



# Evaluation of the 2016 Sacramento Region Spare The Air Campaign

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# 2016 Spare The Air Evaluation

## RESEARCH METHODOLOGY

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### Background

The Sacramento region's 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 eight-hour ozone standard with an attainment deadline of June 2019. The region fails to meet the 2008 federal health based 8-hour ozone standard,<sup>1</sup> 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 (VOCs) 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. 2016 Spare The Air outreach efforts included radio, television, digital and outdoor advertising featuring various air quality tips, a website ([www.SpareTheAir.com](http://www.SpareTheAir.com)) including "Scooter's Corner" for children, social media (Facebook, Twitter, Instagram and Pinterest), as well as Scooter's appearance at community events, distribution of newsletter articles, and the Sacramento Region Air Quality app.

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 126 (0.078 parts per million) the next day, a Spare The Air alert is issued by the Sacramento Metropolitan AQMD by 12:00 p.m. The Spare The Air alert communication involves notifying the public through a variety of channels, including social media, paid radio, television and digital outdoor advertising, email Air Alerts, news broadcasts, the Spare The Air website, the Sacramento Region Air Quality app 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 the central plain district of Yolo-Solano. To

<sup>1</sup> The 2008 federal ozone health standard is .075 parts per million averaged over eight hours. This standard became effective May 27, 2008. From 1997 to May 2008, the federal eight-hour ozone standard was .08 parts per million. On October 1, 2015, the federal ozone standard was strengthened to .070 parts per million averaged over eight hours. Attainment designations for the new standard have not been established at the time of this report.



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 the same level.

### Spare The Air 2016 Season

There were 17 Spare The Air days called during the 2016 summer smog season. This increase in Spare The Air days was due to the trigger level being lowered to .078 parts per million (126 on the Air Quality Index) by the region's air pollution control officers. This APCO decision was made in response to the new federal ozone standard of .070 ppm that went into effect in October 2015. In comparison, last season's Spare The Air trigger level of .086 ppm resulted in five Spare The Air days. Examination of the daily maximum Air Quality Index (AQI) for the Nonattainment Area reveals that the **recorded actual AQI for ozone met or exceeded the 126 AQI threshold on all but six Spare The Air days**<sup>2</sup>. The frequency of Spare The Air days in the 2016 season is the greatest since 2002, which included 22 episodes.<sup>3</sup>

<i>Spare The Air date</i>	<i>Forecast AQI</i>	<i>Actual Maximum AQI</i>	<i>Health Level for Actual AQI</i>	<i>Reporting Station of Actual Maximum AQI</i>
<b>June 2</b>	133	80	Moderate	Antelope – North Highlands
<b>June 3</b>	133	100	Moderate	Placerville
<b>June 4</b>	156	119	Unhealthy for Sensitive Groups	Sloughhouse
<b>June 30</b>	133	164	Unhealthy	Placerville
<b>July 1</b>	133	150	Unhealthy	Colfax
<b>July 2</b>	126	77	Moderate	Colfax
<b>July 15</b>	126	154	Unhealthy	Auburn
<b>July 26</b>	129	151	Unhealthy	Placerville
<b>July 27</b>	140	174	Unhealthy	Cool
<b>July 28</b>	133	185	Unhealthy	Auburn
<b>July 29</b>	133	133	Unhealthy for Sensitive Groups	Lincoln
<b>July 30</b>	133	58	Moderate	Colfax
<b>August 12</b>	129	164	Unhealthy	Placerville
<b>August 13</b>	133	172	Unhealthy	Placerville
<b>August 18</b>	133	143	Unhealthy	Placerville
<b>September 18</b>	140	115	Unhealthy for Sensitive Groups	Roseville – N.Sunrise / Douglas
<b>September 27</b>	133	156	Unhealthy	Roseville – N.Sunrise / Douglas

<sup>2</sup> Note: this was edited on 4/7/2017 by Joseph Hanson after an error was noted by Ann Hobbs in an email dated 4/6/2017. The original sentence incorrectly stated that the recorded AQI met or exceeded the 126 AQI threshold on all but **five** Spare The Air days when it should have said **six** Spare The Air days.

<sup>3</sup> AQI figures obtained from the Historical Data section at [www.sparetheair.com](http://www.sparetheair.com).



## **Media Buy**

To educate a broad audience about the campaign and its message to reduce driving on a Spare The Air day, the 2016 Spare The Air campaign's paid advertising for general outreach consisted of radio, TV, outdoor billboards, online banner ads, and, for the first time, paid social media advertising on Facebook and Twitter as well as the Sacramento Region Air Quality app. For episodic advisories, alerts were issued the day before and the day of each Spare The Air day. The 2016 season used a variety of mediums to communicate the alert, including Spare The Air alert TV and radio commercials, digital outdoor billboard advertising, news broadcasts, social media, the Spare The Air website, the Sacramento Bee, plus website ads.

### **General Media Buy**

In 2016, a total of \$154,391 was spent on the Spare The Air general awareness campaign. It ran from May through September 9, 2016,<sup>4</sup> and used radio and television commercials, outdoor billboards, transit bus advertising, social media, and online ads to reach residents throughout the Sacramento region. The commercials educate residents on health effects, what causes ozone pollution, and asks them to reduce the number of car trips they take and download the Sacramento Region Air Quality app.

### **Specific Spare The Air Alert Episodic Media Buy**

This year, a total of \$63,877.75 was spent on episodic TV and radio commercials, and digital outdoor billboards for advertising on 16 of the 17 Spare The Air days. There was no media buy for Saturday, June 4, 2016 because there was no additional advertising inventory available:

1.	6/2-6/3/16	\$10,936.75
2.	6/30/2016	\$ 4,660.26
3.	7/1/2016	\$ 4,714.75
4.	7/2/2016	\$ 3,124.25
5.	7/15/2016	\$ 4,615.75
6.	7/26/2016	\$ 4,481.75
7.	7/27/2016	\$ 4,676.00
8.	7/28/2016	\$ 3,409.00
9.	7/29/2016	\$ 3,703.25
10.	7/30/2016	\$ 3,841.50
11.	8/12/2016	\$ 4,417.99
12.	8/13/2016	\$ 4,498.75
13.	8/18/2016	\$ 4,517.75
14.	9/18/2016	\$ 1,980.00
15.	9/27/2016	\$ 300.00

## **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

<sup>4</sup> Information provided by Lori Kobza, Sacramento Metropolitan AQMD, January 13, 2017.



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.<sup>5</sup>

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.<sup>6</sup>
4. Compare awareness of the Spare The Air campaign and driving reduction among the individual air quality 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 may also increase if they continue to exclude most cell phone numbers.

Moreover, increasing regulation of Computer Assisted Telephone Interviewing (CATI) has rapidly inflated the cost of interviewing in the past decade. To maintain this evaluation’s accuracy within budget

<sup>5</sup> 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.

<sup>6</sup> 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 2014 model, for the summer of 2016 accessed from <https://www.arb.ca.gov/emfac/2014/>.



parameters that have not expanded as quickly as costs, it has become necessary to random sample from Listed frames, meaning that a computer draws from known working numbers within set area codes and prefixes. In so doing, costs are reduced by avoiding dialing dead numbers, businesses, fax machines, or something else.

The potential for coverage error stemming from the growth of the cell phone-only population, as well as increased cost of interviewing, have led to the development of dual frame, Listed Random Digit Dial (LRDD) surveys. In these dual frame designs, a traditional sample from the landline LRDD frame is supplemented with an independent sample from the banks of numbers designated for cellular phones. In 2016, 50% of interviews were conducted via mobile phones.

## Sampling Design

The next table summarizes the targeted goal of completed interviews in each air district area for both Spare The Air days and Control days.<sup>7</sup> The goal was to conduct up to 1,200 interviews 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.

Air District	Spare The Air interviews	Control day interviews
<b>Sacramento Metropolitan AQMD:</b>	400	300
<b>Yolo-Solano AQMD</b>	300	300
<b>Placer County APCD</b>	300	300
<b>El Dorado County AQMD</b>	200	300
<b>Maximum Total</b>	<b>1,200</b>	<b>1,200</b>

Within each air district, quotas were set with respect to geographic area, age, and gender.<sup>8</sup> Not all areas of each county are included in the Nonattainment Area. Some residents in Yolo, Solano, Placer and El Dorado County are excluded from interviews because they do not reside in a zip code contained in their corresponding district. 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

<sup>7</sup> 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.

<sup>8</sup> 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.





a target of a certain minimum number of interviews on a given day in order to maximize efficiency and contain costs. Given the expected increase in alert days during the 2016 season due to a lower Spare The Air threshold that was implemented in response to EPA's new lower 2015 ozone health standard, the strategy adopted was to conduct approximately 80-100 interviews throughout the region (proportionally representative of the population in general by county), starting with every occurrence of a Spare The Air alert, 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 except for three episodes. It was decided that dialing on July 3 for the July 2 episode may affect results due to the July 4 holiday. Then, by the September 18 and September 27 episodes, a substantial number of interviews were already completed and actual costs of interviewing were exceeding predictions, warranting an exclusion of these episodes from the evaluation. Control day interviewing took place in August and September. Control day interviews were matched in terms of the day of the week of the Spare The Air day interviews, and took place on August 5, 6, 7, 10, 25, 26, 27, 28, and September 9, 10, 11.

## Respondents

In Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD, interviews were conducted with a random representative sample of listed landline and cellular telephone numbers.

Respondents included a total of **1,942 drivers**, following both Spare The Air days as well as Control days. Results for the Sacramento Nonattainment Area as a whole were weighted proportionally.<sup>9</sup> The next table lists the number of completed interviews for each group along with their affiliated margins of error (at the most conservative level).

A total of **1,078** interviews were conducted on days following Spare The Air days. Control day calling completed **864** interviews. When weighted,<sup>10</sup> the total number of completed interviews is 577 following Spare The Air days, and 488 on Control days in the Sacramento Nonattainment Area as a whole.

<sup>9</sup> Based on the 2010 US Census available at: <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>. The total population in the entire Sacramento Nonattainment Area [including El Dorado AQMD] is 2,272,658: [Sacramento Metropolitan AQMD (63%) - 1,418,788; Yolo-Solano AQMD (15%) - 330,226 (this includes the total 200,849 from Yolo County and 129,377 from the Dixon, Rio Vista and Vacaville areas of Solano County); Placer County APCD (15%) - 338,613 (this figure represents the 87% of Placer County's 348,432 residents who do not live in zip codes north or east of Auburn), El Dorado AQMD (7%) - 150,515 (this figure represents 67% of El Dorado County's 181,058 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).

<sup>10</sup> 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 63% of the entire population, Yolo-Solano AQMD is 15%, Placer County APCD is 15%, and El Dorado County AQMD is 7%). This is why the weighted total number of completed interviews (i.e. 577) is less than the sum of the total number of interviews conducted in all air districts (i.e. 1,078).



<i>Number of Completed Interviews (unweighted)</i>	<i>Spare The Air Days</i>	<i>Margin of Error</i>	<i>Control Days</i>	<i>Margin of Error</i>
<b>Sacramento Metropolitan AQMD:</b>	<b>366</b>	+/- 5.1%	<b>309</b>	+/- 5.6%
<b>Yolo-Solano AQMD</b>	<b>263</b>	+/- 6.0%	<b>205</b>	+/- 6.8%
<b>Placer County APCD</b>	<b>275</b>	+/- 5.9%	<b>218</b>	+/- 6.6%
<b>El Dorado County AQMD</b>	<b>174</b>	+/- 7.4%	<b>132</b>	+/- 8.5%
<b>Total Regional (Unweighted)</b>	<b>1078</b>	+/- 3.0%	<b>864</b>	+/- 3.3%
<b>Total Regional (Weighted)</b>	<b>577</b>	+/- 4.1%	<b>488</b>	+/- 4.4%

## 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. All surveys were conducted using a Computer Assisted Telephone Interviewing (CATI) system. The questionnaire was translated into Spanish and approximately 1% of all interviews were conducted in that language. The average interview lasted just over four minutes. A copy of the 2016 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 how many trips they avoided and why they avoided those trips.

### 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.

### **Statistical Significance**

The level of significance for each statistical test is set to a  $p$  value of less than .05, which equates to at least 95% assurance in the integrity of an identified significant relationship. That is, a significant relationship is one that cannot be accounted for by chance alone. Because the relationship cannot be accounted for by chance alone it is instead 95% likely due to differences in the subpopulations being compared. It is assumed this relationship holds for members of the population who are not part of the sample, but who share the quality being used to compare subpopulations. For example, it may be determined that a significant difference arises in the driving reduction between Yolo-Solano AQMD and El Dorado County AQMD respondents such that Yolo-Solano residents reduced driving to a greater degree than El Dorado residents. This means researchers are 95% sure that a difference in reported driving reduction between residents of these regions is due to their location, and not to chance.

### **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; Prozio Communications 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 2016 SPARE THE AIR CAMPAIGN

### Objectives

The specific objectives of the current section are to:

- a. Measure awareness of the 2016 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 2010 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 2016 Spare The Air campaign (correcting for Control days).
- e. Identify which media and/or outreach mediums most noticeably communicated Spare The Air information by using responses from participants regarding where each read/heard/saw notifications about air quality.

