# Use of Community Assessments for Public Health Emergency Response (CASPERs) for Drought


Tesfaye Bayleyegn, MD

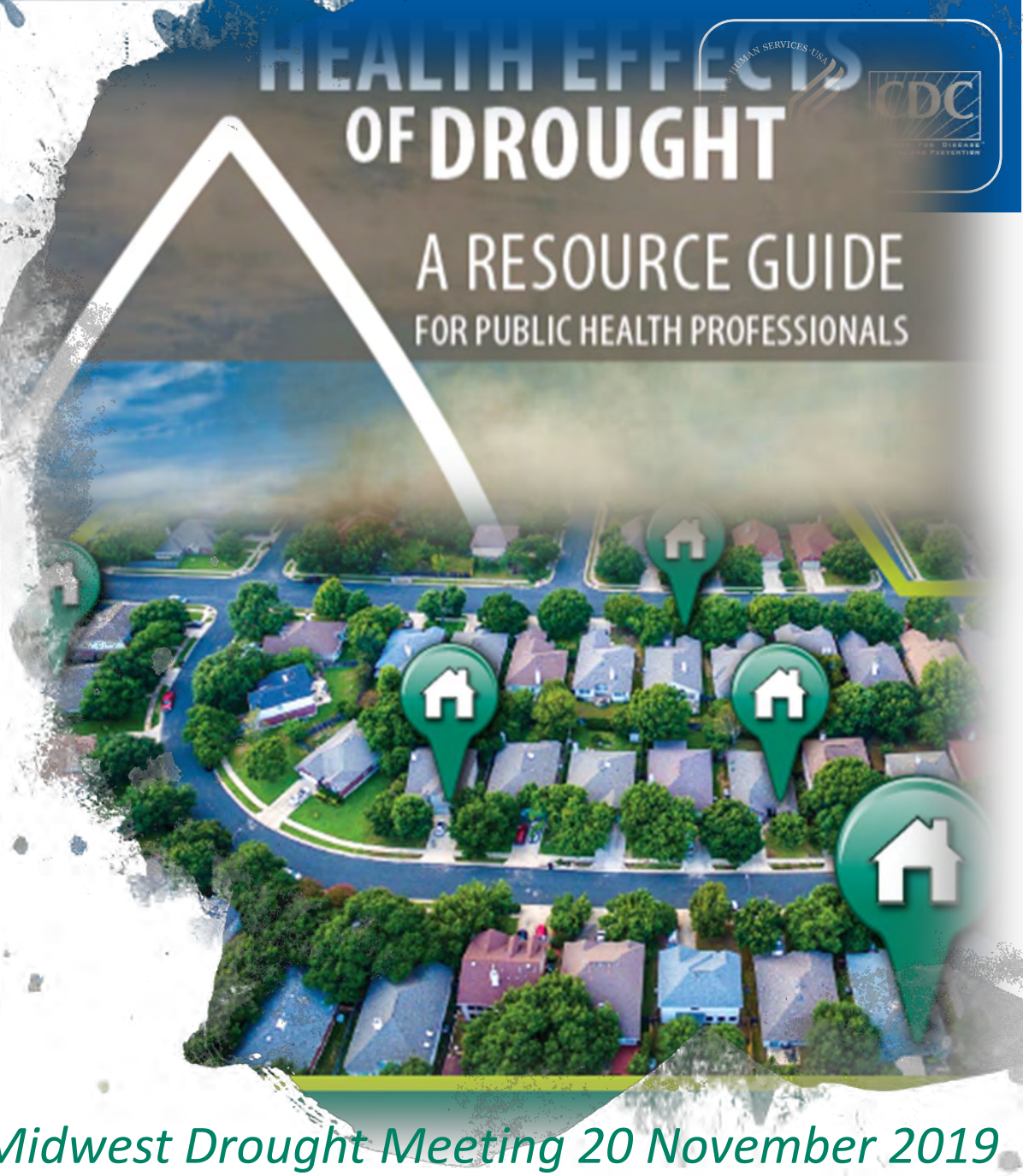
Senior Service Fellow
Team Lead, Disaster Epidemiology and Response Team

Health Studies Section

Division of Environmental Health Science and Practice

National Center for Environmental Health

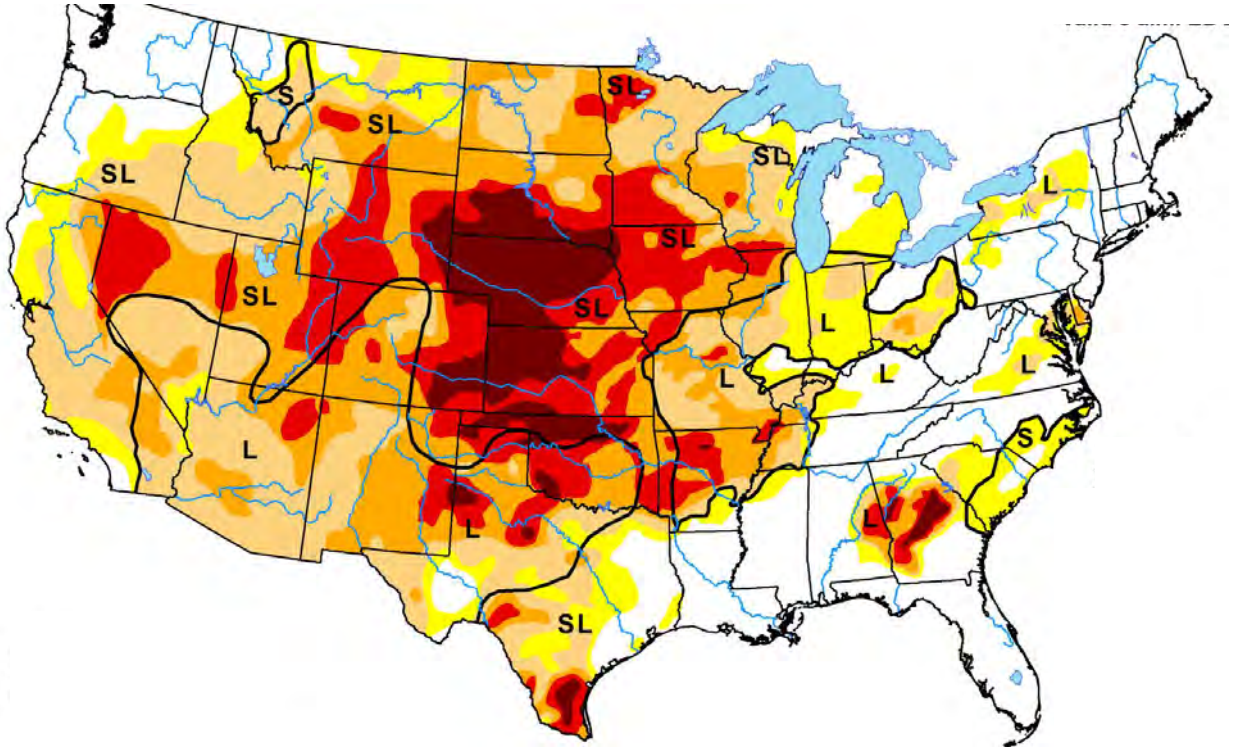
Center for Disease Control and Prevention

