

**Community Assessment for Public Health Emergency  
Response (CASPER) addressing the California drought—  
Mariposa County, California, November, 2015.**

California Department of Public Health (CDPH)

Mariposa County Health Department (MCHD)

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## BACKGROUND

California is in its fifth year of the most severe drought in its recorded history. At the end of November 2015, California's reservoirs were at 52 percent of average across all hydrologic regions.<sup>1</sup> Low precipitation levels have adversely affected surface water with decreased stream flows and increases in groundwater depth. As of November 2015, approximately 2,455 "dry" wells have been identified statewide, affecting an estimated 12,275 residents.<sup>2</sup> Mariposa County has reported 140 dry wells, impacting >700 residents as of September 2015<sup>3</sup>; as of February 2016, Mariposa County has reported >200 dry wells.<sup>a</sup>

Mariposa County, located at the western foothills of the Sierra Nevada Mountains, and encompassing much of Yosemite National Park, is known for its varied terrain, consisting of rolling foothills, savannahs, oak woodlands, and mixed conifer forests.<sup>4</sup> The drought has had a severe impact on the forests throughout Mariposa County, resulting in thousands of acres of dying or dead trees.<sup>5</sup> Drought-stressed trees are more susceptible to bark beetle infestation, which are ravaging pine trees throughout the County and the state. An estimated 29 million trees have died in California due to drought and bark beetle infestation.<sup>6</sup> Analyses conducted in Mariposa County in November 2015 and February 2016 indicated that 30 percent and 50 percent, respectively, of pine, fir, and oak have died; pine and fir mortality has reached 100 percent in the communities of Lushmeadows, Greeley Hill, and Ponderosa Basin.<sup>a</sup> Drought-stricken forests and dead trees are at increased risk for wildfires. The prevalence of dying trees and resulting hazards prompted Mariposa County to issue a resolution, forming a Tree Mortality Disaster Mitigation Committee for responding to the issue county-wide.<sup>5</sup>

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<sup>a</sup> Personal communications, Dana Tafoya, Mariposa County Health Department, February 19 and 23, 2016.

Governor Edmund G. Brown Jr. proclaimed a State of Emergency in California due to the drought in January 2014 as a result of record low precipitation persisting since 2012.<sup>7</sup> During that same month, the Secretary of the United States Department of Agriculture designated 27 California counties, including Mariposa County, as natural disaster areas due to the drought.<sup>8</sup> As of November 2015, the state has received 63 Emergency Proclamations from city, county, tribal governments and special districts.<sup>2</sup> In April 2015, Governor Brown issued an Executive Order mandating a 25 percent water use reduction for cities and towns across California.<sup>9</sup> The Governor issued another Executive Order in November 2015, intensifying the State's drought response by calling for additional actions and extending emergency conservation regulations through October 2016.<sup>10</sup> Building on the state's response to the drought, the Governor issued a state of emergency proclamation addressing the tree mortality epidemic on October 30, 2015.<sup>11</sup>

The weather outlook for the upcoming year is positive, with an El Niño weather pattern predicted to bring above average rainfall to most of California, particularly the southern portion of the state. However, climate experts agree that even if the October 1, 2015–September 30, 2016 “water year” is the wettest on record, rainfall amounts would need to exceed 198 percent to 300 percent of normal (depending on the region) to get the current 5-year precipitation deficit out of the lowest 20 percent for all 5-year periods on record.<sup>12</sup> Thus, California will continue facing impacts of the drought into 2016, and for an unknown time period beyond.

Drought can have far-reaching impacts on the economy, the environment, and affected communities, leading to both direct and indirect public health consequences. The United States Centers for Disease Control and Prevention (CDC), in their report, “When every drop counts: protecting public health during drought conditions—a guide for public health professionals,” list a number of issues associated with droughts, including compromised quality and quantity of potable water, diminished living conditions, adverse mental and behavioral health outcomes, and increased disease incidence, including infectious diseases.<sup>13</sup> Water shortages may lead to closures of businesses and job losses, resulting in more poverty, a known social determinant of health.<sup>13,14</sup> A systematic review of drought-related studies has shown that the extent of health

effects associated with this natural disaster depends not only on the drought severity and duration, but also on the underlying population vulnerability and resources available to mitigate the effects as they occur.<sup>15</sup>

Existing disease surveillance might support some predictions of drought-associated disease incidence. The CDC predicts an increased incidence of certain communicable diseases during drought resulting from environmental or ecological changes, lapses in hygiene maintenance, increased contamination of drinking water, and increased contamination of food due to greater use of recycled water.<sup>13</sup> However, systematic studies of drought-related public health impacts in California are limited, and none have clearly demonstrated increased infectious disease incidence attributable to the drought.

Given the slow and ongoing nature of a drought emergency, monitoring and anticipating the indirect public health implications is challenging because of the difficulties in assigning a starting point for accumulated effects over time. Multiple data sources and analytic methods might be necessary to gain a more complete understanding of the public health implications of the drought in California. Because relatively little is known about the population health effects of and coping mechanisms employed for this ongoing drought, a rapid needs assessment similar to those used in other natural disaster settings was employed to quantify these effects in the near-term and to provide basic information that could be used for immediately actionable decisions by public health officials.

The California Department of Public Health (CDPH) reached out to County Health Officers wishing to partner with severely impacted counties in conducting a rapid needs assessment of drought-related health impacts using the Community Assessment of Public Health Emergency Response (CASPER) methodology (see Appendix 1).<sup>16</sup> CASPER is a tool developed by the CDC to assess public health needs in both disaster and non-disaster settings. It uses an epidemiologic technique (2-stage household-based sampling) designed to provide representative household-based information about a community's status and needs in a timely manner. In the context of

a drought, CASPER could be used to gather actionable information about household water use, water needs, and conservation behaviors; hygiene (personal and food); impact on work, wages, and food affordability; mental, emotional, and behavioral health effects (from here on referred to as behavioral health); exacerbations of chronic diseases; drought-related community beliefs; and other topics of special interest to affected jurisdictions.

To address multiple knowledge gaps about the drought's impact on its residents, Mariposa County Health Department (MCHD) partnered with the Emergency Preparedness (EP) Team of the Division of Environmental and Occupational Disease Control at CDPH to conduct a county-wide CASPER in November 12–14, 2015. The EP Team also partnered with Tulare County Health and Human Services Agency (TCHHSA) to conduct two CASPERs in northern and southern portions of Tulare County in October 20–22, 2015; Tulare County data will be presented in a separate report. MCHD and TCHHSA both contributed to the design of the questionnaires used in these CASPERs. This report describes the methods, results, conclusions, and CDPH and MCHD's recommendations derived from the analysis of the data collected by this CASPER.

## **METHODS**

### *CASPER sample selection and data collection*

CASPER uses a two-stage cluster sampling methodology modified from the World Health Organization's Expanded Program on Immunization Rapid Health Assessment to select a representative sample of 210 households (seven households from 30 clusters) to be interviewed in a predetermined geographic area of interest, i.e., sampling frame (detailed methodology described in the CASPER Toolkit Version 2.0).<sup>17</sup> The sampling frame can be an entire city or county, or any subset thereof, and captures the entire population from which a CASPER sample is drawn and to which the results would be generalized. The 30 clusters, typically census blocks, are selected from the sampling frame with probability proportional to the number of housing units in the cluster (i.e., the higher the number of housing units in a cluster, the higher the probability that this cluster would be selected for a CASPER). A cluster

may be chosen more than once. Interview teams then select seven households in the field, in accordance with the systematic random sampling instructions they receive at a just-in-time training. During data analysis, weights are applied to the sample to produce a result generalized to the entire sampling frame.

### *Mariposa sampling frame*

Mariposa County has 1919 census blocks, 10,188 housing units, and 18,251 residents, and an estimated 7,238 households according to the 2010 Census.<sup>18,b</sup> Outside of the Town of Mariposa, the County is largely rural and sparsely populated. MCHD was interested in understanding county-wide impacts of the drought. Therefore, Mariposa sampling frame included the entire County (Figure 1).

CDPH used the 2010 TIGER/Line with Selected Demographic and Economic Data shapefile and the 2010 Census Redistricting Data Summary File for geography and for estimating population and housing units in the sampling frames and each cluster.<sup>19,20</sup>

### *Cluster sample selection*

For each block, U.S. Census reports the total number of housing units and the number of occupied and vacant housing units. Clusters could be selected based on the total number of housing units or on the number of occupied ones. We modified the CASPER cluster sample selection process to account for low population density by aggregating adjacent census blocks and by sampling on occupied housing units. In the sampling frame, 1595 out of 1919 (83 percent) census blocks had fewer than seven total housing units; in some blocks, more than a third of housing units was vacant. In order to achieve a minimum of seven housing units per

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<sup>b</sup> According to the U.S. Census QuickFacts 2014, Mariposa County number of residents declined to 17,682 between 2010 and 2014. For CASPER purposes, we use the numbers from the decennial Census.

cluster, we combined geographically proximate census blocks with neighboring census blocks to form aggregated blocks with at least seven occupied housing units using the SAS version of the Geographic Aggregation Tool, developed by the New York State Health Department.<sup>21</sup> After aggregation, the Mariposa sampling frame had 320 new “blocks,” from which to select the 30 clusters. We performed cluster selection (first stage of sampling) in ArcGIS 10.3, using a custom toolbox provided by the CDC.<sup>22</sup>

Considering that some areas in Mariposa County foothills could be challenging to reach (e.g. unpaved roads or residences offset far from the main road), we selected an additional five clusters to supplement the original cluster selection. After consulting with the County staff on site, we determined that two of the originally sampled clusters were not reasonably accessible, and we therefore opted not to attempt fieldwork in those two clusters. We randomly drew two clusters from the pool of five additional clusters to replace the inaccessible ones, resulting in a total of 32 selected clusters with a target of 224 interviews.

#### *Field sample selection*

In the second stage of sampling, field interview teams used systematic random sampling to select seven households from each of the selected clusters to conduct household interviews. The interviewers were provided with street level maps of each selected cluster and a randomly chosen starting point. They were instructed to go to every  $n^{\text{th}}$  housing unit to systematically select the seven housing units to interview ( $n = \text{total number of housing units in the cluster divided by seven}$ ; e.g. for a cluster with 28 housing units, teams would survey every fourth housing unit). Teams were instructed to make three attempts at each selected household before replacement (i.e., moving on to another unit). In several clusters where systematic random sampling opportunities were exhausted in the final hours of the survey, interview teams were permitted to abandon every  $n^{\text{th}}$  housing unit selection and approach every housing unit that had not yet been sampled until they either obtained the seven interviews or ran out of housing units to approach.

