Nitrogen Oxides (NOx)] were reduced during the 2012 season that could be attributed directly to the Spare The Air program. In order not to overestimate possible reductions, a correction factor based on Control day interviewing has been applied. Results, therefore, are conservative.

Results

Calculation of Estimated Emission Reductions

19 ➢ ***The methodology used to estimate emission reductions due specifically to the Spare The Air program is conservative. Using that criteria alone, the 2012 program did not demonstrate emission reductions in the Sacramento Nonattainment Area.***

The methodology used to estimate emission reductions due specifically to the Spare The Air program is conservative. First, it includes only those drivers who said they drove less the previous day for air quality reasons (we interview respondents the day after a Spare The Air day is called). Thus, seasonal reducers who normally make fewer trips during the summer to help improve air quality are not (necessarily) included,[51]. Further, any purposeful driving reduction for air quality reasons on non Spare The Air days (i.e. Control day interviews) is subtracted from the emission reduction estimate. In addition, emission reductions were to be calculated only in those air districts where significantly more respondents said they drove less on Spare The Air days than on Control days. It has previously been recommended that the necessity of requiring this last step be dropped.[52] The prerequisite was introduced at a time when air quality in the nonattainment area was much worse.[53]

[51] These respondents are examined in another report on Seasonal Driving Reduction.
[52] See also Purposeful Driving Reduction reports in 2009, 2010, 2011, and 2012.
[53] This requirement, considered a prerequisite for the calculation of emission reductions in each air district, was introduced into the methodology in 2000 by Jude Lamare, Ph.D.; formerly with the Cleaner Air Partnership; and prior to discussions in 2002 with the Air Resources Board as to what would constitute a purposeful driving reducer. The definition of a purposeful reducer

Results from the Sacramento Nonattainment Area as a whole (including El Dorado County AQMD results) are used to illustrate the procedure for estimating emission reductions 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,[54] and who also said they drove less than usual on Spare The Air days, specifically for air quality reasons. For the Nonattainment Area as a whole, this was **0.0%**[55] (0 / 513[56]) 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 **0** single trips avoided.

3. Extrapolate to the total number of drivers in the region[57] this year: the percentage of Spare The Air reducers therefore represents **0** drivers in the Sacramento nonattainment area, and the number of single trips avoided was **0** (0 drivers x 0 trips avoided on average).

4. Multiply the number of trips avoided by a per trip emission reduction average of **3.71 grams of ozone precursors.**[58] [This includes a total of Reactive Organic Gas (ROG) emissions (2.17 grams per trip for light duty passenger cars plus two categories of light duty trucks) plus Oxides of Nitrogen (NOx) emissions (1.54 grams per trip for light duty

changed after these discussions, but the previous methodology requiring a significant difference between Spare The Air and Control drivers saying they drove less the previous day did not. The air districts might therefore want to reconsider whether this prerequisite is still necessary, given the fact that Control day interviewing already acts as a correction factor; that the sampling design change in 2008 of fewer completed interviews means that the margins of error in each air district are increased, and that other explanations are plausible. In fact, in 2009 a significant difference was found in the weighted Sacramento nonattainment area as a whole as well as in Placer County APCD, but not in Sacramento Metropolitan AQMD, or Yolo-Solano AQMD, or El Dorado County AQMD. Emission reductions were still calculated for Sacramento Metropolitan AQMD as it is the largest air district within the nonattainment area. This year there were no significant differences in any of the air districts.

54 Using the ARB-worded question for measuring general awareness of Spare The Air: Q.12b "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?"

55 See the Purposeful Driving Reduction section of the 2012 report for a full explanation of these results.

56 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. (Sacramento Metropolitan AQMD: 66%, Yolo-Solano AQMD: 15%, Placer County APCD: 14%, and El Dorado County AQMD: 5%.) This is why the weighted total of completed interviews (514) is less than the sum of the total number of interviews in all air districts (976). Consequently, the one recorded purposeful reducer in El Dorado County is weighted out of the Nonattainment region as a whole.

57 The number of drivers in the Sacramento nonattainment area for 2012 was estimated, using the number of driver licenses by county for 2012, obtained from the California Department of Motor Vehicles database http://www.dmv.ca.gov/about/profile/dl_outs_by_county.pdf , and calculating the percentage increase, based on county population figure increases from 2011 to 2012 listed at: http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/documents/E-1_2012_Internet_Version.xls. The estimated number of licensed drivers for the total Sacramento nonattainment area in 2012, therefore, was 1,457,782: Sacramento Metropolitan AQMD: total 927,347 + Yolo-Solano: total of 203,656 (124,762 in Yolo County + Solano County: 272,050 * 29% for the proportion located within the Air Quality district = 78,894) + Placer County: total of 231,220 (265,770 * 87% for Air Quality district) + El Dorado County: total of 95,559 (140,528 * 68% for Air Quality district). The proportion of drivers in each district also corresponds to the residential population proportions used in the calculation of weights for the region as a whole.

58 Estimates were based on the Summer On-Road Inventory - EMFAC 2011 v 2.3 model, for the summer of 2012, provided by Charles Anderson, Program Coordinator, SMAQMD Planning & Emission Inventory in an email dated October 30, 2012. The total ROG tons for a combined total of light duty passenger cars and two categories of light duty trucks (6.3 + 1.93 + 2.53) 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. 3,040,786 for light duty passenger cars + 419,212 for light duty trucks1 + 1046,171 for light duty trucks2) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (4.03 +1.12 + 2.51) x 2000 x 454 / (3,040,786 + 419,212 + 1,046,171). ROG grams and NOx grams were then combined (2.17 + 1.54) to obtain 3.71 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.

passenger cars and light duty trucks) emissions, based on 2012 models of EMFAC2011 V2.3.] EMFAC2011 V2.3 is the latest update to the EMFAC model. It is used by California state and local governments to meet Clean Air Act (CAA) requirements. EMFAC2011 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 **0 grams** of ozone precursors (0 single trips avoided x 3.71 grams per trip).

5. Convert to tons.[59] For the Sacramento nonattainment area as a whole, this translates to an estimated total of **0.00 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. As there were no recorded purposeful reducers on control days, this step was skipped.

