



## **Procedures and Safety Manual for Wilderness-based Fieldwork**

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UNBC Off-Campus Safety Committee

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## **INTRODUCTION**

This handbook is designed for use by UNBC community members who will be engaged in fieldwork activities<sup>1</sup>. This manual is an introductory level guide whose purpose is to provide fieldworkers with a risk management resource that will help them conduct operations responsibly and prevent accidents and injuries during field work in wilderness and remote locations. This is not an all-encompassing resource, and it is up to those engaged in fieldwork activities to think about potential risk factors and to acquire necessary training or knowledge. For community-based fieldwork, please also see the *Community-Based Research Safety Guide*.

Risk management is the responsibility of the entire institution. It is, therefore, imperative that everyone monitor how successfully its organizational structure, policies, procedures, resources, and equipment are contributing to the effective management of risk.

Risk management is not a one-time event. It is a dynamic, evolving process of adaptation and change in response to shifting circumstances.

UNBC Policies and Procedures regarding Field Work Safety  
(<https://www.unbc.ca/safety/field-safety>)

## **ACKNOWLEDGEMENTS**

We would like to thank UBC Faculty of Forestry Safety Committee for permission to modify their manual, from which the original template of this manual was derived.

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<sup>1</sup> Fieldwork is any approved practical teaching and research activities carried out by faculty, staff, or students in the natural environment or community, away from the normal support networks of the university.

## 1. SAFETY

### 1.1. Who's Responsible?

Everyone is. Safety is primarily common sense and common courtesy. The most important skill is to remain aware of yourself, others, and your relationship to the surrounding environment. Certain activities that might be safe under one set of circumstances might not be under a different set.

There are certain responsibilities spelled out by WorkSafe BC, and compliance with the Workers' Compensation Act and Regulations is the minimum acceptable standard. All students, faculty, and staff are encouraged to strive to exceed these minimum legal standards. The University aims to provide a safe, healthy and secure environment in which to carry on the University's affairs. All reasonable preventive measures are taken to prevent accidental injuries, occupational diseases and risks to personal security.

#### The University

Relevant to this manual, it is the responsibility of the University Administration to:

- Provide a safe, healthy and secure working environment;
- Take action as required to improve unsafe conditions;
- Ensure that health, safety, and personal security considerations form an integral part of the design, construction, purchase and maintenance of all buildings, equipment and work processes;
- Provide first aid facilities where appropriate;
- Support supervisors and safety committees in the implementation of an effective health, safety and security program;
- Ensure compliance with WorkSafe BC and other applicable legislation;
- Establish and maintain safety committees;
- Communicate with the university community or affected groups about events or situations when potentially harmful conditions arise or are discovered;
- Ensure adequate resources are available to implement appropriate procedures.

#### The Supervisor

It is the responsibility of the supervisor to:

- Ensure that Critical Data forms are completed for all those working in the field;
- Ensure Volunteer Waiver forms, and other applicable paperwork are completed when non-staff or students are in the field;
- Perform field risk assessment and complete and submit a **Field Risk Assessment and Safety Plan (FRASP)** (<https://www.unbc.ca/safety/field-safety>);

- Ensure that all employees under their supervision are aware of safety practices and follow safety procedures in the FRASP;
- Provide training in the safe operation of equipment;
- Correct unsafe work practices or hazardous conditions promptly;
- Be responsive to concerns expressed about personal security and investigate any incidents or personal security concerns which have occurred in their area of responsibility;
- Report any accidents or incidents involving personal security to the appropriate University authority;
- Participate, if requested, on safety committees.

### **Individual Students, Staff, and Faculty**

It is the responsibility of individuals (students, faculty, and staff) to:

- Observe safety procedures established by supervisory staff, administrative heads and the University, as well as those in the FRASP;
- Be safety-conscious in all activities;
- Report as soon as possible any accident, injury, unsafe condition, insecure condition or threats to personal security to a supervisor or administrative head of unit;
- Use personal protective equipment properly;
- Participate on safety committees.

### **1.2. Risk Management**

Risk is the likelihood of loss or damage occurring. In off-campus locations, this loss or damage is usually thought of in terms of personal physical injury. However, risk also involves the potential to negatively impact mental, social, financial, market, business, and public relations aspects of an institution or its staff.

Fieldwork involves varying levels of risk because of the variation in activities and conditions. For example, driving on a resource road during slippery conditions or with heavy truck traffic carries more risk than driving under dry conditions or with low truck traffic.

Risk factors are those elements that contribute to the likelihood of an incident occurring. These fall into three categories: people, equipment, and environment. The greater the number of issues related to these factors for any given outdoor activity, the greater the chance of an incident occurring. Most serious incidents are a result of a combination of risk factors.

Risk management must be considered when preparing for field activities and community-based research. A risk assessment for each activity must be performed before entering the field to ensure adequate hazard prevention and emergency procedures are in place.

## **2. ISSUES OF CONDUCT AND ETHICAL CONSIDERATIONS**

### **2.1. Stewardship and Regulatory Compliance**

In carrying out scientific research treat the natural world with care and consideration. Respect the rights of the public and property owners. For some studies permits or regulatory requirements, such as Animal Care and Use approvals may be needed before field activities commence.

### **2.2. Communicating with Land-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 (e.g. Ministry of Forests, etc.), 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.

### **2.3. Working Within National and Provincial Parks**

Within BC, any research or field activity that “involves removal, destruction, damage, disturbance or exploitation of a natural resources or occupation use of land” requires a permit (see: <https://portal.nrs.gov.bc.ca/web/client/-/research-parks-use-permit>). Studies in national parks also require permits. More information can be found here: <https://parks.canada.ca/nature/science/recherche-research>.

### **2.4. Personal Conduct**

As an employee or student of UNBC (a publicly funded organization) you are representing your employer when you work in remote areas, even when you are on personal time. It is, therefore, important that you conduct yourself appropriately. If you require specific permits to conduct your research, make sure you are carrying them with you.

You are also expected to follow all UNBC policies even when working in off-campus locations (<https://www.unbc.ca/policy>). UNBC has internal policies to ensure we are providing a safe and inclusive environment for everyone. More information and available resources can be found here: <https://www2.unbc.ca/positive-environment>.

## **3. BEFORE FIELDWORK BEGINS**

This is probably the most important part of field safety. Most problems can be avoided by

taking proper precautions before going into the field. This means equipping yourself with the proper skills and equipment required for your type of work. This may include relevant vaccinations (see Section 5 – Wilderness Health Risks).

Use the Field Safety Checklist (at the end of this guide) as a starting point for what needs to be considered before going into the field, and in preparing your FRASP.

### **3.1. Contact Procedures**

Before going into the field, it is imperative that you leave a copy of the FRASP with your supervisor and one or more backup contact persons, and if necessary, the proprietor of the land base where you will be working.

Some organizations will require you to attend a safety training session before you begin work on their land base. They may also require you to carry specific safety or firefighting equipment.

Be sure to familiarize yourself with industrial traffic patterns and locations of active industrial operations. See section 6 on resource road safety.

Cell phone coverage is generally poor away from towns and cities. Consider whether satellite phones and/or personal locating devices (e.g. SPOT or InReach satellite personal trackers) are required, especially when traveling where cell phone range is poor. Remember that not all areas of BC follow the daylight-saving time change (e.g. the Peace region). It is important to be aware of this when planning daily security check-ins and trip travel time. It is also important to note that the majority of BC highway driving is remote and there can be long stretches with no cell phone service.

### **3.2. 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.

#### **Clothing and Personal Protective Equipment**

Appropriate clothing will depend on the working conditions. Loose fitting clothing, dangly jewelry and long unrestrained hair may create a safety hazard. Caulked boots 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 power saw you should wear boots equipped with steel toes, eye and ear protection, gloves, and Kevlar safety chaps or pants.

Always be aware of your environment: it is easy to wander into hazardous areas (e.g. oil and gas industry sites are increasingly common in northern BC, and can be extremely dangerous), which require specialized safety equipment, without realizing that you are at risk. Consider whether you need protective equipment or clothing for handling chemicals or contaminants while conducting your field activities. If you are required to wear these in the laboratory setting, then you also need them in the field. Also be sure that you have the necessary equipment and facilities for cleaning up spills and disposing of chemicals properly. Researchers should also be dressed appropriately for local weather conditions. This may include the need for thermal layers, appropriate gloves, rain gear, head lamps, waterproof footwear, or even ice cleats.

Dress needs for community-based research will depend on the research method and target audience. If researchers are engaged in extensive community or door-to-door survey work, additional safety precautions should be considered (See the Community-based Research Safety Guide, <https://www.unbc.ca/safety/field-safety>). Each researcher should be equipped with an identification badge that may include information about community partners. Researchers should also be equipped with high-visibility safety vests if they are working outside of daylight hours.

### **First Aid Kit**

All vehicles used in the field must be equipped with an adequate First Aid kit, blanket and fire extinguisher. Personal First Aid kits should also be carried by individuals working in the field. Check expiry dates before leaving and check the kit annually. Replace any items used as soon as possible.

First Aid Kit requirements can be determined from [Schedule 3-A](#) of the WorkSafe BC OHS Regulations.

See this WorkSafe BC site for lists of the minimum requirements of personal, basic, and levels 1,2 and 3 First Aid kits. [https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-guidelines/guidelines-part-03#SectionNumber:G3.16\\_1.1](https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-guidelines/guidelines-part-03#SectionNumber:G3.16_1.1) First Aid kits must be kept clean and dry and must be readily available as per requirements in Schedule 3-A.