### *Questionnaire design*

The EP Team, in collaboration with TCHHSA and MCHD, developed a five-page questionnaire (Appendix 2), which included questions on the following: 1) household demographics; 2) knowledge, attitudes, and practices regarding the drought; 3) access to and use of water; 4) water conservation practices; 5) impacts of the drought on the household, including behavioral health issues, exacerbations of chronic diseases, and employment issues; and 6) household disaster communication preferences. Topics were selected based on County priority areas of interest. Questions were adapted from the California Health Interview Survey (CHIS), National Health and Nutrition Examination Survey (NHANES), Behavioral Risk Factor Surveillance System (BRFSS), and prior CASPERs in Alabama and California.<sup>23,24</sup> Potential questions were edited to lower literacy levels and re-worded from an individual to a household-based perspective.

To reflect the unique needs and interests of the County, MCHD was given the option of developing one additional page of questions to be used in CASPERs in their County. MCHD included the following additional topics: use of grey water and rain water catchment systems, perceptions of the impact of the forecasted El Niño, special medical equipment needs, and health insurance coverage. The questionnaire and County supplements were translated into Spanish.

### *Training and field interviews*

On November 12, 2015, the EP Team provided field interview teams with a five-hour, just-in-time training session on the overall purpose of the CASPER, household selection, questionnaire, interview techniques, safety, and logistics. There were 10 two-person teams on November 12, 11 teams on November 13, and 9 teams on November 14. The teams primarily consisted of Mariposa County staff and volunteers recruited from other local organizations. Teams conducted interviews between 2 pm and 6 pm PST on November 12, and 9 am and 6 pm PST on November 13–14. A smaller number of field teams also conducted interviews throughout the week of November 16–20. Each team was assigned clusters and attempted to complete seven interviews per cluster, with a goal of 210 interviews. One cluster was randomly selected twice,

and one cluster was randomly selected three times; therefore, 14 and 21 interviews were attempted in those clusters, respectively. The teams gave all potential interviewees a packet with relevant information, including a consent form and an introductory letter by the Health Officer. The teams also provided a variety of health education materials and resources from the MCHD to households at the end of completed interviews. Eligible respondents were at least 18 years of age or older and resided in the selected housing unit. If the respondent preferred to conduct the interview in Spanish, we provided a Spanish-speaking interviewer and all written materials were provided in Spanish. Additionally, the interviewers were instructed to complete confidential referral forms whenever they encountered urgent physical or mental health needs. Interviewers were instructed to refer all media inquiries to MCHD.

#### *Data analysis*

We conducted a weighted cluster analysis. The weights are based on the total number of housing units in the sampling frame, the number of clusters selected, and the number of housing units interviewed within each cluster. Since we drew an additional two clusters to replace the inaccessible ones in the original sample of 30, our final data analysis is based on 32 clusters following CDC guidance; the inaccessible clusters had zero data and an additional weight multiplier value was assigned to the two replacement clusters. Some questions were open-ended and allowed respondents to provide narrative answers; responses to these questions were reviewed by CDPH staff and classified into themes which were not mutually-exclusive (i.e., a respondent's answer could be classified into multiple themes.)

Analysis was performed in SAS 9.4 (SAS Institute, Cary, North Carolina) to calculate unweighted and weighted frequencies (projected number of households in the sampling frame), unweighted and weighted percentages, and the 95 percent confidence intervals of the weighted percentages. Unless otherwise stated, throughout the text, the percentages in the text represent the weighted percentages. We calculated projected number of households and weighted percentages only on responses given by  $\geq 10$  households, as shown in the Tables.

## **RESULTS**

Interview teams conducted 179 of a possible 224 interviews (79.9 percent completion rate; Table 1). Interviews were completed in 46.7 percent of approached housing units, and 74.6 percent of homes where the door was answered. Two (1.1 percent) interviews were conducted in Spanish.

### ***Household demographics and home characteristics of the surveyed households***

Household size and age categories of residents could not be determined for one household because of errors by interviewers (e.g. the number of household residents as categorized by age did not total the overall number of household residents). Among the other 178 households, household size ranged from 1–8, with a weighted mean of 2.56 and a median of two. Household age distribution was as follows: 25.8 percent had at least one member  $\leq 17$  years old and 46.2 percent had at least one member  $\geq 65$  years old (Table 2). In most households (96.7 percent), English was the main language spoken in the home. Most households (79.8 percent) reported that they owned their home.

### ***Attitudes about the drought***

No single primary source of information about the drought was identified (Table 3). The two most commonly identified primary sources of information about the drought were television (34.8 percent) and internet (29.9 percent). The proportions of households reported the following statements about water usage as true: there is an increased demand for water (76.3 percent); some people aren't cutting water usage enough (72.9 percent); there is overuse of water by cities (69.2 percent); and there is poor water management by the government (69.3 percent). Households were less likely to report that there is overuse of water by farming or agriculture (26.2 percent) and that too much water is used to protect wildlife (27.7 percent). The vast majority of households reported that droughts are caused by a lack of rain or snow (91.4 percent) and by climate change (67.5 percent). Approximately one quarter (27.5 percent) of households agreed that droughts are caused by a "higher power."

### ***Access to, use, and quality of tap water***

Most households reported that their source of household water before the drought was a private well (74.3 percent) (Table 4). Of those reporting a private well as a source of household water before the drought, 76.4 percent responded that their well water had previously been tested; these households most frequently reported that their well had been tested for unspecified or “standard” testing (37.2 percent), bacteria or biological contaminants (22.7 percent), and for potability or non-specific contaminants (24.5 percent), and for well depth or flow rate (21.2 percent).

Most households (95.6 percent) reported that they currently have running tap water (Table 4). Among households that currently have running tap water, the following were most frequently reported as sources of help during a severe water shortage (answers are not mutually exclusive): county, state, or federal government (60.4 percent); neighbors (38.7 percent); other family members (39.4 percent); non-profit organizations, e.g., American Red Cross (36.6 percent); a utility or water company (35.8 percent); and fire, police, or other emergency agencies (33.4 percent) (Table 5).

Only six CASPER respondents reported that they do not have access to running water in their homes (Table 4). Among these households, three identified cost as the main barrier to getting running tap water in the home (Table 6).

Most households (87.9 percent) answered yes to whether they use tap water for drinking and cooking; nine CASPER respondents further commented that they use tap water for cooking, but not for drinking (Table 7).<sup>c</sup> Some households (18.8 percent) reported that they were aware of problems with their tap water and that their tap water quality had changed since the drought

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<sup>c</sup> Households were asked “Do you use tap water for drinking and cooking?” A portion of households (6.5 percent of 87.9 percent) specifically commented that they use tap water only for cooking.

began in terms of color (7.1 percent), clarity (7.7 percent), odor (9.8 percent), and taste (9.4 percent) (categories are not mutually exclusive); 78.5 percent reported no changes. Some households (16.5 percent) reported that their well water production had fallen in the past year, and most (78.1 percent) reported that they did not have a well or that their well water production had not fallen in the past year (it is not possible in this report to determine which fraction of households that currently have a well have also reported a decrease in well water production).

### ***Water use reduction practices***

Nearly all households (92.0 percent) responded that they have reduced their water usage in response to the drought (Table 8). A majority of households reported saving water on property maintenance, including repairing leaks (59.5 percent) and reducing water used for lawn or landscaping (79.8 percent). A majority also reported reducing water usage in hygienic practices, including: reducing frequency of laundry (60.4 percent); flushing toilet less (65.2 percent); reducing shower time (76.3 percent); reducing shower frequency (43.8 percent); reducing handwashing frequency or duration (52.2 percent); and reducing food washing frequency or duration (36.5 percent). Most households (68.6 percent) reported that they could further reduce their water usage if the drought continued.

### ***Potential health impacts of the drought***

Most households reported that the drought had negatively impacted them as follows (categories are not mutually exclusive): affected their property (53.9 percent); finances (24.9 percent); health (12.6 percent); peace of mind (61.0 percent); or affected them in another way (12.2 percent) (Table 9). While not specifically asked during the interviews, 16.0 percent of households further reported that tree death associated with the drought has adversely affected their household (volunteered information). Only 22.5 percent reported that the drought has not negatively impacted their household (Table 9).

Of the 36.3 percent of households that reported a member of the household is medically fragile or has a chronic medical condition, 16.0 percent reported that the condition has gotten worse since the drought began and 14.2 percent reported that their household had sought additional medical attention for this condition. Of the 18.9 percent of households that reported a member of the household has been told by a provider that they have depression or another emotional or mental health problem, 26.9 percent reported that the condition has gotten worse since the drought began, and 11.0 percent of had sought additional medical attention for this condition. Some households (8.1 percent) responded “yes” to at least one question indicating acute stress. Of the households reporting an acute stressor, most (52.5 percent) reported not seeking help.

When asked questions gauging economic stress, 4.8 percent of households (nine CASPER respondents) reported reduced income and 4.7 percent (eight CASPER respondents) reported adults in the households cutting the size of or skipping meals because of lack of money to buy food. Some households (17.3 percent) reported considering moving because of the drought.

A minority of households (8.3 percent) reported seeking assistance related to the drought and of those, 83.5 percent reported getting the assistance (Table 10).

Households most commonly reported that their current greatest need was money, employment, or help with bills (14.3 percent) (Table 11); only 1 percent of households (two CASPER respondents) reported that food was their household’s greatest need. More than a quarter (26.8 percent) could not identify a need, and some households 21.8 percent identified a need that could not be easily categorized.

### ***Household disaster threats and emergency communications***

Households were asked to choose three from a list of nine of the greatest disaster or emergency threats to their household. Households most commonly identified wildfires (88.1

percent), drought (63.5 percent), and winter storms (37.2 percent) as the greatest disaster or threat to their household (Table 11).

No single preferred method of communication during an emergency or disaster was identified by a majority of households; households most commonly identified landline telephone (19.3 percent), television (18.0 percent), and internet (18.2 percent) as their preferred method of receiving information during an emergency or disaster. Some households (16.5 percent) identified impaired hearing as a potential barrier to communication during an emergency or a disaster.

