

Northern Great Plains Network

National Park Service



Job Hazard Analysis (JHA) for Stream Channel Monitoring

Stream Channel Monitoring

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Summary

This standard operating procedure (SOP) contains a Job Hazard Analysis (JHA) for NGPN Stream Channel Monitoring (Thornbrugh et al. 2019). This document outlines hazards and risks associated with Stream Channel Monitoring and gives some ways to mitigate them. The combined list of hazards and safe action or procedure are from individual NGPN JHAs on file, and adopted from McDonald et al. (2018) with updates based on USGS' s Safety and Health for Field Operations Plan.

Recommended reading:

Lane, S. L., and R. G. Ray. 1997. Safety in field activities: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. A9.

Also an updated version which supersedes 'Safety in the published version but is not published yet from the USGS National Field Manual for the collection of water quality data: [445-3-H, Safety and Health for Field Operations | U.S. Geological Survey \(usgs.gov\)](#) also OSHA's heat exposure standards: [Heat - Heat Hazard Recognition | Occupational Safety and Health Administration \(osha.gov\)](#) and information on the heat index: [Using the Heat Index: A Guide for Employers \(nalc.org\)](#).

Revision Log

Previous Version	Revision Date	Author	Changes Made	Reason for Change	New Version
1.0	20230413	Anine Rosse	Added SPOT for check-in, falls, storms, chiggers, bank hazards, bridge scour. Updated reference to USGS safety in field activities and some OSHA information on heat stress. Clarified what constitutes medical emergency in some cases.	Some hazards were not in original version, also made changes to some recommended responses, especially based on updated USGS National Field Manual Safety and Health for Field Operations and OSHA guidance, organized hazards to group like hazards.	Version 1.1 20230413

This JHA (job hazard analysis) consists of 3 tables: General hazards, Wading hazards, and finally those from Hazards from harmful plants or animals and a figure displaying NOAA's heat index table.

Table A-1. General Job Hazard Analysis table (JHA) for safe implementation of the PIP for Stream Channel Monitoring in the NGPN, including potential hazards and recommended safe actions for tasks and procedures.

Northern Great Plains Network JOB HAZARD ANALYSIS			
Job Description: Stream Channel Monitoring		Date of last update: April 13, 2023	
Primary responsibility for this JHA: NGPN	Last updated by: A. Rosse	Reviewed by:	Approved by:

Potential Hazards	Safe Action or Procedure
Lack of knowledge and experience with tasks	All people (permanent, seasonal, VIPs) involved in any project should receive a general orientation and tailgate safety session specific to the task prior to beginning of work.
General accidents	Complete First Aid and CPR training course. Always carry standard personal protective equipment, which includes a first aid kit.
Carrying heavy loads	Heavy loads are best carried on backs. Take your time and carry only what you can handle, do not exhaust yourself dragging heavy loads from the vehicle.
Falls	Take your time, keep center of gravity balanced. If you do fall, don't try to "catch" yourself but instead fall onto soft part of body.
Encounters with strangers	Report uncomfortable encounters with strangers in the park to a supervisor as soon as possible; report apparent illegal activity to a park ranger, do not get into a confrontation with visitors in the park.
Hypothermia	• Always anticipate bad weather and dress accordingly, or carry warm clothes with you • always travel in pairs as a minimum • keep clothing as dry as possible • eat high energy nutritional supplements between meals