Additional items to consider adding to a personal first aid kit include the following:

1	Copy of a wilderness first aid guide (e.g. St. John Ambulance official wilderness first aid guide; Mountaineering First Aid: A Guide to Accident Response and First Aid Care, 5th Edition).
1	Pair scissors
2 – 6	Sterile gauze pads, 10 cm <sup>2</sup>
1 – 3	Non-adherent dressings, 25 x 40 cm
12 – 24	Strip bandages of varying sizes, assorted knuckle/fingertip elastic adhesive pads, butterfly suture bandages
1 – 3	Sealed sanitary napkins (for use as soaker pads)
1 roll	Adhesive tape, 2.5 cm wide
3 – 7	Cloth triangular bandages
1 – 2	Elastic bandages, 8 cm wide
10 – 20	Cleansing wipes (antiseptic)
	Rehydration packages or the salt, baking soda and sugar mixture outlined below <sup>3</sup> - for treatment from dehydration. For treatment of heat cramps or heat exhaustion, metabolite replacement solutions like Gatorade packets can also be used.
2	Large plastic garbage bags, or a field safety blanket (for covering someone suffering from hypothermia)
1 pair	Tweezers/tick removers
1	Antiseptic solution, plastic bottle
3-4	Iodine swabs

## **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, unable to continue, or your vehicle breaks down. The kit should include at least:

- Water bottle with water in it – staying hydrated is a critical element of survival
- Emergency food
- Blankets / sleeping bag, and warm clothing
- Pocket knife
- Watch
- Compass, map, GPS and the knowledge to use them
- Flashlight/headlamp (in case of delay) – check batteries and pack spare batteries
- Pencil and waterproof field notebook
- Flagging tape
- If working in bear country – bear spray and a bear banger (make sure you know how to use these – just having them doesn't help you!). See Section 5.3 for more information.
- 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 or InReach 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.
- In winter, include sand, a shovel and chains in the vehicle kit. Know how to put chains on and remove them before leaving.

### **3.3. Courses to Take**

Investigate what is required for your activities, and also carefully consider due diligence and take recommended courses beyond the minimum requirements. Minimum requirements for most field research at UNBC are Bear Safety (Staying Safe in Bear Country) and Basic First Aid (Occupational Health and Safety Level 1 First Aid) (or equivalent). In some cases, higher-level first aid courses and Transport Endorsement may also be needed. Requirements are based on the hazards of the job, number of field personnel, and distance to the nearest hospital. Supervisors should undertake a risk assessment for each field activity. For certain types of field work, other courses may be required (e.g. Power Saw Operator Safety). Other courses or training could also be quite

useful, such as Wilderness First Responder. If there are courses that you feel your personnel/students need that are not offered, contact the Safety office at UNBC. Courses are also available through companies and agencies external to UNBC.

Detailed knowledge, skill development and practice are always advised. UNBC Continuing Studies offers various courses on a regular basis (<http://www.unbc.ca/continuing-studies>). The most relevant offerings available through UNBC Continuing Studies are currently Bear Aware and Power Saw Safety.

### **First Aid**

There are several options for first aid training:

- Basic First Aid (OFA 1) – St. John Ambulance or Lifesavers First Aid Training, one day and covers common first aid emergencies, sudden medical emergencies and CPR-A.
- Wilderness First Aid courses are offered by OVERhang in Prince George. They vary from 20 – 40 hours.

## **3.4. Foundational Field Skills**

### **Field Navigation**

It is beyond the scope of this manual to teach field navigation, however a one-day field skills course is coordinated annually by the Safety office ([safety@unbc.ca](mailto:safety@unbc.ca)), with the assistance of personnel from the Aleza Lake Research Forest.

### **Power Saw Use**

Before working on projects that involve use of a power saw, you will need to undertake a Power Saw Safety course through Continuing Studies or some other recognized course. PPE must be worn at all times while using a power saw. Saws must have spark arresters and must be in good working condition to avoid starting a fire.

### **Pulaski Fire Axe, Axes and Knives 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 hand position. 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. Appropriate footwear is mandatory, and protective

eyewear advised, 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**

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. Even the most benign looking slopes can slide, or be at the base of sliding sections above. Weather and time of year also affect avalanche hazard. It is critically important to be able to recognize avalanche terrain and conditions that lead to avalanches. Wilderness travel in winter requires this advanced knowledge. Courses are available locally (OVERhang, Dezaiko Alpine Adventures) and through Canada West Mountain School (<https://themountainschool.com/product-category/avalanche/>) as well as other providers.

Always carry avalanche equipment for each person (transceiver, shovel, probe, etc.) when in avalanche terrain and know how to use them. These tools are no use unless you are familiar with their use. The Canadian Avalanche Association (CAA) avalanche has an information bulletin <http://www.avalanche.ca/> which should be consulted prior to winter travel off major travel routes.

### **Firearms Use**

If you or anyone of your team will be handling firearms, you must have a Federal Firearms License: Possession and Acquisition License (PAL). Contact a local gun club for course information. For Canadian regulations for firearms contact the Canadian Firearms Centre: <http://www.rcmp-grc.gc.ca/cfp-pcaf/index-eng.htm>. It is not the intention of this manual to cover firearms safety in detail, but remember the “vital four”:

- Regard every firearm as loaded;
- Control the muzzle direction at all times;
- Keep your finger off the trigger except when firing;
- Open the action and check that there is no ammunition in the firearm.

## **Operating University Vehicles**

Authorization is required in order to operate a University owned or leased vehicle. If an accident were to occur, it is possible that the individual's driving record could be affected. It must be noted that the University cannot protect an individual's driving record. Theft of or damage to personal property is not covered under the UNBC insurance policy.

Students, faculty and staff with a "L" designation will not be permitted to rent or use vehicles for University business. Individuals with an "N" designation will not be permitted to carry passengers. Under NO circumstance will the rental or use of 15 passenger vans be permitted.

Rental vehicles should be treated in the same manner with the addition of any specific requirements of the rental agency. BCAA or other road-side assistance coverage is strongly recommended for all vehicles.

Request to operate a UNBC vehicle:

[www.unbc.ca/assets/safety/vehicle/request to use a university motorized vehicle for m.pdf](http://www.unbc.ca/assets/safety/vehicle/request_to_use_a_university_motorized_vehicle_for_m.pdf)

ICBC Regulations: [www.icbc.com/licensing/lic\\_getlic\\_types.asp](http://www.icbc.com/licensing/lic_getlic_types.asp)

## **Operating Personal Vehicles**

With use of personal vehicles the owner of the vehicle needs to understand that they are taking on the liability for anything that should happen with regard to their vehicle in the field. It is their insurance that will be affected and they are responsible to ensure that they have the proper insurance coverage. Some items for consideration:

- Is the vehicle properly insured for each person driving. (i.e. including others who have less than 10 years driving experience)
- Is the class of insurance appropriate for the activity (e.g. "to and from work within 15km" would not appropriate for field studies)
- It is advisable to discuss the intended use with your insurance provider

If a personal vehicle is used, the ownership and control of the vehicle can have implications for other members of the research team – particularly in communities that have limited or no public transportation. It is preferable that more than one researcher have keys to access the vehicle if needed. It is important that the owner of the vehicle understand that at all times they are responsible for the transportation needs of the research team. This may include being prepared to appropriately share the use of the vehicle if needed. If this is questionable, then alternative transportation arrangements will have to be made. The vehicle should always be parked within close proximity to where the research team is working (i.e. on a central location of a street, or within a few minutes' walk from the research team). It is always preferable to park the vehicle in a space where it will not be blocked in and pointed outward in order to facilitate a quick exit if needed.

It is critical that personal vehicles are held to the same maintenance standards as rental or university vehicles. Ensure that an adequate pre-trip inspection is conducted (see section 6.1)

### **Resources**

The UNBC Field Safety website <https://www2.unbc.ca/safety/field-safety> has some useful references for more information.

Recommended readings for wilderness travel:

Bear Attacks: Their Causes and Avoidance (2003) Stephen Herrero Staying Safe in Bear Country (Bear Aware Video)-Gary Shelton

[Emergency Survival: A Pocket Guide : Quick Information for Outdoor Safety](#) by Christopher Van Tilburg (May 31, 2001) [Outdoor Survival \(Essential Guide\)](#) by [Garth Hattingh](#)

Mountain Weather: Backcountry Forecasting for Hikers, Campers, Climbers, Skiers, Snowboarders by Jeff Renner

Mountaineering First Aid: A Guide to Accident Response and First Aid Care; 5th Revised edition (2004) Mountaineers Books

St. John Ambulance official wilderness first aid guide (1994) McClelland & Stewart; 1 edition (Mar 1 1994)

[Surviving Coastal and Open Water: Greg Davenport's Books for the Wilderness](#) by [Gregory J. Davenport](#) (Paperback - July 2003)

[Surviving Cold Weather: Simply Survival \(Greg Davenport's Books for the Wilderness\)](#) by [Gregory J. Davenport](#) and Steven A. Davenport (Paperback - Jan. 2003)

The official wilderness first-aid guide. McClelland & Stewart Inc., Toronto. 390 pp. Merry, W. 1994.

[Wilderness Medical Society Practice Guidelines for Wilderness Emergency Care, 5th](#) by Wilderness Medical Society and William W. Forgey M.D. (Paperback - Aug. 1, 2006)

## **4. IN THE FIELD**

### **4.1. Daily Routine**

When you are working in the field ensure the information in your FRASP (<https://www.unbc.ca/safety/field-safety>) is left with a responsible person who can

monitor when you are to return from the field and initiate a search should you not report back. UNBC Security can do this if needed. Sections 6 and 7 of the FRASP are critical for checkin/check out procedures.

Check-in procedures for crews working from a base camp (camp or other accommodations) need to be discussed with all crew members and included in the Field Risk Assessment and Safety Plan. These procedures will vary with circumstances but should include frequency and method of check-in, and response procedures when the check-in does not happen.