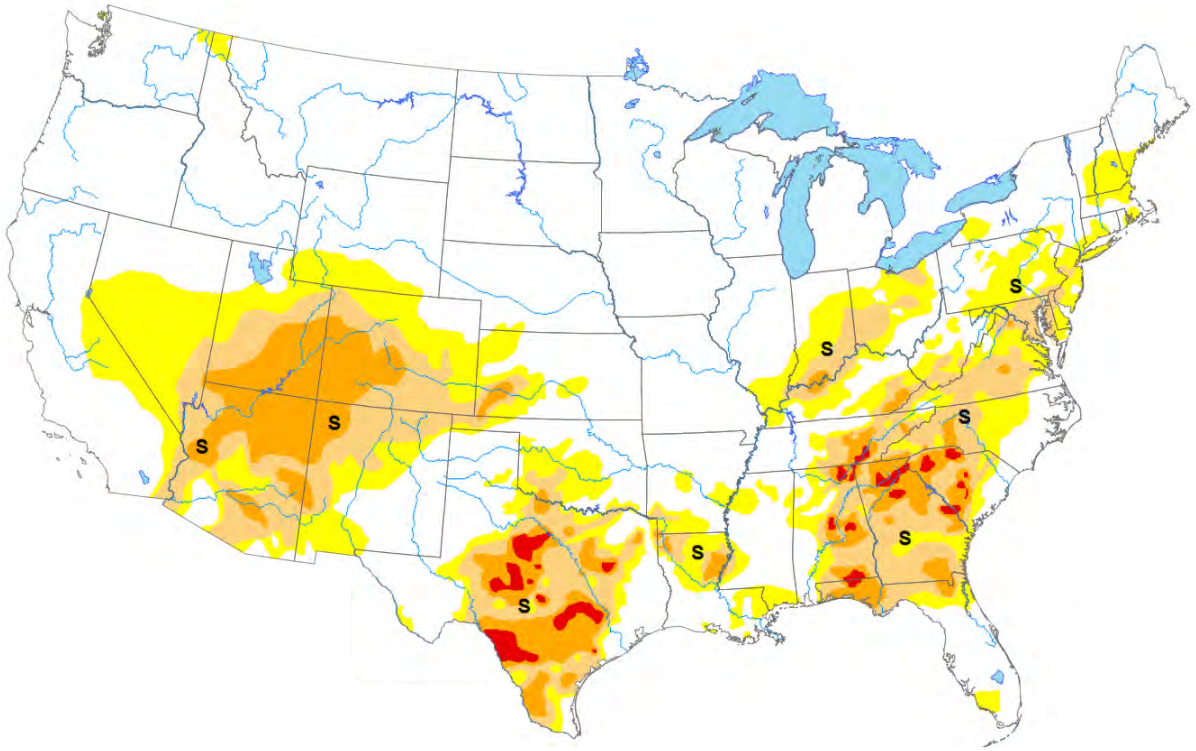

*Midwest Drought Meeting 20 November 2019*

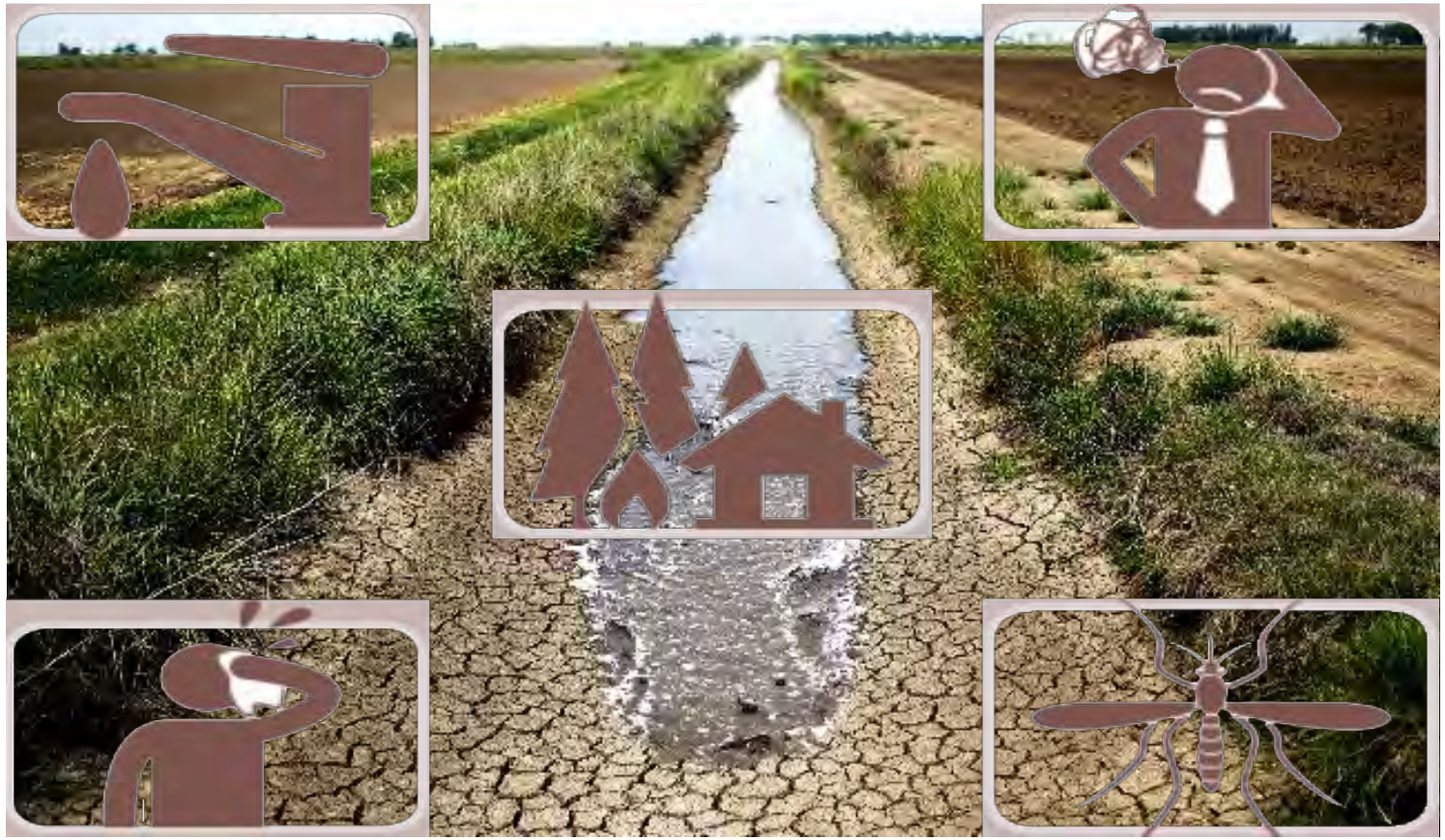
# Drought Monitor

Data valid: October 23, 2019




Data valid: October 22, 2019





# Example: Potential Health Effects of Drought

- **Compromised quantity and quality of potable water**
- **Diminished living conditions**
  - Impacts on behavioral health
  - Decreased air quality
  - Increased risk of injury
- **Increased disease incidence**
- **Compromised food and nutrition**

# Challenges of Assessing Health Effects of Drought

- Drought can be slow-evolving
- Difficult to define when drought begins and ends
- Impacts are not immediate
- Often requires intermediate steps for health outcomes
- Surveillance not designed to connect drought and health
- Surveillance often not long enough to determine outcomes

# Disaster Epidemiology & Response Team

**Advance Science**

- Research

**Build Capacity**

- Training
- Tools, guidance docs, materials


**Provide Assistance**

- Response
- Disaster surveillance
- Needs assessments

# Community Assessment for Public Health Emergency Response (CASPER)

# What is a Needs Assessment?

**A systematic process of information collection and analysis regarding the type, depth, and scope of a problem**

**Can be *rapid* or *in-depth***

- Rapid (RNA): information collected and findings generated over 1 day to few weeks, ideally within 5 days
- In-depth: comprehensive look to identify recovery-oriented needs, capacities, and gaps taking several months

# Importance of RNAs

- Provides situational awareness
- Determines needs of affected population, especially with resource limitations
- Provides basis for interventions or follow-up

ONE type of RNA

Provides *household-based* information about a community, quickly and at low-cost

Used in both disaster and non-disaster settings

