Standard Operating Procedure #1:

Safety, Personnel, Preparation, and Training

Summary

This Standard Operating Procedure (SOP) describes safety procedures and qualifications for field personnel; specifically, it outlines: 1) risks that are inherent to ERMN fish community monitoring in wadeable streams and 2) information and procedures that must be used during field work planning, training, and implementation to mitigate these risks.

Revision Log

Original Version #	Date of Revision	Revised By	Changes	Justification	New Version #

Safety

The Eastern Rivers and Mountains Network (ERMN) considers the occupational health and safety of their employees to be of utmost importance and is committed to ensuring that all employees receive adequate training on safety procedures, accident reporting, and emergency response prior to field work.

Encountering hazardous situations is inherent to all field work; consequently, personnel that participate in field work are always, to some extent, exposed to the risk of accident, injury, or illness. This SOP describes procedures that help ensure that hazardous conditions are recognized, and measures, including thorough preparation, are taken to minimize risks.

Risks

Risks inherent to ERMN fish community monitoring include:

- Driving – Travel within and among parks requires long road trips in varied weather and road conditions.

- Remote roads and trails – Accessing sampling reaches often requires travel on secondary roads that are gravel or dirt, and some sites require considerable hiking. Unsurfaced roads can become impassible during wet weather and may remain muddy for several days after precipitation. Hiking is often done on unestablished trails that vary in difficulty and condition.

- Varied weather conditions – The ERMN region is characterized by weather conditions that differ considerably among seasons, on a daily basis, and even hour-by-hour. Snow, wind and temperatures below 0°F can occur in the winter, and summer temperatures may be above

100°F. As a result, field work requires preparation for this range of conditions. Hypothermia and heat-related injury are possible and occasional discomfort is certain.

- Activities in streams - Extra care is necessary when wading because many streams are steep, swift, and stream substrate can be loose, slippery, hard, and/or sharp. Precautions are needed to (1) recognize and avoid risks, (2) use proper techniques to avoid accidents, and (3) be properly equipped for self-rescue. It is recognized that some sites will not be accessible during periods of bad weather. If there is any doubt, the correct decision is to forgo sampling until another day.

- Backpack electrofishing –The energy generated from backpack electrofishing equipment is sufficient to cause lethal injury; consequently, it is essential that all crew members have thorough, up-to-date training regarding electrofishing concepts and the gear in use, in addition to appropriate personal protective equipment.

- Ticks and other potentially dangerous animals and plants – Being able to identify and avoid the risks associated with wild animals and plants is essential to maintaining a healthy and efficient stream monitoring crew.

- Chemicals – Some chemicals used are hazardous and require proper storage, handling, disposal and personal safety gear including eye and skin protection.

Procedures that the ERMN uses to mitigate these risks are discussed in the following sections and summarized as a Job Hazard Analysis (Appendix A).

Communication

Having established lines of communication between ERMN staff and park staff (i.e., natural resource specialists, rangers, and communications/dispatch) is essential for safe operations. It is also essential that each crew have appropriate communications equipment and clearly understand how to use it in case of emergency. Guidance for maintenance and use of park radios and Personal Locator Beacons is updated and shared locally among ERMN staff.

- *Cell phones:* Field crews crew is required to carry at least one fully charged cell/mobile phone with them while in the field. Coverage among cellular carriers varies among parks; as of 2021, AT&T coverage is considerably better than other carriers at NERI. Cell phones are the primary means of emergency communication in ALPO, FONE, and FRHI. Park radios are not required in these parks.

- *Park radios*: (needs updated) Field crews working at BLUE, DEWA, and NERI are required to carry an NPS-owned and programmed Motorola XTS 2500 radio. Radio use is primarily reserved for emergency situations (medical or logistical). However, radios can be used for more routine communication while in the field. It is important that you understand which radio channel and zone to be using in each situation.

- *Personal Locator Beacon*.- (needs updated) Each field crew is required to carry and know how to efficiently use a Personal Locator Beacon (PLB) in the event that communication cannot be established via cell phone or park radio.

Routine Communication

Park Notification

Network parks are contacted before field seasons each year regarding staffing changes; an updated park-contact list is shared locally among ERMN staff. Two weeks before field work, the Crew Leader will notify park contacts (via email) that a monitoring crew will be coming to work in the park(s). Information provided includes arrival date, departure date, names of crew members, housing accommodations (park housing, hotel, etc.), vehicle make(s), model(s), color(s) license plate (federal plates or other).

