

# Field Safety Guidelines

**Environmental Health & Safety  
Carleton University**

**March 2025**

## 1. INTRODUCTION

### **Purpose**

Carleton's Field Safety Program at Carleton University is designed to identify and assess both existing and potential hazards associated with off-campus field work, which may pose uncommon risks compared to individuals' daily activities. This encompasses off-campus field activities within the country and abroad. The program places significant emphasis on the role and responsibilities of supervisors in identifying hazards, performing risk assessments, and implementing controls.

### **Applicability**

This program is applicable to all university personnel including staff, students, postdoctoral research fellows, volunteers, interns, and faculty engaging in off-campus activities involving data collection, sampling, analysis, educational field trips, and academic courses. Such activities may encompass various disciplines including biosciences, engineering, fisheries and wildlife, forestry, architecture, and geology, among others.

A remote site is delineated by both distance and accessibility, referring to an off-campus location situated beyond approximately one hour's travel time from the nearest definitive treatment for illness, injury, or other unintended consequences. Definitive treatment denotes the most suitable course of treatment for a patient, as determined by a medical professional, following consideration of all available options (e.g., surgery for internal bleeding, casting for a broken bone, suturing for a deep laceration).

The Occupational Health and Safety Act defines a workplace as "any land, premises, location or thing at, upon, in or near which a worker works." Therefore, all sanctioned activities in the field are considered a workplace and University policies must be followed.

Activities covered by the program include:

- Domestic field activities at remote sites
- Domestic field activities at non-remote sites
- Domestic field courses and field trips
- International field activities at remote sites
- International field activities at non-remote sites
- International field courses and field trips

Some field activities take place at industrial sites (e.g. mining, processing or manufacturing) where all procedures and activities are conducted under strict supervision, control, and adherence to established protocols and regulations. Safety measures within an industrial setting encompass comprehensive risk assessments to ensure the protection of workers, researchers, and the environment. These protocols and agreements could be provided to partially fulfil the requirements of the Field Safety Program. For further details, please contact the Office of Risk Management

### **Responsibilities**

Roles and responsibilities specific to the Field Safety Program include:

### Principal Investigators/Supervisors/Activity Leader

- Inform the department's administration office of the fieldwork activity at least two weeks before departing for work within Ontario and at least one month before departing for interprovincial or international fieldwork.
- Evaluate the fieldwork activity to identify actual and potential hazards by referring to the Remote Field Work Safety Plan
- Develop and implement additional safety measures not specified in this document, including emergency procedures specific to the activity prior to departure, as required.
- Ensure the ratio of participant(s) to supervisor(s) is appropriate based on the level of risk of the fieldwork
- Ensure that all participants conducting fieldwork have read and understood this manual.
- Ensure that fieldwork participants complete and submit the necessary fieldwork forms (e.g. informed consent, waivers, fieldwork declaration, etc.) and review the completed Field Safety Plan
- Conduct an orientation session for fieldwork participants to cover the specific purpose of the trip, its challenges, minimum requirements (e.g., vaccinations, additional insurance, etc.), the risks associated with the fieldwork, the precautions implemented during the fieldwork, local laws and customs, and the emergency procedures to follow.
- Approve the composition of the fieldwork team. Ensure that participants possess the competencies required to deal with anticipated situations.
- Identify and implement appropriate health, safety and security mitigation and control procedures, including measures that deal with emotional or psychological hazards created in the fieldwork environment.
- Ensure that equipment (protective or other) are ready and that participants have received related and necessary instruction and training on this equipment (e.g., Wilderness First Aid, Pleasure Craft Operator Card, etc.)
- Ensure that participants use equipment safely and follow procedures.
- Take reasonable precautions for the safety of those participating in fieldwork activities for the duration of the trip, including before, during, and after activities listed on the trip schedule, such as daily verification that the number of participants arriving at the fieldwork site is equal to the number returning to the University at the conclusion of fieldwork, etc.

### Field Activity Participants

- Behave in a respectful and safe manner, taking reasonable precautions to ensure their actions do not endanger themselves or other fieldwork participants and supervisors.
- If health conditions warrant, seek medical advice prior to participating in fieldwork activities.
- Follow written and verbal instructions issued by supervisors and persons in authority.
- Identify hazards, assess risks, and report incidents and/or concerns to a supervisor immediately (or as soon as is reasonably possible)
- Prior to participating in fieldwork activities, notify the fieldwork supervisor of required medication and/or medical condition(s) that restricts the individual's ability to undertake certain aspects of the proposed fieldwork, or increases their risk if they participate.
- In consultation with the supervisor, complete and submit relevant fieldwork forms, such as informed consent forms, waivers, fieldwork declaration, etc., prior to the deadlines established by the supervisor.

## 2. ACKNOWLEDGEMENTS

We would like to thank the University of Northern British Columbia, University of Ottawa, University of Alberta and Queen's University for permission to adapt their manuals, from which this manual is derived.

## 3. ISSUES OF CONDUCT AND ETHICAL CONSIDERATIONS

### Stewardship

In carrying out scientific research treat the natural world with care and consideration. Respect the rights of the public and property owners. Familiarize yourself with local customs including within indigenous communities. Acknowledge and recognize traditional indigenous territories and cultural practices. For some studies it is advisable to obtain a list of threatened and endangered species to avoid inadvertently destroying rare species. A list for your study area may be obtained from the Ministry of Natural Resources.

Where fieldwork involves managing or handling hazardous materials, proper hazardous waste disposal procedures must be established and adhered to.

### Communicating with Land Base Owners

In advance of going to the field, it is your responsibility to contact and obtain permission to enter and carry out your work from the owners or managers of the land base where you will be located. This may be a First Nations group, a provincial ministry, a licensee, a private owner, or national or provincial parks service. Ask the proprietors to identify hazards they are aware of and establish a prime contact person.

### Working within National and Provincial Parks

Your research and methodology will have been reviewed carefully before you are given permission to work within a park. You may be making higher use demands on the park than a typical visitor. Try to minimize your impact on the study area. Take alternative routes to your study sites to avoid creating permanent trails. Camp stoves are always preferable to campfires. When latrine facilities do not exist, bury human wastes and pack out toilet paper. Unless special permission is granted, it is illegal to pick plants or to remove rocks or soil in national and provincial parks. Wildlife (including insects) should not be harassed or killed. Vehicles should not be driven off-road within parks. Food waste can attract bears. All food wastes should be removed from parks and other work areas.

### University Policy Compliance

University policies approved by the Senior Management Committee apply across campus to all faculties, departments, and services. All faculty, staff and students must comply with these policies. Certain policies include statements directly supporting the Field Safety Program. These include the following;

- Responsible Conduct of Research

*"11.1 A researcher proposing to engage in research involving hazardous experiments or materials of any kind shall:*

*(i) comply with the Regulatory Framework governing the conduct of such experiments or the use of such materials;*

*(ii) obtain all necessary approvals before accepting delivery of hazardous materials, or embarking on the research;*

*(iii) perform comprehensive risk assessment to disclose potential hazards to participants, students and others that might be impacted; and*

*(iv) prepare written procedures describing the activities and how risks are to be managed.”*

- Travel and Related Expenses

*“3. All travel and related expenses must be approved by the traveler’s supervisor. The approval confirms the relevance and reasonableness of the travel, for University purposes.”*

- Workplace Harassment Prevention

*“Harassment will not be tolerated in the workplace, and if identified, will be addressed immediately.”*

- Workplace Violence Prevention

*“All acts of violence in the workplace are strictly prohibited, and if identified, will be addressed immediately.”*

Fieldwork locations are considered workplaces, and as such, activities are subject to University workplace policies. Consequently, in accordance with University policy, smoking is not permitted in fieldwork locations, including all vehicles. Personnel must be fit for work, including in the field; therefore, no alcohol, recreational drugs (marijuana or other) or other impairing substances are permitted in a workplace setting.

### **Personal Conduct**

As an employee or student, you are representing Carleton University when you work in the field, even when you are on personal time. It is therefore important that you conduct yourself appropriately. In small communities, people will know who you are and who you work for. It is also a good idea to carry some form of identification that describes who you are and what you are doing. If you require specific permits to conduct your research, make sure you are carrying them with you.

### **Mental Health**

Existing mental health conditions can be exacerbated by being away from the familiar during field work. The list of stressors also include pressure to succeed, colleague interactions, and heightened hazard environments. Researchers can manage these stressors by setting up support structures and coping skills. Clear goals and plans prior to fieldwork must be established to set manageable expectations. Peer-support and CU internal services such as Health and Counselling can help establish reasonable goals; recalibrate plans; and address feelings of stress and anxiety. Fieldwork takes time and energy and researchers should supplement work with leisure and rest to prevent burnout.

### **Harassment and Equity**

Working and living in close quarters during field work can lead to friction or unwanted attention. Each participant has a right to privacy and personal space. Be respectful of your coworkers. Carleton University is committed to the protection of the health, safety, and wellbeing of all members of the University community. As such, the supervisor must take all precautions reasonable to provide and maintain a respectful learning and working environment that is free of harassment including in the field. All participants must be familiar with the Workplace Violence and Harassment Prevention Programs.

## 4. PROCEDURE

The following steps must be followed when planning for or performing field activities.

1. Plan for field activity and seek approval
2. Prepare for field activity
3. Perform field activity
4. Debrief upon field activity completion

### STEP 1 Plan for Field Activity

#### Key Activities

- Determine the Principal Investigator/ Activity Leader
- Complete all applicable fields in the Field Activity Safety Plan.
- Review and acquire insurance as necessary, validating the insurance decision with the Office of Risk Management
- Submit completed forms to the appropriate Departmental Chair for review and approval at least 4 weeks before departure for work within Ontario and at least 6 weeks before departure for interprovincial or international field activities.
- Once approved, send the signed forms to [risk@carleton.ca](mailto:risk@carleton.ca) for review at minimum 2 weeks before departure.

Field activity participants who travel outside Canada may face additional requirements due to international restrictions. All field activity participants travelling outside of Canada must register in Carleton Central, with Global Affairs Canada and with International SOS prior to travel. These registrations provide information such as travel advisories, document requirements, and emergency information for Canadians travelling abroad and are critical in the event of an emergency such as a natural disaster or civil unrest. The University will not approve any travel to a destination the Government of Canada recommends avoiding due to risk to personal safety because of war or terrorist activities. Contact the Office of Risk Management for details.

