



Field Procedures and Safety Manual

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**UBC Faculty of Forestry
Safety Committee**

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INTRODUCTION

This handbook is designed for use by anyone who is about to embark on outdoor fieldwork or programs including those in community-based research, outdoor recreation, geography, natural resource management, and biology. The goal of this manual is to provide basic information to field assistants, graduate students, and technicians who are about to embark on their field work.

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 backcountry terrain. Certain sections deal with issues very briefly (e.g. avalanche awareness). We took this approach to encourage people to think about potential risk factors and to acquire specific skills through further training or using certified, more knowledgeable guides where necessary for the safe completion of field work.

Risk management is not a one-time event. It is a dynamic, evolving process of adaptation and change in response to shifting circumstances. This process ensures that outdoor programs will constantly improve—and constantly maintain a high standard and record of safety. The risk management information presented in this handbook draws from the practices used by private and public institutions around the world.

ACKNOWLEDGEMENTS

This manual is an update of earlier versions and was prepared by the UBC Faculty of Forestry Safety Committee, with inclusion of significant updates to previous versions completed by the UNBC Field Safety Committee, portions of which have been included verbatim. We would like to acknowledge other manuals from which we obtained information, namely: the UNBC Field Procedures and Safety Manual, Field Workshop Manual (prepared by the External Communications committee of the Centre for Applied Conservation Biology, including several sections developed under Forest Renewal B.C. funding), Soil Science field safety manual (prepared by T.M. Ballard – Safety and Security Committee), Safety in Research and Teaching 3rd ed., 1995 (prepared by the Safety Committee, Faculty of Forestry), Safety Procedures in Research & Teaching (produced by the Safety Committee, Faculty of Forestry, 2003) and, Forestry Handbook for B.C. (edited by Sue Watts – 4th ed.). Additional input from numerous UBC Faculty, Staff, and Students has greatly improved this manual.

1. SAFETY

1.1 Who's Responsible?

Everyone is. Safety is a crucial consideration for all activities in our field, which without careful consideration may derail an entire research program, or result in severe consequences to individual wellbeing. The most important skill we would like to

emphasize 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. Working alone should be avoided whenever possible. If it is necessary to work alone, carry a radio and arrange a check-in procedure, see section 4.2.

It is also important to keep your fellow workers in mind. In cases where special hazards are associated with your work, warnings should be posted in the vicinity of the project to alert co-workers and members of the public to the danger. These signs should be large and legible. Bright colors are preferred. Remove the signs when the work is completed. If you see unsafe work practices occurring, speak up and attempt to ameliorate them.

There are certain responsibilities spelled out by WorkSafe BC, and compliance with the Workers' Compensation Act is the minimum acceptable standard. All students, members of 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

It is the responsibility of the University acting through administrative heads of unit to:

- ▶ Provide a safe, healthy and secure working environment;
- ▶ Ensure that regular inspections are made and 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 department or building 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 supervisory staff to:

- ▶ Formulate specific safety rules and safe work procedures for their area of supervision;
- ▶ Ensure that all employees under their supervision are aware of safety practices and follow safety procedures;
- ▶ Provide training in the safe operation of equipment;
- ▶ Inspect regularly their areas for hazardous conditions;
- ▶ Correct promptly unsafe work practices or hazardous conditions;

- ▶ Be responsive to concerns expressed about personal security and investigate any accidents, 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 department or building safety committees.

Individual Students and Members of Staff and Faculty

It is the responsibility of individual students and members of faculty and staff to:

- ▶ Observe safety rules and procedures established by supervisory staff, administrative heads of unit and the University;
- ▶ Be safety-conscious in all activities, be they work, study or recreation;
- ▶ 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 properly and care for adequately personal protective equipment provided by the University;
- ▶ Participate, if elected or appointed, on departmental or building safety committees.

Departmental Safety Committees monitor the safety programs within their areas and make recommendations to help meet the safety objectives of the University. The Faculty of Forestry Safety Committee meets and conducts inspections regularly. Our mission statement is:

"To develop, maintain and promote attitudes leading to a safe working environment, in the Faculty of Forestry, both on campus and in the field, through external and internal communication and liaison."

From this end, supervisors, students, and field staff are strongly urged to participate in orientation sessions to be certain personnel working in the field have had the required first aid, fire fighting, and orienteering training; have and know how to safely use and maintain personal safety gear and equipment including, radio, vehicle, fire fighting tools.

1.2 Risk Management

Levels of risk are controlled by both the diligence of supervisors, who must attend to the administrative details required by good risk management, and the knowledge, skills, and abilities of supervisors or students who must conduct activities, sometimes in harsh environments and difficult circumstances. Risk management must be considered when preparing for field activities and community-based research.

Many programs, even those that appear to be similar to one another, contain different levels of real risk. 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

Respecting yourself and your study area

2.1 Stewardship

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 it is advisable to obtain a list of threatened and endangered species to avoid destroying rare species inadvertently. A list for your study area may be obtained from the Conservation Data Centre in Victoria. They can be contacted via their [web page](#) or by calling 250-356-0928. You need to give the latitude/longitude of the area for them to check their database for possible species of concern in the area.

2.2 Communicating with Landbase 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 Nation, a provincial ministry (e.g. Ministry of Forests), a licensee, a private owner, or national or provincial parks service. Ask the land managers to identify hazards they are aware of and establish a prime contact person. Establishing these relationships as early as possible is essential, as they often take time to build to a working stage.

2.3 Working Within National and Provincial Parks

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

2.4 Personal Conduct

As an employee or student of UBC (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. In small communities, people will know who you are and who you work for. If you drive a marked vehicle (University of BC, or Ministry of Forests (MoF) emblazoned), always be sure to drive responsibly. It is also a good idea to carry some form of identification (i.e. a simple business card) that describes who you are and what you are doing. If you are driving an unmarked or personal vehicle for fieldwork, it may be a good idea to have a sign in the window describing who you are. While driving a UBC vehicle on personal time, you are covered under UBC insurance policy, provided you received prior approval from your departmental supervisor. This is also contingent upon the fact that you were driving in a responsible manner and not

deemed negligent. It goes without saying that driving while intoxicated is considered negligent (and illegal), and will not be tolerated.

2.5 Harassment and Equity

As an employee or student of the University of British Columbia you must comply with policies concerning [discrimination](#), as well ensure a [respectful environment for all students, faculty and staff](#).

Working and living in close quarters during field work can lead to friction or disagreements between team members, as well as from members of the public or external collaborators. Each employee, student, and faculty member has a right to privacy and personal space. Be respectful of your co-workers. From the UBC Policy on Respectful Environment for Students, Faculty and Staff: “The University of British Columbia envisions a climate in which students, faculty and staff are provided with the best possible conditions for learning, researching and working, including an environment that is dedicated to excellence, equity and mutual respect. The University of British Columbia strives to realize this vision by establishing employment and educational practices that respect the dignity of individuals and make it possible for everyone to live, work, and study in a positive and supportive environment, free from harmful behaviours such as bullying and harassment.”

These policies, both in spirit and as written should be reviewed by all team members and followed throughout the course of all research activities.

2.6 Additional Resources

On Campus:

Equity and Inclusion Office: Brock Hall, Rm 2306, 1874 East Mall, 604-822-1773.

<http://www.equity.ubc.ca>

<https://equity.ubc.ca/resources/> (A list of useful additional resources)

The Equity Office provides confidential assistance and a procedure (informal resolution, mediation, investigation and recommendation) to deal with complaints of discrimination and harassment. The Equity Office is very approachable and tries to assist in any way possible. You can approach the Equity Office if you are experiencing an uncomfortable situation, or if you are trying to avoid placing someone else in such a situation.

Counseling Services:

Brock Hall, Rm 1200, 1874 East Mall, 604- 822-3811.

<http://students.ubc.ca/counselling/>

Sexual Assault Support Centre:

Nest 3130, third floor, 6133 University Blvd

<https://www.amssasc.ca>

AMS Ombudsperson:

<https://ombudsoffice.ubc.ca>

Student Health Services: Rm M334, 2211 Wesbrook Mall, 604-822-7011.

First Nations House of Learning: 1985 West Mall

<https://indigenous.ubc.ca/students/>

UBC Safety and Risk Services: Rm 336, 2389 Health Sciences Mall, 604- 822-2029.

<https://srs.ubc.ca>

Off Campus:

Government Services – British Columbia - Service BC can assist you in contacting the relevant government services (7:30 a.m. – 5:00 p.m. Monday through Friday)

Greater Vancouver: 604-660-2421.

Outside Vancouver: 1-800-663-7867.

Text: 1-604-660-2421

VictimLinkBC:

Provides information and referral services to all victims of crime and immediate crisis support to victims of family and sexual violence, including victims of human trafficking exploited for labour or sexual services.

<https://www2.gov.bc.ca/gov/content/justice/criminal-justice/victims-of-crime/victimlinkbc>

Call or text: 1-800-563-0808 (24 hours daily)

Email: VictimLinkBC@bc211.ca

BC Human Rights Tribunal:

605 Robson St., Rm 1170, Vancouver, 604-775-2000, 1-888-440-8844

<http://www.bchrt.bc.ca>

Deals with complaints of discrimination and sexual harassment.

Intervention and Suicide Prevention Centre for Greater Vancouver:

24 hour distress line

Greater Vancouver: 604-872-3311

BC Wide: 1-800-784-2433

Mental Health Support (BC Wide):

24 hour resource and support line

Phone: 310-6789 (no area code needed)

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, assessing potential risks, and adequately mitigating them. 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). See the Faculty of Forestry Project Safety Plan Template and Field Risk Questionnaire for further requirements.

3.1 Contact Procedures

Before going into the field, it is imperative that you leave a written description of how to reach the location where you will be working, your daily contact protocol, and when you expect to return with:

- Your supervisor and one or more backup contact persons
- The proprietor of the landbase where you will be working

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

- Be sure to familiarize yourself with industrial traffic patterns and locations of active industrial operations.
- Carry a two-way radio and call your mileage on industrial roads if required. You may need to obtain permission from the proprietor to use company radio frequencies.
- Cell phone coverage is generally poor away from towns and cities. Consider whether two way satellite devices like a Garmin InReach, SpotX, or satellite phone may be required. Some form of functional communication device is required at all times when in the field.

3.2 What to Bring

3.2.1 Clothing and Personal Protective Equipment

Appropriate clothing will depend on the working conditions. Loose fitting clothing, dangly jewellery, rings, and long un-constrained hair may create a safety hazard. Rings in particular should be removed prior to any work with the potential for hand injuries, as they are difficult to remove once fingers swell, and may increase damage to digits. Caulked boots (pronounced “corked” - steel spiked soles) improve safety in slippery conditions and are required in some locations. A CSA approved brightly coloured hard hat is required equipment whenever there is the possibility of injury caused by falling, flying, or thrown objects. When working near machinery or during hunting season, a high-visibility vest is also required. When using a chainsaw you should wear boots equipped with steel toes, eye and ear protection, gloves, and Kevlar safety chaps or pants, all of which are mandated by WorkSafe BC. 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 would be 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.

3.2.2 First Aid Kit¹

The minimum you are required to bring to the field is a [Level One First Aid Kit](#), but with a larger crew, or if you are working in extreme conditions or remote areas, you may need to take a larger kit and have a Certified First Aid Attendant on the study site. Contact WorkSafe BC to determine what is appropriate to your situation. At a minimum your Level One kit which is frequently kept in the vehicle should include the following items. These items must be kept clean and dry and must be ready to take to the scene of an accident. A weatherproof container is recommended for all items except the blanket.