Check-out / Check-in

A daily check-out/check-in procedure is required for each monitoring crew and each crew member to help ensure timely assistance can be provided if necessary. A routine is established where each crew has an ERMN contact person (i.e., a "check contact") and is required to "check-out" before heading into the field each day and then "check-in" upon safely returning from the field with that contact person.

Check-out information includes the sampling site(s) to be visited and the estimated return/check-in time. Communication is typically in the form of text message. The check contact person should confirm (i.e., reply) that they received both the check-out and check-in messages. **Do not deviate** from the daily plan without clearly discussing and confirming it with all crew members and check contacts. If a crew member does not "check-in" within two hours of the agreed upon time, the check contact person, in conjunction with other crew members, should begin to contact/locate missing crew member(s) using all appropriate means. This includes cell phones, park radios, revisiting the scheduled sampling site, and notifying 9-1-1 and/or Park Dispatch to initiate a search and rescue.

No crew member is allowed to conduct field work without fully understanding who their check contact is and "checking out" with that person. **The work day for the entire crew, including check contacts, does not end until each crew member has safely returned from the field and checked-in with the appropriate contact.**

Emergency Communication

Emergency contact information for 9-1-1, each park, ERMN personnel, hospitals, and individual crew members is posted in each field house and in the glove compartment of each field vehicle. This information is updated annually and shared locally among ERMN staff.

Responding to a medical emergency:

a. Administer first aid to the best of your knowledge, ability, and training and contact 9-1-1 or park emergency number via phone or park radio as soon as possible. If unable to contact emergency services by cell phone or radio and unable to move, activate Personal Locator Beacon (PLB). If appropriate, transport victim to emergency room. Directions to the nearest hospital from each park are in the glove compartment of each field vehicle.

b. As soon as it is practical to do so, contact the Program Manager and the park's emergency contact.
c. Complete Worker's Compensation paperwork.

Responding to a non-medical incident (e.g., stuck or broken vehicles):

a. Contact park ranger via cell phone or park radio.
b. As soon as it is practical to do so, contact the Program Manager.

Radio Use

This section provides information and guidelines to be followed when using NPS-owned and programmed radios in and around ERMN parks. These radios are registered U.S. Government Property, but crew members are personally responsible for radios issued in their name. Keep them secure at all times. Do not loan them out or leave them unattended. Report lost, stolen, or damaged radios immediately to a park contact or the protocol lead.

In case of a medical or logistical emergency where radio use is required:

- Stay calm and assess situation. Be prepared with a clear, concise message before initiating radio communication.
- Turn the radio ON and verify that it is tuned to the appropriate Zone and Channel.
- Identify yourself as an "NPS Researcher". Press the talk button, wait one second, then say "Dispatch from NPS Researcher". Release the talk button and wait for the dispatcher to respond.
- Keep repeating your message periodically until Dispatch or another emergency responder makes contact with you. Let the nature of the situation dictate how frequently you repeat your communication. Repeat your message frequently (i.e., every few seconds) if it is a serious medical emergency).
- Be sure that your communication is being received and broadcast by the repeater. The small red light on the top of the radio should turn red and continue to blink for several seconds after you stop your communication. If not, move to a new location (preferably uphill) and try again. Sometimes a move of only 20 m will allow your radio to reach the repeater.
- After contact has been made, follow the emergency responders' instructions. They will likely ask for your location. Lat/Long coordinates are ideal but any other descriptive information will help, reference obvious roads, streams, towns, mountains, etc.

Personal Locator Beacon (PLB) Use

A demonstration of PLB use must be reviewed annually before conducting field work: http://www.youtube.com/watch?v=Dm3s5cRPTLw. The Fast Find 210 operates by sending out 406 and 121.5 MHz frequencies and using the global positioning system (GPS). The 406 MHz

frequency is sent out and picked up by satellites and used to alert emergency crews. This signal will be retrieved regardless of GPS signal, but if the GPS can get a signal this will be used to assist in the accuracy of the location. After search and rescue crews are on site, they can use the 121.5 MHz frequency as a homing signal to find the person(s) in need.

More information about how the Fast Find 210 works can be found on the Fast Find website: http://www.fastfindplb.com/us/. Information about how PLB signals are used and responded to can be found at this website: http://www.sarsat.noaa.gov/sysdiag.html.

- Each ERMN PLB is registered with the name and mobile number of the person who carries it in the field.