In addition, the activity leader must identify any public health issues, political concerns and cultural limitations in the field site location. They must also identify necessary tools, equipment, training, assessments, services, immunizations, documents, procedures, applications, permits, and approvals required to successfully execute the field activity. Collect all details including participant information and GPS coordinates and complete the Field Activity Safety Plan using Appendix 1: Common Field Activity Hazards as a reference.

### STEP 2 Prepare for Field Activity

#### Key Activities

- Gather the necessary items and information
- Collect necessary signed fieldwork forms from participants
- Provide fieldwork orientation for all participants prior to departure
- Provide applicable training to all participants prior to departure

- Inspect all equipment prior to departure

Prior to orienting participants all applicable fieldwork forms must be signed by participants and collected and documented by the fieldwork supervisor. Applicable fieldwork forms may include informed consent, waivers, and fieldwork declaration.

### Orientation

Prior to departing for fieldwork all support staff and students shall be oriented by the fieldwork supervisor. The orientation shall cover the Field Safety Plan and any additional topics associated with the execution of the planned activities such as, local laws and customs, disciplinary measures, drug and alcohol consumption, etc.

### Training

All applicable and required fieldwork-related training and fieldwork equipment training will be identified in the orientation and shall be provided to, and completed by, supervisors, workers, and students prior to the start of fieldwork activities. A needs assessment must be conducted when determining training requirements. The fieldwork supervisor shall retain the training documentation. Any participant who does not complete required training shall seek appropriate exemptions from the fieldwork supervisor prior to being allowed to participate in the fieldwork activity.

### Inspection of equipment

Necessary fieldwork equipment is specific to the activity being conducted; therefore, all equipment that is required to perform the fieldwork activity shall be inspected by the fieldwork supervisor, or other competent faculty personnel, and its condition will be noted in an inspection log prior to beginning the fieldwork activity. Any defective equipment should be tagged and taken out of service and replaced with properly functioning equipment prior to beginning the fieldwork activity.

### Transportation

Automobiles or other motorized vehicles used for fieldwork activities require special care to be taken to comply with local laws and regulations. Authorization is required in order to operate a University owned or leased vehicle. Vehicles owned by Carleton University are used by various University Departments in the completion of their duties and activities.

However, University owned vehicles are not provided to every employee or student. As a result transportation must be arranged using alternative methods. Methods include: the hiring of buses from a transit company, the long term lease of a vehicle, the short term rental of a car or van, and car pooling in a vehicle owned by a student, professor or coach.

Automobile Insurance is legislated by Provincial Governments in Canada and State Governments in the United States of America. Although basic coverage is similar in most jurisdictions in North America, there can be differences in areas such as required legal limits, the right to sue for damages, and methods of determining responsibility in the event of an accident. When driving a Carleton University vehicle out of the Province of Ontario, the user should consult with the Manager, Risk and Insurance to determine if there are any specific insurance requirements for the jurisdictions to be travelled in.

For additional information and to register as a driver of a University vehicle, please consult the Office of Risk Management website.

### STEP 3 Conduct Field Activity

#### Key Activities

- Perform daily safety meeting before the start of each fieldwork session
- Inspect critical equipment daily prior to starting fieldwork
- Execute the fieldwork as described in planning and preparation steps
- Perform participant check-in before and after each fieldwork session
- Report any incidents and respond to any emergencies (as necessary)

#### Field Safety Meeting

Before the start of each day’s fieldwork, a safety meeting will be held for all participants, supervisors, and workers. The safety meeting will review the Safety Plan for the work that is being completed on that day, the controls that are in place to minimize the hazards and risks, emergency response plans, communication plans and contact information, check in procedures and their applicable locations, as well as completing the equipment inspection. Safety meetings must be documented, and the topics discussed, and attendance must be recorded. Field worksite safety inspections must also be performed at regular intervals and should include the following information.

Field Site Inspector Name	Date Completed	Inspection Form Attached
		<input type="checkbox"/>

#### Check-in Procedures

When working in the field you should leave a sign-out sheet and field work information with a responsible person who can monitor when you are to return from the field and initiate a search should you not report back. The following information should be included:

- Name;
- Date;
- Time of departure;
- Expected date/time of return;
- Anticipated route and location;
- Activities to be undertaken;
- Expected sign-in time.

Always let someone know where you are going and when you are to return before going on any field trip.  
Always be sure to sign in when you return from the field.

If any participants are not accounted for during check-in, emergency procedures will be enacted as necessary. Incidents will be reported as necessary. Fieldwork should be executed according to the plan and all participants and workers should follow the instructions issued by the fieldwork supervisor.

A buddy system shall be put in place for any fieldwork in any environment or workspace where work is complete across large geographic areas, or in areas where loss of contact between participants can occur. The second party is intended to act as a call person and summon assistance in the event of an emergency. Fieldwork activities conducted in isolation are strongly discouraged.

### Critical Equipment Inspection

Every day, students and supervisors must inspect critical equipment before starting a fieldwork session. An inspection serves to identify potential deficiencies, damages, or defects in the equipment that would affect normal functionality in an emergency. An inspection must be documented and must include a review of:

- Battery life and working condition of navigation and communication equipment (including stock of extra batteries)
- Flashlight
- Clothing appropriate for fieldwork conditions
- Food and water supply
- Necessary medication
- Contents and condition of first aid or other medical equipment
- Condition and working function of required PPE
- Condition and working function of other critical equipment (e.g., scuba gear, ropes, sample containers, etc.)

Damaged or defective equipment shall be removed from service and marked as “out of service” such that it may not be used for the duration of the fieldwork.

### Radio/Phone Checks

When a field crew is working off campus the sign-out/in procedures still apply, however local contacts will be needed to monitor your daily activities. Every crew member should use the system you adopt. Establish the following protocol with your check-in person. If one radio/phone check is missed and you are alone, a search is initiated immediately. If there is more than one person in the party, two radio/phone checks are missed before a full search is initiated. When using a radio, assign a radio call sign to every crew member as it facilitates communication.

### Working Alone

Working alone should be avoided whenever possible. Some guidelines to follow are:

- Do not work alone if you will be climbing trees, operating a chainsaw or plan to engage in any other high risk activities;
- On day trips:
  - ✓ Carry a radio or other communication devices if possible and check periodically for loss of communication (cell phones can replace radios, but be sure that coverage is adequate, if

unsure have both available). Most handheld radios are line of sight, good only for a few km depending on topography.

- ✓ If radio communication is not possible, establish detailed check-in procedures and detailed route plans.
- On overnight trips:
  - ✓ twice a day radio check-in is mandatory (once in the morning, and once at the end of the day). Leave a detailed route plan. You don't necessarily have to carry a radio with you if there is one at the destination site (e.g. cabin, camp).
- Spots and beacons are good for locating users but convey very little info to rescuers should the need arise. Use them in combination with other devices that allow 2-way communication (cell phones, radios or satellite phones). If you are working in very remote locations, consider taking a satellite phone so that you have better ability for outside contact should an emergency arise.

## STEP 4 Debrief following completion

### Key Activities

- Debrief and share details after completing fieldwork and returning to campus

The University recommends that participants debrief shortly after they complete the fieldwork activity to highlight situations in which the group excelled and to learn from situations that were unexpected. The debrief will help fieldwork supervisors prepare for subsequent fieldwork activities.

## 5. EMERGENCY PROCEDURES

These steps inform members of the field team, and the University community, of the proper procedure if an emergency arises during field activities.

### Contact emergency services

During a situation requiring immediate medical, police, or fire response in the field, supervisors must immediately call 911 or the equivalent local emergency number. If emergency contact is not possible from the location where fieldwork is being conducted, the activity leader must assess the risk of leaving, or sending representatives from the group to leave the fieldwork area to contact emergency services.

In the event of a critical injury or an incident that the University should be informed, the supervisor must notify Campus Safety Services (613-520-4444) to initiate Carleton University response procedures.

### Follow field activity-specific emergency procedures

Preparation for field activities must include the development of specific emergency response procedures. If an emergency occurs while fieldwork is being completed, the fieldwork-specific emergency procedures should be followed first. These can include, but are not limited to: use of first aid, locating lost participants, evacuating due to a natural disaster or civil unrest, etc.

### Incident Reporting

For situations that are not considered urgent, participants should record and report all accidents or incidents (including good catches) that occur during their field activity. The supervisor must complete an Incident, Injury, Good Catch report form within CU WorkSafe whenever a person is, or could have been,

injured, including spills and accidental emissions, as well as any illness contracted because of fieldwork or that may develop following the fieldwork.

In urgent situations, reporting can be delayed until the situation is under control and it is appropriate to devote time to reporting the incident or emergency.

## **Getting Lost**

### Prevent Getting Lost

Always plan your route before leaving a vehicle and think about the length of time it should take to get to/from your study site. If you have a GPS, take a waypoint at the truck before you leave, but keep in mind that GPS units can fail due to batteries or poor satellite reception. Study your maps and make a mental note on the most direct route out of the woods in case you lose your map or equipment fails. What general direction will take you to the closest road or to a known landmark (north, south, east or west; uphill or downhill)? Make sure you have all orientation equipment with you and that it is working properly (maps, compass, GPS, aerial photos).

### Action When Lost

- Remain calm;
- Take stock of what you have with you;
- Sit down, relax, then try to figure out where you are;
- Use your compass, maps and aerial photos;
- Proceed to a high point to view the lay of the land and to be more readily spotted; or if that seems impractical, walk downhill until you encounter a creek and follow it;
- If you have not discovered your position by at least one hour before sunset, prepare to spend the night out:
  - ✓ Check instructions in flare kit (dusk and dawn are the best times for spotting flares. Pick an opening from a hilltop if possible and aim in front of the approaching aircraft).
  - ✓ Prepare smoke signal fire (be cautious during fire season). Lay out ground to air signals if necessary.
  - ✓ Make shelter and build a fire. If this is impossible, cover yourself with leaves and brush.
  - ✓ Keep busy but prevent exhaustion and exposure. In cold weather be especially careful not to sweat as this will lead to becoming chilled.
  - ✓ Conserve food.
- If you are lost due to a forced landing it is important to stay put. Search and rescue organizations have planes, highly trained personnel and every kind of equipment and medical supplies ready to find and rescue you.

