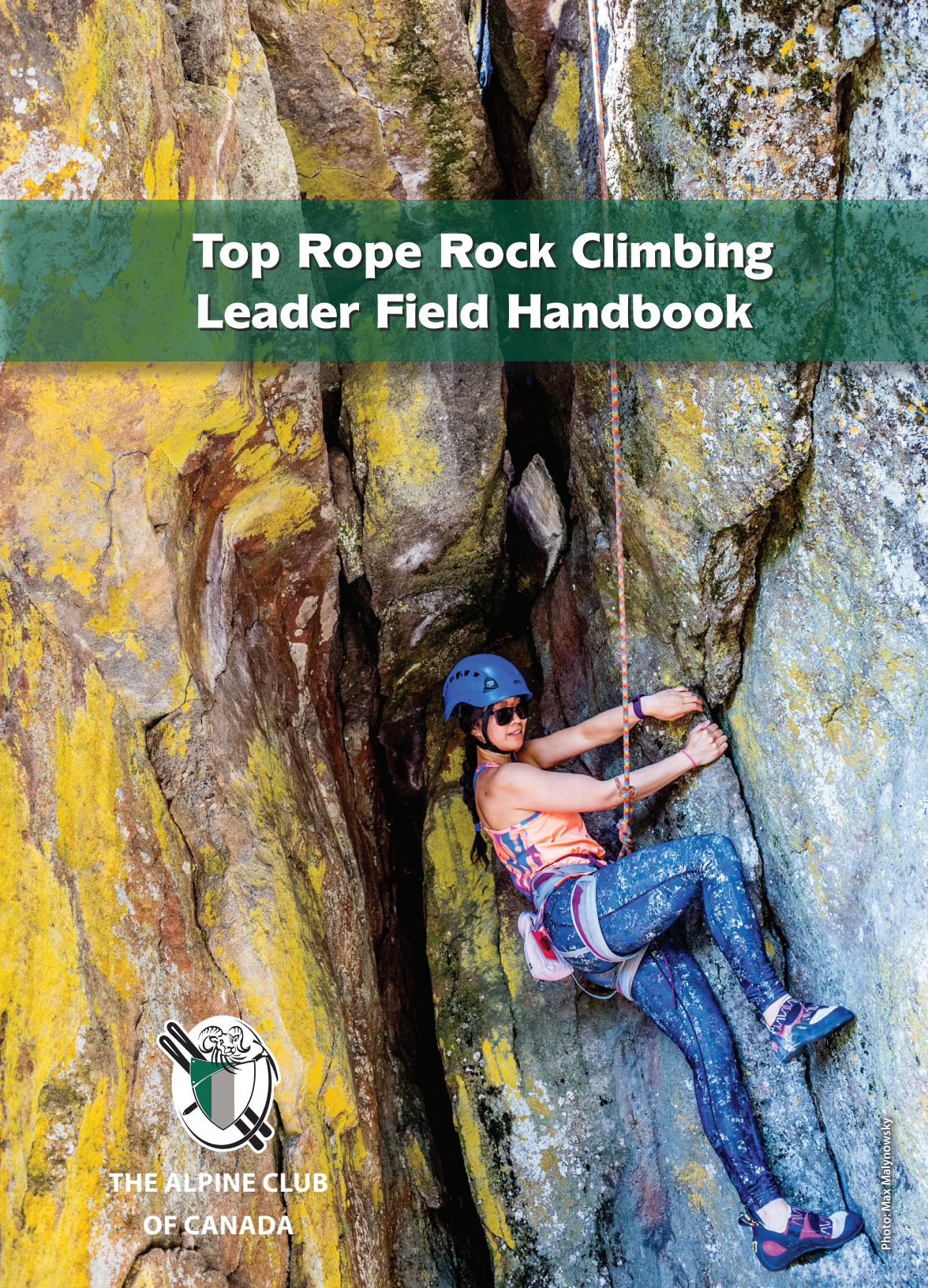
Top Rope Rock Climbing Leader Field Handbook



THE ALPINE CLUB OF CANADA

Photo: Max Malynowsky

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Foreword

The Alpine Club of Canada's (ACC) passionate volunteer leaders have expressed a desire for a nationally-supported training program that recognizes the diversity of ACC trip leaders and their roles in the various types of trips they lead in Sections across Canada. The ACC's Section representatives and Board of Directors have expressed concern at lack of a standardized national training curriculum. Previous attempts, over the last four decades, to provide standardized leader training materials (developed by national panels, mountain professionals or external consultants) were not well-received.

The approach taken in developing this field manual (and associated materials) recognizes that past attempts to develop curricula and training materials failed, largely because they were developed using a top-down approach whereby the Sections and their volunteer leaders were merely the recipients of materials at the end of a process. Past Leadership Development Committee (LDC) co-chairs Zac Robinson and Cyril Shokoples proposed the opposite, whereby the Sections and their leaders would be involved right from the beginning in identifying volunteer leader types, associated competencies and appropriate levels of proficiency, to be considered "really excellent leaders".

The process proposed by the LDC, and endorsed by Section Council and the Board of Directors, was driven by ACC volunteer leader input and participation. The LDC merely acted as facilitators, coordinating the process and ensuring results met ACC members' expectations. All ACC Sections were invited to appoint a volunteer leader to participate in an ACC Competency Profile working group (ACP). ACP reps were active volunteer leaders who were familiar with their Section's own leadership needs and current training practices. After establishing an initial list of leader types found nationally, ACP representatives and LDC members met to finalize the list and draft a competency profile for each leader type. Resulting "DACUM" charts list competencies and related learning objectives.

Past LDC member Sandra Bowkun was instrumental in working with LDC members and the ACP reps to ensure the competency profiles captured their intent. Draft profiles were sent to ACP reps for their review, and then shared with other volunteer leaders, for further input. A final set of 15 competency profiles was endorsed by the ACP reps, and by Section Council and Board of Directors.

With Section input, ACP reps then prioritized the development of training materials for their top three leader types: Top Rope Rock

Climbing Leader, Winter Backcountry Leader (av), and Summer Mountaineering Leader. In addition, the ACP reps ranked a list of course goals addressing the competency profiles for each leader type based on their Section's view of the highest-priority learning objectives for each competency. Section Council then directed the LDC to begin developing a training module for the Top Rope Rock Climbing Leader.

Both the ACP and LDC recognize there are numerous skilled and competent volunteer leaders currently active in ACC Sections, and not all of them will have high proficiency in every competency identified in the applicable profile. It is not the intent of the LDC or the ACP reps to define the minimum levels of proficiency in each competency for a given leader type necessary to lead Section trips. The relative importance or necessity for proficiency in each competency varies across the country according to the context in which each Section operates. It is therefore up to individual Sections to decide which competencies are absolutely necessary for the various leader types in their context, and what appropriate minimum levels of proficiency are in each competency relative to their Section's needs.

Aspiring volunteer leaders can consider the Competency Profile to represent the ACC's definition of what skills an exceptional volunteer leader would have or aspire to develop. It is possible that volunteer leaders already leading Section trips may not have the highest levels of proficiency in all competencies. This should NOT be taken to mean they are no longer qualified to continue leading Section trips; rather, the competency profile can be used by these individuals as a road map for continued personal leadership development.

This handbook follows competencies in the Top Rope Rock Climbing Leader Competency Profile. Together with an accompanying Instructor Agenda, Lesson Plans, Participant Evaluation Form and Competency Vetting Form, it forms a complete module intended to facilitate training of volunteer Top Rope Rock Climbing leaders by qualified ACC volunteers, professional outdoor educators, or guides. Individual ACC Sections may choose to simply refer to the module to augment existing Section training materials, or use it as the basis for their own local volunteer training programs. They may choose to use volunteers from within their own or other Sections, or professional instructors, in the delivery of all or some of the materials presented.

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Introduction

The purpose of this field handbook is to support the Alpine Club of Canada's top rope leader training program, as well as to act as an ongoing resource for top rope leaders. It is designed to highlight techniques and applications commonly used by top rope leaders to assist in the delivery of a successful top roping outing.

TARGET AUDIENCE

The directed audience for this field handbook includes experienced recreational climbers, with some prior basic group management experience, who are confident lead climbers and technically proficient with basic climbing systems, and who possess current first aid training. Additionally, it is designed for aspiring leaders who are in the process of increasing their recreational climbing knowledge and abilities, and as a reference resource for top rope leaders who have successfully completed the Top Rope Leader Training program.

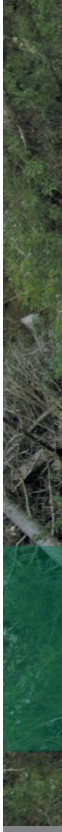
LIMITATIONS

This field handbook strives to provide information specific to common, or routine, top rope climbing and group management scenarios. However, it is not all encompassing and cannot account for all potential situations or circumstances. It is therefore expected that in addition to this manual, top rope leaders are capable of exercising good judgement and situational awareness.

DISCLAIMER

The information contained in this field handbook has been obtained from equipment manufacturers, industry best practices, applications promoted by the Association of Canadian Mountain Guides, and the policies of the Alpine Club of Canada. Every care has been taken to ensure that the information contained herein is accurate and current. However, the content of this field handbook is subject to change as equipment, techniques, and best practices evolve. Therefore, the field handbook should be used as a resource guide only.

The author, publisher, The Alpine Club of Canada, its board, directors and officers, and employees are not responsible for the results of any actions taken by users of the information contained in this book. Climbing is an inherently dangerous activity that you pursue at your own risk.



Designing a Top Roping Outing

A successful top roping outing starts well before the actual top roping day begins. Careful planning and diligent preparation significantly increase the probability that the top roping outing will be a success. In this chapter we will explore key aspects specific to the planning and design of a top roping day.

Pre-Trip Planning

The first step in organizing a top roping outing involves basic pre trip planning. This planning will enable the leader to determine the suitability of the trip for varying participant abilities, and ensure that the venue and objectives are appropriate.

ESTABLISHING TRIP OBJECTIVES

Establishing clear trip objectives early in the planning process will enable the top rope leader to choose the most suitable venue for the outing. It will determine necessary participant prerequisites, equipment requirements, participant to top rope leader ratios, and overall feasibility. Common top roping outing objectives may include:

- Introducing first time climbers to the sport;
- Teaching basic movement skills;
- Teaching rope handling and equipment proficiency skills;
- Continued development for intermediate climbers; and
- Team work and trust building.