A [Critical Data Form](#) for each field worker should also be included in the FRASP. This will ensure that in the case of a rescue, the search team will be able to correctly identify you and your crew members and be aware of any medical issues. If you are working from campus on a daily basis, UNBC security is available to monitor your sign-out/in times. Be sure that you are familiar with the UNBC sign-out/in procedures and that your contacts are willing and available to assist in an emergency.

Always let someone know where you are going and when you are to return before going on any field trip. Always be prepared to spend a night in the woods, especially if you are working away from your vehicle. Always park your vehicle with the front end facing an easy exit. Always be sure to sign in when you return from the field.

Remember that not all areas of BC follow the daylight-saving time change (e.g. the Peace regions). It is important to be aware of this when planning daily security check-ins and trip travel time. It is also important to note that the majority of BC highway driving is remote and there can be long stretches with no cell phone service. Driving during daylight hours is preferable, and drivers should expect more wildlife activity around roads when travelling at dawn or dusk.

#### **4.2. Working Alone**

Working alone should be avoided whenever possible. If working alone is necessary, some guidelines to follow are:

Do not work alone if you will be climbing trees, operating a power saw 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. SPOT or InReach communication devices are highly recommended for lone workers. These require a subscription service, some pre-field work set-up, and access to open sky (can be clear or cloudy, and they work within forests— basically same criteria as picking up signals with a GPS. Transmission can be blocked inside vehicles, so make sure it is on the dash and can

'see' the sky through the window).

**On overnight trips** – twice a day check-in is mandatory (once in the morning, and once at the end of the day). Leave a detailed route plan. Ensure you have an appropriate means of communication available at all times, which in remote areas means a satellite device.

### **4.3 Working or Traveling Near Active Industrial Sites**

See section 6 for detailed information on travelling on resource roads and use of truck to truck radios.

Your travel or work may require you to drive, walk through, or work in active industrial sites. These include logging operations, log sorting or loading areas, oil and gas sites, road repair or construction zones. Hazards include falling trees, heavy equipment with limited visibility, helicopters, swinging or sliding logs, rock or debris falling on roadway, rough road surfaces and blasting, and even toxic emissions.

Contact the site/forest licensee before heading to the field to learn where active operations are located, and to let them know that you will be visiting the site. They can tell you if you can safely travel through the area, and what procedures to follow. If the plan is to be outside of your vehicle at the site, bring appropriate safety clothing including at minimum a hard hat, high visibility vest and ear protection.

When you are on an industrial site you must become familiar with and respect the safety protocols of the company responsible for that site (the "prime contractor"). When you arrive at an industrial work area in the field watch for posted radio channels to see how to contact workers by radio. If you cannot see the activities/operators from the roadway, turn off your vehicle engine, wind down your windows and listen for chainsaws, yarding or log skidding equipment. Never enter an active work zone without making eye contact and receiving acknowledgement and permission from the supervisor or foreman, if present, or an equipment operator, or worker. Be patient if you need to wait for an operation to finish. Talk to the workers, explaining where you are heading and what you are doing, and ask where you can park safely and out of their way. A safety conscious logging operator will provide a safety orientation for you on site and will let you know about the hazards to be aware of. Normally they will clear a path for you if you need access through their work area and stop the equipment when they have reached the end of a cycle. If you are planning to travel back by the same route, make sure the crew knows to leave a clear path for you if they finish work before you return.

### **4.4 Hazards**

#### **Losing your way**

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 vehicle 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).

If you do become lost 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.

Otherwise -

- Remain calm;
- Review the rule of 3 to help you set priorities. You can survive approximately 3 minutes without air, 3 hours without shelter (depending on the conditions), 3 days without water, and 3 weeks without food.
- 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. Look for linear features (trails, streams, lakes or roads) that could be used as a “handrail” back to a known location.
- Proceed to a high point to view the lay of the land and to be more readily spotted; but do not expend a lot of energy trying to find your way.
- 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.
- Stay hydrated and conserve food.

## **Fire**

### Forest Fire

It is every person’s legal obligation, under the BC Wildfire Act, 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. If you see or suspect a forest fire while you’re in the field, call BC MoF fire hotline at 1-800-663-5555, or \*5555 from a cell phone.

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 at:

[http://bcwildfire.ca/Weather/Maps/danger\\_rating.htm](http://bcwildfire.ca/Weather/Maps/danger_rating.htm)

Provincial forest fire risk categories are as follows:

Low	Low fire danger.
Moderate	Carry out any forest activities with caution.
High	Fire hazard is serious. Extreme caution must be used in any forest activity. Burning permits and industrial activities may be restricted.
Extreme	Extremely high fire hazard. General forest activities may be restricted, including burning permits, industrial activities and campfires.

For information on fire conditions and burning restrictions:

<https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/fire-bans-and-restrictions>

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, powerlines);
- Access to the area (road, boat, helicopter);
- Fire-fighting resources currently in use suppressing the fire;

Check the current wildfire situation prior to going into the field

(<https://wildfiresituation.nrs.gov.bc.ca/map>). Plan in advance for escape routes should a fire start close to where you are working. Remain alert to the smell or site of smoke, and to possible features that might provide a refuge from a fire should it become necessary. For example, Wetlands, lakes, rivers, large creeks, deciduous forests, areas already burned.

### **Campfires**

When building a campfire use common sense. Do not build it near a tree, a log or dry tinder. Scrape the area down to mineral soil. Keep your fire small and watch for sparks. Be sure your fire is dead out and cold before you leave it. Current regulations define a campfire as no larger than 0.5 m in height and 0.5 m in diameter, and require that a hand tool, such as a shovel, or at least 8 litres of water be immediately available.

### **Required Fire Fighting Equipment**

The BC Wildfire Act, Wildfire Regulation has the following requirements for “industrial activity” which includes field surveying/sampling operations.

“If there is a risk of a fire starting or spreading on an area that is

- (a) forest land or grass land, or
- (b) within 300 m of forest land or grass land,

a person who carries out an industrial activity at a site in that area must ensure that fire-fighting hand tools are available at that site in a combination and type to properly equip each person who works at the site with a minimum of one fire-fighting hand tool. Fire-fighting hand tools includes shovels, axes, pulaskis, hand tank pumps and fire extinguishers.

This equipment is especially important if you will be lighting any type of fire, or using any equipment, such as a power saw, with gasoline or diesel motor that could start a fire.

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

#### **4.5 Major Accidents/Injuries**

All personnel working in off-campus locations should have Basic First Aid (Occupational First Aid Level 1) or equivalent. Depending on the type of activity and number of persons involved, a higher level of training may be required. It is the responsibility of supervisors, with support from the UNBC Safety Office, to determine training needs and ensure adequate training. The following are basic procedures which do not replace proper training.

##### **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).

Call or radio someone to call 911 and specify that an ambulance is needed. Be prepared to provide the location and distance from the nearest road, and the nature of injury.

Assess the ABC's:

- A – Open Airway by gently tilting head back and checking mouth for obstructions.
- B – Check for Breathing and administer mouth-to-mouth assisted breathing if required.
- C – Maintain circulation with Cardio Pulmonary Resuscitation if necessary.

Check for bleeding (remember to check under clothing). To stop bleeding, hold a pressure dressing or pad of clean cloth directly on the wound and apply hand pressure. If this fails to stop the bleeding, apply pressure to the relevant pressure point. Do not apply a tourniquet

except in the extreme condition when the patient's life is threatened by loss of blood. Loosen tourniquet briefly every 20 minutes. Prevent infection by applying a clean, sterile dressing.

If possible, remove any dangerous objects from the vicinity of the patient.

Keep the patient warm.

Inform area supervisor and upon return ensure that the appropriate UNBC Incident/Accident Report form is completed and submitted it to the UNBC Safety Office.

**Burns**

Burns are classified and treated according to depth or degree of tissue damage:

Burn Type	Causes	Tissue Damage	Treatment
1st Degree	Hot object, scalding liquid	Produces redness or discoloration, mild swelling, pain;	Submerge burn in cold water or apply water to area. This will ease the pain of minor burns and may promote healing
2nd Degree	Severe contact with hot object, flash burns (flammable liquids)	Greater depth than 1st degree; red/mottled appearance, blisters; more pain than deeper burns because nerve endings are still intact	Submerge in cold water until pain subsides (or apply clean cloths soaked in cold water); gently blot dry; apply sterile gauze or clean bandage. For arms/legs - raise above the body. Never break blisters or remove tissue. DO NOT apply antiseptics or ointments (surgeons treating the burn may have to remove any greases or salves applied, causing further damage).
3rd Degree	More severe contact with hot object, flash burns (flammable liquids)	Deep tissue damage; white or charred-look; complete loss of skin	Do not remove particles of charred clothing; cover burns with clean clothes; keep hands/legs elevated above the heart. For face burns, keep patient propped up. DO NOT submerge a large burned area in water (may increase shock). DO NOT apply ointments or greases. Transport to hospital immediately.

**4.6 Danger Tree Hazards**

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

- 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 higher risk if there are potentially dangerous 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. In some cases it may be necessary to either move the research site, or engage a certified danger tree assessor and to remove dangerous trees if appropriate. Avoid field work during periods of high winds or heavy snow/ice loading.

### **Responsibilities of supervisors**

In some instances, where researchers are working directly with potentially dangerous trees, advanced training or certification is required. More generally this training should include discussion of safe work procedures, inspection of field sites for hazards prior to commencement of work, and consideration of weather conditions under which risk of injury increases. Supervisors should provide appropriate safety equipment and training in its use. If research activities require specialized skill or equipment (e.g. tree felling, tree climbing), the supervisor is responsible for engaging workers with appropriate experience, equipment, and certification.