### Results

#### General Awareness

- 1 ➤ *In 2016, 33% of respondents in the entire Sacramento region had heard, read, or seen the Spare The Air advertisements. The 33% translates into an estimated **749,977** residents in the Sacramento Nonattainment Area who were aware of the 2016 Spare The Air campaign.*

The Spare The Air season runs from May through October of each year. This year there were 17 Spare The Air days.<sup>11</sup> Levels of general awareness of Spare The Air have been measured since 2002 with the following question:

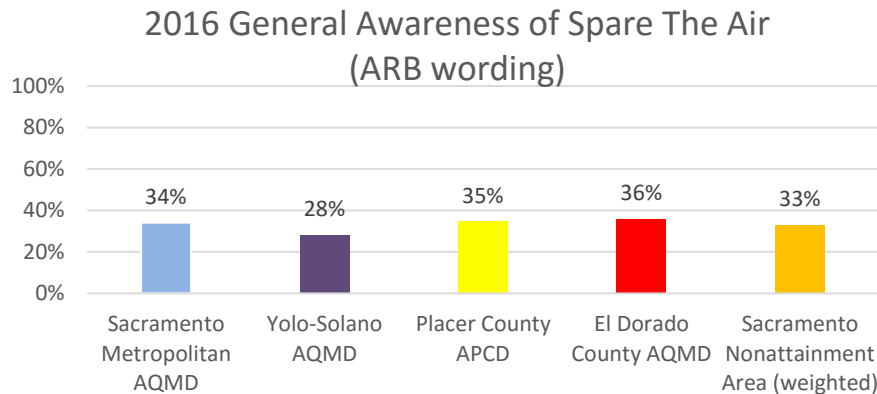
“In the past two days have you heard, read, or seen any advertisements or news broadcasts about Spare The Air, or poor air quality, or requests to drive less in this area?”

The next chart displays 2016 general awareness levels for residents in the individual air districts as well as in the entire Sacramento Nonattainment Area as a whole (weighted results<sup>12</sup>). On average, 33% of respondents in the entire region were aware of Spare The Air in general, translating to 749,977 residents<sup>13</sup>. In terms of the individual air quality districts, general awareness ranged from 28% in Yolo-Solano AQMD to 36% in El Dorado AQMD.

<sup>11</sup> See methodology section for a complete list of 2016 Spare The Air episodes.

<sup>12</sup> See methodology section for a complete description of weighting methods.

<sup>13</sup> Based on the 2010 US Census available at: <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>. The total population in the entire Sacramento Nonattainment Area [including El Dorado AQMD] is 2,272,658: [Sacramento Metropolitan AQMD (63%) - 1,418,788; Yolo-Solano AQMD (15%) - 330,226 (this includes the total 200,849 from Yolo County and 129,377 from the Dixon, Rio Vista and Vacaville areas of Solano County); Placer County APCD (15%) - 338,613 (this figure represents the 87% of Placer County's 348,432 residents who do not live in zip codes north or east of Auburn), El Dorado AQMD



**Specific Awareness: Request Not to Drive**

2 ➤ *After weighting, 14% 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 318,172 residents were aware of Spare The Air alerts.*

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?”<sup>14</sup>

The specific episodic alert that is sent to Air Alert subscribers and radio, television and print media says: “This is a Spare The Air alert. The air quality forecast for [today] is unhealthy. Take action now. The best way to reduce air pollution is to get out of your car. Reduce driving, eliminate car trips, and postpone errands. To protect your health, minimize outdoor activities in the afternoon when pollution levels are at their most harmful.”

The next chart shows 14% of respondents in the region as a whole (weighted results) were aware of this specific request not to drive.<sup>15</sup> Specific awareness has always been statistically lower than general awareness. The 14% translates into an estimated 318,172 residents in the Sacramento region who heard the specific request not to drive on Spare The Air days. Levels of specific awareness ranged from 13% in Yolo-Solano AQMD to 15% in Sacramento Metropolitan AQMD and El Dorado AQMD.

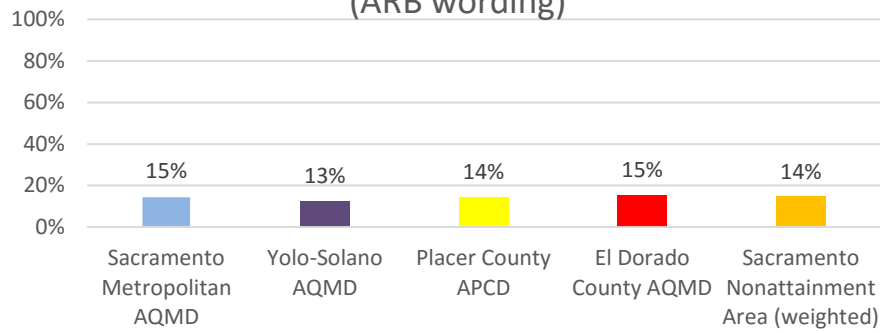
(7%) - 150,515 (this figure represents 67% of El Dorado County’s 181,058 residents, and includes residents from El Dorado Hills, Placerville, Shingle Springs, Georgetown, Cool, and the following unincorporated ZIP codes: 95613, 95619, 95623, 95633, 95635, 95651, 95664, and 95672).

<sup>14</sup> The order of the specific and general awareness questions was randomized so as to eliminate any possible order-response bias.

<sup>15</sup> See methodology section for review of weighting procedures.



### 2016 Specific Awareness of Spare The Air (ARB wording)



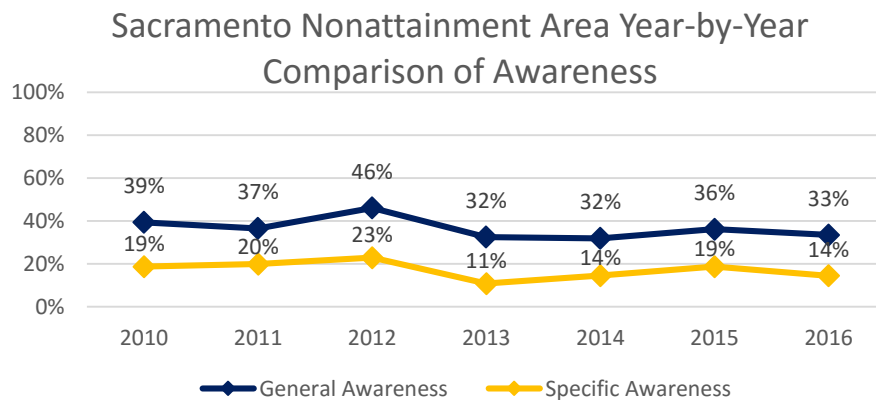


### Year-To-Year Comparisons of Awareness: Sacramento Nonattainment Area

- 3 ➤ *The level of general awareness for 2016 in the Sacramento Nonattainment Area is consistent with the previous three seasons, at 33%. Specific awareness is also level, at 14%.*

The next chart displays annual percentages of general and specific awareness of Spare The Air in the Sacramento Nonattainment Area from the past six seasons. General awareness in 2016 does not demonstrate significant deviation from the 2010-2016 mean ( $\bar{x}$ =37%), and is not significantly different from other seasons, excluding 2012, which stands out as an unusually aware season.

Likewise, specific awareness levels in 2016 do not differ significantly from the average ( $\bar{x}$ =18%). The 23% of aware respondents in 2012 is significantly higher than other years, while the 11% of respondents in 2013 is significantly lower.



Data for the 2016 season are unexpected in that they do not support the relationship between awareness levels and frequency of episodes developing over the course of the previous three seasons. The 2013, 2014, and 2015 data all found strong correlations between awareness and the number of episodes in a season.<sup>16</sup> In stark contrast, the 2016 season included 17 Spare The Air episodes, the most since 2002. Yet, awareness levels do not differ from the average for either general or specific measures. Additionally, previous reports have tested the hypothesis that multi-day episodes result in higher specific awareness levels<sup>17</sup>. Contrary to that hypothesis, the 2014 season, which included one multi-day episode, failed to find evidence of an increase in awareness levels. The 2015 season included two multi-day episodes, and found some support. Because this relationship is still in question, and the 2016 season includes many multi-day episodes, this hypothesis is tested once more.

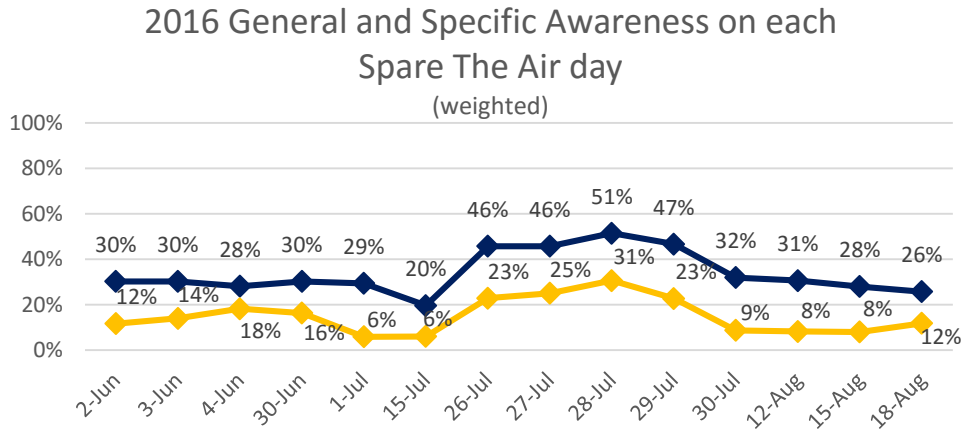
General and specific awareness are highest in 2016 during the July 26 to July 30 episode, where awareness levels are significantly greater than during the other episodes. However, awareness was not any higher than the average during the June 2 through June 4 multi-day

<sup>16</sup> The 2013 report found a correlation between number of episodes and general ( $r = .73, p < .05$ ) and specific ( $r = .84, p < .05$ ) awareness, the 2014 report found a correlation between general ( $r = .80, p < .05$ ) and specific ( $r = .92, p < .05$ ) and the 2015 report found a correlation between general ( $r = .79, p < .05$ ) and specific ( $r = .92, p < .05$ ).

<sup>17</sup> The 2011 and 2012 reports both found significant increases in awareness during closely timed Spare The Air days.



episode. Once more, a conclusion on multi-day episodes cannot be drawn. Multi-day episodes may increase awareness, but the 2016 data suggest that perhaps some other factor may be a predictor of awareness.







## Year-To-Year Comparisons by Air District

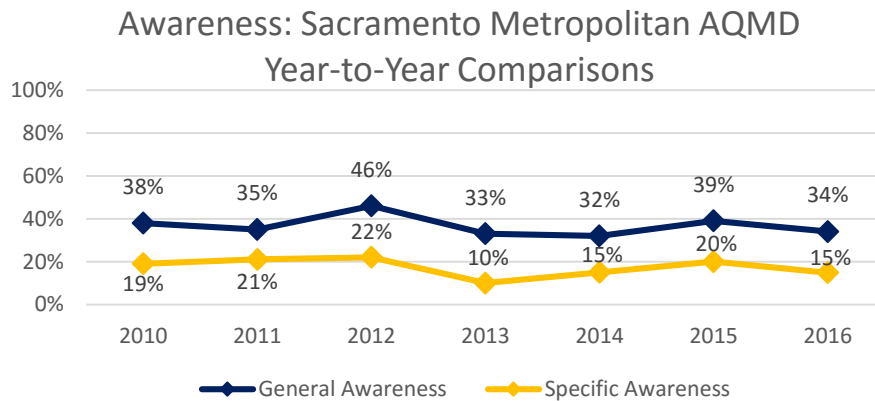
- 4 ➤ *Both general and specific awareness are marginally lower in 2016 than they were in 2015, but do not differ significantly from the seven-year average. Levels of both types of awareness in all individual air districts were highest in 2012, and at their lowest in 2013.*

Year-to-year comparisons of the annual levels of general and specific awareness for the individual air districts from the most recent six seasons are presented in the next graphs.

### Sacramento Metropolitan AQMD

As can be seen in the next graph, the highest levels of general as well as specific awareness in Sacramento Metropolitan AQMD between 2010 and 2016 occurred in 2012. A Chi Square analysis confirms a significant relationship between year and general awareness such that 2012 general awareness (46%) is significantly larger than the others. The 2016 season, while marginally lower than 2015 at 34%, does not deviate significantly from the mean ( $\bar{x}$ =36%).

The Chi Square analysis again exposed a significant relationship between year and specific awareness, such that 2013 (10% specific awareness) is a significant low for the six years of seasons. The 2016 season, with specific awareness at 15%, does not differ significantly from the seven-year average of 17%.

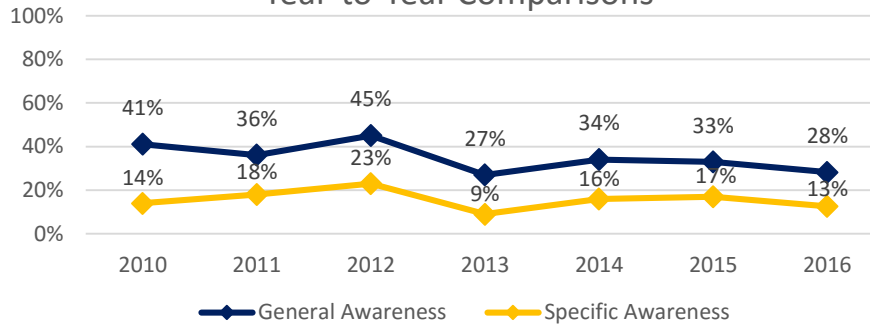


### Yolo-Solano AQMD

In Yolo-Solano AQMD, the 2016 level of general awareness (28%) is not significantly different from the seven-year average of 35%. In terms of specific awareness, this year's level of 13% is also different from the mean ( $\bar{x}$ =16%). In Yolo-Solano AQMD, like Sacramento, 2012 shows a significantly high general awareness while 2013 shows a significantly low specific awareness.