- The Fast Find 210 is activated by flipping the red tab up and pulling on it to remove the top of the device, un-coil the antenna, and press the "ON" button. Point the antenna at the sky and do not cover the "GPS zone" marked by circles near the "ON" button.

- If the device is activated accidentally, the person to whom the device is registered will receive a phone call to confirm that the device was activated intentionally. If the registered person does not confirm that it is indeed an emergency, an emergency situation will be assumed. If the device is accidentally activated, the person/crew must call 800-851-3051 immediately. If the person is out of cell phone reception, they will go as quickly as possible to an area with cell phone reception; if that is not possible in a timely manner, use the ERMN park radio to alert dispatch to call in the false alarm.

- The Protocol Lead and other emergency response personnel will be automatically notified that a user-specific PLB has been activated. They will coordinate with others to assist the search and rescue teams in any way possible.

Driving

Crew members are responsible for inspecting their vehicles before every use to ensure that the vehicles are in safe working condition. This includes visually checking tire pressure, adjusting mirrors, and making sure equipment is secure. Address any potential hazards or needed repairs immediately, and if necessary, consult the ERMN Aquatic Ecologist or Program Manager. Strategies to avoid motor vehicle accidents are outlined in the job hazard analysis. Rules that must be followed when operating an NPS vehicle include:

- Everyone in a government vehicle is required to wear a seat belt.
- *All use of cell phones (including talking and texting) is strictly prohibited while driving.*
- Only NPS employees or authorized cooperators and contractors are allowed to operate a government vehicle. Individuals that are not NPS employees or authorized cooperators and contractors are forbidden from riding in a government vehicle.
- Drivers must adhere to all federal and state vehicle regulations, including all posted speed limits.

Vehicle accident reporting. – Necessary forms and procedures are updated and shared internally among ERMN staff. They are checked annually for updates and copies are printed and kept in the glove compartment of each ERMN vehicle.

Personal Protective Equipment

Each crew member is responsible for ensuring that he/she is wearing appropriate clothing and footwear while in the field. Personal protective equipment (Table XX) includes appropriate clothing, gear, and supplies used to mitigate risks associated with:

- prolonged cold (insulated material),
- heat exposure (e.g., wicking material),
- long hikes over uneven terrain,
- exposure to ticks and biting insects,
- electrofishing,
- and handling fish.

Crew members should always carry ample water (2-3 liters) and food when working in the field. Dehydration is a serious condition that can lead to more serious conditions if untreated. It is important to drink liquid frequently to maintain hydration on a warm day, even if you do not feel thirsty.

Navigation to and from Sample Reaches

Risks associated with hiking to sample reaches differ considerably throughout the ERMN and are dependent on many factors including: 1) terrain between sample reaches and parking spots and 2) sample reach distances from parking areas, roads, and emergency services. Before leaving any parking spot, crews should ensure that: 1) they are physically and mentally prepared to make the hikes and conduct required work (e.g., conduct a "GAR") and 2) there is ample time to complete sampling and return to the vehicle before nightfall. Furthermore, all crew members must be capable of orienteering, including the ability to efficiently use GPS units and track logs, compasses, and maps.

Ticks

Ticks and tickborne illnesses are common throughout the mid-Atlantic region and ERMN parks; consequently, crew members should read and understand up-to-date guidance from the U.S. Centers for Disease Control (CDC) regarding tick bite prevention, tick removal, and symptoms of tick-borne illnesses. Tick avoidance measures include minimizing contact with vegetation while hiking (e.g., hike in center of established trails when possible), wearing clothing treated with 0.5% permethrin, and/or using EPA-registered insect repellents (e.g., picaridin). It is critical to thoroughly check your entire body for ticks whenever possible, including during and especially after field work. At the end of every day of field work, leave field gear and clothing outside if possible. Shower as soon as possible after field work and conduct an additional tick check before going to bed.

Forms and procedures required for reporting tick bites are updated and shared among ERMN staff. They are checked annually for updates and are discussed with field crews during training. If you find an embedded tick, remove it following CDC guidance, know and monitor for symptoms of tickborne illness, and follow up with the ERMN Program Manager and a doctor accordingly.

Backpack Electrofishing

The energy generated from backpack electrofishing equipment is sufficient to cause injury or death (AFS 2008); consequently, thorough training and appropriate PPE are essential elements of all electrofishing operations. Before electrofishing, crew members must complete USFWS training regarding principles and techniques of electrofishing (i.e., USFWS Course "FWS-CSP2201" or "FWS-CSP2C01" [online]). Crew members must not become complacent regarding risks associated with electrofishing; therefore, all crew members must annually complete the USFWS "Electrofishing Safety" course (FWS-CSP2202A) and review the ERMN Electrofishing SOP.