### ***Questions developed by Mariposa County***

Most households (79.2 percent) reported that they had conserved water before the drought began (Table 12); these households most commonly reported using less water for plants or lawn, or replacing landscaping (30.1 percent), generally conserving water but not providing specific details (22.5 percent), using washing machines or dishwashers less frequently or only using these appliances when they are full (13.7 percent), or shorter or less frequent showers or baths (13.8 percent).

Some households (19.6 percent) reported that they have a grey water system; of these households, most (62.2 percent) reported that the grey water system was installed before the drought. Of the 72.6 percent of households that reported not having a grey water system, the most commonly reported barriers to installing a grey water system were that it is too expensive (30.7 percent), they do not know enough about grey water systems (24.8 percent), that there are too many regulations regarding grey water systems (14.0 percent), that they are planning to but have not yet installed a grey water system (16.1 percent), that grey water systems are illegal (11.8 percent), and that grey water systems are too complicated (14.3 percent).

Some households (18.1 percent) also reported that they have a rain water catchment system. Of these households, most (55.4 percent) reported that the rain water catchment system was installed before the drought. Of the 80.5 percent of households that reported not having a rain water catchment system, the most commonly reported barriers to installing a rain water catchment system were that it is too expensive (29.4 percent), they do not know enough about rain water catchment systems (25.9 percent), that they are planning to but have not yet installed a rain water catchment system (17.7 percent), and that rain water catchment systems are illegal (10.5 percent).

Most households (70.4 percent) reported that they believe the forecasted El Nino will improve the drought situation.

One fifth of households (20.7 percent) reported that a member requires special medical equipment or supplies, most commonly breathing equipment (55.5 percent). Few households (4.4 percent) reported that it has been more difficult to obtain these equipment or supplies since the drought began.

Nearly all (99.0 percent) households reported having health insurance. Of these households, the most common reported forms of health insurance were Medicaid (48.0 percent) and employer-provided insurance (47.7 percent).

## **DISCUSSION AND CONCLUSIONS**

The California drought has evolved over several years and its health effects have not been well-characterized. While CASPERs were originally conceived to assess communities following an acute disaster, this methodology provides a statistically valid approach to evaluate community status in any situation, including a slow motion disaster like drought. This report presents data

from the 179 CASPER surveys conducted in Mariposa County November 12–20, 2015, with most interviews being conducted November 12–14.

This CASPER was conducted during the fourth year of the California drought, and is therefore timely and relevant. The demographic data collected in this CASPER compares to that reported by U.S. Census QuickFacts<sup>18</sup> as follows: 1) QuickFacts reports that Mariposa County has owner-occupied housing unit rate of 72.8 percent; 79.8 percent of households sampled in the Mariposa CASPER reported owning their homes; 2) QuickFacts reports the household size in Mariposa as 2.33 persons per household; the average household size reported in Mariposa CASPER was 2.56; and 3) QuickFacts reports that 24.5 percent of households have a resident age 65+ years; 46.2 percent of households sampled in the Mariposa CASPER reported having a resident age 65+ years. These comparisons suggest that the households interviewed might vary somewhat from the population in Mariposa in that they were more likely to have an older, possibly retired resident, likely to be at home during daylight hours when the CASPER was conducted (according to U.S. Census QuickFacts, 48.5 percent of Mariposa adults over 16 years of age are employed and according to California Health Interview Survey, approximately 60 percent of Mariposa’s and neighboring counties’ residents are retired<sup>d</sup>).

Respondents overwhelmingly reported perceptions of poor water management by the government and overuse of water by cities, and that droughts are caused at least in part by climate change. The vast majority reported that they had engaged in at least some water-conserving behaviors. Furthermore, most households reported that they also believed they could further reduce their water usage. Taken together, these data suggest that households

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<sup>d</sup> <http://ask.chis.ucla.edu>. Mariposa County is grouped with Tuolumne, Calaveras, Amador, Inyo, Mono, and Alpine Counties in CHIS sample; according to AskCHIS, 60.3 percent (95 percent CI 51.6-69.0) of residents in this county group are retired.

could still be motivated by outreach and messaging to further and/or more appropriately reduce their water usage. However, the reported widespread practice of reducing the frequency or duration of hand and food washing in response to the drought is worrisome, as hand washing and food washing are well-established means of reducing the risk of a wide variety of communicable diseases (e.g., enteric diseases and influenza) and removing pesticide residues. Over a third of households reported that they had replaced appliances such as washing machines and toilets, installed faucet aerators, or that they had created a method for capturing and reusing water, which are important water-conservation steps.

It is not possible to fully characterize the health effects associated with the drought within this sampling frame using household-based interviews. Nevertheless, the data presented in Table 9 provides insight into the various ways that the ongoing drought has impacted the surveyed population and the estimated number of households in the sampling frame, and may be useful in informing outreach and mitigation plans. A substantial proportion of households reported that the drought has negatively affected their property and finances, with some households experiencing decreased income and fewer work hours and the associated stress of strained finances. The majority of households reported that the drought has negatively affected their piece of mind. 8.1 percent of households in Mariposa reported at least one household member who had symptoms of acute stress within the past 30 days they felt was related to the drought. Of households with member(s) experiencing acute stress, most reported that the affected household member(s) did not seek any help in dealing with this stress. Furthermore, of those households reporting that a member has been diagnosed with depression or another emotional or mental health problem, eight CASPER respondents or an estimated 403 households in the sampling frame report that the condition had gotten worse since the drought began, and that most have not sought additional medical attention.

This CASPER also provides some evidence that the drought has negatively impacted the preexisting health conditions of residents of Mariposa County. Approximately one third of households report that a member of the household is medically fragile or has a chronic medical

condition; of those, 16.0 percent report that the condition has gotten worse since the drought began and most households have not sought additional medical care. Further, 12.6 percent of households report that the drought has negatively affected their household's health. Admittedly, it may be difficult to specifically associate a worsening of a chronic disease or mental health condition with the drought given that the condition may have naturally deteriorated over time, or that the worsening chronic condition could also be associated with aspects of the environment that might or might not be related to the drought (e.g., economic or other stressors that households may experience in their daily lives). Nevertheless, these findings suggest that households perceive a connection between worsening health and the drought. A substantial proportion of households (16.5 percent) report that they have considered moving because of the drought.

Of the few households that reported lacking reliable running water, the most common identified barrier to getting running tap water was cost. Most households without running water use bottled water, and households without running tap water have most commonly either sought assistance from county/state/federal government or from no one.

A minority of households (19.6 percent) in Mariposa reported that a grey water system was installed in their home, with 62.2 percent of those systems being installed before the drought began. Cost and not knowing enough about grey water systems were the two most common reasons for not having them (30.7 percent and 24.8 percent of households, respectively). Interestingly, 11.8 percent of households report that they believe grey water systems are illegal, whereas there is a County ordinance in Mariposa permitting installation and usage of grey water systems.<sup>25</sup> Only 18.1 percent of households report having a rain water catchment system, with cost and not knowing enough about them being most common reasons for not having the systems. Similar to grey water systems, 10.5 percent of households report believing (albeit incorrectly) rain catchment being illegal.

We found that households have no single preferred method of receiving information during an emergency, with households most commonly relying on landline telephone, television, internet, and reverse 911. This is an important finding for two reasons: 1) delivery of general outreach messages and 2) overall emergency planning as, depending on the emergency, television and internet might not be reliable communication media (e.g. during any event causing a widespread and/or prolonged power outage). A substantial proportion of households (16.5 percent) reported that impaired hearing by household members may be a barrier to effective communication during an emergency.

Among households that currently have running water, in the event of a severe water shortage, the majority of households in Mariposa would seek assistance from the government, from emergency agencies, and from non-profit organizations such as the American Red Cross. Most surveyed households believe that there is poor water management by the government. Despite this, a substantial percentage of households reported they would seek government assistance in the case of a severe water shortage, indicating that they, regardless of beliefs and perceptions of the government, would still rely on it for assistance.

Based on a preliminary analysis of the data collected during this CASPER, we recommend the following to MCHD:

1. Continue outreach efforts to inform residents of Mariposa County's Dry Well Program, because these CASPERs identified that some sampled households do not currently have reliable tap water despite current assistance programs.
2. Consider an outreach and messaging program about the grey water and rain water capture systems, explaining these systems and providing County-relevant information about permitting and other resources.

3. Ensure that households use adequate water for critical hygienic practices, especially adequate hand washing. Establish outreach and messaging about the importance of hand washing and food washing even in the context of the drought.
4. Consider expanding mental health services to serve those under acute stress from the drought or drought-related consequence, such as dying trees. Consider outreach strategies to inform residents of Mariposa County's Behavioral Health and Recovery Service.
5. The County might be eligible for financial assistance through the California Disaster Assistance Act (CDAA), for costs associated with identification, removal and disposal of dying trees, under certain conditions. Households might be eligible for dead tree removal assistance from the Mariposa Fire Safe Council, Mariposa County Resources Conservation District, or National Resources Conservation. A considerable number of households report needing help with removal and disposal of dead or dying trees.
6. Consider multiple media sources for the County's planned communications during acute disasters and events that may cause widespread and/or prolonged power outages, since households reported no single preferred method for receiving information during an emergency or disaster.

