Fire and Water: Investigating Drinking Water Contamination in Paradise, California after the Camp Fire

GINA M. SOLOMON, M.D., M.P.H.

PRINCIPAL INVESTIGATOR, PUBLIC HEALTH INSTITUTE, OAKLAND, CA

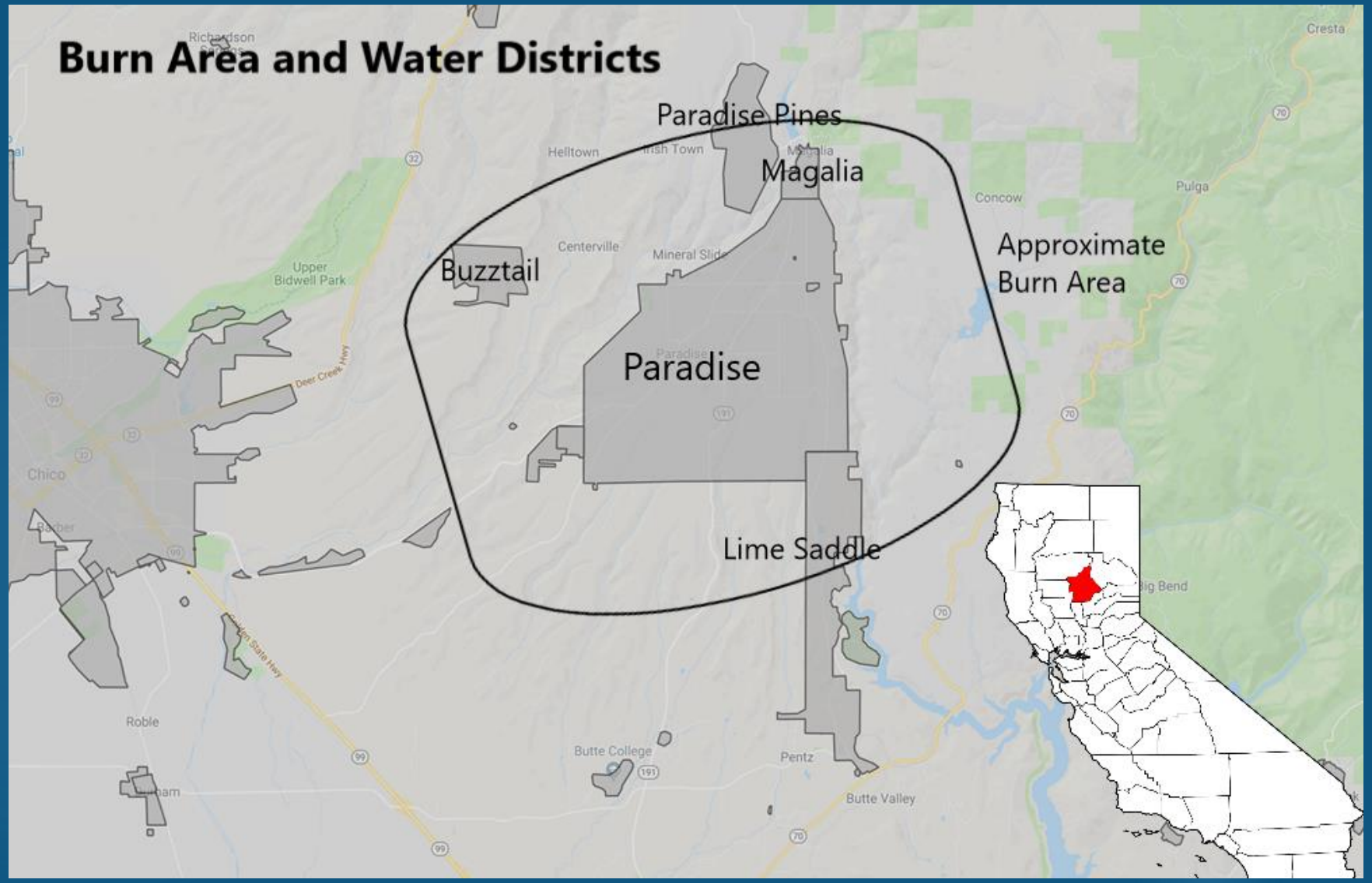
CLINICAL PROFESSOR, UNIVERSITY OF CALIFORNIA SAN FRANCISCO

Gina.Solomon@phi.org

Today's Training

1. Overview of the study
2. Eligibility criteria
3. The Observational Checklist
4. The Log book
5. Safety
6. Logistics

Camp Fire Approximate Burn Area




Magalia and Paradise Pines
Helltown
Irish Town
Magalia
Centerville
Mineral Slide
Paradise
Gold Nugget Museum
Skyway Rd
Pentz Rd
Wagstaff Rd
Clark Rd
Billie Rd
Oliver Rd
Elliott Rd
Sawmill Rd
Pearson Rd
191
Neal Rd
To Chico
Lime Saddle area

Study Overview

- **Aim:** Test drinking water from homes affected by the Camp fire for benzene and other chemicals
- **Goal:** Better understand, identify, and address drinking water contamination after fires
- **Timeframe:** September 2019 – August 2020
- **Funder:** National Institutes of Health (NIH) - National Institute for Environmental Health Sciences (NIEHS)

Project Questions

1. Benzene has been detected in the water systems, but is it also in the homes?
2. Where is the benzene coming from?
3. Are there other contaminants that haven't yet been identified?

Study Team

- Study lead
- Overall study coordination and implementation

- Study design
- Data analysis

- Air monitoring
- Laboratory analysis
- Connect with other studies related to the Camp fire

- Data mapping
- Community outreach
- Results return