As recommended by AFS (2008, pg 17), "All crewmembers need to wear chest or hip waders to insulate them from electrical shock. Suitable waders are generally constructed of neoprene, PVC, silicon, etc…Breathable, lightweight waders may not have adequate electrical insulating properties—however it is recognized that logistical or climate constraints may necessitate the use of this type of wader. In the event that Gore-Tex type waders are used for electrofishing activities, the following precautions will be followed: operators need to wear dry clothing that covers bare skin within the waders..."

Fish Handling

According to AFS (2008, pg 28), "The potential for personal injury and disease from handling fish is one of the greatest, and most underestimated, hazards for fisheries biologists. Hazards include contacting numerous disease-causing organisms; punctures, cuts, or abrasion injuries from fish spines, gill rakers, teeth, or opercula; and secondary infections."

Although puncture wounds and cuts can be painful, secondary infection can lead to much more serious health issues; *see* AFS (2008) for a summary of 16 potential pathogens/diseases. To mitigate these risks, fish handlers must understand how to properly handle different fishes, depending on fish anatomy. Nylon or Kevlar gloves can be worn to minimize risk when handling large fish, but in ERMN wadeable streams, where most fish are relatively small, these gloves are likely cumbersome and counterproductive. If crew members have open wounds on their hands, they should bandage the wound and wear protective (latex or nitrile) gloves. It is good practice to frequently use alcohol-based hand sanitizer frequently while in the field, but fish handlers should sanitize their hands immediately after fish processing is complete.

Chemicals

To minimize potential risk to human and environmental health, the ERMN uses chemicals only when absolutely necessary; namely when anesthetizing non-game fishes (to minimize stress) or to disinfect sampling gear to mitigate the spread of microorganisms and invasive species. Follow chemical manufacturer instructions and guidelines (e.g., MSDS information) and always use appropriate PPE (e.g., eye protection, gloves). Chemicals are stored according to their Material Safety Data Sheets, which are available in the ERMN office.

First-Aid

Although being thoroughly prepared and working cautiously can prevent many accidents, emergency situations can arise quickly and unexpectedly; consequently, it is important for crew members to understand how to respond appropriately if medical emergencies occur while conducting field work. Permanent ERMN employees are required to have advanced first aid training because they all participate in field-based activities. Relevant trainings and certifications include: Wilderness First Aid, Outdoor Emergency Care, and/or Wilderness First Responder. These levels of training also include CPR certification. All permanent ERMN employees are also required to take NPS Occupational Leadership Training.

First Aid Kits

Monitoring crews should carry a stocked first aid kit with them in the field. Field vehicles should have a more substantial first aid kit. Contents of the kit(s) include:

Bandage Materials
5 Bandage, Adhesive, Fabric, 1" x 3"
2 Dressing, Gauze, Sterile, 2" x 2", Pkg./2
2 Dressing, Gauze, Sterile, 4" x 4", Pkg./2
2 Dressing, Non-Adherent, Sterile, 3" x 4"
2 Bandage, Conforming Gauze, 3"
5 Bandage, Adhesive, Fabric, Knuckle

Bleeding
1 Trauma Pad, 5" x 9"
1 Instructions, Easy Care Bleeding
1 Gloves, Nitrile (Pair), Hand Wipe

Blister / Burn
1 GlacierGel (Large Oval)
11 Moleskin, Pre-Cut & Shaped (11 pieces)

CPR
1 CPR Face Shield, Laerdal

Duct Tape
1 Duct Tape, 2" x 5 Yards

Fracture / Sprain
1 Instructions, Easy Care Fracture & Sprain
1 Bandage, Elastic with Velcro, 3"
1 Bandage, Triangular

Instruments
1 EMT Shears, 4"
1 Splinter Picker/Tick Remover Forceps
3 Safety Pins
1 Pencil
3 Thermometer, Disposable

Medical Information
1 Comp. Guide to Wilderness & Travel Medicine
1 Patient Assessment Form

Medication
2 Ibuprofen (200 mg), Pkg./2
2 Acetaminophen (500 mg), Pkg./2
1 Instructions, Easy Care Medications
2 Antihistamine (Diphenhydramine 25 mg)
1 Aspirin (325 mg), Pkg./2