## **LIMITATIONS**

The data generated by these CASPERs represent a snapshot in time, which should be considered when attributing chronic health effects to a multi-year natural disaster. MCHD might consider a follow-up assessment at a later date to assess the effectiveness of strategies recommended above, if they are implemented. MCHD might also use these findings to generate hypotheses for further investigations of the impact of the drought on the health of

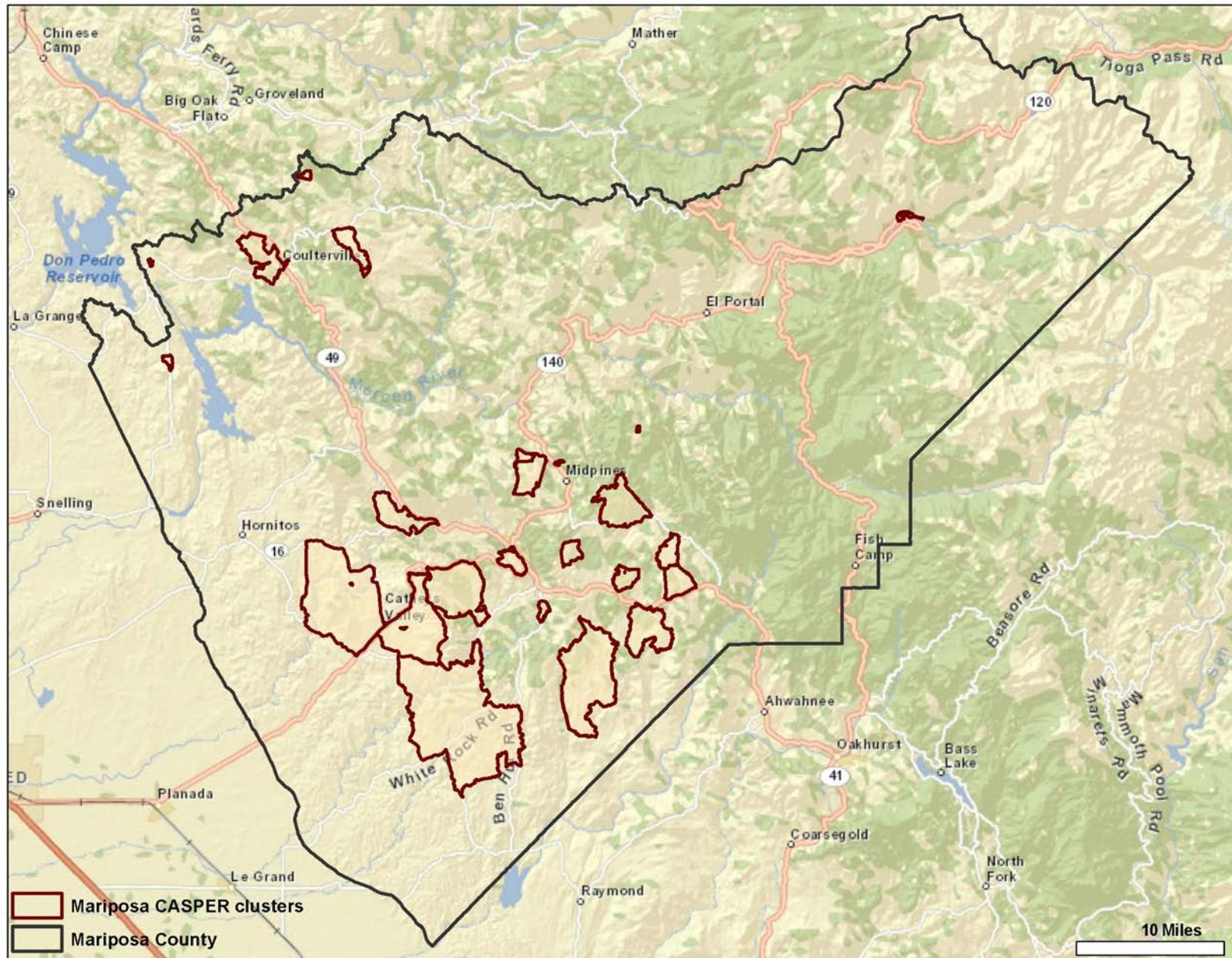
residents of Mariposa County. Two clusters from the original sample were not visited due to their remoteness; therefore, the data presented in this CASPER might not be representative of households living in the most remote areas of Mariposa County.

The CASPER described here was a successful collaboration between CDPH and MCHD, and helped characterize drought-associated health effects, assistance seeking behaviors and barriers to assistance, and household water use and reduction practices. We hope that the results presented here will be useful in allocating resources for response to the drought and strengthening the emergency preparedness capacity of Mariposa County.

## FIGURES AND TABLES

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Figure 1. Mariposa County CASPER sampling frame.



**Table 1. Questionnaire response rates for CASPER conducted in Mariposa County, California.**

<b>Questionnaire response</b>	<b>Percent</b>	<b>Rate</b>
<b>Completion</b> *	79.9	179/224
<b>Cooperation</b> †	74.6	179/240
<b>Contact</b> ‡	46.7	179/383

\*Percent of surveys completed in relation to the goal of 224

†Percent of contacted households that were eligible and willing to participate in the survey

‡Percent of randomly selected households which completed an interview

**Table 2. Demographics of participating households, Mariposa County CASPER, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Households with ≥1 member in the following age categories</b>			n=178	
≤17 years old*	46	25.8	2035	25.76 (19.25, 32.27)
≥65 years old*	83	46.6	3650	46.21 (38.97, 53.45)
<b>Own or rent home</b>			n=179	
Own	140	78.2	6334	79.83 (70.59, 89.08)
Rent	36	20.1	1485	18.72 (9.83, 27.61)
Other	3	1.7	-	-
<b>Primary language spoken at home</b>			n=179	
English	173	96.7	7674	96.73 (93.29, 100.0)

**Table 3. Perceptions about the drought, Mariposa County CASPER, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Primary drought information source</b>	n=179			
Newspaper	18	10.1	657	8.28 (3.80, 12.77)
TV	67	37.4	2758	34.77 (25.89, 43.65)
Friends	5	2.8	-	-
Family members	4	2.2	-	-
AM/FM radio	4	2.2	-	-
Work	9	5.0	-	-
Internet	44	24.6	2371	29.88 (19.01, 40.76)
Place of worship	1	0.6	-	-
Other	7	3.9	-	-
Multiple/could not choose one	10	5.6	372	4.69 (1.26, 8.12)
Personal observation/experience	9	5.0	-	-
Don't know	1	0.6	-	-
<b>Identified the following statements as “true”</b>	n=179			
There is an increased demand for water	135	75.42	6055	76.33 (68.36, 84.30)
There is poor water management by the government	126	70.39	5495	69.26 (62.87, 75.66)
Cities use too much water	126	70.39	5490	69.21 (63.61, 74.81)
Agriculture/farming uses too much water	51	28.49	2077	26.18 (18.69, 33.66)
Too much water is used to protect wildlife	48	27.68	2196	27.68 (20.71, 34.65)
Some people not cutting usage enough	134	74.86	5780	72.86 (63.34, 82.38)
Droughts are caused by lack of rain/snow	161	89.94	7255	91.44 (87.12, 95.77)
Droughts are caused by climate change	120	67.47	5353	67.47 (60.42, 74.53)
Droughts are caused by a “higher power”	49	27.37	2179	27.47 (15.74, 39.20)

**Table 4. Household water source before the drought, Mariposa County CASPER, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Household water sources before drought (not mutually-exclusive)</b>				
			n=179	
Town water	28	15.64	1145	14.44 (4.13, 24.74)
Private well	130	72.63	5897	74.34 (59.61, 89.06)
Small water system	15	8.38	681	8.59 (0.00, 17.88)
Bottled water	18	10.06	777	9.80 (2.40, 17.20)
Other water source	4	2.23	-	-
DK	6	3.35	-	-
Refused	1	0.56	-	-
<b>If private well, has well ever been tested?</b>				
			n=130	
Yes	98	75.38	4506	76.41 (67.73, 85.10)
<b>For what has the well been tested?</b>				
			n=98	
Unspecified or "standard" testing	36	36.73	1677	37.20 (25.64, 48.76)
Potability or non-specific contaminants	23	23.47	1105	24.52 (14.41, 34.64)
Well depth or flow rate	20	20.41	957	21.24 (11.03, 31.44)
Specific chemicals	11	11.22	434	9.63 (2.67, 16.59)
Bacteria/biologicals	23	23.47	1021	22.65 (13.55, 31.74)
<b>Does household <u>currently</u> have running water?</b>				
			n=179	
Yes	171	95.53	7586	95.62 (92.65, 98.59)
No	6	3.35	-	-
DK	2	1.12	-	-

**Table 5. Perceptions of available assistance, households that report having running tap water, Mariposa County CASPER, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Where would household go for help during a severe water shortage?</b>	n=171			
Faith community	35	20.47	1768	23.54 (15.19, 31.89)
Family	61	35.67	2991	39.43 (27.49, 51.38)
Neighbors	62	36.26	2938	38.72 (26.91, 50.54)
Utility/water company	55	32.16	2715	35.80 (24.811, 46.78)
Non-profits (e.g., ARC)	56	32.75	2776	36.59 (26.36, 46.81)
Food bank	37	21.64	2076	27.36 (13.90, 40.82)
Fire/police/emergency agency	51	29.82	2531	33.36 (22.65, 44.07)
County/state/federal government	95	55.56	4585	60.44 (47.44, 73.44)
Employer	22	12.87	1273	16.78 (6.82, 26.74)
Would purchase water	13	7.60	499	6.58 (2.48, 10.68)
Well driller	5	2.92	-	-
Would seek help from any/all available sources	6	3.51	-	-
Other source	12	7.02	532	7.02 (2.82, 11.22)
None	7	4.09	-	-
DK	9	5.26	-	-

**Table 6. Experiences of households that report *not having* running tap water, Mariposa County CASPER, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Main barrier to getting running tap water in home?</b>				
	n=6			
Too expensive	3	50.00	-	-
Well drillers not available	0	0.00	-	-
Landlord's responsibility	0	0.00	-	-
Waiting for government financial assistance	0	0.00	-	-
Waiting for government goods/services	0	0.00	-	-
Other	2	33.33	-	-
DK	1	16.67	-	-
<b>Where has household obtained/is obtaining water?</b>				
	n=6			
Neighbors	0	0.00	-	-
Community tank	0	0.00	-	-
County tank	3	50.00	-	-
Private tank	2	33.33	-	-
Bottled water	3	50.00	-	-
Private supplier	1	16.67	-	-
<b>Where did household obtain bottled water?</b>				
	n=3			
Purchased	3	100.00	-	-
Government	0	0.00	-	-
Private or non-profit donation	0	0.00	-	-
Landlord	0	0.00	-	-
Place of worship	0	0.00	-	-
<b>Has purchasing bottled water caused difficulty in affording other necessities?</b>				
	n=3			
Yes	1	33.33	-	-
<b>Where has household sought assistance to get water?</b>				
	n=6			
Family	0	0.00	-	-
Neighbors	0	0.00	-	-
Faith community	0	0.00	-	-
Non-profit (e.g., ARC)	0	0.00	-	-
Food bank	0	0.00	-	-
Utility or water company	1	16.67	-	-
Fire/police/emergency agency	0	0.00	-	-
County/state/federal government	3	50.00	-	-
Employer	0	0.00	-	-
None	2	33.33	-	-
Other	1	16.67	-	-