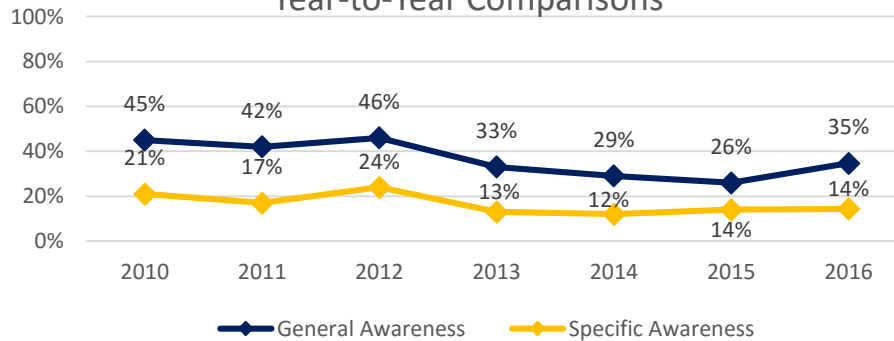
### Awareness: Yolo-Solano AQMD Year-to-Year Comparisons



### Placer County APCD

Breaking a three-season trend, general awareness in Placer County APCD increased significantly in the 2016 season. Now at 35%, the increase moves the 2016 season closer to, but not significantly different from, the seven-year average of 37%. Specific awareness at 14% marks no change from the previous season, yet is still consistent with the average ( $\bar{x}$ =17%).

### Awareness: Placer County APCD Year-to-Year Comparisons

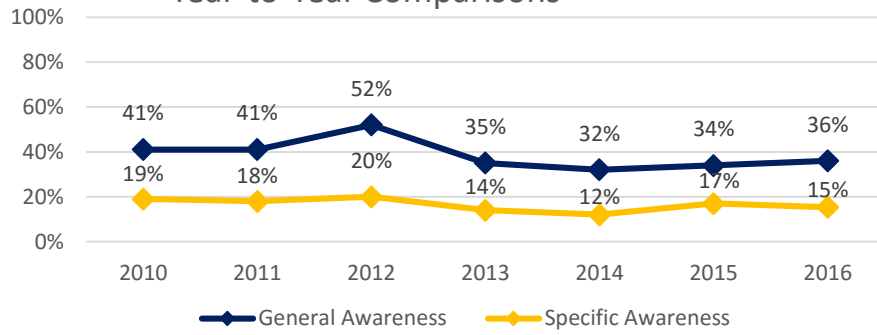


### EI Dorado County AQMD

In EI Dorado County AQMD, both types of awareness remained similar to previous years. The 52% general awareness level in 2012 is still a significant high compared to later seasons, including the 36% in 2016. In contrast, specific awareness in EI Dorado County AQMD has remained relatively constant, with no significant difference between years. The 15% specific awareness in 2016 is consistent with the six year average of 17%.



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





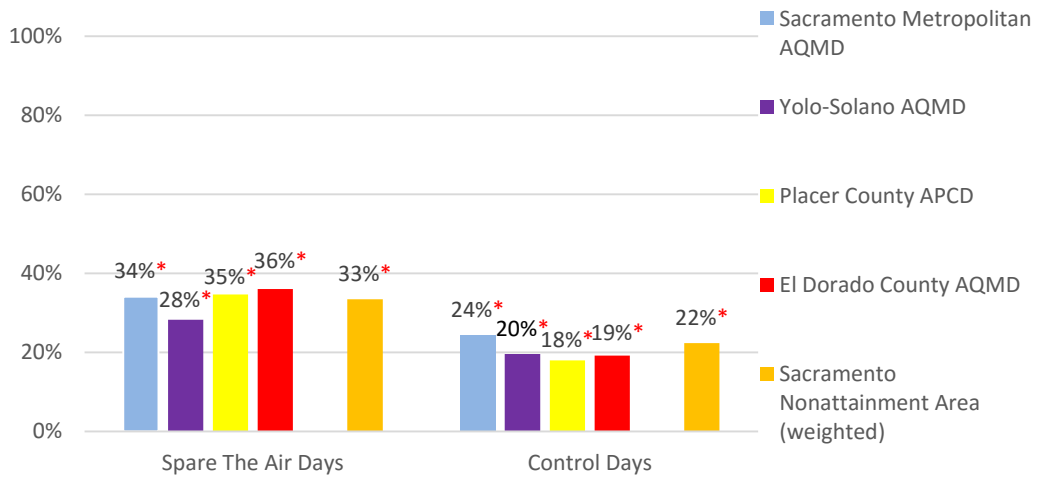
**Spare The Air vs. Control Days**

- 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, an indication that the episodic announcements are 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. Control interviews took place on the same days of the week as the Spare The Air interviews, but on a day that wasn't a Spare The Air day. The same questionnaire as the one used following Spare The Air days was used for Control day calling. The use of a Control group ensures 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.

Results for general awareness are presented in the next chart and indicate that 15% of area respondents interviewed on Control days said they had seen or heard Spare The Air announcements. Significantly more (33% vs 22%) of those interviewed after Spare The Air days remembered seeing or hearing them. Thus, the paid episodic media buy was effective at reaching the Sacramento region's residents throughout the summer. This was particularly evident 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 region population.**

Spare The Air vs. Control Days: 2016 General Awareness



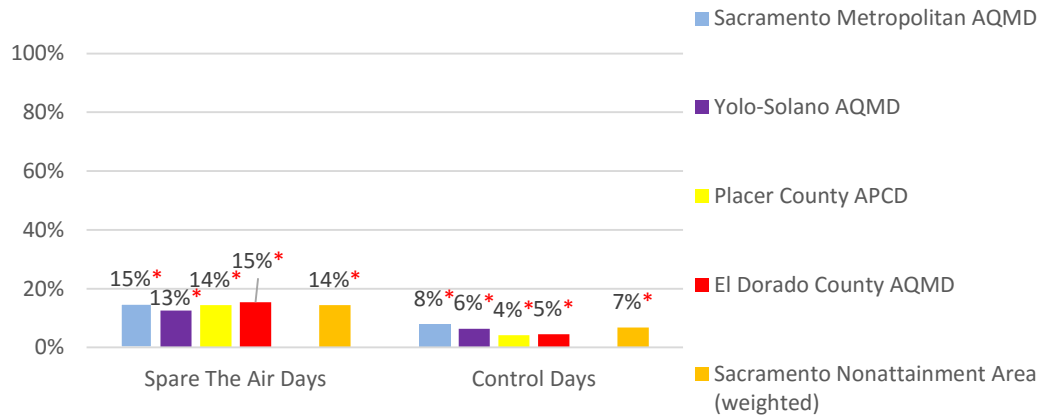
\* indicates statistically significant differences between Spare The Air and Control percentages.

In terms of specific awareness, 7% of Control day respondents in the area as a whole incorrectly heard a request not to drive versus the 14% 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: 2016 Specific Awareness



\* indicates statistically significant differences between Spare The Air and Control percentages.



## Estimating the Number of Spare The Air-Aware Drivers

- 7 ➤ *The percentage of respondents who were aware of Spare The Air in general translates into an estimate of 532,111 drivers in the Nonattainment Area who were aware of a Spare The Air day during the 2016 season.*

There were an estimated 1,612,457 drivers in the entire Sacramento Nonattainment Area in the summer of 2016.<sup>18</sup> With the level of general awareness of Spare The Air at 33%, this translates into an estimated **532,111 drivers in the Sacramento Nonattainment Area who were aware of the 2016 Spare The Air campaign in general.** The next table displays the calculations and the estimated number of drivers who heard the alerts in each individual air district.

<i>Air District</i>	<i>Total Estimated Number of Drivers</i>	<i>Percent Aware of STA (General Awareness) STA</i>	<i>Estimated Number of Drivers Aware of STA in General</i> <sup>19</sup>
<b>Sacramento Metropolitan AQMD</b>	989,415	34%	<b>336,401</b>
<b>Yolo-Solano AQMD</b>	225,615	28%	<b>63,172</b>
<b>Placer County APCD</b>	275,434	35%	<b>96,401</b>
<b>El Dorado County AQMD</b>	121,993	36%	<b>43,918</b>
<b>Sacramento Nonattainment Area</b> <sup>20</sup>	1,612,457	33%	<b>532,111</b>

<sup>18</sup> The number of drivers in the Sacramento Nonattainment Area for 2016 was estimated, using the number of driver licenses by county for 2015, obtained from the California Department of Motor Vehicles database <http://www.dmv.ca.gov/portal/wcm/connect/90a04dc3-ac0d-4528-a6a3-4797d0842689/DL+By+County+2015.pdf?MOD=AJPERES>. The estimated number of licensed drivers for the total Sacramento Nonattainment Area in 2016, therefore, was 1,612,457. Sacramento Metropolitan AQMD: total 989,415 + Yolo-Solano: total of 225,615 (134,046 in Yolo County + Solano County: 295,385 \* 31% for the proportion located within the air district = 91,569) + Placer County: total of 275,434 (283,952 \* 97% for the air district) + El Dorado County: total of 121,993 (146,980 \* 83% for the air 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.

<sup>19</sup> In previous seasons, Control day respondents who said they were generally aware of the campaign were subtracted from the total generally aware Spare The Air day respondents to make these calculations. It was decided in a meeting on April 2, 2014 between Lori Kobza of SMAQMD and Joe Hanson of Meta Research that for general awareness, a correction factor to extrapolate to the resident population is unnecessary because Control day respondents can reasonably be generally aware of the campaign even if they do not recall a specific request not to drive because there are Spare The Air outreach efforts taking place from May through October. Reducing estimates of generally aware residents by subtracting Control day responses greatly underreports total awareness estimates.

<sup>20</sup> 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.



- 8 ➤ In terms of specific awareness, and correcting for Control day responses, 112,872 drivers in the region heard the episodic request not to drive on Spare The Air days in 2016.

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 **112,872 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	989,415	15% / 8%	148,412 – 79,153= 69,259
Yolo-Solano AQMD	225,615	13% / 6%	29,330 - 13,537= 15,793
Placer County APCD	275,434	14% / 4%	38,561 – 11,017= 27,543
El Dorado County AQMD	121,993	15% / 5%	18,299 - 6,100= 12,199
Sacramento Nonattainment Area <sup>21</sup>	1,612,457	14% / 7%	225,744 – 112,872= <b>112,872</b>

<sup>21</sup> 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.



## Awareness of General Media Campaign

### 9 ➤ *Television commercials, news or weather broadcasts, and radio commercials were the most cited sources of air quality information in the Sacramento Nonattainment Area.*

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:

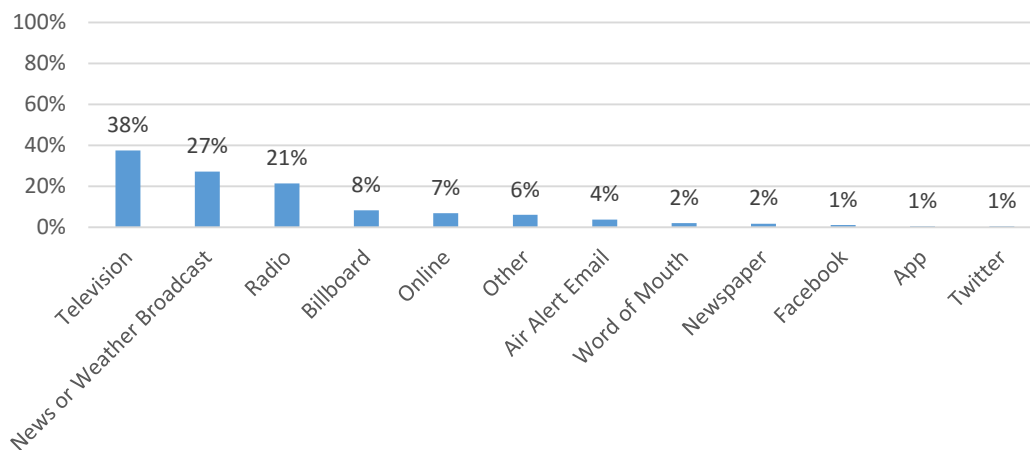
“Where do you recall seeing/hearing/reading that information?”<sup>22</sup>

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 11 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 sources of Spare The Air information are television commercials and news or weather broadcasts, cited by a respective 38% and 27% of respondents who were aware of the campaign in general. The next most cited source was radio (21%).

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.

2016 Sacramento Nonattainment Area  
 General Media Awareness  
 (weighted)



<sup>22</sup> Seeing/hearing/reading syntax dependent upon answer to general awareness item.



## PURPOSEFUL DRIVING REDUCTION

### Objectives

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

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 2010 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 2010 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 2016;
- 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

- 1 ➤ *One in five (19%) respondents in the Sacramento Nonattainment Area as a whole said they drove less on Spare The Air days. The percentage was highest among Placer County residents (21%), and lowest among El Dorado County residents (17%).*

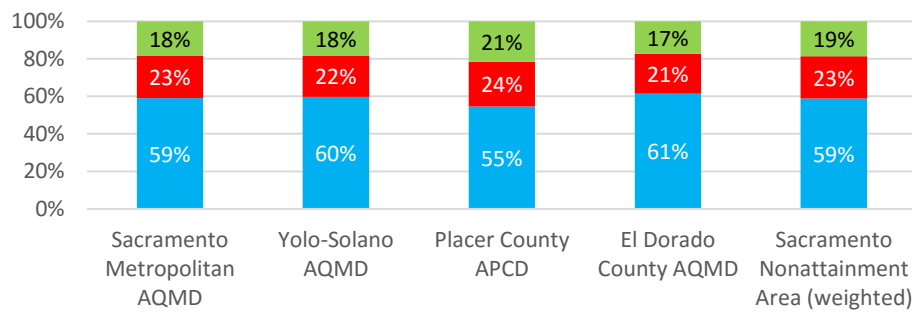
At the beginning of the survey, respondents interviewed following Spare The Air days were asked to think about their driving behavior the previous day and say whether they drove the “same, more, or less frequently” than they normally did on that particular day of the week. Results from each of the four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



The majority of respondents did not make any changes in their driving behavior – 59% in the area as a whole said they drove the same as usual the previous day. Nearly a quarter (23%) said they drove more, and the remaining 19% said they drove less. This pattern was seen within each of the individual air quality districts.

