

U.S. Department of the Interior  
U.S. Geological Survey  
Joint Funding Agreement  
FOR  
Water Resource Investigations

Customer #: 6000000828  
Agreement #: 25ZGJFA11000065  
Project #:  
TIN #: 94-6000539

Fixed Cost Agreement YES[ X ] NO[ ]

THIS AGREEMENT is entered into as of November 1, 2024, by the U.S. GEOLOGICAL SURVEY, California Water Science Center, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the Sonoma County Water Agency party of the second part.

1. The parties hereto agree that subject to the availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation for Lake Sonoma Soil Moisture Monitoring (see attached), herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50, and 43 USC 50b.

2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) include In-Kind-Services in the amount of \$0.00

- (a) \$32,302 by the party of the first part during the period  
November 1, 2024 to September 30, 2026
- (b) \$164,662 by the party of the second part during the period  
November 1, 2024 to September 30, 2026
- (c) Contributions are provided by the party of the first part through other USGS regional or national programs, in the amount of: \$0

Description of the USGS regional/national program:

- (d) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.
- (e) The performance period may be changed by mutual agreement and set forth in an exchange of letters between the parties.

3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.

4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.

5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.

6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.

7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.

8. The maps, records or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program, and if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at cost, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records or reports published by either party shall contain a statement of the cooperative relations between the parties. The Parties acknowledge that scientific information and data developed as a result of the Scope of Work (SOW) are subject to applicable USGS review, approval, and release requirements, which are available on the USGS Fundamental Science Practices website (<https://www.usgs.gov/office-of-science-quality-and-integrity/fundamental-science-practices>).

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9. Billing for this agreement will be rendered quarterly. Invoices not paid within 60 days from the billing date will bear Interest, Penalties, and Administrative cost at the annual rate pursuant the Debt Collection Act of 1982, (codified at 31 U.S.C. § 3717) established by the U.S. Treasury.

USGS Technical Point of Contact

Name: Mimi Payne  
Physical Scientist  
Address: Placer Hall 6000 J Street  
Sacramento, CA 95819  
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Telephone: (707) 547-1983  
Fax: (n/a)  
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Name: Carmen Diaz-Pensler  
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U.S. Geological Survey  
United States  
Department of Interior

Sonoma County Water Agency

Signature

By \_\_\_\_\_ Date: \_\_\_\_\_  
Name: Anke Mueller-Solger  
Title: Director, USGS California Water Science Center

Signatures

By \_\_\_\_\_ Date: \_\_\_\_\_  
Name:  
Title:

By \_\_\_\_\_ Date: \_\_\_\_\_  
Name:  
Title:

By \_\_\_\_\_ Date: \_\_\_\_\_  
Name:  
Title:

# Scope of work for USGS Lake Sonoma Soil Moisture Monitoring

## Cooperator: Sonoma County Water Agency

### CAWSC Proposal # 2025-02

Mimi Payne

Physical Scientist, Watershed Group

USGS California Water Science Center, Sacramento

The following is a preliminary scope of work for site selection and hydrologic monitoring in the Lake Sonoma watershed, in northern Sonoma County, California. The initial work for this project (completed under Proposal 2021-21 *Feather River Watershed Drought Study*) included site selection, permitting, and equipment purchases to install 2 real-time soil moisture monitoring stations. The proposed FY2025 and FY2026 work involves continued operations and maintenance (O&M) and data quality assurance and archival operations. Data for these sites would be transmitted and archived in the USGS Aquarius database and displayed publicly on the USGS National Water Information System (NWIS) (USGS, 2024).

#### Purpose

Soil moisture is a fundamental hydrologic parameter in estimating runoff, streamflow, and water availability. Soil moisture is under-observed, resulting in a large uncertainty. Incorporating soil moisture into statistical and hydrologic simulation models can improve streamflow and seasonal forecasts over using precipitation and snowpack measurements alone. The Lake Sonoma Watershed currently does not have any soil moisture monitoring stations. The USGS in cooperation with the Sonoma County Water Agency have initiated an effort to improve hydrologic monitoring, including streamflow and meteorological monitoring.

#### **TASK 1. Soil moisture response unit mapping** [This task has been completed].

The USGS has developed a map of soil moisture response units for the Lake Sonoma Watershed using a principal component analysis (PCA) to categorize and group the significant contributing factors to differing soil moisture response. This follows the methodology described by Curtis et al. (2019) and using input/data from the 2023 California Basin Characterization Model (BCM; <https://doi.org/10.5066/P9PT36UI>). The Lake Sonoma Watershed was classified into two SMRUs (Figure 1).

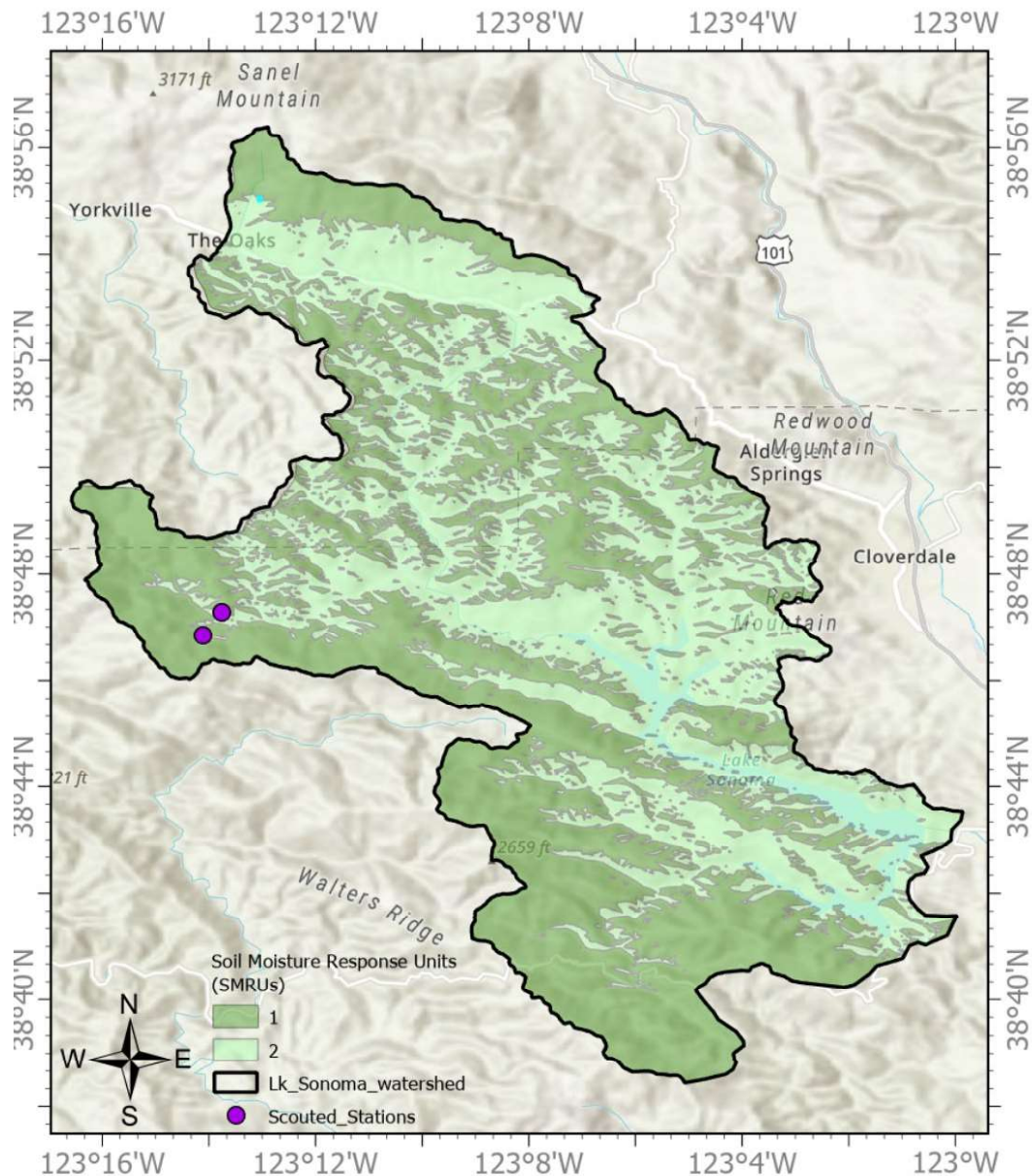
#### **TASK 2. Site selection and Permitting** [This task has been mostly completed].