**Table 7. Perceptions of water quality, Mariposa County CASPER, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Does your household use tap water for drinking and cooking?</b>	n=179			
Yes	157	87.71	6969	87.85 (82.38, 93.92)
No	22	12.29	963	12.15 (6.68, 17.62)
<b>Does household use tap water for cooking but not drinking? (answer volunteered by respondent)</b>	n=157			
Yes	9	5.73	-	-
<b>Is household aware of problems with tap water?</b>	n=179			
Yes	33	18.44	1492	18.81 (11.90, 25.72)
No	142	79.33	6298	79.39 (71.85, 86.93)
DK	4	2.23	-	-
<b>Has household noticed changes in tap water quality?</b>	n=179			
Color	13	7.26	563	7.09 (3.85, 10.33)
Clarity	13	7.26	611	7.70 (3.40, 12.00)
Odor	18	10.06	775	9.77 (4.08, 15.46)
Taste	18	10.06	744	9.37 (4.09, 11.65)
No changes	142	79.33	6225	78.46 (72.72, 84.21)
DK	2	1.12	-	-
<b>Has well water production fallen in the past year?</b>	n=179			
Yes	26	14.53	1311	16.53 (9.42, 23.64)
No	107	59.78	4785	60.32 (48.74, 71.90)
Don't have well	35	19.55	1412	17.80 (5.24, 30.35)
DK	11	6.15	425	5.35 (2.15, 8.56)

**Table 8. Water conservation practices, Mariposa County, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Has household taken the following steps to reduce water usage?</b>	n=179			
Reduced water usage	164	91.62	7299	92.00 (88.03, 95.97)
Capturing and reusing water	64	35.75	2924	36.85 (28.74, 44.97)
Installed aerators	78	43.58	3549	44.73 (35.17, 54.30)
Repaired leaks	108	60.34	4723	59.54 (51.60, 67.47)
Replaced appliances	83	46.37	3830	48.28 (39.91, 56.64)
Reduced frequency of laundry	105	58.66	4788	60.35 (51.61, 69.09)
Flush toilet less	114	63.69	5173	65.21 (56.86, 73.56)
Reduce shower time	134	74.86	6055	76.32 (70.62, 82.02)
Reduce shower frequency	78	43.58	3477	43.82 (36.88, 50.77)
Reduce handwashing frequency/duration	91	50.84	4143	52.22 (43.27, 61.17)
Reduce food washing frequency/duration	66	36.87	2899	36.54 (28.44, 44.64)
Stopped washing hands with water	7	3.91	-	-
Quit farming	59	32.96	2818	35.52 (25.32, 45.72)
Quit gardening	79	44.13	3592	45.28 (36.70, 53.87)
Reduce water used for lawn	141	78.77	6328	79.76 (73.51, 86.01)
Use swamp cooler less	34	18.99	1536	19.37 (13.45, 25.28)
Reduce water-using recreation (e.g. sprinklers)	65	36.31	3124	39.37 (30.09, 48.66)
Reduce time spent outdoors	35	19.55	1849	23.30 (13.59, 33.02)
<b>Could household further reduce water usage if drought continues?</b>	n=179			
Yes	123	68.72	5440	68.57 (61.87, 75.27)
No	47	26.26	2119	26.71 (20.18, 33.24)
DK	7	3.91	-	-
Missing	2	1.12	-	-

**Table 9. Impacts of the drought, Mariposa County, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Has the drought negatively affected your household's... (not mutually exclusive)</b>	n=179			
Property	91	50.84	4274	53.87 (44.31, 63.44)
Finances	43	24.02	1975	24.90 (17.38, 32.42)
Health	21	11.73	995	12.55 (7.23, 17.86)
Peace of mind	107	59.78	4837	60.97 (54.02, 67.92)
DK	3	1.68	-	-
Other	21	11.73	967	12.19 (6.45, 17.93)
None	41	22.91	1787	22.53 (16.70, 28.35)
<b>Did respondent specifically mention dead/dying trees as an impact on their household? (answer volunteered by respondent)</b>	n=179			
Yes	29	14.01	1268	15.99 (7.23, 24.75)
<b>Is anyone in the household medically fragile or have a chronic medical condition?</b>	n=179			
Yes	65	36.31	2876	36.25 (26.28, 46.22)
<b>If yes, has the condition gotten worse since the drought began?</b>	n=65			
Yes	12	18.46	459	15.96 (6.31, 25.62)
<b>If yes, has your household sought additional medical attention for this condition?</b>	n=65			
Yes	9	14.52	-	-
<b>Has anyone in the household been diagnosed with depression or another emotional or mental health problem?</b>	n=179			
Yes	32	17.88	1497	18.87 (8.90, 28.84)
<b>If yes, has the condition gotten worse since the drought began?</b>	n=32			
Yes	8	25.00	-	-
<b>If yes, has your household sought additional medical attention for this condition?</b>	n=32			
Yes	3	9.68	-	-
<b>Has anyone in your household experienced any of the following the past 30 days related to the drought?</b>	n=179			
Trouble concentrating	4	2.23	-	-
Trouble sleeping	7	3.91	-	-
Loss of appetite	2	1.12	-	-
Racing heartbeat	2	1.12	-	-
Agitated behavior	8	4.47	-	-
Witnessed violence/ threats	1	0.56	-	-

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
Intent to harm self	0	0.00	-	-
Increase alcohol	1	0.56	-	-
Increase drug use	0	0.00	-	-
Other	4	2.23	-	-
Any of the above	15	8.38	643	8.11 (3.43, 12.78)
<b>Has anyone in your household experiencing any of the above sought help from any of the following sources? (not mutually exclusive)</b>			n=15	
Faith community	2	13.33	-	-
Support group	0	0.00	-	-
ED	0	0.00	-	-
1° care provider	3	20.00	-	-
Social worker	0	0.00	-	-
County MH	1	6.67	-	-
Private MH health	3	20.00	-	-
Other	1	6.67	-	-
DK	0	0.00	-	-
None	8	53.33	-	-
<b>Has anyone in your household experienced any of the following job impacts related to the drought?</b>			n=179	
Decreased income	9	5.03	-	-
Lost a job	1	0.56	-	-
Less work hours	4	2.23	-	-
Had to change jobs	1	0.56	-	-
Had to travel further to find work	2	1.12	-	-
Skip/reduce meals	8	4.47	-	-
<b>Is your household considering moving?</b>			n=179	
Yes	26	14.53	1370	17.27 (10.04, 24.49)

**Table 10. Assistance-seeking behaviors, Mariposa County, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Did your household seek assistance related to the drought?</b>				
n=179				
Yes	13	7.26	657	8.28 (2.18, 14.38)
No	166	92.74	7276	91.72 (85.62, 97.82)
<b>Which of the following types of assistance did your household seek?</b>				
n=13				
Well-drilling	3	23.08	-	-
Drinking water	7	53.85	-	-
Health services	0	0.00	-	-
Utility or energy assistance	0	0.00	-	-
Financial help	0	0.00	-	-
Food assistance	1	7.69	-	-
Employment services	0	0.00	-	-
Removal/chipping of dead trees	4	30.77	-	-
<b>Did household get assistance they were seeking?</b>				
n=13				
Yes	10	76.92	548	83.45 (58.29, 100.00)
<b>From where did your household receive assistance?</b>				
n=10				
Other family members	1	10.00	-	-
Neighbors	0	0.00	-	-
Food bank	1	10.00	-	-
Faith community	0	0.00	-	-
Non-profit (like ARC)	0	0.00	-	-
Utility or water company	1	10.00	-	-
Fire/police/emergency agency	0	0.00	-	-
County/state/federal government	7	70.00	-	-
Employer	0	0.00	-	-
Other	1	10.00	-	-
<b>How difficult was it for your household to get assistance?</b>				
n=13				
Very difficult	1	7.69	-	-
Difficult	2	15.38	-	-
Easy	5	38.46	-	-
Very easy	5	38.46	-	-
<b>Household's greatest need</b>				
n=179				
Water	15	7.25	756	9.53 (5.10, 13.96)
Money, employment, help with bills	26	12.56	1131	14.26 (8.64, 19.87)
Rain	9	4.35	-	-
Home renovation/repair/improvements	15	7.25	597	7.53 (3.12, 11.93)

Food	2	0.97	-	-
Improved health/remain healthy	2	0.97	-	-
Dead tree removal	12	5.80	551	6.94 (1.83, 12.05)
Clearing brush or weeds	4	1.93	-	-
Wood	3	1.45	-	-
Other	37	17.87	1728	21.78 (16.21, 27.35)
None or doesn't know	49	23.67	2126	26.80 (19.04, 34.55)
No answer recorded	7	3.38	-	-

**Table 11. Disaster threats and emergency communications, Mariposa County, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Which of the following are among the three greatest emergency or disaster threats to your household?</b>			n=179	
Chemical releases	7	3.91	-	-
Drought	108	60.34	5037	63.48 (53.80, 73.17)
Earthquakes	24	13.41	1159	14.61 (8.18, 21.04)
Floods	19	10.61	853	10.76 (4.28, 17.23)
Heatwave	35	19.55	1456	18.35 (11.42, 25.28)
Mudslides	21	11.73	930	11.72 (5.45, 17.99)
Terrorist attacks	10	5.59	363	4.57 (1.63, 7.52)
Wildfires	159	88.83	6991	88.12 (81.88, 94.35)
Winter storms	68	37.99	2952	37.21 (29.49, 44.93)
Other	10	5.59	383	4.83 (1.69, 7.96)
DK	4	2.23	-	-
Ref	2	1.12	-	-
<b>What is your household's preferred method of receiving information during an emergency?</b>			n=179	
TV	32	17.88	1430	18.03 (13.20, 22.86)
Cell phone	11	6.15	411	1.11 (0.00, 2.71)
Reverse 911	24	13.41	1050	13.23 (7.65, 18.82)
Radio	6	3.35	-	-
Landline	34	18.99	1527	19.25 (10.16, 28.33)
Word of mouth	7	3.91	-	-
Text	14	7.82	567	7.14 (3.17, 11.11)
Internet	29	16.20	1446	18.23 (9.18, 27.28)
Other	20	11.17	883	11.13 (6.05, 16.22)
If Other, NIXLE	8	4.47	-	-
DK	2	1.12	-	-
No single 1 <sup>o</sup> option	6	3.35	-	-
<b>Does anyone in household have any of the following conditions that could be a barrier during an emergency or a disaster?</b>			n=179	
Impaired vision	15	8.38	842	10.61 (4.30, 16.93)
Impaired hearing	28	15.64	1307	16.47 (11.22, 21.72)
Cognitive/developmental disability	10	5.59	457	5.76 (2.07, 9.45)
Difficulty understanding written material	12	6.70	583	7.34 (3.44, 11.25)
Difficulty understanding English	2	1.12	-	-
DK	1	0.56	-	-
Ref	1	0.56	-	-