SELECTING A CLIMBING VENUE

Based on the established objectives for the top roping outing, the leader can then select the most ideal venue for the trip. The ideal venue should possess the following characteristics:

- Easily accessible and front-country;
- Offer a variety of routes at grades appropriate to the objectives;
- Facilitate the set-up and take down of top rope anchors;
- Minimal, or easily managed natural hazards;
- Have well defined areas to belay from; and
- Be of an adequate size to accommodate both the top roping group as well as other recreational users.

Climbing grades:

Prior to selecting specific routes for the outing, the leader must first determine the level of difficulty appropriate for the objectives. If the objective is directed towards first time climbers, the level of difficulty of the routes should be kept relatively low to ensure participant success and a positive introduction to the sport. Routes 5.6 and below, are typically achievable objectives for active and physically fit individuals new to the sport. If the objective is to challenge experienced climbers, the level of difficulty may be increased to include climbs 5.7 and harder.

Grade		Comments
5.3		Big holds, low-angle routes
5.3		
5.3		
5.5		
5.5		
5.6		
5.7		Angle is steep or steepening, holds are shrinking.
5.8		
5.9		
5.10a	5.10b	Requires training.
5.10c	5.10d	Missing holds, sections appear blank.
5.11b	5.11c	Tiny holds; requires advanced technique.
5.11d	5.12a	Complex sequencing.
5.12b	5.12c	Really difficult.
5.12d	5.13a	
5.13b	5.13c	Specific training.
5.13d	5.14a	
5.14b	5.14c	Very overhung, few holds widely spaced.
5.14d		Near the limit of what can be climbed.

Selecting routes:

Once the desired level of difficulty has been determined, the top rope leader can then familiarize themselves with routes at the desired grade, and confirm that the venue is still suitable for the outing. When selecting routes for a top roping outing the following characteristics are desirable:

- Routes in close proximity to one another to allow for easy participant supervision;
- Routes that require or reinforce specific climbing movement, if the objective is movement specific;
- Routes devoid of loose rock and other hazards;
- Routes without excessive rock-polishing;
- Routes that offer shade in the heat of the summer, routes that offer sun during colder shoulder seasons;
- Routes that facilitate emergency response in the event it is required; and
- Routes that are not common lead-climbing objectives for recreational climbers.

It is important that the top rope leader understand the impact a group of top roping climbers may present to recreational users sharing the venue. Large groups using the same routes throughout an entire day may prohibit recreational users from accessing their desired routes. The leader should be cognisant of other users.

Permit Requirements:

Many Provincial and National parks require user permits, and in some instances activity or front-country use permits may also be required. Prior to offering a top roping outing a top rope leader must determine if any, and what, permits are required. They must also determine what, if any, stipulations the permit presents, and who will be responsible for obtaining the permit or permits prior to the outing.

Seasonal/Unusual Closures, and Access Issues:

Many popular top roping climbing venues are subject to seasonal or periodic closures for a variety of reasons. Often the closures may be related to ecological sensitivities. In other instances, the closures may be a result of industry operating in the same area or vicinity as the climbing venue. It is important that the top rope leader research the venue and ensure that no closures are in place.

Occasionally the top roping venue itself may not be closed, but the roads, trails, or lands used to access the venue may be under a closure. In these instances, it is imperative that the top rope leader research alternative access points to the venue. If no alternate access to the venue exists, the leader must select a different location.

EMERGENCY RESPONSE AND EVACUATION PLANNING

Once a venue has been selected it is imperative that the top rope leader research and develop emergency response and evacuation plans for the site. These plans should contain the information that would be required to either self rescue or contact organized rescue support in the event of an accident. Important information to be included in the emergency response and evacuation plan would be:

- Accessibility to reliable communication (cell phone coverage, nearby land lines or pay phones, satellite phone, personal locator beacon [PLB], radio);
- Emergency contact phone numbers or radio frequencies (EMS, Parks, etc.)
- Options for self rescue;
- Access and egress points based on incident location;
- Access to organized rescue, fire, ambulance, public safety, and volunteer rescue services; and
- Location details (location description, coordinates, terrain details).

DETERMINING PARTICIPANT PREREQUISITE REQUIREMENTS

Once the objectives have been determined and the venue selected, the top rope leader should then determine what type of participants the trip is suitable for. Criteria such as age, experience, and ability should be considered when determining participant requisite requirements.

Some venues may not be suitable for specific participant demographics. Access to a venue that involves moving through exposed terrain, or a venue where the top or base area is significantly exposed, would not be advised for participants who are inexperienced.

Depending on the objectives of the outing and the layout of the venue, prerequisite experience may be required. Climbing that is intermediate in nature, requires belaying from above, requires the participant to recognize and mitigate minor objective hazards (such as loose rock), or that involves access through challenging terrain, should stipulate previous experience requirements.

DEFINING TOP ROPE LEADER TO PARTICIPANT RATIOS

The appropriate ratio between top rope leaders and participants will vary depending on the objectives of the outing, the proximity of the intended climbs to one another, the experience level of the group, the age of the group, the experience level of the leader, the leader's familiarity with the area, and the terrain where belaying activities will be completed from.

Leader Familiarity with the Area:

Whenever possible, top rope leaders should avoid taking participants to a venue they are not personally familiar with. In situations where no other options exist and the leader must deliver a top roping outing at a venue that is unfamiliar, they should decrease the participant ratio to accommodate for their lack of knowledge and experience in the area.

Recommended Ratios:

An ideal setting is one where the participants are experienced, the climbs are in close proximity to one another allowing for easy supervision by the leader, the leader is experienced, the base area is flat with no objective hazards, and the participants

are focused. In situations where the participants or leader lack experience, the venue presents significant objective hazards, or the participants are minors, the ratio of participants to leader(s) should be decreased accordingly. In situations where the climbs are spread out limiting the leader's ability to supervise more than one climb at a time, ratios may need to be further decreased to ensure adequate supervision of the group.

Developing Pre-Trip Communication with Participants

Initial communication between the trip leader and participants will begin to build rapport with participants and set the tone for the top roping outing. Participants need to be acutely aware of the trip objectives, the venue, the access, driving directions, what is expected of them, and what the leader will be responsible for. Early communication with participants also allows the top rope leader to gain information specific to the participants, and modify the objectives slightly to best meet the participants' needs.

EQUIPMENT AND CLOTHING LIST

Top rope leaders are often responsible for ensuring that technical equipment specific to the activity such as ropes and anchor materials are available for the outing. Participants may be responsible for ensuring that personal gear such as clothing, harness, helmet, climbing shoes, day pack, food and water, etc., are brought. A sample list that could be provided to participants prior to their participation in a top roping outing is:

Personal Equipment:

- Climbing helmet;
- Sunglasses;
- Sunscreen;
- Lip balm;
- Harness;
- Belay device;
- Locking carabiner;
- Climbing shoes;
- Light weight hiking boots or approach shoes;
- Back pack, minimum 40 litres;
- Water bottle, minimum 2 litres;
- Personal first aid kit;
- Personal medications.

Clothing:

- Sun hat;
- Toque;
- Short sleeved top;
- Long sleeved top;
- Insulating layer;
- Light-weight insulating bottoms;
- Waterproof shell jacket;
- Climbing pants;
- Waterproof shell pants;
- Warm socks;
- Gloves with leather palms (optional for cool days).

Group Equipment:

- Dynamic climbing ropes;
- Anchor materials;
- Group first aid kit;
- Tarp or emergency shelter;
- Emergency communication device;
- Adjustable wrench;
- Hangers and nuts (optional);
- Improvised rescue equipment.

LAYERING

Appropriate layering ensures the comfort of the leader, and of the participants throughout the day in a multitude of conditions. Appropriate layering will enable participants to stay warm when it is cool, and avoid overheating when it is warm. Layers are commonly separated into three categories; a base layer that sits next to the skin, a mid layer that traps in heat, and an outer layer that protects from the elements such as wind, rain, and snow.

Characteristics of Base Layers:

- Should wick moisture away from the skin;
- Should be lightweight;
- Should be close fitting;
- Should have flat seams to avoid chaffing;
- Should be constructed of a material that dries quickly and is breathable;
- Common base layer fabrics include: synthetics such as polyester or natural materials such as wool.

Cotton articles should be avoided in climates that are cool and/or damp. This includes cotton base, mid, and outer layers. That said, on a warm and dry summer day a cotton t-shirt or pants, may be desirable climbing clothing.

Characteristics of Mid Layers:

- Should be light-weight;
- Should be air permeable;
- Should be compressible and packable;
- Should provide insulation and warmth;
- Should fit comfortably over a base layer, but still fit close to the body;
- Common mid layer materials include: synthetics like fleece and lofts, and down.

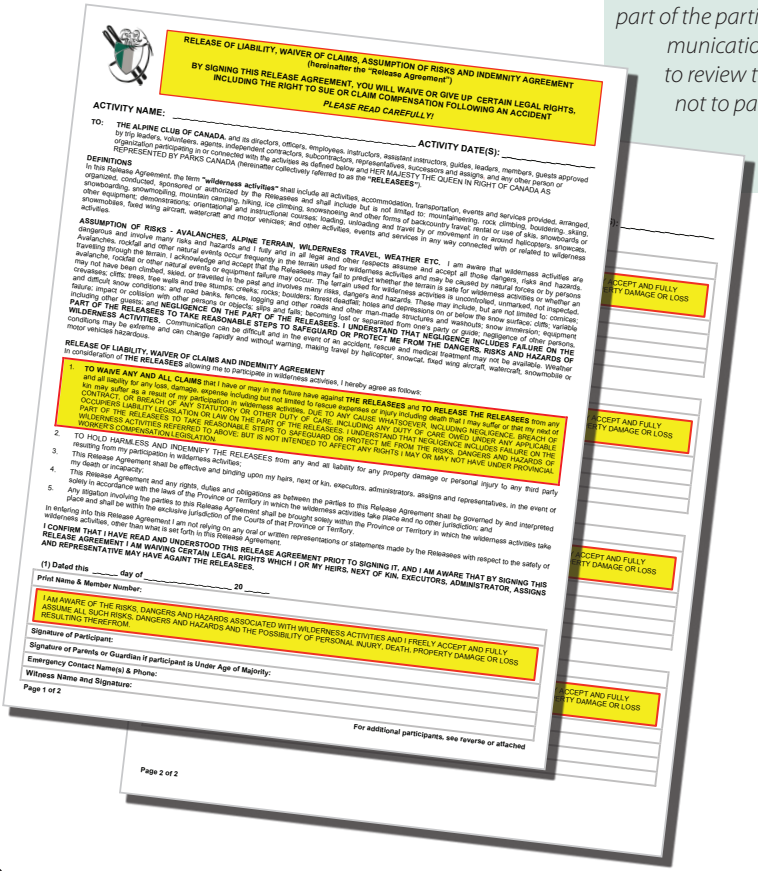
Characteristics of Outer Layers:

- Should block the wind;
- Should block precipitation;
- Should be breathable;
- Should fit comfortably over base and insulating layers;
- Should allow freedom of movement;
- Common outer layer materials include: breathable hard shell nylon materials, and softshell nylon materials.