The highest percentage of those who said they drove less on Spare The Air days occurred in Placer County APCD (21%). The lowest percentage is in El Dorado County AQMD, where 17% drove less.

### Driving Behavior Yesterday: 2016 Spare The Air Responses by Air Quality District



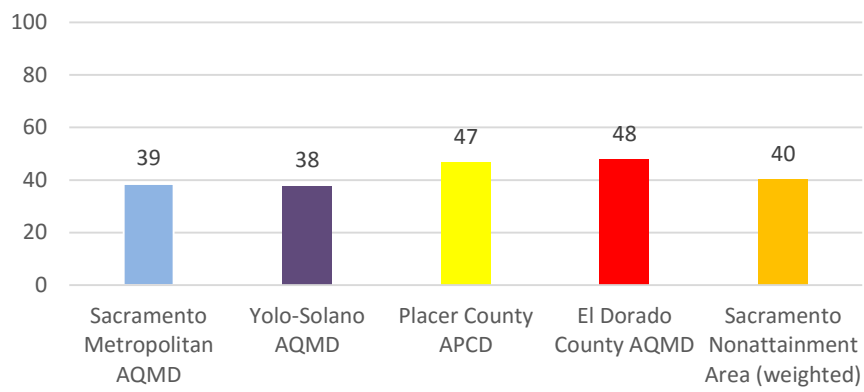
Note: Percentages do not add to 100% due to rounding  
 Same More Less



### Vehicle Miles Traveled

Respondents who drove less were asked “and approximately how many miles less than normal did you drive?” The data for the 2016 season are displayed in the table below for each air district and for the Sacramento Nonattainment Area<sup>23</sup> as a whole. The average number of fewer miles driven by those who said they drove less on a Spare The Air day ranged from 38 miles in the Yolo-Solano AQMD to 48 miles in El Dorado County AQMD. There are no significant differences between air districts for fewer miles driven. This may be due in part to the small sample size as well as the great variability between individual responses.

2016 Vehicle Miles Traveled:  
Driving Less



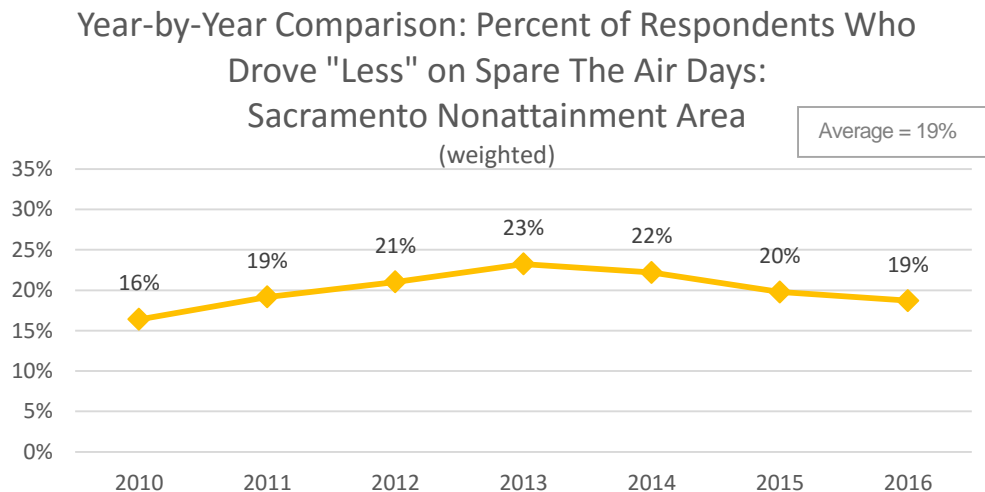
<sup>23</sup> Weighted results



## Year-to-Year Comparisons: Percent Who Drove Less

- 2 ➤ *Over the last seven years, the highest percentage of those who drove less on Spare The Air days in the Sacramento Nonattainment Area occurred in 2013 (23%), and the lowest percentage occurred in 2010 (16%). This year's 19% of respondents who said they drove less on Spare The Air days is the same as the seven-year average.*

The next graph plots the percentages of drivers from 2010 to the present who said they drove less on Spare The Air days in the Sacramento Nonattainment Area. It can be seen that, with only a few exceptions, the percentage of respondents who said they drove less on Spare The Air days has remained relatively stable at about 19%, which is the seven-year average. In 2010, driving reduction behavior was at its lowest with levels at a significantly low 16%, according to a Chi Square analysis. The 2016 season, at 19%, is no different from the seven-year average.

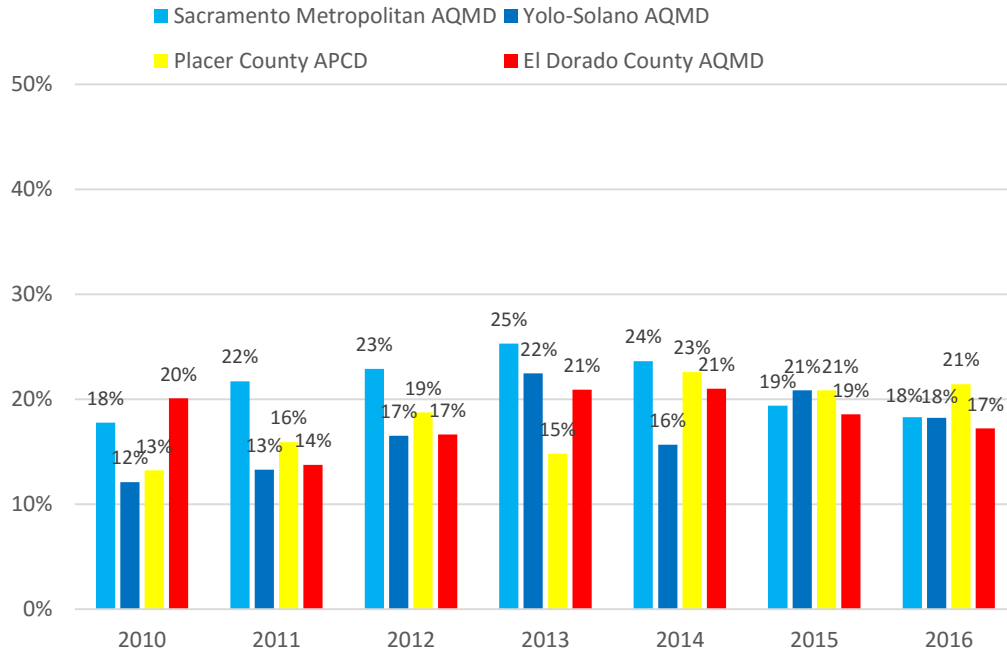


- 3 ➤ *In the individual air districts, the percentage of respondents who drove less this year is not significantly different from the average.*

The annual percentage of respondents who drove less the previous day in the individual air districts from 2010 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 18% in 2010 and 2016 to a high of 25% in 2013. This year's percentage of 18% is lower than most recent years but still not significantly different from the seven-year average of 21%. Results in **Yolo-Solano AQMD** ranged from a low of 12% in 2010 to a significantly greater high of 22% in 2013. This year's 21% exceeds the seven-year average of 17% in that air district and is also significantly greater than 12% in 2010. In **Placer County APCD**, 21% of residents this year who said they drove less is significantly higher than the seven-year average of 18%. In **EI Dorado County AQMD**, the 17% of respondents who reported driving less is consistent with the seven-year average of 18%. Overall, 2016 reported driving frequency, as it was in 2015, is less variable between districts than previous years.



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



## Percentage of Purposeful Reducers

- 5 ➤ *In 2016, 0.8% of respondent drivers were classified “purposeful reducer” – they drove less on Spare The Air days because they heard the Spare The Air alerts and wanted to improve air quality in the region.*

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 quality reasons, and who had heard announcements about Spare The Air (general awareness using the ARB question.<sup>24</sup>) Results from each air quality district and for the weighted Sacramento region are presented in the next table. It can be seen that for the Sacramento Nonattainment Area 0.8% of Spare The Air respondent drivers (4 out of 577) met the **strict ARB standard** for purposeful driving reduction. Individually, three respondents in **Sacramento Metropolitan AQMD** qualified as purposeful reducers; no respondents in **Yolo-Solano AQMD**; three respondents in **Placer County APCD**; and two respondents in **El Dorado County AQMD** can be classified as a purposeful reducer. Sacramento Metropolitan AQMD is used as the baseline during the data weighting procedure<sup>25</sup> and all other air districts are weighted down according to each respective population relative to Sacramento County. Therefore, after weighting, only 4 purposeful reducers are recorded for the Sacramento Nonattainment Area as a whole.

A possible explanation for the lower driving reduction results of 0.8% in 2016, compared to 2.8% in 2015, could be a return to pre-2008 employment rates in the Sacramento area.<sup>26</sup> Driving reduction may not have been an option for many Sacramento Nonattainment Area residents. Plus it was a very unique and intense presidential election year and, while it's only speculation, it should be noted that the election rhetoric and advertising may have influenced either who agreed to take the phone survey, or people's attitude towards marketing or the environment in general.

<sup>24</sup> 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.

<sup>25</sup> See Methodology section for full description of weighting procedure.

<sup>26</sup> Data retrieved from the Bureau of Labor and Statistics 11/20/2016 at <http://beta.bls.gov/dataViewer/view/timeseries/LAUCN060670000000003>



<i>Spare The Air: Purposeful Reducers in 2016</i>	<i>Number of Respondents Who Reduced Driving For Air Quality Reasons and Were Aware of STA Alerts</i>	<i>Total Number of Respondents Interviewed on Days Following Spare The Air</i>	<i>Sampling Error<sup>27</sup></i>	<i>% of Total Respondents Who Reduced Driving for Air Quality Reasons and Were Aware of STA Alerts</i>
<b>Sacramento Metropolitan AQMD</b>	<b>3</b>	<b>366</b>	<b>+/- 5.1%</b>	<b>0.8%</b>
<b>Yolo-Solano AQMD</b>	<b>0</b>	<b>263</b>	<b>+/- 6.0%</b>	<b>0.0%</b>
<b>Placer County APCD</b>	<b>3</b>	<b>275</b>	<b>+/- 5.9%</b>	<b>1.1%</b>
<b>El Dorado County AQMD</b>	<b>2</b>	<b>174</b>	<b>+/- 7.4%</b>	<b>1.1%</b>
<b>Sacramento Nonattainment Area<sup>28</sup></b>	<b>4</b>	<b>577</b>	<b>+/- 4.1%</b>	<b>0.8%</b>

<sup>27</sup> Sampling error is a measure of the range of possible difference between the characteristics of the sample and the population from which the sample was drawn. For example, the average weight of a sample of 1,000 individuals from a population of 1,000,000 will likely not be exact to the average weight of the entire population. Though the precise difference cannot be determined it is estimated to be within a range of values extending from the sample value (e.g. +/- 10%).

<sup>28</sup> 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 63% of the entire population, Yolo-Solano AQMD is 15%, Placer County APCD is 15%, and El Dorado County AQMD is 7%.) This is why the weighted total number of completed interviews (i.e. 577) is less than the sum of the total number of interviews conducted in all air districts (i.e. 1,078).



**Percentage of Purposeful Reducers: Year-To-Year Comparisons**

- 7 ➤ *The percentage of purposeful reducers is significantly greater in Placer County APCD (1.1%) and El Dorado County AQMD (1.1%) than the seven-year average in those districts.*

The next table lists the annual proportions of purposeful reducers from 2010 to the present. In the Sacramento Nonattainment Area, this year's percentage of **0.8% reducers** is exact to the seven-year average of 0.8%.

In terms of the **Sacramento Metropolitan AQMD**, the 1.1% of reducers is significantly lower than the 2015 season, but no different from the 2010 to 2014 seasons. In **Yolo-Solano AQMD** the percentage of reducers (0.0%) is lower than previous seasons, but is not different from the average of 0.1%. In **Placer County APCD**, the 1.1% of purposeful reducers is significantly higher than each season except for the 2014 season. Likewise, at 1.1% in 2016, El Dorado County AQMD shows a significant increase from all previous seasons but 2013.