National Institute for Environmental Health Sciences (NIEHS) grant award number R21ES-031501

Study Team

Gina Solomon, MD, MPH	PHI and UCSF	Principal Investigator
Daniela Morales	PHI	Research Associate
Peggy Reynolds, Ph.D.	UCSF	Epidemiology/statistics
Susan Hurley, MPH	UCSF	Project Management
Minhthu Le	UCSF	Data management
Paul English, Ph.D.	CDPH and PHI	Oversees mapping & communication
Michelle Wong, MPH	PHI	Results communication
Justin Howell	PHI	GIS mapping
Irva Hertz-Picciotto, MPH, Ph.D.	UC Davis	Liaison to U.C. Davis studies
Camille Burlaza	UC Davis	Research Associate
Tom Young, Ph.D.	UC Davis	Non-targeted analysis

Water Testing

	Phase One (October)
How many homes?	About 175 homes
How will you sample the water?	Kitchen tap, no filter
What will you test for?	>120 volatile organic compounds (VOCs) at BC Laboratory, Bakersfield, CA
Will else will you test for?	Will re-sample homes with elevated VOCs
When will results be ready?	Will return results to participants in 2-3 weeks

Which homes are eligible to be part of the study?

1. Served by Paradise Irrigation District (PID) or Del Oro Water Company
2. Homes only. No public or commercial buildings or schools.
3. Standing homes only.
4. Renters can participate, but we need the landlord's permission

More considerations

- Want homes from across the entire area
- Will sample from a few homes outside the burn area for comparison

Responsibilities

Team Member 1

- Must be trained in human subjects research

- Obtains informed consent from the participant
- Administers the questionnaire
- Maintains custody of daily schedule, consent forms and questionnaires