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. Because both Spare The Air day and Control day emissions reductions equal zero, no correction factor is necessary :

8. Result: **0.00 tons of ozone precursors reduced per Spare The Air day in 2012.**

Emission reductions attributable to the Spare The Air campaign are a function of the percentage of purposeful reducers recorded in a season. Because the 2012 season resulted in no recorded purposeful reducers, emission reductions must also be zero. **Described in the Purposeful Driving Reduction section of the 2012 report are possible explanations of the 2012 data that elaborate on why no purposeful reducers were recorded** (and thus, no emission reductions) **and what that means for Spare The Air moving forward. It is recommended that interested parties read that section thoroughly in order to understand the significance of those possibilities in relation to the emissions reduction calculated here**. The procedure just described is summarized in the following table:

[59] There are 907,200 grams in a ton.

Sacramento Nonattainment Area	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons[60]	X Number of Licensed Drivers in Sacramento Nonattain-ment Area (1,457,782 Total)	X Mean Number of Single Trips Reduced Per Day	X 3.71 Grams of Ozone Precursors Per Trip (EMFAC 2011 V2.3) 2012 summer	= Estimated Tons per Day of Ozone Precursors Reduced
Spare The Air Days	0.0% (0 / 513[61])	0	0	0 grams	0 tons
Control Days	0.0% (0 /587)	0	0	0 grams	0 tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions – Control Day Reductions)					*0.00 tons*

2012 Emissions Reduction Estimate: Sacramento Metropolitan AQMD

20 ➢ *There was no reduction in ozone precursors in Sacramento Metropolitan AQMD per Spare The Air day. See pages 30-33 for explanation.*

Sacramento Metropolitan AQMD	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons	X Number of Licensed Drivers in Sacramento Metropolitan AQMD (924,541 Total)	X Mean Number of Single Trips Reduced Per Day	X 3.96 Grams of Ozone Precursors Per Trip (EMFAC 2007 V2.3) 2012 summer	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	0.0% (0 /336)	0	0	0 grams	0.00 tons
Control Days	0.0% (0 / 384)	0	0	0 grams	0tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions – Control Day Reductions)					*0.00 tons*

[60] 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 - Q12b).

[61] Please note that the weighted total number of completed interviews for the Sacramento Nonattainment Area as a whole (i.e. 513) is less than the total number of completed interviews within all air districts (976 unweighted). Since the beginning evaluation in 1995, the methodology for weighting has been to set Sacramento Metropolitan AQMD interviews as 1, and down-weight interviews from all other counties appropriately, depending on the size of their populations. The Sacramento Metropolitan AQMD represents the largest percentage of the nonattainment area population at 66%, followed by Yolo-Solano AQMD (15% of area population), Placer County APCD (14%), and El Dorado County AQMD (5%). In other words, the number of completed interviews for the weighted Sacramento nonattainment area is not the simple sum of the number of completed interviews in each individual air district.

Comparison with Previous Years: Sacramento Metropolitan AQMD (only)

A comparison of estimated emission reductions[62] due to the Spare The Air program from 2001 to 2012 present in the Sacramento Metropolitan Air Quality Management District[63] are presented in the next table. It is important to point out that the factors that contribute to the estimates (i.e. differences in yearly estimated ROG and NOx emission factors per trip,[64] changes in the number of drivers, the percentage of purposeful reducers, the average number of trips reduced, the severity of air quality conditions and the number of Spare The Air days experienced during each summer season) vary from one year to the next.

It can be seen that the average estimated emission reductions per Spare The Air day ranged from a low of .00 tons in the 2012 season to a high of 1.32 tons in 2001. **Other than this 2012 season, it can be seen that the Spare The Air program has been successful in reducing the amount of ozone precursors in the air each year.** The 2012 season marked the fourth consecutive year where the region had six or fewer Spare The Air days during the season due to improved air quality overall. This may have contributed to the lack of purposeful reducers and, consequently, the tons of emissions precursors attributable to the Spare The Air campaign. Additionally, the large margins of error associated with the very small sample of purposeful reducers means that the lack of emissions reductions in 2012 is possibly a simple function of sampling error.

Year	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*
Sacramento Metropolitan AQMD: ***Average emission reductions attributed to Spare The Air (tons)***	**1.32**	**0.99**	**0.26**	**0.42**	**0.25**	**0.26**	**0.06**	**0.03**	**0.19**	**0.07**	**0.08**	**0.00**

2012 SUMMERTIME SEASONAL TRIP REDUCTIONS

Objectives

There is a group of residents who usually drive less to help improve air quality in the region during the summer months who are not necessarily included in emission reduction estimates as they may have not driven less on a Spare The Air day because they have already reduced their driving behavior. Specific objectives of the current report are to:

[62] The estimated emissions reductions shown in the current table were based on accepted EMFAC models for each year. This year, estimates were based on the EMFAC 2011 v 2.3 model, 2012 summer, Charles Anderson, Program Coordinator, SMAQMD Planning & Emission Inventory & Hao Quinn, SMAQMD Associate Air Quality Engineer in an email dated October 30, 2012.

[63] Over the years, reductions could often not be calculated for Placer County APCD, Yolo-Solano AQMD, and El Dorado County AQMD as there were often no significant differences between Spare The Air and Control day drivers who said they drove less. (See footnote 3.) Once again, the air quality districts might want to consider dropping this prerequisite. Also, as El Dorado County AQMD respondents were not interviewed in every survey year, it is not feasible to compare the tons reduced from the entire nonattainment area over the years. Emission reductions for just the Sacramento Core Region (excluding El Dorado County AQMD) were not included in previous years' evaluations.

[64] It should be noted that over the years the motor vehicle emissions have lowered, because cleaner burning vehicles produce fewer emissions.

a. 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,
b. compare the percentage of seasonal trip reducers and the mean number of trips they have avoided over the past 13 years, and
c. estimate emission reductions from these voluntary driving reducers.

Results

Seasonal Driving Reducers

21 ➢ One third (33%) of all respondents in the Sacramento Nonattainment Area are seasonal reducers – that is, they usually reduce the amount of driving they do during the summer to avoid adding to air pollution.