Wound Care
2 Tincture of Benzoin Topical Adhesive
6 After Cuts & Scrapes Antiseptic Wipe
1 Instructions, Easy Care Wound
1 Tape, 1" x 10 Yards
1 Syringe, Irrigation, 20 cc, 18 Gauge Tip
1 Povidone Iodine, 3/4 oz
1 Wound Closure Strips, 1/4" x 4", Pkg./10
1 Cotton Tip Applicator, Pkg./2

Field Work Preparation

Field Season Planning and Implementation Timeline

All preparations for ERMN fish community monitoring must be completed by May 1, which is when sampling begins at parks in West Virginia and parks in western Pennsylvania (Table 1). Delaware Water Gap NRA are sampled during July and August depending on weather and streamflow. The ERMN Aquatic Ecologist will inventory equipment and supplies (Table 2) during January of every year that fish community monitoring occurs, which allows time for needed purchases and repairs. All gear, including Personal Protective Equipment (PPE) must be checked to ensure that it is in excellent working condition before using it for field work.

Table 1. Target start and completion dates for ERMN fish community monitoring in wadeable streams.

Task	Start Date	Completion Date
Communicate with Parks Field Work Plans	January 1	January 31
Inventory and Purchase Equipment/Supplies	January 1	January 31
Hire Technician(s)	January 1	March 31
Prepare Data Forms	March 1	March 31
Prepare Electronics, Equipment and Supplies	March 1	April 21
Coordinate Sampling Schedule with Parks	April 1	April 21
Field Work – Bluestone NSR, New River NP&PRES, WEPA parks	May 1	June 15
Field Work – Delaware Water Gap NRA	June 16	July 31

Table 2. Equipment and supplies required for ERMN fish community monitoring in wadeable streams.

Equipment and Supplies

- 25 m Measuring Tape
- Metric Surveyors Rod
- Backpacks
- Batteries for Aerators, Flow Meter, Range Finder
- Compass
- Flow Meter and Staff Gauge
- Data Forms, Clipboards, and Pencils
- Digital Camera, Batteries, Lenses, Memory Cards
- Gear Decontamination Rinse (tap water)
- Gear Decontamination Spray Solution
- GPS Units (Waypoints/tracks uploaded)
- Pump Sprayers (2)
- Range Finder
- Road and Park Maps
- Sample Reach List
- Secchi Tube(s)
- Utility Tools
- Water Quality Multiprobe, Display, and Cable(s)
- Water Quality Standard Solutions
- Water Quality Maintenance Kit (tools, grease, O-rings, pH electrolyte solution)
- Wire Flags / Flagging

Fish Sampling

- 1.5 ml Polypropylene Sample Tubes
- 5 gal Buckets (at least six)
- 95% Ethanol
- Acrylic "Fish Viewers"
- Clean/polished Anode Ring Probes
- Backpack Electrofishing Units
- Block Nets
- Dip Nets
- Electrofishing Gloves (PVC, Nitrile, Latex)
- Electrofishing Unit Batteries
- Electrofishing Unit Battery Chargers
- Fish Handling (Aquarium) Nets
- Fish Measuring Boards
- Flow Meter and Staff Gauge
- Forceps
- Live-well aerators (two)
- Net pens (2)
- Taxonomic Keys
- Tissue Sample Labels
- Tricaine methanesulfonate (MS-222)
- Tweezers

Personal Supplies

- Cell Phone
- Disinfectant Lotion
- Electrofishing gloves
- First Aid Kits
- Nitrile gloves
- Park Radio
- Personal Locator Beacon
- Polarized Glasses
- Waders (two per crew member)
- Wading boots (“sticky” rubber with studs)
- Wader repair kits

Hiring the Field Crew (TBD)

The Aquatic Ecologist and Program Manager are responsible for hiring the field crew. If possible, priority consideration should be given to crew members from previous years and other protocols (e.g., benthic macroinvertebrates, streamside birds) to maximize logistical efficiencies and consistency. Hiring of crew members should be initiated as early as possible but no later than January 1 of calendar years when fish monitoring occurs.

Crew Leader Qualifications

1. Prior experience monitoring aquatic systems.
2. Preferably graduate level stream ecology experience and training.
3. Substantial backpacking and orienteering experience.
4. Ability to carry an average pack weight of 60 lb. over three or more miles of rough terrain, spend six hours conducting fish community monitoring, and return the three or more miles in a single, 10 hour period.
5. Familiarity with fish communities in the mid-Atlantic region.
6. Leadership experience and ability to diffuse conflicts.
7. Excellent organizational skills.
8. Ability to manage and work well with others in a field crew setting for long periods of time.
9. Excellent data management skills and aptitude with computers and other technology (e.g, water quality multiprobes, GPS)
10. Certification in wilderness first aid.