Team Member 2

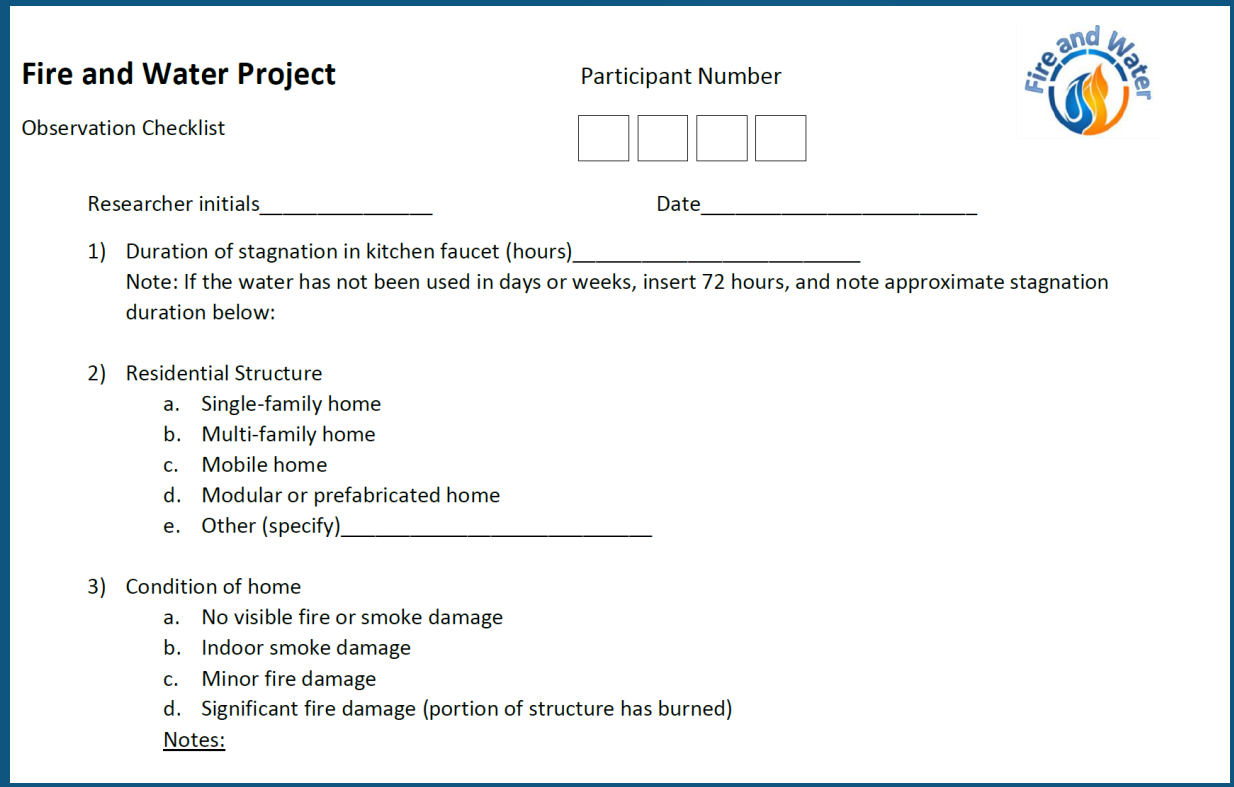
- Does not need to be trained in human subjects research

- Collects tap water sample
- Fills out chain of custody form
- Takes notes in Log book
- Maintains custody of water samples, chain of custody forms, log book, and observational checklists

Both Team Members: Complete observational checklist on structure and pipes

Observational Checklist: General

- Do the best you can, but don't get behind on the schedule.
- It's OK to leave things blank, or to make a note indicating uncertainty.
- Document with photographs; note location of each photo in the logbook.
- Safety is the most important consideration!



Fire and Water Project Participant Number

Observation Checklist ☐☐☐☐

Researcher initials_____ Date_____

1) Duration of stagnation in kitchen faucet (hours)_____
   Note: If the water has not been used in days or weeks, insert 72 hours, and note approximate stagnation duration below:

2) Residential Structure
   a. Single-family home
   b. Multi-family home
   c. Mobile home
   d. Modular or prefabricated home
   e. Other (specify)_____

3) Condition of home
   a. No visible fire or smoke damage
   b. Indoor smoke damage
   c. Minor fire damage
   d. Significant fire damage (portion of structure has burned)

   Notes:

Observational Checklist

- Duration of stagnation in kitchen faucet (hours)
- Residential Structure (apartment, home, mobile home)
- Condition of home
- Condition of yard
- Water service connection (condition of meter)
- Distance from the water meter to the home
- Home construction (basement, crawl space, slab-on-grade)
- Composition of pipes