1	Blanket
24	14 cm x 19 cm wound cleansing towelettes, individually packaged
50	Sterile adhesive dressings, assorted sizes, individually packaged
10	10 cm x 10 cm sterile gauze dressings, individually packaged
4	10 cm x 16.5 cm sterile pressure dressings with crepe ties
2	7.5 cm x 4.5 m crepe roller bandages
2	7.5 cm conforming gauze bandages
1	2.5 cm x 4.5 m adhesive tape
2	Cotton triangular bandages, minimum length of base 1.25 m
2	Quick straps (a.k.a. fracture straps or zap straps)
1	Windlass style tourniquet
1	14 cm stainless steel bandage scissors or universal scissors
1	11.5 cm stainless steel sliver forceps
1	Pocket mask with a one-way valve and oxygen inlet
6	Pairs of medical gloves (preferably non-latex)
6	Medical masks (also known as procedure or surgical masks)
2	Face shields (or safety eyewear)
1	Waterproof waste bag
	First aid records

A personal or basic first aid kit may be carried for field work away from the vehicle, which may be supplemented depending on the distance and/or time from both the vehicle and higher levels of medical care. Minimum contents of a Basic First Aid Kit should include:

6	14 cm x 19 cm wound cleansing towelettes, individually packaged
10	Sterile adhesive dressings, assorted sizes, individually packaged
6	10 cm x 10 cm sterile gauze dressings, individually packaged
1	10 cm x 16.5 cm sterile pressure dressings with crepe ties
1	Cotton triangular bandage, minimum length of base 1.25 m
1	14 cm stainless steel bandage scissors or universal scissors
1	2.5 cm x 4.5 m adhesive tape
1	7.5 cm x 4.5 m crepe roller bandage
3	Pairs of medical gloves (preferably non-latex)

¹ All vehicles used in the field should be equipped with an adequate First-aid kit, blanket and fire extinguisher.

3	Medical masks (also known as procedure or surgical masks)
1	Face shield (or safety eyewear)
1	Waterproof waste bag

Additional equipment which is not required by WorkSafe BC, but is highly suggested includes:

100	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 – 2	Elastic bandages, 8 cm wide
	Rehydration packages or the salt, baking soda and sugar mixture outlined below ² - for treatment from dehydration (for treatment of heat cramps or heat exhaustion, metabolite replacement solutions like Gatorade packets can also be used)
3	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
1 pack	Benadryl or other antihistamines for insect bites and stings
1	Epi-pen (increasingly recommended, as members of the crew may not know if they have severe allergies to stings, etc. before going into the field)
	Any medicine as recommended by physicians and written instructions for use of all medicines carried

3.2.3 Survival Kit

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

- Water bottle with water in it – **DO NOT** get dehydrated in the field. Ensure enough water for each team member, including at least 1L of extra water for each person.
- Emergency food
- Blankets and warm clothing
- Pocket knife
- Watch
- Compass, map, GPS
- Flashlight/headlamp (if you get lost or just work a little too late you may have a hard time finding your way through dark woods) – check batteries and pack spare batteries
- Pencil and waterproof field notebook
- Flagging tape
- If working in bear country – bear spray (make sure you know how to use this – just having it doesn't help you!). See [Section 3.2.5](#) for more information.

- Matches in waterproof container or cigarette lighter
- In active logging areas, a hard hat and a high visibility vest must be worn. During hunting season, wear blaze orange headgear and a blaze orange vest or jacket
- Two-way radio/cell phone (check coverage)/satellite phone/satellite communicator (Spot/InReach)
- If there is even a remote chance of getting lost (i.e. working >20 m from the vehicle), bring a 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.

3.2.4 Compass, Maps, GPS

Carry and know how to use a compass, maps, charts or aerial photographs. Know the scale of the maps and photos and where geographic north is located. Know the length of your stride so that you can pace distances if necessary. Keep track of your position as you travel. An inexpensive GPS can track your movement from a start position and give you return directions, however they may not work under heavy canopy or in deep valleys. Most handheld GPS units will be sufficient to get you oriented as long as you know how to use them. Mapping apps on cell phones (e.g. Gaia Maps, Avenza Maps, Trail Forks, OSMAnd+, etc.) are also very useful but depend on having a charged cellphone, and may require pre-downloaded maps for areas out of service. If planning to use such apps for navigation, bring a spare battery pack for your phone, and associated charging cables.

3.2.5 Bear Spray

Bear spray (see also [Section 5.3.2](#)) 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 should consider the potential for additional complications from exposure (i.e. ensure you have a rescue inhaler, or a pair of eyeglasses).

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

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

car while you were driving. Dry ammo cases or marine boxes can be purchased at Canadian Tire or other stores – these containers are airtight and o-ring sealed, and work well for transporting bear spray. In a pinch, get a couple of ziplock freezer bags and double pack the bear spray canisters.

3.2.6 Bear Bangers

Although bear bangers can be an effective way to deter bears, we do not recommend them as a primary deterrent method.

Rather, we suggest the use of bear spray as a more efficacious alternative. We discuss them here for people who want to carry them in addition to bear spray.

Bear bangers can be fired from pistols or signal launchers. These signal chargers can fire bear bangers or flares – be sure to read the labels and know which type of cartridge you are carrying and firing. Also remember that these are essentially exploding shells. 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:

1. 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.
 - a. In this situation, bear bangers can be loaded and fired to encourage the bear to leave the area, if less invasive options (i.e. field team detours) are not available.
 - b. 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! Knowledge of the different flight characteristics and effective distances of different cartridges requires previous practice in a safe environment.
2. The second case of bear banger use would be having one stored in a central location within an established camp, where all personnel know its location. If the banger is stored within a sealed water-proof container (e.g. ammo case), this would allow the bear banger to be accessed and used if a bear approaches into the camp. While this may be a prudent choice for areas with high likelihood of bear encounters, we would advocate that the primary deterrent that should be accessible and used would be 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.

3.3 Courses to Take

Careful assessment of potential risks is a key part of the risk management process mandatory for each field project. Once risks are assessed, mitigation measures can be implemented to reduce risk. Adequate training is one potential risk mitigation strategy which we highly encourage. While project specific training requirements may vary, everyone taking part in field research should have, at minimum, Occupational First Aid (OFA) Level One, and cardio-pulmonary resuscitation (CPR) certification.

3.3.1 First Aid

Courses can be taken through various providers across the province. Providers of OFA1 courses can be found here: <https://www.redcross.ca/training-and-certification>

Beyond the minimum of OFA1, some projects may wish or need to have team members certified in Wilderness First Aid at varying levels, dependent on risks faced. Options include:

- Remote First Aid (~25 hours)
- Wilderness First Aid (40-50 hours)
- Wilderness First Responder (80+ hours)

Many groups at UBC have received excellent training from [Coast Wilderness Medical Training](#), who are willing to provide discounts to UBC groups, as well as private courses for groups of six or more people.

It is key to familiarize all members of the field crew with potential emergency situations, planned response to these situations, and how to contact the nearest source of further assistance.

3.3.2 Map and Compass Use

Knowledge of proper map and compass use is essential when in the bush. People have become disoriented and lost 200 m from the roadside. It is beyond the scope of this manual to teach proper map and compass use but be sure to familiarize yourself with these skills before heading into the field. Orienteering instructions should be provided by employers or field course instructors. UBC's Varsity Outdoors club also occasionally holds instructional orienteering courses. Staff at the Malcolm Knapp Research Forest periodically hold field safety workshops. Excellent books and web resources are readily available.

3.3.3 Chainsaw Use

Before working on projects that involve chainsaw use, take a chainsaw course or obtain proper chainsaw use and maintenance instruction. WorkSafe BC and the Faculty of

Forestry require an in-person training course prior to chainsaw use. UNBC, BCIT, and various private companies in the Lower Mainland provide these courses. When using a chainsaw you should wear boots equipped with steel toes, eye and ear protection, gloves, and Kevlar safety chaps or pants, all of which are mandated by WorkSafe BC.

Some brief guidelines: Take steps to avoid kick-backs caused by poor working position, poor maintenance, binding, or inadvertently contacting branches or obstructions. Check that all parts are tight and that the chain is properly adjusted and filed. When idling, the chain should be stopped. When carrying the saw, shut the motor off and keep the chain bar to the rear. Don't stand directly behind the saw – work to one side. Allow the saw to cool before refueling, and follow the manufacturer's fuel and oil specifications. Refuel on bare ground and ensure the gas cap is replaced tightly. Check for leaks. Clean the saw of spilled fuel, sawdust and oil, and move away from the refueling spot before starting. Don't operate a saw if it is backfiring. Periodically check and clean the muffler. **Do not operate a chainsaw without proper training!**

3.3.4 Bladed Tool Use

Accidents caused by bladed tools such as knives, axes, hand saws, and Pulaski's 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 such tools, please 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.

3.3.4.1 Axes

Long handled axes are safer than short handled hatchets. The proper grip for a right handed person is to have the right hand $\frac{3}{4}$ of the way up the handle and the left hand approximately 3 inches from the end of the handle. A left-handed person should reverse the position of the hands.

Make sure you have a clear circle in which to swing the axe before chopping. Remove all vines (including overhead), brush and shrubbery within the swing range. Ensure you have good footing. It is advisable to wear caulk boots and protective eyewear when using an axe.

Always inspect an axe before using it – check to ensure the head and haft are lined up. If the haft is split, chipped, damaged or broken, or the head is loose, do not use it.

Sheath the axe when not in use.

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

3.3.4.2 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 is kept clear. Folded lock-blade knives carried in a belt holder reduce the potential for injury during a fall.

3.3.5 Avalanche Awareness

Avalanches kill several people each year in western Canada and the number is increasing steadily with increased backcountry use. You must be avalanche-aware if you are doing any backcountry fieldwork in the winter months. Even the most benign looking slopes can slide, particularly where vegetation may have been removed in logging activities. Assessment of the presence of potential avalanche terrain should be undertaken as part of risk assessment practices for any project conducting work when snow is on the ground. If project supervisors are not qualified to conduct this assessment themselves, consultation with an appropriately trained colleague or professional ACMG guide should take place. As a general rule, project activities, including transit to and from study sites, should not take place in terrain rated above “simple” on the [Avalanche Terrain Exposure Scale](#), where such ratings exist.

Always carry avalanche equipment (transceiver, shovel, probe, etc.) when in avalanche terrain. However, these tools won’t save your life unless you are familiar with their use. Avalanche Safety Training Level One (AST1) should be completed by all team members travelling or working in avalanche terrain. Training is available from many providers, many of which are listed here: <https://www.avalanche.ca/training/courses>

Always consult the avalanche bulletin before field work in avalanche terrain. This can be accessed online at <https://www.avalanche.ca/>, or via the Avalanche Canada mobile app. Avalanche forecasts can also be accessed via [satellite messaging devices](#) if out of cellular service.