Quick, reliable public health and basic needs data to inform decision-makers

Is generalizable, flexible, and uses simple reporting format

Cluster sample methodology – two stage (30x7) design

Results are descriptive of the entire sampling area

# Community Assessment for Public Health Emergency Response (CASPER)

# CASPER Methodology Overview

Two-stage probability sampling

30 clusters

7 households

Household interview

Data weighting to adjust to obtain population estimates

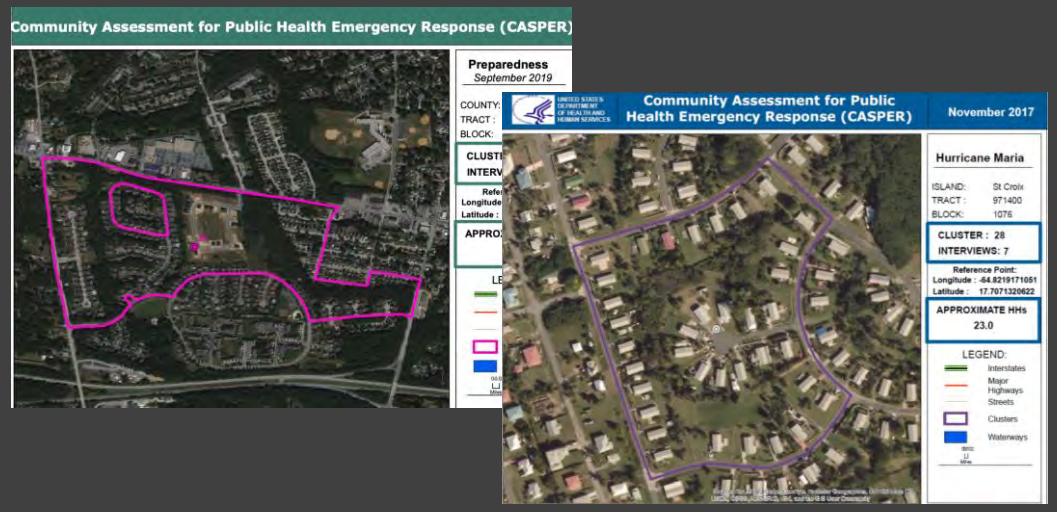
Report generated within 36 hours of data collection and shared with key stakeholders and decision-makers

# CASPER Materials

| | |
|---|---|
| Consent form | • Verbal consent, no PII |
| Questionnaire | • Short, closed-ended, actionable |
| Tracking form | • Tracks EVERY household attempted |
| Referral form | • For emergent needs |
| Public health materials | • Helps with community participation<br>• Opportunity to get message out |

# Stage 1: Selecting 30 Clusters

- What is a cluster?
  - Mutually exclusive with a known number of households
    - Census blocks are ideal clusters
- Select probability proportional to size
  - Clusters with more households have higher chance of selection
  - Data are weighted to obtain estimates




**STEP-BY-STEP**

1. List all blocks in the sampling frame with their corresponding number of households
2. "Number" each household
3. Randomly select 30 clusters using probability proportional to size *(number of households)*

   *NOTE: some clusters may be chosen twice*
4. Map the 30 clusters using mapping website or GIS software

# Stage 2: Selecting Households

## Systematic sampling

- Select everything *n*th house, with *n* based on size of the cluster
- Replace households only if *vacant*, *refused*, or *after THIRD attempt with no answer*
- The goal is to be sure interviews are spread out across the cluster

