

Springs Monitoring Protocol Implementation Plan for Park Units in the Southern Colorado Plateau Network

Standard Operating Procedure (SOP) # 1

Safety, Field Personnel, and Training

Version SCPN_Springs_SOP1_20180930

Revision History Log:

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This SOP is adopted from the Northern Colorado Plateau Network's SOP #1 Safety, Field Personnel, and Training, Version 1.00 (June 2016) in Weissinger, R., M. Moran, S. Monroe, and H. Thomas. 2017. Springs and seeps monitoring protocol for park units in the Northern Colorado Plateau Network, Version 1.00. Natural Resource Report NPS/NCPN/NRR—2017/1439. National Park Service, Fort Collins, Colorado.

This SOP explains safety procedures and the qualifications needed for permanent and seasonal field personnel. Technicians must be prepared, both mentally and physically, for the extreme weather and difficult terrain of Southern Colorado Plateau Network (SCPN) parks. Safe, accurate, consistent data collection begins with the hiring process.

Safety

The SCPN approach to crew safety requires that each crew 1) keep SCPN and park staff informed as to its activities, 2) evaluate risks and activities as they arise, and 3) be prepared to handle emergency situations.

SCPN has a programmatic Field Safety Plan that provides detailed safety procedures and is updated annually. Topics covered in the Field Safety Plan include guiding principles, implementing safe practices, preventing accidents and injuries, field operations and communications, field safety, vehicle safety, network and park contacts, how to use satellite phones and personal locator beacons, checking in and out procedures, and reporting an incident. Crew members also participate in developing and reviewing the appropriate Job Hazard Analyses (JHA) for their position, which should be completed and signed before fieldwork begins. Example JHAs for springs monitoring activities are attached to this SOP in Appendix A and B.

At the beginning of the field season, each crew member should review the SCPN Field Safety Plan. Prior to each field hitch, crew members should meet together to discuss potential safety hazards and review documentation from previous seasons recorded in each site's access information. When in the field, each SCPN crew carries a well-stocked first aid kit and a satellite phone and/or a SPOT beacon/InReach/Digital Radio. Crew members should be trained in how to use items in the first aid kits and the satellite phone/SPOT and should know where these emergency materials are stored during fieldwork.

Monitoring crews spend considerable time in the backcountry under potentially hazardous conditions. The Field Safety SOP outlines the minimum procedures that the program must take to ensure crew safety. However, ultimately the responsibility lies with each crew member. Crew members must be prepared to ensure personal safety and survival for up to twenty-four hours in the backcountry. Crew members should use good judgment in the field to determine whether working conditions are acceptable. If a crew member feels that a situation is unsafe, s/he should take action to remove herself or himself from the situation. Safety should always be the first priority of every SCPN crew member.

Risks Inherent in Springs Monitoring

Risks inherent in springs monitoring in general, and specifically to monitoring the sites selected in SCPN parks, include the following:

Working alone

Field staff often will work alone when traveling to and from remote sites and when making measurements and collecting samples in the field. As a result, particular attention must be given to safety and safety check-ins.

Long road trips

Travel between parks will require long road trips at all times of the year and under varied weather and road conditions.

Backcountry travel

Accessing spring sample sites requires travel on secondary roads that are gravel or dirt, and some sites require hikes of up to three hours each way. The unsurfaced roads can become impassible during wet weather, and may remain muddy for several days after snowmelt. Hiking may be on or off trail through steep, rocky, sandy or muddy conditions. Hiking often occurs in washes that have flash flood potential. Accessing sample sites may require scrambling on sloping bedrock.

Varied weather conditions

The Colorado Plateau region is characterized by weather conditions that vary considerably through the seasons, day-to-day, and hour-by-hour. Snow, wind, and temperatures below 0°F occur in the winter, and summer temperatures are often well above 100°F. Lightning is common during the summer monsoon storms. Hypothermia and heat-related injury are possible, and occasional discomfort is certain. Successful field work requires preparation for this wide range of conditions.

Use of hazardous materials

Some of the water quality solutions and reagents used are hazardous and require proper storage, handling, and personal protection, including eye and skin protection.

Field Personnel***Staffing requirements***

Springs monitoring requires hydrologic and vegetation expertise. A hydrologic technician (minimum GS-6/7) installs and maintains all hydrologic equipment and coordinates collection of hydrologic data. A biological science technician with previous vegetation monitoring experience (minimum GS-6/7) leads site characterization and vegetation sampling. The approach to vegetation monitoring in this protocol requires many decisions at each field site, and pilot sampling with multiple observers indicated that technicians with previous vegetation monitoring experience had more similar data than an experienced botanist without prior monitoring experience.