3.3.6 Firearms Use

If you or anyone on your team will be handling firearms, you should have a Firearms Possession and Acquisition License (PAL), which requires completion of the Canadian Firearms Safety Course. This document is required by law if you will be handling, transporting, or operating a firearm. For Canadian regulations for firearms contact the Canadian Firearms Program: <https://www.rcmp-grc.gc.ca/en/firearms>

Multiple groups offer the Canadian Firearms Safety Course locally, including:

- Eat Wild: <https://www.eatwild.ca/pal-vancouver-canadian-firearms-safety-course/>
- BC Firearms Academy: <https://bcfirearmsacademy.ca/canadian-firearms-safety-course-cfsc/>
- Silvercore: <https://silvercore.ca/courses/canadian-firearms-safety-course-slash-canadian-restricted-firearms-safety-course/>

It is not the intention of this manual to cover firearms safety in detail, but reiterate the importance of the basic **ACTS** and **PROVE**:

- Assume every firearm is loaded.
 - Control the muzzle direction at all times.
 - Trigger finger must be kept off the trigger and out of the trigger guard.
 - See that the firearm is unloaded - PROVE it safe.
-
- Point the firearm in the safest available direction.
 - Remove all cartridges.
 - Observe the chamber.
 - Verify the feeding path.
 - Examine the bore.

3.3.7. Swiftwater Rescue

Rescue 3 International (<http://www.rescue3international.com/>) is the recognized world standard in water rescue education. In Canada, Raven Rescue, (<http://ravenrescue.com/>) provides water safety training in accordance and certified to Rescue 3 International standards.

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.

* 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/>

3.4 Operating University Vehicles

The Safety and Risk Services website is an excellent reference tool.
<https://srs.ubc.ca/insurance/insurance-programs/automobile-insurance/>

3.5 Operating Personal Vehicles

In using personal vehicles the owner of the vehicle need 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 requirements. Some items for consideration:

- Is the vehicle properly ensured 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 adequately share the use of the vehicle if needed. If this is questionable, then alternative transportation needs will have to be considered. 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 distance to the research team). It is always preferable to park the vehicle in a space where it may not be blocked in and pointed in the direction of exit in order to facilitate a quick exit if needed.

3.6 Course Based Field Trips

While field trips relating to course based activities are expected to follow the guidance in this document in addition to any other faculty or university safety guidelines, we also provide the following additional suggestions (based on input from the Wood Science department).

3.6.1 General safety preparation before the trip

1. At least one instructor is required to have valid first-aid certification (OFA1);
2. A level one first-aid kit needs to be provided during the field trip;
3. A satellite phone or other reliable communication should be available during the field trip;
4. A portable defibrillator needs to be provided during the trip, and at least one instructor should be trained on using the defibrillator;
5. Students should receive a thorough safety briefing prior to starting the field trip.

3.6.2 General safety during transportation

1. All students are required to transport on chartered transportation during the field trip;
2. No student is allowed to travel on their own, unless getting permission from all instructors;
3. No alcohol is allowed on the bus;
4. Do not walk far away from the bus during break and return to bus before the break ends;

3.6.3 General safety and housekeeping for trips in research forests or mills

1. Personal protection equipment (ppe) must be worn, according to WorkSafeBC. In research forests or associated mills, this means:
 - Eye protection must be worn at all times while inside the mills or in the field; (Safety glasses which fit over prescription glasses are available)
 - Hearing protection must be used in noisy mill environment;
 - Dust protection must be worn in dusty mill environment;
 - CSA approved steel-toed boots must be worn when entering the mill and research forest;
 - High visibility vest must be worn inside the mills or in the field;
 - Hard hat is mandatory all the time when entering the mill or in the field;
2. NO LOOSE CLOTHING OR JEWELLERY MAY BE WORN, INCLUDING:
 - Neck ties, loose shirt sleeves (unless rolled up);
 - Jackets must not be tied around the waist or slung around the neck/shoulders;
 - Rings, bracelets, or necklaces;
 - Long hair must be tied back.
3. While in the mill or research forest, all students are required to follow the tour guides and only walk along the designated route. Do not leave the group;
4. Students are not allowed to touch any machine or products, unless permission is granted;
5. Cell phone usage is prohibited during the tours; (unless explicitly permitted by the tour guide)
6. No food or drink in the mills;
7. Absolutely no “horse play” or running inside the mills;
8. No unnecessary loud noises or yelling. This can startle or distract personnel operating dangerous machinery;
9. Wear appropriate clothing in the research forest for possible adverse weather conditions, such as rain, cold, and wind.

3.6.4 General safety at spare time

1. Approved personal floatation device (PFD) or life jacket is mandatory for any water activities;
2. No alcohol is allowed on a boat/kayak/canoe or immediately prior to using the boat/kayak/canoe;
3. Inform your instructors before hiking in the forest away from the immediate area of the group, and students should not hike alone in the forest.

See appendix C for an example field trip safety contract.

3.7 International Travel Safety

While the vast majority of the information contained in this manual is relevant to fieldwork anywhere in the world, working internationally may add additional complexity to your field safety planning. As the complexities of local work are highly dependent on the specific locale where you may be operating or travelling, we do not provide direct advice within this manual; instead providing links to other relevant resources provided by both UBC and other organizations.

Any international travel for study purposes is bound by the [UBC Students Abroad Policy](#).

UBC Student Safety Abroad:

<https://safetyabroad.ubc.ca>

safety.abroad@ubc.ca

604 822 0942

This resource provides extensive information related to travel planning, international risk mitigation, and links to the mandatory Student Safety Abroad Registry. Self-directed online modules provide information on topics including: logistics and safety, health and wellness, and intercultural communication and identity. The staff in this office may also be able to provide you specific information and resources related to your destination or intended work. Emergency assistance abroad is also managed through this office.

International SOS:

<https://www.internationalsos.com/>

<https://safetyabroad.ubc.ca/emergency>

This is the group contracted by UBC to provide international emergency support and guidance. UBC students are able to access this resource 24/7, from anywhere in the world, via phone or the International SOS mobile app.

UBC Travel Safety:

<https://finance.ubc.ca/travel/plan/travel-safety>

This page provides additional resources related to the above, including further information specific to faculty and staff travelling abroad for employment or research.

3.8 Additional Resources

UBC Safety and Risk Services: <https://srs.ubc.ca/health-safety/safety-programs/field-work-safety/>

UBC Travel and Field Safety: <https://travelfieldsafety.ubc.ca/about/>

UBC Zoology Field Safety: <https://www.zoology.ubc.ca/resources/safety/safety-forms-and-labels/field-research-safety-webforms>

UNBC Field Safety: <https://www2.unbc.ca/safety/field-safety>

4. IN THE FIELD

4.1 Daily Routine

Daily activities in the field should begin with a brief “tailgate meeting”, where crew leads present the planned activities for the day, discuss potential hazards and their associated mitigations, and ensure all team members are prepared for a day of safe work. This is a good time to assess whether team members may be sick or overly fatigued, which might warrant revisions to the daily plan. It should also be an open venue to discuss any safety or other concerns prior to beginning work. This is also an excellent time to incorporate a brief inventory of essential equipment prior to heading into the field for the day.

When you are working in the field you should leave a daily planning sheet with an appropriate and responsible person, who will monitor your progress, ensure you return from the field, and initiate emergency response procedures should you not return. This sheet should include the following information:

- Name(s)
- Contact information for field leads, and all other crew members
- Date
- Time of departure
- Expected date/time of return
- Anticipated route and location, including sub-sites
- Activities being undertaken
- Expected check-in time and method (including time zone if relevant)
- Protocols for missed check-ins

The check-in person will be responsible for ensuring all crew members are out of the field, or have confirmed their status by expected check-in times. Written instructions should be included outlining the proper response to missed check-ins, including escalation to emergency services or search and rescue. This information will also be part of the Emergency Response Plan for each project or trip.

It is important to note that time-zones may vary between the location of the check-in person and the field location. Ensure that a common understanding of which time zone check-in times are based upon is established to reduce the possibility of missed check-ins.

All crew members should be aware of this daily protocol, and a hard copy of the daily planning sheet should be carried into the field by each group as a form of minimal guidance. Care should be taken to ensure check-ins are not accidentally missed by setting alarms on watches or cellphones, and checking for connectivity of the communication method being used prior to expected check-ins.

We suggest establishing the following protocol with your check-in person:

- If one check is missed and you are alone, a search is initiated immediately.
- If there is more than one person in the party, two checks are missed before a full search is initiated.

These rules may be adapted dependent on contact method, assessed risks, and likelihood of connectivity issues (i.e. steep terrain limiting satellite connectivity for InReach or Spot devices). It is however required that some form of protocol for missed check-ins is established.

4.2 Working Alone

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

- Do not work alone if you will be climbing trees, operating a chainsaw or plan to engage in any other high-risk activities.
- On day trips:
 1. 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). Most hand-held radios are line of sight, good only for a few km depending on topography. If you are linked to a network of repeaters (e.g. company, Ministry of Forests, or Parks Canada) your range can be increased to the size of the entire grid. Access to repeater networks is highly regulated, and not commonly granted unless the network operator is a close project collaborator.
 2. If radio communication is not possible, establish detailed check-in procedures and detailed route plans. Two-way satellite communications devices (e.g. Garmin InReach) should be carried and used for check-ins at pre-determined intervals. These require a subscription service, some pre-field work set-up, and access to open sky. 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 as a minimum, with more frequent check-ins highly recommended, dependent on assessed risk (i.e. every 2-4 hours). Leave a detailed route plan, as described in section 4.1 above. You must carry a method of two-way communication which will function throughout your travels in the field. In some cases a cell phone may be sufficient if working in a region of adequate signal coverage, however a two-way satellite communication device is highly recommended as a backup, and is considered mandatory in areas without other coverage. These devices have the additional benefit of SOS features, which directly dispatch emergency response via the RCMP and BC EHS to your exact location.

4.3 Getting Lost

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

Action when lost

1. Remain calm

2. Take stock of what you have with you
3. Sit down, relax, then try to figure out where you are
4. Use your compass, maps and aerial photos. Use your GPS or mapping apps to orient yourself.
5. Proceed to a high point to view the lay of the land and to be more readily spotted.
6. If you have not discovered your position by at least one hour before sunset, admit you are lost. Note: if you are lost due to a forced landing of an aircraft 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.
7. Prepare to spend the night out:
 - Check instructions in flare kit if available (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 extremely cautious during fire season). Lay out ground to air signals if necessary.
 - Make shelter and build a fire. If this is impossible, cover yourself with leaves and brush.
 - Keep busy but prevent exhaustion and exposure. In cold weather be especially careful not to sweat as this will lead to becoming chilled.
 - Conserve food.

4.4 Working or Traveling Near Active Industrial Sites

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, moving 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. A good contractor will have extra safety equipment for you if needed.

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. You all have jobs to do and safety comes

first. 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.

4.5 Fire

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

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 activities. 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: 1-888-336-7378, <https://www2.gov.bc.ca/gov/content/safety/wildfire-status>

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;
- Potential water sources within the area

4.5.2 Caught in a Forest Fire

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

- “Islands”: Wetlands, lakes, rivers, large creeks
- Large cutblocks with a young plantation
- Areas already burned

4.5.3 Camp Fire

Before building a campfire, it is important to first consider whether you truly need a fire or not. If you do choose to construct a campfire, do not build it near a tree, a log or dry tinder. Scrape the area down to mineral soil, including a 1m radius around your fire ring, which should either be steel at serviced campsites, or made of large rocks collected from the area. Keep your fire small and watch for flying sparks. Be sure your fire is out and cold before you leave it, using the soak, stir, soak again method. Current regulations define a campfire as no larger than 0.5 m in height and 0.5 m in diameter. The person must be equipped with a hand tool, such as a shovel, and at least 8 litres of water. See for more information: <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention>

4.5.4 Required fire fighting equipment when working in the field

For more information check the Ministry of Forests Protection Branch website: <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/for-industry-commercial-operators>

- (1) If the number of persons who normally work at a worksite is 3 or less, the person carrying out the industrial activity must ensure that the following fire fighting tools are kept at the worksite or in the vehicle:
 - one round-nosed shovel
 - one Pulaski tool or mattock
 - one hand-tank pump containing at least 18 liters of water
- (2) If the number of persons normally working at a worksite is more than 3, the person carrying out the industrial activity must ensure that the following fire fighting tools are kept at the worksite:
 - one round-nosed shovel, Pulaski tool or mattock for each person
 - one hand-tank pump containing at least 18 liters of water for every 3 persons, to a maximum of 8 hand-tank pumps
- (3) For the purpose of subsection (2), the number of round-nosed shovels must, as nearly as possible, equal the combined number of Pulaski tools and mattocks.