Seasonal driving reducers are defined as those who say they usually reduce the amount of driving they do during the summer months to avoid adding to air pollution. In large part, they can be considered as Spare The Air "success" stories – they understand that driving is a significant contributor to air pollution particularly through the summer months, and have incorporated it into their actual driving behavior by reducing the number of vehicle trips they make during the summer. It can be seen in the next pie chart that for the entire Sacramento Nonattainment Area as a whole, 33% of all[65] respondents in 2012 can be considered seasonal driving reducers. That 33% translates into an estimated 481,068[66] drivers in the Sacramento Nonattainment Area who regularly reduce their driving during the summer months to avoid adding to air pollution.

Percent Who Usually Reduce Driving in the Summer for Air Quality Reasons: 2012 Results for the Sacramento Nonattainment Area

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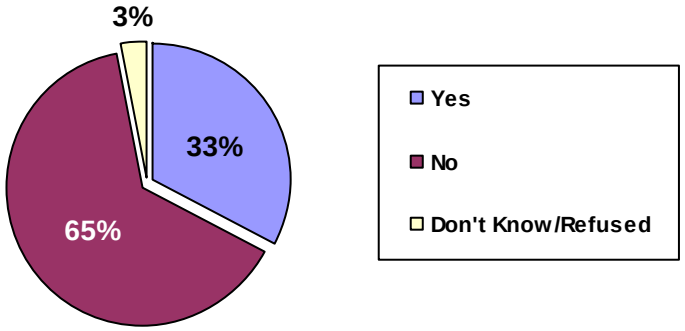


[65] For the purpose of this report, results from respondents interviewed following Spare The Air days have been combined with those interviewed on Control days as the issue under discussion applies equally to both groups of respondents.

[66] The number of drivers in the Sacramento nonattainment area for 2012 was estimated, using the number of driver licenses by county for 2012, obtained from the California Department of Motor Vehicles database http://www.dmv.ca.gov/about/profile/dl_outs_by_county.pdf , and calculating the percentage increase, based on county population figure increases from 2011 to 2012 listed at: http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/documents/E-1_2012_Internet_Version.xls. The estimated number of licensed drivers for the total Sacramento nonattainment area in 2012, therefore, was 1,457,782: Sacramento Metropolitan AQMD: total 927,347 + Yolo-Solano: total of 203,656 (124,762 in Yolo County + Solano County: 272,050 * 29% for the proportion located within the Air Quality district = 78,894) + Placer County: total of 231,220 (265,770 * 87% for Air Quality district) + El Dorado County: total of 95,559 (140,528 * 68% for Air Quality district). The proportion of drivers in each district also corresponds to the residential population proportions used in the calculation of weights for the region as a whole

Number of Reduced Trips

22 ➢ Summertime driving reducers made fewer trips than those who did not change their driving habits during the summer: on average, they made .85 fewer trips per day.

This 33% of seasonal reducers reported that they entered their cars the previous day an average of 2.55 times. The 65% who said they did not usually reduce the amount of driving they do during the summer self-reported entering their cars more frequently, an average of 3.40 times. **On average, seasonal driving reducers made 0.85 fewer trips per day** than did non-reducers (3.4 – 2.55 = 0.85 trips). An analysis of variance indicated that these means are significantly different from each other.[67]

	Seasonal Driving Reducers: Mean # Times Entered Vehicle	*Non-Reducers: Mean # Times Entered Vehicle*	*Statistically Significant Difference?*
Sacramento Nonattainment Area (weighted results)	**2.55**	**3.40**	**Yes**

Seasonal Trip Reduction: Estimated Emission Reductions

23 ➢ In 2012, nearly half a million (481,068) drivers were seasonal reducers. The number of trips they avoided translated into a reduction of 1.67 tons per day of ozone precursors during the summer of 2012.

Respondents who habitually drive less in the summer represent a substantial proportion of the general population of drivers who are helping to improve air quality in the region by reducing emissions. The 33% of 2012 seasonal reducers translates into nearly half a million drivers (481,068) in the entire Nonattainment Area.[68] Although not officially recognized, it is possible to estimate the amount of ozone precursors that have been reduced due to respondents habitually driving less during the summer for air quality reasons. The methodology is the same as that used to estimate emission reductions on Spare The Air

[67] F (1, 1069) = 5.40, p < .05.

[68] The number of drivers in the Sacramento nonattainment area for 2012 was estimated, using the number of driver licenses by county for 2012, obtained from the California Department of Motor Vehicles database http://www.dmv.ca.gov/about/profile/dl_outs_by_county.pdf , and calculating the percentage increase, based on county population figure increases from 2011 to 2012 listed at: http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/documents/E-1_2012_Internet_Version.xls. The estimated number of licensed drivers for the total Sacramento nonattainment area in 2012, therefore, was 1,457,782: Sacramento Metropolitan AQMD: total 927,347 + Yolo-Solano: total of 203,656 (124,762 in Yolo County + Solano County: 272,050 * 29% for the proportion located within the Air Quality district = 78,894) + Placer County: total of 231,220 (265,770 * 87% for Air Quality district) + El Dorado County: total of 95,559 (140,528 * 68% for Air Quality district). The proportion of drivers in each district also corresponds to the residential population proportions used in the calculation of weights for the region as a whole.

days[69] and is summarized in the next table. **It can be seen that the average of 0.85 of a trip per day that seasonal reducers avoided translates into an estimated 1.67 tons of ozone precursors reduced per summer day in 2012.**

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 Nonattain-ment Area (1,457,782 Total)	x Mean Number of Trips Reduced Per Day Compared to Non-Reducers	x 3.71 Grams of Ozone Precursors Per Trip (EMFAC 2011 V2.3) 2012 Summer Model[70]	= Estimated Tons[71] Per Day of Ozone Precursors Reduced
Spare The Air and Control Day Interviews Combined	33%	481,068	x 0.85 = 408,908	1,517,048 grams	1.67 tons

How They Reduce Driving

24 ➢ ***Seasonal reducers used alternative transportation, made fewer trips, stayed home, or planned and consolidated errands in order to reduce the amount of driving they did during the summer months.***