## Steps in the field

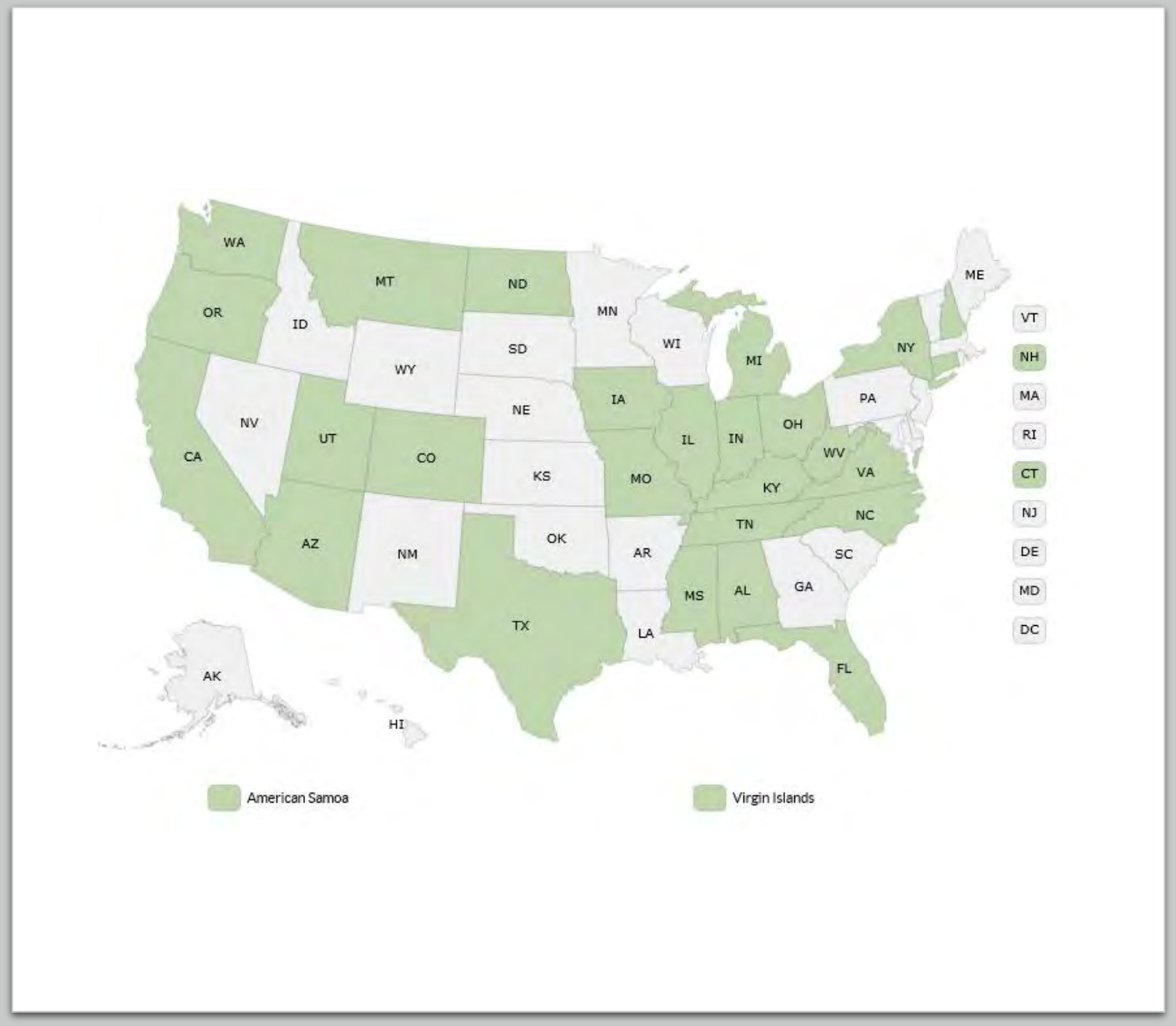
- Receive verbal consent
- Hand out public health information
- Report any emergencies
- Track all households!

# Just-In-Time Training

- 3-6 hours of training
  - One day in advance OR morning of first day
- Items to cover
  - Background, objectives, and methodology
  - Safety
  - Roles, responsibilities, and logistics
- Familiarize teams with materials
  - Questionnaire, tracking form, etc.
  - Any technology (tablets, GPS, etc.)

# Use of CASPER

- **Throughout disaster cycle and in non-emergent settings**
- **Population representative data**
  - Determine if 30x7 method is appropriate (size, feasibility)
- **Over 120 CASPERs conducted in past decade**
  - Approximately one half are preparedness
  - One quarter are response
  - Increasing number of recovery and “other” (e.g., opioids, H1N1, chronic respiratory conditions)



# Impact of Past CASPERs

| | |
|---|---|
| Resources | Allocate scarce resources<br>Respond to specific needs |
| Support | Provide valid information for decision-making or rumor control<br>Support funding of projects |
| Messaging | Target communication messages and education |
| Future planning | Modify emergency management plans |