Potential Hazards	Safe Action or Procedure
	• cover the head and neck to prevent heat loss • keep active to maintain the body's metabolism • drink plenty of liquids to prevent dehydration, although an individual may not "feel" thirsty; drink warm liquids not cold • understand the effects of cold and wind • most hypothermia cases develop between 30°F and 50°F If someone falls in cold water, they need to get dry and warm as soon as possible. If possible, leave the field quickly and get inside a heated vehicle or building. Cover the victim with blankets or sleeping bags. Call emergency services if necessary.
Heat Stress/Hyperthermia	Take appropriate breaks. Maintain proper hydration and electrolyte consumption. Slow pace or reduce field hours if heat index is high beginning at 86°F under very humid conditions. Heat index is over 100 for example at 98 ° F and 40% rh; heat index is 105 at 94 ° F and 55 % rh, heat index is 106. Heat index card is included in Figure D-1 and exceeds 100 at temperatures as low as 86°F. Allow time to acclimate. Hyperthermia may occur during high temperatures, during humid weather. Monitor for dehydration, heat exhaustion, heat cramps, and heat stroke. Heat exhaustion symptoms include headache, dizziness, or fainting; weakness or wet skin; irritability or confusion; thirst, nausea, or vomiting. Immediately seek a cool place to rest and drink water if symptoms occur. Monitor situation, heat exhaustion may progress to heat stroke which is a medical emergency. If symptoms do not improve or co-worker is acting very confused or strangely, contact medical professionals. Drink plenty of cold/cool water (even when you are not thirsty). As heat increases, take frequent breaks in cool locations; wear a light shirt. Waders may increase heat stress, can remove during breaks.
Dehydration	• Drink some water every 15 minutes, even if not thirsty. Drinking small amounts more regularly is beneficial. OSHA recommends 1 cup of water every 20 minutes. • Mandatory water /bathroom breaks for 10 minutes after completing major field activity or every 4 hours. Remind co-workers to drink. • Limit caffeine intake, as caffeine dehydrates you • Carry sufficient amounts of water • Avoid long exposure to sun • Wear hat with wide brim for shade

Potential Hazards	Safe Action or Procedure
	Use electrolyte supplements or drink sports drinks (e.g., Gatorade)
Sunburn	Much of the work may take place in full sunlight so to prevent sunburn, use 30+ or greater SPF sunscreen and lip balm; and wear a wide brim hat, sunglasses, and long-sleeve shirt.
No one available in the park office	Attempt to call or text park contacts using a cellular phone according to NGPN safety plan. If there is no park check in, check in with SPOT beacon with supervisor and 2 other approved contacts. In event of failure, text supervisor on exit from park.
No cellular signal	Use alternate method of communication such as the satellite beacon or navigate to a location with cellular signal. Carry SPOT device.
Hazardous materials and environmental incidents	- Prioritize protecting human health and safety. Avoid exposure to hazardous materials, and always err on the side of personal safety. - Never disturb or retrieve improperly disposed hazardous materials for any reason. Doing so may cause personal injury, worsen the impact, incur liability for crewmembers and their organizations, or increase the cost of treatment and disposal of the material. - Notify the appropriate authorities as soon as possible. For most environmental incidents, this will be the host park, the State or Tribal department of environmental quality or protection, U.S. Coast Guard, or the U.S. EPA regional office. In the event of a major environmental incident, the National Response Center may need to be notified at 1-800-424-8802. Carry an updated list of contact information for these organizations.
Puncture wounds, tools crushing wounds (hammer or post pounder)	- Wear gloves when handling metal rebar or large nails - Use appropriate tools (multi tools for twisting wire, hammers for pounding) - Keep hands clear of hammer - Hammer carefully, ensuing accurate strikes - Wear eye protection when hammering

Potential Hazards	Safe Action or Procedure
	Carry a first aid kit
Improper hand tool use	Always take care to use hand tools for the purpose for which they are intended (use the “right tool for the job.”)
Cuts and/or eye injury caused by undergrowth	Wear gloves and safety glasses (or other glasses) when hiking in brushy areas to protect hands and eyes from protruding objects.
Cuts and/or eye injury caused by flying debris	Wear gloves and safety glasses (or other glasses) to protect hands and eyes.
Barbed wire fence crossing	Barbed wire fences may need to be crossed during work. When possible use gates (leave them, open or closed depending on how you find them). If no gate is available cross under or over with caution.
Fatigue	Get a good night's sleep before fieldwork. Know the limits of your own body (e.g., tolerance to heat, cold, allergies, strength, endurance, etc.), pursue physical conditioning prior to the field season if necessary, and do not over-exert yourself. Tighten stomach muscles when standing for long periods to support the lower back. When hiking up / down hills, avoid walking on your toes as this cause muscle fatigue rapidly. Using the entire sole of your foot uses the large muscles of your legs thus avoiding leg-muscle fatigue.
Hunting season	Wear bright colored clothing, hat, or orange vests during hunting season. Observe the area for possible hunters.
Ergonomics hazard	Use proper mechanics when bending over or lifting objects (i.e., lift with your knees, bend knees when bending over).
Weather, Thunderstorms and Lightning	Monitor weather reports and keep an eye on the sky. Avoid fieldwork during active storm warnings or until thunderstorm passes. There is no safe place to be outside when thunder is present. Seek shelter in vehicle or well-constructed building. Wait until 30 minutes after last rumble of thunder to resume work outside. If storm takes you by surprise or shelter is not reachable, move to low-lying areas, avoid metal objects, spread out from other crew members and crouch into ball, do not lie flat. Lightning victims are safe to touch, seek medical attention immediately. If victim is not breathing, start CPR.