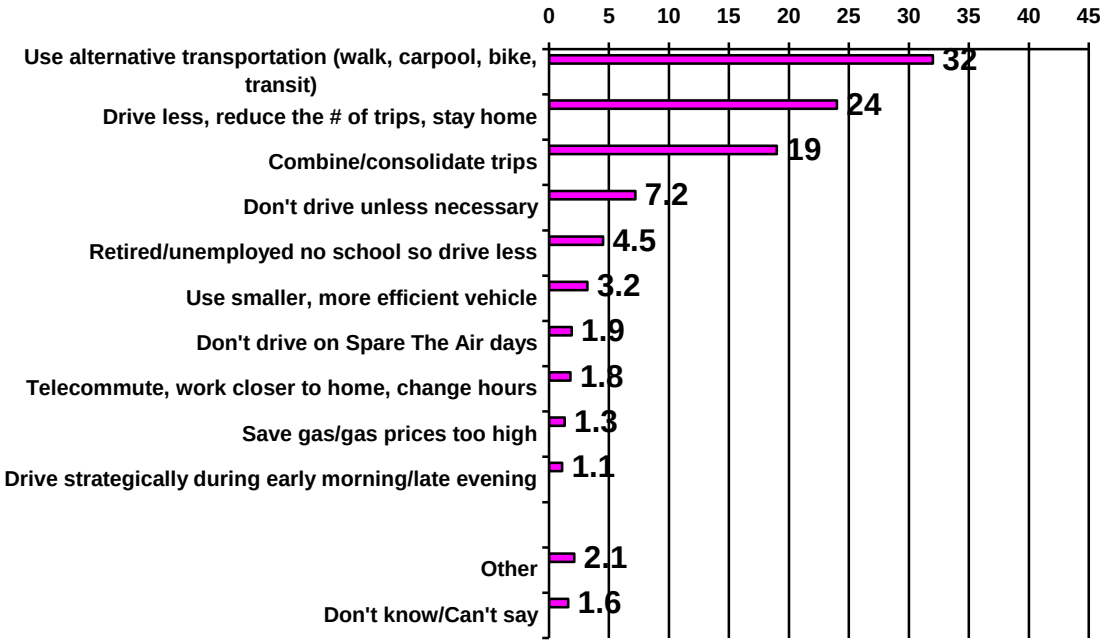
Those who said they usually reduce the amount of driving during the summer months were then asked to elaborate. Verbatim comments were captured and later categorized, and the results are presented in the next graph. It can be seen that a third (32%) of seasonal reducers said they used alternative transportation, which included biking, walking, carpooling, or using public transit. One quarter (24%) said they made fewer trips or just stayed home. A further 19% said they regularly combined or consolidated their trips so as to go out less. Another portion (7.2%) said they do not drive unless necessary. Close to five percent (4.5%) were either retired, unemployed, or as parents or teachers, they didn't have to drive to school during the summer. Some respondents (3.2%) use a smaller more efficient vehicle. Two percent (1.9%) specifically mentioned that they avoided driving on Spare The Air days. "Other" reasons were offered by two percent of respondents (2.1%).

[69] For a full explanation of the methodology, see report titled "Estimated Emission Reductions during the 2012 Spare The Air Season", Joseph Hanson, November 2012.

[70] Estimates were based on the Summer On-Road Inventory - EMFAC 2011 v 2.3 model, for the summer of 2012, provided by Charles Anderson, Program Coordinator, SMAQMD Planning & Emission Inventory in an email dated October 30, 2012. The total ROG tons for a combined total of light duty passenger cars and two categories of light duty trucks (6.3 + 1.93 + 2.53) 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. 3,040,786 for light duty passenger cars + 419,212 for light duty trucks1 + 1046,171 for light duty trucks2) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (4.03 +1.12 + 2.51) x 2000 x 454 / (3,040,786 + 419,212 + 1,046,171). ROG grams and NOx grams were then combined (2.17 + 1.54) to obtain 3.71 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.

[71] There are 907,200 grams in a ton.

How Have You Reduced Driving This Summer?



A few representative comments[72] from those who used alternative transportation are listed below.

- A regular bus rider.
- Bike or electric scooter
- Carpooling
- Carpool or stay at home
- Does not do much driving, either walks or catches a bus.
- I drive as little as possible. We also use a golf cart
- I either bike to work or I carpool with some friends. I work in two different areas so it depends
- I have not gone places and when we go somewhere we all go in the same car.
- I just don't drive much and do a lot of walking.
- I have combined errands with exercise, such as jogging.
- I have eliminated errands and I have ridden my bicycle for some errands.
- I just go the short way. I let people ride with me.
- I ride my bike and walk to work
- I ride my mountain bike more in the summer to places that I would normally drive.
- I take the train.
- I try to take the bus and I combine trips. I try not to drive at all.
- I use Amtrak. I do not drive my car.
- I usually take the light rail to work
- I walk more. I try to do all my deliveries in one day.
- I work in property management for a retail center. I will walk the property instead of driving.
- Instead of driving to a location, I start my runs from home. I am training for a marathon.
- Monthly public transportation and biking.
- My husband and I carpool. Ride a bike.

[72] The complete transcripts of all responses are available in the statistical file.

- No vacation and less driving, and ride my bike and walk if not too hot.
- Ride my bike. When able to, I walk. Otherwise carpool.

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

- By just not going around as much
- Do as less as I can. Only go about three miles every time. I drive to the market and back.
- Avoid driving when it is 100 or higher.
- Do not drive on weekends, stay home until Monday.
- Do not go out unless I have to pay or go buy groceries
- Do not go to the store as often.
- Don't go out on my lunch hour.
- Have not been going many places.
- Have not taken any road trips.
- I go maybe twice a week instead of everyday driving.
- I go out as little as possible and do not travel.
- I hang out at home a lot more. I have a pool and I usually stay at home.
- I just don't take those drives in the country with my mom. We try to reduce shopping trips
- I plan my driving for the most efficient amount of miles. Some days I just don't get in the car and work from home.
- I try not to travel to places unless they're close to my route.
- I try to avoid unwanted driving, if I don't have to go I don't go anywhere. I just stay home.
- I would keep my trips to a minimum
- Just drive to work, home and the gym.

A few representative comments by those who combined trips include:

- Bringing a lunch to work so I don't have to go out at lunch. Combine errands.
- By consolidating my trips that way I make fewer trips. And a lot of times I walk to work.
- Combine chores, if I have to go to the hardware store I make sure that I do my grocery shopping.
- Combine errands, omit long trips that are not necessary
- Do all my errands in one day.
- Do most of shopping in town.
- Doing as many things at one time. Planning my route.
- Double up on destinations
- Drive in a circle, all errands in a circle, no back tracking.
- Figure out what I need all in one trip.
- I always try to make my trips more logical so I'm not doing a lot of back tracking. I have not driven as much.
- I do whatever errands I need to do during lunch, so I do not have to go out on the weekends.
- I don't drive as often. I combine trips. I do it all at once instead of making separate trips. I do 3 or 4 errands while I am out.
- I don't go for one thing I group it.