The USGS has identified several (5) potential monitoring sites and is working with Sonoma County on landowner permission, access, and finalizing site selection for 2 sites.

The USGS has initiated environmental review and compliance in accordance with the National Environmental Policy Act (NEPA) and sites are expected to be covered by a categorical exemption (CE). To comply with the NEPA permitting process, we have conducted a Section 7 review of threatened and endangered species in the study areas and are in the process of a Section 106 review of the National Historic Preservation Act (Natural and Cultural Resources). We have identified and contacted 25

Federally recognized tribes with ancestral territory in the study areas and have been coordinating with the State Historical Preservation Office (SHPO).

The sites have not been finalized due to logistical difficulties of coordinating with in-person field visits to confirm site viability. Thus far, three sites have been visited and are usable with one of them on U.S. Army Corps Land. Since the other two sites that have been visited have a change in location outside of allowable perimeter for the initial permitting process, permitting efforts need to be completely redone for these two sites. Per the map, the sites in reference are the furthest west on the map and the US Army Corps site is the furthest south.



**Figure 1.** Map of soil moisture response units and their respective 5 potential soil moisture stations for the Lake Sonoma watershed.

### **TASK 3. Installation of soil moisture stations (tentatively planned for Dec-April 2024/2025)**

We propose to install two soil moisture monitoring stations, each representing one of the two SMRUs. Each site will have 5 soil moisture sensors at 5 cm, 10 cm, 25 cm, 50 cm, and 100 cm; total actual sensor depth will depend on soil depth. Sensors will be Campbell Scientific CS-655 sensors which use transmission line oscillation (TLO) technology (Caldwell, T. G., *et al.* (2018). Each sensor will measure soil moisture, soil temperature, and bulk soil conductivity at 1-minute intervals and report the 15-minute average. Data will be telemetered to the GOES satellite using a Sutron Satlink 3. Data will be transmitted hourly via satellite. During installations, four subsets of soil samples will be collected between 0-15 cm, 25 cm, 50 cm, and 100 cm. Samples will be sent to a laboratory to characterize soil properties such as texture, bulk density, and electrical conductivity for the lower depths. Results from sample testing will be used to calibrate the sites based on their texture analysis; results will be stored in NWIS.

### **TASK 4. Long term O&M**

Sites would be visited 3-4 times per year. During site visits, the soil moisture monitoring station is inspected. Approximately 20-30 soil moisture measurements in the area surrounding the station will be made using a hand-held, portable, Campbell Scientific HydroSense 2 (HS-2). Those measurements from the portable instrument will be compared to measurements from the upper (5- and 10-cm depth) in-situ sensors. As comparison measurements are collected over multiple seasons and a range of conditions (dry to wet), these data can be reviewed to determine if a bias correction is needed. Data collected from measurements will be stored in Aquarius in a sublocation in discrete readings. Continuous records for all 15 parameters will be reviewed quarterly following USGS QA/QC procedures (e.g. Caldwell, et al. 2022).

# CAWSC Data Management and Infrastructure Plan

## General Project Information

Lake Sonoma Moisture Monitoring Stations for Improved Streamflow Forecasting	
Project Short Title	Lake Sonoma Soil Moisture
Project Chief	Mimi Payne, <a href="mailto:mpayne@usgs.gov">mpayne@usgs.gov</a> , (916) 558 8510
Project Team Members	Mimi Payne – Project Lead; Nate Smalley – assists with installing soil moisture stations and working soil moisture records, Joe Lewis – assists with working soil moisture records; potentially have Jeff Gronemyer and Elias Tejeda assist with installing soil moisture stations. Marissa Wulff will assist with DMS decodes and getting sites established in NWIS.
Cooperator or Partner	Sonoma County Water Agency (SCWA)
Data Management Responsibility	USGS has overall data management responsibility for project-related data acquisition, processing, quality control, documentation, and preservation.
Start Date	October 1, 2024
End Date	September 30, 2026
Project Summary	Purpose of the project is to collect soil moisture data to understand the relationship between soil, plant and water processes that affect streamflow into Lake Sonoma reservoir. Soil moisture is under-observed, resulting in a large and important data gap. Incorporating soil moisture into statistical and hydrologic simulation models can improve streamflow and seasonal forecasts over using precipitation and snowpack measurements alone.
Data Sharing Agreement	No formal data sharing agreement in place but is in the process of being finalized. We will share all soil moisture data acquired from the USGS soil moisture stations and the data will be publicly available on NWIS.

## Acquire, Process, Analyze

*Describe datasets, models, software/code, and web tools produced and used by the project. Use a separate table to describe each distinct dataset or product.*

## Dataset(s)

Dataset (Soil Moisture Data)	
	Data parameters collected from the soil moisture sensors are: (74027) volumetric water content, (72253) temperature, (72205) bulk electrical conductivity, and (72259) dielectric permittivity. Type of data is recorded in 15-minute intervals at two locations in Sonoma County, CA during the funded two years of this project. We will publish soil moisture and temperature but keep bulk conductance and dielectric permittivity in Aquarius Time-Series.
	This is a continuous real-time dataset and will need to be refreshed 2-3 times per year when visits are made, and calibration checks for the top two sensors are performed. Soil sensor data workflow timeline is considered part of the standard review process. Time frame for working records will take a week each quarter.
Priority	Medium
	No existing data for this project exists. We have similar sites in the Feather River basin that is currently going through the DMS decodes process. Soil moisture stations are relatively new for CAWSC.
Format	Time-series data will be generated and maintained through Aquarius.
	<a href="#">In situ soil moisture sensors in undisturbed soils   U.S. Geological Survey (usgs.gov)</a> Soil moisture stations are relatively new to USGS, especially to CAWSC. The above paper demonstrates the installation process. An SOP for QA/QC of soil moisture data is in the process of establishment.
Fees	No fees associated with acquiring the data, all done through GOES telemetry.
	As mentioned, the QA/QC method is in the process of establishment. We plan to check the sites
Workflows	
Metadata	Standard protocols will be used to set up the sites with their metadata. USGS will be responsible for creating metadata files.

## Model(s)

No model nor code will be developed will be part of the project deliverables.



## **Software/Code and Web Tools**

No software or code will be used as part of this project nor as part of a project deliverable.

## Backup, Secure, and Preserve

*Describe the approach for storage and backup of project-related information. Consult with IT staff to ensure that applicable SOPs and guidelines are followed to ensure that project data are appropriately stored, backed up, and secured.*

Backup, Secure and Preserve	
Storage	Non-digital data will be scanned in and saved on the one drive; digital data, such as SVMAQ and photos, will be uploaded and saved to one drive.
Backup and Secure	Data from the two soil moisture stations will be downloaded during each visit (2-3 times per year) and uploaded to Aquarius and to the Watershed Sciences, Lake Sonoma One Drive for safe long-term storage.
Format	The final format of the data will be as a continuous time-series through Aquarius and available to the public through NWIS. Data releases are not required for this project.
Preserve (Short Term – Repository)	N/A this data will be in NWIS.
Preserve (Long Term – Archive)	Link does not work. N/A this data will be in NWIS and accessible through one drive.

## Publish and Share

<b><i>Identify the project deliverable(s) and data product(s) developed and released. Project Deliverables and Data Products</i></b>	
<b>Audience</b>	Intended audience is our cooperator, Sonoma County Water Agency, Lake Sonoma and Sonoma County residents, and the public. Data will be available to the public.
<b>Publication</b>	N/A. The deliverable is data publicly available through NWIS.
<b>Data Release</b>	N/A.
<b>Software Release</b>	N/A.
<b>Publication IPDS#</b>	N/A.
<b>Publication DOI#</b>	N/A.
<b>Data Release IPDS#</b>	N/A.
<b>Data Release DOI#</b>	N/A.
<b>Repository</b>	N/A.
<b>Restrictions</b>	No restrictions.