<i>Spare The Air: Purposeful Reducers</i>	2010	2011	2012	2013	2014	2015	2016	<i>Significant Difference Among Years? (see footnotes)<sup>29</sup></i>	<i>Seven-year Average</i>
<b>Sacramento Metropolitan AQMD</b>	0.5%	0.8%	0.0%	0.6%	0.8%	4.0%	0.8%	Yes	1.1%
<b>Yolo-Solano AQMD</b>	0.0%	0.0%	0.0%	0.0%	0.4%	0.4%	0.0%	No	0.1%
<b>Placer County APCD</b>	0.3%	0.4%	0.0%	0.7%	1.4%	0.8%	1.1%	No	0.7%
<b>El Dorado County AQMD</b>	0.5%	0.0%	0.5%	0.9%	0.0%	0.6%	1.1%	No	0.5%
<b>Sacramento Nonattainment Area</b>	0.36%	0.5%	0.0%	0.4%	0.8%	2.8%	0.8%	Yes	0.8%

<sup>29</sup> In Sacramento Metropolitan AQMD the percentage of purposeful reducers in the 2015 season is significantly greater than 2010, 2011, 2012, 2013, 2014, and 2016. In the Sacramento Nonattainment Area (weighted) the percentage of purposeful reducers in the 2015 season is significantly greater than 2010, 2011, 2012, 2013, 2014, and 2016.





**Estimated Number of Purposeful Reducers**

- 8 ➤ *After weighting, an estimated 12,900 drivers in the entire Sacramento Nonattainment Area purposefully made fewer trips each Spare The Air day in 2016 in order to reduce air pollution.*

There were an estimated 1,612,457 drivers<sup>30</sup> in the entire Sacramento Nonattainment Area in 2016. 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.

<i>Air District</i>	<i>Total Number of Drivers</i>	<i>Percent of Purposeful Reducers</i>	<i>Percent of Control 'Reducers'</i>	<i>Estimated Number of Purposeful Reducers in 2016</i> <i>[(Reducers - Control)*Drivers]</i>
<b>Sacramento Metropolitan AQMD</b>	989,415	<b>0.8%</b>	<b>0.0%</b>	<b>7,915</b>
<b>Yolo-Solano AQMD</b>	225,615	<b>0.0%</b>	<b>0.0%</b>	<b>0</b>
<b>Placer County APCD</b>	275,434	<b>1.1%</b>	<b>0.0%</b>	<b>3,030</b>
<b>El Dorado County AQMD</b>	121,993	<b>1.2%</b>	<b>0.0%</b>	<b>1,464</b>
<b>Sacramento Nonattainment Area</b>	1,612,457	<b>0.8%</b>	<b>0.0%</b>	<b>12,900<sup>31</sup></b> <b>purposeful reducers</b>

<sup>30</sup> The number of drivers in the Sacramento Nonattainment Area for 2016 was estimated, using the number of driver licenses by county for 2015, obtained from the California Department of Motor Vehicles database <http://www.dmv.ca.gov/portal/wcm/connect/90a04dc3-ac0d-4528-a6a3-4797d0842689/DL+By+County+2015.pdf?MOD=AJPERES>. The estimated number of licensed drivers for the total Sacramento Nonattainment Area in 2016, therefore, was 1,612,457. Sacramento Metropolitan AQMD: total 989,415 + Yolo-Solano: total of 225,615 (134,046 in Yolo County + Solano County: 295,385 \* 31% for the proportion located within the air district = 91,569) + Placer County: total of 275,434 (283,952 \* 97% for the air district) + El Dorado County: total of 121,993 (146,980 \* 83% for the air 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.

<sup>31</sup> 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.



**Estimated Number of Single Trips Avoided by Purposeful Reducers**

- 9 ➤ *In the Sacramento Nonattainment Area, 51,600 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 **three** resulting in a total of **51,600 trips avoided directly attributed to the Spare The Air program**. Results for the individual air districts as well as for the weighted regions are presented in the next table.

<i>Air District</i>	<i>Estimated Number of Purposeful Reducers</i>	<i>Mean # of Trips Avoided for Air Quality Reasons</i>	<i>Estimated Number of Single Trips Reduced</i>
<b>Sacramento Metropolitan AQMD</b>	<b>7,915</b>	<b>4</b>	<b>31,660</b>
<b>Yolo-Solano AQMD</b>	<b>0</b>	<b>2</b>	<b>0</b>
<b>Placer County APCD</b>	<b>3,030</b>	<b>3</b>	<b>9,090</b>
<b>El Dorado County AQMD</b>	<b>1,464</b>	<b>4</b>	<b>5,856</b>
<b>Sacramento Nonattainment Area<sup>32</sup></b>	<b>12,900<sup>33</sup></b>	<b>4</b>	<b>51,600 trips</b>

<sup>32</sup> Includes El Dorado County AQMD.

<sup>33</sup> 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.



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

- 10 ➤ *The 0.8% purposeful reducers on Spare The Air days is not significantly greater than the 0.0% on Control days, but still represents marginal behavior change.*

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.<sup>34</sup>

The next table indicates the results from Control interviews in all the air districts. For the entire Nonattainment Area, no respondents erroneously claimed to have reduced their driving because of a specific request not to drive the previous day. Still, the low percentages of true purposeful reducers are not enough to be distinguished from 0%, meaning no significant differences arose in any of the air districts between Control day and episodic purposeful reducers. No differences arising in these calculations has been common place since 2010.

Air District	% of Respondents Who Reduced for Air Quality Reasons		Significant Difference?
	Who Were Aware On STA Days	On Control Days	
Sacramento Metropolitan AQMD	0.8%	0.0%	No
Yolo-Solano AQMD	0.0%	0.0%	No
Placer County APCD	1.1%	0.0%	No
El Dorado County AQMD	1.2%	0.0%	No
Sacramento Nonattainment Area	0.8%	0.0%	No

<sup>34</sup> This year the same methodology as was adopted in 2010 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).

## ESTIMATED EMISSION REDUCTIONS

### Objective

The main objective of the current section is to estimate how many tons of ozone precursor emissions [Reactive Organic Gases (ROG) and Nitrogen Oxides (NOx)] were reduced during the 2016 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

- 1 ➤ *The 2016 Spare The Air voluntary driving reduction program was successful in reducing air pollution in the entire Sacramento Nonattainment Area by an estimated 0.14 tons of ozone precursors per Spare The Air day. This is due specifically to drivers purposefully reducing the number of trips they took on Spare The Air days for air quality reasons.*

The methodology used to estimate emission reductions due specifically to the Spare The Air program is very 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<sup>35</sup>. 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.

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 alerts,<sup>36</sup> 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 **0.8%**<sup>37</sup> (4 / 577<sup>38</sup>) 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 **four** single trips avoided.
3. Extrapolate to the total number of drivers in the region<sup>39</sup> this year: the percentage of Spare

<sup>35</sup> These respondents are examined in this report's section on Seasonal Driving Reduction on page 42.

<sup>36</sup> 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?"

<sup>37</sup> See the Purposeful Driving Reduction section of the 2016 report for a full explanation of these results.

<sup>38</sup> Weighted results. See Methodology section for description of weighting procedures.

<sup>39</sup> The number of drivers in the Sacramento Nonattainment Area for 2016 was estimated, using the number of driver licenses by county for 2015, obtained from the California Department of Motor Vehicles database <http://www.dmv.ca.gov/portal/wcm/connect/90a04dc3-ac0d-4528-a6a3-4797d0842689/DL+By+County+2015.pdf?MOD=AJPERES>. The estimated number of licensed drivers for the total Sacramento Nonattainment Area in 2016, therefore, was 1,612,457. Sacramento Metropolitan AQMD: total 989,415 + Yolo-Solano: total of



The Air reducers therefore represents **12,900** drivers in the Sacramento Nonattainment Area, and the number of single trips avoided was **51,600** (12,900 drivers x 4 trips avoided on average).

4. Multiply the number of trips avoided by a per trip emission reduction average of **2.50 grams of ozone precursors**.<sup>40</sup> [This includes a total of Reactive Organic Gases (ROG) emissions (8.52 grams per trip for light duty passenger cars plus two categories of light duty trucks) plus Oxides of Nitrogen (NOx) emissions (4.79 grams per trip for light duty passenger cars and light duty trucks) emissions, based on 2016 models of EMFAC 2014]. EMFAC 2014 is the latest update to the EMFAC model. It is used by California state and local governments to meet Clean Air Act (CAA) requirements. EMFAC 2014 defines trips as vehicle starts and calculates them separately as a function of vehicle population (derived from vehicle registration data), based on ARB and U.S. EPA instrumented vehicle studies. For the Sacramento Nonattainment Area, this amounts to **129,000 grams** of ozone precursors (51,600 single trips avoided x 2.50 grams per trip).
5. Convert to tons.<sup>41</sup> For the Sacramento Nonattainment Area as a whole, this translates to an estimated total of **0.14 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 Control day emissions reductions in 2016 equal zero, no correction factor is necessary.
8. Result: **0.14 tons of ozone precursors reduced per Spare The Air day directly attributable to the Spare The Air program.**

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225,615 (134,046 in Yolo County + Solano County: 295,385 \* 31% for the proportion located within the air district = 91,569) + Placer County: total of 275,434 (283,952 \* 97% for the air district) + El Dorado County: total of 121,993 (146,980 \* 83% for the air 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.

<sup>40</sup> Estimates were based on the Summer On-Road Inventory - EMFAC 2014 model, for the summer of 2016, accessed from <https://www.arb.ca.gov/emfac/2014/>. The total ROG tons for a combined total of light duty passenger cars and two categories of light duty trucks (4.85 + 1.44 + 2.23) 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. 3,323,698 for light duty passenger cars + 321,815 for light duty trucks<sup>1</sup> + 1,178,369 for light duty trucks<sup>2</sup>) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (2.60 + 0.57 + 1.62) x 2000 x 454 / (3,323,698 + 321,815 + 1,178,369). ROG grams and NOx grams were then combined (1.60 + 0.90) to obtain 2.50 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.

<sup>41</sup> There are 907,200 grams in a ton.



Sacramento Nonattainment Area	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons <sup>42</sup>	X Number of Licensed Drivers in Sacramento Nonattainment Area (1,612,457 Total)	X Mean Number of Single Trips Reduced Per Day (3)	X 2.50 Grams of Ozone Precursors Per Trip (EMFAC 2014) 2016 summer	= Estimated Tons per Day of Ozone Precursors Reduced
Spare The Air Days	0.8% (4 / 577)	42,298	126,894	129,000 grams	0.14 tons
Control Days	0.0% (0/488)	0	0	0 grams	0.00 tons
<b><i>Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions minus Control Day Reductions)</i></b>					<b>0.14 tons</b>

<sup>42</sup> In addition, in the case of Spare The Air respondents, these drivers had to say they had heard the Spare The Air alert (the ARB general awareness question - Q12b).



**2016 Emissions Reduction Estimate by Air District:**

- 2 ➤ *There was a 0.09 ton reduction in ozone precursors in Sacramento Metropolitan AQMD per Spare The Air day.*

Emission reductions were greatest in Sacramento Metropolitan AQMD, where there was 0.09 tons of ozone precursors reduced per Spare The Air day. In the other districts, the Spare The Air campaign did not have as much of an impact on emissions. Placer County APCD showed the second most reductions at 0.03 tons of ozone precursors reduced per Spare The Air day. El Dorado County AQMD accounts for only 0.01 tons, while in Yolo-Solano AQMD, no emission reductions can be attributed to the Spare The Air campaign due to correcting for a Control day purposeful reducer.

Sacramento Metropolitan AQMD	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons	X Number of Licensed Drivers in Sacramento Metropolitan AQMD (989,415 Total)	X Mean Number of Single Trips Reduced Per Day (4)	X 2.50 Grams of Ozone Precursors Per Trip (EMFAC 2014) 2016 summer	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	0.8% (3 / 336)	7,915	31,661	79,153 grams	0.09 tons
Control Days	0.0% (0 / 309)	5,756	17,268	44,551 grams	0.00 tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions minus Control Day Reductions)					<b>0.09 tons</b>

Yolo-Solano AQMD	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons	X Number of Licensed Drivers in Yolo-Solano AQMD (225,615 Total)	X Mean Number of Single Trips Reduced Per Day (2)	X 2.50 Grams of Ozone Precursors Per Trip (EMFAC 2014) 2016 summer	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	0.0% (0 / 263)	0	0	0 grams	0.00 tons
Control Days	0.0% (0 / 205)	0	0	0 grams	0.00 tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions minus Control Day Reductions)					<b>0 tons</b>



Placer County APCD	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons	X Number of Licensed Drivers in Placer County APCD (275,434 Total)	X Mean Number of Single Trips Reduced Per Day (3)	X 2.50 Grams of Ozone Precursors Per Trip (EMFAC 2014) 2016 summer	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	1.1 % (3 /275)	3,030	9,087	22,717 grams	0.03 tons
Control Days	0.0% (0 / 218)	0	0	0 grams	0.00 tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions minus Control Day Reductions)					<b>0.03 tons</b>

El Dorado County AQMD	Percent of Respondent Drivers Who Drove Less for Air Quality Reasons	X Number of Licensed Drivers in El Dorado County AQMD (121,993 Total)	X Mean Number of Single Trips Reduced Per Day (4)	X 2.50 Grams of Ozone Precursors Per Trip (EMFAC 2014) 2016 summer	= Estimated Tons Per Day of Ozone Precursors Reduced
Spare The Air Days	1.1% (2 /174)	1,342	5,368	13,420 grams	0.01 tons
Control Days	0.0% (0 / 132)	0	0	0 grams	0.00 tons
Estimated Tons of Ozone Precursors Reduced Per Day: (STA Day Reductions minus Control Day Reductions)					<b>0.01 tons</b>





**Comparison with Previous Years: Sacramento Metropolitan AQMD (only)**

- 3 ➤ *Emission reductions in 2016 remain significantly higher than the 2010 through 2014 seasons, but are half as large as 2015. The 2015 season claims the greatest reductions per Spare The Air day of the last seven seasons.*

A comparison of estimated emission reductions<sup>43</sup> due to the Spare The Air program from 2010 to 2016 in the Sacramento Metropolitan AQMD<sup>44</sup> 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,<sup>45</sup> 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 estimated emission reductions per Spare The Air day ranged from a low of .00 tons in the 2012 season to a high of 0.28 tons in 2015. **The Spare The Air program has been successful in reducing the amount of ozone precursors in the air each year except for 2012.** Data from 2016 are evidence of the success of the program in reducing ozone precursors in the Sacramento Nonattainment Area on Spare The Air days. The 2016 season emission reductions are significantly greater than the 2010 through 2014 season, but significantly less than the 2015 season.