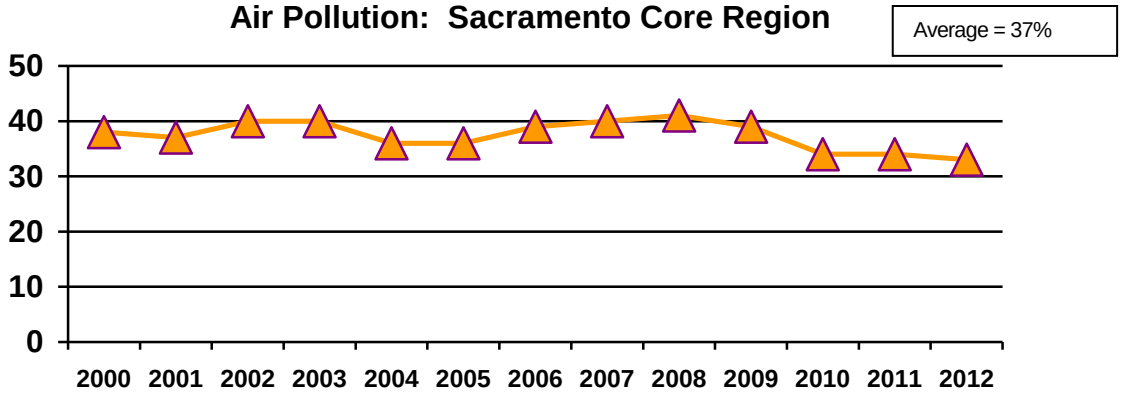
Year-To-Year Comparisons

25 ➢ This year's percentage of seasonal reducers in the Sacramento Core Region is not significantly different from the 13-year average of 37%.

The year-to-year analysis excludes respondents from El Dorado County AQMD as they were not interviewed in evaluations prior to 2004. As can be seen in the next graph, the

percentage of respondents who said they usually reduce their driving during the summer to avoid adding to air pollution has remained relatively stable, with a 13-year average of 37%. In the context of the 2012 season, which exhibited improved air quality and few Spare The Air days, consistency with the average over 13 years is evidence for the success of the program. The high of 41% reached in 2008 was significantly greater than the 33% of this year and last year.

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



26 ➢ ***The 13-year average number of trips <u>avoided</u> on an average summer day by seasonal reducers was 0.7. This varied from a high of 1.1 trips avoided in 2001 and 2003 to a low of .4 trips in 2008 and last year.***

The next table shows the average numbers of self-reported trips made by seasonal reducers versus non-reducers[73] from 2000 to the present. It can be seen that the average number of additional trips <u>avoided</u> by seasonal reducers (that is, the difference between reducers and non-reducers) ranged from .4 of a trip per day to just over 1 trip per day. **In other words, a substantial subset of the population of respondents in the Spare The Air evaluations habitually reduce the amount of driving they do during the summer months.** Some of these individuals may not qualify as episodic reducers on specific Spare The Air days for methodological reasons (i.e. they may not have driven less on a specific Spare The Air day because they already had reduced their driving as much as they could.)

[73] Excludes El Dorado County AQMD results. The very first question of the survey asked respondents "Thinking just about yesterday, how many different TIMES did you get into a car, truck, or van to drive?" This was before any mention of air quality or Spare The Air or driving habits was asked and therefore is likely a fairly accurate self-report.

Year	Seasonal Driving Reducers: Mean # Times Entered Vehicle	Non-Reducers: Mean # Times Entered Vehicle	Difference (Mean Number of Daily Single Trips Avoided by Seasonal Reducers)	Statistically Significant Difference?
2000	3.6	4.1	0.5	Yes
2001	3.1	4.2	1.1	Yes
2002	3.1	4.1	1.0	Yes
2003	3.1	4.2	1.1	Yes
2004	3.4	3.9	0.5	Yes
2005	3.0	3.5	0.5	Yes
2006	2.9	3.6	0.7	Yes
2007	3.2	3.8	0.6	Yes
2008	2.9	3.3	0.4	Yes
2009	2.6	3.4	0.8	Yes
2010	2.9	3.8	0.9	Yes
2011	2.9	3.3	0.4	No
2012	2.5	3.4	.85	Yes

APPENDIX A

Landline versus Cell phone RDD samples: Sacramento Metropolitan AQMD

Joseph Hanson, M.A.

November, 2012

Background

In previous years, telephone interviews were conducted with samples of residents throughout the air basin, using Random Digit Dialing (RDD) procedures in which a computer generates phone numbers from known landline area codes and prefixes. Up to 2010, these samples have only included landline numbers and not cell phone numbers. Although Spare The Air interviewing has always set quotas based on geography, age, and gender, it is becoming more and more difficult to survey young adults in the U.S. aged 18 to 34 years via a landline-only frame. As cell phone use in the United States grows, the potential for coverage bias in typical RDD telephone surveys will also increase if they continue to exclude most cell phone numbers.

For the purpose of the 2011 Spare The Air evaluation, a dual-frame overlapping sampling design was conducted in Sacramento metropolitan AQMD only, using "key" questions (Q5, Q9, Q10, Q12a and Q12b) in the survey to compare results from the landline sample with those from the cell phone sample of respondents. The key questions involved driving behavior, whether respondents seasonally reduced driving during the summer, their employment status, and awareness of Spare The Air.

The analysis revealed no differences between the two samples on any of the key survey items. The samples were then combined for the purposes of the 2011 evaluation.

Sampling Design

Though it was recommended in the 2011 evaluation that the cell phone sampling frame be adopted and combined with the landline responses in subsequent evaluations, the volatile nature of social science research and the cost of conducting RDD cellular interviews permits a second evaluation using the dual-frame overlapping sampling procedure. Thus the 2012 Spare The Air evaluation follows the same dual-frame sampling procedure of the 2011 evaluation. Up to 400 interviews were to be conducted with respondents drawn from a typical Random Digit Dialed (RDD) landline frame, and up to 100 additional interviews were to be conducted with respondents from an RDD cellular frame, following Spare The Air days. This type of overlapping design means that some households could have landlines in addition to cell phones, but questions about cell phone and regular/wired phone use were added to try and estimate the percentage of "cell phone-only" households.