## Infrastructure and Equipment Planning

Infrastructure and Equipment Planning	
<b>Will Scientific Equipment or Infrastructure Be Deployed?</b>	Yes
<b>Regulatory Understanding</b>	Yes, I understand the federal legislation requirements to ensure the sites are not on historical sites.
<b>Description</b>	The soil moisture stations will have a 10' tall mast connected to a concrete form, which was made in advance in a 5-gallon bucket. The mast will be secured in the ground in a 2-3' deep hole. On the mast will be an enclosure housing a Sutron Satlink, battery and wires, with a solar panel above and a Yagi directional antenna. Near the mast will be a 1-meter-deep pit with 5 soil probes at depths 5 cm, 10 cm, 25 cm, 50 cm and 100 cm.
<b>Location(s)</b>	The stations will be installed in Sonoma County, CA on land that is relatively flat and is representative of the surrounding area with a good south facing viewshed of sky.
<b>Property Ownership</b>	The sites will be installed on private property owned by the Ghidinellis. We may install a site on USACE land but are waiting on a response from our cooperators for total budget.
<b>Equipment Ownership During Project</b>	USGS will own the equipment during the project duration. Upon completion or ending of funding, USGS will provide the option to allow Sonoma County or CW3E to continue gage operations and maintenance. USGS will remove their datalogger and battery. The solar panel and antenna can be left depending on needs of next operator. Sonoma County has expressed interest and desire that once funding starts for a project and equipment is installed, they make a strong effort to keep stations going for long-term data collection.
<b>Equipment Maintenance During Project</b>	During the project, the equipment will be maintained by USGS employees in the Watershed group who will perform routine maintenance of the site 2-3 times per year.
<b>Vandalism and Risk Mitigation During Project</b>	Sites will be installed as inconspicuously as possible aided with spray paint to subdue reflection from the sun. Additionally, fencing will be installed around the gages to prevent disturbance from local wildlife. 2640 locks will be installed on both stations to protect vandalism of the battery and datalogger.

<b>Post-project Equipment Disposition</b>	<p>Upon project completion, the infrastructure will be maintained by USGS and uninstalled when the project agreement terminates. Upon the project deadline, USGS will offer SCWA the option to continue running the site with equipment already installed. USGS will take the Sutron Satlink datalogger, but all other materials will remain.</p> <p>If SCWA does not want to continue running the site, USGS employees will return to the site and remove all equipment. The removal of the stations will likely take the duration of a typical field visit which has been accounted for in the budget.</p>
<b>I verify that this Project Infrastructure Plan is outlined in the cooperator agreement associated with this project proposal.</b>	Yes

#### **TIMELINE:**

	FY2025				FY2026			
Task	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sept	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sept
1. Soil moisture response unit mapping (complete)	X	X						
2. Site selection, permitting, recon		X	X	X	X			
3. Installation*, set up sites in NWIS					X	X		
4. Quarterly site visits, O&M, QA/QC						X	X	X

\* The start of installation depends on the permitting process and land access. USGS funds for Tasks 1-3 are only available in FY2025 (the Federal fiscal year is from Oct 1 thru Sept 30.)

#### **Budget summary:**

**SCWA funded:** Tasks 1-3 FY2025, including equipment: \$79,072.

**SCWA funded:** Task 4 FY2026 (Oct 1-Sept 30): \$83,026

Description	
FY2025 (Task 1-3) installation, equipment purchase, site selection process	\$93,499
FY2026 (Task 4) operations and maintenance, including data publication, QA/QC	\$71,163
<b>Requested from Sonoma County Water Agency</b>	<b>\$164,662</b>

## REFERENCES:

Caldwell, T.G., Cosh, M.H., Evett, S.R., Edwards, N., Hofman, H., Illston, B.G., Meyers, T., Skumanich, M., Sutcliffe, K., 2022. In situ Soil Moisture Sensors in Undisturbed Soils. J. Vis. Exp. (189), e64498, <https://doi.org/10.3791/64498>

Caldwell, T.G., Bongiovanni, T., Cosh, M.H., Halley, C., Young, M.H., 2018. Field and Laboratory Evaluation of the CS655 Soil Water Content Sensor. Vadose Zone Journal, 17(1), pp1-16. <https://doi.org/10.2136/vzj2017.12.0214>

Curtis, J.A., Flint, L.E. and Stern, M.A., 2019. A multi-scale soil moisture monitoring strategy for California: Design and validation. JAWRA Journal of the American Water Resources Association, 55(3), pp.740-758.  
<https://doi.org/10.1111/1752-1688.12744>

Grimsley, R, Marineau, M.D., Iannucci R., 2021 (accepted), Experiences in LP-IoT: EnviSense Deployment of Remotely Reprogrammable Environmental Sensors; Conference proceedings paper for Low Power Internet of Things'21, October 2021, New Orleans, LA, USA, <https://doi.org/10.1145/3477085.3478988>

U.S. Geological Survey, [2024], USGS water data for the Nation: U.S. Geological Survey National Water Information System database, accessed [November 19, 2024], at <https://doi.org/10.5066/F7P55KJN>.



Figure 2. Example of a USGS soil moisture monitoring station under construction at the Pepperwood Preserve; Ryan Ferrell, Pepperwood Foundation Hydrologist (left), Michelle Stern, USGS Hydrologist (right).





Figure 3: Example of a fully installed USGS soil moisture station in the Feather River Basin in Plumas National Forest (left); example of a soil pit with a tape measure and 5 installed soil moisture sensors (right).







### Job Hazard Analysis For New Projects

- Check the numbered box(s) for all significant safety concerns this project should address. Significant safety concerns are commonly those that require training, purchase of safety equipment, or specialized preparation to address potentially hazardous conditions.
- Identify any unlisted safety concerns at bottom of the page.
- Provide details on the back of this page.

Proposal Number: 2025-02

Project Title (Short): Lake Sonoma soil moisture study

Project Chief or Proposal Author: Mimi Payne

	<b>Safety Concerns</b>
1.	Wading, bridge, boat, or cableway measurements or sampling
2.	Working on ice covered rivers or lakes
3.	Measuring or sampling during floods
4.	Well drilling; borehole logging
5.	Electrical hazards in the work area
6. 	Construction
7. 	Working in remote areas, communication, office call in procedures
8. 	Ergonomics, carpal tunnel syndrome
9. 	Field Vehicles appropriate for task - safety screens, equipment restraints
10. 	All terrain vehicles, snowmobiles
11.	Helicopter or fixed wing aircraft usage
12.	Site access
13.	Hypothermia or heat stroke
14.	Hantavirus, Lyme Disease, Histoplasmosis, Pfiesteria, West Nile Virus, Others?



15. ↕	Contaminated water with sanitary, biological, or chemical concerns
16.	Immunizations
17.	<p>Laboratory:</p> <ul style="list-style-type: none"> <li>• Chemical Hygiene Plan (CHP) must be read and signed by lab users and their supervisors. Any additions to the CHP must be communicated to the Lab Safety Officer and the CAWSC Safety Coordinator.</li> <li>• Describe any project activities planned for CAWSC laboratory facilities that use new or non-standard procedures and methods employed in the labs.</li> <li>• List any chemicals to be used in the project activities planned for CAWSC laboratory facilities planned laboratory facilities that are currently NOT in the Lab's chemical inventory.</li> </ul>
18.	Hazardous waste disposal
19.	Hazardous waste site operations
20.	Confined space
21.	Radioactivity
22. ↕	Respiratory protection
23.	Scuba Diving
24.	Electrofishing
25.	Fall Protection
26. ↕	Defense Against Wild Animals
27.	Breath-Holding, Snorkeling, and Free Diving
28. ↕	Trailer
29. ↕	Sun Protection
30.	Sample Prep Areas (primarily field offices) and Mobile Water Quality Sampling Vehicles
31.	Exposure to toxic algae
32. ↕	Pandemic: Field, Lab, Office, and Travel SOPs
33.	Hydrogen Sulfide Gas