Qualifications and attributes

In addition to the technical skills, experience, and knowledge listed below, certain qualities are necessary for all SCPN field personnel. To maintain data quality, all staff should have the ability to successfully engage in repetitive, detail-oriented work with strict adherence to standard operating procedures. Technicians must be able to work independently and thrive in difficult field conditions. They should also be in good physical condition, able to hike up to 8 miles in a day, often with significant elevation change and off-trail conditions. Certification as a Wilderness First Responder (or Wilderness First Aid) and CPR is an asset. Employees should expect to travel to remote parks and work away from home for periods of up to 8 consecutive days and, in some instances, to camp in backcountry situations.

Technical Skills, Experience, and Knowledge**Lead Hydrologic Technician**

- Experience taking flow measurements using a variety of methods, particularly volumetric methods.
- Experience calibrating and using multiparameter probes to take water quality measurements.

Biological Technician

- Previous experience with a rigorous vegetation monitoring program.
- Ability to identify common wetland genera and species.
- Ability to key plants to species using floras and technical keys.
- Competence in scrambling on bedrock to access hanging gardens.
- Willingness to be exposed to some poison ivy and heights.

Annual Training

Program overview – introduction to SCPN goals and projects

Administrative responsibilities and policies – timesheets, travel, work hours, leave policies, and equipment care

Safety – SCPN Field Safety Plan, Job Hazard Analysis, first aid kits, satellite phone use, personal locator beacon use, first aid kit contents, specific safety concerns

Government vehicles – proper use and care, vehicle inspection, tire changing, defensive driving

Park etiquette – biological soil crust, visitor interactions, low impact practices

GPS – navigation, logging points, data dictionaries

Photos – taking good reference photos, appropriate camera orientations for monitoring photos, checking time and date settings

Plant identification – making plant collections, using available plant references, review of common species with particular attention to difficult groups including grasses, sedges, rushes and willows

Vegetation measures – Using site maps and photo documentation to delineate surfaces in the field, endemic plant identification

Hydrologic measures – Calibrating water quality instrument, assuring stability prior to recording measurements (e.g., pool height stability, water quality instrument equilibration)

Data management – overview of data management, collecting high-quality data, annotating paper data sheets, entering and verifying field data in the database

Appendix A. Example JHA for springs monitoring field work

JOB HAZARD ANALYSIS (CERTIFICATION OF HAZARD ASSESSMENT - 29 CFR 1910.133)		JOB ACTIVITY: Monitoring Field Work DATE: 6/18/12 PREPARED BY: Rebecca Weissinger CERTIFIED BY:	
U.S. National Park Service			
PERSONAL PROTECTIVE EQUIPMENT REQUIRED: Sun and rain protection, insect repellent, boots, water, communication equipment, shovel, and jack.		QUALIFICATIONS, EXPERIENCE, OR TRAINING REQUIRED: Basic backcountry competence	
BASIC JOB STEPS	HAZARDS	SAFE JOB PROCEDURE	
Break work down to basic elements (such as remove, lift, carry, stop, start, apply, return, squeeze, weld, saw, walk, hold, grind, place, etc.). Describe what is done, not how it is done.	For each job step, state what accident could occur and/or what hazard is present. To determine this, ask yourself if the person could fall; overexert; be exposed to burns, fumes, rays, gas, etc.; hit against, be struck by, come in contact with, be caught in, on, or between something?	State how each element of work should be performed to prevent the accident or avoid the hazard. What should the person do or not do? Be specific. What precautions should be taken? Ask yourself what you can do to eliminate, modify, guard, identify, or protect against the potential hazard or accident, including such things as how the worker stands, holds, uses, carries, dresses, etc.	
1. Highway driving	a) Varied road conditions and road hazards such as animals and other obstructions b) Fatigue c) Behavior of other drivers d) Phone / mobile device use	Be well rested before road trips and constantly alert to obstructions and behavior of other drivers. Sleep if over tired on the way home after long days. Trade driving with passenger(s). Always wear seatbelt. Both hands on steering wheel at all times. It is against government policy to use your mobile device while driving.	
2. Dirt road driving	a) Rough and rutted roads, high-clearance driving b) Muddy roads c) Narrow roads with short sight distances d) Animals and other obstructions e) Oncoming traffic	Be well-rested before road trips and constantly alert to obstructions and behavior of other drivers. If overtired, stop to sleep on the way home after long days. Trade driving with passenger(s). Always wear seatbelt. Both hands on steering wheel at all times. Be wary of washboards and blind corners.	
3. Inclement weather driving	a) Slippery roads and poor visibility	Drive slowly. Watch for snow, ice, ruts, washed-out roads, washboard surfaces, loose gravel, and flash floods. Be well-rested before road trips and constantly alert to obstructions and behavior of other drivers. If overtired, stop to sleep on the way home after long days. Trade driving with passenger(s).	
4. Hiking	a) Steep, loose terrain b) Uneven footing c) Long distances	Wear sturdy shoes and don't rush on uneven terrain. Distribute weight low and close to back in backpack. Rest frequently and drink lots of water and hydrating liquids. Be wary of dangerous animals (domestic or wild).	
5. Stream crossings	a) Swift currents, deep water b) Flood flows c) Cold water and ice d) Contaminated water	Approach streams cautiously. Don't enter stream if visual estimate of product of depth and velocity is >10 (depth in ft and velocity in ft/s). Be wary of slippery and loose stream beds and dangerous animals. Be prepared to self-rescue if you fall in.	
6. Deal with environmental conditions	a) Temperature and sun exposure b) Adverse weather (rain, snow, lightning, and wind)	Wear sunscreen. Have appropriate extra clothing for weather changes. Keep to low areas during lightning. Watch for flash floods. Be prepared to spend the night out.	