Table B-1. Wading Job Hazard Analysis table (JHA) for safe implementation of the PIP for Stream Channel Monitoring in the NGPN, including potential hazards and recommended safe actions for tasks and procedures.

Potential Hazards	Safe Action or Procedure
Unstable Banks	Many banks in NGPN are incohesive and unstable. Be aware that bank collapse and landslides may occur. Use extreme caution around banks greater than 2 meters high and avoid scaling directly if possible. Walk around to find a more gradual slope.
Falling on slippery, steep, and rugged terrain	Assess terrain conditions to find safe route and modify sampling plans to avoid unsafe areas. Wear boots with slip-resistant soles with tops well above the ankle, broken in before the field season, plus wool socks. Tennis shoes are not permitted. If wearing wading boots, be cognizant that they are slippery on grass and mud. Carry supplies in backpack, make sure pack is comfortable and secure - a waist belt is recommended. Take care when walking on hardwood leaf litter and on wet ground. Maintain an erect posture when contouring steep slopes. Avoid walking below another person due to the potential for rocks to dislodge from above. Do not walk on wet logs and logjams.
Stream crossing	Wear proper slip-resistant footwear and life jacket. Unfasten backpack hip belt before crossing. Cross streams only if you are sure they are safely wadeable. Cross in shallow relatively calm area with limited obstacles (boulders, logs, etc.). Use a walking stick or pole to balance and check for drop-offs or deep pools. Cross at a slight downstream angle to avoid fighting the current.
Falling on slippery stream bank or substrate	Wear proper waders or hip boots for conditions. When using waders, wear wading belt or similar. Retrofitted waders with anti-slip devices if necessary. Use more caution if bottom is not visible or current is swift.
Working near unstable, steep, deep channels, swift flows.	• Familiarize yourself with stream and adjacent reach. • Know the current and projected flow conditions from weather forecasts and stream gage information • Familiarize yourself with work area prior to fieldwork. • Review maps and aerial photos to determine access points, reference points, and potential evacuation points. • Use a wading rod wherever possible when walking.

	• Do not enter water deeper than waist-deep. Water any deeper is not wadeable, retreat back the way you came if entering deep water. Do not wade in water that is moving faster than a walking pace on average about 3 feet/s. • Wear waist-belt for waders and secure snugly. • Develop evacuation plans for remote stream reaches and make sure you leave a trip plan with supervisors (written plan is preferred)
Soft stream bottom/ Quick sand	Use the wading rod to test bottom before stepping. Be aware quick sand may occur and avoid deep pools with soft bottoms. Always work with a team. If one becomes trapped in quicksand, spread out your body out, avoid struggling, and have your partner pull you out using a stick or wading rod, whatever is at hand.
Bridge scour	Be mindful of holes when wading near bridges.
Wading/walking in and across streams and other aquatic areas	Wear chest/hip waders or wading boots. Lug-soled boots are recommended for the fine sediment streams monitored using this protocol. In cold weather, wear neoprene waders or wear warm, preferably polyester garments with standard waders. Use walking stick to improve stability in current. Walk slowly and carefully. Work in teams of two or more and within sight of one another. Cross-stream at shallow riffles, and avoid deep, swift areas (avoid water moving faster than you can walk, about 3 feet/ second. There is considerable variation on what is safe based on a person's height and weight. A vd (velocity-depth product) of 7.56 was found to cause instability in a 124- lb person while a 201- lb person may withstand vd products of 24.2. The 'rule of 10' for velocity* depth should be revised to a lower number. USGS Safety Plan no longer cites the rule of 10. If velocity becomes too great, back out instead of turning around. Do not enter water that you feel unsafe in. When wading in aquatic sites with deep, fine sediments, test fine sediment depths with wading rod or pole before entering. Do not enter when fine sediment depths extend above knee. Consult weather forecast each morning or call local observer to determine stream and flow conditions. Carry a means of communication (e.g., cell phone or radio). Be aware of rapid changes in river stage. Keep a landmark handy to determine if river stage is rising or falling.
Flash floods	DO NOT TRY TO WALK, DRIVE, OR OTHERWISE CROSS FLOODWATERS. Keep in mind that floodwaters are swift moving, even if they do not appear to be on the surface. It is possible to drown in just a few inches of water if swept away by floodwaters. Especially important when working in stream and river areas, workers should be aware of the possibility of flash floods. When working in stream and river environments, at least one team member should watch nightly weather reports, or monitor weather band radio, to assess if weather conditions for flash floods may exist.