Crew Member Qualifications

1. Strong interest, knowledge, and training in aquatic ecology.
2. Ability to carry an average pack weight of 60 lb. over three or more miles of rough terrain, spend six hours conducting fish community monitoring, and retherm the three or more miles in a single, 12 hour period.
3. Ability to work well with others in a field crew setting for long periods of time.
4. Backpacking and orienteering experience.
5. Knowledge of, or preferably, certification in wilderness first aid.
6. Data management skills including basic computer knowledge.

Data Forms

Ample copies (Table 3) of all data forms (Appendix B) must be printed with a laser printer on waterproof paper.

Table 3. Number of blank data forms required in panel one (even years, 38 sites) and panel two (odd years, 32 sites) of ERMN fish community monitoring.

Data Form	Panel 1	Panel 2
Electrofishing	120	105
Discharge	120	105
Habitat	40	35
Rapid Habitat	40	35

Schedule Field Work and Field Crew Training

The target field season for fish community monitoring is from May 1 to July 31; coordinate logistics (e.g., housing, if available) with park staff and schedule field crew training (SOP 2) so that it occurs during the week before field work (e.g., late April if weather permits).

Training

Field crew training takes place during April when weather and stream conditions are suitable. Crew members are expected to review SOPs before training, but the ERMN Ecologist(s) and crew will perform all field work tasks (Table 3) together multiple times during training. As soon as possible after May 1, field work begins and the ERMN Aquatic Ecologist accompanies the crew until all tasks are performed consistently and efficiently.

Table 4. Organization of topics during field crew training for ERMN fish community monitoring (based on Weissinger et al (2017).

Category	Topics
Program Overview	Introduction to ERMN goals, projects, and staff
Administrative Responsibilities	Work hours, equipment care, travel
Safety	Job Hazard Analysis, communication, electrofishing, ticks
Vehicles	Proper use and care, inspection, tire changing, defensive driving
Park Etiquette	Communication with park staff, visitor interactions, low impact practices, driving
Navigation	Car GPS units, handheld GPS waypoints and tracklogs
Water Quality	Calibration, accuracy checks, metadata, equipment maintenance, measurement
Electrofishing	PPE, concepts, settings, methods
Photos	Reach photos, incidental photos, photo vouchers, photo logs
Fish identification	Park-specific species lists and key characters among likely encountered species
Discharge Measurement	Velocity-area method, neutrally-buoyant object method
Habitat Measurements	Channel dimensions and substrate, fish cover, riparian vegetation, large wood debris, rapid habitat assessment
Equipment Disinfection	Spray method, bath method
Data Management	Data forms, file uploads, data entry, versioning

Literature Cited

American Fisheries Society (AFS). 2008. Fisheries Safety Handbook. Professional Safety Committee. Bethesda, MD. 48 pp.

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.

Appendix A. Job Hazard Analysis - Fish Community Monitoring

U.S. Dept. of Interior, National Park Service, Eastern Rivers and Mountains Network **JOB HAZARD ANALYSIS BY:** **Caleb Tzilkowski, Ana Casillas, Andrew Weber**	**WORK ACTIVITY** Fish Community Monitoring in Wadeable Streams	☒ **NEW** October 2021 ☐ **REVISED**

Required Personal Protective Equipment and Supplies:
Weather/condition-appropriate clothing, water and food, cell phone, park radio, Personal Locator Beacon, GPS unit(s), compass, maps, first aid kit, polarized sunglasses, hat, helmet, headlamp.

Electrofishing PPE: Properly rated waders and rubber gloves, wading boots with "sticky rubber" soles and studs.