## **Accidents/Injuries**

- a. If a person is found unconscious

Check area for ongoing safety hazards. Be aware that there may be serious unseen injuries, (e.g. fractured spine, other broken bones or internal bleeding). In case of injury or sudden severe illness when the patient is unconscious or semiconscious, it is advisable to refrain from moving the patient - except to open an airway (see below) – until professional help arrives. However, it may be necessary to move the patient if their life is endangered by the situation, (e.g. fire, fumes, explosion, moving machinery).

- b. Call or radio for designated first aid provider and emergency response personnel

Have the following information ready:

- Location and distance from the nearest road;
- Nature of injury.

## APPENDIX A: COMMON FIELD WORK HAZARDS

### Physical and Equipment Hazards

#### a. Danger Trees

Danger trees are hazardous trees, or branches, that are at risk of falling and injuring a person. Visible indicators of potential danger trees are:

Large amounts of fungi growing on the main stem or other evidence of decay; Leaning or —hung up|| trees or branches that are over the work site; High winds that are strong enough to cause trees to snap or fall over.

Some trees may have no visible signs of decay and may still be a hazard. The degree of risk of injury from a known or unknown danger tree is proportional to the amount of time you spend at a particular location. For example, a walk-through transect survey will place you at low risk of getting hit by a tree, while spending all summer at only one or two sites will put you at high risk if there are hazard trees present. Diligent practice at sites that are visited more than once in a field season is to do a quick assessment of the site every time you arrive to identify and avoid potentially hazardous areas. Protective headwear may be necessary if hazards are identified, and the tree cannot be removed. In some cases it may be prudent to carry out a professional assessment (by a certified danger tree assessor) and to remove dangerous trees if appropriate. If there are known or suspected hazard trees at your site, it is best to avoid field work at that location during periods of high winds or heavy snow/ice loading.

#### b. Dehydration

Dehydration can be a serious heat related illness. Under normal conditions, we all lose body water daily through sweat, tears, urine, and stool which is usually replaced by drinking fluids and eating foods that contain water. When a person becomes so sick with fever, diarrhea, or vomiting, or is overexposed to the sun, dehydration occurs as the body loses water and essential body salts such as sodium, potassium, calcium bicarbonate and phosphate. The most common symptoms include: thirst, less-frequent urination, dry skin, fatigue, dizziness, confusion, dry mouth and mucous membranes, and increased heart rate and breathing.

To prevent dehydration, drink plenty of fluids or sports drinks to maintain electrolyte balance, especially when working or playing in the sun. Schedule strenuous physical activity for the cooler parts of the day.

In cases of mild dehydration, simple rehydration is recommended by drinking fluids. Many sports drinks on the market effectively restore body fluids, electrolytes, and salt balance. For moderate dehydration, intravenous fluids may be required, although if caught early enough, simple rehydration may be effective. Cases of serious dehydration should be treated as a medical emergency, and hospitalization, along with intravenous fluids, is necessary. Immediate action should be taken.

#### c. Heat stress and Heat Stroke

Heat stroke is the most severe form of heat illness and is a life-threatening emergency. Under certain circumstances, such as extreme heat, high humidity, or vigorous activity in the hot sun, if a person becomes dehydrated and cannot sweat enough to cool their body, their internal temperature may rise to dangerously high levels, causing heat stroke. It is a condition that can occur in anyone – even the young and fit. It develops rapidly and requires immediate medical treatment. The most common symptoms

include: headache, dizziness, disorientation, agitation or confusion, sluggishness or fatigue, seizure, hot, dry skin that is flushed but not sweaty, high body temperature, loss of consciousness, rapid heart rate, and hallucinations.

To prevent heat stroke, drink plenty of fluids during outdoor activities, especially on hot days. Water and sports drinks are the drinks of choice; avoid tea, coffee, soda and alcohol as these can lead to dehydration. Wear lightweight, tightly woven, loose-fitting clothing in light colors, and wear a hat. Schedule vigorous activity for cooler times of the day. Increase the time spent outdoors gradually to get your body used to the heat. During outdoor activities, take frequent drink breaks and splash water on your head. Be aware of humidity as high humidity inhibits a body's ability to perspire and cool even when the actual temperature is not that high.

It is important for a person with heat stroke to be treated immediately as it can cause permanent damage or death. There are some immediate first aid measures you can take while waiting for help to arrive. Get the person indoors or into the shade. Remove clothing and gently apply cool water to the skin followed by fanning to stimulate sweating. Apply ice packs to the groin and armpits. Have the person lie down in a cool area with their feet slightly elevated. Intravenous fluids are often necessary to compensate for fluid or electrolyte loss. In an emergency where a pre-formulated rehydration solution is unavailable, you can make your own oral rehydration solution by mixing 1/2 teaspoon salt, 1/2 teaspoon baking soda, 3 tablespoons sugar and 1 liter of safe drinking water. Be sure to measure accurately because incorrect amounts can make the solution less effective or even harmful. If possible, have someone else check your measurements for accuracy. Bed rest is generally advised.

For additional information, visit <https://carleton.ca/ehs/programs/operational-health-safety/groundskeeping-safety/outdoor-heat-exposure/>

#### d. Hypothermia

Hypothermia, or loss of core body temperature, is a very serious threat in our environment and can occur in any season.

Bring adequate clothing. Tell someone the instant you feel cold. Drink plenty of fluids throughout the day. Eat a lot before bed and first thing in the morning, try to snack throughout the day. This is especially important if you know you will be winter camping. You can wear all the clothes you want but your body needs energy to generate heat. Once hypothermia starts it may be too late for recently ingested food/fluid to be useful. Be aware of wet and windy conditions where you can lose heat faster than your body can generate it. Dress in layers and manage your clothing to avoid sweating. Change all wet clothing including socks, gloves, and hats. Keeping dry will minimize the risk of hypothermia which cools you through evaporation.

Patients with only mild hypothermia should not have abnormalities in the ABC's. If any signs of deterioration occur in the patient's status, i.e. decreased level of consciousness, respiratory distress, or decreased peripheral pulse, the attendant must consider the presence of other injuries.

Patient is shivering, slurring words, but can answer questions intelligently:

#### 1. Assess the ABC's

A – Maintain adequate Airway

B – Maintain adequate Breathing

C – Support the Circulation as necessary

2. Minimize further heat loss. Replace all wet clothes with dry ones. Wrap patient in a blanket or sleeping bag.
3. Handle the patient gently.
4. Do not suppress shivering, even if it appears violent. This is the most effective way that the body has to generate heat.
5. Only give warm fluids when the patient is fully alert, or else they have a high risk of vomiting. Do not give any stimulant (coffee, tea, alcohol).
6. Do not massage the extremities or trunk.
7. Do not give the patient a warm bath or shower.
8. The application of hot packs is controversial. Patients with moderate to severe hypothermia treated in this way have a higher mortality rate than those treated without hot packs. Furthermore, hot packs have the potential to burn the patient. Patients with mild hypothermia may benefit from the careful application of warm pads or hot-water bottles behind the patient's neck (unless a cervical spine injury is suspected), in the groin and the armpit (trunk areas only). Treatment of moderate to severe hypothermia is beyond the scope of this manual.

It is essential to call for medical professionals as soon as possible. The most important phase of treatment is the prevention of post-rescue collapse during the first 30 minutes following rescue, and during transportation to a medical facility:

A further cooling of core temperature occurs after the victim is removed from the cold environment. This after-drop is often responsible for post-rescue collapse.

Preventing respiratory heat loss and progressive cooling, of the heart through the tissues is essential. This cooling if not arrested, can lead to ventricular fibrillation of the heart. Patients who are unconscious, with a temperature below 30°C or 80°F, may not respond to defibrillation. Thermally stabilizing a patient with suitable equipment is necessary, both before transportation and enroute to the hospital to prevent additional cardiac complications.

Core rewarming is the most effective treatment for all cases of moderate to severe hypothermia, whether treatment occurs in the hospital or in the field.

As the only non-invasive hospital treatment suitable for active core rewarming in the field, inhalation rewarming donates heat directly to the head, neck, and thoracic core (the critical core) through inhalation of warm, water-saturated air at 43 - 45°C (107 - 122°F) i.e. steam. This method also warms the hypothalamus, the temperature regulation center, the respiratory center, and the cardiac center at the base of the brainstem. In many cases, this rewarming of the central nervous system at the brainstem reverses the cold-induced depression of the respiratory centers and improves the level of consciousness. Beside this strategic donation of heat, inhalation rewarming also eliminates Respiratory heat loss. This accounts for 10% to 30% of the body's heat loss. This is particularly important in rescue situations where the ambient air is cold. In summary, inhalation rewarming is highly effective in providing "basic life support" through thermally stabilizing the core and brainstem temperatures. It is safe for treatment for all levels of hypothermia, but is particularly important for severe cases, because insulating alone (blankets), does not prevent further cooling of the core.

The first half hour during rescue is the most critical phase of hypothermia management. Avoid having the victim assist with their own rescue. Muscular activity by the hypothermic victim pumps cold peripheral blood from the arms and legs into the central circulation causing the core temperature to drop even further. Gentle handling is critical! A cold heart is susceptible to ventricular fibrillation, and some victims may suffer fatal ventriculation when jolted about during initial handling or transportation.

e. Frostbite

Superficial frostbite is characterized by numbness and white or waxy skin. Warm the part with body heat by placing it against a bare stomach or in the armpit. Hold a warm hand over nose, ears or cheeks. Make sure that foot and hand circulation is not restricted by tight clothing. Add dry layers of clothing.