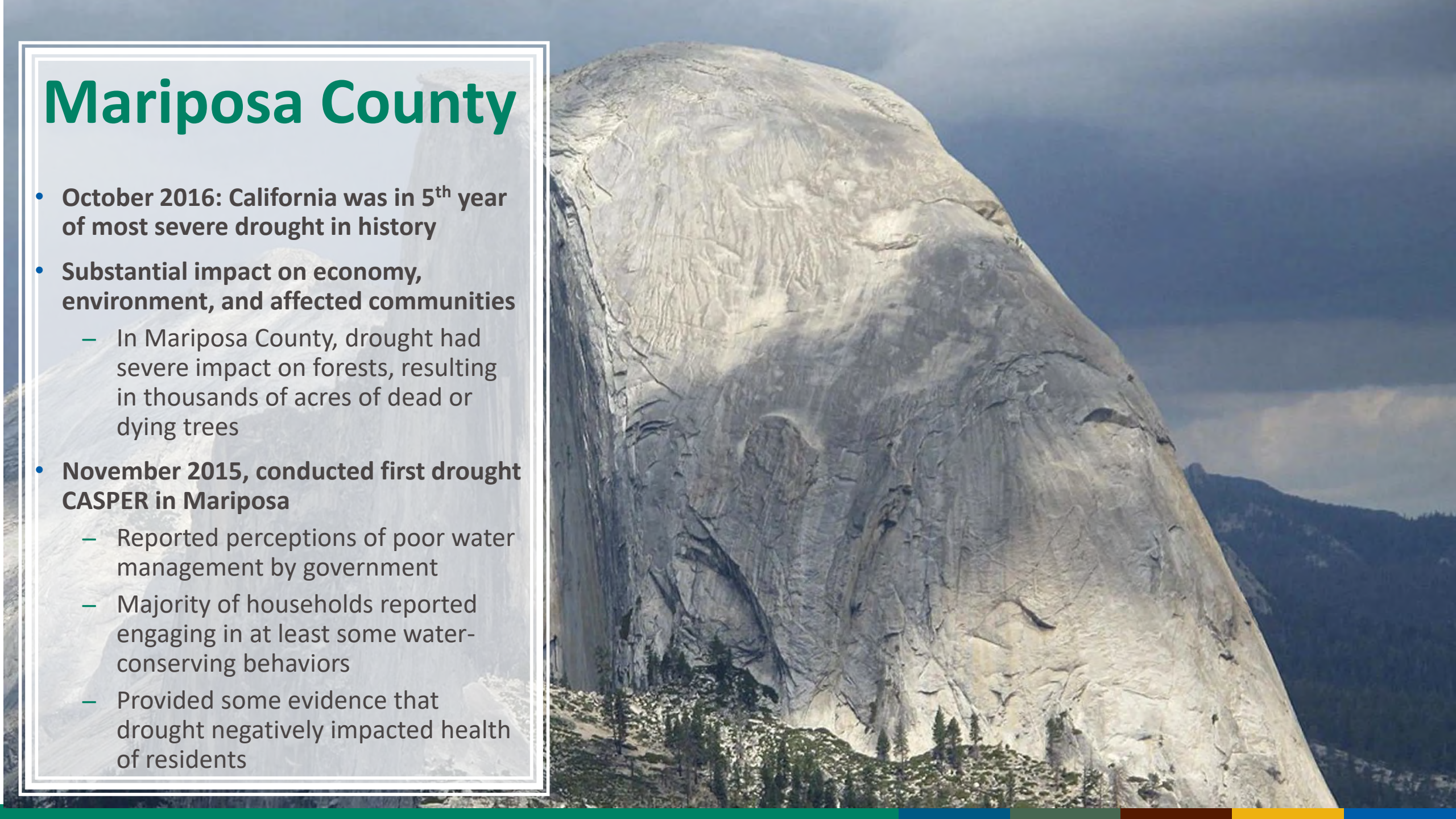
# 2016-2017 Drought CASPERs

- **Sampling Frames**
  - Mariposa County, CA – October 2016
  - Crook County, OR – May 2017

- **Objectives**
  - Address ongoing drought effects within community
  - Conduct descriptive analysis of health effects associated with drought
  - Develop recommendations for improving response

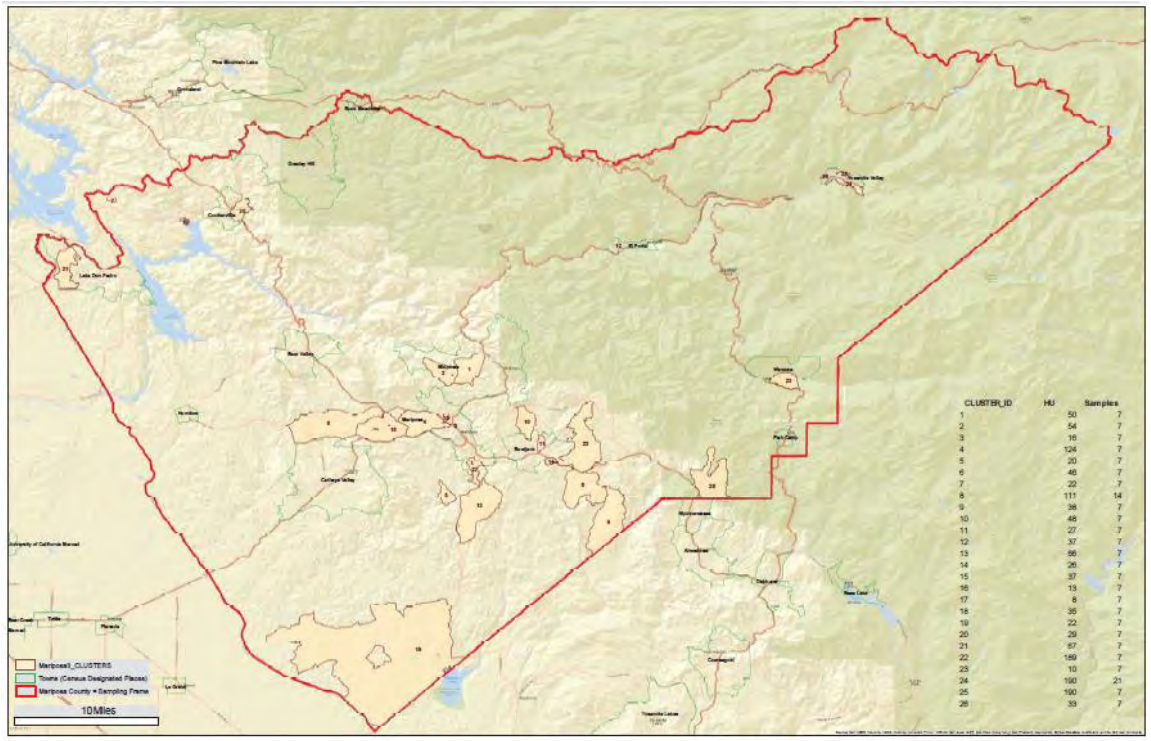
# Mariposa County

- **October 2016: California was in 5th year of most severe drought in history**
- **Substantial impact on economy, environment, and affected communities**
  - In Mariposa County, drought had severe impact on forests, resulting in thousands of acres of dead or dying trees
- **November 2015, conducted first drought CASPER in Mariposa**
  - Reported perceptions of poor water management by government
  - Majority of households reported engaging in at least some water-conserving behaviors
  - Provided some evidence that drought negatively impacted health of residents