The total number of interviews actually completed was less than the maximum budgeted: 299 from the landline sample and 37 from the cell phone sample, for a combined total of 336.

Methodology

The purpose of the current report was to use "key" questions in the survey to compare results from the landline sample with those from the cell phone sample of respondents. If no significant differences are found, it is reasoned that the cell phone results could be combined with the landline results and would better represent the entire population within Sacramento County. The key questions involved driving

behavior, whether respondents seasonally reduce driving during the summer, and awareness of Spare The Air (Q5, Q9, Q12a and Q12b).[74]

Results

Results are presented in the next table. It can be seen that the cell phone sample of respondents did not differ from the landline sample on any of the key questions. The two groups were therefore combined for all analyses in the report of the 2012 evaluation of the Spare The Air campaign.

	Percentage of Respondents in the Sacramento Metropolitan AQMD		
Question	***RDD Landline Sample (N=299)***	***RDD Cell phone Sample (N=37)***	***Statistically Significant Difference?***
Q5. Yesterday, did you drive your car, truck or van:			
Same	**58%**	**62%**	
Less	**23%**	**19%**	
More	**18%**	**19%**	**No**
Q9. Do you usually reduce the amount of driving you do during the summer to avoid adding to air pollution?			
Yes	**33%**	**43%**	
No	**65%**	**54%**	**No**
Q.12a. Do you recall being asked not to drive yesterday because our area was experiencing a period of unhealthy air?			
Yes	**24%**	**11%**	
No	**75%**	**89%**	**No**
Q12b. In the past two days have you heard, read, or seen any advertise-ments or news broadcasts about Spare The Air, or poor air quality, or requests to drive less in this area?			
Yes	**47%**	**32%**	
No	**53%**	**68%**	**No**

[74] Q10, regarding employment status, was removed from the survey for the 2012 evaluation.

In order to try and estimate the percentage of cell phone-only households, questions were asked about landline and cell phone use. The next table indicates that nearly two-thirds (62%) of the cell phone sample also had landline phones at home, which means that in Sacramento County, **the percentage of cell phone-only households could be as high as 38%.** These results closely resemble the results from the 2011 evaluation in which it was revealed that up to 36% of Sacramento County households are cell-phone only households. Among those contacted via a landline, 86% also had a cell phone. Respondents who had both cell phones and landlines were then asked whether they used one or the other more frequently when at home. Results, also presented in the next table, indicate that about a third (36%) use their cell phones more, 34% use their landline phones more, and the remaining 29% use them both equally.

	Percentage of Respondents in the Sacramento Metropolitan AQMD		
Question	***RDD Landline Sample (N=299)***	***RDD Cell phone Sample (N=37)***	***Those with both landlines and cell phones (N=280)***
Q16. Do you also have a regular/wired telephone in your home?			
Yes		**62%**	
No		**38%**	
Q17. Do you also have a cellular telephone?			
Yes	**86%**		
No	**13%**		
Q.18. When you are home, are you more likely to use your cellular phone, your regular/wired phone, or do you use them both?			
Use Cellular More			**36%**
Use Regular/Wired More			**34%**
Use Both Equally			**29%**

cell phone-only households

Because no differences were found between respondents of the landline and cell phone surveys during the 2011 and 2012 evaluation, and due to the costly and risky nature of cell phone interviewing, it is recommended that only landline interviewing be conducted in future evaluations. Though this may increase the effort required to reach younger participants, it is clear that the added difficulty and cost of cell phone interviewing is not a necessary inclusion when evaluating Spare The Air.

APPENDIX B

2012 BEHAVIOR & ATTITUDE TELEPHONE TRACKING SURVEY
FINAL QUESTIONNAIRE ~ MARCH 25, 2012

	Methods:
Field Dates:	• STA episodes days: May – September, 2011 Control days: September, 2011
Sample Size:	• up to 2,500 completed interviews - up to 1,300 completes on STA episodes days - 400 Sacramento Co. residents + up to 100 local cell phone - 300 Yolo/Solano Co. residents - 300 Placer Co. residents - 200 El Dorado Co. residents - 1,200 completes on Control days - 300 Sacramento Co. residents - 300 Yolo/Solano Co. residents - 300 Placer Co. residents - 300 El Dorado Co. residents
Unit of Analysis:	• Household
Sampling Frame:	• RDD landline, RDD cell phone Sacramento County
Budgeted Length of Interview:	• 4 minutes (Average)

CELLX. CONTACT NUMBER: CATI CODED FROM SAMPLE; NOT ASKED

0) Landline
1) Cell phone

• SURVEY INTRODUCTION & REQUEST •

Hello, my name is _____ with Meta Research, a regional public opinion research firm. We are conducting a 4-minute survey regarding your transportation activities yesterday.

IF CELL PHONE:

First, I need to ask you if you are in a safe place to take this call. Are you in a safe place? [If NO: Then I will call back later, thank you for your time.]
IF YES, CONTINUE WITH:

BOTH CELL AND LANDLINE:
If someone is available and has the time, I would like to interview the youngest male driver aged 18 or older who is home now.
[If none available: I would like to interview the youngest female driver aged 18 or older who is home now.] Would that be you? [IF NOT, ASK FOR PERSON WHO IS, REPEAT INTRODUCTION]
Do you have 4 minutes for a confidential interview? Your opinions are very important.

[IF NECESSARY, CONTINUE WITH: This is research, NOT SALES. Your telephone number WILL NOT BE associated with your answers. Your answers will be summarized with other peoples' answers; results will not be reported individually.]

[IF RESPONDENT ASKS FOR NAME OF SURVEY SPONSOR, SAY] In order not to bias your responses, we will be glad to tell you the name of the sponsoring agency at the conclusion of the survey.