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

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

4.6 Major Accidents/Injuries

Check area for ongoing safety hazards. Do not approach if hazards to your personal health exist (examples include downed live powerlines, predatory animals, etc.)

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 semi-conscious, 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)

1. Assess the ABC's:

- A** Open **A**irway by tilting head back and checking mouth for obstructions
- B** Check for **B**reathing and administer mouth-to-mouth assisted breathing if required
- C** Maintain circulation with **C**ardio Pulmonary Resuscitation if necessary.

2. Check for bleeding (remember to check under clothing, and in hollows of the body, such as behind the knees and lower back):

Hold a 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. Prevent infection by applying a clean, sterile dressing. Stitches or a tetanus booster may be necessary.

3. Call or radio someone to call 911, activate SOS on Satellite Messenger

Specify whether you need **P**olice, **A**mbulance or **F**ire

Have the following information ready:

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

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

5. Keep the patient warm

6. Inform supervisor

Have them fill out the appropriate UBC Incident/Accident Report form and submit it to the departmental office and UBC CAIRS.

4.7 Procedures for Dangerous Tree Management at Research Forests and Research Installations

See [Appendix B](#) for information on tree hazards and work procedures in the vicinity of dangerous trees.

4.8 Working Around Water

Any time you are working in, on or near a water body, even a shallow one, you must be aware of the additional risks posed by water. For this reason, aquatic work should never be undertaken alone. Most water accidents result from people underestimating the power of water. Many people have drowned by slipping by a river bank and getting swept downstream. It is extremely easy to slip and fall in wet areas, and it is possible to drown in even a few inches of water.

4.8.1. Hazard Assessment:

Prior to working around water, it is recommended that personnel identify all possible hazards associated with working in and around their water environment. Summer field work could involve working around lakes with sudden drop-offs, crossing shallow 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.

4.8.2. Personal protective equipment for water:

- PFD – personnel flotation device, a life jacket that is approved by Transport Canada. The 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 – street shoes are not appropriate for working in and around water. 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 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 a PFD
- Hip or chest waders – good waders will insulate from the cold, not leak and provide good footing. It is important to ensure waders fit properly. Keep your waders in good shape and check them for leaks before each field season. It is also important to wash waders and boots thoroughly after each use as invasive plants, seeds, or disease vectors can become stuck in wader boots and transferred between field sites. If using chest waders, always use an appropriate wading belt.

4.8.3. Working directly in a water body:

On occasion, you may need to work directly in the water body itself if conducting cross sections or water sampling. If using waders be aware that it is easy to sink deeply into the sediments, particularly in wetlands, making it difficult to take your next step and often resulting in a fall into the water. Move deliberately and test your footing before trusting your full weight to a step. Try to keep at least one foot on something solid and pay attention while you're working: you will likely continue to sink into the sediments as you stand in place. If one foot does become stuck, avoid sudden movements or turns. Put your weight on the solid footing and slowly pull out the foot that is stuck. You will likely have to wiggle that foot or twist it gently from side to side to loosen it.

4.8.4. Additional key points:

Never put your feet down if swept away and swimming.

Do not put your feet down in current. Basic river swimming is typically performed on the back with the feet downstream, knees bent and heels slightly lower than the buttocks. The feet should be ready to push the swimmer away from obstructions. Aggressive swimming where the swimmer rolls onto their stomach and swims hard using the crawl stroke may be considered if swimming into a safe calm area at the side of a river.

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 rope; 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, one must determine the water depth, water velocity and channel bottom. One must be able to determine that that water depth is shallow enough for a safe crossing. Water velocity is usually the most obvious danger and even fast-moving shallow water has the ability to knock someone off their feet. Before crossing one must ensure the channel bottom is stable and not have any sudden drop offs. Often it is useful to use a stick for stabilization when crossing a stream. It is a good idea to always face upstream and not turn sideways, that way one can always see any upstream hazards that may be floating down.

4.9 Extreme Weather and Natural Disasters

While rare, occurrences of extreme weather or natural disasters may pose significant risk to those working in the field. Despite the relatively low likelihood of occurrence, it is important to plan for the potential of these events should you operate in an area where they may occur.

4.9.1 Earthquakes

Earthquakes are a threat year-round in many areas of British Columbia, as well as across the world. While there is rarely any form of warning prior to a seismic event, knowing how to respond should one occur is an important consideration.

If an earthquake occurs while you are in the field:

- Attempt to find cover from any falling objects
- Seek an open area if possible
- Stay away from any danger trees to the best of your ability, as they may fall during or after the earthquake
- Address any first aid requirements
- Keep your team together, do a headcount
- If possible, stay away from steep cutbanks, eroded areas on FSR's, and areas where landslides or avalanches are known to occur
- Attempt to establish contact with your designated check-in person
- Evacuate from the field in the safest manner possible

4.9.2 Tsunami's

Tsunami risk is a consideration for any coastal areas, particularly on the north and central coast of British Columbia, as well as the western coast of Vancouver Island. The cause of most tsunami's is a seismic event such as an earthquake, resulting in energy transfer to the ocean floor, leading to a large wave (or waves). Most coastal towns and research stations will have a designated tsunami response protocol, which should be reviewed as part of your safety planning process.

General points of tsunami response:

- If you hear a siren in a coastal area, it is likely a tsunami warning
- Proceed to the highest land possible within a timely manner
- If working in a remote field area, this likely means travelling uphill as fast as possible
- If working on a boat away from shore, it is generally suggested to travel further from shore, as the wave may not have "broken" yet
- Once you have reached high ground, respond in the same manner as to an earthquake (above)

4.9.3 Extreme Weather

Extreme weather events may take many forms, including heavy rains, gale force winds, or near-polar temperatures in usually temperate areas. While this guide does not seek to provide information for each of these possible events, we reiterate the importance of checking the weather forecast as a crucial aspect to field planning, in addition to carrying proper equipment suited to the anticipated weather conditions.

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-info>) and the Public Health Agency of Canada (<https://www.canada.ca/en/public-health.html>).

5.1.1 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.

5.1.2 Giardia

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

5.1.3 Lyme Disease

There have been over 60 confirmed cases of Lyme disease in BC. 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, including use of bug repellent spray, wearing light coloured clothing, and tucking pant legs into socks. Symptoms of Lyme disease can appear days or weeks after being bitten, and include headache, muscle and joint pains, fatigue and weakness of the face muscles. A skin rash, especially one that looks like a “bull’s eye” may appear. If you have removed a tick and you experience these symptoms, your doctor will prescribe antibiotics that kill both Lyme disease and Rocky Mountain spotted fever. Be sure to tell the doctor that you have been bitten by a tick and, if possible, provide the tick for testing. Removed ticks can be preserved in small plastic sampling tubes filled with ethanol (consider carrying a few in your first aid kit). Lyme disease is not a rapidly progressing disease, although it is serious, and its worst complications can be avoided if it is treated early.

5.1.4 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. There has been only one recent rabies-caused death in British Columbia, 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. If you are bitten, scratched or licked by an animal, examination of the animal’s brain will quickly show if it was rabid.

If you work with animals that are likely to carry rabies (the most likely carriers may vary depending on where you are working, but skunks, squirrels, bats, and wolves are potential carriers in BC) you may be able to request immunization: contact your family doctor, or Vancouver Coastal 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!

5.1.5 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:

5.2.1 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.

5.2.2 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 very hot, heavily salted water several times throughout the day. Additionally, consider carrying antibiotic ointments (such as Polysporin) to apply to any wounds after thoroughly cleaning them with water.

5.2.3 Tetanus

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

5.3 Wildlife²

Before entering an area, always gather information from local contacts to familiarize yourself with potentially dangerous wildlife and find out how to prepare yourself. Obtain this information from field guides, your employer, or resources provided by the Ministry of Environment or Conservation Officer Service

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

WildSafe BC is also an excellent resource for learning about coexisting with wildlife safely: <https://wildsafebc.com/>

While travelling or working in the field, it is crucial to maintain awareness of your surroundings. Using all of your senses is the most effective tool for avoiding negative

² Significant portions of this section were originally compiled by the UNBC Field Safety Committee

encounters with wildlife. This includes staying visually aware of the area around you, even when conducting focused sampling activities. It also includes looking for signs like tracks, markings or scat, keeping your ears open (and headphone free), and being aware of smells which might be associated with animals (such as carcasses dragged slightly off trail).

General advice for avoiding negative animal encounters:

- 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).
 - If you need to handle animals as part of your research, make sure you are wearing protective gear appropriate to the species and risk (e.g. gloves, ventilation mask).
- Respect an animal's personal space if you approach them. Watch for signs of distress (frequent glancing in your direction, ears back, jittery movement, stomping or grunting) as you approach. If the animal starts showing signs of these, stop and back off until those behaviours cease – this means you likely have maintained the distance at which the animal feels more comfortable.
- Don't corner an animal – always make sure you leave an escape path for an animal if you are approaching them. If the encounter is sudden, move slowly and deliberately to allow the animal an escape route.
- While this advice is fairly generic for animals you might encounter, some species have characteristic behaviours that have specific kinds of responses. These are outlined below.

5.3.1 Cougars

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

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, do not approach them or attempt to pick them up. A female will defend her young, so leave the area immediately. Cougars are frequently most active at dawn and dusk, so attempt to avoid travelling or working during these times where possible.

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. Hold your arms over your head to appear as large as possible. 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 up things off of 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. Bear spray is also effective against cougars within close (2-5m) proximity.

5.3.2 Bears

If you are planning on spending time in bear country you should take a Bear Aware course or take the provincial government's [online bear encounter self-training course](#). We highly suggest that all field team members are required to watch the film [Staying Safe in Bear Country](#) prior to beginning field work where bears may be encountered.

You must also be carrying bear spray. Not only has this been proven to be one of the best means of deterrents for bear attacks, but it is both readily accessible and easy to apply by the greatest range of personnel. Buy the larger canisters (e.g. 325g) – it is false economy to get the cheaper, smaller canisters, as in an encounter you may require multiple bursts of spray. Make sure this is accessible and easy to draw – you should be able to access your spray in under two seconds. Check the expiry date on the canister when you buy it and each time you go into the field. All canisters will come with a zip-tie securing the safety when purchased, this **must be removed** prior to bringing the bear spray into the field, as it prevents proper use. In an actual bear encounter requiring use of the spray, there will not be time to remove this zip tie.

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 either animal, and recommended responses to encounters with each species differ. Information on identifying signs and physical appearance of either species is available from WildSafe BC:

<https://wildsafebc.com/species/>

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 stick to 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 thick bush, stay alert and make an extra effort to be noisy (e.g. calling out “YO BEAR” about every 50 paces or at regular intervals if you are stationary works very well), especially near loud streams and waterfalls.

Low frequency sound transmits better than high frequency sounds in forests, so calling tends to work better than bells to alert bears of your presence. Bells have also been suggested as a potential attractant, resulting from a curiosity response to the strange noise which may not be associated directly with humans. 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.