	If caught in a flash flood while in an automobile, abandon the vehicle immediately and move to higher ground. If the vehicle is submerged, do not panic, allow the vehicle to fill with water, and open the doors when the vehicle is full (doors will not open until the water pressure is equal outside and in). Opening windows will expedite the process. Hold your breath, and swim for the surface and toward the bank if possible. If caught in a flash flood while on foot, immediately move to higher ground.
Crossing debris jams	Do not cross on debris jams.
Drowning	• Wear proper protective/floatation gear (e.g. PFD / life vests, wading belts, water repellent clothing) at all times. There may be an exception when water at the stream is uniformly never more than ankle deep such as Highland Creek WICA site. • Work in pairs or teams • Consult flow gauge to determine stream safety level • Those conducting aquatic work should be able to swim • If swept away, point feet downstream (to avoid rocks and other debris), swim towards the bank

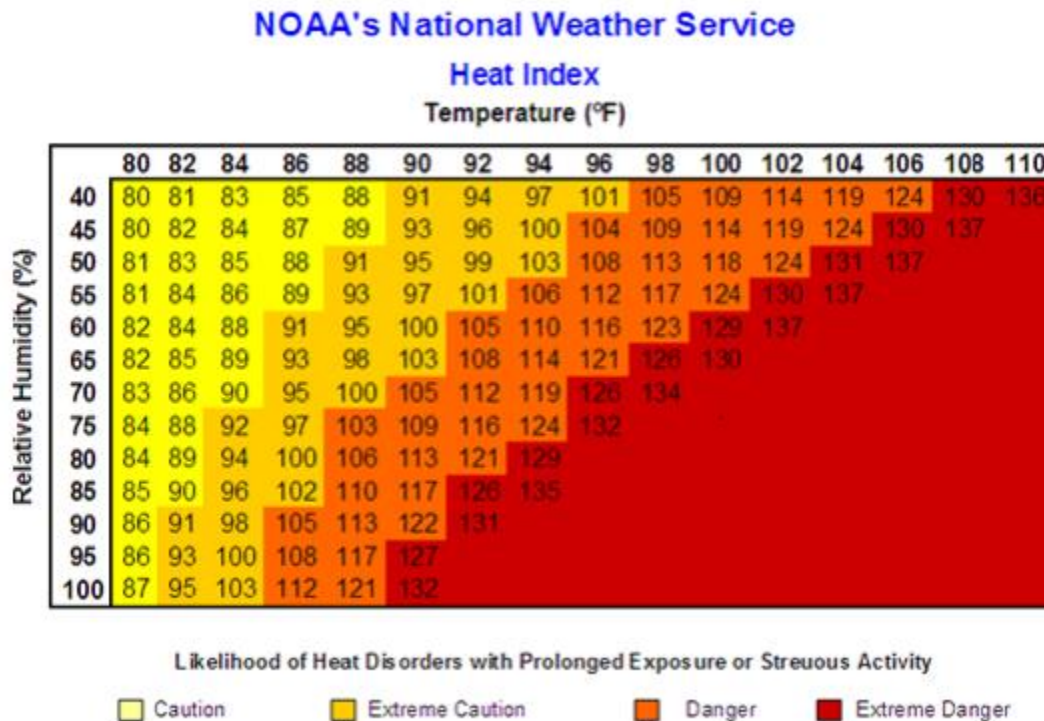
Table C-1. Hazardous Plants and Animals Job Hazard Analysis table (JHA) for safe implementation of the PIP for Stream Channel Monitoring in the NGPN, including potential hazards and recommended safe actions for tasks and procedures.