Deep frostbite is more serious. The affected area has a hard and woody feeling. Don't try to re-warm deep frostbite outdoors or by exercising the affected part. Do not thaw if the tissue is at risk of being refrozen as this will create more severe damage. If you are unable to get indoors to a location where you can stay warm, leave the extremity frozen until definitive medical care can be instituted. The victim should be moved inside as soon as possible, preferably to a hospital. Thaw the frozen tissue in warm water (42-44C, no hotter) for 20 – 30 minutes (very painful). Don't use cool or cold water. Don't walk on thawed feet or toes (serious damage may result). Never rub frozen tissue with snow. Don't massage before, during, or after re-warming.

f. Fire

It is every person's obligation to immediately report an open fire that is burning on or within 1 km of forest land or grass land and appears to be burning unattended or uncontrolled.

Certain types of field activities (use of saws and ATVs) are restricted when fire hazard ratings are high. Be sure to monitor provincial government issued ratings.

When reporting a fire, communicate the following information:

- Exact location and size of the fire;
- Colour, density and volume of smoke;
- Wind speed and direction;
- Type of trees and ground vegetation and how they are spaced;
- The terrain in the area (is the fire on a slope or an open area);
- Values at risk (communities, buildings, power lines);
- Access to the area (road, boat, helicopter);
- Firefighting resources currently in use suppressing the fire;

If fire hazard ratings are high when you are doing field work, take a moment at the beginning of the day to think about fire escape features in your area in case you are caught in the path of a wildfire. Features that might provide a refuge from a fire include:

- Wetlands, lakes, rivers, large creeks
- Large cut blocks with a young plantation
- Areas already burned

Do not build a campfire near a tree, a log or dry tinder. Scrape the area down to mineral soil. Keep your fire small and watch for flying sparks. Be sure your fire is dead out and cold before you leave it.

All work vehicles should contain an ABC rated fire extinguisher. Remember to check charge and the date of last inspection. If not included with rental vehicles, purchase one separately.

## **Safety Hazards**

### **a. Waterways**

Any time you are working in, on or near a water body, even a shallow one, you must be aware of the additional risks posed by water. It is extremely easy to slip and fall in wet areas, and it is possible to drown in even a few inches of water. For this reason, aquatic work should never be undertaken alone. Water bodies can be extremely productive, often with dense vegetation, and an important habitat type for many animals. Encounters with potentially hazardous wildlife, such as bear and moose, often occur near water. Running water can also make it more difficult to hear sounds caused by wildlife – and for them to hear your approach. Finally, your safety and personal gear, especially electronics, dry socks, etc. should be in waterproof packaging.

On occasion, you may need to work directly in the water body itself, for instance with the use of hip waders. Be aware that it is easy to sink deeply into the sediments, particularly in wetlands, making it difficult to take your next step and often resulting in a fall into the water. Keep your hip waders in good shape and check them for leaks before each field season. Move deliberately and test your footing before trusting your full weight to a step. Try to keep at least one foot on something solid, and pay attention while you're working: you will likely continue to sink into the sediments as you stand in place. If one foot does become stuck, avoid sudden movements or turns. Put your weight on the solid footing and slowly pull out the foot that is stuck.

You must also be diligent when working around frozen bodies of water. Prevent falls through the ice by crossing only when necessary, ensuring its proper thickness and avoiding situations such as:

- Water on the ice
- Currents and fast-moving water
- Dark patches
- Cracks
- Snow cover
- Objects protruding through the ice

## **Biological Hazards**

Sources of biological hazards may include bacteria, viruses, insects, plants, birds, animals, and humans. These sources can cause a variety of health effects ranging from skin irritation and allergies to infections (e.g., tuberculosis, AIDS), cancer and so on.

Field workers can encounter a variety of disease agents. More information on these and other diseases is available from the Public Health Agency of Canada (<http://www.phac-aspc.gc.ca/index-eng.php>). Before beginning work in an area, always gather information about potentially dangerous wildlife and find out how to prepare yourself. Obtain this information from field guides, your supervisor, local contacts or a Conservation Officer. While in the field, be aware of your surroundings and pay attention to sights, sounds

and smells that may alert you to the presence of potentially dangerous wildlife. Do not wear headphones while in the field.

a. Hantavirus

Hantavirus is a rare disease which has caused death in about one-third of the diagnosed cases in North America. The highest risk activity is working closely with rodents. Symptoms of Hantavirus pulmonary syndrome is initially very similar to influenza. In early stages, a person may have fever, sore muscles and headache, feel nauseous, vomit, and have shortness of breath. Within about 12 hours, fluid builds up in the lungs causing death within about 48 hours. If a worker develops these symptoms, seek medical attention immediately and advise attending personnel of the occupational risk of Hantavirus.

For people whose occupations involve frequent rodent contact (e.g. mouse trappers) a baseline serum sample should be drawn and stored at a local lab before work is begun. You must first get a doctor's referral for the test. Keep a note in your wallet which states what lab has your serum sample. If you become ill, speedy diagnosis is important; this is done by comparing a blood sample with your baseline sample, and the hospital will need to know where this baseline sample is being held. When handling rodents or handling and cleaning rodent traps, workers should wear appropriate personal protective equipment including a half-face air-purifying (or negative pressure) respirator equipped with HEPA filters (other types of masks, such as paper masks, and other filters WILL NOT WORK – make sure you have the right kind), rubber or latex gloves and coveralls. Coveralls and trapping gloves should be kept in a sealed bag between uses. If dirty traps are transported between sites in a vehicle, they should be placed in sealed bags. Disinfect traps and clothing with a commercial disinfectant or bleach solution. Traps should be soaked for several hours and scrubbed in the solution.

b. Giardia

Symptoms of infection by this intestinal parasite include diarrhea, abdominal cramps, nausea and vomiting, weight loss, and fatigue. The infection can last from one to three weeks or longer. The disease is not considered life-threatening but can be very uncomfortable! The Giardia parasite is quite common in Canadian water bodies, even in very isolated areas. NEVER drink untreated surface water from any source. Water from lakes and streams should always be boiled for at least two minutes or filtered using an absolute pore size of one micron or less. Most commonly available filters have pore sizes larger than one micron, which could allow cysts to pass through with the water. In an emergency, you can put two drops of chlorinated household bleach in 1 litre of water (four drops if the water is cloudy), stir and let sit for 30 minutes. Be careful to use the correct amount of bleach or your stomach lining will suffer.

c. Lyme Disease

The risk for exposure to the disease is highest in regions where the ticks that transmit Lyme disease are known to be established. There are an increasing number of areas in Ontario where ticks carrying Lyme disease are found. These black-legged ticks (also known as deer ticks) attach to birds which migrate from place to place, bringing this health risk. While Lyme disease is easily treated when detected early, it can have serious and permanent health consequences if left untreated. Lyme disease is caused by an organism carried by ticks and can be transferred to humans through tick bites. Ticks also carry the organisms that cause relapsing fever, tularemia, and Rocky Mountain spotted fever. If you are working in areas where ticks are common in vegetation, take precautions to avoid being bitten. Symptoms of Lyme disease can appear days or weeks after being bitten, and include headache, muscle and joint pains, fatigue and weakness of the face muscles. A skin rash, especially one that looks like a —Bull's Eye may appear. If

you have removed a tick and you experience these symptoms, your doctor will prescribe antibiotics that kill both Lyme disease and Rocky Mountain spotted fever. Be sure to tell the doctor that you have been bitten by a tick and, if possible, provide the tick for testing. Lyme disease is not a rapidly progressing disease, although it is serious, and its worst complications can be avoided if it is treated early.

#### d. Rabies

Rabies is a viral disease transmitted in the saliva of infected animals. It affects the nervous system, causing increased difficulty in swallowing, excessive drooling, muscle spasm or weakness, and strange behavior. If not treated in time, rabies kills almost all its victims. Many people per year are treated for suspected exposure. It is crucial to begin treatment for suspected rabies as soon as possible. Rabies typically takes two weeks to a month to display symptoms. If treatment is not sought until the symptoms appear, it may be too late to begin effective medical procedures. If you are bitten, scratched or licked by an animal, examination of the animal 's brain will quickly show if it was rabid.

If you work with animals that are likely to carry rabies (the most likely carriers are skunks, squirrels and wolves) you may be able to request immunization. Speak to your family doctor. Even if you are vaccinated, you will likely still undergo treatment if you are exposed to the virus.

#### e. West Nile Virus (WNV)

The WNV is transmitted to humans through the bite of an infected mosquito. To avoid contracting the virus, take steps to avoid mosquito bites. However, even in areas where mosquitoes do carry the virus, very few mosquitoes are infected, and most people infected with WNV experience no symptoms at all. About 20% of those infected develop mild flulike symptoms lasting a week or less. Symptoms typically include fever, headache, and body aches; a rash on the trunk of the body and swollen lymph glands may also be present. Less than 1% of people who are infected become severely ill with meningitis or encephalitis. People over 50 years of age are most at risk for severe illness.

#### f. Food-borne Illnesses

Field camps often do not have refrigeration. Food poisoning is caused by bacteria (often Salmonella) and can result from allowing foods to go bad: especially eggs or meats (including fish). Most people develop diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. Infections usually resolve in 5-7 days and often do not require treatment unless the patient becomes severely dehydrated or the infection spreads from the intestines. People with severe diarrhea may require hospitalization and rehydration, often with intravenous fluids.

#### g. Blood Poisoning

Blood poisoning and gangrene can result from allowing a bad blister or other wound to go untreated. Symptoms that the wound may have passed the trivial stage are redness, swelling and a hot feeling in a large area surrounding the wound, red lines traveling —up vein|| from the wound, and pain and ache in the groin area. At this point it medical treatment is essential. To help prevent a wound from becoming seriously infected, if you cannot get to a health clinic immediately, bathe it in very hot, heavily salted water several times throughout the day.

#### h. Tetanus

If you puncture your skin deeply in such a manner that the wound seals over on the surface, the anaerobic conditions necessary for tetanus to develop may occur. If you have had a tetanus shot within the last ten years, you need not worry. Be sure to clean the wound thoroughly before it closes, and watch for symptoms of tetanus (muscle spasms, severely progressing tightness and swelling of neck muscles).