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
None	126	70.39	5581	70.35 (62.01, 78.70)
Missing	5	2.79	-	-

**Table 12. County-specific questions, Mariposa County, California**

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Did household conserve water before drought began?</b>			n=179	
Yes	139	77.65	6285	79.23 (71.13, 87.33)
<b>If yes, how did household conserve water?</b>			n=139	
No specific answer	30	21.58	1413	22.48 (15.49, 29.48)
Flushed toilet less often	4	2.88	-	-
Used less water in toilet	6	4.32	-	-
Watered plants with reused water	7	5.04	-	-
Used less water for plants/lawn or replace landscaping	43	30.93	1892	30.11 (20.52, 39.69)
Shorter or less frequent showers/baths	20	14.39	864	13.75 (5.22, 22.28)
Repaired leaks	5	3.60	-	-
Turned off faucet when not in use	7	5.04	-	-
Used washing machine/dishwasher less or only when full	20	14.39	860	13.68 (5.91, 21.45)
Used new or water-efficient appliances	6	4.32	-	-
Used automatic shutoff valves or timers for water pump	5	3.60	-	-
Washed car less frequently	5	3.60	-	-
Purchased drinking water	3	2.16	-	-
Other	15	10.8	734	11.68 (4.04, 19.33)
No answer	2	1.44	-	-
<b>Does household have a grey water system?</b>			n=179	
Yes	37	20.67	1551	19.55 (12.08, 27.02)
No	126	70.39	5757	72.56 (63.46, 81.66)
DK what grey water system is	10	5.59	402	5.07 (0.75, 9.40)
DK	6	3.35	-	-
<b>If yes, when was grey water system installed?</b>			n=37	
Before drought began	23	62.16	965	62.21 (40.39, 84.04)
After drought began	6	16.22	-	-
DK	8	21.62	-	-
<b>If no, what are household's barriers to installing a grey water system (answers not mutually-exclusive)</b>			n=126	
Too complicated	15	11.90	825	14.33 (2.55, 26.10)
Too expensive	34	26.98	1748	30.67 (18.48, 42.26)
Grey water is too dirty to reuse	4	3.17	-	-
Don't know enough about grey water systems	31	24.60	1429	24.82 (16.52, 33.12)
Grey water systems don't work	1	0.79	-	-
Grey water systems are illegal	16	12.70	677	11.76 (6.12, 17.41)
Too many regulations regarding grey water systems	18	14.29	808	14.03 (8.25, 19.81)
Soaps and chemicals in grey water kill plants	9	7.14	-	-

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
Planning to install, just haven't done it yet	18	14.29	925	16.07 (7.23, 24.91)
Doesn't need or doesn't want a grey water system	8	6.35	-	-
Rents home, up to landlord to install	5	3.97	-	-
Other	13	10.3	563	9.77 (4.28, 15.27)
DK	5	3.97	-	-
<b>Does household have a rain water catchment system?</b>			n=179	
Yes	30	16.76	1438	18.13 (11.60, 24.66)
No	146	81.56	6386	80.50 (74.39, 86.61)
DK what rain water catchment system is	0	0.00	-	-
DK	3	1.68	-	-
<b>If yes, when was rain water catchment system installed?</b>			n=30	
Before drought began	16	53.33	797	55.43 (34.83, 76.03)
After drought began	12	40.00	472	32.87 (11.23, 54.51)
DK	1	3.33	-	-
Missing	1	3.33	-	-
<b>If no, what are household's barriers to installing a rain water catchment system (answers not mutually-exclusive)</b>			n=146	
Too complicated	11	7.53	529	8.29 (3.53, 13.05)
Too expensive	40	27.40	1875	29.36 (20.85, 37.87)
Rain water is too dirty to use	1	0.68	-	-
Don't know enough about rain water catchment Systems	36	24.66	1652	25.87 (19.36, 32.37)
Rain water systems don't work	2	1.37	-	-
Rain water systems are illegal	17	11.64	671	10.51 (6.01, 15.02)
Too many regulations regarding rain water catchment Systems	12	8.22	516	8.08 (3.25, 12.92)
Planning to install, just haven't done it yet	26	17.81	1130	17.69 (11.52, 23.87)
Doesn't need or doesn't want a rain water catchment system	11	7.53	508	7.95 (2.75, 13.15)
Rents home, up to landlord to install	7	4.79	-	-
Other	19	13.01	858	13.44 (7.70, 19.17)
DK	5	3.42	-	-
Ref	2	1.37	-	-
<b>What will be the impact of the forecasted El Nino?</b>			n=179	
Improve the drought	128	71.51	5588	70.43 (63.00, 77.87)
Have no impact on the drought	8	4.47	-	-
DK if it will have an impact on the drought	39	21.79	1804	22.73 (16.81, 28.66)
DK what El Nino is	4	2.23	-	-

	Unweighted		Weighted	
	Frequency	%	Frequency	% (95% CI)
<b>Does anyone in the household require special medical equipment/supplies?</b>	n=179			
Yes	39	21.79	1638	20.65 (13.12, 28.18)
No	137	76.54	6178	77.88 (70.22, 85.54)
Ref	2	1.12	-	-
Missing	1	0.56	-	-
<b>If yes, what kind of medical equipment/supplies?</b>	n=39			
Breathing equipment	21	53.85	908	55.45 (35.62, 75.28)
Dialysis	0	0.00	-	-
Feeding tube	1	2.56	-	-
Insulin	8	20.51	-	-
Oxygen	9	23.08	-	-
Ventilator	1	2.56	-	-
Mobility-associated (e.g., wheelchair)	4	10.26	-	-
Other	11	28.21	425	25.93 (9.42, 42.42)
Ref	0	0.00	-	-
<b>Has it been more difficult to obtain/maintain these equipment/supplies since the drought began?</b>	n=39			
Yes	2	5.41	-	-
<b>Does household have health insurance?</b>	n=179			
Yes	177	98.88	7851	98.96 (97.45, 100.00)
No	2	1.12	-	-
<b>If yes, what kind of health insurance?</b>	n=177			
Employer-provided	81	45.76	3741	47.65 (38.86, 56.44)
Medicare	29	16.38	1188	15.14 (8.38, 21.89)
Medicaid	87	49.15	3768	48.00 (38.63, 57.36)
Privately-purchased	9	5.08	-	-
Supplemental	19	10.73	769	9.79 (3.60, 15.98)
VA or TRICARE	14	7.91	749	9.54 (3.53, 15.55)
Other	26	14.69	1085	13.82 (7.78, 19.85)
Ref	2	1.13	-	-
<b>If no, what are the barriers to getting insurance?</b>	n=2			
Cannot afford insurance	1	50.00	-	-
Doesn't believe in insurance	0	0.00	-	-
Doesn't need insurance	0	0.00	-	-
Employer doesn't pay for insurance	1	50.00	-	-
Other	0	0.00	-	-
DK	0	0.00	-	-

## Appendix I: Letter from CDPH Director to local health departments, August, 2015



KAREN L. SMITH, MD, MPH  
Director & State Health Officer

State of California—Health and Human Services Agency  
California Department of Public Health



EDMUND G. BROWN JR.  
Governor

August 30, 2015

Dear Local Health Officer:

As you know, California is facing ongoing water shortfalls and the Governor has declared a State of Emergency in response to this historic drought. Relatively little is known about the human health impacts of drought. CDPH is interested in working with counties to fill some of the information gaps. Rapid assessments, such as those used in other natural disasters, might allow us to better quantify the human health effects of the drought, inform state and local policy decisions, and identify community needs requiring immediate attention. We believe that an assessment would best be conducted in mid-October of this year. We realize that mid-October is a very tight timeline but believe it is important to gather this information before the rainy season begins.

CDPH would like to partner with severely impacted counties in conducting in a rapid assessment of drought-related health impacts using the Community Assessment of Public Health Emergency Response (CASPER) methodology. Below you will find a description of the CASPER methodology and more details of our proposal. An appendix with additional details is also enclosed. Drought impacts vary by county but, while this letter is primarily intended for health officers in counties that are most significantly impacted, I am sending it to all health officers so you are all aware of our proposal and have an opportunity to respond with any interest you may have.

There are several benefits to the CASPER methodology. Unlike many surveys, it provides statistically valid information in a very short time with a preliminary report usually available within one week of the field survey. Also, the survey content can be adapted to include specific topics of interest to you and your County. Participating in a drought-related CASPER will also provide county staff with training and experience increasing your County's capacity for conducting future CASPERs.

To conduct a CASPER, CDPH will provide staff with expertise in conducting CASPERs who will oversee the administration of the assessment and handle its technical aspects. With your input CDPH will also: 1) design the questionnaire; 2) provide Just-in-Time training for all field volunteers and local headquarters staff; 3) provide logistical support during field administration of the survey; 4) analyze collected data ; and 6) write the report.

We will need participating counties to: 1) reach out to and communicate with local communities about the CASPER; 2) secure cooperation of cities within the selected

Karen L. Smith  
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sampling frame(s); 3) assist with recruiting local volunteers to conduct field surveys; 4) provide space for local CASPER headquarters; 5) assist with logistical support during field administration of the survey; and 6) provide personnel to staff local headquarters and do real-time data entry.

We will hold an informational webinar for interested jurisdictions on Thursday, September 3, 2015, 2 p.m. – 3 p.m (call in information below). Please feel free to join the webinar to learn more about CASPER and ask questions of our team.

If you are interested in conducting a CASPER in your jurisdiction or would like to get more information about the process, please contact Jason Wilken ([jason.wilken@cdph.ca.gov](mailto:jason.wilken@cdph.ca.gov)); 510-620-3622) by Tuesday, September 8. If you know you are interested in participating, it will be very helpful if you can provide the following information when you call:

- What part of your County would you like to survey (i.e. what is your recommended sampling frame)?
- What resources (e.g. headquarters, meeting rooms, planners, field surveyors) could you provide?
- What additional domains of knowledge (see appendix) would you like the CASPER to cover?

I look forward to your response and to partnering with you in conducting this important assessment of the human health impacts of the ongoing drought.