Potential Hazards	Safe Action or Procedure
Poison ivy/oak	Wear long sleeve shirts and long pants. Make sure you can identify poison ivy in all its growth forms including foliage, bare twigs, and berries (the plant is toxic in winter when foliage is absent!). Avoid sitting with arms resting on knees; use Technu (or something similar) to prevent exposure; wash with soap immediately after returning from the field; bring an extra set of clothes and shoes to change into after coming out of field; wash field clothes separately from other laundry.
Bees/Wasps/Hornets	Determine if any field crew are allergic to bee stings. Notify other crewmembers and the supervisor if you know you are allergic to bee stings. Ensure that an allergic individual carries prescribed medication to prevent anaphylactic shock; carry a bee sting kit or Benadryl or other antihistamine. Be aware of the ground where you step - some hornets build nests in the ground at the base of trees or shrubs, or in rotten logs - watch for bees buzzing in and out of holes or around ground level; if possible, flag a nest so future surveyors won't run into it.
Ticks	Spray clothing with insect repellent such as DEET, as a barrier. Wear light colored clothing that fits tightly at the wrists, ankles, and waist. Each outer garment should overlap the one above it. Cover trouser legs with high socks, boots, or nylon gaiters OR duct tape pant legs to shoes. Tuck in shirttails. Search the body on a regular basis, especially hair and clothing; ticks generally do not attach for a couple of hours. If a tick attaches, use a tick removal tool or tweezers to grasp the tick as close as possible to the point of attachment and pull straight out with gentle pressure. Wash skin with soap and water then cleanse with rubbing alcohol. Place the tick in an empty container for later identification, if the victim should have a reaction. Record dates of exposure and removal. Do not try to remove the tick by burning with a match or covering it with chemical agents. If you cannot remove the tick, or the head detaches, seek prompt medical help.

	If you are bitten by a tick, first document it on a calendar or injury log, and then watch for warning signs of illness: a large red spot on the bite area; fever, chills, headache, joint and muscle ache, major fatigue, and facial paralysis are reactions that may appear within two weeks of the bite. Symptoms specific to Lyme disease include confusion, short term memory loss, and disorientation. Review the CDC documents relating to tick-borne diseases at http://www.cdc.gov/ticks/diseases
Chiggers	• Wear waders when possible. • Avoid sitting in long grass. • Treat with calmine lotion and avoid scratching.
Mosquitoes	Wear long sleeves and pants. Avoid heavy scents, such as strong soap, lotion, or perfume. Use insect repellents and follow manufacture instructions. Carry after-bite medication to reduce skin irritation.
Venomous snakes	Be alert in snaky parks. The rattlesnake is the main snake of concern in NGPN. Bull snakes also look like rattlesnakes. Wear high top boots and snake gaiters or chaps when surveying banks. When going through thick underbrush, be alert. Walk slowly and give snakes ample time to move out of the way. Walk on clear paths as much as possible. Be careful where placing feet and hands. Always step ON the log, not OVER the log! Do not walk on or place hands in debris or logjams. In the event a venomous snake bites you, stay calm and seek immediate medical attention. If help is nearby sit still, and call and wait for help. If close to a vehicle, have partner drive you directly to hospital.
Disease (Tetanus, bubonic plague, hanta virus, Lyme disease, rocky mountain spotted fever)	Ensure tetanus booster is up-to-date. Wear all-leather-upper protective footwear. Stay away from dead rodents and rodent feces, especially in closed buildings
Bison and large ungulates	• Maintain a safe distance from animals. If they alter their behavior, you are too close! • Be especially wary around young animals and during breeding season. • Back away slowly and predictably if coming across one by surprise. • Seek high ground immediately when bison are running toward you as a herd. Bison can run 3 times faster than a human.
Giardia	Giardia is caused by drinking contaminated water – carry drinking water on outings. Take care not to get stream water on your water bottle. Wash or sanitize your hands before eating.

Infectious waterborne diseases	Wear appropriate gloves. Prevent water from contacting your skin.
Scorpions	Inspect items left lying on the ground, e.g., clothing, for scorpions prior to putting them on

Figure D-1. NOAA Heat Index. Reduce and Adjust work when in the “Danger” zone.



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