Year	2010	2011	2012	2013	2014	2015	2016
<b>Sacramento Metropolitan AQMD:</b>	<b>0.07</b>	<b>0.08</b>	<b>0.00</b>	<b>0.02</b>	<b>0.07</b>	<b>0.28</b>	<b>0.09</b>
<i>Average emission reductions attributed to Spare The Air (tons)</i>							

<sup>43</sup> The estimated emission reductions shown in the current table were based on accepted EMFAC models for each year. This year, estimates were based on the EMFAC 2014 model, 2016 summer.

<sup>44</sup> 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 day and Control day drivers who said they drove less.

<sup>45</sup> It should be noted that over the years the motor vehicle emissions have lowered, because cleaner burning vehicles produce fewer emissions.

## 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:

- 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; and
- c. estimate emission reductions from these voluntary driving reducers.

## RESULTS

### Seasonal Driving Reducers

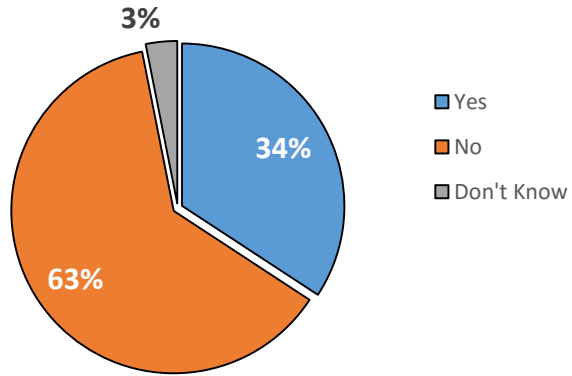
- 1 ➤ *Over one third (34%) of all respondents in the Sacramento Nonattainment Area are seasonal reducers – that is, they usually reduce the amount of driving they do during the summer to avoid adding to air pollution.*

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, 34% of all<sup>46</sup> respondents in 2016 can be considered seasonal driving reducers. **That 34% translates into an estimated 548,235<sup>47</sup> drivers in the Sacramento Nonattainment Area who regularly reduce their driving during the summer months to avoid adding to air pollution.**

<sup>46</sup> 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.

<sup>47</sup> The number of drivers in the Sacramento Nonattainment Area for 2016 was estimated, using the number of driver licenses by county for 2015, obtained from the California Department of Motor Vehicles database: <http://www.dmv.ca.gov/portal/wcm/connect/90a04dc3-ac0d-4528-a6a3-4797d0842689/DL+By+County+2015.pdf?MOD=AJPERES>. The estimated number of licensed drivers for the total Sacramento Nonattainment Area in 2016, therefore, was 1,612,457. Sacramento Metropolitan AQMD: total 989,415 + Yolo-Solano: total of 225,615 (134,046 in Yolo County + Solano County: 295,385 \* 31% for the proportion located within the air district = 91,569) + Placer County: total of 275,434 (283,952 \* 97% for the air district) + El Dorado County: total of 121,993 (146,980 \* 83% for the air 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.

Percent Who Usually Reduce Driving in  
the Summer for Air Quality Reasons:  
2016 Results for the Sacramento  
Nonattainment Area





**Number of Reduced Trips**

- 2 ➤ *Summertime driving reducers made fewer trips than those who did not change their driving habits during the summer: on average, they made .63 fewer trips per day.*

This percentage of seasonal reducers reported that they entered their cars the previous day an average of 2.75 times. The 63% 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 3.38 times. **On average, seasonal driving reducers made 0.63 fewer trips per day** than did non-reducers (3.38 – 2.75 = 0.63 trips). An analysis of variance indicated that these means are significantly different from each other.<sup>48</sup> **Continued significant difference between seasonal reducers and non-reducers is another indication of Spare The Air’s success.**

	<i>Seasonal Driving Reducers: Mean # Times Entered Vehicle</i>	<i>Non-Reducers: Mean # Times Entered Vehicle</i>	<i>Statistically Significant Difference?</i>
<i>Sacramento Nonattainment Area (weighted results)</i>	<b>2.75</b>	<b>3.38</b>	<b>Yes</b>

<sup>48</sup> F (1, 1027) = 4.957, p < .05. See the Methodology section for a description of statistical significance.



**Seasonal Trip Reduction: Estimated Emission Reductions**

- 3 ➤ *In 2016, over half a million (548,235) drivers were seasonal reducers. The number of trips they avoided translated into a reduction of 0.95 tons per day of ozone precursors during the summer of 2016.*

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 34% of 2016 seasonal reducers translates into over half a million drivers (548,235) in the entire Sacramento Nonattainment Area. 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 days<sup>49</sup> and is summarized in the next table. **The average of 0.63 of a trip per day that seasonal reducers avoided translates into an estimated 0.95 tons of ozone precursors reduced per summer day in 2016.**

Sacramento Nonattainment Area	Percent of Respondent Drivers Who Usually Drive Less During the Summer for Air Quality Reasons	x Number of Licensed Drivers in Sacramento Nonattainment Area (1,612,457 Total)	x Mean Number of Trips Reduced Per Day Compared to Non-Reducers	x 2.50 Grams of Ozone Precursors Per Trip (EMFAC 2014) 2016 Summer Model <sup>50</sup>	= Estimated Tons <sup>51</sup> Per Day of Ozone Precursors Reduced
Spare The Air and Control Day Interviews Combined	34%	548,235	x 0.63 = 345,388	863,470 grams	<b>0.95 tons</b>

<sup>49</sup> For a full explanation of the methodology, see the section titled "Estimated Emission Reduction" beginning on page 36 of this report.

<sup>50</sup> Estimates were based on the Summer On-Road Inventory - EMFAC 2014 model, for the summer of 2016, accessed from <https://www.arb.ca.gov/emfac/2014/>. The total ROG tons for a combined total of light duty passenger cars and two categories of light duty trucks (4.85 + 1.44 + 2.23) 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. 3,323,698 for light duty passenger cars + 321,815 for light duty trucks<sup>1</sup> + 1,178,369 for light duty trucks<sup>2</sup>) in order to obtain the average grams per trip. The same process was used to calculate NOx grams per trip (2.60 + 0.57 + 1.62) x 2000 x 454 / (3,323,698 + 321,815 + 1,178,369). ROG grams and NOx grams were then combined (1.60 + 0.90) to obtain 2.50 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.

<sup>51</sup> There are 907,200 grams in a ton.

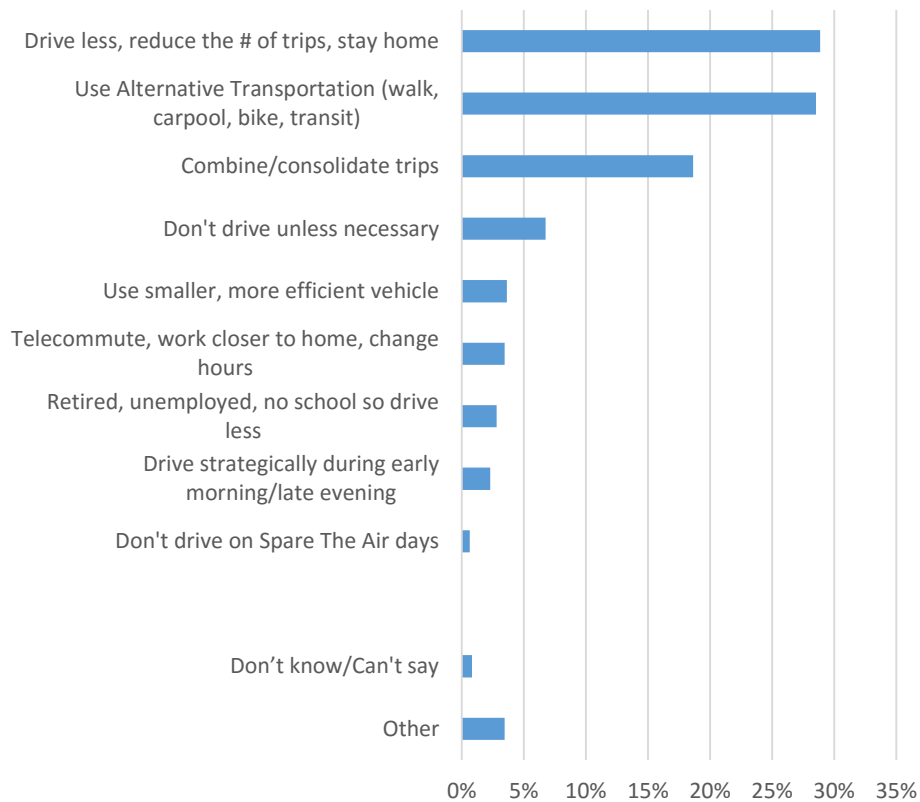


## How They Reduce Driving

- 4 ➤ *Seasonal reducers made fewer trips or stayed home, used alternative transportation, and 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. Over a quarter (28.9%) of seasonal reducers said they drove less, stayed home and made fewer trips. Almost equally common, 28.5% of seasonal reducers used alternative transportation, which included biking, walking, carpooling, or using public transit. Nearly one fifth (18.6%) said they made combined or consolidated trips. Less frequently, respondents said they don't drive unless necessary (6.8%), or use smaller more efficient vehicles throughout the summer (3.6%). Others said they telecommute, or have a change of hours in the summer that allows them to drive less (3.5%), are retired, don't work, or don't go to school in the summer (2.8%) and are able to reduce their trips. The remaining respondents drive at strategic times of the day to avoid adding to air pollution (2.3%), don't drive on Spare The Air days (0.7%), or reduce their driving in a way that doesn't fall into one of these categories (3.5%).

How Have You Reduced Driving This Summer?



A few representative comments<sup>52</sup> from those who combined trips include:

- Avoid driving in general. Less trips, more walking.
- Being happy by just staying home.
- By foregoing vacations, staying around the house and doing all my weekly errands in one big trip.
- By just staying home.
- By staying home and not going shopping since it has been so hot. When I used to work we carpoled.
- Doing more stuff at home.
- Don't drive on my days off.
- Drive closer distances.
- Drive less and keep up car maintenance.
- Entertaining ourselves at home; we have a pool.
- Fewer trips.
- I do not usually go anywhere on the weekends, so that is how I try to help with air pollution.
- I don't drive as much.
- I don't go out that much.
- I have no drive days. Also, I ride with other people and combine my trips. I just did about 10% less driving.
- I just don't go anywhere.
- I just stay in my local area.
- I stay at home on the weekend.
- I try not to drive as much.
- Not drive 70 miles every day.
- Not going out as often and not driving.
- Not taking as many trips.
- Stay home a lot.
- Stay local.
- Taking shorter trips less often.

A few representative comments by those who used alternative transportation include:

- Bicycle and walking.
- Bicycling, making small trips to store for an item or two.
- Carpool. Ride a bicycle instead.
- Carpooling and taking a break from driving.
- Commute on public transit.
- Commute through bus.
- Got my bike fixed.
- I carpool with my friends and walk as much as I can.
- I share my driving with someone else.
- I share the car with my son.
- I take the bus and walk. I use the bus on weekdays, and only drive when I have to.
- I take the light rail.
- I walk to places.
- I walk to work instead of driving.
- Public transportation.

<sup>52</sup> The complete transcripts of all responses are available in the statistical file.



- Ride my bike 90 percent of the time.
- Take bus to work.
- Trato de ir con mi marido cuando el maneja. / I try to carpool with my husband.
- Walked and taking the train. Schedule trips instead of just doing things randomly.

A few representative comments from those who said they combined or consolidate trips include:

- By trying to consolidate trips.
- Combine errands with other members of the family.
- Combining errands instead of doing it one at a time; I knocked it all out all at once.
- Do all errands at once so don't have to during the week.
- Have several errands done all at once.
- I combine trips. I go out once rather than several other times.
- I combine work and errands in one trip when I can.
- I try to carefully plan the shortest route, and try to get as much done away from the house at one time.
- I try to make trips 'on the way'.
- Instead of coming home and driving to different places I tried to put all my errands in one trip so I don't have to come home and then go somewhere else.
- Planning trips better.
- Trying to combine multiple trips into one. Avoid driving in the heat and stay close to home when driving.



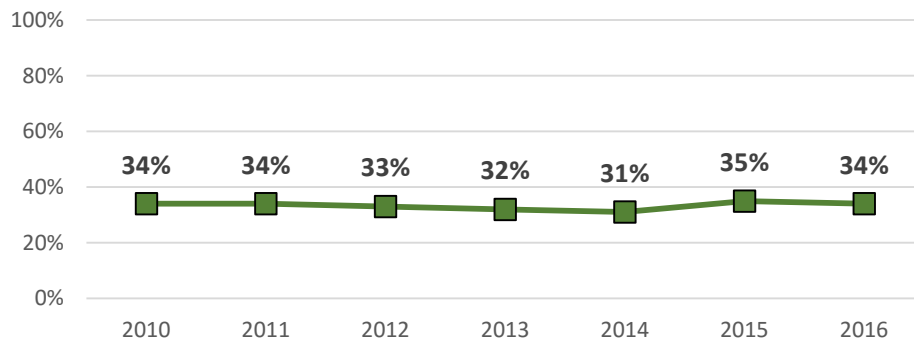


### Year-To-Year Comparisons

- 5 ➤ *This year's percentage of seasonal reducers in the Sacramento Core Region is not significantly different from the seven-year average of 33%. That the program continues to inspire seasonal reduction is testament to the efforts spent keeping Spare The Air effective.*

The year-to-year analysis shows 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 six-year average of 33%. The 2016 season finding 34% seasonal reducers is welcome consistency. The evaluation program reaches a similar percentage of residents in the Sacramento Nonattainment Area each year who are self-reported seasonal reducers. That the program continues to inspire seasonal reduction is testament to the efforts spent keeping Spare The Air effective.