The Water Meter

- Meter may be anywhere along the edge of the property line, usually near the street
- Rectangular cover, may be plastic or concrete
- Use a screwdriver to pry up the lid. Wear gloves, if possible
- Try to clean off the pipe nearest the house, and take a photo of the meter and pipe
- Identify the kind of pipe, if possible

Observational Checklist: Distance from Meter to House

- If the meter is relatively close to the house, and you have a Zircon sonic measure or an 100 foot tape measure, use that to measure the distance.
- If you don't have a Zircon or the meter is >50 feet from the house, then pace out the distance if it's safe to do so.
- A pace = 2 normal-length steps. Your pace is approximately equal to your height. So record the number of paces and multiply by your height to estimate the distance.
- If it's not safe or possible to pace the distance, then make a rough estimate and note that it's only an estimate.

Identifying Pipes

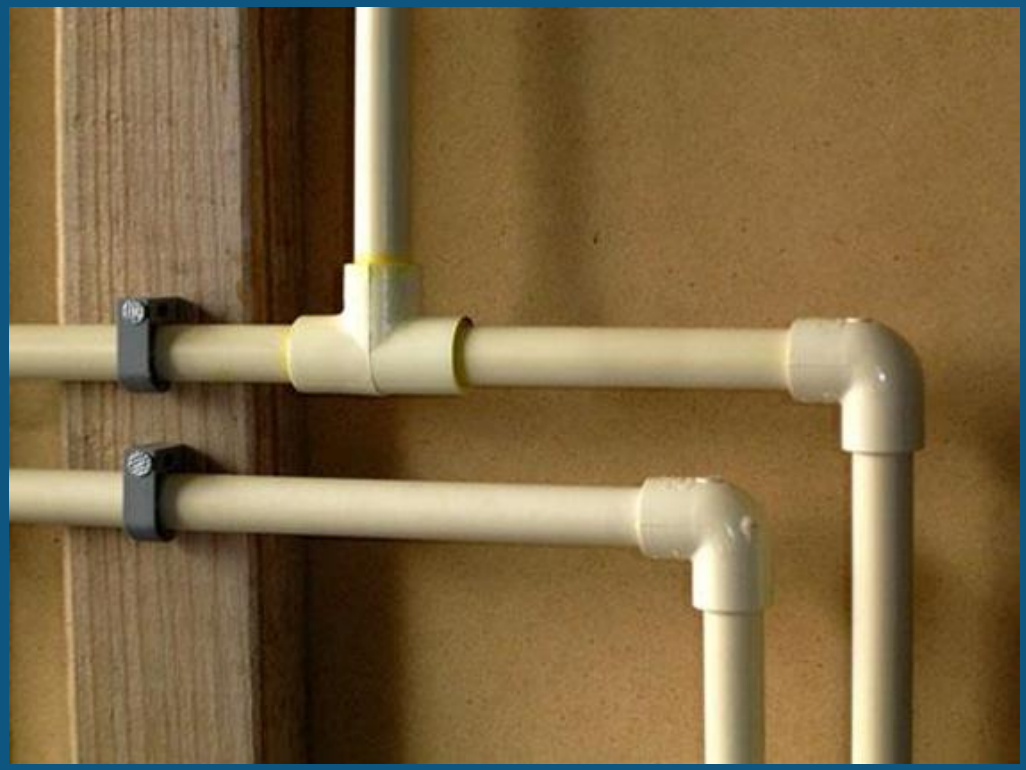
- Locate exposed pipes
  - Under the kitchen sink
  - Around the hot water heater and near the washing machine
  - Where the pipes enter the house
  - At the house-side of the water meter
- Tap on the pipe with a screwdriver
  - Metal or plastic?
- Then look carefully at the pipe to identify the type of metal or plastic
  - It's usually written on plastic pipe
  - If you can't identify the exact type, at least note if pipe is metal or plastic