## Wildlife Hazards

### a. Cougars

Conflicts between cougars and humans are rare, but attacks have occurred. Stay in groups. Carry a walking stick to use as a weapon if necessary. Look up above on bluffs, behind you, and keep an eye out for tracks. Cougars cover unconsumed portions of their kills with soil and leaf litter. Avoid these food caches as a cougar feeding on a kill is especially dangerous. Cougar kittens are usually well hidden, but if you chance upon some, do not approach them or attempt to pick them up. A female will defend her young, so leave the area immediately. Even though it normally avoids confrontations, a cougar is unpredictable. Never approach a cougar. If you do encounter a cougar, always try to give it an escape route. Stay calm and talk in a confident voice. Do not run but try to back away slowly as sudden movement or flight may trigger an attack. Face the cougar, maintain eye contact, remain upright, and do all you can to enlarge your image: do not crouch down or try to hide. Pick up sticks or branches, and wave them about. If a cougar becomes aggressive, arm yourself with a large stick, throw rocks, and speak loudly and firmly. Convince the cougar that you are a threat, not prey. If a cougar attacks, fight back! Many people survive cougar attacks by fighting back with anything at hand, including rocks, sticks, bare fists, pocketknives and fishing poles.

### b. Bears

Bear encounters can occur while conducting field work. The species is dependent on the location of field work. In Ontario, black bears (*Ursus americanus*) live throughout. Grizzly bears (*Ursus arctos*) are found mostly in Western Canada. Bears species are responsible for serious injuries and deaths, and both should be treated with extreme caution. The best way to avoid bear-human conflict is to alert bears to your presence before getting too close to them, by making a lot of noise. Loud voices probably work better than bear bells. As well, try to stick to open areas where you can be easily seen and heard. While walking through thick bush, stay alert and make an extra effort to be noisy (e.g. calling out —yo bear at every 50 paces or at regular intervals if you are stationary works very well), especially near loud streams and waterfalls. Low frequency sound transmits better than high frequency sounds in forests so calling tend to work better than bells to alert bears of your presence. Avoid getting close to an animal carcass and getting close to a female with cubs. Avoid areas where ravens are numerous (sign of a nearby carcass) and be on the lookout for carcasses. If you see cubs or carcasses, leave the area.

The black bear may not be black: colour can vary to brownish cinnamon. Black bears are seldom dangerous. If unaccustomed to people, they will usually turn and run from an encounter. Black bears are sometimes known to engage in predatory attacks. The rule of thumb is always to try and fight off an attacking black bear. Do not play dead. Use pepper spray, a branch, stones, or whatever is available to fight off an attack. If a bear comes into camp, yell and bang pots together to make as much noise as possible.

Grizzlies occasionally make unprovoked attacks, but most attacks result from being surprised at close quarters. Grizzlies are distinguished from black bears by their shoulder-hump and dish-shaped faces. They are also usually brownish or yellowish- brown but vary in colour from blonde to black. If you startle a grizzly bear and it behaves aggressively towards you, consider playing dead. Lie on your stomach and

cover your neck, and keep your pack on, as it can offer some protection. If you are being stalked by a grizzly bear in an apparent predatory situation, do not play dead. Try and appear as large as possible and stick close to your group members.

In coastal arctic environments, polar bears may be a problem. These bears are extremely dangerous and may move out of sight to begin stalking human prey. In polar bear habitat, a firearm may be needed for protection of field personnel.

Learn to recognize bear signs – overturned logs, dug up mammal burrows, patches of earth overturned in search for roots, broken tree branches, slashes on tree trunks, bear scat or tracks. Be sure to be on the lookout in berry patches – these are hotspots for bears. If you notice berries fallen from branches and mangled twigs, a bear may have been feeding recently. Riverbeds and valleys are also hotspots for bears as they feed on vegetation in these areas. Be particularly alert in areas where your vision is obscured, for instance by high, dense vegetation.

Some locally available bear deterrents include bells, horns, bear spray and bear bangers. As with any field equipment, be certain that such deterrents are always well-maintained and accessible. If you do encounter a bear, prepare to drop your pack to distract it if attacked but note that some people claim that a pack can afford protection during a mauling.

Avoid carrying odors that may attract bears. If possible, when working in areas with high bear densities, leave your lunch in the truck and return to the truck to eat, rather than carrying food with you. Don't cook near your tent or sleeping area and never bring food into it to avoid permeating it with food odors. When camping, leave particularly smelly foods at home (e.g. bacon) and, if possible, burn empty wrappers or cans (retrieve from ashes and pack out). Store your food in a plastic bag hung high in a tree at least 30m away. In a field camp, create a cache to keep all food, cosmetics, trapping supplies (bags of grain, etc.), and garbage: this should be suspended between two trees in bear country. All garbage should be promptly removed from the camp area for burial or for storage and subsequent packing out. Pitch tents well off the trail and well off what may be natural corridors for bear travel. Again, be aware of your surroundings and aware of bear signs. Note that, unless appropriately trained, dogs should not be taken into bear country. They are more likely to cause trouble than to render protection.

### c. Moose

A moose encounter has the potential to be just as dangerous as a bear encounter. Therefore, similar measures must be taken to avoid these large ungulates. Moose are especially aggressive in the spring (calving season) and the fall (rutting season). Moose are most active in the early hours of the morning. However, one can expect to meet a moose any time of the day, especially in marshy woodland and around lakes. The best method of avoiding unwanted encounters with wildlife is to make a lot of noise. Hence, while practicing good bear-avoidance measures, moose will also be alerted of your presence.

As harmless as a moose encounter may seem, it is important to have a high level of respect for the damage and injury these animals can incur if they feel threatened. Hence, if a moose is encountered, a minimum of 100 m must be put between yourself and the animal. If the moose remains stationary, you should cautiously move away from the animal, monitoring its behaviour in the process. Signals such as whether its ears are forward or back, or a lowering of the head are good indicators of aggressiveness (forward and erect is the animal being alert, back and down over the head is aggressive). React according to the signals being sent by the animal. Also, the direction you use in moving away should not interfere with any natural escape routes the moose may want to take. For instance, if near a marshy area, it is best to move away

from both the moose and the marsh, as the moose will likely want to seek the marsh for safety. Similarly, it is very important not to position yourself between two moose (cow and calf or two rutting males).

If a moose feels threatened, it may charge at the person that has invaded its space. Moose are not predatory animals. As a result, if a crewmember notices a moose exhibiting aggressive behaviour, it is best to give the animal a lot of space, quickly.

Unlike in a bear encounter, walking quickly, or if safe to do so, running away from an angry moose will not lead to a sustained attack; it will likely prevent it.

Should the moose charge regardless, the best method of defense is to move behind a big tree. Continue to try to get away from the animal while always keeping large solid objects between yourself and the moose. It is imperative that no false sense of security is attained once a large solid object is between a person and an angry moose, as moose are very capable of kicking accurately with their forelegs around a tree trunk.

Although it is best to try to get away from the animal, this is sometimes difficult, particularly if the area is challenging to move through. In such a scenario, a final option may be to climb a tree. However, there are risks involved with this, such as the moose charging the tree, or simply not leaving the area at all.

Regardless of how minor an encounter with a moose, good judgment must be used to determine whether it is safe to continue working in this area for the day. A good rule of thumb should be that if the moose does not leave the area upon the arrival of the fieldworker(s), the area should be vacated for the day. Other crewmembers must be alerted of the presence of moose using the radio.

#### d. Other Potentially Dangerous Animals

Researchers working in rattlesnake habitats might wish to carry a snake-bite kit among their first aid supplies and be familiar with its use.

#### e. Ticks

Avoid ticks by walking on cleared trails whenever possible. Apply insect repellent to clothing. Choose light-colored clothing and tuck your pants into your boots or socks and tuck your top into your pants. If the vegetation is high, wear a wide-brimmed hat. Check your body, scalp, and bedding for ticks every evening. The ticks are 2-3 mm long and favour sheltered locations on the body, so check carefully. If you find an attached tick remove it promptly (within 24 to 36 hours) as this can decrease the risk of infection. An attached tick must be removed carefully as the tick burrows into the skin and can leave behind its mouthparts when pulled away suddenly. Use tweezers or a tick-remover, grasp the tick as close to the skin as possible. Without squeezing the tick, gently lift it straight out, and then clean the bite area with rubbing alcohol or soap and water. Keep the tick in an airtight container: if you develop symptoms of Lyme disease the tick can be tested easily.

For additional information, visit <https://carleton.ca/ehs/wp-content/uploads/Tick-Bites-Lyme-Disease-Final-002.pdf>

#### f. Biting flies

Biting flies include blackflies, mosquitoes, horseflies and deerflies, and biting midges or no-see-ums. Females of these flies break the host's skin and inject saliva in order to obtain blood. The host's body reacts to the physical damage but also to the injected saliva. There is also a psychological response, both

to the bites themselves and to the sight and sound of the attacking flies. Different people react differently to different types of flies and to physical, biochemical and psychological irritation.

Blackflies complete their larval development in fast-running water, and the adults tend to be most common in areas where these habitats are available. They tend to be active during the day and do not bite indoors. They will crawl under loose-fitting clothing in order to feed. Mosquitoes, on the other hand, tend to be most active at dusk and dawn, and will bite through thin clothing. Horseflies and deerflies are large flies that locate their prey by sight. They frequent edge habitats near forest openings and fields and are active during the day. They can be extremely persistent and aggressive biters. Biting midges or —no-see-ums|| are tiny (1-3 mm) and are active especially at dawn and dusk in wooded areas or in dense vegetation. The bites can be extremely painful.

The best protection for most biting flies is avoiding times and habitats when the flies are most active, particularly when choosing a camp site. Because avoidance is not always possible for field workers, strategies such as dressing appropriately and using a repellent when necessary are recommended. Wear long sleeves, long pants and a hat. Tuck in cuffs, especially when blackflies are prevalent, and wear loose-fitting clothes to reduce mosquito bites. Choose light-coloured clothing, as some research suggests that biting flies prefer dark, matte colours. Many repellents are currently available. The most effective ones contain diethyltoluamide, or DEET. While effective, DEET is not risk-free for humans. When possible, avoid applying it directly to the skin. Instead, use it on clothing, and wash hands well after application. Be aware that DEET will destroy many plastics! DEET is not particularly effective against biting midges or horseflies and deerflies. Deerfly patches (white sticky patches applied to the backs of hats) may provide some relief from horseflies and deerflies. For all biting flies, head nets and mesh —bug jackets|| can also help prevent bites especially to the face and neck.