WAIVER DOCUMENTS

Waivers are commonly used to transfer responsibility and highlight risks associated with top rope climbing activities. It is recommended best practice to provide participants with waivers in advance of the top roping outing so they can familiarize themselves with the risks specific to their participation, and ensure they are comfortable and accepting of them.

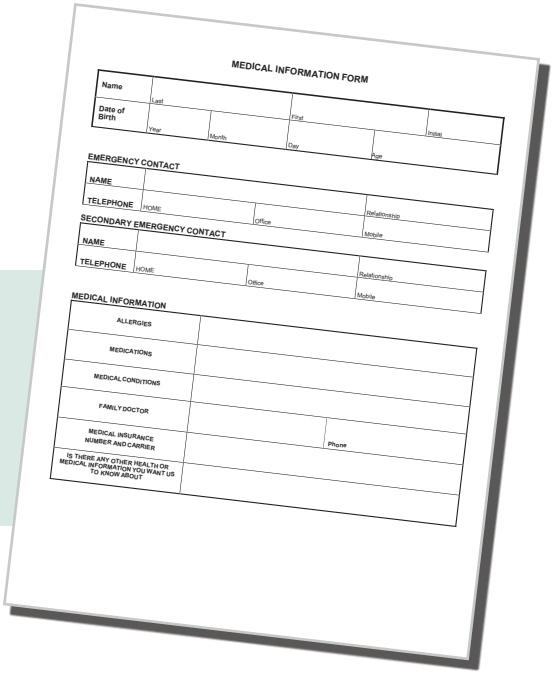
Participant waivers should be signed in blue or black ink, in person, at the commencement of the top roping outing. Providing the waivers as part of the participant pre-trip communication allows participants to review the waiver, and choose not to participate in the activities without any element of duress.


RELEASE OF LIABILITY, WAIVER OF CLAIMS, ASSUMPTION OF RISKS AND INDEMNITY AGREEMENT
(hereinafter the "Release Agreement")
BY SIGNING THIS RELEASE AGREEMENT, YOU WILL WAIVE OR GIVE UP CERTAIN LEGAL RIGHTS, INCLUDING THE RIGHT TO SUE OR CLAIM COMPENSATION FOLLOWING AN ACCIDENT
PLEASE READ CAREFULLY!
ACTIVITY NAME:
ACTIVITY DATE(S):
TO: THE ALPINE CLUB OF CANADA, and its directors, officers, employees, instructors, assistant instructors, guides, leaders, members, guests approved by trip leaders, volunteers, agents, independent contractors, subcontractors, representatives, successors and assigns, and any other person or organization participating in or connected with the activities as defined below and HER MAJESTY THE QUEEN IN RIGHT OF CANADA AS REPRESENTED BY PARKS CANADA (hereinafter collectively referred to as the "RELEASEES").
DEFINITIONS
In this Release Agreement, the term "wilderness activities" shall include all activities, accommodation, transportation, events and services provided, arranged, organized, conducted, sponsored or authorized by the Releasees and shall include but is not limited to: mountaineering, rock climbing, bouldering, skiing, snowboarding, snowshoeing, mountain camping, hiking, ice climbing, snowscooping and other forms of backcountry travel; rental or use of skis, snowboards or other equipment; demonstrations; orientational and instructional courses; loading, unloading and travel by or movement in or around helicopters, snowcats, snowmobiles, fixed wing aircraft, watercraft and motor vehicles; and other activities, events and services in any way connected with or related to wilderness activities.
ASSUMPTION OF RISKS - AVALANCHES, ALPINE TERRAIN, WILDERNESS TRAVEL, WEATHER ETC. I am aware that wilderness activities are dangerous and involve many risks and hazards and I fully and in all legal and other respects assume and accept all those dangers, risks and hazards. Avalanches, rockfall and other natural events occur frequently in the terrain used for wilderness activities and may be caused by natural forces or by persons travelling through the terrain. I acknowledge and accept that the Releasees may fail to predict whether the terrain is safe for wilderness activities or whether an avalanche, rockfall or other natural events or equipment failure may occur. This terrain used for wilderness activities or whether an may not have been climbed, skied, or travelled in the past and involves many risks, dangers and hazards. These may include, but are not limited to: comices; crevasses; cliffs; trees, free walls and tree stumps; creeks; rocks; boulders; forest deadfall; holes and depressions on or below the snow surface; cliffs; variable and difficult snow conditions; and road banks, fences, logging and other roads and other man-made structures and watercraft; snowmobile or failure; impact or collision with other persons or objects; slips and falls; becoming lost or separated from one's party or guide; negligence of other persons, including other guests; and NEGLIGENCE ON THE PART OF THE RELEASEES. I UNDERSTAND THAT NEGLIGENCE INCLUDES FAILURE ON THE PART OF THE RELEASEES TO TAKE REASONABLE STEPS TO SAFEGUARD OR PROTECT ME FROM THE RISKS, DANGERS AND HAZARDS OF WILDERNESS ACTIVITIES. Communication can be difficult and in the event of an accident, rescue and medical treatment may not be available. Weather conditions may be extreme and can change rapidly and without warning, making travel by helicopter, snowcat, fixed wing aircraft, watercraft, snowmobile or motor vehicles hazardous.
RELEASE OF LIABILITY, WAIVER OF CLAIMS AND INDEMNITY AGREEMENT
In consideration of THE RELEASEES allowing me to participate in wilderness activities, I hereby agree as follows:
1. TO WAIVE ANY AND ALL CLAIMS that I have or may in the future have against THE RELEASEES and TO RELEASE THE RELEASEES from any and all liability for any loss, damage, expense including but not limited to, I assume all those dangers, risks and hazards. kin may suffer as a result of my participation in wilderness activities, DUE TO ANY CAUSE WHATSOEVER, INCLUDING NEGLIGENCE, BREACH OF CONTRACT, OR BREACH OF ANY STATUTORY OR OTHER DUTY OF CARE, INCLUDING ANY DUTY OF CARE OWED UNDER ANY APPLICABLE OCCUPIERS LIABILITY LEGISLATION OR LAW ON THE PART OF THE RELEASEES. I UNDERSTAND THAT NEGLIGENCE INCLUDES FAILURE ON THE PART OF THE RELEASEES TO TAKE REASONABLE STEPS TO SAFEGUARD OR PROTECT ME FROM THE RISKS, DANGERS AND HAZARDS OF WILDERNESS ACTIVITIES REFERRED TO ABOVE; BUT IS NOT INTENDED TO AFFECT ANY RIGHTS I MAY OR MAY NOT HAVE UNDER PROVINCIAL WORKER'S COMPENSATION LEGISLATION.
2. TO HOLD HARMLESS AND INDEMNIFY THE RELEASEES from any and all liability for any property damage or personal injury to any third party resulting from my participation in wilderness activities.
3. This Release Agreement shall be effective and binding upon my heirs, next of kin, executors, administrators, assigns and representatives, in the event of my death or incapacity.
4. This Release Agreement and any rights, duties and obligations as between the parties to this Release Agreement shall be governed by and interpreted solely in accordance with the laws of the Province or Territory in which the wilderness activities take place and no other jurisdiction; and
5. Any litigation involving the parties to this Release Agreement shall be brought solely within the Province or Territory in which the wilderness activities take place and no other jurisdiction; and
In enforcing this Release Agreement I am not relying on any oral or written representations or statements made by the Releasees with respect to the safety of wilderness activities, other than what is set forth in this Release Agreement.
I CONFIRM THAT I HAVE READ AND UNDERSTOOD THIS RELEASE AGREEMENT PRIOT TO SIGNING IT, AND I AM AWARE THAT BY SIGNING THIS RELEASE AGREEMENT I AM WAIVING CERTAIN LEGAL RIGHTS WHICH I OR MY HEIRS, NEXT OF KIN, EXECUTORS, ADMINISTRATOR, ASSIGNS AND REPRESENTATIVE MAY HAVE AGAINT THE RELEASEES.
(1) Dated this _____ day of _____, 20 ____
Print Name & Member Number:
I AM AWARE OF THE RISKS, DANGERS AND HAZARDS ASSOCIATED WITH WILDERNESS ACTIVITIES AND I FREELY ACCEPT AND FULLY ASSUME ALL SUCH RISKS, DANGERS AND HAZARDS AND THE POSSIBILITY OF PERSONAL INJURY, DEATH, PROPERTY DAMAGE OR LOSS RESULTING THEREFROM.
Signature of Participant:
Signature of Parents or Guardian if participant is Under Age of Majority:
Emergency Contact Name(s) & Phone:
Witness Name and Signature:
Page 1 of 2
For additional participants, see reverse or attached
Page 2 of 2

Medical forms

Medical forms enable the top rope leader to familiarize themselves with pre-existing injuries, medical conditions, allergies, and any medications participants may have or require. It is recommended that this information be collected from the participants prior to the outing and reviewed by the leader to ensure the outing is suitable for all members of the group. If medications are required by participants for allergies or pre-existing medical conditions, this provides the top rope leader with the opportunity to remind participants to bring their medications on the trip.

Participant medical information should be sourced prior to the trip, however the forms should be accessible throughout the outing for reference by the leader should a medical incident occur. Personal medical information is subject to Freedom of Information and Privacy laws and must be kept strictly confidential and destroyed following an outing.



MEDICAL INFORMATION FORM

Name: Last, First, Initial

Date of Birth: Year, Month, Day, Age

EMERGENCY CONTACT

NAME

TELEPHONE: HOME, Office, Relationship, Mobile

SECONDARY EMERGENCY CONTACT

NAME

TELEPHONE: HOME, Office, Relationship, Mobile

MEDICAL INFORMATION

ALLERGIES	
MEDICATIONS	
MEDICAL CONDITIONS	
FAMILY DOCTOR	Phone
MEDICAL INSURANCE NUMBER AND CARRIER	
IS THERE ANY OTHER HEALTH OR MEDICAL INFORMATION YOU WANT US TO KNOW ABOUT	

CONTINGENCY PLANS

Participants should also be informed of any potential contingency plans. The trip leader should ensure they have contact information for all participants, in the event last minute communication with participants is needed the morning of the trip. Participants should also be provided with a phone number, or other means of contacting the trip leader on the day of the outing.