Where standing dead trees, potentially dangerous trees, or coarse woody debris are the object of study, it is recommended that at least one of the field researchers have received training in [Wildlife/Danger Tree Assessment](#).

### **Responsibilities of field workers**

Field workers are responsible for safe work habits, familiarizing themselves with safe work procedures, inspecting their worksites for potential hazards and wearing appropriate personal protective equipment, and notifying their supervisors of unsafe working conditions.

## **4.7 Working Around Water**

Working in, on or near a water body, even a shallow one, poses additional risks. For this reason, aquatic work should never be undertaken alone. Most water accidents result from people underestimating the power of 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.

### **Hazard Assessment and Training**

Prior to working around water personnel should identify possible associated hazards.

For example, summer field work could involve working around lakes with sudden drop-offs, crossing streams or rivers, and sampling from river banks where one could slip. Winter field work may involve working on frozen lakes or rivers where one could fall through the ice, slip on wet ice or become subject to cold weather and hypothermia. It is important that all personnel identify and prepare for such hazards.

Water bodies can also 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. See section 5.3 for more information on avoiding wildlife conflicts.

When fieldwork involves working in or around water, appropriate training is needed. The level of training depends on the activity and the water body (still, moving, ocean).

Rescue 3 International (<https://www.rescue3.com/>) is the recognized world standard in water rescue education.

The most common water safety courses taken throughout British Columbia by provincial government employees, Water Survey Canada technicians, private consulting and industry are:

- Flatwater Safety and Rescue – 1 day course for natural resource personnel who work near or in non-moving water including lakes and ponds.
- Swiftwater Operations – 2 day course for shore- based work beside moving water, but not in water itself.
- Swiftwater Rescue Technician – 3 day course for field personnel working in moving water.
- Ice safety and Rescue Technician – 2 day course for field personnel working on surface ice.
- Locally, OVERhang (<https://www.overhang.ca/>) and Raven Rescue, (<https://www.ravenrsm.com/>) provide swiftwater rescue technician courses

If field personnel are operating a boat they must obtain a 'Pleasure craft Operator Card'. This certification is mandatory for all operators of powered watercraft in Canada regardless of age, engine horsepower or length of boat. Certification can be obtained through the following website: <http://www.boatinglicense.ca/>

#### **Personal protective equipment for water:**

PFD – personnel flotation device, a life jacket that is approved by Transport Canada. Fit is the most important feature when selecting a PFD. A life jacket should provide the most flotation while also fitting properly. Most life jackets provide a minimum of 7 kilograms of flotation.

Footwear –Wool or neoprene socks are useful combined with outdoor boots that have a

good gripping sole. Whistle – a good whistle is necessary for communication. It should be specific to water conditions ie. It should be able to work when wet (a 'pea-less' whistle), and be loud enough to hear over flowing water. A whistle should be attached to the shoulder of the PFD.

Hip waders – good hip waders will insulate from the cold, not leak and provide good footing. It is important to ensure hip waders fit properly. Keep your hip waders in good condition and check them for leaks before each field season. It is also important to wash hip waders and boots thoroughly after each use as invasive plants and parasites can become stuck in wader boots and transferred between field sites.

### **Unintended Swimming**

Never put your feet down if swept away and swimming. If your foot becomes stuck in rocks the current could push you down below the water and hold you there. Stay on your back with your feet downstream, knees bent and heels slightly lower than the buttocks. The feet should be ready to push the swimmer away from obstructions. Angle your body upriver towards the closest or safest shoreline, so the current pushes you to the side. Use both arms together in a modified backstroke. Do not stand until your butt is hitting the river bottom.

### **Running a line across a waterway**

If running a line across a waterway for the purpose of a cross section, never stand downstream of the line; always stand on the upstream side of the rope. In case the rope comes free and swings down river, the person will not be knocked over or injured.

### **Shallow water crossing**

To decide if a crossing is possible, you must determine the water depth (is it shallow enough for safe crossing), water velocity and channel bottom. Water velocity is usually the most obvious danger and even fast-moving shallow water can knock a person off their feet. Before crossing ensure the channel bottom is stable and does not have any sudden drop offs. Move up or downstream as needed to find the best crossing location. If you do choose to cross the stream, unbuckle backpack hip belt and sternum straps. Face upstream and use poles to maintain balance. Cross on rocks that are closer to the water surface, even if partially submerged to limit risk from fall off higher rocks. Step on pointy rocks instead of flat rocks (less slippery). Avoid crossing in bare feet.

## **5. WILDERNESS HEALTH RISKS**

### **5.1. Diseases**

Field workers can come into contact with a variety of disease agents. Most are extremely rare and we include only the most dangerous or most common in BC. More information on these and other diseases is available from the British Columbia Centre for Disease Control (<http://www.bccdc.ca>), Health Canada (<http://www.hc-sc.gc.ca/index-eng.php>), and the Public Health Agency of Canada (<http://www.phac-aspc.gc.ca/index-eng.php>).

## **Hantavirus**

Hantavirus is a very 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 are 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. Early diagnosis is crucial: 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.

## **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 brought to a rolling boil or filtered using a filter rated for Giardia.

## **Lyme Disease**

Lyme disease is caused by an organism carried by ticks and can be transferred to humans through tick bites. The organism has been found in ticks from many areas of BC. 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 (see Section 5.4 for more details). 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" appears in about 25% of cases. 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.

### **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. Rabies-caused death in British Columbia are rare, but 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. There are no reliable tests to detect rabies in animals before signs or symptoms start. Animals must be killed to test them. If testing is needed, a health care provider or veterinary professional can arrange the testing.

If you work with animals that are likely to carry rabies (the most likely carriers may vary depending on where you are working, but skunks, bats, foxes and raccoons are the most common carriers in BC) you may be able to request immunization: contact your family doctor, or Northern Health. Even if you are vaccinated, you will likely still undergo treatment if you are exposed to the virus. This is not a disease to take lightly!

### **West Nile Virus (WNV)**

The first non-travel linked case of WNV was found in southern BC in 2009. The usual way for humans to get WNV is through the bite of an infected mosquito. To avoid contracting the virus, take steps to avoid mosquito bites (See Section 5.4 for more information). Species of mosquito capable of transmitting WNV do occur in BC. 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.

## **5.2. Some Common Ailments:**

The following ailments may be common or worrisome to persons working in isolation:

### **Food Poisoning**

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.

### **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 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 hot (as hot as you can stand) heavily salted water several times throughout the day.

### **Tetanus**

Deep skin punctures can create the anaerobic conditions necessary for tetanus to develop. If you have had a tetanus shot within the last ten years, you need not worry about tetanus (the potential for other infections still needs to be addressed). Be sure to clean the wound thoroughly before it closes. If you have not had a tetanus shot within the last 10 years, or can't remember when you had one, see your doctor and get one immediately.

## **5.3. Wildlife**

Before beginning work in an area, always gather information about potentially dangerous wildlife. Obtain this information from field guides, your employer, local contacts or a Conservation Officer at the Ministry of Environment (<http://www.gov.bc.ca/env/index.html>). 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 and do learn track patterns of some of the more common species, particularly moose, bear (black and grizzly) and cougar for regions in BC.

General information about some of the more common species considered “potentially dangerous wildlife” is provided below. However, all wildlife should be treated with respect – even bites from seemingly-innocuous small animals, like chipmunks, can result in disease transmission such as Hantavirus or Rabies (5.1). Moose and deer can deliver strong kicks if provoked, so animal encounters that could lead to injury are not limited to carnivores.

### **General advice for avoiding negative animal encounters:**

Unless your work requires approaching wildlife, avoid encounters by making noise. Increase the frequency and volume of noise when near streams/rivers due to higher likelihood of encounters as well as the noise of the running water.

Many wild animals will likely view you as a potential predator, and approaches or attempts to touch them may evoke anti-predator escape responses (biting, scratching, kicking etc). If

you need to handle animals as part of your research, you need to be appropriately trained, and have the appropriate equipment and protective gear. You also need to have necessary approvals from the Animal Care and Use Committee and any other regulatory requirements.

Respect an animal's personal space and do not approach them unless this is necessary for your research. Watch for signs of distress (frequent glancing in your direction, ears back, jittery movement etc.) as you approach. If the animal starts showing signs of these back off and leave the immediate area.

Don't corner an animal – always make sure you leave an escape path for an animal. If the encounter is sudden, move slowly and deliberately to allow the animal an escape route. Additional information is provided below for commonly encountered species, or species that pose a greater risk if encountered.

### **Cougars**

Conflicts between cougars and humans are rare, but attacks have occurred in BC. Vancouver Island has particularly high cougar densities.

Working in groups offers more protection in cougar habitat, cougar attacks have tended to occur on individuals. Some indications suggest that children may be more likely to be viewed as potential prey than adults, possibly due to smaller size, higher pitched voices and more erratic movements. For field workers, this may indicate physical size is a factor in risk to consider.

Carrying a walking stick allows you to use it as a weapon if necessary. As you move through the wilderness, it is a good idea to be looking around you - look up above on bluffs, lower branches of trees, occasionally scan behind you, and keep an eye out for tracks and signs of animal presence (this applies to early detection of presence being a key factor in helping mitigate all large animal encounters). Also be aware of potential food caches – unusual abundance of scavengers/ravens in an area, and signs of dead or decaying animals. 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, leave the area immediately.

Even though cougars normally avoid confrontations, and you may never even detect the animals' presence, the species is unpredictable. Never approach a cougar.

If an encounter occurs:

- Stay calm and talk in a confident voice.
- Pick up children immediately - children frighten easily, the noise and movements they make could provoke an attack. When picking up children, try to do so with minimal bending and do not take your eyes off the cougar.
- Leash dogs and keep them under control.
- Keep the cougar in view and in front of you at all times. Never turn your back on

a cougar.