Box no.	<p>For each numbered box checked on the previous page, briefly:</p> <p>A. Describe the safety concern as it relates to this project.</p> <p>B. Describe how this safety concern will be addressed. Include training, safety equipment and other actions that will be required.</p> <p>C. Estimate costs.</p>
6	<p><b>Construction being performed:</b> Appropriate personal protective equipment (PPE), such as protective footwear, hearing protection, work gloves, and impact safety glasses, will be worn by personnel during construction activities.</p> <p>Contact Ayelet Delascagigas CAWSC Safety Specialist, for more information.</p> <p>Construction details include: digging a meter deep hole for soil moisture sensors and 2-3' deep hole for the mast, often in rocky soils. Step ladder will be used to install solar panel and antenna on mast – caution will be taken when climbing up and down the ladder ensuring it is on stable ground:</p> <p>A. Construction primarily using hand tools for digging; a battery powered hammer drill can be used to expedite the digging process.</p> <p>B. PPE for this will be gloves, safety glasses and dust masks as needed; employees will be required to wear boots.</p> <p>C. Cost = \$30 plus salary for WFA training</p>
7.	<p><b>Placer Hall Call-in Procedures:</b> The following Call-In procedure applies to all CAWSC employees. However, individual offices and projects may develop their own specific procedures if they contain all the elements of the CAWSC Call-In Procedure.</p> <p><b>EMERGENCY CONTACT INFORMATION:</b> It is very important that employees have up-to-date emergency contact information. Employees can update their emergency contact information <a href="#">HERE</a>.</p> <p><b>SAFETY BRIEFING:</b> Regardless of which procedure is used, senior personnel should begin each field workday with a “tailgate” safety talk addressing potential safety hazards.</p> <p><b>IDENTIFICATION:</b> Employees will always keep personal identification on their person (i.e. in their pockets).</p> <p><b>BUDDY SYSTEM:</b> Field work should be conducted by two or more employees whenever practical.</p> <p><b>SPECIAL CALL-IN PROVISION:</b> Lone field employees should check-in throughout the day as opposed to by 8 PM when in groups. Continuous check-in will allow time for a search party to be organized the day contact with an</p>

	<p>employee is lost as opposed to having to wait until the following day due to darkness. Check-in can be accomplished by text, satellite phone, or satellite communication device (SPOT or inReach) and should follow the applicable procedure below:</p> <ul style="list-style-type: none"> <li>· Lone employee traveling from site to site during a single day should communicate to a designated person when they arrive at each site. When the lone employee is preparing to leave a site he/she should communicate their next destination to the designated person.</li> <li>· If working at a single site during a workday, then a lone employee should check in periodically (e.g. upon arrival, every 2-3 hours, and upon departure).</li> </ul> <p><b>CAWSC CALL-IN PROCEDURE</b></p> <p>Prior to departing the employee will provide the following information to a designated person (i.e. relative, friend, or colleague):</p> <ul style="list-style-type: none"> <li>· Destination(s)</li> <li>· Dates of Travel</li> <li>· Vehicle being used</li> <li>· Cell phone number(s)</li> <li>· Hotel name and phone number</li> </ul> <p>If a relative is the designated person, then he/she will be provided with these guidelines and the work and after-hours contact information of the employee's supervisor.</p> <p>Unless otherwise specified (see SPECIAL CALL-IN PROVISION above), the employee will check-in with a designated person by 8:00 pm nightly. A satellite phone or satellite communication device (SPOT or inReach) is required in areas that do not have cell phone coverage.</p> <p>If the employee has not called in by 8:00 pm, then the designated person will attempt to make contact using the information provided by the employee prior to departure.</p> <p>If the employee has not been reached by 8:30 pm, then the employee's supervisor will be notified. The supervisor will attempt to contact the employee's emergency contact.</p>
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	<p>If the employee has not been contacted by 10:00 pm, then the supervisor will notify the local police department and request a “health and welfare check”. This request will dispatch a police unit to the employee’s field location as noted in the information the employee left prior to departure. The supervisor will contact the Program Chief and the CAWSC Safety Specialist (Ayelet Delascagigas, 916.823.1793). Note: this action may be taken sooner at the discretion of the supervisor.</p> <p>If the employee is not located by 10:00 pm, then the Program Chief will contact the CAWSC Director. The Director will decide a further course of action (e.g. organize a USGS search party).</p> <p>OFFICE-SPECIFIC CALL-IN PROCEDURES:</p> <p>Placer Hall San Diego Project Office Poway Field Office Redding Field Office Eureka Satellite Office Redlands Field Office Santa Cruz Field Office Truckee Field Office Ukiah Field Office</p> <p>Contact Ayelet Delascagigas CAWSC Safety Specialist, for more information.</p> <p>C: \$11.95/month in reach subscription</p>
8	<p><b>Office:</b></p> <p>Data processing and report writing may require long periods of work on a computer. Ergonomic office furniture, keyboards, and accessories are available to staff to fit the user and mitigate stress associated with carpal tunnel syndrome and other repetitive-motion injuries. Personnel should take regular breaks and work on non-computer tasks. When working in the office, all personnel should identify and correct any slip, trip, or fall hazards. Ergonomic assessments of employee workstations are available upon request from the CAWSC CAWSC Safety Specialist, Ayelet Delascagigas. The CAWSC has developed an SOP for procuring approved ergonomic equipment.</p> <p><b>Field:</b></p> <p>Performing work duties requiring moving or lifting heavy objects, long periods of sampling operation, or other repetitive activities can result in injury. Employees will team lift if a load is too heavy or awkward for one person to handle. When lifting, employees will bend at the knees (not stoop), keep their backs straight, and lift with strong leg muscles (not weaker back muscles). When possible, mechanical equipment will be used to move heavy items.</p> <p><b>Contact Ayelet Delascagigas CAWSC Safety Specialist, for more information.</b></p>
9.	<p>The California Water Science Center uses vehicles for data collection activities, supply runs, and travel to and from meetings and conferences.</p>

	<p>The California Water Science Center uses vehicles for data collection activities, supply runs, and travel to and from meetings and conferences. Vehicle operators will not exceed 10 consecutive hours of driving during a 16-hour duty period. This 10-hour period included rest and meal breaks. A driver shall drive only if they have had at least 8 consecutive hours off duty before beginning a shift. Drivers shall stop and take a break or let an approved vehicle operator take their place if they feel drowsy. Management may place further limitations on the above hours of duty and/or driving time due to safety factors (example, fatigue, weather, distance, and illness).</p> <p>Vehicle Safety Maintenance and Inspection:</p> <p>Vehicle maintenance resides with the person primarily responsible for upkeep of that vehicle. This person is to complete the USGS Vehicle Safety Inspection Checklist annually and file locally (i.e. in the location where the vehicle is stored). The checklist form can be accessed from the Center's Safety webpage.</p> <p>Cargo Barriers:</p> <p>Vehicles shall contain appropriate safety barriers to protect occupants from potential cargo projectiles. This pertains to vehicles in which the passenger and cargo compartments are not separate. Note: any modification to GSA vehicles (G-vehicles) must first be approved by GSA Fleet Service. Contact the CAWSC Vehicle Coordinator for information.</p> <p>Training:</p> <p>All employees who use any vehicles, including personal vehicles, while working for the USGS will complete an approved driver safety training course every three years. This requirement can be satisfied by successfully completing the 4-hour DOI Talent training compliance module titled "Defensive Driving 2.0". Alternatively, employees can take the following free online course, <a href="https://ddt.dgs.ca.gov/">https://ddt.dgs.ca.gov/</a> *. The Certificate of Completion should be filed at the employee's duty station. *For the employee's training to be recorded in DOI Talent the employee should click on the link below and self-certify: <a href="https://doitalent.ibc.doi.gov/enrol/index.php?id=573">https://doitalent.ibc.doi.gov/enrol/index.php?id=573</a></p> <p>Additional training is available for employees who drive utility trucks, especially off-road.</p> <p>Contact Ayelet Delascagigas CAWSC Safety Specialist, for more information.</p>
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15.	<p>Contaminated water with sanitary, biological, or chemical concerns (Note: if the contaminated water samples will be processed in CAWSC laboratories, describe lab procedures for safe handling of these samples):</p> <p>Surface water in some areas may have low to moderate levels of contamination from sewage or agricultural runoff. Although contaminant concentrations are likely to be not so high as to pose an immediate danger to workers on-site, USGS activities will conform to site access and hygiene requirements at those sites. Field personnel will be advised of the contamination risk and will be provided onsite with protective equipment and supplies (e.g. impermeable gloves, splash resistant safety glasses, clean water supply, and antibacterial soap). Field personnel will be informed that they are entitled to no-cost Hepatitis-A, Hepatitis-B, and Tetanus vaccinations. Appropriate dust masks will be supplied if needed.</p> <p>Contact Ayelet Delascagigas CAWSC Safety Specialist, for more information.</p>
22	<p>A. Respiratory protection –</p> <p>There are three primary components to the CAWSC Respiratory Protection Plan: medical evaluations, training, and fit testing.</p> <p>The CAWSC received medical evaluations from 3M online Respirator Medical Evaluations. Employees should contact Ayelet Delascagigas to decide if an evaluation is needed.</p> <p>To satisfy the annual training requirement, employee can complete the DOI Talent Course titled, SAFETY: 1570 USGS Respiratory Protection for Users.</p> <p>Employees can receive fit tests from the USGS Industrial Hygienist, Paul Callao.</p> <p>B. PPE: Consider the use of safety goggles · If required, don N95—(Must be enrolled in respiratory protection program and adhere to the requirements.)</p> <p>C. Cost - \$20 for masks.</p>
26	<p>A. Defense Against Wild Animals – remote work in National Forest, may encounter wild animals.</p> <p>Bear Spray is used as a deterrent against wild animal attack. It should be effective on animals with tear ducts, sinuses, and eyeballs, including bear, mountain lions, and feral dogs. Note: mountain lions tend to be ambush predators</p>