Notes:

Preparing for a Top Roping Outing

Following completion of the design phase, it is important to then communicate with participants and prepare for the top roping day. Participants who possess a clear understanding of the day's logistics, activities, and expectations will be far better equipped to achieve the outing objectives. In this chapter we will explore the key information that needs to be conveyed to participants, the requisite weather related information that the top rope leader should research, and the required decision making process as to whether or not to proceed with the outing based on that research.

Coordinating and Communicating with Participants

Early in the preparation stage it is important to coordinate and communicate with participants. This provides them with sufficient time to ensure the trip is suitable for their skill level, they meet any prerequisite requirements, and they are capable of appropriately equipping themselves for the day and arranging transportation to the climbing venue. There are many ways to communicate to participants, however, email is one of the simplest methods to ensure all participants receive consistent and accurate information. Information that must be communicated to participants includes:

- Meeting time;
- Meeting location (parking lot for well established venues, carpool locations, or restaurant/coffee shop, etc.);
- Top rope leader contact information (cell phone number, email);
- Level of risk specific to the activity (site considerations, difficulty of the climbing, and access concerns);
- Prerequisite requirements (previous top roping climbing experience, ability to climb a specific grade, minimum age, etc.)
- Clothing requirements for the day (include clothing list for participants);
- Equipment requirements for the day (include equipment list for participants); and
- Contingency plans for the day (nearby alternate venues, climbing gym, trip cancellation).

Gathering Weather Information

One of the greatest factors in determining the success of a top roping outing, and the level of risk the outing will present, is the weather. Warm, dry, and calm conditions are by far preferable to cool, wet, and windy days when climbing. Being able to anticipate weather occurrences and changes for the duration of the outing enables the top rope leader to adapt the objectives, location, or timing of the outing to increase participant enjoyment and success while also decreasing the level of risk.

RESOURCES FOR GATHERING WEATHER INFORMATION

Current, short-range, and long-range weather forecasts can be quickly accessed online through a variety of sources. During periods of stable and predictable weather, these forecasts tend to be quite accurate and highly reliable. However, during periods of instability or changing weather, the forecasts and modelling upon which they are based, become less reliable and the top rope leader may need to complete further research to obtain an accurate depiction of the weather systems that will affect the outing.

Resources for obtaining a basic weather forecast:

- Environment Canada www.weather.gc.ca/ (radar, satellite, and jet stream mapping);
- The Weather Network www.theweathernetwork.com/ca;
- Accuweather www.accuweather.com;
- Spot Weather Forecast www.spotwx.com;
- Televised weather stations; and
- Weather Radio Canada: frequency (MHz) 162.40

Resources for obtaining a more detailed understanding of the weather systems:

- Environment Canada www.weather.gc.ca/radar.

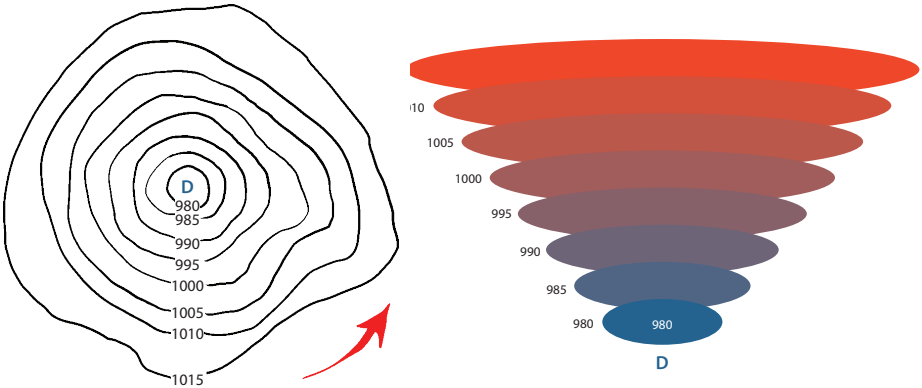
UNDERSTANDING BASIC WEATHER

Weather is a combination of atmospheric pressure, atmospheric humidity, air temperature, elevation, and wind. These variables combine to create localized weather systems, widespread weather patterns, and changes in weather conditions. In the context of preparing for a top roping outing, it is crucial that the top rope leader explore the weather forecast, and at times complete further research to obtain a solid understanding of the anticipated weather for the day. Widespread weather systems are typically easy to predict, however localized weather can at times be more challenging. Understanding if the weather will be poor for an entire day, or just for brief periods during the day, will enable the top rope leader to determine if they should proceed with the trip, reschedule, or implement contingency plans.

Atmospheric Pressure:

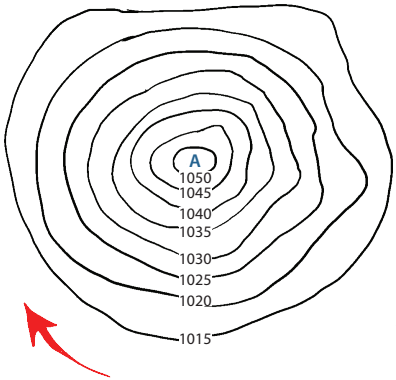
Atmospheric pressure is essentially the measurement of air density and is commonly measured in either hectopascals, kilopascals, or millibars. Atmospheric pressure gives an overall sense of the widespread weather systems throughout a region, and is commonly viewed on a large scale pressure map that enables the viewer to identify areas of both high and low pressure.

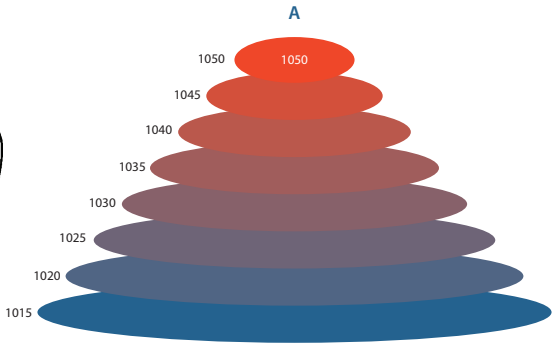
As air warms it rises and expands creating lower pressure at the earth's surface. The continual upward movement of the air mass can create strong winds and overall instability of the pressure centre. Warm air tends to be more humid and as it rises and cools, precipitation often develops. During the summer months this precipitation comes in the form of rain and thunderstorms, and in the winter months, it comes in the form of snow. A low pressure system will show increasing pressure outward when viewed on a large scale pressure map.



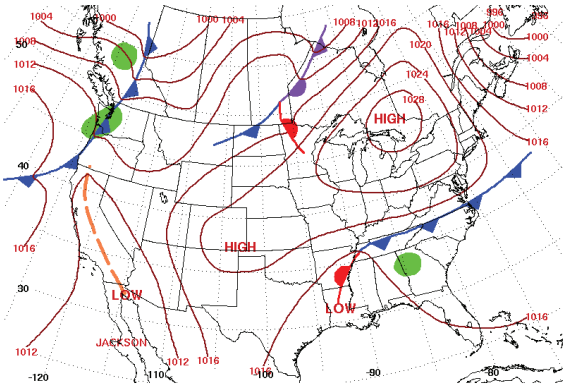
Jet streams are narrow bands of strong wind high in the atmosphere that steer weather systems and transfer heat and moisture around the globe. The local weather that we experience is related to high and low pressure systems and fronts, however, jet streams high in the atmosphere impact their movement and impact their trajectory and speed.

As air cools it contracts creating higher pressure at the earth's surface. A high pressure system draws air downwards often creating calm wind conditions and overall stability of the air mass. Cool air tends to be dry and lack humidity, therefore, a high pressure system is typically not characterized by notable precipitation. A high pressure system in the summer usually offers calm, comfortable climbing conditions, whereas in the winter a high pressure system may bring with it extreme cold and clear conditions. A high pressure system will show decreasing pressure outward when viewed on a large scale pressure map.





Decreasing pressure often signifies worsening weather conditions, whereas rising atmospheric pressure tends to indicate improving conditions. A rapid change in the pressure often signifies a shorter but more intense shift in the weather, whereas a slow and steady change in the pressure typically indicates a change that will last for an extended period of time. Changes in the atmospheric pressure are typically characterized by both ground and high level winds.



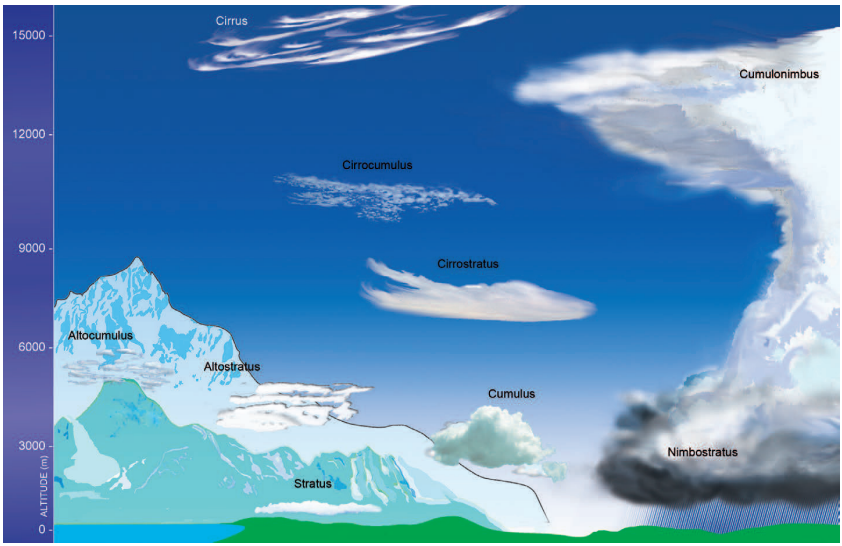
Surface Weather Map at 7:00 A.M. E.S.T.

The location where two air masses converge is referred to as a front. Fronts are often depicted on weather maps with modelling that illustrates the anticipated trajectory and speed of the front. Cold fronts are typically shown in blue to delineate where a cold air mass is replacing a warm air mass, whereas warm fronts are typically shown in red to define warm air replacing cold air.

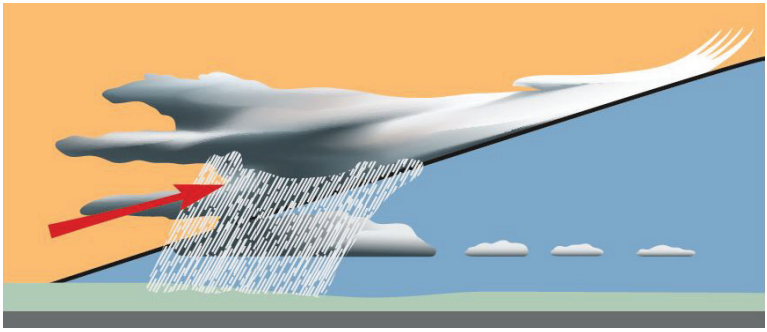
Coriolis Effect: as pressure systems travel across the earth they do not move in straight lines. The rotation of the earth, the earth's strata, and high level atmosphere winds, such as jet streams, cause rotation in the air mass, and weather systems that are circulating in nature.