7. Animals	a) Insects: Scorpions and Spiders b) Snakes: Rattlesnakes c) Mammals: Mountain Lions and Bears	Avoid placing extremities in locations such as rock crevices and overhangs, behind shrubs, and over fallen logs without inspecting the locations first. Be aware of your surroundings. Walk carefully, listen for rattles, and be able to identify bear and mountain lion tracks. If tracks appear fresh, return to vehicle.
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Appendix B. Example JHA for springs monitoring office work

JOB HAZARD ANALYSIS (CERTIFICATION OF HAZARD ASSESSMENT - 29 CFR 1910.133) U.S. National Park Service		JOB ACTIVITY: Office activities DATE: 6/18/12 PREPARED BY: Rebecca Weissinger CERTIFIED BY:	
PERSONAL PROTECTIVE EQUIPMENT REQUIRED:		QUALIFICATIONS, EXPERIENCE, OR TRAINING REQUIRED:	
BASIC JOB STEPS	HAZARDS	SAFE JOB PROCEDURE	
Break work down to basic elements (such as remove, lift, carry, stop, start, apply, return, squeeze, weld, saw, walk, hold, grind, place, etc.). Describe what is done, not how it is done.	For each job step, state what accident could occur and/or what hazard is present. To determine this, ask yourself if the person could fall; overexert; be exposed to burns, fumes, rays, gas, etc.; hit against, be struck by, come in contact with, be caught in, on, or between something?	State how each element of work should be performed to prevent the accident or avoid the hazard. What should the person do or not do? Be specific. What precautions should be taken? Ask yourself what you can do to eliminate, modify, guard, identify, or protect against the potential hazard or accident, including such things as how the worker stands, holds, uses, carries, dresses, etc.	
1. Enter data	a) Repetitive motions b) Sitting in one place for long periods of time	Take frequent breaks and switch tasks with other crew members when possible.	
2. Move field equipment	a) Back strain from lifting heavy objects	Lift with legs, not back. Ask for assistance when needed.	
3. Calibrate multiparameter probe	a) Standing in one place for long periods of time b) Eye and skin irritation from Sodium Sulfite, pH and conductivity standards c) Inhalation of acid fumes	Wear eye protection, rubber gloves, apron, know clean up acid spills, work with exhaust fan running, take frequent breaks, comfortable shoes for standing, wash hands after processing. Do not allow sodium sulfite to become airborne.	
4. Process bacterial samples	a) Danger of ingesting bacterial media b) Potential inoculation or ingestion of bacterial colonies after incubation	Wear rubber gloves, eye protection, and apron. Do not puncture bacteria containing plates after incubation, remove flammables from work area, do not let pressure cooker run dry, run exhaust fan during sterilization procedure. Keep bacteria plates in biohazard bags after counting colonies. Wash hands vigorously after handling bacteria plates.	
5. Prepare and use decontamination solution	a) Eye and skin irritation from quaternary ammonium	Wear rubber gloves, eye protection, and apron. Have clean water available during preparation. Wash hands thoroughly after use.	