- 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.
- Do not run, but try to back away slowly; sudden movement or flight may trigger an attack.
- Ensure that the animal has a clear avenue of escape. Never corner large and potentially dangerous animals.
- Make yourself look as intimidating as possible. Pick up sticks or branches, and wave them about. Your goal is to persuade the cougar you are not easy prey.
- If a cougar shows interest or follows you, respond aggressively. Arm yourself with a large stick, throw rocks, and speak loudly and firmly. Crouch down as little as possible when bending down to pick items up from the ground.

If a cougar attacks, fight back. Convince the cougar you are a threat. Use anything you can as a weapon. Many people survive cougar attacks by fighting back with anything at hand, including rocks, sticks, bare fists, pocket knives and fishing poles. Focus your attack on the cougar's face and eyes.

For more information on cougars:

<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/human-wildlife-conflict/staying-safe-around-wildlife/cougars>

## **Bears**

If you are planning on spending time in bear country, which is almost everywhere in western Canada, you must take a Bear Aware course or take the provincial government's online bear encounter self-training course which includes the "Bear Aware" video. <http://www.for.gov.bc.ca/hfd/library/documents/bib22777.htm>. You must also be carrying bear spray. Not only has this been proven to be one of the best deterrents for bear attacks, but it is both readily accessible and easy to apply by the greatest range of personnel. See below for more information on bear spray.

British Columbia has two bear species, the black bear (*Ursus americanus*) and the grizzly bear (*Ursus arctos*). Being able to identify the difference between the two species, both visually and by their tracks and sign, is extremely useful for being able to respond to encounters, as the behaviours exhibited by the two species, and recommended responses to encounters differ. Information on identifying signs and physical appearance of either species can be found here: <https://www.bearsmart.com/about-bears/know-the-difference/>.

Both bear species have been responsible for serious injuries and deaths to humans in BC, 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. Many encounters occur by suddenly surprising bears that were unaware of your presence – alerting them to your location will likely result in most bears avoiding you. This is best

accomplished by making a lot of noise. Wherever possible, try to travel or work in more open areas where you can be easily seen and heard, and also affords you greatest ability to detect bears at larger distances. While walking through forest with heavy underbrush, stay alert and make an extra effort to be noisy (e.g. calling out about every 50 paces or at regular intervals if you are stationary), especially near loud streams and waterfalls. Low frequency sound transmits better than high frequency sounds in forests; bear bells are not effective – use your voice. In very noisy areas, or areas with very dense vegetation, some workers have found small marine airhorns are effective noisemakers for alerting bears of your presence.

A particularly dangerous situation is when encountering a bear defending either a carcass, or a female with cubs. Stay vigilant for signs of carcasses - avoid areas where ravens or other scavengers appear to be congregating and be aware of smells of decay. If you detect a carcass, leave the area. The responses of females with cubs can differ slightly between species, and will be dealt with below.

### **Black Bears**

Black bears are not always black - colour can vary from brownish to cinnamon, and even white in Kermode bears on BCs northern coast. They are typically smaller than grizzly bears, although large black bears can overlap in size with small grizzlies. Black bears have a more narrow-looking face and longer, rounder ears than grizzlies. When viewed from the side, black bears lack a hump on the back characteristic of grizzly bears, and the profile of the face has a straight slope from forehead through tip of nose.

If unaccustomed to people, black bears will usually turn and run from an encounter. However, black bears are often curious, can easily become habituated to people if they begin associating people with sources of food, and have also been known to engage in predatory attacks. Understanding the bear's behaviour is key to knowing how to respond in an encounter.

### **Grizzly Bears**

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. Grizzlies occasionally make unprovoked attacks, but most encounters are defensive-aggressive and result from being surprised at close quarters. Fewer predatory attacks are reported for grizzly bears than for black bears, but these have been known to occur. As with black bears, understanding the bear's behaviour is important to determine your response. The responses in different scenarios, however, may differ from responses to a black bear, which is why it is important to be able to distinguish the species of bear and assess its behaviour.

In any bear encounter:

- Get out your bear spray and have it ready for use – do this in ALL encounters
- Stay calm and gauge the animal's behaviour

- If the bear detects you from a distance or appears nervous – even in a surprise encounter, the bear may not behave aggressively. It could include the bear standing on its hind limbs and sniffing the air, or moving its head back and forth to get a better view. Standing is not necessarily an indication of aggressiveness – look to see if the ears are forward and straight up. This may simply be to determine what you are and what threat you impose.
- Begin talking to the bear in a calm voice (doesn't really matter what you say, it is the tone of your voice that counts), and waving your hands slowly above your head
- Make sure you give the bear an escape route
- Back slowly away from the bear, never turning your back on the bear.
- Do not run, this may invoke a predatory response to chase you, even if this hadn't been the bear's intention in the first place.
- Leave the area, even if the bear does run away.

**Defensive-aggressive behaviour.** If the bear becomes aggressive (defensive attacks) – particularly if you surprise a bear at close range, or it is defending either cubs or a carcass, the bear may begin acting in a very aggressive manner huffing or snapping its teeth, swiping at the ground, or even bluff charging in an aggressive manner. The ears may be flat or back on the head and the animal may be baring its teeth. The bear is attempting to exert its dominance and neutralize you as a threat. Especially in grizzly encounters, this can escalate to the bear making physical contact, knocking you to the ground and even biting. However, physical contact does not necessarily mean the bear is intent on killing or eating you, only ensuring that you no longer pose a threat.

Stand your ground, do not run

- Stand your ground, do not run
- Begin talking calmly to the bear – you are now trying to show it you are not a threat. Wave your hands slowly above your head
- Avoid direct eye contact, as this can be perceived as a threat
- Back slowly away from the bear, never turning your back on the bear. If the bear charges, stop immediately and stand your ground and keep talking calmly. Look for the next opportunity to put more distance between you and the bear.
- When safe to do so, leave the area.
- If the bear gets very close or presses to a physical attack
- First, deploy your bear spray when the bear is within 2-3m .
- If the attack persists, and physical contact is made, DON'T FIGHT BACK (at least not initially).
- Drop to the ground, roll onto your stomach, spread your legs apart and clamp your hands, fingers interlocked behind your neck. This position best protects your vital organs and face.
- If the bear bites or strikes you, make every effort possible not to make noise or move out of this position (your life may depend upon it).

- If the bear tries to roll you onto your back, continue the momentum of the roll and continue until you are back on your stomach.
- If you can maintain this submissive posture, a bear intent only on neutralizing you as a threat may cease an attack after less than a minute. **STAY IN THIS POSTURE AND DO NOT MOVE ONCE THE ATTACK HAS STOPPED UNTIL YOU ARE SURE THE BEAR HAS LEFT THE AREA.** If the bear is still nearby, moving or attempting to escape may result in it resuming its attack. Only when you are sure the bear has left the area should you attempt to escape. When it is safe to do so, leave the area as quickly and safely as possible.
- If the attack persists or the bear begins consuming you, the attack may have shifted from neutralizing to an opportunistic predatory attack. This is a very rare scenario, but now you need to start fighting with whatever you have at hand.

An encounter with a female with cubs – often the first clue that a female with cubs is present is when cubs scramble up trees ahead of you. Assume that their mother is close by and leave the area immediately – preferably the way you came. The response to this scenario is similar to that of an aggressive bear. Your goal is to show the female you are not a threat to her cubs. Follow the same steps as above.

**Predatory/Offensive behaviour.** If a bear appears to be stalking you without appearing aggressive, including avoiding eye contact, this could be an indication of a predatory attack. In the case of predatory behaviour, unlike the defensive aggressive behaviours above, your objective is to show it you are potentially dangerous and a bad prey item. This behaviour is more common with black bears than grizzly bears.

- Begin talking in a loud and assertive voice: yell at the bear, bang pots together, make as much noise as possible.
- Make yourself look big. Stand on low stumps or rocks (as long as they are stable and aren't likely to cause you to fall over). Hold your hands above your head.
- Make aggressive movements, like picking up large sticks and hitting them against tree trunks, the ground or waving them at the bear.
- Try and distance yourself from the bear, act aggressively as you back away. **DO NOT TURN YOUR BACK ON THE BEAR.**
- If the bear gets close enough, deploy your bear spray directing it at the face, targeting the eyes and nose area.
- If the bear presses the attack, use whatever you have on hand and fight back. 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.

### **Minimizing Risk**

Be alert for bear sign – overturned logs, dug up mammal burrows, patches of earth overturned in searches for roots, broken tree branches, slashes on tree trunks, torn apart

ant nests, 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 horns, bear spray and bear bangers (see below). As with any field equipment, be certain that such deterrents are well-maintained and accessible at all times.

Avoid carrying items with odors that may attract bears. If possible, when working in areas with high bear densities, leave your lunch in the vehicle and return to the vehicle 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. All garbage should be promptly removed from the camp area for proper disposal. 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 sign.

### **Bear Spray**

Bear spray comes in pressurized cans of varying quantities. We recommend that you don't buy the smallest one, 325 g cans are the minimum recommended (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 Capsicum oleoresin (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 the spray canisters into air-tight containers to contain accidental release of contents. Special containers are available at outdoor stores, and dry ammo cases or marine boxes can also be used as these are airtight. In a pinch, pack the bear spray canisters in a couple of ziplock



freezer bags.

### **Bear Bangers**

Bear bangers can be an effective way to deter bears under specific circumstances, however they are not recommended as a primary deterrent. Bear spray is the best option. Information on bear bangers is provided here for people who want to use them in addition to bear spray.

Bear bangers can be fired from pistols or signal launchers that 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. Do not carry bear bangers with the shells loaded on the chambers, these should be set when needed (which means they are not effective in sudden and close encounters, only when the bear can be detected at a distance). Make sure you transport and store bear bangers in appropriate containers (e.g. ammo boxes).