Tasks	Potential Hazard(s)	Recommended Action or Procedure
Planning and Communication	• Not being prepared. • Not following plan/itinerary. • Communication breakdowns	▪ Plan ahead. Know where you will be going, including travel routes and potential hazards. ▪ Check weather and stream forecasts each day and plan sampling schedule accordingly. ▪ Keep other ERMN staff apprised of your daily itinerary by following check out/check in procedures. ▪ Carry a charged cell phone and/or park radio at all times. Verify that devices are working and have sufficient charge before leaving parking areas.
Emergency Preparedness	• Not knowing emergency procedures • Not having proper emergency supplies	▪ Depending on work site (park), know who to contact and how to reach them if emergency occurs. ▪ Have current first aid and CPR certification. ▪ Carry a well-maintained first aid kit.
General vehicle operation	• Injuries from vehicle accident; damage to vehicle	▪ Check vehicle condition often (tire pressure, fluids, fuel). ▪ Do not use the vehicle if it is unsafe and promptly address needed repairs. ▪ Do not drive if fatigued. ▪ Ensure full visibility from all windows and mirrors. ▪ Drive defensively and be alert for wildlife and pedestrians. ▪ Wear seat belts with shoulder harnesses. ▪ Do not use cell phones while driving. ▪ Obey all traffic laws and speed limits. ▪ Adjust speed to changing weather or traffic conditions ▪ Properly store and secure all cargo so to prevent shifting.
Driving on gravel, dirt, or un-maintained roads	• Injuries from vehicle accident; Damage to vehicle	▪ Use the appropriate vehicle for the terrain (e.g., AWD/high ground clearance, small turning radius). ▪ Do not exceed the capacity of your vehicle or driving ability. ▪ Use spotters to assist while navigating obstacles. ▪ Maintain safe speeds for changing road conditions (e.g., loose gravel, potholes, fallen trees/boulders). ▪ Be alert on narrow roads for oncoming vehicles. Be prepared to slow down, pull over, or stop with little notice.

U.S. Dept. of Interior, National Park Service, Eastern Rivers and Mountains Network **JOB HAZARD ANALYSIS BY:** **Caleb Tzilkowski, Ana Casillas, Andrew Weber**	**WORK ACTIVITY** Fish Community Monitoring in Wadeable Streams	☒ **NEW** October 2021 ☐ **REVISED**

Required Personal Protective Equipment and Supplies:
Weather/condition-appropriate clothing, water and food, cell phone, park radio, Personal Locator Beacon, GPS unit(s), compass, maps, first aid kit, polarized sunglasses, hat, helmet, headlamp.

Electrofishing PPE: Properly rated waders and rubber gloves, wading boots with "sticky rubber" soles and studs.

Tasks	Potential Hazard(s)	Recommended Action or Procedure
Working outdoors during storms	• Being struck by falling trees or branches • Being struck by lightning	▪ Check weather forecast each morning (radio or internet). ▪ Plan or adjust field work to avoid being outside during storms. ▪ If you see or hear a thunderstorm coming, retreat from water, high ground, and exposed areas. Go inside a sturdy building or vehicle if possible. ▪ If you can't get inside, make yourself the smallest target possible and minimize contact with the ground. ▪ Members of the crew should stay separated by at least ten feet. ▪ Crouch down on your pack on the balls of your feet and keep your feet close together. Place your hands on your knees and lower your head.
Working in heat, humidity, or cold	• Heat exhaustion, sunburn, dehydration, hypothermia	▪ Evaluate weather forecast each morning and plan accordingly. ▪ Carry and drink plenty of water. ▪ Take extra breaks and otherwise adjust the work routine to minimize exposure to extreme heat and humidity. ▪ Take adequate garments for all possible weather conditions. Choose clothing that will keep you warm even if it gets wet.
Hiking	• Steep , rugged, and slippery terrain. • Hazard trees – being struck by falling trees or branches.	▪ Use caution at all times. Walk carefully and watch footing. ▪ Assess terrain to find safe routes. ▪ Avoid walking downslope of others due to potential for rocks to dislodge from uphill. ▪ Wear appropriate footwear. Stay aware of your feet. Address blisters and hot spots promptly. ▪ Avoid carrying excessive weight or unbalanced loads. ▪ When walking on a steep slope, lean upslope. ▪ Ensure that stems and vines are alive and can support your weight before relying on them. ▪ Look up. Be alert for storm damaged trees with large broken limbs, and unstable standing dead trees. ▪ Do not spend extended time in an area with hazard trees.
Walking through thick vegetation	• Cuts, scratches, bruises, eye or ear injuries	▪ Shield your eyes and face with your hands, glasses, or hat when moving through tall thick brush. Keep your head and eyes pointed downward so your head hits obstacles before your eyes.

U.S. Dept. of Interior, National Park Service, Eastern Rivers and Mountains Network **JOB HAZARD ANALYSIS BY:** **Caleb Tzilkowski, Ana Casillas, Andrew Weber**	**WORK ACTIVITY** Fish Community Monitoring in Wadeable Streams	☒ **NEW** October 2021 ☐ **REVISED**

Required Personal Protective Equipment and Supplies:
Weather/condition-appropriate clothing, water and food, cell phone, park radio, Personal Locator Beacon, GPS unit(s), compass, maps, first aid kit, polarized sunglasses, hat, helmet, headlamp.