Sincerely,

*(Original signed by Karen L. Smith)*

Karen L. Smith, MD, MPH  
Director and State Health Officer

Enclosure

Webinar: Thursday, September 3, 2015, 2 p.m. – 3 p.m

To connect to the Web Conference and Telephone Audio:

1. Click here: <https://connect4.uc.att.com/calnet/meet/?ExEventID=88035637>
2. Toll-Free Number (in USA): 888-363-4734
3. Caller-Paid number: 215-446-3656
4. When prompted, enter the Meeting Access Code: 8035637#

### **Community Assessment for Public Health Emergency Response (CASPER)**

<http://www.cdc.gov/nceh/hsb/disaster/casper.htm>) is a situational awareness tool developed by the Centers for Disease Control and Prevention (CDC) to determine the health status and basic needs of a community. CASPER uses valid statistical methods to analyze household-level data. The data generated by a CASPER is representative of the entire selected community, and might therefore be more valuable to emergency management and public health practitioners than anecdotal information.

Previous CASPERs have addressed impacts of a diversity of disasters, as well as household emergency preparedness in non-disaster settings. However, no CASPER has assessed communities in the setting of a drought. Development and validation of a drought CASPER questionnaire will require use of existing questions, input from subject matter experts and approval from participating partners.

Using CASPER methodology, we can define any geographic area as the sampling frame (e.g., a particular town, city, county, water district, etc.), and results generated from analysis of CASPER data are generalizable to that sampling frame. CASPER methodology selects 30 clusters (usually Census blocks) and field interviewers select seven households in each cluster, with the goal to survey 210 households in total. There are no specified geographic or population size requirements to conduct a CASPER and the areas within a sampling frame do not need to be contiguous; however, the CDC recommends a minimum of 800 households in the sampling frame. CASPERs are most efficiently conducted in areas with fairly high population density, but have been conducted in less dense areas (e.g., semi-rural and rural). Drought impact in terms of health effects, economic effects, and preparedness will likely vary by region, city, and urban vs. rural areas.

The results of CASPER data analysis are applicable only to the selected *sampling frame* (e.g., a particular town, city, district, etc.) and separate or parallel CASPER surveys might be required depending on the CASPER purpose and region(s) surveyed. Multiple jurisdictions could be assessed using the same CASPER tool. There is no specific limit to the number of jurisdictions assessed by a given CASPER, with the following caveats: (1) meaningful comparisons between jurisdictions is only possible with identical CASPER questions, and CASPERs should be conducted as close together in time as possible; and (2) each CASPER should be conducted with similar resources. Each assessed jurisdiction will require resources to complete the CASPER, most notably interviewers (typically 30 interviewers available each day over a three-day period). The health and/or environmental health officials of any jurisdiction where a CASPER would be performed should become project partners and provide input on the design and execution of the CASPER, as well as conduct outreach and community awareness of CASPER.

We envision two possible approaches: **(1)** complete uniformity between all drought CASPERs in different jurisdictions. This approach will maximize comparability among communities, and will require consensus among all participating local health jurisdictions; or **(2)** a core set of identical questions to be used in each CASPER, with additional questions unique to each community as selected by local jurisdictions and other stakeholders.

## **Appendix**

### **Conduct of CASPER and Questionnaire Content**

Conduct and execution of a CASPER requires substantial planning and logistical coordination including three phases (not counting the questionnaire design) as follows:

**1. Preparation** phase, sampling frame(s) is/are selected based on CASPER geographic priorities. Clusters (census blocks or block groups) within the sampling frame(s) are chosen using random sampling proportional to the number of households. The clusters are shared with the local stakeholders to assess potential safety concerns and language issues. All partners identify the dates to conduct the CASPER (typically three consecutive days). The local jurisdiction identifies CASPER headquarters and, in collaboration with CDPH, a minimum of 30 interviewers available for three days (accounting for language skills appropriate for the selected census blocks and vehicle availability). Interviewers might be recruited from various local sources; the local health jurisdiction might consider the CASPER as an exercise opportunity for PHEP-funded departments and recruit accordingly. A leadership team (typically consisting of CDPH representatives and one to two persons from the local health department) is selected. Go-kits for field work are assembled (including printing 210 questionnaires, field team instructions, and other auxiliary materials). CDPH prepares field safety kits.

**2. Execution** phase (three days or longer, if needed) includes a half-day training for interviewers, and 2.5 (or more) days devoted to conducting interviews. The interviewers are divided into 15 teams of two, and each team is assigned two clusters with the goal of completing seven interviews in each. Field team training is conducted by CDPH and local jurisdiction leadership team. The leadership team staffs the local headquarters, maintains accountability for all field interviewers (regular check-ins with teams in the field, daily check-in/out), maintains a running tally of completed interviews, reviews all completed surveys at team check-in, briefs the interview teams each morning, and troubleshoots any issues throughout the CASPER. Time and resources-permitting, staff at the headquarters also do real-time data entry of completed questionnaires.

**3. Analysis and reporting** phase, the CASPER process is completed with final data entry, data management and analysis, and completion of a preliminary report. Given sufficient staff resources (including meeting the need to enter data for up to 210 questionnaires), a preliminary report can be provided to the local jurisdiction within a week of completion of the CASPER. Preliminary report is then reviewed and approved by appropriate stakeholders.

**Domains of Knowledge:** Many validated questions among multiple domains of disaster response and emergency preparedness used in previous CASPERs could be

adapted to this project; other questions specific for this CASPER can be developed. Domains which could be addressed by this CASPER include (but are not limited to):

- Water availability
- Household water use, water needs, and conservation behaviors
- Drinking water quality and contamination
- Well water usage
- Hygiene (personal and food)
- Mental health effects
- Exacerbations of chronic diseases
- Impact on work, livelihood, food access, food affordability and need for assistance
- Impact on livestock
- Perceptions of community support
- Drought-related community beliefs, perceptions, “hearsay”
- Housing assistance and displacement
- Environmental concerns
- General emergency preparedness
- Air quality (including non-chronic respiratory conditions)
- Impacts on wildfire affected areas: population displacement, air quality and water quality related concerns, resilience to future flooding
- Behavioral changes (e.g., purchasing different items; spending less time outdoors because of air quality, etc.)
- Disease vectors (e.g., perceptions of mosquito prevalence)
- Utilization of social services

The purpose of a drought-related CASPER is to fill public health knowledge gaps related to the ongoing California drought and possible mitigation actions. The local jurisdiction of the selected CASPER sampling frame(s) should help identify gaps and

priorities addressable by a household-level survey. There is no specific guideline for the number of questions to include in a CASPER questionnaire, however, longer questionnaires take more time and might result in lower completion rates.

**Data analysis, data ownership, and results dissemination:** Any CASPER should include involvement or an invitation for involvement of the local health and/or environmental health official(s). If CASPERs are planned in multiple jurisdictions, a common method for data entry and analysis and clear delineations of data ownership are recommended.

**Appendix II: CASPER questionnaire.**

To be completed by interview team BEFORE the interview	
a. Date (MM/DD/YY):	b. Time: <input type="checkbox"/> AM <input type="checkbox"/> PM
c. Cluster Number:	d. Survey Number:
f. Team Name:	e. County:
	g. Team Member Initials:

First, I would like to ask you some general questions about your household. Please respond for all members in your household.

1. Including yourself, how many people live in your household? \_\_\_\_\_
2. Including yourself, how many people living in your household are: **(list number in each age group)**  
 Less than 2 years old? \_\_\_\_ 2-17 years old? \_\_\_\_ 18-64 years old? \_\_\_\_ 65 years or older? \_\_\_\_  DK  R
3. What is the main language spoken in your household?  
 English  Spanish  Other \_\_\_\_\_  Don't Know  Refused
4. Does your household own or rent your place of residence?  
 Own  Rent  Other \_\_\_\_\_  Don't Know  Refused
5. What is your household's primary source of information about the drought in California? **(choose one)**  
 Newspaper  TV  Friends  Family members  AM/FM radio  Work  
 Internet  Place of worship  Other \_\_\_\_\_  None  DK  R

California is in the fourth year of drought. I'm going to read you a set of statements about the drought. Please tell me whether you or your household members believe the statement is true or false.

6. There is an increased demand for water  True  False  Don't Know  Refused
7. There is poor water management by the government  True  False  Don't Know  Refused
8. There is overuse of water by cities  True  False  Don't Know  Refused
9. There is overuse of water by farming or agriculture  True  False  Don't Know  Refused
10. Too much water is used to protect wildlife  True  False  Don't Know  Refused
11. Some people aren't cutting water usage enough  True  False  Don't Know  Refused
12. Droughts are caused by a lack of rain or snow  True  False  Don't Know  Refused
13. Droughts are caused by climate change  True  False  Don't Know  Refused
14. Droughts are caused by a "higher power"  True  False  Don't Know  Refused

15. Where did your household water come from before the drought? **(check all that apply)**

- Town, city, or county water system
- Small water system operated by property owner or homeowner association
- Bottled water
- Private well
- Other \_\_\_\_\_
- Don't Know
- Refused

b. Has your well water ever been tested?  
 Yes  No **(go to 16)**  DK  R

c. How often: \_\_\_\_\_

d. For what: \_\_\_\_\_

16. Does your household currently have reliable running water from a well or water system?

- Yes **(go to 17)**  No **(go to back page, question 35)**  DK  R

17. During a severe shortage of water, would your household go to any of the following for assistance? **(check all that apply)**

- Other family members  People in your neighborhood  Your faith community
- Non-profit organizations, such as the Red Cross  Food Bank  Utility or water company
- Fire, police, or emergency agencies  County, state, or federal government agencies
- Employer  Other \_\_\_\_\_  None  DK  R

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18. Do you use tap water for drinking and cooking?

- Yes  No  Don't Know  Refused

19. Are you aware of any problems with the quality of your tap water?

- Yes  No  Don't Know  Refused

20. Have you noticed a change in the color, clarity, odor, or taste of your water? (check all that apply)

- Color  Clarity  Odor  Taste  None  Don't know  Refused

21. In the last year, has your household seen a decrease in well water production?

- Yes  No  Do not have a well  Don't Know  Refused

In response to the drought, the governor has asked communities to cut back water usage by 25%. I am going to ask you a series of yes or no questions about actions your household may have taken to reduce water usage.