• DATA FROM SAMPLE •

DB1. Zip Code

DB2. Geographic Population

1) Sacramento County
2) Yolo/Solano County
3) Placer County
4) El Dorado County

DB3A. Geo/Location Population **QUOTAS for landline sample**
[NOTE TO PROGRAMMER: The data files are divided by the category names and should be coded appropriately. Interviews should be completed proportionally. In other words, categories 20, 21, 22, and 23 should be called simultaneously as well as 30 and 31; similarly for 41 to 46.]

10) Sacramento – Sacramento
(STA QUOTA: 400 completes)
(CONTROL QUOTA: 300 completes)

20) Yolo/Solano – Davis (95616) (20%)
(STA QUOTA: 61 completes)
(CONTROL QUOTA: 61 completes)

21) Yolo/Solano – Woodland (95695, 95776), West Sacramento (95605, 95691), Others 95606, 95607, 95612, 95618, 95627, 95653, 95679, 95694, 95698, 95937) (41%)
(STA QUOTA: 125 completes)
(CONTROL QUOTA: 125 completes)

22) Yolo/Solano – Vacaville (30%)
(95687, 95688)
(STA QUOTA: STA 90 completes)
(CONTROL QUOTA: 90 completes)

23) Yolo/Solano – Dixon/Rio Vista (8%)
(95620, 945741)
(STA QUOTA: 24 completes)
(CONTROL QUOTA: 24 completes)

30) Placer – Auburn and vicinity (22%)
(95602, 95603, 95658, 95663)
(STA QUOTA: 66 completes)
(CONTROL QUOTA: 66 completes)

31) Placer – Roseville (95661, 95678, 95747), Lincoln (95648), Rocklin, Loomis, Other South Placer (95650, 95677, 95765, 95746, 95681) (78%)
(STA QUOTA: 234 completes)
(CONTROL QUOTA: 234 completes)

41) El Dorado – El Dorado Hills (95762) (23%)
(STA QUOTA: 46 completes)
(CONTROL QUOTA: 69 completes)

42) El Dorado – Placerville (95667) (31%)
(STA QUOTA: 63 completes)
(CONTROL QUOTA: 95 completes)

43) El Dorado – Shingle Springs (95682) (24%)
(STA QUOTA: 49 completes)
(CONTROL QUOTA: 73 completes)

44) El Dorado – Georgetown (95634) (2%)
(STA QUOTA: 4 completes)
(CONTROL QUOTA: 6 completes)

45) El Dorado – Cool (95614) (3%)
(STA QUOTA: 6 completes)
(CONTROL QUOTA: 9 completes)

46) El Dorado – Other (95613, 95619, 95623, 95633, 95635, 95651, 95664) (16%)
(STA QUOTA: 32 completes)
(CONTROL QUOTA: 48 completes)

• CATI GENERATED •

DB4. STA / Control Date

DB5. Day of Week (for STA or Control Day)

1) Sunday
2) Monday
3) Tuesday
4) Wednesday
5) Thursday
6) Friday
7) Saturday

DB6. Type

1) Spare the Air
2) Control

• SURVEY BEGINS •

I want to inform you that this call may be monitored for quality purposes.

• SCREENING QUESTIONS •

ASK ALL RESPONDENTS

Q1. First, did you drive a car, truck or van within the last week?
[If no, thank and seek interview with another driver within the household]

1) Yes
2) No

Q2. To assist in our analysis, please tell me which of the following categories contains your age:

1) 18 to 24
2) 25-34
3) 35-44
4) 45-54
5) 55-64
6) 65 or over
8) Refused

03. Gender [BY OBSERVATION]

1) Male
2) Female

Data for quotas taken from the American Community Survey.[75]

1200 COMPLETES FOLLOWING A **SPARE THE AIR EPISODES** DAYS

400 COMPLETES **SACRAMENTO COUNTY** RESIDENTS
204 FEMALES (51%) / 196 MALES (49%), OF THESE WE NEED

FEMALE 18 - 24 NO LESS THAN **9%**	**18**	Completes
MALE 18 - 24 NO LESS THAN **10%**	**20**	Completes
FEMALE 65 PLUS NO MORE THAN **13%**	**27**	Completes
MALE 65 PLUS NO MORE THAN **9%**	**18**	Completes

100 COMPLETES **SACRAMENTO COUNTY** CELL PHONES
51 FEMALES (51%) / 49 MALES (49%), OF THESE WE NEED

FEMALE 18 - 24 NO LESS THAN **9%**	**5**	Completes
MALE 18 - 24 NO LESS THAN **10%**	**5**	Completes

[75] http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

FEMALE 65 PLUS NO MORE THAN **13%** **7** Completes
MALE 65 PLUS NO MORE THAN **9%** **4** Completes

300 COMPLETES **YOLO/SOLANO COUNTY** RESIDENTS
150 FEMALES (50%) / 150 MALES (50%) , OF THESE WE NEED
FEMALE 18 - 24 NO LESS THAN **13%** **20** Completes
MALE 18 - 24 NO LESS THAN **13%** **20** Completes
FEMALE 65 PLUS NO MORE THAN **12%** **17** Completes
MALE 65 PLUS NO MORE THAN **9%** **12** Completes

300 COMPLETES PLACER COUNTY RESIDENTS
153 FEMALES (51%) / 147 MALES (49%), OF THESE WE NEED
FEMALE 18 - 24 NO LESS THAN **13%** **20** Completes
MALE 18 - 24 NO LESS THAN **8%** **12** Completes
FEMALE 65 PLUS NO MORE THAN **16%** **24** Completes
MALE 65 PLUS NO MORE THAN **14%** **21** Completes

200 COMPLETES **EL DORADO COUNTY** RESIDENTS
100 FEMALES (50%) / 100 MALES (50%), OF THESE WE NEED
FEMALE 18 - 24 NO LESS THAN **7%** **7** Completes
MALE 18 - 24 NO LESS THAN **8%** **8** Completes
FEMALE 65 PLUS NO MORE THAN **15%** **15** Completes
MALE 65 PLUS NO MORE THAN **14%** **14** Completes

1200 COMPLETES ON **CONTROL** DAYS
300 COMPLETES **SACRAMENTO COUNTY** RESIDENTS
153 FEMALES (51%) / 147 MALES (49%), OF THESE WE NEED
FEMALE 18 - 24 NO LESS THAN **9%** **14** Completes
MALE 18 - 24 NO LESS THAN **10%** **15** Completes
FEMALE 65 PLUS NO MORE THAN **13%** **20** Completes
MALE 65 PLUS NO MORE THAN **9%** **13** Completes