The primary situations where bear bangers may be effectively used are:

When working in open country and bears can be detected at large distances (e.g. greater than 100m), and the bear has an easy escape route that takes it away from the field crew. Care must be taken to ensure that the banger explodes BETWEEN you and the bear. This will require firing the bear banger upwards at a 45 degree angle or higher – you do not want the cartridge to explode behind the bear and have the animal run towards you!

Bear bangers can also be stored (within a sealed water-proof container ) in a central location within an established camp, where all personnel know its location. This would allow the bear banger to be accessed and used if a bear approaches into the camp, but should still be in addition to bear spray.

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.

### **Polar Bears**

In coastal arctic environments, polar bears are extremely dangerous and may move out of sight to begin stalking human prey. Treat all approaches by polar bears as being

predaceous and respond using the above actions for offensive/predatory behaviour by a black bear acting in similar manner. In polar bear habitat, a firearm may be needed for protection of field personnel (see Section 3.3).

### **Wolves, Coyotes and Foxes**

Wolves and other canids (members of the dog family, such as coyotes and foxes) are generally not a threat to humans. Wolves are secretive; usually once a wolf has spotted or smelled a human it will run away without the person even knowing it was there. An exception to this is when canids have become acclimated to people, possibly when associating people as a source of food. This may be especially true of coyotes and foxes, especially in urban settings.

### **Wolves**

Indicators that wolves are present in an area include scat and tracks as well as potential to hear howling from packs or individuals. Howling does not indicate aggressiveness; this is signaling method between individuals within a pack to locate each other, and between packs to identify territorial boundaries. Howls can be heard upwards of 5km away, so simply hearing a wolf does not indicate it is in immediate proximity. Wolf howls are typically long, low pitched and drawn out, whereas coyote howls tend to be short, higher pitched and often include yipping.

If an encounter occurs:

- Stay calm
- Do not allow a wolf to approach any closer than 100 metres.
- Back away slowly, do not turn your back on a wolf.
- If the wolf approaches, raise your arms and wave them in the air to make yourself look larger.
- If you have younger children with you, pick them up without as little bending as possible, and do not take your eyes off the wolf
- In the extremely unlikely event that you are attacked by a wolf, fight back. Try to remain standing and use sticks, rocks or any other implements you may have to fend off the attack. Keep the animal away from your neck and head.

For more information:

[http://www.env.gov.bc.ca/cos/info/wildlife\\_human\\_interaction/docs/wolves.html](http://www.env.gov.bc.ca/cos/info/wildlife_human_interaction/docs/wolves.html)

### **Coyotes and Foxes**

Encounters with these smaller canids are more likely to be considered a nuisance than dangerous. Coyotes, particularly in urban areas, can become acclimated to the presence of people, and have been known to prey on small pets. However, attacks on people have occurred, and although this is extremely atypical of coyote behaviour, it does indicate that these animals should be given due respect.

Fox attacks are also rare, but all canids, including foxes, are potential carriers of rabies, and bites from affected animals have occurred.

## **Moose**

A moose encounter has the potential to be just as dangerous as a bear encounter. Further, encounters with moose are often more frequent than encounters with bears in given areas. 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 and other wildlife will also be alerted to 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 should 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, walk quickly, or if safe to do so, run away from an aggressive moose.

Should the moose charge, move as quickly as possible towards a barrier, such as a big tree, a large rock. Continue to try to get away from the animal while always keeping large solid objects between yourself and the moose. Although it is best to try to get away from the animal, this can be difficult, particularly if the area is challenging to move through. 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 is, 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 crew members must be alerted of the presence of moose.

## **Rattlesnakes**

Researchers working in rattlesnake habitats need to be aware of where they are walking and wear ankle-high boots and long loose pants. Normally less than five people a year are bitten by rattlesnakes in BC. Bites are rarely fatal if treated promptly. Most snake bites are due to people deliberately trying to handle or harm rattlesnakes. If bitten, move away from the snake, remove restricting items (eg. watches, rings, shoes), get the victim to the hospital - call 911 as soon as possible, have the victim avoid strenuous activity. Monitor the swelling around the bite – draw a circle around the swelling every 20 minutes and record the time. Do NOT apply a tourniquet, use a snake bit kit, cut the wound or suck out the venom. For more information: <https://bcreptilesandamphibians.trubox.ca/rattlesnake-awareness/>.

## **5.4 Invertebrates**

### **Ticks**

Avoid ticks by walking on cleared trails whenever possible. Apply insect repellent to clothing. Choose light-coloured 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 thoroughly. If you find an attached tick remove it carefully, as the tick burrows into the skin and can leave behind its mouthparts when pulled away suddenly. Using 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 (see Section 5.1) the tick can be tested.

### **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 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, breed in stagnant water: however, even tiny amounts of water (e.g. a hoof print) can be enough. They 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 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 and synthetic fabrics! 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.

### **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 (see Section 5.4 for more about 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.

### **Other Invertebrates**

Spiders are also frequently blamed for bites. While all spiders have venom glands, which they use to subdue their prey, almost none of the species in BC are capable of breaking human skin. The exception is the black widow spider which is found in the southern half of the province. 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. There have been various unconfirmed reports of other, potentially dangerous, spiders in BC. In general, any painful unidentified bite should probably be checked by a doctor, particularly if it becomes infected or does not heal quickly.

### **Anaphylaxis**

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, lie them on their side to allow drainage from the mouth. Keep the victim as cool as possible. 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 the best practice for every field crew to have immediate access to an Epipen.

## **5.5 Dehydration and Heatstroke**

### **Dehydration**

Dehydration can be a serious heat related condition. 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 is sick with fever, diarrhea, or vomiting, or is overexposed to the sun, dehydration can occur 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 hard 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 more severe 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.

### **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 the case of heat stroke, medical attention is required as soon as possible.

### **Heat Stress–Related Disorders** (for more information:

[http://www.labour.gov.on.ca/english/hs/pubs/gl\\_heat.php](http://www.labour.gov.on.ca/english/hs/pubs/gl_heat.php)

A summary of heat stress–related disorders, causes, symptoms, treatment and prevention is presented in increasing severity in the table below.

	Cause	Symptoms	Treatment	Prevention
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Heat Rash	Hot humid environment; plugged sweat glands.	Red bumpy rash with severe itching.	Change into dry clothes and avoid hot environments. Rinse skin with cool water.	Wash regularly to keep skin clean and dry.
Heat Cramps	Heavy sweating from strenuous physical activity drains a person's body of fluid and salt, which cannot be replaced just by drinking water. Cramps occur from salt imbalance resulting from failure to replace salt lost from heavy sweating.	Painful cramps commonly in the most worked muscles (arms, legs or stomach) which occur suddenly at work or later at home.  Heat cramps are serious because they can be a warning of other more dangerous heat-induced illnesses.	Move to a cool area; loosen clothing, gently massage and stretch affected muscles and drink cool salted water ( $\frac{1}{4}$ to $\frac{1}{2}$ tsp. salt in 1 litre of water) or balanced commercial fluid electrolyte replacement beverage. If the cramps are severe or don't go away after salt and fluid replacement, seek medical aid. Salt tablets are not recommended.	Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other to help spot the symptoms that often precede heat stroke.
Fainting	Fluid loss and inadequate water intake.	Sudden fainting after at least two hours of work; cool moist skin; weak pulse.	GET MEDICAL ATTENTION. Assess need for CPR. Move to a cool area; loosen clothing; make person lie down; and if the person is conscious, offer sips of cool water. Fainting may also be due to other illnesses.	Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other to help spot the symptoms that often precede heat stroke.
Heat Exhaustion	Fluid loss and inadequate salt and water intake causes a person's body's cooling system to start to break down.	Heavy sweating; cool moist skin; body temperature over 38°C; weak pulse; normal or low blood pressure; person is tired and weak, and has nausea and vomiting; is very thirsty; or is panting or	GET MEDICAL ATTENTION. This condition can lead to heat stroke, which can kill. Move the person to a cool shaded area; loosen or remove excess clothing;	Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other to help spot the symptoms that often precede heat stroke.



		breathing rapidly; vision may be blurred.	provide cool water to drink; fan and spray with cool water.	
Heat Stroke	If a person's body has used up all its water and salt reserves, it will stop sweating. This can cause body temperature to rise. Heat stroke may develop suddenly or may follow from heat exhaustion.	High body temperature (over 41°C) and any one of the following: the person is weak, confused, upset or acting strangely; has hot, dry, red skin; a fast pulse; headache or dizziness. In later stages, a person may pass out and have convulsions.	CALL AMBULANCE. This condition can kill a person quickly. Remove excess clothing; fan and spray the person with cool water; offer sips of cool water if the person is conscious.	Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other to help spot the symptoms that often precede heat stroke.

### **Hypothermia**

Hypothermia, or loss of core body temperature, is a very serious threat in our environment and can occur in any season. Heat is lost from people in multiple ways:

- Radiation – loss of heat from the body when the outer temperature is lower than internal temperature
- Convection – loss of heat due to wind (very significant)
- Conduction – loss of heat due to contact with cold surfaces (rocks, snow – very significant)
- Respiration – loss of heat through breathing, especially through the mouth
- Evaporation – loss of heat from moisture on the body (sweat, wet clothing – very significant)

The Centre for Disease Control provides good information on the prevention and treatment of hypothermia.

<https://www.cdc.gov/disasters/winter/staysafe/hypothermia.html>

### **Prevention**

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.