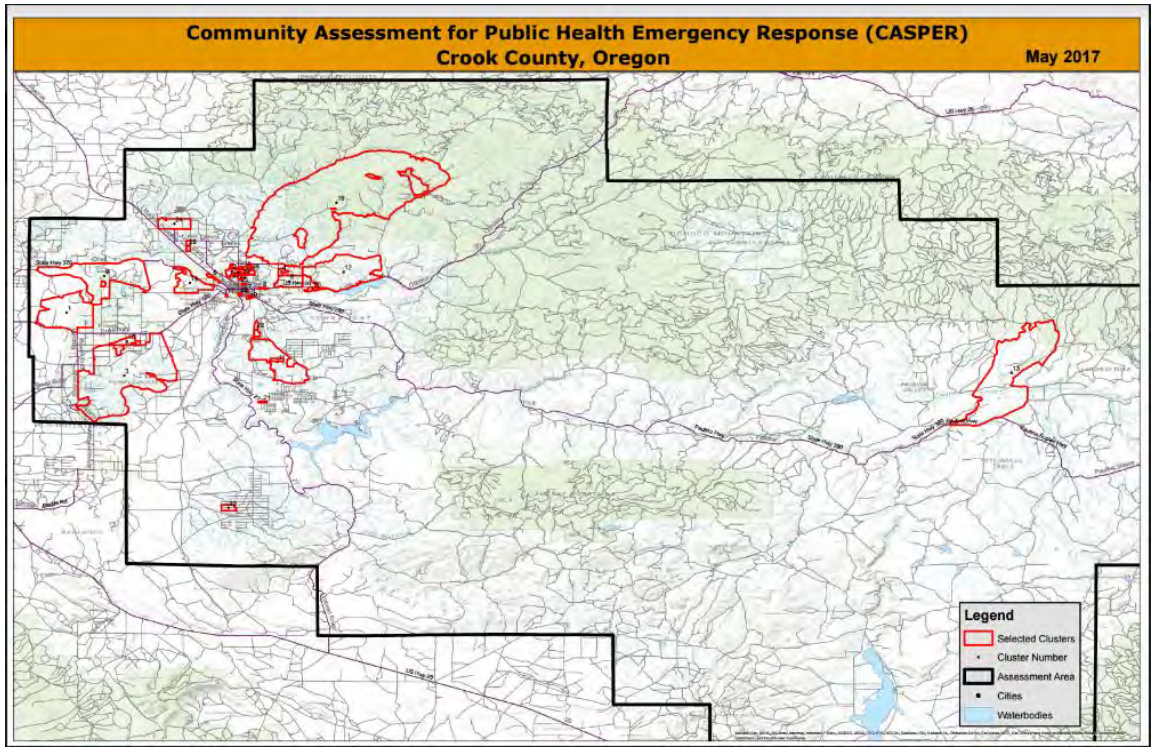


# Crook County

- **Severe impact on snowpack**
  - Led to below average irrigation and stream flows
  - affected local farmers/ranchers
- **May 2017: Crook county in a drought ready state**
  - February 2014: State of Emergency due to the dry conditions, low snowpack, and lack of precipitation
  - April 2015: continued State of Emergency as projected forecasts did not expect to alleviate the drought conditions
  - 2016: received more snowpack, however threat of drought remained each summer




Mariposa County: 7,693 occupied HHs




Crook County: 10,202 occupied HHs

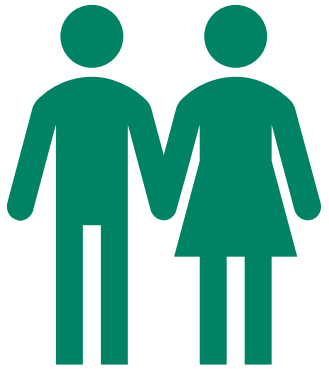
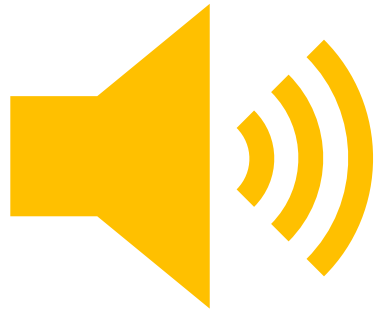
# Sampling Frames

# Response Rates

| | Mariposa County | | Crook County | | |
|---|---|---|---|---|---|
| | Percent | Rate | Percent | Rate | Description |
| **Completion** | 90.0 | 189/210 | 81.9 | 172/210 | $\frac{\text{Total completed}}{210}$ |
| **Cooperation** | 75.3 | 189/251 | 59.1 | 172/291 | $\frac{\text{Total completed}}{\text{Total contact made}}$ |
| **Contact** | 46.6 | 189/406 | 42.7 | 172/403 | $\frac{\text{Total completed}}{\text{Total selected}}$ |

# Background Information

*Mariposa County*

| 77.7% | 64.5% | 43.1% | 99% |
|---|---|---|---|
|  |  |  |  |
| **Single Family Home** | **Own their residence** | **Over 65** | **Speak English** |

| 86.5% | 83.6% | 49.6% | 99% |
|---|---|---|---|

*Crook County*

# Water Conservation Practices

| | Mariposa County (n=189) | | | Crook County (n=172) | | |
|---|---|---|---|---|---|---|
| | Estimate | Percent | 95% CI | Estimate | Percent | 95% CI |
| **Household has taken the following steps to reduce water usage** | | | | | | |
| Reduced water usage | 6,636 | 86.3 | 81.0–91.5 | 4,508 | 45.7 | 36.4–55.0 |
| Reduced water for lawn/landscape | 5,317 | 69.5 | 57.2–81.7 | 3,969 | 40.3 | 31.0–49.5 |
| Shortened shower/bathing times | 5,197 | 67.6 | 59.8–75.3 | 3,055 | 31.0 | 21.9–40.0 |
| Decreased washing HH laundry | 4,311 | 56.0 | 46.8–65.2 | 2,096 | 21.3 | 14.9–27.6 |
| Reduced how often flush toilet | 4,043 | 52.6 | 43.4–61.7 | 1,946 | 19.7 | 12.7–26.8 |
| Reduced how often shower/bath | 3,504 | 45.5 | 37.4–53.7 | 1,760 | 17.6 | 11.6–24.1 |
| Stopped gardening | 2,938 | 38.2 | 27.9–48.5 | 460 | 4.7 | 1.6–7.7 |
| Washed hands less/shorter time | 2,766 | 36.0 | 26.9–45.0 | 1,541 | 15.6 | 9.6–21.6 |
| Created system to capture/reuse H2O | 2,141 | 27.8 | 20.0–35.7 | 853 | 8.7 | 3.5–13.8 |
| Reduced outdoor rec. time | 1,677 | 21.8 | 12.3–31.3 | 1,739 | 17.6 | 9.3–25.9 |
| Drank less water | 847 | 11.0 | 3.8–18.3 | 238 | 2.4 | 0.1–4.8 |

# Drought Beliefs

| | Mariposa County (n=189) | | | Crook County (n=172) | | |
|---|---|---|---|---|---|---|
| | Estimate | Percent | 95% CI | Estimate | Percent | 95% CI |
| **Household identified the following statements as TRUE** | | | | | | |
| Droughts caused by lack of rain/snow | 7,252 | 94.3 | 90.8–97.7 | 9,121 | 92.5 | 82.9–93.2 |
| Some aren't cutting water enough | 6,237 | 81.1 | 73.0–89.2 | 7,098 | 72.0 | 64.1–79.9 |
| Overuse of water by cities | 6,143 | 79.9 | 73.5–86.2 | 4,424 | 44.9 | 35.9–53.8 |
| Increased demand for water | 5,606 | 73.9 | 67.4–80.4 | 7,741 | 78.5 | 68.8–88.2 |
| Droughts are caused by climate change | 5,494 | 71.4 | 65.1–77.8 | 6,215 | 63.0 | 54.4–71.7 |
| Poor water management by the govt | 4,847 | 63.0 | 54.7–71.3 | 4,145 | 42.0 | 33.6–50.5 |
| Droughts are caused by a higher power | 3,034 | 39.4 | 32.2–46.6 | 3,813 | 38.7 | 29.4–47.9 |
| Too much water used to protect wildlife | 1,228 | 16.0 | 10.3–21.6 | 1,215 | 12.3 | 7.2–17.5 |
| Droughts increased wildfire risk | – | – | – | 9,121 | 92.5 | 85.2–99.8 |
| Poor water management by ag industry | – | – | – | 2,856 | 29.0 | 22.0–35.9 |
| Too much water for ranches/livestock | – | – | – | 1,056 | 10.7 | 5.4–16.0 |