5.3.2.1 Black Bears

The black bear may not be black: colour can vary from brownish to cinnamon to blonde, and even white in Kermode bears on BC's northern coast. In physical appearance, these bears 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.

Most encounters with black bears do not result in attacks. 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. Reading the behaviour of the animal is a key to knowing how to respond in an encounter.

If an encounter occurs:

- Get out your bear spray and have it ready for use – do this in ALL encounters. This include removing the safety clip by sliding it backwards.
- Stay calm and gauge the animal's behaviour
- If the bear appears nervous, it may be looking for an opportunity to escape. This behaviour 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 a behaviour 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.

If the bear appears aggressive – this might take the form of the bear 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. The bear is feeling threatened, or attempting to exert its dominance, so you need to respond by de-escalating the situation. Although frightening, the correct response in this type of encounter will reduce the prospects of escalating to physical contact.

- 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. However, wait literally until the bear is close enough for you to be smelling breath and “seeing the whites of the eyes” – bear spray only works well in very close proximity (<2-3m distance between you and the bear).
- If the attack persists, and physical contact is made, you should fight back with anything you have at your disposal – sticks, rocks, etc. You are now trying to show it you are dominant, as well as the preventing the encounter from changing to predatory.

If you encounter a female with cubs – often the first sense you may have that a female with cubs is present is when one or more small bears scramble to safety in the trees ahead of you. If you see cubs climbing or in trees, assume that their mother is likely at the base of that tree to defend them. This is one of the most common circumstances leading to a defensive attack.

- 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.

If the bear approaches you without appearing aggressive – This may appear as though the bear is being curious. It may approach without looking directly at you, or avoiding eye contact. It may not appear aggressive (e.g. have ears in forward, alert position, etc.). **THIS IS AN EXTREMELY DANGEROUS SCENARIO.** The bear is potentially sizing you up as prey. Your objective is to show it you are potentially dangerous and a bad prey item.

- 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, acting aggressive 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.

5.3.2.2 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 result from them being surprised at close quarters. In this instance, it may act very aggressively. Fewer predatory attacks are reported for grizzly bears than for black bears, but these have been known to occur. As with black bears, reading the bears behaviour is important in determining 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 what kind of bear you are looking at!

If an encounter occurs:

- 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. The response here is similar to the similar scenario for black bears.

- 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.

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. 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. You need to respond by de-escalating the situation. Although frightening, the correct response in this type of encounter will reduce the prospects of escalating to physical contact.

- 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 progresses to a physical attack

- First, deploy your bear spray. However, wait literally until the bear is close enough for you to be smelling breath and “seeing the whites of the eyes” – bear spray only works well in very close proximity (<2-3m distance between you and the bear).
- 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 far rarer scenario, but now you need to start fighting. Follow the response below for potentially predatory attacks.

If the bear approaches you without appearing aggressive (predatory attacks) – This may appear as though the bear is being curious or nonchalantly walking into your camp. It may approach without looking directly at you, or avoiding eye contact. It may not appear aggressive (e.g. have ears in forward position, wandering gait, slow circling). This kind of encounter is much less common type of grizzly encounter than is the defensive attacks noted above, but **THIS IS AN EXTREMELY DANGEROUS SCENARIO**. The bear does not see you as a threat, and is potentially sizing you up as prey. Your objective is to show it you are potentially dangerous and a bad prey item.

- 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, acting aggressive 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. Use pepper spray, a branch, stones, or whatever is available to fight off an attack. Target the eyes and nose.
- If what started as a defensive attack above turns into an opportunistic predatory attack, fight back as above.

5.3.2.3 Minimizing Risk

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

Some locally available bear deterrents include horns, bear spray, and bear bangers (see [Section 3.2.6](#)). As with any field equipment, be certain that such deterrents are well-maintained and accessible at all times. If you do encounter a bear, prepare to drop your pack to distract it if attacked but note that some people claim that a pack can afford protection during a mauling.

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

5.3.2.4 Polar Bears

In coastal arctic environments, polar bears may be a problem. These bears are extremely dangerous and may move out of sight to begin stalking human prey. Treat all approaches by polar bears as being potentially predaceous and respond to the “non-aggressive approaches” by a grizzly bear acting in similar manner. In polar bear habitat, a firearm may be needed for protection of field personnel (see [Section 3.3.5](#)).

5.3.3. 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 winded a human it will run away without the person even knowing it was there. An exception where canids, including wolves, may approach humans is when they have become acclimated to people, possibly through being fed by or associating people as a source of food. This may be especially true of coyotes and foxes, especially in urban settings.

5.3.3.1. Wolves

Indicators that wolves are present in an area will be sign (scat, 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 yapping.

If an encounter occurs:

- Stay calm
- Do not allow a wolf to approach any closer than 100 meters.
- 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 bending down or taking 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.

5.3.3.2 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 residential pets. However, attacks on people have occurred, including some which have been fatal. Although extremely atypical of coyote behaviour, it does indicate that these animals should be given due respect. Fox attacks are also rare, and would be unlikely to result in death. However, all canids, including foxes, are potential carriers of rabies, and bites from affected animals have occurred. Never feed a wild animal, which is the most common reason for habituation and subsequent attacks by coyotes.

If you encounter an aggressive coyote or fox:

- If you have younger children with you, pick them up without bending down
- Make yourself appear large and threatening
- Yell, shout, and attempt to scare the animal away
- Throw rocks, sticks, or other available items
- If the animal comes close enough to make contact, deploy bear spray if available, and otherwise kick at the animal, aiming for the face. Considering picking up a large stick if available, to use as a defensive weapon.

5.3.4 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 of your presence.

As harmless as a moose encounter may seem, it is important to have a high level of respect for the damage and injury these animals can incur if they feel threatened. Hence, if a moose is encountered, a minimum of 100 m 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 presented by the animal. 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. Some examples of aggressive behaviour that may be exhibited are flattening of the ears and approaching humans. An angry female may also try to put herself between crewmembers and her calf. Unlike in a bear encounter, walking quickly, or if safe to do so, running away from an angry moose is unlikely to lead to a sustained attack; it will likely prevent it.

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

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

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 crewmembers must be alerted of the presence of moose using the radio or other communication methods.

5.3.3 Other Potentially Dangerous Animals

Researchers working in rattlesnake habitats might wish to carry a snake-bite kit among their first aid supplies and be familiar with its use. Informed opinions differ as to the merits of various snake-bite kits. Obtain current advice on this from a medical professional in the area before making a decision.

5.4 Biters and Stingers³

5.4.1 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

³ Significant portions of this section are from the UNBC Field Procedures and Safety Manual

favor sheltered locations on the body, so check carefully. 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 5.1.3](#)) the tick can be tested easily.

5.4.2 Biting Flies

Biting flies include blackflies, mosquitoes, horseflies and deerflies, and biting midges or “no-see-ums”. Females of these flies break the host’s skin and inject saliva in order to obtain blood. The host’s body reacts to the physical damage but also to the injected saliva. There is also a psychological response, both to the bites themselves and to the sight and sound of the attacking flies. Different people react differently to different types of flies and to physical, biochemical and psychological irritation.

Blackflies complete their larval development in fast-running water, and the adults tend to be most common in areas where these habitats are available. They tend to be active during the day and do not bite indoors. They will crawl under loose-fitting clothing in order to feed. Mosquitoes, on the other hand, 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 extremely painful.

The best protection for most biting flies is avoiding times and habitats when the flies are most active, particularly when choosing a camp site. Because avoidance is not always possible for field workers, strategies such as dressing appropriately and using a repellent when necessary are recommended. Wear long sleeves, long pants and a hat. Tuck in cuffs, especially when blackflies are prevalent, and wear loose-fitting clothes to reduce mosquito bites. Choose light-coloured clothing, as some research suggests that biting flies prefer dark, matte colours. Many repellents are currently available. The most effective ones contain diethyltoluamide, or DEET. While effective, DEET is not risk-free for humans. When possible, avoid applying it directly to the skin. Instead, use it on clothing, and wash hands well after application. Be aware that DEET will destroy many plastics 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.

5.4.3 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 5.4.5](#) 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.

5.4.4 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 black widow spider is, however, 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.

5.4.5 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.

It is the best practice for every field crew to have immediate access to an EpiPen.

For severe reactions:

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 comfortable, or assume their position of most comfort.

- If the person is unconscious and breathing, lay them down on their side to allow drainage from the mouth.
- If there is no breathing, movement or response to touch, begin CPR.
- If the person is carrying an allergy kit containing epinephrine (epipen), follow the instructions on the kit.

5.5 Dehydration and Heatstroke

5.5.1 Dehydration

Dehydration can be a serious heat-related disease. Under normal conditions, we all lose body water daily through sweat, tears, urine, and stool which is usually replaced by drinking fluids and eating foods that contain water. When a person becomes so sick with fever, diarrhea, or vomiting, or is overexposed to the sun, dehydration occurs when the body loses water content 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, increased heart rate and breathing

Treatment

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

Prevention

Drink plenty of fluids and 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.

5.5.2 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 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 beat, hallucinations.

Treatment

It is important for the person to be treated immediately as heat stroke 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. In the field, submersion of the body in a stream or creek where available is an effective method of rapid cooling, although requires close supervision of the patient as they may be disoriented. Do not allow a person with heat stroke to submerge unsupervised, or where water is flowing fast enough to wash them downstream. Intravenous fluids are often necessary to compensate for fluid or electrolyte loss. Bed rest is generally advised.


Prevention

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 through diuretic effects. Wear lightweight, tightly woven, loose-fitting clothing in light colors. Schedule vigorous activity for cooler times of the day. Wear a hat. Increase 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.

Heat-Related Illnesses⁴

HEAT-RELATED ILLNESSES

WHAT TO LOOK FOR	WHAT TO DO
HEAT STROKE <ul style="list-style-type: none">• High body temperature (103°F or higher)• Hot, red, dry, or damp skin• Fast, strong pulse• Headache• Dizziness• Nausea• Confusion• Losing consciousness (passing out)	<ul style="list-style-type: none">• Call 911 right away-heat stroke is a medical emergency• Move the person to a cooler place• Help lower the person's temperature with cool cloths or a cool bath• Do not give the person anything to drink
HEAT EXHAUSTION <ul style="list-style-type: none">• Heavy sweating• Cold, pale, and clammy skin• Fast, weak pulse• Nausea or vomiting• Muscle cramps• Tiredness or weakness• Dizziness• Headache• Fainting (passing out)	<ul style="list-style-type: none">• Move to a cool place• Loosen your clothes• Put cool, wet cloths on your body or take a cool bath• Sip water <p>Get medical help right away if:</p> <ul style="list-style-type: none">• You are throwing up• Your symptoms get worse• Your symptoms last longer than 1 hour
HEAT CRAMPS <ul style="list-style-type: none">• Heavy sweating during intense exercise• Muscle pain or spasms	<ul style="list-style-type: none">• Stop physical activity and move to a cool place• Drink water or a sports drink• Wait for cramps to go away before you do any more physical activity <p>Get medical help right away if:</p> <ul style="list-style-type: none">• Cramps last longer than 1 hour• You're on a low-sodium diet• You have heart problems
SUNBURN <ul style="list-style-type: none">• Painful, red, and warm skin• Blisters on the skin	<ul style="list-style-type: none">• Stay out of the sun until your sunburn heals• Put cool cloths on sunburned areas or take a cool bath• Put moisturizing lotion on sunburned areas• Do not break blisters
HEAT RASH <ul style="list-style-type: none">• Red clusters of small blisters that look like pimples on the skin (usually on the neck, chest, groin, or in elbow creases)	<ul style="list-style-type: none">• Stay in a cool, dry place• Keep the rash dry• Use powder (like baby powder) to soothe the rash



5.6 Hypothermia

Hypothermia, or loss of core body temperature, is a very serious threat in our environment and can occur in any season. Baby It's Cold Outside (BICO - <https://bicorescue.com/>) provides a great free, online resource on the prevention and treatment of hypothermia.