#### g. Stinging insects

Bees and wasps will sting to defend themselves or their colony. They inject venom that contains histamine and several other proteins. The venom causes localized swelling and stinging. Some people react more than others to stings of various types, and a few people may exhibit a potentially lethal hypersensitive reaction called anaphylaxis.

Bees rarely sting unless directly threatened. The honeybee stinger is barbed, and tears out when the bee pulls away, leaving the stinger and venom sack behind. The stinger is best removed by stroking a knife quickly and firmly along the surface of the skin, lifting the stinger out. DO NOT squeeze the stinger, as more venom will be injected into the wound. Wasps, on the other hand, do not have barbed stingers and are able to sting repeatedly. Most human-wasp encounters result from a person stepping on or brushing up against a nest of wasps. Large nests can be extremely aggressive and have many defending insects.

To avoid being stung, pay attention to your surroundings and avoid these insects. If there are large numbers of wasps nearby, or if you can hear loud buzzing, choose a different route. Stings are usually not dangerous unless a person is allergic or is stung many times. In both those cases, remove the person from further harm and treat as if anaphylaxis is imminent. There are several products available for the relief of discomfort caused by stings.

#### h. Spiders

Many spiders are not capable of breaking the skin with their fangs while other species contain venom that causes no reaction. Spiders are usually very timid and will only bite in self-defense if mishandled, cornered, or injured. Even when they bite, spiders do not always inject venom. The black widow spider is found in

the province of Ontario. It is a shiny black spider with a red to orange hour-glass marking on the underside. It usually occurs away from occupied buildings, in fields, under logs or in disused buildings. It is sometimes found in outhouses. While the bite is painful, mortality is extremely rare. In general, any painful unidentified bite should probably be checked by a doctor, particularly if it becomes infected or does not heal quickly.

i. Allergens

Anaphylaxis is a life-threatening allergic reaction. Some common causes are insect bites/stings, and food and drug allergies. The reaction is sudden, severe, and causes constriction of the airways, resulting in wheezing and difficulty breathing. Hives on the lips, eyelids, throat, and/or tongue as well as abdominal pain, cramps, vomiting, and diarrhea may also occur. Symptoms develop rapidly, often within seconds or minutes. Risks include prior history of any type of allergic reaction. Any person who is stung by an insect should be monitored. People who have a history of allergy to insect bites/stings should be instructed to carry (and use) an emergency kit consisting of injectable epinephrine and a chewable antihistamine such as Benadryl. They should also wear a Medic-Alert or similar bracelet/necklace stating their allergy. However, be aware that it is possible for a severe reaction to occur the first time a person is exposed or stung. Severe reactions may progress rapidly. Call for emergency assistance if signs of anaphylaxis appear. While waiting for or during transport, have the person lie down. If the person is unconscious and breathing, lay them on their side to allow drainage from the mouth. If there is no breathing, movement or response to touch, begin CPR. If the person is carrying an allergy kit containing epinephrine (Epipen), follow the instructions on the kit.

It is a best practice for every field crew to have access to an Epipen.

### **Psychosocial Hazards**

a. Addiction related hazards

Participants in a field activity may indulge in consumption of alcohol and/ or drugs which may result in uncontrolled behaviors and unplanned activities. This could result in violent acts involving other participants or other individuals. The research may involve interacting with individuals or communities studying the effects of alcohol consumption or drug addiction.

To avoid any assault or violent activities resulting from mental impairment under the influence of alcohol or drugs, always follow the guidelines, work with a buddy and never alone. Local NGO's or guides can act as buddies.

b. Thefts and assault

In certain parts of the world, carrying electronics, cash or jewelry can make field researchers easy victims of thefts and assault.

To avoid such situations, do not carry valuable items to remote sites. Electronic devices could carry sensitive research data and theft of these devices could become a Research security issue. Official electronic devices should never be carried to remote places.

**For a more detailed list of hazards visit the Hazard Assessment and Control Tool in the Resources.**

## APPENDIX B: HAZARD AND RISK ASSESSMENT

Use the following information to complete the Hazard identification, assessment and control section A of the Field Activity Safety Plan.

### Defining categories of Severity and Likelihood

Risk posed by a hazard, or a hazardous activity is calculated as a product of Likelihood and severity. Likelihood is the probability of a bad outcome while severity is the extent of the bad outcome. If we use the 5x5 **Risk Matrix**, the calculated risk can range from 1 – 25. 1 being minimal risk and 25 being the highest risk level.

For example, a field activity close to water can result in slips and falls. The likelihood varies from rare (1) to certain (5) depending upon the depth of water, the currents, sediment strength and the type of work being performed. If a slip or fall happens the severity can range from insignificant injury (1) to a bone fracture or head injury with death (5) as the worst outcome.



Based on the Risk level calculated using the Risk Matrix and applying best judgement, the total risk can be Very low, Low, Medium, High and Intolerable. Using the color distribution across the matrix,

Color of squares	Calculated risk value	Risk level
Green squares	1 – 2	Very low to low risk
Yellow squares	3- 12	Medium risk
Red squares	15 – 25	High to intolerable risk

	<b>Slight</b>	<b>Moderate</b>	<b>Extreme</b>
<b>Low</b>	Very Low Risk	Low Risk	Medium Risk
<b>Medium</b>	Low Risk	Medium Risk	High Risk
<b>High</b>	Medium Risk	High Risk	Intolerable Risk

The total risk can be reduced by applying the mitigation controls or risk reduction strategies. You're your best evaluation to assess the level of residual risk after applying the controls.

## **APPENDIX C: VEHICLE MAINTENANCE, TROUBLESHOOTING, AND OFF-ROAD TRUCK USE**

Field vehicles are relied upon heavily during the field season. Getting to and from a site may require substantial travel on gravel roads well away from paved highways and high travel areas. A number of issues will be covered here relating to off highway travel, including vehicle maintenance, troubleshooting, driving tips, safety, navigation, and radio calling. This discussion should be considered a commonsense guide, and not viewed as complete coverage of best practices for vehicle use.

### **Pre-trip Vehicle Inspection**

Be sure to thoroughly check fluid levels, air pressure, tire tread, spare tire pressure, brakes, lights, horn, and vehicle contents before leaving town. Know where the spare tire, jack and tire change wrenches are located, and practice changing a tire. Work vehicles should carry a first aid kit, blanket, flares, an ABC rated fire extinguisher, equipment for basic maintenance, and seasonally appropriate emergency equipment. Vehicles must be equipped with appropriate communications equipment.

### **Inspecting Unfamiliar or Rented Vehicles**

Many researchers use rental vehicles for fieldwork. These vehicles should have been serviced before being rented to you; however, you should double-check the following items.

#### Fluid levels

Does your vehicle have clean and adequate amounts of oil, transmission fluid, brake fluid, and water in the radiator? Engine coolant is designed to help keep the engine cool in summer. An overheating engine could be due to lack of coolant, but keep in mind that it could also be due to a loose fan belt, unsealed radiator cap, or faulty coolant thermostat). If you are working in the winter make sure you have the proper mix of antifreeze and water; frozen coolant can crack the engine block and require expensive repairs;

#### Brakes

It is recommended to have the brakes checked based on your risk assessment.

#### Tires

Are your tires in good condition, with adequate tread and inflated to the correct pressure? It is a very good idea to crack the lug nuts on your tires before you begin work – they have often not been removed for a long time and may be almost welded to the rims. Are your tires appropriate for gravel roads? Do you have snow tires?

#### Spare tire

Do you have one? Is it in good condition? Is it flat? Some vehicles will have a small tire intended only to let you reach the nearest gas station. For field vehicles it is better to have a real tire for a spare, as it may be a while before you can get the tire repaired; Know how to change a tire and where the tools are located.

#### Basic Truck Kit (necessary items will change seasonally)

The basic truck kit should include the following:

- Spare key in magnetic case on outside of vehicle or in a pocket that you will always have on (i.e. not in a jacket you might leave in a car)
- Jack
- Swede saw, axe, or preferably both
- Rope and/or —come-along (hand winch)
- Shovel
- Jumper cables
- Ensure emergency spare tire is in the vehicle (recommend having a full size tire for the vehicle)
- A small compressor that plugs into the cigarette lighter is also useful for re-inflating tires
- Reflective triangle or flares
- Toolkit
- Extra fuel
- Flashlight and spare batteries
- Fire extinguisher
- First aid kit
- Personal safety equipment
- Survival kit
- Additional items for winter travel (candles with lighter or matches, appropriate chains for the vehicle (and know how to use them), ice scraper/snow brush).

## **The Basics: Operation, Maintenance and Troubleshooting**

### Simple Maintenance Rules

**Oil:** It is important to not run out of oil. If this happens, the moving parts of the engine have no lubrication, they seize up and crack, and the vehicle is basically ruined. **Water:** If you do not have enough water in the radiator, or if the radiator is not cooling the engine for some reason and the engine is overheating, do not drive it. Overheating can cause components to warp, crack, or be otherwise damaged, and the engine may seize.

### Parking

Park facing home with enough access to the roadway to get you out but stay well clear of travel surface. Leave parked vehicles with manual transmissions in first gear and the emergency brake engaged. Never leave a vehicle in neutral. For vehicles with automatic transmissions, always shift into PARK and apply the emergency brake. Large trucks may roll when parked on a hill - check that the emergency brake works. Park with the wheels angled into the curb when facing down a hill and with wheels angled out from the curb when facing up a hill. Remember disengage the emergency brake when you drive away, otherwise it will quickly lose its effectiveness. Do not rely on the vehicle's emergency brake to keep it from rolling on a steep hill; place rocks on the downward side of the tires to block them. In fire season, do not park in dry vegetation, especially grass. A hot exhaust system can start a fire!

### Avoiding Flat Tires

Ensure tires are in good condition and are suitable for gravel roads before leaving town. Rental vehicles often have lightweight tires unsuitable for rough roads. When driving on gravel roads, avoid hitting

potholes at high speed and be on the look-out for sharp rocks that could pierce the tread or slash the side walls. This is especially important on recently built or resurfaced roads. Slow down.