# Impacts of Drought

| | Mariposa County (n=189) | | | Crook County (n=172) | | |
|---|---|---|---|---|---|---|
| | Estimate | Percent | 95% CI | Estimate | Percent | 95% CI |
| **Drought has negatively affected household's…** | | | | | | |
| Peace of mind | 3,583 | 46.6 | 37.5–55.6 | 1,646 | 16.7 | 11.4–22.0 |
| Property | 3,067 | 39.9 | 32.0–47.8 | 919 | 9.3 | 4.4–14.3 |
| Finances | 1,500 | 19.5 | 12.4–26.6 | 829 | 8.4 | 1.2–15.7 |
| Health | 639 | 8.3 | 4.6–12.0 | -- | -- | -- |
| Other | 574 | 7.5 | 3.4–11.5 | 615 | 6.2 | 2.3–10.2 |

- **6.6% in Mariposa and 3.1% in Crook said drought affected their job/income**
- **7.1% of households in Crook experienced more stress due to potential future impacts to their jobs, crops, land, or other**

# Key Findings

Approximately 20% (Mariposa) and 8% (Crook) reported a decrease in well water production

Majority of households in Mariposa did not participate in their dry well program

86% in Mariposa and 46% in Crook reduced water usage in response to shortages

36% washed hands less or for a shorter time in Mariposa and 16% in Crook County

The majority (72%, 63%) of households believe drought is caused by climate change in Mariposa and Crook Counties

47% of households stated that drought has negatively affected peace of mind in Mariposa and 17% in Crook County

# Key Findings

15% of households reported worsening of at least one chronic condition from drought in Mariposa and 10% in Crook county

14% and 8% of households, respectively, reported poor or fair general health

In Mariposa County, almost 40% of households reported a negative effect on property

62% had dead/dying trees on their property

13% considered moving because of the drought

In Crook County, the majority of households practice wildfire mitigation

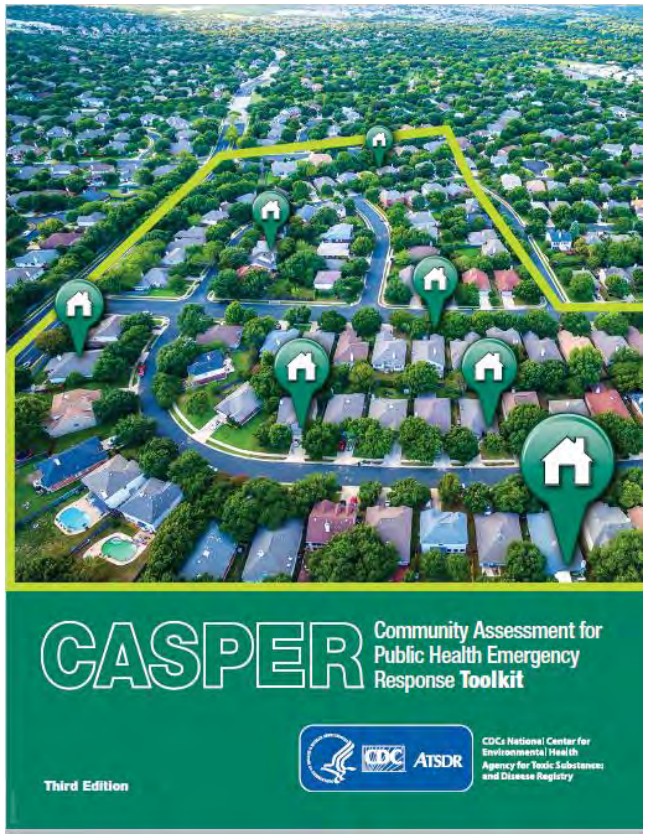
41% have concerns about swimming in recreational waters

25% reported observing more mosquitoes

Top response to greatest need was “nothing/no needs” in both counties (40%, 51%)

# Impact of CASPERs

- **Developed (and continued) awareness campaigns, hosted community workshops**
  - Crook County's Wildfire mitigation programs
  - Mariposa County's Dry Well Program
  - Practice of capturing and reusing water for conservation purposes
- **Promoted proper hygienic practices, especially regarding hand-washing behaviors**
- **Expanded mental health services to serve those under acute stress from the drought or drought-related consequences**