Metal Pipes

- Copper
- Galvanized Iron

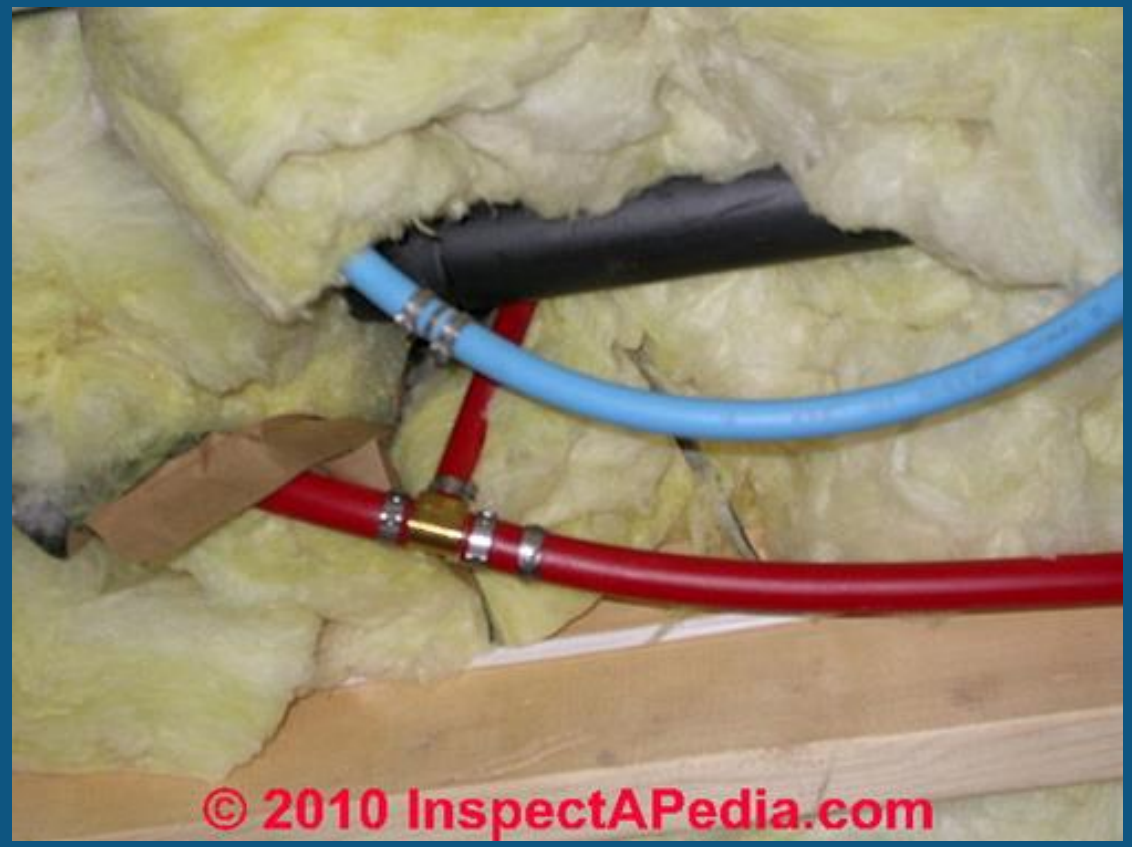
Chlorinated polyvinyl chloride (CPVC)

- Very common
- Rigid
- Dull white, or cream colored



Cross-Linked Polyethylene (PEX)

- Very common in newer homes, or in areas where pipes were repaired relatively recently
- Flexible plastic
- Generally colored by water temperature
  - (red = hot, blue = cold)
- Sometimes PEX pipes are shiny white