Electrofishing PPE: Properly rated waders and rubber gloves, wading boots with "sticky rubber" soles and studs.

Tasks	Potential Hazard(s)	Recommended Action or Procedure
		▪ Wear long clothes to protect bare skin. ▪ Look before you grab vegetation to avoid grasping thorny stems/poison ivy etc.
Wading	• Injuries from falling and/or drowning	▪ Wear studded boots with "sticky rubber" treaded soles. ▪ Make sure waders and boots fit properly and do not leak. ▪ Wear wading belt ▪ Be sure that one foot is always firmly in place before taking another step ▪ Avoid walking sideways, cross streams at an angle, facing upstream ▪ Take care to not step into crevices in bedrock or between rocks where you may become stuck or cause injury (e.g., ankle or knee). ▪ Avoid deep mud/depositional areas that can be deceptively deep. These areas can lead to potential injury or unnecessary fatigue if you become stuck. ▪ If you fall, keep your face up with your feet downstream and attempt to move toward stream bank.
Electrofishing	• Electric shock • Drowning	▪ Complete thorough training regarding electrofishing concepts and practices. ▪ Complete refresher electrofishing safety training annually, before field work. ▪ Wear PPE that is in good condition, including: waders, studded wading boots, electrician gloves, and polarized sunglasses.
Ticks	• Contracting diseases transmitted from ticks	▪ Know how to identify tick life forms, and the signs & symptoms of tick-borne diseases. ▪ Wear long sleeves and pants, pre-treated with permethrin (e.g., Insect-shield). ▪ Tuck pants into socks and tuck shirt into pants. ▪ Conduct thorough tick checks during, and particularly after completing field work. ▪ Shower every day of field work and conduct even more thorough tick checks. ▪ Know how to properly remove embedded ticks (with fine point tweezers or tick removal tool) by grasping the tick as close to the skin as possible and steadily pulling away from your body. ▪ Understand current NPS (regional) guidance regarding tick exposure and immediately follow-up

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		with ERMN Program Manager regarding available options for medical treatment.
Poisonous plants, especially poison ivy	• Contamination/toxicity from contact with poisonous plants	▪ Learn to identify poison ivy in its many growth forms. ▪ Wear long sleeves and pants. ▪ Thoroughly wash hands, equipment, and clothes with Tecnu or similar specialized soap after working in areas with poison ivy.
Bee, wasp, or yellow-jacket stings	• Multiple stings from disturbing or stepping into nest areas	▪ Be alert to hives in brush, ground holes, or hollow logs. Watch for insects traveling in and out of one location. ▪ If any crew member is known to have allergic reactions to bee stings, other crew members must be informed and know where emergency medication is located (if applicable). ▪ If the victim develops hives, asthmatic breathing, tissue swelling or a drop in blood pressure, seek medical help immediately. ▪ If stinger is left behind, scrape it off of skin. Do not use tweezer as this squeezes the venom sack, worsening the injury.
Working in bear territory	• Bear encounter	▪ Avoid working alone if possible. ▪ Be especially alert near dawn or dusk. ▪ Be especially aware of mother bears with cubs. Never approach cubs or come between a mother bear and her cubs. ▪ Maintain eye contact, face the animal, continually make noise -- do not freeze or remain silent. ▪ Appear larger by standing tall, waving arms or jacket over your head. ▪ Slowly back away – don't approach a bear. ▪ Never run from a bear. ▪ Throw things and shout loudly. ▪ Fight back aggressively.
Venomous snakes	• Being bitten by a venomous snake	▪ Be alert for snakes in thick vegetation and rocky habitats. ▪ Look before putting hands or feet in places out of immediate view. ▪ Immobilize the bitten area and keep it lower than the heart. ▪ Apply a bandage, wrapped two to four inches above the bite, to help slow venom. The bandage should be loose enough to slip a finger under it.

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Tasks	Potential Hazard(s)	Recommended Action or Procedure
		▪ Remove rings, watches, shoes, etc. before swelling begins in earnest. ▪ Seek medical attention immediately and/or call for help. Remain calm.
Handling Chemicals	• Injury/illness from improper use	▪ Follow chemical manufacturer instructions for use and wear all appropriate PPE (e.g., eye protection, latex/nitrile gloves).