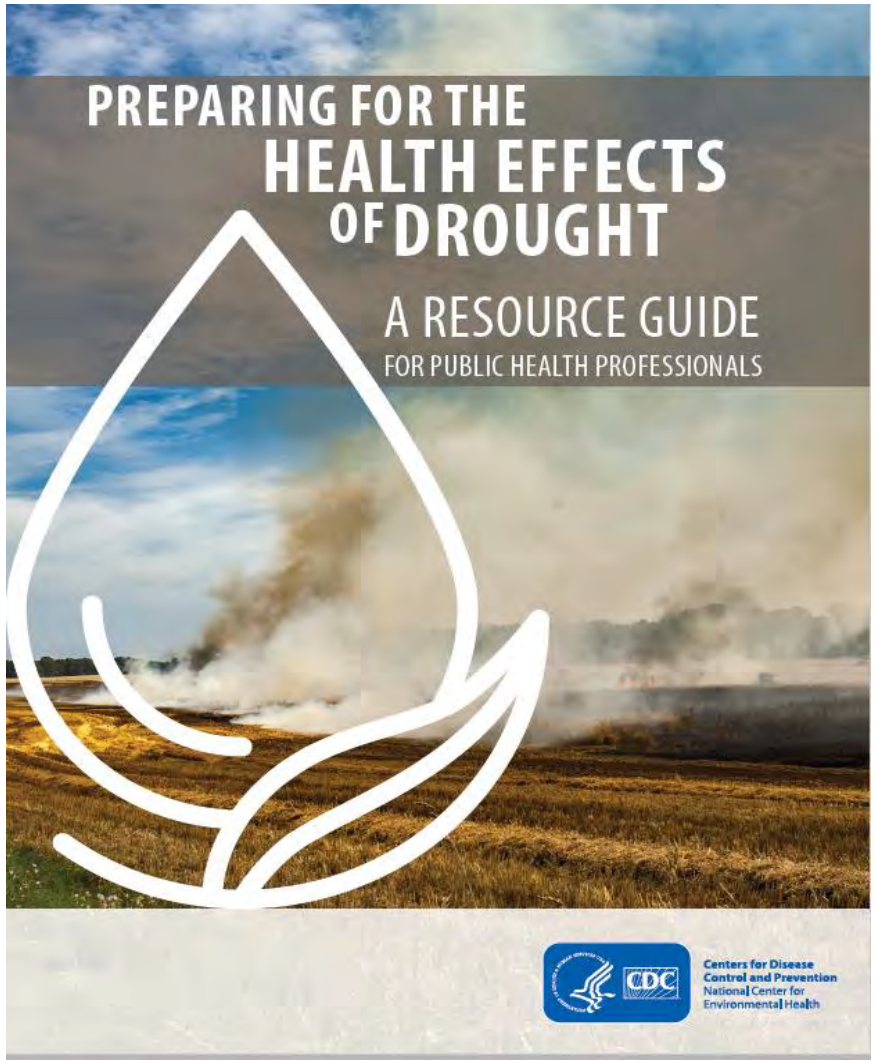

# Requesting CASPER

- **Technical assistance from Atlanta**
  - Contact CDC: Amy Helene Schnall (GHU5@cdc.gov) or CASPER@cdc.gov
  - Wide range of technical assistance provided (free!)
- **In-field assistance**
  - State epidemiologist,  health officer, and/or tribal council leader must make official request to CDC Health Studies

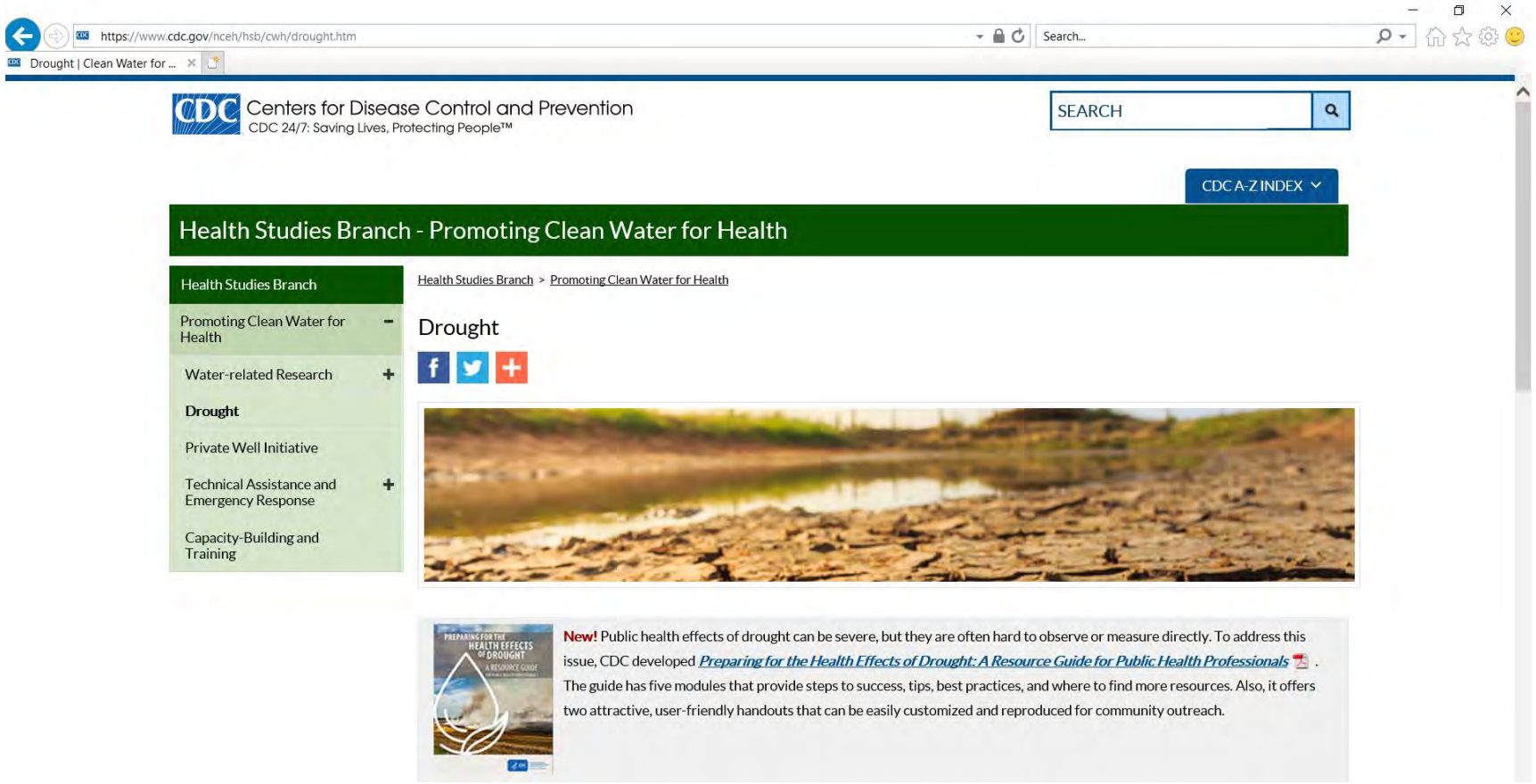
https://www.cdc.gov/nceh/hsb/disaster/casper/default.htm

# Preparing for Health Effects of Drought: A Resource Guide for Public Health Professionals

- Interviews with public health professionals
- Review of state drought plans
- Literature review on health effects of drought



# Preparing for Health Effects of Drought: A Resource Guide for Public Health Professionals




https://www.cdc.gov/nceh/hsb/cwh/drought.htm

# Helpful Links & Resources

- **CASPER Website** https://www.cdc.gov/nceh/hsb/disaster/casper/default.htm
- **CASPER Training Template** https://www.cdc.gov/nceh/hsb/disaster/casper/docs/CASPER_2018_template.pptx
- **CASPER YouTube video** https://youtu.be/bTc91V1Xexg
- **Overview fact sheet** https://www.cdc.gov/nceh/hsb/disaster/casper/pdf-html/casper_cap.html
- **Flint Michigan** https://www.cdc.gov/nceh/hsb/disaster/casper/pdf-html/flint_water_crisis_pdf.html
- **Preparedness questionnaire template** https://www.cdc.gov/nceh/hsb/disaster/casper/docs/CLEARED_CASPER_Toolkit.pdf#page=71

# Acknowledgements


- **California**
  - Jason Wilken
  - Svetlana Smorodinsky
  - Rebecca Laws
  - Eric Sergienko
  - Dana Tafoya
  - Mariposa County Health Department
- **Oregon**
  - Meredith Jagger
  - Melissa Powell
  - Vicky Ryan
  - Crook County Health Department
- **Interview team members**
- **Survey Respondents**


# Thank You

**Tesfaye Bayleyegn**
BVY7@cdc.gov
770.488.3476

**Amy Helene Schnall**
GHU5@cdc.gov; CASPER@cdc.gov
770.488.3422

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.