300 COMPLETES **YOLO/SOLANO COUNTY** RESIDENTS
150 FEMALES (50%) / 150 MALES (50%), OF THESE WE NEED
FEMALE 18 - 24 NO LESS THAN **13%** **20** Completes
MALE 18 - 24 NO LESS THAN **13%** **20** Completes
FEMALE 65 PLUS NO MORE THAN **12%** **17** Completes
MALE 65 PLUS NO MORE THAN **9%** **12** Completes

300 COMPLETES PLACER COUNTY RESIDENTS
153 FEMALES (51%) / 147 MALES (49%), OF THESE WE NEED
FEMALE 18 - 24 NO LESS THAN **13%** **20** Completes
MALE 18 - 24 NO LESS THAN **8%** **12** Completes
FEMALE 65 PLUS NO MORE THAN **16%** **24** Completes
MALE 65 PLUS NO MORE THAN **14%** **21** Completes

300 COMPLETES **EL DORADO COUNTY** RESIDENTS
150 FEMALES (50%) / 150 MALES (50%), OF THESE WE NEED

FEMALE 18 - 24 NO LESS THAN **7%**	**11**	Completes
MALE 18 - 24 NO LESS THAN **8%**	**12**	Completes
FEMALE 65 PLUS NO MORE THAN **15%**	**23**	Completes
MALE 65 PLUS NO MORE THAN **14%**	**21**	Completes

Q15. Language of interview [BY OBSERVATION]

1) English
2) Spanish

• DRIVING BEHAVIOR •

[ALL RESPONDENTS]
Q4. 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.]

_____ Specific number
999) Don't know/Refused

[ALL RESPONDENTS]
Q5. 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]?

1) Same
2) Less
3) More
8) Don't know/Refused [Thank and TERMINATE]

[PROGRAMMER: For each q5=8, we will need a replacement survey]: Note that any surveys answered to this point do not count as a completed interview.If participants have not met the quota criteria then a replacement interview must be completed with another participant who does.

[Q5=2: THOSE WHO DROVE LESS]
Q7a. Why did you make that change or those changes? [OPEN ENDED-do not read; use for coding only]

1) Air quality/ reduce pollution / concerned about smog/ Spare the Air campaign
2) Weather related reason [skip to Q9]
3) Some other reason [skip to Q9]
4) Multiple INCLUDING air quality related
5) Multiple NOT including air quality related [skip to Q9]

6) High gas prices
9) Don't know/Refused [skip to Q9]

[Q5=2: AND Q7A= 1 OR 4: THOSE WHO DROVE LESS FOR AIR QUALITY REASONS]

Q7b. 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."]

[NOTE TO INTERVIEWER: VALIDATE RESPONSES OVER 12 TIMES]

_____ Specific number
999) Don't know/Refused

[Q7B> 0 AND Q7B < 999, FOR THOSE WHO ESTIMATED THE NUMBER OF SINGLE TRIPS ELIMINATED]

[ALL RESPONDENTS]

Q9. Do you usually reduce the amount of driving you do during the summer to avoid adding to air pollution?

1) Yes
2) No
8) Refused/Don't Know/ "depends"

[ASK RESPONDENTS WHO USUALLY REDUCE Q9=1]

Q9b. And how have you reduced driving this summer to decrease air pollution?
50) Record response
99) Non-response (Don't know / Refused)

[ALL RESPONDENTS]

[NOTE TO PROGRAMMER: Please rotate the order of q12a and q12b for every other interview, asking both questions of everyone]

q12. CATI-CALC: Q12 question order

1) Q12a asked first
2) Q12b asked first

[ALL RESPONDENTS]

Q12a. Do you recall being asked not to drive yesterday because our area was experiencing a period of unhealthy air?

1) Yes
2) No, do not recall that
8) Don't know/Refused

[ALL RESPONDENTS]

Q12b. In the past two days have you heard, read, or seen any commercials, news broadcasts or information online about Spare the Air, poor air quality, or requests to drive less in this area?

1) Yes
2) No, do not recall that [Skip Q12c]
8) Don't know/Refused

[Ask if Q12b = 1 (yes)]
Q12c. Where do you recall [Q12b: seeing, hearing, or reading] that information?

CATEGORIES FOR CODING:
1) Mentioned
2) Not mentioned
8) Refused

a. Radio Commercial
b. Television Commercial
c. Facebook
d. Twitter
e. News or Weather Broadcast
f. Word of Mouth
g. Newspaper
h. Air Alert email

[FROM SAMPLE]
CELLX. Landline RDD sample or cell phone RDD sample?
0) Landline
1) Cell phone

[READ TO ALL]
Finally, I just have a couple of questions about your telephone usage…

[ASK IF CELLX = 1 (CELL PHONE SAMPLE]
Q16. Do you also have a landline phone in your home?
[Interviewer, if needed: A land line is a regular/wired phone.]

1) Yes
2) No
8) Don't know/Don't recall/Refused

[ASK IF CELLX = 0 (LANDLINE SAMPLE]
Q17. Do you also have a cell phone?

1) Yes

2) No
8) Don't know/Don't recall/Refused

[ASK THOSE WHO HAVE BOTH CELL PHONE AND LANDLINE (Q16=1, Q17=1]

Q18. When you're at home, are you more likely to use your cell phone, your landline phone, or both equally?

[NOTE TO PROGRAMMER: Please alternate the order in which CELL PHONE and LANDLINE phone are presented in the question.]

[Interviewer, if needed: A land line is a regular/wired phone.]

1) Use Cellular more
2) Use Regular/wired more
3) Use both Equally
8) Don't know/Don't recall/Refused

THIS HAS BEEN A CONFIDENTIAL INTERVIEW CONDUCTED BY _____ AT META RESEARCH. YOU MAY BE CALLED BY SOMEONE FROM META RESEARCH TO VERIFY THAT THIS INTERVIEW WAS CONDUCTED. May I have just your first name for verification purposes? THANK YOU VERY MUCH FOR YOUR TIME.

IF ASKED, AT END OF SURVEY EXPLAIN THAT THIS SURVEY IS BEING CONDUCTED FOR: Sacramento Metropolitan Air Quality Management District