### Flat Tires

If you are on remote roads, you can drive a fair distance on a partly or completely flat tire if it is necessary to reach civilization. If the tire is totally flat, driving on it will bend the wheel rim which is expensive to replace. Do not drive on the highway with a partly flat tire because if it breaks you could swerve into oncoming traffic at 100 km/hr.

### Changing a Tire

Make sure the truck is in gear (not in neutral), place rocks or wood blocks in front and behind the tires so that the truck cannot roll once it is jacked up. Crack (loosen) the nuts of the flat tire while it is still on the ground. Do not take the nuts off entirely as the truck could fall over. Place a jack under the wheel axle in such a position that it looks least likely to fall over once the truck is jacked up. Jack the vehicle up until the tire is just off the ground. Remove the tire and replace it with a new one. When re-tightening the nuts, do so in a balanced fashion – first one, then the nut across from it, etc. When the nuts are tightened down, jack down the truck and do another tighten now that the wheel can't rotate. After driving for 15 minutes, check that the nuts are still tight. Repair the flat tire as soon as possible and ask the station to replace the spare with the repaired tire. Another flat can happen any time. If you are in an area where flats are common and repair stations are few and far between, consider carrying two spares – there is nothing more annoying than getting a second flat on the way to getting your spare fixed. It is good to practice changing a tire before the field season begins.

### Avoiding Dead Batteries

Check that headlights and running lights are turned off before leaving the vehicle. Check that dome or door lights turn off when doors are closed. Make sure doors are closed.

### Push or Roll-starting a Vehicle

This can be done with only one person, but with two it is much easier - especially on a level surface; one person pushes while the other steers. In theory, you can push the vehicle yourself and then jump in once it is rolling, but this is much more difficult. If on a hill, start the vehicle rolling with the transmission in neutral until you are moving about 10 km/hr. If rolling forward, shift into second gear and quickly —pop the clutch out. As soon as the engine catches, push the clutch back in and rev the engine for a while. It will take some time to recharge the battery, so keep the engine running. You can also push-start going backwards down a hill. In this case, put the transmission in reverse before you start moving, and pop the clutch at a lower velocity.

### Jump-starting a Vehicle

Park the working vehicle close to the one with the dead battery and put it in park (automatic) or neutral with hand brake on - wheels blocked if you don't trust the brake (standard) and leave the engine running. Attach the red end of the jumper cables to the positive terminal of the working vehicle's battery, and the black end to the negative terminal. The terminals are marked with a + for positive and a – for negative. Do not let the two clips of the other end of the cable touch each other. Clip the other red end onto the positive terminal of your dead vehicle and the black end to the negative terminal. It is extremely important not to connect the positive terminal of one battery to the negative terminal of the other. Start your

vehicle. (If your battery is flat dead, it might require a few minutes for the other vehicle to charge it sufficiently to turn your engine over. Ask the other driver to rev his or her engine slightly). Once your engine starts, disconnect the cables by removing the negative clip first and then the positive one. Keep your vehicle running for at least 30 minutes to recharge the battery.

### Getting Stuck

As soon as you are stuck, jam a bunch of branches and rocks under your tires, and put the vehicle in 4WD. This is worth the effort. It is especially worth being careful if you are miles from anywhere. Be careful – there is a good likelihood that some of the stuff you jam under the tires for traction could be sent flying by a spinning truck wheel. Make sure that the trajectory path is clear of other personnel before you try and get yourself unstuck.

Another useful trick, if you have a small compressor with you, is to let a third to half the air out of your tires by pressing the escape valve pin. This increases the traction surface and will often allow you to drive out of mud and soft sand with little difficulty. Once back on solid ground, re-inflate the tires. This is especially useful if you do not have 4WD.

### Driving Fundamentals

The known hazards of driving on forest roads include:

Losing track of your location; Losing track of other vehicles location; Meeting oncoming vehicle without a radio; Not following calling procedures; Unnecessary radio chatter; Using the wrong frequency; —Talking over|| other calls; Being distracted.

Since off-highway driving is less structured without traffic lights, signs, and centre lines, courtesy is even more important than usual. The fundamental rule of driving on dirt roads: expect the unexpected. You will experience a much broader range of conditions compared to paved roads. Drive with your headlights on. Be cautious and drive slower than what may seem necessary, especially if you are an inexperienced off-road driver.

Conditions can change rapidly and catch you off-guard. For example, a speed that is otherwise reasonable on a paved road can cause you to lose control when you hit a patch of washboard and/or loose gravel – right about the time you notice a cow on the road or a logging truck coming toward you. A pool of water on the road that looks superficially innocent may be much deeper than expected or sufficiently mud filled to ensure that you get stuck. Deep ruts should be approached with caution if you hope to get home with your muffler still attached or to avoid a broken axle. Roads in dry areas or summer conditions can be very dusty especially if there is little industrial traffic (during high use the road is sprayed to keep the dust down). In general, use an abundance of caution and common sense when making driving decisions and recognize that it takes time to become experienced at off-road driving.

Another issue relates to encountering other users of the road. Unlike yourself, assume that many others do not share your common sense and will make poor decisions. Thus, it is almost inevitable that you will round a corner only to find that someone is approaching on your side of the road. If you are driving at a reasonable speed, on your own side of the road and paying attention, the likelihood of a problem is much reduced.

### 4WD Operation

With heavy rain, snow or other poor road conditions, the use of a four-wheel drive (4WD or 4x4) vehicle becomes mandatory. While all the previous comments apply to 4WD use, some points specific to 4WD driving require special considerations.

The best advice is: Always go IN to a location in 2WD, reserve 4WD for getting yourself OUT. Having said that, you can use 4WD:

- When you encounter a mud-slippery road, and your vehicle starts sliding
- As soon as you get stuck (do not wait until you 've dug a hole)
- To navigate very rough or steep roads.

Most importantly, use it under speeds of 50 km/hr. If you have to go into 4WD it should be the first indicator that you should be slowing down your speed

### **Accidents**

If you are in a vehicle accident, stay calm, ensure everyone is safe and clear of hazards from damaged vehicles or traffic. Clear vehicles from the roadway or put out warning markers. Administer first aid and call emergency services if necessary. Exchange names, addresses, license and insurance information including name and address of registered owner of vehicles and record the names and contact information of any witnesses. Report any incidents, injuries or illnesses to Environmental Health and Safety through CU Worksafe within 24 hours. Injuries that result in medical follow up will be submitted to the WSIB through Human Resources.

## APPENDIX D: AIRCRAFTS AND BOATS

When possible, speak to pilots in person before approaching their aircraft. Often they will have specific details relating to the safety of their aircraft and will give you a safety briefing. If you have not flown in a small plane or helicopter before, ask for a safety briefing first.

### Helicopters

- Approach and leave a helicopter on the downslope side to avoid the main rotor.
- Crouch while approaching and leaving; Never walk behind a helicopter on the downslope side.
- Always approach and leave within the pilot's field of vision to avoid the tail rotor.
- Near the helicopter always carry tools horizontally, below waist level – never upright or on the shoulder.
- Loose items (e.g. parkas, empty cans) should be secured or removed from the helispot.
- No fires should be made in the helispot area.
- Have the crew and unloaded equipment moved to a safe area, in view of the pilot after unloading. Have them wait in a safe, visible (usually upwind) area from the helispot when the helicopter approaches for a pick-up.
- Double-check baggage compartment and passenger doors after loading and unloading.
- Keep seatbelts fastened continuously when in flight, and buckle seatbelts AFTER you exit the helicopter as well.

### Fixed-wing Aircraft

- When on the ground, stay away from the propeller.
- When in flight, keep seatbelts fastened continuously.
- With a float plane, it is safest to wear a hard hat while loading and unloading and beware of striking the head or neck on the flat trailing edge of the wing. This hazard may be serious when working on a float plane dock.
- Wheeled aircraft occasionally use roads, gravel bars, and other unprepared strips when transporting field workers. When waiting for a pickup, field crews should check the landing zone to ensure that it is long enough, that the ground is not too soft, and that boulders are removed. It may be helpful to mark both ends of the strip, and to mark the downwind (approach) end at both sides, where it can be checked by the pilot immediately before touchdown. A bright-colored shirt tied to a shovel handle may assist the pilot in judging wind during a fly-over before landing for a pickup; Radio the pilot before he/she begins landing, to exchange instructions. While landing, he/she will be too busy to transmit.

### Boats

- If you are unfamiliar with the use of the craft you will be piloting, obtain instruction from your employer or supervisor.
- Emergency supplies must be stored in a waterproof container and a spare oar or paddle should be attached to the boat.
- Life jackets should be worn at all times.
- When alone in a motorized boat the outboard should be equipped with a kill switch that is connected to your body by a cord. If you fall overboard, the boat will not continue without you.
- A patch kit which includes duct tape should always be carried with inflatables and canoes.
- It may be prudent to secure inflatables with a long line to shore upstream, while ferrying crew or equipment across fast water.

## APPENDIX D: WHAT TO BRING

The following are a series of lists which indicate practices and items that should be considered before going into the field or included in equipment and supplies taken to the field.

### a) Personal Protective Clothing

Appropriate clothing will depend on the working conditions. Loose fitting clothing, dangly jewelry and long unconstrained hair may create a safety hazard. Caulked boots (also called cork boots – ones with steel spiked soles) improve safety in slippery conditions and are required in some locations. A CSA approved brightly-coloured hard hat is required equipment whenever there is the possibility of injury caused by falling, flying, or thrown objects. When working near machinery or during hunting season, a high-visibility vest is also required. When using a chainsaw you should wear boots equipped with steel toes, eye and ear protection, gloves, and Kevlar safety chaps or pants.

### b) First Aid Kit

First-aid kits, appropriate to the situation, are required for off-campus operations. It is the responsibility of the supervisor or activity coordinator to ensure that a kit is available and maintained at the site, and available on any transportation used. It is also their responsibility to document the presence of a first aid kit and any first aid supplies prior to departure. Refer to Appendix A for recommendations for the type and contents of first aid kits.