	<p>so reaction time to deploy bear spray may be reduced relative to attack by other animals.</p> <p>Employees must successfully complete the certification procedure defined in the USGS Bear Spray Safety Program to carry bear spray. Certification includes training (available as a 1-hour course on DOI Learn), demonstration of skills using an inert training canister, and completion of a Certificate of Need. Bear spray kits are available for check out from the CAWSC Safety Program.</p> <p>Contact Ayelet Delascagigas CAWSC Safety Specialist, for more information.</p> <p>Personnel should stay alert when in snake habitat and to be particularly cautious of young snakes since they tend to deliver a full dose of venom relative to adult snakes. Instruction to step on, not over, logs and always be sure you can see where you are putting your hands and feet will be provided. The first thing to do if bitten is to stay calm. Generally, the most serious effect of a rattlesnake bite to an adult is local tissue damage which needs to be treated. Personnel will be advised of the following snake bite response plan: wash the bite area gently with soap and water, remove watches, rings, etc., which may cause constriction during swelling, immobilize the affected area, and transport safely to the nearest medical facility.</p> <p>Some insects such as the Africanized Honey Bee present serious safety hazards. When working in areas where contact with these insects is a possibility keep the following in mind:</p> <ul style="list-style-type: none"> <li>· Be aware of your surroundings and look for bee activity (presence of a hive or foraging bees).</li> <li>· Avoid climbing trees, disturbing logs, or moving large rocks without checking for bee activity first.</li> <li>· If you disturb a colony of bees, then RUN! Agitated bees have been reported to chase people for up to a quarter mile.</li> <li>· Protect your head/face as much as possible without blocking your vision.</li> <li>· Call 911 if you are stung multiple times, are seriously allergic to bee venom, or experience severe allergic reactions (itching, difficulty breathing, swelling of throat and tongue, weak, rapid pulse, nausea, dizziness, fainting).</li> <li>· Remove stingers by scraping with a fingernail or credit card.</li> <li>· If you are allergic to bee venom, then consult your health care provider. Inform them you work outdoors where you may encounter bees in remote areas. They may prescribe an EpiPen or two for you to carry in the field.</li> <li>· If hive removal is needed, then contact a professional.</li> </ul> <p>Rain can increase mosquito populations by increasing standing water habitat for their larvae, but can it help ticks too? The answer is yes. During times of draught ticks can go dormant (enter diapause) and wait for more favorable environmental conditions. With abundant rainfall areas of California become favorable for</p>
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	<p>increases in mosquito and tick populations. Rainfall also indirectly benefits ticks by promoting increased grass and shrub growth. This vegetation provides ladders for the ticks to crawl up to potential hosts that pass by.</p> <p>Deer ticks may transmit Lyme's disease to humans by attachment to the human body. Much of the State is considered to hold at least a medium risk for the contraction of Lyme's disease. Brown ticks can transmit a variety of diseases to humans by attachment to the human body.</p> <p>Mosquitoes are known to spread West Nile virus. Personal insect repellent that contains DEET is an effective deterrent/repellent for ticks and mosquitoes and will be supplied to field personnel.</p> <p>Vector-borne diseases such as Lyme disease (ticks) and West Nile virus infection (mosquitos) can be transmitted to humans from these arthropods. Symptoms of these diseases include:</p> <ul style="list-style-type: none"> <li>· Body/muscle aches</li> <li>· Fever</li> <li>· Headaches</li> <li>· Fatigue</li> <li>· Joint pain</li> <li>· Rash</li> <li>· Stiff neck</li> <li>· Paralysis</li> </ul> <p>If you experience these symptoms and suspect a mosquito or tick bite, then seek professional medical attention right away.</p> <p>Here are some steps to take to protect yourself:</p> <ul style="list-style-type: none"> <li>· Wear a hat and light-colored clothes so you can spot ticks.</li> <li>· Wear long-sleeved shirts and tuck pants into boots or socks.</li> <li>· Use insect repellents such as DEET (apply to clothes and/or skin) or Permethrin (apply to clothes only). Note: use of chemicals should be considered if collecting water quality samples.</li> <li>· Perform a full body check for ticks once out of the field.</li> <li>· Wash field clothes in hot water to kill ticks.</li> </ul> <p>If you find an attached tick:</p> <ul style="list-style-type: none"> <li>· Use fine-tipped tweezers to grasp the tick as close to the skin's surface as possible. Note: grasping the tick by the abdomen could expel its stomach contents into you and increase the chance of infection.</li> <li>· Pull upward with a steady, even pressure.</li> <li>· Thoroughly clean the bite area and hands with rubbing alcohol, iodine scrub, or soap and water.</li> </ul> <p>To preserve the tick for possible testing, put it in a zip-lock bag or small vial with a piece of wet cotton or paper towel to keep it from drying out.</p>
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	<p>B. Safety concern will be addressed by taking Defense Against Wild Animals DOI/USGS training and having bear spray with personnel. Additional caution will be taken with wild hogs ensuring there are enough seats in a vehicle within 25' of work site for quick escape if needed.</p> <p>C. Cost: Time for training and cost of purchase for bear spray</p>
28.	<p>A. All drivers must go through trailering prior to trailering. The project requires UTV/ATV access where trucks are not drivable. Distances are too far for walking with heavy equipment. Some employees are required to use trailers to conduct field work. Prior to using a trailer, these employees must complete training as stated in the USGS Occupational Safety and Health manual: "For large vehicles and vehicles pulling trailers, personnel shall complete hands-on vehicle maneuverability training prior to operation to ensure they have the skills needed to operate the vehicle safely."</p> <p>Components of this training to be taught by a knowledgeable person include: Trailer JHA review Vehicle and Trailer inspections discussion</p> <ul style="list-style-type: none"> <li>- Vehicle tow rating/capacity discussion</li> <li>- Trailer rating/capacity discussion</li> <li>- Hand-on attachment of trailer to tow vehicle</li> <li>- Hands-on maneuvering of the tow vehicle and trailer in both forward and reverse directions</li> <li>- Knowledgeable employees who plan to conduct this training should first contact the Contact Ayelet Delascagigas the CAWSC Safety Specialist, for more information.</li> </ul> <p>GENERAL PRE-DEPARTURE CHECKLIST FOR LIGHT-WEIGHT TRAILERS:</p> <ul style="list-style-type: none"> <li>· Balance weight from side to side</li> <li>· Distribute cargo weight evenly along the length of the trailer</li> <li>· Secure and brace all items to prevent them from moving during travel</li> <li>· Adjust the height of the tow vehicle/trailer interface</li> <li>· Check and correct tire pressure on the tow vehicle and trailer.</li> <li>· Make sure the wheel lug nuts/bolts on the tow vehicle and trailer are tightened to the correct torque. Do you have a lug nut wrench that fits the trailer?</li> <li>· Be sure the hitch, coupler, safety chains and other equipment that connect the trailer and the tow vehicle are properly secured and adjusted.</li> <li>· Check that the wiring is properly connected—not touching the road, but loose enough to make turns without disconnecting or damaging the wires.</li> <li>· Make sure all running lights, brake lights, turn signals, and hazard lights are working.</li> <li>· Verify that the brakes on the tow vehicle and trailer are operating correctly.</li> <li>· Check that all items are securely fastened on and in the trailer. Straps can fail! Always use chain or cable as a backup safety measure to keep from losing your load.</li> </ul>