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



- 6 ➤ *The seven-year average number of trips avoided on a summer day by seasonal reducers is 0.63. This varied from a high of 1.12 trips avoided in 2012 to a low of 0.3 trips in 2013.*

The next table shows the average number of self-reported trips made by seasonal reducers versus non-reducers from 2010 to the present. It can be seen that the average number of additional trips avoided by seasonal reducers (that is, the difference between reducers and non-reducers) ranged from 0.3 of a trip per day to just over 1 trip per day (1.12 trips). **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), but they nonetheless contribute to voluntary emissions reductions during the summer months.



<i>Year</i>	<i>Seasonal Driving Reducers: Mean # Times Entered Vehicle</i>	<i>Non-Reducers: Mean # Times Entered Vehicle</i>	<i>Difference (Mean Number of Daily Single Trips Avoided by Seasonal Reducers)</i>	<i>Statistically Significant Difference?</i>
<b>2010</b>	<b>2.94</b>	<b>3.84</b>	<b>0.9</b>	<b>Yes</b>
<b>2011</b>	<b>2.88</b>	<b>3.26</b>	<b>0.4</b>	<b>No</b>
<b>2012</b>	<b>2.55</b>	<b>3.67</b>	<b>1.12</b>	<b>Yes</b>
<b>2013</b>	<b>2.40</b>	<b>2.70</b>	<b>.3</b>	<b>Yes</b>
<b>2014</b>	<b>2.92</b>	<b>3.43</b>	<b>.51</b>	<b>No</b>
<b>2015</b>	<b>2.8</b>	<b>3.37</b>	<b>.57</b>	<b>Yes</b>
<b>2016</b>	<b>2.75</b>	<b>3.38</b>	<b>.63</b>	<b>Yes</b>

## SUMMER 2016 HEALTH ISSUES

### Objectives

The main objective of the current section is to document the relationship between air quality and the health effects experienced by households in the Sacramento Nonattainment Area during the summer of 2016. More specific objectives are to:

- a. compare levels of perceived health effects due to poor air quality between respondents interviewed following Spare The Air days and those interviewed on Control (non Spare The Air) days;
- b. estimate the number of households in the Sacramento Nonattainment Area whose health was affected by poor air quality specifically due to ozone air pollution on Spare The Air days in 2016;
- c. determine if levels of reported health problems during summer Spare The Air seasons have increased, decreased, or stayed the same from 2010 to the present in the Sacramento Core Region (excluding El Dorado County AQMD); and
- d. compare the incidence of reported health problems among the four air quality districts in the Sacramento Nonattainment Area (Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD).

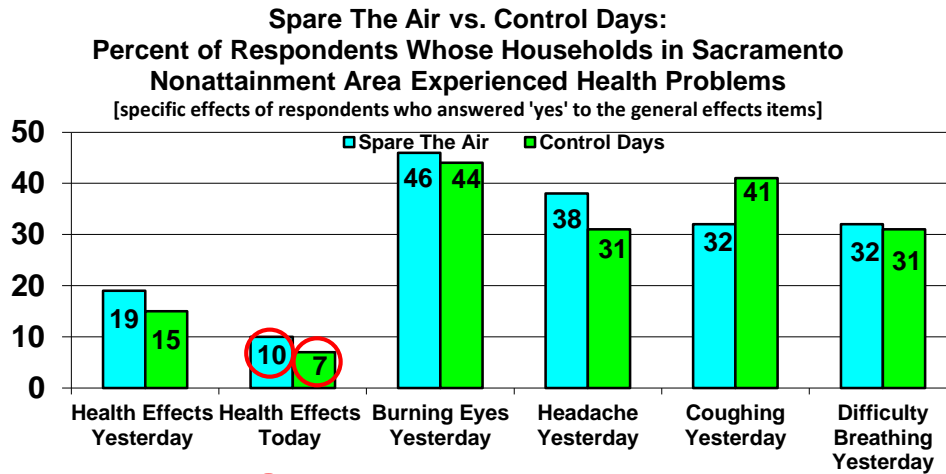
### RESULTS

#### **Perceived Health Problems: Spare The Air Days vs. Control Days**

- 1 ➤ ***Nineteen percent (19%) of households in the entire Sacramento Nonattainment Area reported breathing problems on Spare The Air days in 2016.***

For both Spare The Air and Control day respondents, respiratory health of individuals within the household was measured using two items at the end of the survey, each with a follow-up item to gather more specific information. First, respondents were asked if they or anyone else in their household experienced any health effects, such as burning eyes, headaches, coughing, or difficulty breathing the day before the interview due to unhealthy air, which was the actual Spare The Air day. If yes, a secondary question solicited open ended responses as to what, specifically, they experienced (burning eyes, headaches, coughing, difficulty breathing, or other). Next, respondents were asked a similar question that was specific to the day of the interview. If yes, open ended responses were solicited regarding what, specifically, they experienced.

Results from the weighted Sacramento Nonattainment Area as a whole are presented in the next chart. Percentages of specific health effects are reported only for respondents who experienced any effects at all. For health effects yesterday, Spare The Air day respondents (19%) experienced marginally more discomfort than Control day respondents (15%), though the difference is not statistically significant. On the day of the interview, however, Spare The Air day respondents (10%) experienced significantly more distress than Control day respondents (7%). Coughing, headaches, and burning eyes were experienced by both groups of households.



○ Indicates statistically significant differences

Traditionally, number of households experience health effects estimates were only calculated in these reports if there was a significant difference between Spare The Air and Control day respondent health effects *yesterday*. Since the 2016 season included many multi-day episodes, on the presumption that many of the episodic interviews would have still occurred on a Spare The Air day, this report estimates the total number of households affected for health effects *today* only.

An estimated<sup>53</sup> 86,547 households experienced health effects due to poor air quality on the days of Spare The Air Interviews. After subtracting for Control Days (60,583), **a total of 25,964 households in the Sacramento Nonattainment Area experienced health discomfort due to poor air quality on the days of their interview.**

<sup>53</sup> The measure used for households was the "total housing units" column, in order to be consistent with previous years' evaluations. This year the dataset includes a new column for "total households", not previously present. Reference: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State, 2010-2011, with 2010 Benchmark. Online source <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-5/>. The estimated number of households for the entire Sacramento Nonattainment Area is **865,467** ((Sacramento Metropolitan AQMD: 555,932) + (Placer County APCD: 152,648\* 87% = 132,803) + (Yolo-Solano AQMD: 116,784 (Yolo: 73,908; Solano (Dixon, Rio Vista & Vacaville: 42,876)) + (El Dorado County AQMD: 88,159\* 68% = 59,948)).

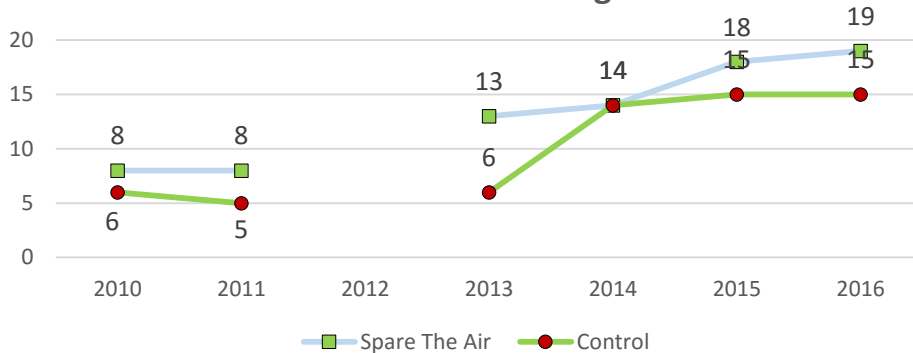


## Year-To-Year Comparisons

- 2 ➤ *The percentage of reported health effects in 2016 is the highest of the last seven years.*

The percentages of respondents who said someone in their household experienced health effects due to air quality the previous day on Spare The Air and Control days from 2010 to the present, excluding 2012 when health effects were not surveyed, are plotted in the next graph. Reported health effects have increased from the low 2010 and 2011 levels (8%) to the present 19%. In terms of Control day interviewing, the percentage of households who reported breathing difficulties remained relatively stable and consistently lower, until 2014 when it reached 14%. This season, frequency of health effects on Control days remains the same as the 2015 season, at 15%. While serious wildfire smoke in 2014 and 2015 at least partially explained the high frequency on Control days, it's possible that in 2016 the timing of Control day interviews also impacted results. In 2016, Control day interviews began in August instead of September as in the previous years. It's quite possible that many Control respondents may have also legitimately experienced health effects from poor summer air.

**Year-to-Year Comparison of Percent of Respondents Whose Households Experienced Breathing Difficulties Yesterday: Sacramento Core Region**

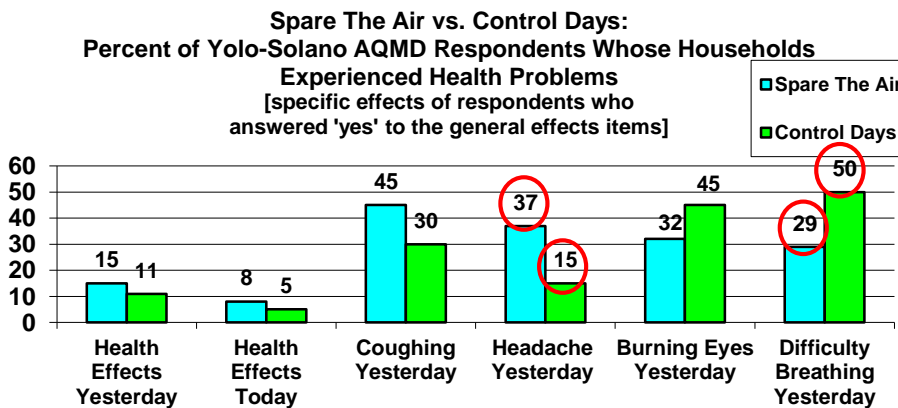
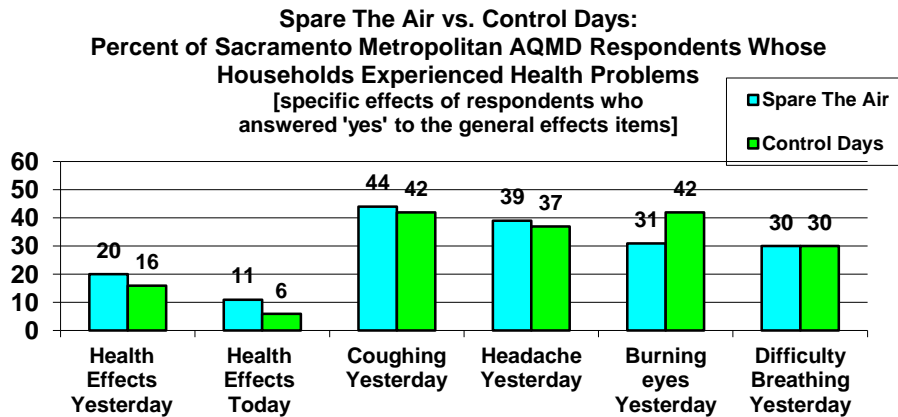




### Individual Air Quality Districts

- 3 ➤ *No significant differences exist between the individual air districts regarding frequency of experienced health effects.*

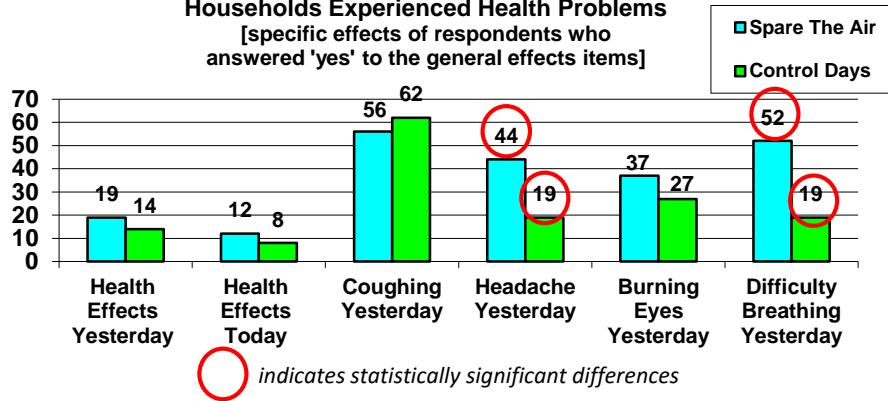
The next four graphs indicate the percentages of household health issues experienced by Spare The Air and Control day respondents in each of the individual air quality districts. No significant differences are found in reported health concerns between respondents. However, within the set of respondents who report experiencing health effects “yesterday” in Yolo-Solano AQMD, Placer County APCD, and El Dorado County AQMD, there is significant variation in which aspects of health were affected between Spare The Air and Control day respondents. Note that these percentages fluctuate greatly between seasons, as well as geographies, and are a function of sample size. Meaning if there are very few respondents who experienced health effects, like on Control Days, percentages of respondents experiencing specific effects will appear inflated.