22. In response to shortages of water, have you or members of your household:

a. Reduced water usage	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
b. Created a system to capture and reuse water	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
c. Installed faucet aerators	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
d. Repaired plumbing leaks	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
e. Replaced appliances such as a washing machine or toilet	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
f. Decreased how frequently your household washes laundry	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
g. Reduced how often members of your household flush the toilet	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
h. Shortened shower times	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
i. Reduced how often members of your household shower or bathe	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
j. Washed your hands less often or for a shorter period of time	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
k. Washed food less often or for a shorter period of time	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
l. Stopped washing hand with water	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
m. Quit farming or let land go fallow	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
n. Stopped gardening	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
o. Reduced how much water is used for your lawn or landscaping	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
p. Used your swamp cooler less	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
q. Changed recreational activities, like playing in sprinklers, to save water	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R
r. Spent less time outdoors	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA	<input type="checkbox"/> DK	<input type="checkbox"/> R

23. Are there other actions your household has taken to use less water?

\_\_\_\_\_

24. If the drought continues, would your household be able to further reduce water consumption?

- Yes  No  Don't know  Refused

b. How would you conserve additional water?

\_\_\_\_\_

25. Has the drought negatively affected your...? (check all that apply)

- Property  Finances  Health  Peace of mind  Anything Else \_\_\_\_\_  DK  R

Next I would like to ask you about assistance you or members of your household may have tried to obtain because of the drought.

26. Did anyone in your household look for assistance related to the drought?

- Yes
- No
- Don't know
- Refused

b. What type of assistance did your household need...? (check all that apply)

- Well drilling       Drinking water       Health services
- Utility or energy assistance       Financial help       Food assistance
- Employment services       Other \_\_\_\_\_       DK       R

c. Did members of your household get the assistance they were looking for?

- Yes       No (go to e)       DK       R

d. Who provided the assistance? (check all that apply)

- Other family members       People in your neighborhood       Food Bank
- Your faith community       Non-profit organizations, such as the Red Cross
- Utility or water company       Fire, police, or emergency agencies
- County, state, or federal government agencies       Employer
- Other \_\_\_\_\_       DK       R

e. How difficult was it to get the assistance?

- Very Difficult       Difficult       Easy       Very Easy

f. What were the barriers to getting assistance?

- \_\_\_\_\_  No barriers

Now, I will ask you about any health issues members of your household may have.

27. Is anyone in your household medically fragile, or been diagnosed with a chronic medical condition?

- Yes
- No
- Don't know
- Refused

b. Has this condition gotten worse since the drought?

- Yes       No       DK       R

c. Have you or household members sought additional medical attention outside of your normal care because of the drought?

- Yes       No       DK       R

28. Has a healthcare professional ever diagnosed you or any members of your household with depression or any other emotional or mental health condition?

- Yes
- No
- Don't know
- Refused

b. Has this condition gotten worse since the drought?

- Yes       No       DK       R

c. Have you or household members sought additional medical attention outside of your normal care because of the drought?

- Yes       No       DK       R

29. Has anyone in your household experienced any of the following in the last 30 days because of the drought?

a. Difficulty concentrating	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
b. Trouble sleeping/nightmares	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
c. Loss of appetite	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
d. Racing or pounding heartbeat	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
e. Agitated behavior	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
f. Witnessed first-hand violent behavior or threats of violence	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
g. Thoughts or attempts to harm self	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
h. Increased alcohol consumption	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
i. Increased drug use	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
j. Other (specify) _____	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
				<b>If all No, skip to question 31</b>

30. Did you or anyone in your household seek help for any of the items we've just covered using any of the following services? **(check all that apply)**

- Counseling from a religious leader or friend       Pre-existing support group       Emergency Room  
 Primary Care Provider or a clinic       Social worker or case manager       County Mental Health  
 Private mental health provider **[if needed, say "such as psychologist or counselor"]**  
 Other, specify: \_\_\_\_\_       None of the above       DK       R

31. **Some people experienced changes in their employment status or income because of the drought. Please tell me if any of the following apply to your household.**

a. Has your household income decreased?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
b. Has a member of your household lost a job?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
c. Have hours of work been reduced?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
d. Have you or household members had to change jobs?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
e. Have any household members had to travel further to find work?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
f. Did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
g. Have you or household members considered moving?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't Know	<input type="checkbox"/> Refused
				Where _____

32. Of the following, which are the three greatest emergency or disaster threats to your household? **(check three)**

- Accidental chemical releases       Drought       Earthquakes       Floods  
 Heat waves       Mud slides       Terrorist attacks       Wild fires       Winter storms  
 Other, specify: \_\_\_\_\_       DK       R

33. What is your household's most preferred method for receiving information during an emergency event? **(check one)**

- TV       Radio       Text message       Cell phone call       Landline call  
 Internet       Reverse 911       Word of mouth       Other \_\_\_\_\_       DK       R

34. Does anyone in your household have any of the following that could be barriers to effective communication during an emergency...? **(check all that apply)**

- Impaired hearing       Impaired Vision       Developmental/cognitive disability  
 Difficulty understanding written material       Difficulty understanding English       None       DK

**This is our final question.** What is your household's greatest need right now? \_\_\_\_\_

**(The interview is complete. Please thank the participant)**

**There are no questions on this page**

**Questions for households without water (“No” to question 16)**

35. What is the main barrier to getting running water in your home? **(choose one)**

- Too expensive
- Well drillers are not available
- Landlord needs to do it and has not
- Waiting for government financial assistance
- Waiting for government to provide goods or services
- Other \_\_\_\_\_
- Don't Know
- Refused

36. Has your household obtained additional water from any of the following sources? **(check all that apply)**

- Neighbor's well
- Community water tanks
- Household water tanks (county provided)
- Household water tanks (private purchase)
- Bottled Water
- Other \_\_\_\_\_
- Don't Know
- Refused

**b. How has your household obtained this water? (check all that apply)**

- Purchased yourselves
- Received from a government agency
- Received a donation from a private company (on non-profit)
- Received from the landlord
- Received from a place of worship
- Other \_\_\_\_\_
- DK
- R

37. Where has your household gone for assistance since the drought?

- Other family members
- People in your neighborhood
- Your faith community
- Non-profit organizations, such as the Red Cross
- Food Bank
- Utility or water company
- Fire, police, or emergency agencies
- County, state, or federal government agencies
- Employer
- Other \_\_\_\_\_
- None
- DK
- R

38. If you are purchasing bottled water, has this caused difficulty in affording other necessities?

- Yes
- No
- N/A
- Don't Know
- Refused

**(Please continue the interview at the top of page 2, question 18)**

## Appendix III: Mariposa County-specific questions added to the questionnaire.

### Additional questions for Mariposa county CASPER

Cluster number:	Survey Number:	Team Name:	Team initials:
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39. Did your household conserve water before it learned about the drought?  Yes (go to 39a)  No (go to 40)  DK  R

39a. What was the main thing your household did to conserve water? \_\_\_\_\_  DK  R

40. Does your household have a grey water system?  Yes (go to 40a)  No (go to 40b)  DK  DK what it is  R

<p><b>40a. When was it installed?</b></p> <p><input type="checkbox"/> Before drought started</p> <p><input type="checkbox"/> After drought started</p> <p><input type="checkbox"/> Don't know</p> <p><input type="checkbox"/> Refused</p>	<p><b>40b. Which of the following do you see as barriers preventing your household from installing a grey water system? (check all that apply)</b></p> <p><input type="checkbox"/> I've been told grey water use is illegal</p> <p><input type="checkbox"/> I think grey water is too dirty to reuse</p> <p><input type="checkbox"/> I think that the soaps and other chemicals in grey water will kill my plants</p> <p><input type="checkbox"/> Grey water systems don't work</p> <p><input type="checkbox"/> I don't know enough about grey water use</p> <p><input type="checkbox"/> Too many regulations</p> <p><input type="checkbox"/> It costs too much</p> <p><input type="checkbox"/> Planning to, just haven't had time</p> <p><input type="checkbox"/> It's too complicated</p> <p><input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> DK <input type="checkbox"/> R</p>
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41. Does your household have a rain water catchment system?  Yes (go to 41a)  No (go to 41b)  DK  DK what it is  R

<p><b>41a. When was it installed?</b></p> <p><input type="checkbox"/> Before drought started</p> <p><input type="checkbox"/> After drought started</p> <p><input type="checkbox"/> Don't know</p> <p><input type="checkbox"/> Refused</p>	<p><b>41b. Which of the following do you see as barriers preventing your household from installing a rain water catchment system? (check all that apply)</b></p> <p><input type="checkbox"/> I've been told rain water catchment is illegal</p> <p><input type="checkbox"/> I think rain water is too dirty to reuse</p> <p><input type="checkbox"/> Rain water catchment systems don't work</p> <p><input type="checkbox"/> I don't know enough about rain water catchment system use</p> <p><input type="checkbox"/> Too many regulations</p> <p><input type="checkbox"/> It costs too much</p> <p><input type="checkbox"/> Planning to, just haven't had time</p> <p><input type="checkbox"/> It's too complicated</p> <p><input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> DK <input type="checkbox"/> R</p>
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42. What do you or members of your household think the forecasted El Niño will do for Mariposa County? (choose only one)

- Improve the drought  Have no impact on the drought  Don't know if El Niño will have any impact
- DK what El Niño is  Refused

43. Does anyone in your household need special medical equipment or supplies?  Yes (go to 43a)  No (go to 44)  DK  R

43a. If yes, what type? (check all that apply)

Oxygen  Dialysis  Breathing Treatment Machine  Ventilator  Feeding Pump  Insulin  Other \_\_\_\_\_  DK  R

43b. Has anyone in your household experienced any increase in difficulty using or maintaining the equipment or supplies since the drought?  Yes  No  DK  R

44. Does your household currently have health insurance?  Yes (go to 44a)  No (go to 44b)  DK  R

<p><b>44a. What type of health insurance does your household have? (check all that apply)</b></p> <p><input type="checkbox"/> Employer-provided</p> <p><input type="checkbox"/> Medicaid or State-provided</p> <p><input type="checkbox"/> Medicare</p> <p><input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> DK <input type="checkbox"/> R</p>	<p><b>44b. Why does your household currently not have health insurance? (check all that apply)</b></p> <p><input type="checkbox"/> Cannot afford insurance</p> <p><input type="checkbox"/> Employer does not pay for insurance</p> <p><input type="checkbox"/> Do not need insurance</p> <p><input type="checkbox"/> Do not believe in insurance</p> <p><input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> DK <input type="checkbox"/> R</p>
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