Interpreting Clouds:

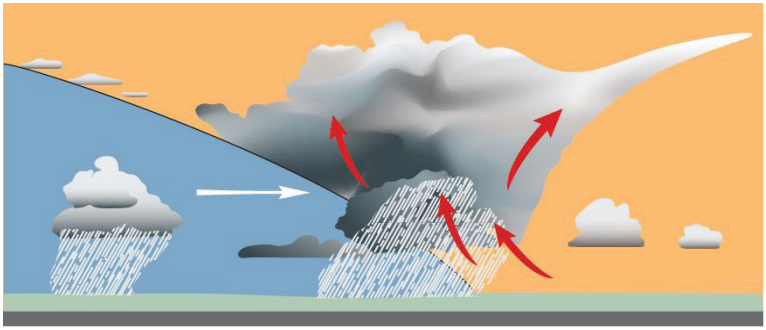
The ability to identify and understand cloud formations will assist the top rope leader in identifying changes in the weather prior to their top roping outing, as well as throughout the day. Clouds are commonly categorized as either cumulus which indicate a vertical development, or stratus, which are clouds that form horizontally. Clouds between 2000-6000 metres, are commonly given the prefix 'alto' whereas clouds above 6000 metres are coined 'cirrus'.



Different cloud formations indicate the arrival of different weather systems. High cirrus clouds will be visible prior to the arrival of a low pressure system or warm front. Cirrus clouds will commonly be visible before the weather changes are felt at a ground level. Initial cirrus cloud formation will precede the ground level weather changes because the warm air mass moving in is less dense and will overlay the cooler air mass. The initial high cirrus clouds are commonly followed by cirrostratus clouds, altostratus clouds, and eventually stratus, and nimbostratus clouds, which commonly bring rain or snow events.



Conversely, the arrival of a high pressure system or cold front is often characterized by a decrease in visibility and the development of alto stratus and cumulus clouds in a chain-like configuration. Weather changes at ground level are often felt quite quickly as the cold air mass pushes the warm air mass on top of it. This causes rapid cooling of the warm air as it gains elevation and nearly immediate precipitation.



Cumulonimbus clouds

In the event that a top roping outing is caught in an electrical storm, the following precautions should be taken:

- *Avoid being the highest point in the surrounding landscape;*
- *Stay away from water;*
- *Stay away from objects that conduct electricity;*
- *Seek shelter in low-lying areas under a thick growth of small trees or bushes; and*
- *Insulate yourself from the ground by sitting on your pack.*

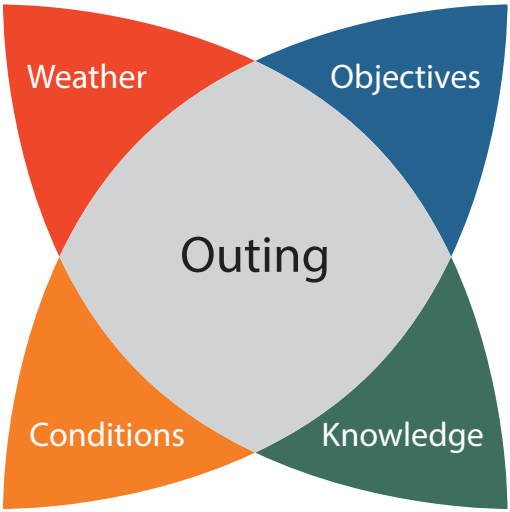
One of the more significant weather related risks to a top roping outing is a thunder or electrical storm. Thunder storms are easily visible forming in the sky, the formation of small cumulus clouds that gradually rise and develop into cumulonimbus clouds are a marked sign of the development of isolated thunder storms. Large cumulonimbus clouds with dark bases indicate an imminent thunder storm and a need for the leader to manage the group accordingly. In the field, is important to differentiate between cumulonimbus and cumulus clouds, as the formation of cumulus clouds that lack vertical development is often insignificant and non-indicative of the formation of a thunderstorm.

WEATHER AND POTENTIAL IMPACTS/RISKS ON A TRIP

Regardless of the forecast, the weather will have an impact and affect on the top roping outing. Warm and dry conditions, while ideal for climbing, often lead to crowding at popular venues, potential heat and sun related illnesses, and increased rock fall following an overnight freeze. Conversely, cool and damp conditions present cold related illness risks, slippery routes and access trails, and increased rock fall. Windy conditions also present a risk in the form of unanticipated dehydration, wind chills, increased rock fall, and communication challenges. A top rope leader needs to be acutely aware of the risks the weather presents and the impact they may have on the outing, and ensure risks are appropriately mitigated.

Pre-Trip Risk Assessment

Prior to proceeding with a top roping outing it is important to complete a pre-trip risk assessment to determine the viability of the outing. The pre-trip risk assessment involves examining the weather forecast and data, the current weather conditions, the objectives of the outing, and the knowledge and experience of the top rope leader and the group to determine a course of action. Periods of predictable and desirable weather matched with dry conditions, realistic objectives, and appropriate leader and group knowledge would demonstrate a likelihood to proceed with the trip as planned. Whereas periods of weather instability, poor existing conditions, unrealistic objectives, or a lack of knowledge on the part of the top rope leader or the group might necessitate a re-examination of the anticipated outing and adjustment to the itinerary.



A top rope leader is responsible for ensuring that risks are well managed and appropriate for the participants throughout the trip. When completing the pre-trip risk assessment and calculating the risks, it is important for the top rope leader to determine their course of action based on their participants' abilities and risk tolerance. While the leader themselves may personally be comfortable proceeding with a top roping outing during periods of weather instability, proceeding with the outing in less than optimal conditions may be beyond the comfort level of the participants.

WEATHER MONITORING DURING A TOP ROPING OUTING

Even during periods of weather stability, top rope leaders should routinely monitor the weather for changing conditions throughout the day. Small localized storms are common in mountain environments. Key elements to monitor throughout the day would include; notable changes in the wind strength and direction, significant changes in temperature, significant cloud formation, presence of thunder and/or lightning, and rapid changes in the atmospheric pressure.

Notes:

Delivery of a Top Roping Outing

A successful top roping outing requires thoughtful management of the group, diligent management of potential risks, and administration of crucial documents such as waivers and acknowledgement of risk forms. In this chapter we will explore the ACC waiver administration process, the basic principles of group management, and the cornerstones of risk management in a top rope climbing context.

Waiver Administration

In accordance with ACC policies, all participants must complete a waiver prior to participating in an outing. The importance of this document to The Alpine Club of Canada cannot be overemphasized. The conduct of the top rope leader when administering the waiver to the participants is of paramount importance, as the administration of the waiver by the leader can affect its legal standing.

The role of the waiver is to protect The Alpine Club of Canada and outing participants against lawsuits in the event that a participant is injured or killed. It also protects the Alpine Club of Canada if a participant has any of their property or personal belongings damaged or lost. The document further protects The Alpine Club of Canada from liability for natural hazards as well as the possible negligence of any of the other Alpine Club of Canada member participants.

Preferred Waiver Delivery Practices Include:

» Send waivers ahead of time to allow time for review;
» Ensure clear communication when delivering the waiver;
» Allow participants adequate time to read the waiver and provide them with the opportunity to ask questions;
» Ensure that participants are aware of the specific and general risks associated with the activity prior to administering the waiver;
» Have participants acknowledge verbally that they have read and understood the waiver;
» Ensure waivers are completed in full and are unaltered;
» Waivers should be administered and witnessed by the top rope leader;
» Waivers should be presented in a standardized format; and
» Ideally completed and signed in blue or black ink.

Other Waiver Delivery Considerations:

» Waivers do not guarantee protection from law suits;
» Waivers do not absolve leaders from acting professionally;
» Waivers are often delivered annually to reiterate risks and ensure participants are accepting of them;
» Waivers are legal documents and cannot be altered in any way;
» Waivers do not expire; and
» If the activity or risks change, a new waiver should be administered.

Completed Waivers

Signed waivers must be retained by the ACC Section for a period of seven years, after which time they can be destroyed. All signed waivers must be forwarded to the appropriate Section member who is responsible for storing the documents, as soon as possible following the top roping outing.

Principles of Group Management

A well managed group will be more likely to achieve the trip objectives, will foster a more cohesive group dynamic capable of resolving interpersonal conflicts, and will be better equipped to address and mitigate any risks associated with the outing. Participants in an effectively managed group will be aware of their responsibilities, will operate under the coordination and guidance of the leader, and will be educated and equipped for the day's activities.

Successful leaders diligently and deliberately set the tone for the outing early in the trip. This is often achieved through an initial face to face group briefing at the start of the day where the leader introduces themselves, explains the goals for the day, outlines their expectations of participants, and facilitates the opportunity for participants to introduce themselves to one another and the group.

EXPECTATIONS

Providing participants with clear expectations both before and during the top roping outing, will enable them to better manage their personal safety and achieve trip objectives. Common expectations may include:

- Group travel expectations
  - pace and spacing;
  - scheduled breaks for water/clothing changes, etc.; and
  - staying on trails.
- Site expectations
  - safe zones (helmets, proximity to edges or other natural hazards);
  - personal belonging storage (backpacks closed, gear and personal belongings are in a contained space and off of trails); and
  - litter and human waste (pack out what you pack in).
- Activity expectations
  - participant positioning;
  - belay stances;
  - climber responsibilities;
  - equipment use expectations; and
  - leader involvement expectations.

LEADERSHIP

High quality leadership and timely motivation by the leader helps ensure that participants act according to the expectations that have been set. Further, supervision enables the leader to identify risks and address them before accidents occur, and to closely monitor the group's well-being throughout the outing. Depending on the outing objectives and participant experience, preferred supervision practices may include:

- Keeping the group's proximity close to allow for continued visual supervision and verbal communication;
- Checking participant technical systems such as the knot and set-up of the belay device before the system is used;
- Continual monitoring of participant nutritional/caloric intake and hydration;
- Monitoring the group for signs of fatigue or distress; and
- Monitoring the group dynamics to ensure continued participant motivation and enjoyment.

EDUCATION

A significant component of group management involves ensuring that participants are educated and empowered to complete the day's activities under the guidance of the leader. In order for this to occur, leaders are often required to provide guidance and instructional inputs throughout the day. Typical instructional inputs may include topics specific to ethics, ecology, risk management, technical systems, local history, personal experience and insight, etc.