If the patient is shivering, and feels cold, but can answer questions intelligently, they likely have mild hypothermia. More severe hypothermia is characterized by clumsiness, irrational behaviour, muscle stiffness. Treatment of moderate to severe hypothermia is beyond the scope of this manual, and professional care is needed. In this case, transportation to a hospital is required and while waiting for transport, prevent further heat loss and keep the patient calm and resting. For more information:

<https://www.cdc.gov/disasters/winter/staysafe/hypothermia.html>

### **Management of Mild Hypothermia**

Assess the ABC's

A – Maintain adequate Airway

B – Maintain adequate Breathing

C – Support the Circulation as necessary

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.

- Minimize further heat loss and consider all types of heat loss. Replace all wet clothes with dry ones. Wrap patient in a blanket or sleeping bag. Move them away from wind if possible, and place insulation (branches, blanket) between the patient and the ground.
- Handle the patient gently.
- Do not suppress shivering, even if it appears violent. This is the most effective way that the body has to generate heat.
- 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).
- Do not massage the extremities or trunk.
- Do not give the patient a warm bath or shower.

Hot packs may be applied to groin and armpit areas only if certain that hypothermia is only mild. These should not be used on people with severe hypothermia.

### **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. Remember, "when your feet are cold put on a

hat.”

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- 44°C, 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.

## **6. VEHICLE MAINTENANCE, TROUBLESHOOTING, OFF PAVEMENT ROAD TRUCK USE, AND RADIO CALLING**

Several topics are covered here that relate to off highway travel, including vehicle maintenance, troubleshooting, driving tips, safety, navigation, and radio calling. This is a “common sense” guide, and is not a replacement for training, nor does it include complete coverage of best practices for vehicle use. More information can be found here:

<https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/resource-roads/local-road-safety-information>

### **6.1. Pre-trip Vehicle Inspection**

Before using a vehicle a pre-trip inspection needs to be completed for all vehicles: personal, university owned, or rentals. A thorough pre-trip inspection should be documented and include a review of the following:

- Engine Compartment (inspect with the engine off and keys in your pocket):
- Fluid levels:
- Oil: Does it reach the full mark at the top of the dip-stick?
- Transmission fluid: is it free of metal filings?
- Coolant/ Radiator Fluid: is it full. If working in the winter have the fluid tested to ensure that is rated for winter temperature.
- Brake Fluid: Is it full? Has the level changed since last inspection?
- Power Steering Fluid: Is it full? Has the level changed since last inspection?
- Belts: are they present? Are they tight?
- Battery: are cables tight?

Vehicle Walk Around:

- Are there objects that could be driven over
- At each wheel

- Tire pressure should be at the level recommended for the vehicle. All tires should be equal
- Tire tread is adequate for your activity? In winter, are winter/snow tires installed? Are the tires adequate for travelling resource roads?
- Tire tread should always be in excess of ¼" deep
- Tire sidewalls – is there any damage
- Wheel lug nuts are they all present? Are they tight? Especially important to check after tires have been changed or a spare tire has been installed
- Look behind the wheel: Is the shock intact (oil leaking from a shock is a sign of damage). Springs: are they intact? Are any cracks visible?
- Spare Tire(s): is it present? Does it have the correct air pressure?
- Lights:
  - Do they all function?
  - Are they all visible? Clear any dirt from lights so that other vehicles can see you.
  - Check brake lights – when pressing the brake do tail lights brighten
  - Check signal lights
  - Check headlights and high beams
- If hauling a trailer
  - Inspect lights as above
  - Inspect wheels as above
- Note any damage around or under the vehicle

In Vehicle cabin:

- Do all of the dash lights work?
- Jack and wheel wrench – are they present?
- Owner's manual: Is it present?
- Equipment in the passenger area of the vehicle should be kept to a minimum and be secured. Any loose item will become a projectile in the event of an accident
- Seatbelts – ensure that they are all working.

## 6.2 Before You Leave

Before driving on resource roads, check current activity by contacting the BC Ministry of Forest District Office for the area you are in. This website provides information on road closures, safety and deactivation plans

(<https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/resource-roads/local-road-safety-information>).

The website above also has several YouTube videos and guides on safe resource road use that should be reviewed prior to commencing field work.

Make sure you are able to interpret the posted road signage for radio frequencies being

used. Contact the owner/manager to let them know you will be traveling, obtain maps, find out about industrial traffic patterns and active operations and clarify which radio channels are in use.



Figure 3: Typical signage indicating industrial activity in the field – could be found at the entrance to a hauling road and/or harvest block

### 6.3 Radio Calling

Travel through or working in areas where there is active logging is a common component of many types of field work. Forest companies and other officials communicate via two-way radios on roads that access active harvest areas in order to operate safely.

Vehicles that will be using active Forest Service or Resource Roads for University activities must be equipped with appropriate communications equipment i.e. VHF (Very High Frequency) radios. There are a number of companies in the north that install two way radios and some departments have radios that can be signed out. Note: it is not enough to have a radio installed in your vehicle. It is imperative that you have the correct radio channels for the resource roads that you will be using. It is best to have a two-way truck radio installed in your vehicle. Hand held radios will also work, but have a shorter range than a truck radio. Any radio you use will need to be programmed with the frequencies you need for the forest roads you will be driving. Some frequencies are owned by the licensees or logging companies, and require permission to be programmed into your radio so it is prudent to make these arrangements several weeks before field season starts.

By convention, all vehicles travelling 'down' or from the bush towards the highway have

the right-of-way and will announce their locations by radio. Others traveling in the opposite direction on the same road should pull off until the vehicles travelling down passes. Most resource roads have signs at the beginning which describe the rules of the road including radio call procedure. Take the time to read and understand what is expected on the roads that you are using. The name of the road and frequency used on the road will be indicated. Make sure that your radio is on the correct frequency. Kms are marked, generally on signs nailed to trees, or on posts on either side of the road. By convention, kms increase as one leaves the highway and approaches a work site. To learn the names of roads and which radio frequencies are in use in an active logging area, contact the appropriate BC Forest Service District office.

This video (<https://www.youtube.com/watch?v=gVIX5NtimDY>) provides a good introduction to safe resource road use and radio calling procedures. Additional information on driving on forest roads can be found here: <https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/resource-roads/local-road-safety-information/prince-george/frp1.pdf> . Driving on a busy forest road requires your undivided attention. It is important not only to call your position accurately and regularly, but also to listen for other traffic and monitor their location so that you can be prepared to pull over if necessary. If there is a passenger with you, they can help by calling the positions and monitoring the locations with the driver. It is absolutely unacceptable and unsafe to use the road radio frequency for any other use than calling your road position to others. Arrange to use another frequency (UNBC has its own channel, for example) to use in the field for general communication purposes.

#### **6.4 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 – ensure the jack is in good working condition.
- Swede saw, axe, or preferably both;
- Rope and/or “come-along” (hand winch);
- Shovel;
- Jumper cables;
- Full size emergency spare tire;
- A small compressor that plugs into the cigarette lighter is also useful for re-inflating tires;
- Reflective triangle or flares;
- Toolkit (more than just the jack accessories);
- Extra fuel.
- Flashlight and spare batteries;
- Fire extinguisher;
- First aid kit, personal safety equipment and survival kit (see section 3.2.).

Additional items for winter travel (candles with lighter or matches, sand, shovel, appropriate chains for the vehicle (and know how to use them), ice scraper/snow brush). These items should be considered mandatory for any off-highway work.

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

### **Parking**

Park facing home with enough access to the roadway to get you out but well clear of the road. 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 (an exception is during very cold weather when the emergency brake may freeze in the applied position). 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. 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!

### **Flat Tires**

Avoid flat tires by ensuring 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.

If you do end up with a flat tire, pull off where it is safe and not on a hill, to change the tire. If you end up with a second flat and no more spare tires, this is where your pre-trip planning and communication plan come into play. You need to make arrangements to get the tires where they can be fixed. Do not drive the vehicle more than absolutely necessary (to reach a safe location) with a flat tire.

To change a tire, make sure the vehicle is in gear (not in neutral) or in park (automatic transmission). Put the emergency brake on and place rocks or wood blocks in front and behind the tires so that the truck cannot roll once it is jacked up. 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 in the appropriate location as per the vehicle user manual. Jack the vehicle up until the tire is just off the ground. Remove the tire and replace it with a new one. In some cases, the jack provided with the vehicle may not raise the vehicle enough to put the spare on. In that case dig soil out from under the wheel location to make more room. 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. It is good to practice changing a tire before the field season begins.

### **Dead Batteries**

To avoid a dead battery, 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-starting and Jumpstarting a Vehicle**

Should the battery go dead, and you have a standard shift vehicle, you can push or roll-start it. If you have an automatic vehicle, you will need another vehicle and jumper cables to jump-start it.

Push or roll-starting can be used for standard shift vehicles. If on a hill, or with other people pushing, 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.

Vehicles with automatic transmission must be jump-started (also done with manual transmission vehicles and is easier than push or roll-starting). 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 the 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 Unstuck**

As soon as you are stuck, jam a bunch of branches and rocks under your tires, and put the vehicle in 4WD. Do not continue to make the situation worse by spinning the tires. If there are people pushing the vehicle, they need to be clear of the trajectory from the spinning tires as debris will be thrown out by the tires.



## Driving Fundamentals

This video: <https://www.youtube.com/watch?v=gVIX5NtimDY> provides a good introduction to safe resource road use and radio calling procedures. Additional information on driving on forest roads can be found here: <https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/resource-roads/local-road-safety-information/prince-george/frp1.pdf>

In summary, the known hazards of driving on resource roads include:

- Losing track of your location;
- Losing track of other vehicles' locations;
- 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 unpaved 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-highway driver. If a vehicle, especially a logging truck or other industrial vehicle comes up behind you, pull over when safe and let them pass.

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. 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.