Other Plastic Pipes

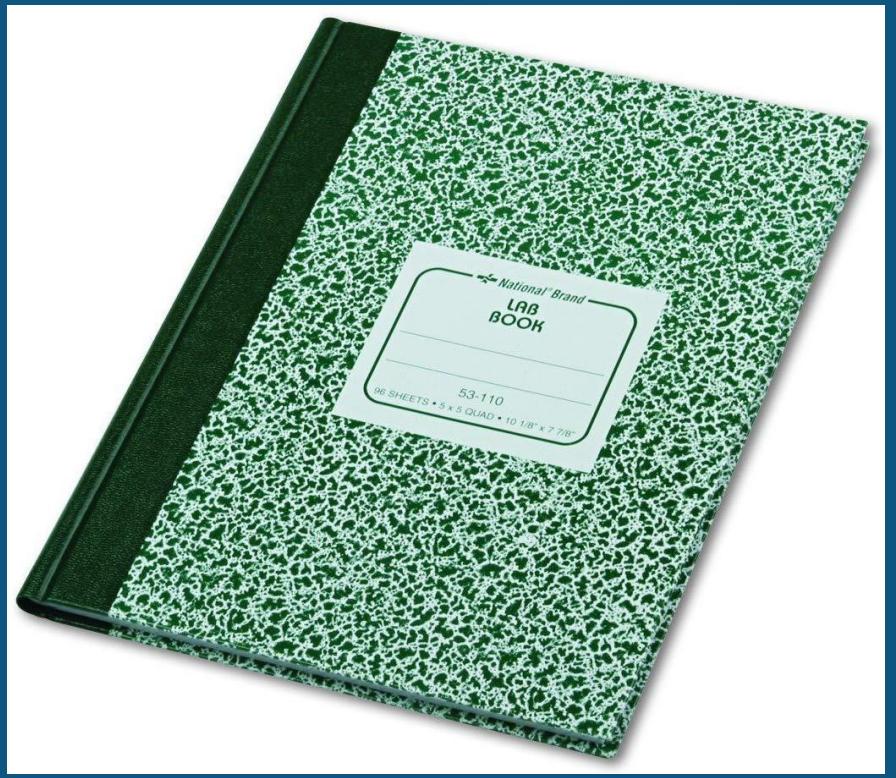
- HDPE – Rigid, black or blue
- Polybutylene – Fairly rigid, Grey

HDPE Pipe

Polybutylene Pipe

The Log Book

- Purpose:
  - To keep a permanent record of each sampling team's daily field activities.
  - To capture information that doesn't clearly fit on any of the other forms.
- Do not put PID (participant names, addresses, or other personal information) in the Log book! Use address codes and sample codes only!
- Consider the Log book to be a public document.



The Log Book

- Record the following information:
  - Date, team member names, time team left the base (hotel)
  - Time arrived and departed each sampling site (using site codes)
  - Time each sample is collected, and sample numbers
  - Time and location where field blank is collected
  - Whether or not aerator is removed from faucet
  - Any potentially relevant observations not captured elsewhere
  - Any issues or deviations from protocol

Safety

- If you don't feel safe entering a home, don't (& call Gina)
- Be careful walking along roads and across uneven ground; don't do it if you don't feel safe
- Wear gloves if you're dealing with water meters (spiders, or injured fingers!)
- Be careful driving, don't rush!

To Bring

- Long pants, long –sleeved shirts, jacket, fleece
- Solid, closed shoes -- light hikers or solid sneakers are best
- Gloves – gardening gloves are best, or any gloves that you don't mind getting dirty, or dish gloves
- A bag to carry stuff (canvas grocery bag, backpack, or shoulder bag)
- A small, powerful flashlight or headlamp
- Hat, sunglasses, sunscreen
- A water bottle, favorite snacks, a small cooler if you want cold water
- Any medications you might need

Schedule

- 07:45 – Gather in lobby at the Oxford Inn and Suites, Chico, CA
  - Sign in, collect all sampling materials
- 08:00 – Depart for Paradise, CA
- 08:30 – Arrive at first sampling site
- 12:30 (approx.) – Break for lunch
- 13:30 – Arrive at first afternoon sampling site
- 17:30 – Finish last sampling site, meet courier
- 18:00 (approx.) – Back at Oxford Inn and Suites, Chico, CA
- 20:00 – Training for newly arriving samplers

Things to review before coming

- Sampling protocol
- Consent form
- Questionnaire
- Observational checklist
- Field Guide to Pipes