GUIDANCE

In addition to educating participants, the success of a top roping outing also requires diligent guidance on the part of the top rope leader. Guidance differs from educating participants in the sense that it motivates and enables participants to develop independent competency with specific skills. Well-guided participants will feel empowered to make their own decisions and manage their personal safety with the understanding that the top rope leader is available to provide support and assistance where required. Qualities of a strong leader capable of providing sound guidance include:

- Situationally aware of risks and safety concerns;
- Enthusiastic, supportive, and motivational;
- Knowledgeable and capable of articulately sharing their knowledge;
- Technically proficient in their systems applications;
- Physically fit and able to complete the day's activities and climbs;
- Sympathetic to the needs of the group; and
- Capable of resolving conflict and providing direct leadership if required.

CONFLICT RESOLUTION

Effective leaders recognize conflict building, and tactfully and firmly address it before it escalates.

Inevitably occasional conflicts will arise within a group or between participants and leaders. Therefore, top rope leaders need to be prepared and adept at resolving minor conflicts. Basic strategies for resolving conflicts include:

- Being assertive and recognizing the conflict;
- Addressing the conflict privately if possible rather than in front of the group;
- Remaining calm and dedicated to resolving the conflict rather than winning an argument;
- Acknowledging the feelings of all parties involved in the conflict and seeking further clarification specific to the issues at hand if required;
- Determining potential resolutions to the conflict;
- Selecting an appropriate resolution and seeking support from those involved in the conflict; and
- Proceeding with the resolution.

Risk Management

A top roping outing may present a variety of risks throughout the day. It is the responsibility of a top rope leader to recognize the risks, quantify them, and appropriately mitigate them to decrease the likelihood of an accident or injury occurring. In this chapter we will explore several crucial risk management components including situational awareness, hazard recognition and mitigation, as well as the concept of participant demonstrated competency.

SITUATIONAL AWARENESS

Situational awareness refers to the top rope leader's ability to recognize and mitigate hazards before they present a risk to the group. It is the responsibility of the top rope leader to step back and evaluate all of the variables in a given situation, determine their interactions, and evaluate the potential for this to present a risk to the group. Situational awareness is closely tied to experience, more experienced leaders tend to more readily recognize the events occurring around them and be better equipped to recognize potential risks.

In the context of a top rope outing, situational awareness is the ability to recognize environ-

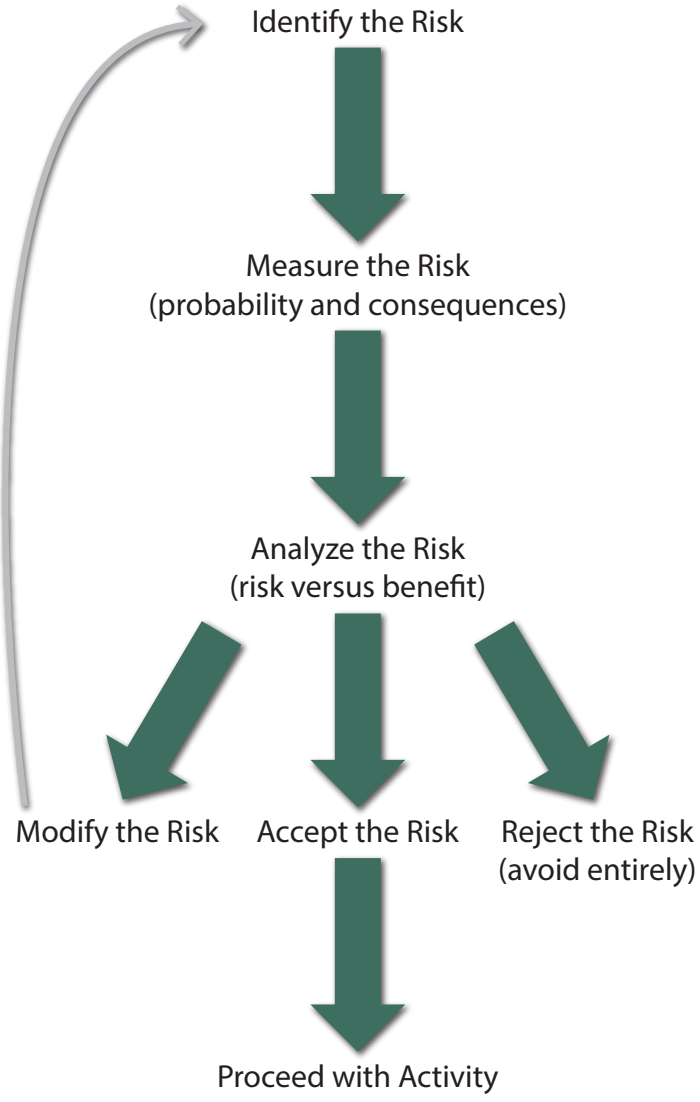
mental, interpersonal, internal human factors, external human factors (other climbers and day users), and the relationship that these factors have on one another as well as any impacts this will have on the safety and success of the outing.

HAZARD RECOGNITION

Closely linked to situational awareness is the top rope leader's ability to recognize hazards, and determine their probability and severity. Climbing is an inherently dangerous activity and therefore has some level of risk associated with it. The top rope leader's role is not to entirely eliminate the risks associated with the activity, but rather to recognize them and ensure that they are well managed, mitigated, or avoided. Common hazards for a top rope leader to recognize include:

- Environmental
  - very warm temperatures (heat exhaustion, heat stroke, sun burn, dehydration);
  - very cool temperatures (hypothermia, loss of dexterity, lack of focus);
  - overnight freeze and daytime warming cycles (natural rock fall);
  - high wind (increased rock fall, challenging communication, dehydration);
  - precipitation (increased rock fall, slippery conditions, hypothermia);
  - lightning (electrocution); and
  - animal encounters (animal attacks, disease transmission, anaphylaxis, rock fall generated by wildlife above the route).
- Interpersonal Risks:
  - conflict (disagreements or altercations); and
  - group not following or listening to the leader.
- Internal human factors:
  - intrinsic motivation (students not following directions of the leader or students pushing the leader to take risks that are out of context with the trip objectives);
  - food, hydration, sleep, symptoms of drugs or alcohol;
  - risk tolerance;
  - fear; and
  - trust.

» External human factors:
  › other users and groups (crowding, interruptions to the day's program, dogs).



HAZARD MITIGATION

Once hazards have been identified, their probability assessed, and their severity analyzed, the top rope leader must determine an appropriate mitigation strategy. In some instances, this may involve avoiding the hazard entirely or modifying the situation to decrease the probability or severity of the hazard, or it may involve acceptance of the hazard and continuing forward. Examples of common hazard mitigation strategies in a top roping climbing context include:

- Wearing helmets anytime there is an overhead or fall hazard;
- Employing instructor systems checks prior to participants commencing a climb;
- Ensuring periodic breaks occur throughout the day to eat, drink, and adjust clothing;
- Continually monitoring the weather to allow for adjustment of the program prior to weather changes;
- Recognizing group conflict and quickly addressing it; and
- Recognizing participant distress and addressing it.

PARTICIPANT DEMONSTRATED COMPETENCY

The ability to assess the demonstrated competency of a participant is a vital component of a top rope leader's hazard recognition and hazard mitigation strategy. Prior to giving participants risk related responsibilities, such as belaying, it is important that participants demonstrate competency with the skills necessary to do so. Until participants have demonstrated adequate competence, it is imperative that the top rope

leader manage risk on their behalf. Common techniques used to support participant competence with specific skills include:

- Providing participants with the opportunity to practice skills in a risk-free context;
- Visually monitoring participants to ensure skills are being practiced and applied correctly;
- Verbally testing participants to gain an understanding of their comprehension of the skill;
- Applying the skill progressively or incrementally;
- Providing the participants with constructive feedback and coaching if they are struggling with a skill;
- Physically supporting the participant's application of the skill in instances where it will increase comfort, safety, or success; and
- Monitoring the participant to ensure the application of the skill remains consistent over time and complacency and regression do not occur.

Ideally participants would demonstrate competency all the time, however, that is not a realistic expectation and often participants will need ongoing coaching, and/or instruction before they achieve independence with specific skills. For this reason, top rope leaders will need to exercise good judgement and limit the level of responsibility offered to those who are unable to demonstrate competency with a skill. This ensures the level of risk presented to the participants remains consistent with the nature of the outing and the trip objectives.

Notes:

Notes:

Wilderness Ethics and Ecology

A top rope leader has a responsibility to encourage the participants to be good environmental stewards, and provide them with basic interpretive education specific to the area where the top roping outing will take place. Practicing good environmental stewardship helps ensure top roping venues are available for future generations to enjoy, and helps ensure the natural state of the area is not negatively impacted by human use. In this chapter we will explore several basic principles of low impact travel, as well as basic wildlife precautions, and natural environment interpretive skills.

Principles of Low Impact Travel

It is important for top rope leaders to recognize the impacts their group and outing will have on the natural environment, and minimize those impacts accordingly. The most notable impacts a top rope outing will have, come in the form of group degradation of the ecology, proliferation of waste, and disturbance of wildlife and other visitors. In order to minimize these impacts, the trip leader must educate participants throughout the outing, to act ethically, and in a manner that will preserve the natural environment.

FOOT TRAVEL

The impacts of foot travel on the natural environment can be greatly minimized by ensuring the group travels on durable surfaces that are less prone to disturbance. Durable surfaces include:

- Rock;
- Gravel;
- Existing trails; and
- Dry grasses;

Further minimization of the impact of foot travel can be achieved by ensuring participants walk single file on existing trails, even when wet or muddy, to prevent trail widening or trail braiding. Care should be taken on durable surfaces to ensure impacts are minimal and evidence of human traffic is kept nominal. Moving any durable objects, such as rocks and logs, should not be done unless absolutely necessary.

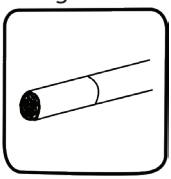
Commonly used top roping climbing venues see thousands of users each year. It is imperative that top rope leaders instill a 'leave no trace' ethic and minimize their impact with their participants to ensure the area remains usable in its natural state for future users.