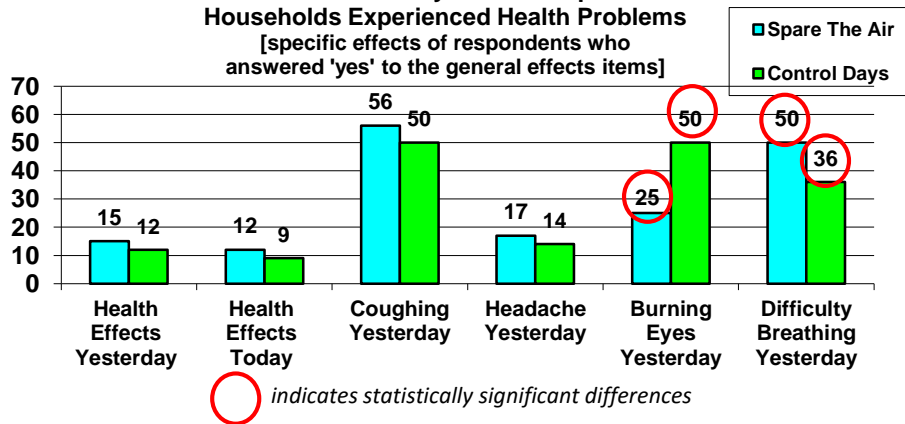
indicates statistically significant differences



**Spare The Air vs. Control Days:  
 Percent of Placer County APCD Respondents Whose  
 Households Experienced Health Problems**  
 [specific effects of respondents who  
 answered 'yes' to the general effects items]



**Spare The Air vs. Control Days:  
 Percent of El Dorado County AQMD Respondents Whose  
 Households Experienced Health Problems**  
 [specific effects of respondents who  
 answered 'yes' to the general effects items]



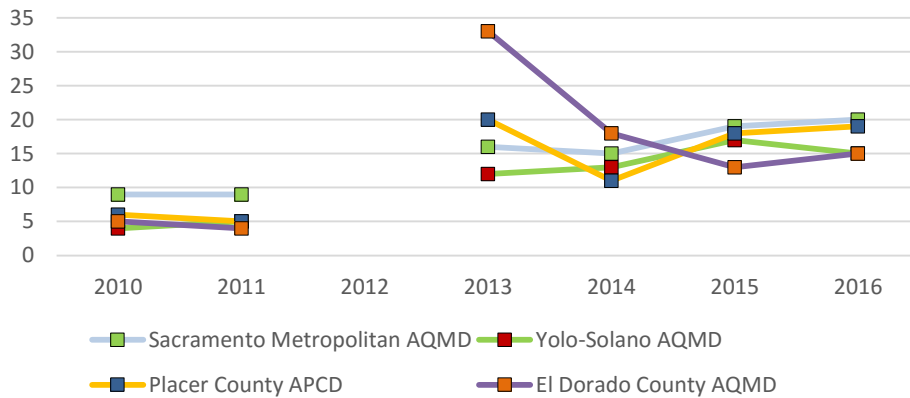


**Air Quality Districts: Year-To-Year Comparisons**

- 4 ➤ *Reports of health concerns in each of the individual air districts have remained consistent since 2014. Frequency of concerns from 2013 through 2016 suggests a greater sensitivity to air pollution than what respondents experienced in 2010 and 2011. Health effects were not surveyed in 2012.*

The percentages of households who reported health problems on Spare The Air days from 2010 to the present in the individual air districts are displayed in the next graph. Aside from El Dorado County AQMD in 2013, reports of health concerns are consistent from 2013 through 2015. Following an increase in frequency between 2011 to 2013, four years of similar results suggest an increased sensitivity to air pollution in the Nonattainment Area population as recent summer air pollution levels have been lower than earlier years, but reported health concerns are more frequent.

**Year-to-Year Comparison of Percent of Respondents Whose Households Experienced Breathing Problems on Spare The Air days**





## APPENDIX A

### 2016 SPARE THE AIR BEHAVIOR & ATTITUDE TELEPHONE TRACKING SURVEY DRAFT QUESTIONNAIRE ~ 04/11/2016

Field Dates:	Methods:
Sample Size:	<ul style="list-style-type: none"><li>• STA episodes days: May – September, 2016</li><li>Control days: June - September, 2016</li><li>• up to 2,400 completed interviews<ul style="list-style-type: none"><li>- up to 1,200 completes on STA episodes days<ul style="list-style-type: none"><li>- 400 Sacramento Co. residents</li><li>- 300 Yolo/Solano Co. residents</li><li>- 300 Placer Co. residents</li><li>- 200 El Dorado Co. residents</li></ul></li><li>- 1,200 completes on Control days<ul style="list-style-type: none"><li>- 300 Sacramento Co. residents</li><li>- 300 Yolo/Solano Co. residents</li><li>- 300 Placer Co. residents</li><li>- 300 El Dorado Co. residents</li></ul></li></ul></li></ul>
Unit of Analysis:	<ul style="list-style-type: none"><li>• Household</li></ul>
Sampling Frame:	<ul style="list-style-type: none"><li>• Listed landline (75%) and mobile (25%)</li></ul>
Budgeted Length of Interview:	<ul style="list-style-type: none"><li>• 4 minutes (Average)</li></ul>

#### • 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 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, motorcycle 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
  - 5) 25-64
  - 6) 65 or over
  - 8) Refused [terminate]
- Q3. Gender [BY OBSERVATION]
- 1) Male
  - 2) Female

Data for quotas taken from the American Community Survey.<sup>54</sup>

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

**400 COMPLETES SACRAMENTO COUNTY RESIDENTS**

**204 FEMALES (51%) / 196 MALES (49%), OF THESE WE NEED**

<b>FEMALE 18 - 24 NO LESS THAN 9%</b>	<b>18</b>	Completes
<b>MALE 18 - 24 NO LESS THAN 10%</b>	<b>20</b>	Completes
<b>FEMALE 65 PLUS NO MORE THAN 13%</b>	<b>27</b>	Completes
<b>MALE 65 PLUS NO MORE THAN 9%</b>	<b>18</b>	Completes

**300 COMPLETES YOLO/SOLANO COUNTY RESIDENTS**

**150 FEMALES (50%) / 150 MALES (50%), OF THESE WE NEED**

<b>FEMALE 18 - 24 NO LESS THAN 13%</b>	<b>20</b>	Completes
<b>MALE 18 - 24 NO LESS THAN 13%</b>	<b>20</b>	Completes
<b>FEMALE 65 PLUS NO MORE THAN 12%</b>	<b>17</b>	Completes
<b>MALE 65 PLUS NO MORE THAN 9%</b>	<b>12</b>	Completes

**300 COMPLETES PLACER COUNTY RESIDENTS**

**153 FEMALES (51%) / 147 MALES (49%), OF THESE WE NEED**

<b>FEMALE 18 - 24 NO LESS THAN 13%</b>	<b>20</b>	Completes
<b>MALE 18 - 24 NO LESS THAN 8%</b>	<b>12</b>	Completes
<b>FEMALE 65 PLUS NO MORE THAN 16%</b>	<b>24</b>	Completes
<b>MALE 65 PLUS NO MORE THAN 14%</b>	<b>21</b>	Completes

**200 COMPLETES EL DORADO COUNTY RESIDENTS**

**100 FEMALES (50%) / 100 MALES (50%), OF THESE WE NEED**

<sup>54</sup> <http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t>



<b>FEMALE 18 - 24 NO LESS THAN 7%</b>	<b>7</b>	Completes
<b>MALE 18 - 24 NO LESS THAN 8%</b>	<b>8</b>	Completes
<b>FEMALE 65 PLUS NO MORE THAN 15%</b>	<b>15</b>	Completes
<b>MALE 65 PLUS NO MORE THAN 14%</b>	<b>14</b>	Completes

**1200 COMPLETES ON CONTROL DAYS**

**300 COMPLETES SACRAMENTO COUNTY RESIDENTS**

**153 FEMALES (51%) / 147 MALES (49%), OF THESE WE NEED**

<b>FEMALE 18 - 24 NO LESS THAN 9%</b>	<b>14</b>	Completes
<b>MALE 18 - 24 NO LESS THAN 10%</b>	<b>15</b>	Completes
<b>FEMALE 65 PLUS NO MORE THAN 13%</b>	<b>20</b>	Completes
<b>MALE 65 PLUS NO MORE THAN 9%</b>	<b>13</b>	Completes

**300 COMPLETES YOLO/SOLANO COUNTY RESIDENTS**

**150 FEMALES (50%) / 150 MALES (50%), OF THESE WE NEED**

<b>FEMALE 18 - 24 NO LESS THAN 13%</b>	<b>20</b>	Completes
<b>MALE 18 - 24 NO LESS THAN 13%</b>	<b>20</b>	Completes
<b>FEMALE 65 PLUS NO MORE THAN 12%</b>	<b>17</b>	Completes
<b>MALE 65 PLUS NO MORE THAN 9%</b>	<b>12</b>	Completes

**300 COMPLETES PLACER COUNTY RESIDENTS**

**153 FEMALES (51%) / 147 MALES (49%), OF THESE WE NEED**

<b>FEMALE 18 - 24 NO LESS THAN 13%</b>	<b>20</b>	Completes
<b>MALE 18 - 24 NO LESS THAN 8%</b>	<b>12</b>	Completes
<b>FEMALE 65 PLUS NO MORE THAN 16%</b>	<b>24</b>	Completes
<b>MALE 65 PLUS NO MORE THAN 14%</b>	<b>21</b>	Completes

**300 COMPLETES EL DORADO COUNTY RESIDENTS**

**150 FEMALES (50%) / 150 MALES (50%), OF THESE WE NEED**

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

Q15. Language of interview [BY OBSERVATION]

- 1) English
- 2) Spanish

**• DRIVING BEHAVIOR •**

[ALL RESPONDENTS]

Q4a. Thinking just about yesterday, how many different TIMES did you get into a car, truck, motorcycle 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 been in a car as the passenger.]

[NOTE TO INTERVIEWER: VALIDATE RESPONSES OVER 50 TIMES]

\_\_\_\_\_ Specific number  
999) Don't know/Refused

[Q4A > 0]

Q4b. And approximately how many miles did you drive yesterday during those trips?  
[PROBE: "Give me a reasonable approximation --a round number."]

[NOTE TO INTERVIEWER: VALIDATE RESPONSES OVER 500 MILES]

\_\_\_\_\_ Specific number  
999) Don't know/Refused

[ALL RESPONDENTS]

Q5a. Yesterday, did you drive your car, truck, motorcycle or van the same, more, or less frequently than you normally do on a [day of the week yesterday]?

- 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.

[Q5A = 2: THOSE WHO DROVE LESS]

Q5b. And approximately how many miles less than normal did you drive?

[NOTE TO INTERVIEWER: VALIDATE RESPONSES OVER 100 MILES]

\_\_\_\_\_ Specific number  
999) Don't know/Refused

[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; Record response if not (1) or (2)]

- 1) Air quality; OR reduce pollution; OR concerned about smog; OR Spare The Air campaign
- 2) Multiple INCLUDING air quality related
- 3) RECORD RESPONSE
- 9) Don't know/Refused [PROMPT AGAIN; skip to Q9]



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

Q7b. About how many SINGLE TRIPS in your vehicle did you avoid driving yesterday to reduce air pollution? And by a SINGLE trip, I mean getting in your vehicle, 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 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

[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)

[ASK RESPONDENTS WHO USUALLY REDUCE Q9=1]

Q10. And on an average day during the summer, by approximately how many miles do you reduce your driving? [PROBE: "Give me a reasonable approximation --a round number." ]

[NOTE TO INTERVIEWER: VALIDATE RESPONSES OVER 100 MILES]

\_\_\_\_\_ Specific number  
999) 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
  - i. Outdoor Billboard
  - j. Online (or STA Website)
  - k. Sacramento Region Air Quality App
  - l. Other (Specify)

[READ TO ALL]

Almost finished, I just have a few of questions about your health.

[ALL RESPONDENTS]

Q13a. Thinking just about yesterday, did you or anyone else in your household experience any effects on your health, such as burning eyes, headaches, coughing, or difficulty breathing, due to unhealthy air?

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

[Ask if Q13a = 1]

Q13b What was it that you experienced? [OPEN ENDED-do not read options; use for coding only]





1. Burning eyes
2. Headaches
3. Coughing
4. Difficulty breathing
5. Other [ record response]

Q14a. And what about today, did you or did anyone else in your household experience any effects on your health, such as burning eyes, headaches, coughing or difficulty breathing, due to unhealthy air?

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

[Ask if Q14a = 1]

Q14b. What was it that you experienced? [OPEN ENDED-do not read options; use for coding only]

1. Burning eyes
2. Headaches
3. Coughing
4. Difficulty breathing
5. Other [ record response]

Q15. Finally, and for statistical purposes only, please stop me when I reach the category that best describes your household income before taxes in 2015.

1. Less than \$15,000
2. \$15,000 to less than \$25,000
3. \$25,000 to less than \$50,000
4. \$50,000 to less than \$100,000
5. \$100,000 or more
6. Don't Know/Refused

*THIS HAS BEEN A CONFIDENTIAL INTERVIEW CONDUCTED BY \_\_\_\_\_ AT META RESEARCH ON BEHALF OF THE SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT. 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.*