- Be sure the trailer jack, tongue support, and any attached stabilizers are raised and locked in place.
- Check load distribution to make sure the tow vehicle and trailer are properly balanced front to back and side to side.
- Check side- and rear-view mirrors to make sure you have good visibility. Because mirrors cannot provide all of the visibility you may need when backing up, have someone outside at the rear of the trailer to guide you, whenever possible.

#### SAFETY USING TRAILERS:

#### EQUIPMENT PROCEDURES/REQUIREMENTS:

##### Braking Systems

The selection of a brake system also will depend on your tow vehicle and the type and fully loaded weight of your trailer. For a trailer with a loaded weight of more than 1,500 pounds, many states require a separate braking system and a breakaway switch, located on the tongue of the trailer, to activate the trailer brakes in the event the trailer separates from the tow vehicle. There are two basic types of brake systems designed to activate the brakes on a trailer: Surge and Electronic. Some states require braking systems on all axles of the trailer. It's your job to know what is required.

##### Wiring Systems

Federal law requires trailers to have taillights, brake lights, side marker lights, turn signals, and side and rear reflectors. Some trailers also have backup lights. To provide power to these lights, a four-way (or more) connector is hooked into the tow vehicle's electrical system. Many tow vehicle manufacturers offer a 7-way connector that may include an electric brake signal, power supply, and backup lights, in addition to the typical four functions. You get the ticket if they don't work.

##### Tires

Periodic inspection and maintenance of tow vehicle and trailer tires and wheels are essential to towing safety, including spare tires. Proper tire pressure affects vehicle handling and the safety of your tires. You can find the correct tire pressure for your tow vehicle in the owner's manual or on the tire information placard. All your trailer tires should be the same type, size, and construction—do not mix bias-belted and radial tires. In selecting tires for your trailer, buy the size, type, and load range found on the trailer's certification label or in the owner's manual. Keep in mind that tires have a load rating that indicates the amount of weight they can carry safely. As with your tow vehicle, always maintain proper tire pressure and replace worn tires. Remember—your tow vehicle tires may require a higher tire pressure for towing, especially heavy loads. Follow the tow vehicle manufacturer's recommendations for brake selection.

##### Hitch

	<p>Check the nuts, bolts, and other fasteners to ensure that the hitch remains secured to the tow vehicle and the coupler remains secured to the trailer. The connection point may require periodic lubrication to permit free movement of the coupler to the hitch ball. Always confirm that the ball and hitch are the same size.</p> <p>Wiring Make sure connector-plug prongs and receptacles, lightbulb sockets, wire splices, and ground connections are clean and shielded from moisture. Lightly coat all electrical terminal connections with non-conducting (dielectric), light waterproof grease. Clean the prongs with very fine sandpaper, being careful not to damage the contact area. Clean the surface deposits in the connector holes. (Make sure the lights are off to prevent blowing a fuse.) Try to clean off only the deposits and lubricate lightly with dielectric, light waterproof grease. (From U.S. DOT) Check Trailers for Federal Safety Regulations   NHTSA</p> <p>B. Safety concern of trailering will be addressed with mandatory trailering for all field technicians.</p> <p>C. Cost of salary for training</p>
29	<p>A. Sun Protection – working outside in spring and summer.</p> <p>Field work may be in open areas or in areas with dead trees that provide little shade. Many CAWSC employees deal with sun exposure when working outdoors. UV radiation from this exposure can lead to sunburn, premature skin aging, and skin cancer.</p> <p>Sunscreen/sunblock and lip balm with Sun Protection Factor (SPF) ratings of 30+ will be provided to employees that have fieldwork as a required component of their assigned duties to mitigate the hazards associated with UV exposure. If collecting water quality samples, then employees should check with the project leader to avoid products that could result in sample contamination. Efforts will be made to procure sunblock without oxybenzone and octanoate; chemicals which have proven harmful to aquatic life.</p> <p>Clothing also protects against UV exposure. Employees should consider wearing light-colored, loose-fitting, breathable long-sleeved shirts, long pants, neck gaiters, sun gloves, full-brimmed hats, and sunglasses.</p> <p>B. Workers should wear sun protection in field (hat, sunblock, etc.), rest often, and drink plenty of water</p> <p>C. \$300 for two canopies providing sun protection, cooler, large water jugs and bottled water when appropriate.</p>
	Other: working in post-wildfire burn areas:

	<p><b>Pre-field work briefing:</b></p> <ol style="list-style-type: none"> <li>1. Brief employees on work assignment and objectives.</li> <li>2. Ensure required PPE is being utilized.</li> <li>3. Review applicable JHAs, Safety Data Sheets (SDS), Air Quality Guidance Wildfire Conditions, and hazard tree indicators. (Refer to section at end of this JHA.)</li> <li>4. Provide information on environmental conditions and forecasts (such as strong and/or gusty winds) that could affect the safety of employees while working.</li> <li>5. Identify decision points as warranted for conditions such as strong winds or changing environmental conditions that could cause landslides.</li> <li>6. Brief employees on the plan that would be executed in the event of a serious employee illness/injury that would require medical evacuation.</li> </ol> <p><b>Size-up of Field Site Conditions:</b></p> <p>Snag hazards: struck by falling tree, tree limbs, landslides, or other debris from tree.</p> <ol style="list-style-type: none"> <li>1. Maintain situational awareness and utilize the risk management process.</li> <li>2. Look up, down and all around for hazard tree indicators and high-risk tree species. Refer to section at the end of this JHA.</li> <li>3. Pay particular attention to burned trees and trees with dead or broken tops, dead or broken limbs, hung-up trees, trees with severe leans and other signs of significant weakness.</li> <li>4. Stay alert for environmental conditions that could increase hazard tree risks or landslides. These include strong/gusty winds, steep slopes and obscured visibility (such as smoke, heavy rain or limited daylight) that inhibits visibility of treetops.</li> <li>5. ABORT WORK if conditions are unsafe.</li> <li>6. Communicate hazards to supervisor if appropriate.</li> </ol> <p><b>Carbon Monoxide</b></p> <p>Elevated levels of carbon monoxide can be present in areas where wildfire has occurred. Especially if still smoldering. Note other possible sources of CO (such as, chainsaws, running vehicles, engines, etc.) Be aware of and know how to identify the effects carbon monoxide on an individual. Stop and/or delay work where carbon monoxide levels are known to be hazardous until conditions are safe to resume work.</p> <p>Gas Monitoring: · A 4 gas meter shall be used when working in areas that have been affected by wildfire. · A 4-gas meter shall be used to continuously monitor gas levels while work is being performed. Leave area if monitors start to alarm.</p> <p><b>Smoke, Ash and Dust:</b></p> <p>Wildfires deposit large amounts of ash on outdoor surfaces in nearby areas, which may cause irritation of the eyes, skin, nose, and throat. Ash and dust (particularly from burned buildings) may contain toxic and cancer-causing chemicals, including asbestos, arsenic, and lead. · Anyone with underlying respiratory health conditions should avoid</p>
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the fire area. · Refer to real-time air quality data and adhere to Air Quality Guidance Wildfire Conditions · Consider the use of safety goggles · If required, don N95—(Must be enrolled in respiratory protection program and adhere to the requirements.)