HUMAN WASTE

Human waste can have a profound and lasting impact on the natural environment. If not disposed of properly it can be detrimental to wildlife, water systems, and other users. In order to ensure the natural environment is kept as pristine as possible, top rope leaders must educate their participants and provide clear expectations specific to the management and disposal of human waste. Underlying principles of managing human waste include:

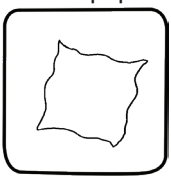
- Packing out everything that was packed in, this includes all litter, food waste, toilet paper, and hygiene products;
- Depositing solid human waste in holes in organic soil, dug 6-8 inches deep and at least 100 metres away from any source of water, or existing trails. The solid waste must be completely covered when finished. In environments that lack organic soil, solid human waste should be collected and packed out; and
- Top rope leaders can encourage responsible disposal of waste by providing a communal bag for litter and food waste as well as a small spade for addressing solid human waste needs.

Unfiltered cigarette



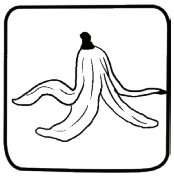
3 months

Tissue paper



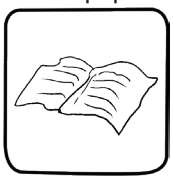
3 months

Fruit rind



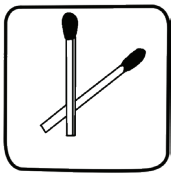
3 - 6 months

Newspaper



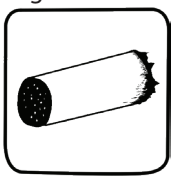
3 - 12 months

Matches



6 months

Cigarette filter

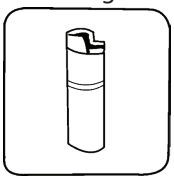


1 - 2 years

Pop can

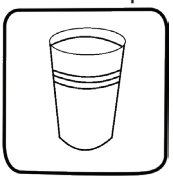
10 - 100 years

Plastic lighter



100 years

Plastic cup

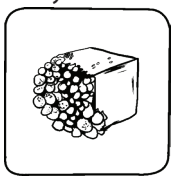


100 - 1,000 years

Phone card

1,000 years

Styrofoam



1,000 years

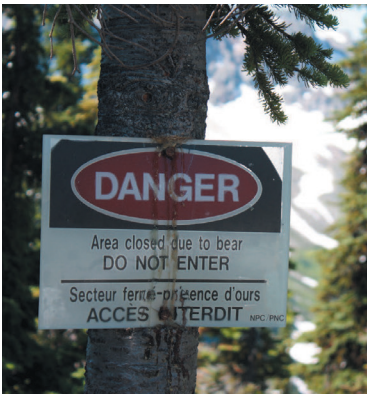
Plastic bag

1,000 years

GROUP SIZE

It is important for top rope leaders to recognize that the size of the group will have an impact on both the environment and other users. The larger the size of the group, the more profound the impact will be on the environment and the more diligent the top rope leader will need to be to ensure the impacts are minimized. Whenever possible group size should be kept small to decrease the impact on trails, climbing sites, local wildlife, and other recreational climbing groups. Groups of notable size should limit their use to venues that are well-established, possess durable surfaces for foot travel and climbing activities, have washroom facilities, and are commonly used for group climbing activities.

Wildlife Issues



It is not uncommon to encounter a variety of wildlife in the course of delivering a top roping outing. Top rope leaders must understand that the group's interactions with wildlife can have a lasting impact on the wildlife's behavioural patterns. Leaders and participants need to minimize their interactions with wildlife of all sizes, by:

- Observing wildlife from a distance, and refraining from approaching;
- Never feeding wildlife and ensuring human food is not accessible to them;
- Leaving pets such as dogs at home;
- Avoiding known wildlife corridors during sensitive times such as mating, nesting, migration, raising young, or preparation for hibernation; and
- Adhering to trail and area closures both mandatory and voluntary.

Sightings and encounters with potentially dangerous wildlife must be treated seriously. All planned activities should be stopped and the group moved from the area to an alternate venue anytime a sighting or encounter of this nature occurs.

Interpretive Skills

The ability of the top rope leader to share area specific knowledge, history, and information with their group is a significant value-added benefit for participants. Canada has a rich history and many diverse ecological areas, a top rope leader should be knowledgeable in the area in which they will be delivering the outing so that they can provide basic interpretation to their participants throughout the outing. Common areas of interpretive interest include flora, fauna, history, and many other local items of interest.

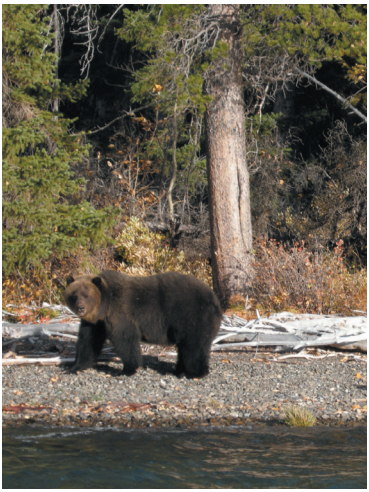
LOCAL FLORA AND FAUNA

The ability of a top rope leader to identify and discuss prominent flora in the area can serve as an additional educational component of the outing as well as a means of ensuring participants avoid noxious plants such as poison ivy and poison oak, etc. Therefore, top rope leaders should be familiar with the region(s) in which they will be leading trips. Common interesting flora facts to share with participants could include:

- Flowers;
- Deciduous trees;
- Coniferous trees;
- Invasive species; and
- Noxious plants.

In areas with noxious plants, it is imperative that top rope leader identify the harmful species with their group and act diligently to ensure participants avoid coming into contact with the plants.

In addition to the flowers and trees, a top rope leader may choose to also be versed in identifying the local fauna and capable of educating participants specific to it. Commonly discussed fauna includes:



- Insects such as butterflies, moths, mosquitoes, blackflies and ticks;
- Birds;
- Squirrels, chipmunks and other small ground dwelling animals;
- Racoons, and marmots;
- Foxes, coyotes, and wolves;
- Cougars, bobcats, lynx;
- Ungulates such as deer, caribou, elk, and moose; and
- Black bears and grizzly bears.

Choosing to educate participants on local fauna can be for informative reasons, as well as for safety reasons, in the event that potentially dangerous wildlife is encountered during the outing.

LOCAL HISTORY AND ITEMS OF INTEREST

In addition to providing interpretation of local flora and fauna, a top rope leader may also find it beneficial to be capable of providing insight into an area's history and notable items of interest. Commonly shared historical information may include:

- Route development pioneers in the area;
- Notable first ascents in the area;
- Formation of parks, protected, or conservation areas;
- Historical ethics specific to climbing in the area; and
- Popular routes in the area or "classic" routes in the area.

Local items of interest that are commonly shared may include:

- Geological formation of the area;
- Rock type;
- Activities other than climbing that occur in the area;
- First Nations history; and
- Migration of specific species through the region.

Notes:

Notes:

Technical Systems

In this chapter we will explore hard and soft goods, as well as their applications in creating technical systems that minimize the risk to participants while partaking in top rope climbing activities, and allow leaders to facilitate rescues if required.

Equipment

With the exception of helmets and personal gear, most technical equipment can be classified into one of two categories: either hard goods such as carabiners and belay/rappel devices; or soft goods such as ropes, cord, and slings.

Ropes:

Ropes come in two varieties: dynamic ropes which are designed to absorb force and dissipate it through their elongation; and static ropes which are designed for applications that do not require the rope to absorb force. In the top rope climbing context, dynamic ropes rated by the manufacturer as 'single ropes' should be used for all belayed climbing activities. In an effort to make dynamic climbing ropes lighter, many rope manufacturers have developed lower diameter single dynamic climbing ropes. While lightweight low diameter dynamic climbing ropes have many applications in the multi-pitch climbing environment, they have limited purpose in the top rope climbing context. For durability, ease of handling, and belaying purposes, dynamic climbing ropes in the 9.8 millimetre to 10.5 millimetre range are recommended for top rope climbing activities.

Static ropes, while not useful for belayed climbing activities, can be invaluable to the top rope leader when extending or constructing large anchors, or establishing a fixed line rappel. Similar to dynamic rope, static rope comes in a variety of diameters. For anchor applications and fixed line rappels, larger diameter static rope in the 10-11 millimetres range is preferable. Static rope is commonly sold by the metre off a spool, for most top-rope anchor applications a section 25 metres in length is sufficient.

Cord:

Cord, commonly referred to as accessory cord, is essentially lower diameter static rope that can be used to create hitches. 7 millimetre cord is the preferred diameter for rope ascending, and for improvised rescue applications. Due to its lower diameter it is important that the top rope leader understand the strength limitations of cord, and ensure that in any full-load bearing application the cord is doubled. Two five-metre lengths, and one one-metre section of cord are commonly carried by the top rope leaders.

Harnesses:

Top rope climbing harnesses need to be commercially manufactured sit harnesses designed for the purpose of recreational climbing. They must have a designated waist belt, leg loops, as well as tie-in points, and a vertically oriented belay loop.

Slings:

Slings are commercially sewn closed loops of nylon material that come in a variety of lengths. They are commonly used to connect carabiners to create a quickdraw, to construct anchors, or as a tether when tethering to an anchor.

Webbing:

Whenever practical it is preferable to use commercially sewn slings rather than bulk nylon webbing. In some instances, such as anchor extensions or large anchor configurations, it may be desirable for the top rope leader to have a 10 metre section of 1-inch tubular nylon webbing available.

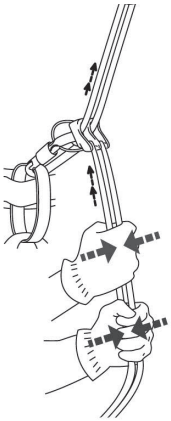
Carabiners:

Carabiners can be either locking or non-locking and constructed of either aluminum or steel. The majority of carabiners used in modern climbing activities are aluminum due to their lightweight properties in comparison to steel. However, in a top rope climbing context, steel carabiners may be preferable at the master

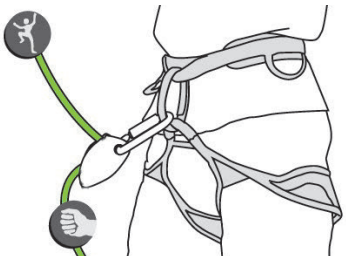
point of an anchor due to their durability and decreased rope dirtying (oxidizing) properties.

Non-locking carabiners may be used at non-critical connection points. These are the connection points in a technical system that would not have catastrophic consequences if they were to fail. All critical connection points in a technical system should employ locking carabiners. In situations where movement of the critical connection point is anticipated and monitoring of that point will be limited, such as the master point of a top rope anchor, two locking carabiners should be used.

Belay and Rappel Devices:



Belay and rappel devices can be either manual braking or assisted braking. Manual braking belay devices create friction by forcing tight bends into the rope. Assisted braking belay devices employ either a moving component, or binding action on the rope to create friction. In some instances, the use of assisted braking belay devices may be preferable as these devices can increase participant comfort and safety. Manual belay and rappel devices may be preferable for rappelling activities or for instances where participant belayers have previously demonstrated competency in their belay skills.