Check expiry dates before leaving and check kit annually. It is also recommended that a personal kit to be kept in your pack at all times. Personal kits can be purchased from most retail stores. All vehicles used in the field should be equipped with an adequate First-aid kit, blanket and fire extinguisher.

#### CONTENTS OF FIRST AID KITS

Supplies and Equipment	Quantity According to Type of First Aid Kit			
	A	B	C	D
Antiseptic swabs (10-pack)	1	1	4	1
Scissors: super shears	-	-	1	-
Bandages: adhesive strips	12	48	100	6
Plastic bags: waterproof, sealable	-	-	2	-
Bandages: triangular, 100 cm, folded	2	6	8	1
Blankets: emergency, pocket size	1	-	-	-
First Aid Kit Container	1	1	1	1
Dressings: combination, 12.7 cm x 20.3 cm	-	-	6	-
Dressings: compress, 7.5 cm x 12 cm	1	2	-	-
Dressings: gauze sterile 10.4 cm x 10.4 cm	4	12	24	2
Dressings: gauze, non-sterile 10.4 cm x 10.4 cm	10	40	200	-
Forceps: splinter	1	1	1	-
Gloves: disposable	4	8	40	-
Mouth-to-mouth resuscitation mask with one-way valve	1	1	1	-
Record book: First Aid	1	1	1	1

Scissors: bandage	1	1	-	-
Self-adhering gauze bandage: 7.5 cm x 4.5 cm	2	6	24	-
Tape: adhesive, 1.2 cm x 4.5 cm	-	-	-	1
Tape: adhesive, 2.5 cm x 4.5 cm Additional supplies and equipment maintained outside of the kit itself (for remote workplace)	1	2	4	-
Blankets: bed type	-	-	2	-
Splint set	-	1	1	-
Stretcher	-	-	1	-

#### ADDITIONAL FIRST AID SUPPLIES AND EQUIPMENT FOR REMOTE WORKPLACES

Supplies and Equipment	Quantity
Guide on wilderness first aid	1
30 mL (6 teaspoons) table salt, sealed in strong plastic bag	1
30 mL (6 teaspoons) baking soda (not baking powder), sealed in strong plastic bag	1
60 mL (12 teaspoons) sugar, sealed in strong plastic bag	1
1 litre plastic bags	5
Large plastic garbage bags	2
Patient treatment record forms, which include vital sign recording sections	3
Oral temperature thermometer in an unbreakable case	1
Emergency signaling mirror	1
Blanket: emergency, pocket size	1
Anti-itch ointment/lotion/swabs (10-pack)	2
Scissors: super shears	1
Bags: disposable, waterproof, emesis	4
Burn jelly (5 mL)	4
Plastic bags: waterproof and sealable for disposal of contaminated waste	2
Cold packs: instant type	2
Hot packs: instant type	2

#### c) Survival Kit

Any time you are driving or working in a remote area, you should have a survival kit with you in case you become lost or your vehicle breaks down and unexpectedly, you must survive for one or more days. The kit should include at least:

- Water bottle/ water
- Emergency food
- Blankets / sleeping bag, and warm clothing

- Pocket knife
- Watch
- Compass, map, GPS (make sure you know how to use these – just having them doesn't help you!)  
Flashlight/headlamp (if you get lost or just work a little too late you may have a hard time finding your way through dark woods) – check batteries and pack spare batteries
- Pencil and waterproof field notebook
- Flagging tape
- If working in bear country – bear spray and a bear banger
- Matches in waterproof container or cigarette lighter
- Fire starter
- Wire saw
- Candles-for warmth in vehicles
- Garbage bags – can be used for waterproofing, wood, clothes etc.
- In active logging areas, a hard hat and a high visibility vest must be worn. During hunting season, wear blazer orange headgear and a blaze orange vest or jacket
- Two-way radio/cell phone (check coverage)/satellite phone/SPOT Satellite Personal Tracker (check batteries – consider bringing spares)
- If there is even a remote chance of getting lost (i.e. working >200 m from the vehicle), bring a flare kit, rescue blanket (aluminized lightweight plastic), and clothing to spend the night. This can happen even where people feel familiar with their study sites.
- Emergency first aid kit

d) Wayfinding Equipment (e.g. Compass, Maps, GPS)

Carry and know how to use a compass, maps, charts or aerial photographs. Know the scale of the maps and photos and where geographic north is located. Know the length of your stride so that you can pace distances if necessary. Keep track of your position as you travel. An inexpensive GPS can track your movement from a start position and give you return directions, however they may not work under heavy canopy or in deep valleys. A mapping quality GPS with secondary CDGPS receiver works much better under canopy, but most GPS units would suffice to help get you un-lost, so long as you know how to use them.

e) Bear Spray

Bear Spray comes in pressurized cans of varying quantities. Don't buy the smallest one, 325 g cans are the minimum (you will regret it if you get repeated attacks during an encounter and have to spray the bear more than once). Make sure you have this in a holster for quick access – it is no good in your backpack.

Bear spray's active ingredient is Oleoresin Capsicum (red pepper) and is harmful to humans. Respiratory responses to Bear Spray include burning of the throat, wheezing, dry cough, shortness of breath, gagging, gasping, inability to breathe or speak (due to laryngospasm or laryngeal paralysis) and rarely, cyanosis, apnea and respiratory arrest. There is a possibility of fatality for people with existing respiratory conditions. Note: if you have a respiratory problem such as asthma or if you wear contact lenses, you might want to reconsider using Bear Spray.

Keep away from children. Avoid accidental contact with eyes, skin, or mucous membranes. In case of external contact, flush thoroughly with water. Do not rub. Call a physician if symptoms persist.

When transporting Bear Spray in cars or enclosed spaces, it is best to pack this into air-tight containers. There is a huge danger associated with accidents if the bear spray accidentally went off in a car while you

were driving. Dry Ammo cases or Marine boxes can be purchased – these containers are airtight and o-ring sealed, and work well for transporting bear spray. In a pinch, use a couple of Ziplock freezer bags and double pack the bear spray canisters.

f) Bear Bangers

Bear bangers can be an effective way to deter bears. They can be fired from pistols or signal launchers. These signal chargers can fire bear bangers or flares – be sure to read the labels and know which type of cartridge you are carrying and firing. Also remember that these are essentially exploding shells. Make sure you transport these in appropriate containers.

Other considerations:

- Store in cool and dry area;
- Do not expose to open fire or heat;
- Do not remove the safety cap from the cartridge before you want to use it;
- Shoot only with a launcher that is in good condition;
- Do not keep the cartridge loaded onto a launcher;
- Replace the cartridges after the expiry date has passed;
- Never try to take a cartridge apart.

### Skills and Knowledge

The following are some skills and knowledge that field workers may need to know prior to going out into the field. A needs assessment must be conducted when determining training requirements.

a) First Aid

At least one participant must have valid (2 years) First Aid training and be deemed by the supervisor the designated First Aid provider. It is preferable for the person to have completed Wilderness First Aid training.

b) Chainsaw Use

Before working on projects that involve chainsaws, you will need to ensure you have been trained on the operation and hazards associated with their proper use. Some brief guidelines:

- Always wear chainsaw pants and boots, as well as face protection when operating a chainsaw;
- Take steps to avoid kick-backs caused by poor working position, poor maintenance, binding, or inadvertently contacting branches or obstructions;
- Check that all parts are tight and that the chain is properly adjusted and filed;
- When idling, the chain should be stopped;
- When carrying the saw, shut the motor off and keep the chain bar to the rear;
- Don't stand directly behind the saw – work to one side; Allow the saw to cool before refueling, and follow the manufacturer's fuel and oil specifications;
- Refuel on bare ground and ensure the gas cap is replaced tightly;
- Check for leaks;
- Clean the saw of spilled fuel, sawdust and oil, and move away from the refueling spot before starting;
- Don't operate a saw if it is backfiring;

- Periodically check and clean the muffler.

### c) Bladed Tool Use

Accidents caused by bladed tools such as Pulaski axes (axe/pick combination used by forest fire workers), knives and axes are usually the result of unsafe use. Each should be used for its correct purpose and safety guidelines followed. Cover cases can prevent accidental injury when carrying. Use these. Always be aware of others in your vicinity when using these tools and indicate to them that you are about to use them.

Long handled axes are safer than short handled hatchets. The proper grip for a right handed person is to have the right hand  $\frac{3}{4}$  of the way up the handle and the left hand approximately 3 inches from the end of the handle. A left-handed person should reverse the position of the hands. Make sure you have a clear circle in which to swing the axe before chopping. Remove all vines (including overhead), brush and shrubbery within the swing range. Ensure you have good footing. It is advisable to wear caulk boots and protective eyewear when using an axe. Always inspect an axe before using it – check to ensure the head and haft are lined up. If the haft is split, chipped, damaged or broken, or the head is loose, do not use it. Sheath the axe when not in use.

When carrying axes, shovels or other hand tools in the field, do not carry them over your shoulder. If you slip, they may hit your head. Hold them at the balance point on the downhill side with the cutting edge away from the body. Maintain distance of at least 2m between individuals when carrying tools.

Knives are the source of more disabling injuries than any hand tool. The major hazard in the use of knives is in the hand slipping from the handle onto the blade. Ensure the cutting stroke is away from the body. If this is not possible, ensure the hands and body are kept clear. Folded lock-blade knives carried in a belt holder reduce the potential of injury during a fall.

### Avalanche Awareness

Avalanches kill several people each year in western Canada and the number is increasing steadily with increased backcountry use. You must be avalanche-aware if you are doing any backcountry fieldwork. Even the most benign looking slopes can slide, slide. Weather and time of year also affect avalanche hazards. Always carry avalanche equipment for each person (transceiver, shovel, probe, etc.) when in avalanche terrain and know and practice how to use them. The Canadian Avalanche Association has information at <https://www.avalancheassociation.ca/>

### Firearms Use

If you or anyone of your team will be handling firearms, you should have a Federal Firearms License: Possession and Acquisition License (PAL). This document is required by law if you will be handling a firearm.

Carleton University has a Weapons Policy that must be adhered to even in the field. It discusses purchasing, usage, storage, transportation, and disposal of firearms and can be found on the website of the University Secretariat.