Special care needs to be taken in areas with active harvest operations as logging trucks often take up most of the road and travel at high speeds. Active logging roads may have restricted or no access. Obey all road signs. Knowing and being able to use appropriate VHF radio calling procedures is an important safety consideration as it makes you aware of surrounding conditions and allows you to make others aware of you. Always yield to industrial traffic. Be very careful when following another vehicle in dusty road conditions and in general try not to follow others closely. Keep your headlights on at all times on gravel roads.

### **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 primary rule to remember is that 4WD does not replace common sense and safe driving practices. It does not enable a safe increase in speed.

4WD is normally used when road conditions are poor, and opportunities to lose control or to become seriously stuck are much higher than when driving in 2WD. It is critical to make good decisions about whether to drive at all, or whether a particular road is driveable. Don't make quick assessments from the driver's seat. Get out and have a close look, and if you're still not sure if the road is driveable, don't do it. 4 wheel drive can mean 4 times the trouble. You tend to go to places it is difficult to get out of - consider walking whenever possible. 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. It is a false sense of security to simply put your vehicle into 4WD as soon as you leave pavement, and then driving as you otherwise would. If you skid on dry logging roads covered in gravel while in 4WD, and your front tire hits a soft shoulder and stops, there is a very good likelihood your back wheels will power you over and flip the vehicle.

Learn the proper operation of the type of 4WD vehicle you are using. Vehicles may vary greatly in how they are put into and out of 4WD, according to their age. If you can't get an experienced operator to show you, at the very least read the operator's manual in the glove box. Some all wheel drive (AWD) vehicles will automatically shift power to the wheels that require them. Others need to be manually shifted into 4WD. Of those, some can be shifted while under power with a gear shift located in the cab, while older models must be stopped and put into neutral. Some older trucks will have manual hubs which must be properly used to avoid some very expensive repairs. These trucks are put in 4WD by

stopping the vehicle, climbing out, and twisting little hubs on the front wheel to a “locked” position. To disengage, you have to stop again, get out, and twist the hubs back. Some models also have to be driven backwards a few yards to engage or disengage 4WD. Extended operation on dry pavement will lead to extensive and expensive damage, so remember to switch back to 2WD before you turn onto the highway.

### **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. Deal with first aid issues 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 to the Risk and Safety Department.

## **7. AIRCRAFT AND BOATS**

The information provided below is a summary of general safety guidelines and does not replace appropriate training.

### **Helicopters**

Even when the machine is shut down:

- Approach and leave a helicopter on the downslope side to avoid the main rotor. Crouch while approaching and leaving;
- Never walk behind a helicopter, especially 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.;
- 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;
- Do not slam helicopter doors. 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, 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. Always follow the pilot’s instructions when loading and unloading.

Radio the pilot before he/she begins landing, to exchange instructions. While landing, he/she will be too busy to transmit.

### **Boats**

Federal law requires boat operators to be licensed. Minimum safety equipment required by Transport Canada varies with pleasure- craft type and length and can be found here: <https://tc.canada.ca/en/marine-transportation/marine-safety/mandatory-safety-equipment>. Ensure that all required safety equipment is on board, before operating any boat or pleasure craft.

If you are unfamiliar with the use of the craft you will be piloting, obtain instruction from your employer or supervisor, and ensure you have the appropriate license. Emergency supplies in a waterproof container and a spare oar or paddle should be attached to the boat. PFDs or 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.

## UNBC Fieldwork Preparation Checklist

This checklist should be used as a guide in advanced planning for fieldwork. Fieldwork includes any off-campus activities such as those in local and remote wilderness as well as community-based work. The topics listed below are not inclusive of all risks that should be considered when planning field activities. Resources have been provided where they exist. This checklist and development of the Field Risk Assessment and Safety Plan should be done in collaboration with supervisors, field team members and others engaged in the field activities.

Y/N	General Considerations	Resources
	Do you know who is your principle contact at UNBC is regarding safety issues, and who is the principle contact at your field sites?	FRCPSM 3.1
	Have you organized the work to ensure that no one works alone and everyone has a contact person in a field setting?	FRCPSM 3.1, 4.2
	For navigation to and at field sites, do you carry and know how to use:	FRCPSM 3.2, 3.3, 3.4
	1) Topographic maps and a compass (set for magnetic declination)?	
	2) GPS unit (with extra batteries)?	
	Do you have a checklist for safety equipment to be carried on site with the crew?	FRCPSM 3.2
	Are you aware of physical hazards on your field sites?	FRCPSM 4, 5
	Are you aware of the specific safety needs for your field site (i.e. forest, mountains, river crossings, etc.)?	
	Risk change – is there a likelihood of hazards increasing to the point that activity will be too risky and have to be cancelled?	
	Do you have a clear route into/out of your field sites?	
	If you access sites by helicopter, have you learned how to approach/exit a helicopter properly?	FRCPSM 7
	Have you informed your co-workers of any pre-existing medical conditions?	
	Does anyone on your crew have a serious medical condition that might affect them on site? E.g. allergies, diabetes	
	When did you last have a tetanus shot?	FRCPSM 5.1
	Does everyone have a list of required clothing and equipment for the environment, including PPE?	FRCPSM 3.2
	Falls often lead to injury – what is appropriate footwear and does everyone have it?	FRCPSM 3.2
	Is everyone carrying extra food and water?	

<b>Y/N</b>	<b>In an Emergency</b>	<b>Resources</b>
	Do you have a means to communicate from your research sites:	FRCPSM 3.1
	1) Cellular phone (with coverage)?	
	2) Radios?	
	3) Satellite phone?	
	Do you know how to contact emergency services using your radio or phone?	FRCPSM 3.1
	Do you have a check-in system at the end of each field day?	FRCPSM 3.1, 4.1
	Do you have a system for monitoring logging trucks and other field vehicles on roads that you will travel? Do you have the road channels in your radio?	FRCPSM 4.4, 6.3
	Have you completed a first aid course in the past 24 months?	FRCPSM 3.3
	Have you been provided a first aid kit to use while conducting your research?	FRCPSM 3.2
	Are you aware of the contents of your first aid kit?	FRCPSM 3.2
	Does your first aid kit include an epi-pen for treatment of allergic reactions?	
	Have you read the epi-pen directions?	
	Do you know the symptoms of hypothermia?	FRCPSM 5.5
	Do you know basic treatment of hypothermia?	FRCPSM 5.5
	Do you know the symptoms of heat stroke?	FRCPSM 5.5
	Do you know basic treatment of heat stroke?	FRCPSM 5.5
	For your field sites, do you know the location of the nearest hospital?	
	1) Do you know how to get there efficiently?	
	2) Does your field crew know how to get there?	
	If someone is injured in the field or lab, are you aware of whom to contact regarding the protocols for an incident report?	

<b>Y/N</b>	<b>In Wilderness Areas</b>	<b>Resources</b>
	Have you completed wilderness training courses?	FRCPSM 3.3
	Do you have the 10 essential safety items in your day pack?	FRCPSM 3.2
	How will you monitor weather conditions – do you have plans for inclement or changeable weather?	
	Are you aware of and prepared for the exposure to animals, insects, plants, and or weather that you may encounter?	FRCPSM 5
	Do you have any medical conditions that could affect your safety in the field? Have you discussed these with your supervisor and crew-mates?	
	Are you allergic to wasps, bees, other insects? Do you carry medication for this? Do your crew-mates know?	FRCPSM 5.4
	Is there risk of exposure to Lyme disease or Hantavirus at your field sites?	FRCPSM 5.1
	Are you aware of the wildlife hazards in your study area?	FRCPSM 5.3
	Do you know proper procedures when you encounter wildlife in the field?	FRCPSM 5.3
	Have you completed a bear /wildlife hazards awareness course?	FRCPSM 3.3, 5.3
	Do you carry bear spray and/or bear bangers?	FRCPSM 3.2, 5.3
	1) Have you read the instructions?	
	2) Attempted to operate your bear spray? Your bear bangers?	
	Do you carry a firearm?	FRCPSM 5.3
	Have you all the necessary licenses for the firearm, and do you know the requirements for safe transport and storage?	
	Do you use a power saw for your field work?	FRCPSM 3.3
	1) Have you completed a Basic Power Saw Operator Training course?	
	2) Do you need a licensed faller to complete your research?	
	Are you aware of fire hazards or fire-related work restrictions in your area (particularly forested areas)?	FRCPSM 4.4
	Do you have the required fire safety equipment in your vehicle?	FRCPSM 4.4

<b>Y/N</b>	<b>On the Water</b>	<b>Resources</b>
	If operating a motorized boat within Canadian waters, do you have a required (by law) valid “Pleasure Craft Operator” card?	<a href="https://tc.canada.ca/en/marine-transportation/marine-safety/proof-competency-recreational-boaters">https://tc.canada.ca/en/marine-transportation/marine-safety/proof-competency-recreational-boaters</a>
	Do you know if everyone on your crew is a strong swimmer?	
	Are there enough life jackets that are rated for the size/weights of the crew?	
	Do you wear your life jackets?	
	Do you have a set of safety equipment (rope, anchor, bailing device etc.)?	FRCPSM 7
	Have you a plan in the case of a boating accident such as a boat capsize?	
	Have you completed a swift-water rescue course?	FRCPSM 3.3
	Do you use an electro-fisher for your field work?	
	Have you completed a WorkSafeBC Electrofishing Operator Training course?	

<b>Y/N</b>	<b>In the Snow</b>	<b>Resources</b>
	Do you access and review the avalanche bulletins prior to field work, and avoid high avalanche risk areas?	FRCPSM 3.3
	Do you carry avalanche transceivers?	
	Is everyone on your crew able to use avalanche transceivers to locate a buried person?	
	Has everyone on your crew completed an avalanche safety course?	
	Does everyone have sufficient and appropriate clothing and safety clothing for cold conditions?	
	Is everyone familiar with how to check if an ice crossing is safe to cross?	