### **Hazardous Driving Conditions:**

#### **DRIVE DEFENSIVELY**

- Alteration in traffic (e.g. rerouted or slowed) may occur because of cleanup or restoration operations and may result in heavier than-normal traffic.
- Driving in traffic, especially during rush hour, with a trailer can be dangerous. Exercise caution and utilize skills learned in defensive driver training.
- Be aware of your surroundings and the presence of large construction vehicles.
- Drive with lights on.
- Do not drive if you feel drowsy, sick or are taking medication that may impair your ability to handle a vehicle.

### **Unstable Terrain/Work Area**

- Be aware of smoldering roots/stumps, wet or loose ash, loose rocks, fallen logs, void spaces from burnt-out roots/stumps, and unstable slopes.
- Burned areas pose unique hazards of causing unstable soil.
- Ash pits can reach temperatures of 1200 degrees F and can be undetectable.
- Beware of areas:
  - that have extensive root systems such as trees or shrubs
  - landscapes that have been cultivated or manipulated by heavy equipment.
  - Animal dwellings such as rodent holes, or dens
  - White ash can indicate an ash pit or hovering insects
  - Look for small nearly translucent smokes that dissipate quickly above ground. Or the smell of incomplete combustion or of creosote burning.
  - Consider marking the area for reference. ·
- Wear appropriate clothing such as 8inch high, non-steel toe, leather boots, and pants.

### **Potential Hazard Tree Indicators**

NOTE: Trees with the indicators below are not all highly hazardous. However, these indicators should be taken into serious consideration when determining whether it would be safe to continue work.

#### **Indicators – Entire Tree**

- Snags – standing dead tree or part of dead tree
- Moderate to severe lean (especially recent)

#### **Crown Indicators**

- Loss of needles & leaves
- Discoloration/dieback
- Thinning crown

	<ul style="list-style-type: none"><li>· Stressed cone crop</li></ul> <p>Limb Indicators</p> <ul style="list-style-type: none"><li>· Dead/cracked/broken branches</li><li>· Fallen limbs on ground</li><li>· Rot or conks</li><li>· Cavities and cankers</li><li>· Mistletoe branches</li></ul> <p>Bole, Stem, Butt Indicators</p> <ul style="list-style-type: none"><li>· Dead/broken tops</li><li>· Forked/multiple tops</li><li>· Bole swelling</li><li>· Cracks or splits</li><li>· Cavities and cankers</li><li>· Rot or conks</li><li>· Wounds/damage – mechanical or fire</li><li>· Loose bark</li></ul> <p>Root &amp; Tree Base Indicators</p> <ul style="list-style-type: none"><li>· Sprung roots – mounded soil or exposed roots</li><li>· Compaction &amp; erosion</li><li>· Damage from previous fire(s)</li><li>· Wind-throw</li><li>· Basil resin flow</li><li>· Rot or conks</li><li>· Cracks or splits</li></ul> <p>Other Indicators</p> <ul style="list-style-type: none"><li>· Smoke or fire is visible in tree</li><li>· Area experiencing insect and/or disease infestations</li></ul> <p>A. Potential for falling tree hazards, unstable roads or bridges?</p> <p>B.</p> <p>C.</p>


Discussed job hazard analysis (JHA) with District

**Collateral Duty Safety Officer**

**Yes** \_\_\_\_\_

**No** \_\_\_\_\_

and/or copy of JHA given to

Collateral Duty Safety Officer

Yes \_\_\_\_\_ No \_\_\_\_\_

Center Director \_\_\_\_\_ Date \_\_\_\_\_

Regional Program Officer \_\_\_\_\_ Date \_\_\_\_\_

Box no.	<p>For each numbered box checked on the previous page, briefly:</p> <p>A. Describe the safety concern as it relates to this project.</p> <p>B. Describe how this safety concern will be addressed. Include training, safety equipment and other actions that will be required.</p> <p>C. Estimate costs.</p>
6	<p>Construction being performed: digging a meter deep hole for soil moisture sensors and 2-3' deep hole for the mast, often in rocky soils. Step ladder will be used to install solar panel and antenna on mast – caution will be taken when climbing up and down the ladder ensuring it is on stable ground:</p> <p>A. Construction primarily using hand tools for digging; a battery powered hammer drill can be used to expedite the digging process.</p> <p>B. PPE for this will be gloves, safety glasses and dust masks as needed; employees will be required to wear boots.</p> <p>C. Cost = \$30 plus salary for WFA training</p>
7.	<p><b>Placer Hall Call-in Procedures:</b></p> <p>Prior to departing the employee will provide the following information to a designated person (i.e. relative, friend, or colleague):</p> <ul style="list-style-type: none"> <li>• Destination(s)</li> <li>• Dates of Travel</li> <li>• Vehicle being used</li> <li>• Cell phone number(s)</li> <li>• Hotel name and phone number</li> </ul> <p>If a relative is the designated person, then he/she will be provided with these guidelines and the business and after-hours contact information of the employee's supervisor.</p> <p>Unless otherwise specified, the employee will check-in with a designated person by 8:00 pm nightly. A satellite phone (available for check-out from the IT Section), SPOT, or InReach transmitter (available for check-out from the CAWSC Safety Coordinator) is required in areas that do not have cell phone coverage.</p> <p>If the employee has not called in by 8:00 pm, then the designated person will attempt to make contact using the information provided by the employee prior to departure.</p>



	<p>If the employee has not been reached by 8:30 pm, then the employee’s supervisor will be notified. The supervisor will attempt to contact the employee’s emergency contact.</p> <p>If the employee has not been contacted by 10:00 pm, then the supervisor will notify the local police department and request a “health and welfare check”. This request will dispatch a police unit to the employee’s field location as noted in the information the employee left prior to departure. The supervisor will contact the Program Chief and the CAWSC Safety Coordinator. Note: this action may be taken sooner at the discretion of the supervisor.</p> <p>If the employee is not located by midnight, then the Program Chief will contact the CAWSC Director. The Director will decide a further course of action (e.g. organize a USGS search party).</p> <p>C: \$11.95/month in reach subscription</p>
8	<p><b>Office:</b></p> <p>Ergonomic assessments of employee workstations are available upon request from the CAWSC Safety Coordinator, Ayelet Delascagigas. The CAWSC has developed an <a href="#">SOP</a> for procuring approved ergonomic equipment.</p> <p><b>Field:</b></p> <p>Performing work duties requiring moving or lifting heavy objects, long periods of sampling operation, or other repetitive activities can result in injury. Employees will team lift if a load is too heavy or awkward for one person to handle. When lifting, employees will bend at the knees (not stoop), keep their backs straight, and lift with strong leg muscles (not weaker back muscles). When possible, mechanical equipment will be used to move heavy items.</p>
9.	<p>The California Water Science Center uses vehicles for data collection activities, supply runs, and travel to and from meetings and conferences.</p> <p><b>Vehicle Safety Maintenance and Inspection:</b></p> <p>Vehicle maintenance resides with the person primarily responsible for upkeep of that vehicle. This person is to complete the USGS Vehicle Safety Inspection Checklist annually and file locally (i.e. in the location where the vehicle is stored). The checklist form can be accessed from the Center’s <a href="#">Safety webpage</a>.</p> <p><b>Cargo Barriers:</b></p>