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. 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

⁴ <https://www.cdc.gov/disasters/extremeheat/warning.html>

for recently ingested food/fluid to be useful. Dress in layers of appropriate clothing, considering factors such as wind chill and humidity in your planning. Try to avoid activities that will make you sweat, and consider carrying a full change of clothing if access to your sites might result in heavy sweating.

Management of Mild Hypothermia

(patient is shivering, slurring words, but can answer questions intelligently):

1. Assess the ABC's

A Maintain adequate **A**irway

B Maintain adequate **B**reathing

C Support the **C**irculation 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.

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

Treatment of moderate to severe hypothermia is beyond the scope of this manual. Please consult a wilderness first aid guide, or <https://bicorescue.com/> for more information on these life-threatening conditions and their treatment.

ASSESS COLD PATIENT

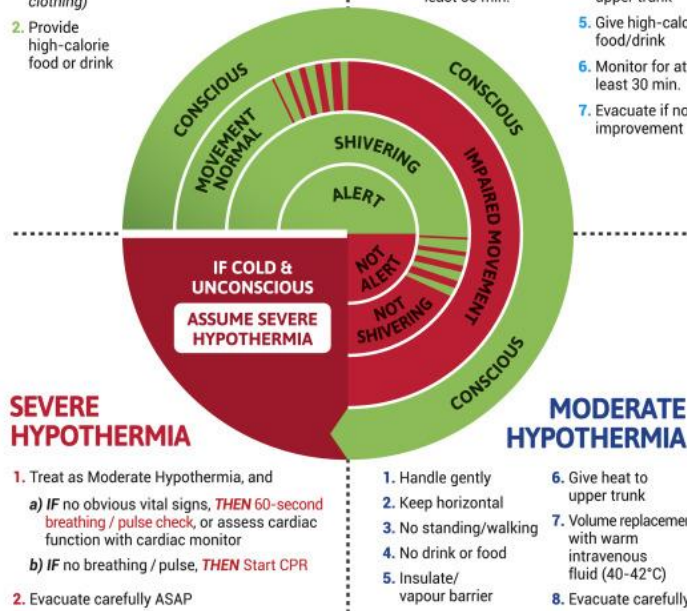
1. From outside ring to centre: assess Consciousness, Movement, Shivering, Alertness
2. Assess whether normal, impaired or no function
3. The colder the patient is, the slower you can go, once patient is secured
4. Treat all traumatized cold patients with active warming to upper trunk
5. Avoid burns: following product guidelines for heat sources; check for excessive skin redness

COLD STRESSED, NOT HYPOTHERMIC

1. Reduce heat loss (e.g., add dry clothing)
2. Provide high-calorie food or drink
3. Move around/ exercise to warm up

MILD HYPOTHERMIA

1. Handle gently
2. Have patient sit or lie down for at least 30 min.
3. Insulate/ vapour barrier
4. Give heat to upper trunk
5. Give high-calorie food/drink
6. Monitor for at least 30 min.
7. Evacuate if no improvement



SEVERE HYPOTHERMIA

1. Treat as Moderate Hypothermia, and
 - a) IF no obvious vital signs, THEN 60-second breathing / pulse check, or assess cardiac function with cardiac monitor
 - b) IF no breathing / pulse, THEN Start CPR
2. Evacuate carefully ASAP

MODERATE HYPOTHERMIA

1. Handle gently
2. Keep horizontal
3. No standing/walking
4. No drink or food
5. Insulate/ vapour barrier
6. Give heat to upper trunk
7. Volume replacement with warm intravenous fluid (40-42°C)
8. Evacuate carefully

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From: <https://bicorescue.com/> and the Wilderness Medical Society (2018)

5.7 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. 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.** The victim should be moved inside as soon as possible, preferably to a hospital. 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.

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.

5.8 Burns

5.8.1 Classification

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

- 1st Degree - hot object, scalding liquid - produces redness or discoloration, mild swelling, pain.
- 2nd Degree - more 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.
- 3rd Degree - deep tissue damage; white or charred-look; complete loss of skin.

5.8.2 Treatment

- Consider carrying burn specific, non-stick bandages.
- 1st Degree - submerge burn in cold water or apply water to area. This will ease the pain of minor burns and may promote healing.
- 2nd Degree - 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/ointments (surgeons treating the burn may have to remove any greases or salves applied, causing further damage). Apply burn specific, non-stick bandages if available.
- 3rd Degree - 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. Apply burn specific, non-stick bandages if available.

6. VEHICLE MAINTENANCE, TROUBLESHOOTING, OFF-ROAD TRUCK USE, AND RADIO CALLING

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

For additional useful information on Resource Road driving, refer to:

<http://www.bcforestsafe.org/transportation/resource-road-safety-2/>

and

https://www.bcforestsafe.org/wp-content/uploads/2021/02/ps_ResourceRoadUserSafetyGuideBrochure.pdf

6.1 Pre-trip Vehicle Inspection

Be sure to thoroughly check fluid levels (oil, fuel, coolant, brake, power steering), air pressure, tire tread, spare tire pressure, brakes, lights, and horn before leaving town. Know where the spare tire, jack and tire change wrenches are located, and practice changing a tire. Work vehicles should carry a first aid kit, blanket, an ABC rated fire extinguisher, and equipment for basic maintenance and emergencies (see [Section 6.5](#) for list). You should also be carrying any required firefighting equipment (see [Section 4.5.4](#))

A pre-trip inspection form is provided in [Appendix A](#), which must be completed prior to beginning field or research activities for each vehicle (whether UBC owned, personal or a rental).

6.2 Before Heading to the Field

Before driving on logging roads, check for current log hauling activity, road conditions, obtain maps, and find out about industrial traffic patterns as well as clarify which radio channels are in use. This information is commonly available from:

BC Ministry of Forests: <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/ministry-of-forests-lands-and-natural-resource-operations-region-district-contacts> and <https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/resource-roads/local-road-safety-information>

If not available from the above sources, this information is generally available from the active leaseholder or timber licensee. You can find this information for your area of work from [FrontCounter BC](#) locations.

6.3 Radio Calling

Often, field workers find themselves traveling through or working in areas where there is active logging. Forest companies and other officials communicate via two-way radio in actively logged areas in order to operate safely. This is important because on many roads one-way travel is required for loaded logging trucks due to their size and speed. 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 on the same road should pull off until the vehicles travelling down passes.

Most logging roads are named and signs tend to be posted at intersections. Signs at the beginning of most major resource roads will explain the radio calling protocol, however it is good practice to become familiar with these procedures prior to heading into the field. The name of the road and frequency used on the road will be indicated. Make sure that your radio is on the correct frequency.

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. Numerous radio shops in the lower mainland are able to provide and install appropriate radios.

In BC there are 35 standard Resource Road (RR) channels, and 5 additional loading (or LAD) channels. These standardized channels are used throughout the province, in an attempt to standardize communication protocols between different forest districts. Radios should be pre-programmed with all of these channels, with details available from Industry Canada: <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11127.html>. Channels will be denoted at the beginning of each resource road, but can also be viewed via [Resource Road Radio Channel Maps](#) for each district.



Example resource road signage

Conventions for radio calling of which you need to be aware.

- Always announce yourself when you first enter a road, and identify what you are driving.
 - E.g. “Seymour, 0k, up, white pickup”
- As you travel, announce your location at least every other km.
- Kilometers are always marked, usually on diamond-shaped signs nailed to trees near the road. By convention, kms increase as one leaves the highway and approaches a work site.
- If kilometers are increasing, announce that you are “road name, kilometer marker, up, vehicle type”
 - E.g. “Florence Lake, 16km, up, blue pickup”
- If kilometers are decreasing, you are “road name, kilometer marker, down, vehicle type”
 - E.g. “Lost Creek, 35km, down, red SUV”
- If you hear someone announce that they are a “loaded” truck on the same road as you, assume it’s a loaded logging truck, find a place to pull off, announce that you did so, and wait until it has passed.

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. Be careful not to key your radio accidentally, as this will block others from transmitting on the channel.

6.4 Before You Begin the Field Season

Many researchers use rental vehicles for fieldwork. These vehicles should have been serviced before being rented to you; however, you should double-check the following items (whether a rental, personal, or UBC vehicle).

- Fluid levels: does your vehicle have clean and adequate amounts of oil, transmission fluid, brake fluid, and coolant in the radiator? Antifreeze is designed to help keep the engine cool in summer. An overheating engine could be due to lack of antifreeze, but keep in mind that it could also be due to a loose fan belt, unsealed radiator cap, or faulty coolant thermostat). If you are working in the winter make sure you have the proper mix of antifreeze and water; frozen coolant can crack the engine block and require expensive repairs.
- Oil: Driving off paved roads is generally considered severe use, and warrants more frequent oil changes than regular use conditions for most vehicles. Consider a pre-field season oil change.
- Brakes: some service station outlets will check your brakes for free. Ensure adequate brake pads remaining, and that rotors or drums are not worn beyond acceptable limits.
- Tires: are your tires in good condition, with adequate tread and inflated to the correct pressure? It is a very good idea to crack the lug nuts on your wheels before you begin work – they have often not been removed for a long time and may be almost welded to the rims.
- Spare tire: do you have one? Is it in good condition? Is it flat? Some vehicles will have a small tire intended only to let you reach the nearest gas station. For field vehicles it is better to have a real tire for a spare, as it may be a while before you can get the tire repaired. In very remote areas, you may consider carrying a second full-size spare tire.
- Know how to change a tire and where the tools are located.

6.5 Basic Truck Kit

The basic truck kit should include the following:

- Spare key in your pocket or in magnetic case on outside of vehicle
- Jack
- Hi-lift Jack (a large, heavy duty jack; these need to push up against a solid flat surface such as a heavy duty bumper, they won't work on lightweight, curved bumpers and will damage side panels). This can be used to help vehicles become unstuck in some cases.
- 2' piece of 2x4 or 4x4 lumber to place under a jack on uneven or soft surfaces.
- Swede saw, axe, or preferably both

- Tow Straps and/or “come-along” (hand winch). Must be specific heavy duty tow straps to prevent dangerous breakage under tension.
- Shovel
- Jumper cables
- Reflective triangle or flares.
- Toolkit (more than just the jack accessories)
- Flashlight and spare batteries
- Extra Fuel
- Fire extinguisher
- First aid kit (OFA Level 1 minimum)
- Blanket
- Food and water (you may need to spend the night in the truck!)
- Maps of the area in which you are working
- A small compressor that plugs into the cigarette lighter is also useful for re-inflating tires

Most of these items should be considered mandatory for any extensive off-highway work. A few examples will help illustrate why you should take your “truck kit” seriously. A stock truck jack can be virtually useless if you get a flat on muddy or rough ground, whereas a jack-all can handle most conditions. On occasion, the jack-all might be the difference between staying stuck and getting the truck out of the ditch. The utility of a saw or an axe becomes apparent to anyone who has headed home at the end of the day only to find a downed tree across the road. Other examples come to mind, but those provided should help convince you that taking the time to properly equip your truck is worth the effort.

6.6 The Basics: Operation, Maintenance and Troubleshooting

6.6.1 Parking

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

6.6.2 Avoiding Flat Tires

Ensure tires are in good condition and are suitable for gravel roads before leaving town. Rental vehicles often have lightweight tires unsuitable for rough roads. When driving on gravel roads, avoid hitting potholes at high speed and be on the look-out for sharp rocks that could pierce the tread or slash the side walls. This is especially important on recently built or resurfaced roads. Slow down.

6.6.3 Flat Tires

If you are on remote roads, and get a flat tire, pull off at a flat spot and change it. If you end up in a situation where your spare tire has also gone flat it is best to leave the vehicle parked, take the flat tires to town and return for the vehicle. If you're at a remote site and there is no one able to assist you it is possible to drive a fair distance on a partly or completely flat tire if it is necessary to reach civilization. If you choose to do so keep your speed low, no more than 30km/hr, to ensure that you can maintain control of the vehicle and stop as needed. If the tire is totally flat, driving on it will bend the wheel rim which is expensive to replace. Do not drive on the highway with a partly flat tire because if it breaks you could swerve into oncoming traffic at 100 km/hr.

Never drive with a flat front tire!

6.6.4 Changing a Flat Tire

Make sure the truck is in gear (not in neutral), place rocks or wood blocks in front and behind the tires so that the truck cannot roll once it is jacked up. Crack (loosen) the nuts of the flat tire while it is still on the ground. Do not take the nuts off entirely as the truck could fall over. Place a jack under the wheel axle in such a position that it looks least likely to fall over once the truck is jacked up. Jack the vehicle up until the tire is just off the ground. Remove the tire and replace it with a new one. When re-tightening the nuts, do so in a balanced fashion – first one, then the nut across from it, etc. When the nuts are tightened down, jack down the truck. 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.

6.6.5 Avoiding Dead Batteries

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

6.6.6 Push-starting and Jump-starting a Vehicle

Another common field problem is a dead battery. If 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.

6.6.6.1 Push or Roll-starting

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

6.6.6.2 Jump-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 your engine starts, disconnect the cables by removing the negative clip first and then the positive one. Keep your vehicle running for at least 30 minutes to recharge the battery.

6.6.7 Getting Stuck

As soon as you are stuck, jam a bunch of branches and rocks under your tires, and put the vehicle in 4WD. This is worth the effort. Sure, you might get out if you try for 5 minutes without doing this, but you might also get much more stuck. It is especially worth being careful if you are miles from anywhere. Another useful trick, if you have a small compressor with you, is to let a third to half the air out of your tires by pressing the escape valve pin. This increases the traction surface and will often allow you to drive out of mud and soft sand with little difficulty. Once back on solid ground, re-inflate the tires. This is especially useful if you do not have 4WD.

6.7 Driving Fundamentals

Common hazards of driving on forest 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 by traffic lights, signs, and centre lines, courtesy is even more important than usual. The fundamental rule of driving on dirt roads: *expect the unexpected*. You will experience a much broader range of conditions compared to paved roads. Drive with your headlights on. Be cautious and drive slower than what may seem necessary, especially if you are an inexperienced off-road driver. Conditions can change rapidly and catch you off-guard.

For example, a speed that is otherwise reasonable on a paved road can cause you to lose control when you hit a patch of washboard and/or loose gravel – right about the time you

notice a cow on the road. 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. 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 level of care and will make poor decisions. Thus, it is almost inevitable that you will round a corner only to find that someone is approaching on your side of the road. If you are driving at a reasonable speed, on your own side of the road and paying attention, the likelihood of a problem is much reduced. Special care needs to be taken in areas actively logged since logging trucks often need most or the entire road and travel at high speeds. Be very careful following another vehicle in dusty road conditions. You may not see or may not be visible to on-coming traffic. Keep your headlights on at all times on gravel roads.

When hiring someone for field work, check that they have a valid driver's license (with a Class 4 designation if necessary for driving multi-passenger vans). You should make a copy of their license and check their driving record with ICBC (604 661-2800).

6.8 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 make you invincible. On the contrary, common sense is especially important when making driving decisions in 4WD conditions. Generally you will be using 4WD because conditions are poor, and as such, opportunities to lose control or to become seriously stuck are probably much higher than when driving in 2WD.

Most of us who have spent any time driving a 4x4 on back roads have probably made at least one poor decision that has, at the very least, left the vehicle seriously stuck. We know of one recent example of a decision to cross, what appeared (from the driver's seat) to be a fairly small stream, with a 4Runner. The Toyota came to a permanent halt midstream after the fuel injector inhaled some water. After a couple of days, a tow truck was able to get to the site and remove the truck – final bill for towing and damages: more than \$5,000.00. That bill was not looked upon very favorably by the employer. The moral of the story? Don't make quick assessments from the driver's seat. Get out and have a close look, and if you're still not sure, 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. Having said that, you can use 4WD: a) when you encounter a mud-slippery road and your vehicle starts sliding; b) as soon as you get stuck (do not wait until you've dug a hole); c) to navigate very rough or steep roads. Most importantly, use it under speeds of 50 km/hr.

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 operators 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.

6.9 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 the incident via [UBC CAIRS](#) (Centralized Accident/Incident Reporting System) within 48 hours. In BC you are required to report the accident to the police within 24hours (or 48 hours if outside of a town) if anyone has been killed or injured or if damage to a vehicle is more than \$1000, see [ICBC Road Safety](#) for more information..

7. AIRCRAFT AND BOATS

When possible, speak to pilots in person before approaching their aircraft. They will often have specific details relating to the safety of their aircraft and will give you a safety briefing. If you have not flown in a small plane or helicopter before, ask for a safety briefing first. Prior to any advanced procedures such as toe-ins, hover exit, or slinging of equipment, ensure adequate training has been provided to all team members, and protocols confirmed by the pilot.

7.1 Helicopters

- Approach and leave a helicopter on the downslope side to avoid the main rotor. Crouch while approaching and leaving.
- Never walk behind a helicopter on the downslope side. Always approach and leave within the pilot's field of vision to avoid the tail rotor.
- Near the helicopter always carry tools horizontally, below waist level – never upright or on the shoulder.
- Loose items (e.g. parkas, empty cans) should be secured or removed from the helispot. No fires should be made in the helispot area.

- Have a 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.

7.2 Fixed-wing Aircraft

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

7.3 Boats

- Federal law requires boat operators to be licensed.
- Minimum safety equipment required by Transport Canada varies with pleasure-craft type and length (<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.
- 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.

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Appendices

These appendices consist of:

- A. Vehicle Pre-Trip Inspection Checklist**
- B. Procedures for Dangerous Tree Management at Research Forests and Research Installations**
- C. Field Trip Safety Contract Example**

Appendix A

VEHICLE PRE-TRIP INSPECTION CHECKLIST

Employee: _____ Date: _____

Vehicle: _____ Odometer Reading: _____

Vehicle Walk Around:

	OK	Defect	Comments
Lights:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Glass/Wiper:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Mirrors:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Canopy bolts:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Body/Frame:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Suspension:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Exhaust:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Fluid Leaks:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Load Secure:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Wheels/Tires:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Spare Keys:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Tools :	<input type="checkbox"/>	<input type="checkbox"/>	_____

Under the Hood:

	OK	Defect	Comments
Battery:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Belts/Hoses:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Brake Fluid:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Eng. Oil:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Trans Oil:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Washer Fluid:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Cooling Sys:	<input type="checkbox"/>	<input type="checkbox"/>	_____

In the Cab:

	OK	Defect	Comments
Emerg Brake:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Clutch:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Doors:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Seats:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Seat Belts:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Emerg Equip ⁵ :	<input type="checkbox"/>	<input type="checkbox"/>	_____
Heat/Defrost:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Horn:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Engine:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Registration:	<input type="checkbox"/>	<input type="checkbox"/>	_____

I have completed the pre-trip inspection and found the vehicle fit for use.

Signature of employee: _____

⁵ Should include ice scraper/snow brush and H.D. extension cord for winter use.

Appendix B

PROCEDURES FOR DANGEROUS TREE MANAGEMENT AT RESEARCH FOREST AND RESEARCH INSTALLATIONS

UBC Faculty of Forestry Safety Committee

February 17, 2006

General Background

It is common for researchers from the UBC Faculty of Forestry to work in forested environments where potentially dangerous trees exist. Researchers work in all seasons and at all times of day. Weather is changeable and trees are more likely to fall during weather extremes. The level of exposure ranges from simply walking through the stands to taking detailed measurements in one location for many hours at regular intervals. Most activities involve measurement or observation and the level of disturbance is generally very low. The level of disturbance increases when researchers use power equipment, climb living or dead trees or when they are involved in destructive sampling. In some cases, long term installations are built within the forest and it will be necessary to protect these installations from falling trees or debris. These activities fall under BC Occupational Health and Safety policies for worker protection. *The policy on Forest Operations and Dangerous Trees is attached.*

While these procedures are not designed for students during routine field exercises/instruction, instructors should be aware of the dangerous tree marking scheme described below, familiarize students with tree hazards during field visits, instruct students to wear hard hats when circumstances warrant, and monitor weather conditions during field activities.

Specific Background

Malcolm Knapp Research Forest notified by several researchers who were concerned about potentially dangerous trees at their research sites. These are sites where the researchers return for regular re-measurements and spend minutes to hours in the same location taking measurements. On inspection, Research Forest staff with Wildlife/Danger Tree Assessment certification decided that these trees met the definition of dangerous trees. The faculty members with research projects in this location were notified and registered their concern that tree-removal could jeopardize long term research projects on habitat structure, supply and use. The UBC Safety Committee discussed this issue at the January 25, 2005 meeting and resolved to prepare a set of recommendations in consultation with the Research Forest staff and faculty. This was followed up by a field visit to MKRF on March 3, 2005 with representatives of MKRF, the Faculty Safety Committee and the WCB in attendance. All of these parties have had input on this document and drafts have been circulated to faculty.

Roles and Responsibilities

UBC Research Forest staff

The final decision on tree management on UBC Research Forests is made by Research Forest staff with the appropriate training, experience and certification. This decision will be made after consultation with researchers and faculty supervisors and consideration of the list of factors and

options outlined below. Research Forest staff will assist with training of researchers and faculty and will provide advice on siting of long term plots and research infrastructure in stands where trees are or could become dangerous. Assessments will be done at the beginning of new research projects and periodically thereafter. Where researchers are working on sites outside the Research Forests, Ministry representatives, local landowners or licensee representatives should be consulted.

UBC faculty supervisors

Hiring, training and supervision of researchers is the responsibility of the UBC faculty supervisor. 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 sampling or construction activities require specialized skill or equipment (e.g. tree felling, construction), 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](#).

Researchers

Researchers 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 Research Forest staff (or landowner/licensee representatives) and their supervisors of unsafe working conditions.

Sources for more information

The [Wildlife/Danger Tree Assessor's course](#) (Wildlife Tree Committee of BC) modules are online and the following discussion is paraphrased from these modules. There are two prime considerations in determining the risk of injury or damage from tree hazards: i) the level of ground/tree disturbance caused by the planned activity and ii) the tree condition at the time of the planned activity. Additional factors include the weather at the time of the activity and the length of time the worker or installation is exposed.

Procedures

The following points are intended to be consistent with the aims of the Occupational Health and Safety Regulation on Dangerous Trees and the hierarchical approach taken in the Wildlife/Danger Tree Assessor's course workbooks. These procedures apply to work on UBC's Research Forests. Researchers working on crown or private land are advised to consult with Ministry representatives, local landowners or licensee representatives and develop comparable procedures if none are in place.