	<p>Vehicles shall contain appropriate safety barriers to protect occupants from potential cargo projectiles. This pertains to vehicles in which the passenger and cargo compartments are not separate. Note: any modification to GSA vehicles (G-vehicles) must first be approved by GSA Fleet Service. Contact the CAWSC Vehicle Coordinator for information.</p> <p><b>Training:</b></p> <p>All employees who use any vehicles, including personal vehicles, while working for the USGS will complete an approved driver safety training course every three years. This requirement can be satisfied by successfully completing the 4-hour DOI Learn training compliance module titled “NSC Defensive Driving II”. Alternatively, employees can take the following free online course, <a href="http://www.dgs.ca.gov/orim/Programs/DDTOnlineTraining.aspx">http://www.dgs.ca.gov/orim/Programs/DDTOnlineTraining.aspx</a>. The Certificate of Completion should be filed at the employee’s duty station and a copy should be sent to the CAWSC Safety Coordinator. Supplemental driver safety training is available to employees who may be driving utility trucks.</p>
15.	<p>Surface water in some areas may have low to moderate levels of contamination from wildfire ash or fire retardant. Although contaminant concentrations are likely to be not so high as to pose an immediate danger to workers on-site, USGS activities will conform to site access and hygiene requirements at those sites. Field personnel will be advised of the contamination risk and will be provided onsite with protective equipment and supplies (e.g. clean water supply, and antibacterial soap). Field personnel will also be informed that they are entitled to no-cost Hepatitis-A, Hepatitis-B, and Tetanus vaccinations.</p>
22	<p><b>A. Respiratory protection –</b></p> <p>Smoke, ash and dust: Wildfires deposit large amounts of ash on outdoor surfaces in nearby areas, which may cause irritation of the eyes, skin, nose, and throat. Ash and dust (particularly from burned buildings) may contain toxic and cancer-causing chemicals, including asbestos, arsenic, and lead. · Anyone with underlying respiratory health conditions should avoid the fire area. Refer to real-time air quality data and adhere to Air Quality Guidance Wildfire Conditions.</p> <p><b>B. PPE:</b> Consider the use of safety goggles · If required, don N95—(Must be enrolled in respiratory protection program and adhere to the requirements.)</p> <p><b>C. Cost - \$20 for masks.</b></p>
26	<p><b>A. Defense Against Wild Animals –</b> remote work in National Forest, may encounter wild animals.</p>

	<p>B. Safety concern will be addressed by taking Defense Against Wild Animals DOI/USGS training and having bear spray with personnel. Additional caution will be taken with wild hogs ensuring there are enough seats in a vehicle within 25' of work site for quick escape if needed.</p> <p>C. Cost: Time for training and cost of purchase for bear spray</p>
28.	<p>A. All drivers must go through trailering prior to trailering. The project requires UTV/ATV access where trucks are not drivable. Distances are too far for walking with heavy equipment.</p> <p>B. Safety concern of trailering will be addressed with mandatory trailering for all field technicians.</p> <p>C. Cost of salary for training</p>
29	<p>A. Sun Protection – working outside in spring and summer.</p> <p>Field work may be in open areas or in areas with dead trees that provide little shade.</p> <p>B. Workers should wear sun protection in field (hat, sunblock, etc.), rest often, and drink plenty of water</p> <p>C. \$300 for two canopies providing sun protection, cooler, large water jugs and bottled water when appropriate.</p>
30	<p>Other: working in post-wildfire burn areas:</p> <p><b>Pre-field work briefing:</b></p> <ol style="list-style-type: none"> <li>7. Brief employees on work assignment and objectives.</li> <li>8. Ensure required PPE is being utilized.</li> <li>9. Review applicable JHAs, Safety Data Sheets (SDS), Air Quality Guidance Wildfire Conditions, and hazard tree indicators. (Refer to section at end of this JHA.)</li> <li>10. Provide information on environmental conditions and forecasts (such as strong and/or gusty winds) that could affect the safety of employees while working.</li> <li>11. Identify decision points as warranted for conditions such as strong winds or changing environmental conditions that could cause landslides.</li> <li>12. Brief employees on the plan that would be executed in the event of a serious employee illness/injury that would require medical evacuation.</li> </ol> <p><b>Size-up of Field Site Conditions:</b></p> <p>Snag hazards: struck by falling tree, tree limbs, landslides, or other debris from tree.</p> <ol style="list-style-type: none"> <li>7. Maintain situational awareness and utilize the risk management process.</li> <li>8. Look up, down and all around for hazard tree indicators and high-risk tree species. Refer to section at the end of this JHA.</li> </ol>

9. Pay particular attention to burned trees and trees with dead or broken tops, dead or broken limbs, hung-up trees, trees with severe leans and other signs of significant weakness.
10. Stay alert for environmental conditions that could increase hazard tree risks or landslides. These include strong/gusty winds, steep slopes and obscured visibility (such as smoke, heavy rain or limited daylight) that inhibits visibility of treetops.
11. ABORT WORK if conditions are unsafe.
12. Communicate hazards to supervisor if appropriate.

#### **Smoke, Ash and Dust:**

Wildfires deposit large amounts of ash on outdoor surfaces in nearby areas, which may cause irritation of the eyes, skin, nose, and throat. Ash and dust (particularly from burned buildings) may contain toxic and cancer-causing chemicals, including asbestos, arsenic, and lead. · Anyone with underlying respiratory health conditions should avoid the fire area. · Refer to real-time air quality data and adhere to Air Quality Guidance Wildfire Conditions · Consider the use of safety goggles · If required, don N95—(Must be enrolled in respiratory protection program and adhere to the requirements.)

#### **Hazardous Driving Conditions:**

##### **DRIVE DEFENSIVELY**

- Alteration in traffic (e.g. rerouted or slowed) may occur because of cleanup or restoration operations and may result in heavier than-normal traffic.
- Driving in traffic, especially during rush hour, with a trailer can be dangerous. Exercise caution and utilize skills learned in defensive driver training.
- Be aware of your surroundings and the presence of large construction vehicles.
- Drive with lights on.
- Do not drive if you feel drowsy, sick or are taking medication that may impair your ability to handle a vehicle.

#### **Unstable Terrain/Work Area**

- Be aware of smoldering roots/stumps, wet or loose ash, loose rocks, fallen logs, void spaces from burnt-out roots/stumps, and unstable slopes.
- Burned areas pose unique hazards of causing unstable soil.
- Ash pits can reach temperatures of 1200 degrees F and can be undetectable.
- Beware of areas:
  - that have extensive root systems such as trees or shrubs
  - landscapes that have been cultivated or manipulated by heavy equipment.
  - Animal dwellings such as rodent holes, or dens
  - White ash can indicate an ash pit or hovering insects
  - Look for small nearly translucent smokes that dissipate quickly above ground. Or the smell of incomplete combustion or of creosote burning.

- Consider marking the area for reference. ·
- Wear appropriate clothing such as 8inch high, non-steel toe, leather boots, and pants.

### **Potential Hazard Tree Indicators**

NOTE: Trees with the indicators below are not all highly hazardous. However, these indicators should be taken into serious consideration when determining whether it would be safe to continue work.

#### **Indicators – Entire Tree**

- Snags – standing dead tree or part of dead tree
- Moderate to severe lean (especially recent)

#### **Crown Indicators**

- Loss of needles & leaves
- Discoloration/dieback
- Thinning crown
- Stressed cone crop

#### **Limb Indicators**

- Dead/cracked/broken branches
- Fallen limbs on ground
- Rot or conks
- Cavities and cankers
- Mistletoe branches

#### **Bole, Stem, Butt Indicators**

- Dead/broken tops
- Forked/multiple tops
- Bole swelling
- Cracks or splits
- Cavities and cankers
- Rot or conks
- Wounds/damage – mechanical or fire
- Loose bark

#### **Root & Tree Base Indicators**

- Sprung roots – mounded soil or exposed roots
- Compaction & erosion
- Damage from previous fire(s)
- Wind-throw
- Basil resin flow
- Rot or conks
- Cracks or splits

#### **Other Indicators**

- Smoke or fire is visible in tree
- Area experiencing insect and/or disease infestations


Discussed job hazard analysis (JHA) with District

**Collateral Duty Safety Officer**  
**No**\_\_\_\_\_

**Yes**\_\_\_\_\_

and/or copy of JHA given to

Collateral Duty Safety Officer

Yes\_\_\_\_ No\_\_\_\_

Center Director \_\_\_\_\_Date \_\_\_\_\_

Regional Program Officer \_\_\_\_\_Date \_\_\_\_\_