Definitions:

QUALIFIED PERSON: A person experienced in the specified work activity and who by reason of education, training, experience or a combination thereof, is able to recognize and evaluate hazards associated with trees, with due regard for the anticipated work activity and possible disturbance of the tree. For our purposes a researcher who has participated in a field safety workshop offered by the UBC Research Forests/Faculty of Forestry qualifies for this designation.

CERTIFIED DANGER TREE ASSESSOR: Someone who has passed one or more of the Wildlife/Danger Tree Assessor's course modules sponsored by the Wildlife Tree Committee of BC, and who holds a valid certificate dated since November 1998.

Research activities will be divided into 3 groups:

Group 1 - Activities such as surveying or sampling that produce very low disturbance levels with visits to plots at infrequent intervals (< 2 per year) and for short duration each time. Contact with live or dead trees includes taking routine tree measurements such as dbh, height and taking increment coring. These are equivalent to very low disturbance level activities (less than Level 1) as described in the workshop materials for the Forest Worker and Recreation Site modules of the Wildlife/Danger Tree Assessment Workshop.

Group 2 - Some studies produce very low level disturbance but require frequent visits (e.g. ≥ 3 per year) to plots and sustained work in plots. Contact with live or dead trees includes taking routine tree measurements such as dbh, height and taking increment coring. These are equivalent to very low disturbance level activities as described in the Forest Worker (less than Level 1) and low disturbance level (Level 1) in the Recreation Site modules.

Group 3 - Some studies require use of power equipment, permanent expensive or high-use infrastructure (e.g. weirs) etc. Contact with live or dead trees includes climbing or resting ladders, or use of pole-pruners. These studies are equivalent to disturbance Level 1 and greater and the specific disturbance Level will be assigned according to standard WCB criteria.

Dangerous tree assessments will be conducted:

In areas where *Group 1* activities occur, workers should be on the lookout for tree hazards. Formal inspections by certified assessors are not required, but can be requested.

In areas where *Group 2* activities occur, certified assessors will assess dangerous trees, mark them with paint in the field and notify Research Forest staff of dangerous tree locations. Dangerous trees will be assigned to one of 3 classes:

- Class A – (marked with a blue X on both sides at BH) dead trees with no evidence of significant decay, defect or lean.
- Class B – (marked with a red X on both sides at BH) dead trees with evidence of significant decay, defects or lean but that do not appear to be in imminent danger of falling.
- Class C – (marked with a red ⊗ on both sides at BH) dead trees with evidence of significant decay, defects or lean that are in imminent danger of falling.

Research Forest staff will complete the initial assessments and marking for new research installations. Re-inspection by qualified persons will occur in conjunction with measurement or other research activities.

As the condition of dead trees deteriorates over time, the tree class will be upgraded, the markings will be changed as appropriate, and Research Forest staff will be updated on dangerous tree locations. If a tree is upgraded to Class C, then the research supervisors will also be notified.

In areas where *Group 3* activities occur and along road rights-of-ways, the standard WCB practices on dangerous tree assessment will be followed.

Safe work practices will be followed:

For *Group 1-3* activities, workers must wear hardhats when working under forest canopies or in the vicinity of forest operations, and must inspect their jobsites for tree hazards before commencing work.

Group 2 activities – workers will travel to and from their plots in a manner that minimizes their exposure to tree hazards, will inspect their travel routes and plot locations for marked trees and unmarked hazards. Short or longer duration work can be conducted in the vicinity of Class A trees. Work can be conducted in the vicinity of Class B trees for very short periods. For longer periods, a co-worker must be present to act as a spotter. No work of any kind should be conducted in the hazard area adjacent to Class C trees, and travel routes between plots should be planned to avoid these locations.

Prior to the establishment of plots, the vicinity should be inspected for the presence of Class A-C trees. Trees may progress from Class A through C relatively quickly. Researchers should plan their plot locations accordingly and be prepared to abandon plots if necessary for worker safety. After consultation with Research Forest staff and other researchers, it may be acceptable to have dangerous trees felled by qualified fallers or push down heavily leaning dangerous trees. Be aware that this decision may impact other research projects. Access routes for *Group 2* activities should be located to minimize exposure to Class B trees and avoid Class C trees. It may be necessary to periodically re-route access routes to avoid new Class C trees.

In areas where *Group 3* activities occur, and along road rights-of-ways, the standard WCB practices on dangerous tree management will be followed. If the standard management practices (no work zone or tree removal) jeopardize experimental objectives, case-specific practices will be developed through consultation by Research Forest staff, researchers and the WCB. For example, in some cases, the object of study is the dangerous tree itself. In these cases, at least one member of the research team should be a certified Wildlife/Danger Tree Assessor. Each tree should be assessed for hazards before commencing measurements. Workers should work in pairs, with one acting as a spotter. Where it is necessary to inspect the tree above head height, self-supporting orchard-style (3-point) ladders should be used rather than resting ladders directly against the tree or climbing the tree. Workers should wear hard-hats or climbing helmets.

Regardless of the level of disturbance caused by the work activity, the likelihood of tree failure increases during severe weather – particularly high winds, heavy snowfall or ice loading. Weather

conditions should be monitored during field activities and workers should leave the woods if conditions deteriorate. Tree hazards should be re-assessed following severe weather events.

Researchers will receive training:

All workers should be aware that the forest environment is dynamic, that tree and other hazards exist, and that they must take prime responsibility for their personal safety while travelling or working in the woods.

All researchers conducting *Group 2 or 3* work must attend a safety orientation session that includes discussion of tree hazards and safe working practices. It is the responsibility of research supervisors to ensure that researchers have adequate training and equipment.

Research Forest staff will assist with delivery of yearly safety orientation sessions on campus or at MKRF.

Research Forests will have several staff members with Wildlife/Danger Tree Assessor certification.

It is recommended that at least one member of a research group in which *Group 2 or 3* activities predominate will obtain Danger Tree Assessor certification.

Policy Item R26.11-1

RE: Forestry Operations - General Requirements - Dangerous Trees (Removal Prior to Silviculture Activities)

BACKGROUND

1. Explanatory Notes

Section 26.11 sets out the requirements for removal of dangerous trees where forestry operations are taking place.

2. The Regulation

Section 26.1:

"dangerous tree" includes any tree that is hazardous to workers because of location or lean, physical damage, overhead hazards, deterioration of the limbs, stem or root system, or a combination of these.

Section 26.11:

- (1) If work in a forestry operation will expose a worker to a dangerous tree, the tree must be removed.
- (2) Trees that will interfere with rig-up, the movement of lines and equipment, or that could be pushed or pulled into the work area must be removed.
- (3) Saplings over 6 m (20 ft) tall, in an area where cable logging is being done, must be moved before yarding commences.
- (4) If it is not practicable to comply with subsection (3), such as during partial cutting operations, alternative work methods or procedures which minimize the risk to workers may be used, and the work must be directed by a supervisor who has, as far as practicable, controlled the danger to any worker.
- (5) Any dangerous tree, regardless of height, located within an active hand falling or cable logging operation must not interfere with safe falling or yarding practices, and if it does interfere, it must be removed.
- (6) A dangerous tree in a forestry operation may be left standing during operations other than construction or harvesting ifM
 - (a) no significant ground vibrations are likely to be produced,
 - (b) no work will be done within reach of the tree when wind speed exceeds 20 km/h (12 mph), and
 - (c) a tree assessor who has completed a training program acceptable to the board determines that the tree will not be dangerous to workers during the planned activity.
- (7) If tree planting is to be done in an area that has more than 500 dangerous trees per hectare, the board may approve a request to work without removing all the dangerous trees if, before work commences,
 - (a) a representative sample of the dangerous trees is assessed by a tree assessor who has completed a training program acceptable to the board,
 - (b) any findings of the assessment as to the removal of dangerous trees or other trees are implemented, and

- (c) no silviculture is done within reach of dangerous trees when wind speed exceeds 20 km/h (12 mph).

POLICY

Silviculture activities include tree planting, juvenile spacing, tree thinning, surveys, cone collecting, brush or weed control and chemical use in tree thinning practices.

Except where sections 26.11(6) and 26.11(7) apply, the responsibility for ensuring that dangerous trees are removed rests with the B.C. Ministry of Forests, owner, licensee or contractor responsible for the work. The felling of dangerous trees is not to be carried out in conjunction with silviculture activities. Dangerous tree removal must be undertaken before silviculture workers are permitted into the hazard area. It is also the B.C. Ministry of Forests, owner, licensee or contractor's responsibility to ensure all falling activities are carried out by trained and competent fallers. Failure to comply with these requirements will result in orders being issued on the B.C. Ministry of Forests, owner, licensee, or contractor.

This policy does not relieve any sub-contractor of responsibility for compliance with the *Regulation*.

PRACTICE

For any relevant PRACTICE information, readers should consult the Prevention Division's Guidelines available on the WCB website.

EFFECTIVE DATE:	April 1, 2001
AUTHORITY:	s.26.11, <i>Occupational Health and Safety Regulation</i>
CROSS REFERENCES:	s. 118, <i>Workers Compensation Act</i> , ss. 26.2 and 26.21, <i>Occupational Health and Safety Regulation</i>
HISTORY:	Replaces Policy No. 60.14 of the Prevention Division <i>Policy and Procedure Manual</i>
APPLICATION:	This Item results from the 2000/2001 "editorial" consolidation of all prevention policies into the <i>Prevention Manual</i> . The POLICY in this Item merely continues the substantive requirements of Policy No. 60.14, as they existed prior to the Effective Date, with any wording changes necessary to reflect legislative and regulatory changes since Policy No. 60.14 was issued.

Field Trip Safety Contract (Wood Science Example)

To ensure that a safe and healthful environment is maintained, all personnel are required to read and follow the Safety Regulations. To indicate that you have read and understand the safety regulations, you are asked to sign and date this upon completion of the safety session.

1. All students are required to transport on chartered transportation during the field trip;
2. No student is allowed to travel on their own, unless getting permission from both instructors;
3. No alcohol is allowed on the bus;
4. Do not walk far away from the bus during break and return to bus before the break ends;
5. Personal Protective Equipment (PPE) must be worn at all times while in the mill or field;
6. No loose clothing or jewellery may be worn
7. While in the mill or research forest, all students are required to follow the tour guides and only walk along the designated route. Do not leave the group;
8. Students are not allowed to touch any machine or products, unless permission is granted;
9. Cell phone usage is prohibited during the tours; (unless explicitly permitted by the tour guide)
10. No food or drink in the mills;
11. Absolutely no "horse play" or running inside the mills;
12. No unnecessary loud noises or yelling. This can startle or distract personnel operating dangerous machinery;
13. Wear appropriate clothing in the research forest for possible adverse weather conditions, such as rain, cold, and wind;
14. Approved personal floatation device (PFD) or life jacket is mandatory for any water activities;
15. No alcohol is allowed on a boat/kayak/canoe or immediately prior to using the boat/kayak/canoe;
16. Inform your instructors before hiking in the forest near Gavin Lake, and students should not hike alone in the forest

I, _____, with student number _____ have read
(please print)

and agree to abide by the safety regulations as set forth above and also by any additional printed instructions provided by the Facility Supervisor and/or Technician.

Date

Student Signature

Emergency Contact Information

Name: _____ Phone #: _____ Relationship to you: _____

Name: _____ Phone #: _____ Relationship to you: _____