Helmets:

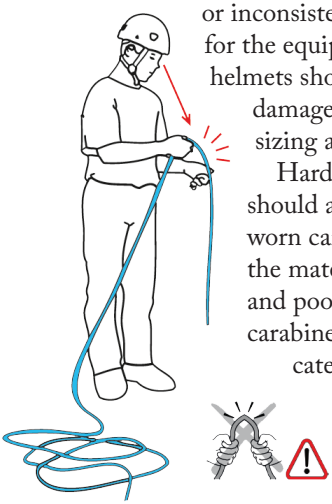
Helmets designed for the purpose of recreational climbing must be worn at all times when a fall or overhead hazard is present.

INSPECTIONS AND LIFESPAN

Prior to using any equipment, it should be visually and manually inspected to ensure it is fully operational and in good repair.

Equipment Inspections:

Soft goods such as ropes, slings, and harnesses should be visually inspected and manually manipulated to check for excessive wear, and/or inconsistencies in material shape or feel prior to use. Notable hard spots, soft spots, signs of excessive abrasion, melting, and/or inconsistent feel are indicators of damage and the need for the equipment to be removed from use. Climbing helmets should be checked for cracks in the outer shell, damage to inner foam, and proper functioning of all sizing and fitting components.



Hard goods such as carabiners and belay devices should also be inspected prior to use. Excessively worn carabiners and belay devices (more than 25% of the material diameter), sharp edges created by wear, and poor operation of moving components such as carabiner and assisted braking device hinges, all indicate damage and removal from use.

Many modern climbing harnesses are constructed with 'wear indicators' at the tie-in points. When wear indicator 'threads' appear at tie-in points, this signifies the need to remove the harness from further use.

Equipment Lifespans:

All commercially manufactured soft goods are given a maximum usable lifespan. For most nylon goods this is 5 years from the date of manufacture. Inspection records and date of manufacture should be tracked for all soft goods being used for top rope climbing activities. In situations where a piece of equipment has attained the manufacturers maximum usable life span, it must be retired even if it appears to be in good repair.

Hard goods have an indefinite lifespan and only need to be retired in instances where there are visible signs of damage or significant wear.

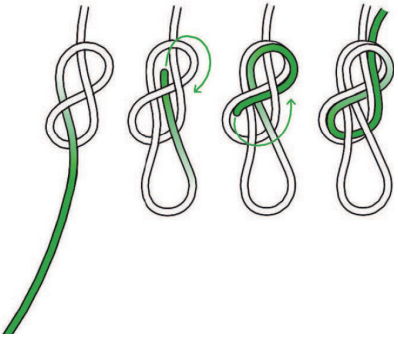
Due to the nylon chin strap and degrading properties of the foam used in climbing helmets, their maximum usable lifespan is often consistent with that of other soft goods.

Knots

Knots are used in ropes and sling material for three main purposes: to create closed loops that allow the connection of various components in a technical system; to create a barrier at the end of a rope; and to connect two pieces of material together.

Figure Eight Follow Through:

The figure eight follow through knot is the preferred tie-in knot throughout North America. It is easy to inspect, relatively easy to untie after being loaded by body weight, and it is a highly secure knot that will not untie without external manipulation. A properly tied figure eight follow through knot will possess the following characteristics: minimal twists in the rope throughout the knot; tight and consistent bends throughout the knot; and a minimum of ten centimetres of 'tail' extending from the knot.



The figure eight follow through knot can also be used to connect two different materials such as nylon webbing and a static rope in an anchor configuration, or to connect static rope to a natural anchor point such as a tree.

Figure Eight on a Bight:

The figure eight on a bight is an efficient means of creating a closed loop in the end of a rope when the end does not need to be passed through or around an object. A properly tied figure eight on a bight will possess the same characteristics as a properly tied figure eight follow through knot.

Double Fisherman's:

The double fisherman's knot is an in-line knot that is used to join two ends of similar diameter rope together. In the top rope climbing context its primary applications are to create a closed loop in cord, and to connect the ends of a static rope in an anchor

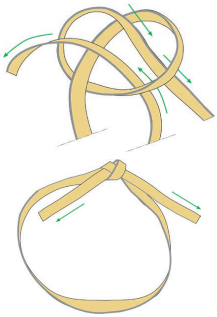
configuration. A properly tied double fisherman's knot will demonstrate the opposing double overhand knots seated together in unison; and each knot will possess a minimum of 10 centimetres of tail.

When connecting ends of low diameter slippery materials, such as technora cord or dyneema webbing, a triple fisherman's should be used in lieu of the double fisherman's or tape knot.

Flat Overhand Knot:

In low-load scenarios that are body weight or less, a flat overhand knot can be used to connect two ends of similar diameter rope. In the top rope climbing context, the flat overhand is primarily used to create closed loops in the tails of a 5 metre prusik cord or to connect a short prusik cord to the harness as a rappel back-up. A properly tied flat overhand will be free of excessive twists, possess tight and consistent bends, and a minimum of 10 centimetres of tail. Note – if a flat overhand is being used to connect two ropes in a rappelling application a second flat overhand should be tied behind the first and a minimum of 30 centimetres of tail should be present.

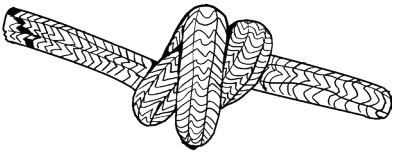
Tape Knot:



The tape knot, also commonly referred to as the water knot, is used to tie the ends of one-inch tubular webbing into a closed loop, or to connect two pieces of one-inch webbing together. A properly tied tape knot will sit flat with no twists and possess a minimum 10 centimetres of tail extending from both sides of the knot. Tape knots left tied in webbing will 'creep' over time, for this reason it is recommended that they be removed following each outing.

Double Overhand Knot:

The double overhand knot is used as a blocking knot in the end of either a dynamic climbing rope or a static rope to prevent the rope from passing through a belay device. It is commonly used in lead climbing and rappelling applications. A properly tied double overhand knot will create an 'X' pattern in the rope, be tight on itself, and possess a minimum of 10 centimetres of tail.



Hitches

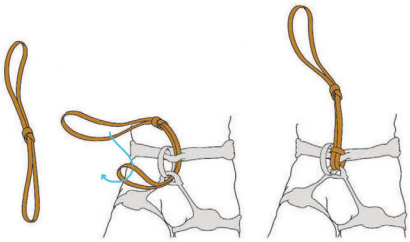
A hitch is similar to a knot however it has the ability to conform to the size and shape of the object to which it is connected.

Basket Hitch:

The basket hitch is commonly used to connect natural anchor points into a large anchor configuration, or to extend the focal point of an anchor. It is the least complex of all the hitches and involves little more than wrapping the hitch material around a fixed object.

Girth Hitch:

The girth hitch is commonly used to connect a sling to the tie-in points of the climbing harness for tethering and rappel applications.

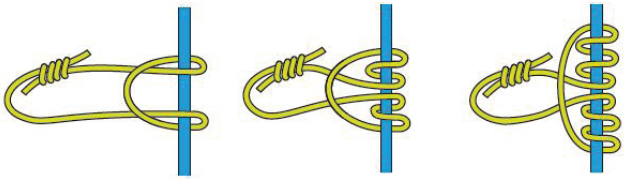


Clove Hitch:

The clove hitch is commonly used to create an adjustable tether when connecting to an anchor with the climbing rope.

Prusik:

The prusik is a multi-directional hitch commonly constructed with cord, that provides rope grabbing properties. It is used to ascend both loaded and unloaded ropes, as a means of backing up a rappel, and in rescue applications. Two or three wraps may be required depending on the difference in diameter between the cord and the climbing rope, or whether the prusik is being used in a load-bearing application or as a back-up. In load-bearing applications, a three wrap prusik should be used. In non-load bearing applications where the prusik is acting solely as a back-up, such as rappelling with a prusik below the rappel device, two wraps may be preferable.



Italian Hitch:

The Italian hitch is a multi-directional, friction-creating hitch that can be constructed on any large locking carabiner. It is commonly used when belaying and lowering a top roping climber from above.

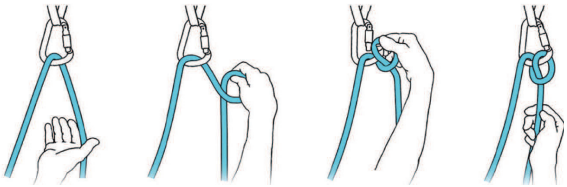
Compared to modern manual braking belay devices, the Italian hitch has relatively low friction creating properties. In instances were an Italian hitch is being used with a large load such as a heavy participant being lowered down very steep terrain, a second locking carabiner of identical size can be connected to the anchor and incorporated into the hitch to increase the friction.

Top Rope Belaying

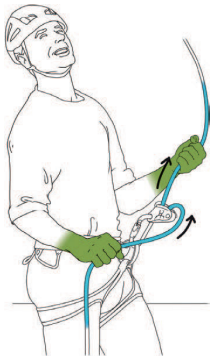
Top rope belaying is a means of moving the climbing rope through a belay device or friction creating hitch, eliminating slack in the top rope climbing system and decreasing the potential distance a climber would fall.

Top Belaying

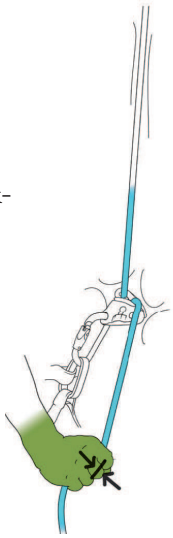
Top belaying occurs in situations where the top rope belay is being provided from above rather than below. In these instances it is preferable for the belay to be provided directly off the anchor instead of the belayer's harness. The comfort of the belayer should be thoughtfully considered when determining the positioning of the anchor and an Italian hitch connected directly to the focal point of the anchor used to belay.

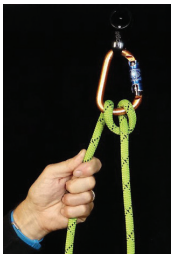


Manual and Assisted Braking Belay Devices:



When belaying with either a manual or assisted braking belay device, the friction creating properties of the device are maximized by forcing tight bends into the rope, or enabling the binding action of the belay device to properly engage. Regardless of the device used, the belay pattern should remain consistent and involve the belayers brake hand continuously in control of the brake rope. The brake hand should also be positioned below the device in the most mechanically advantageous position any time slack is not being removed from the top rope climbing system.





Italian Hitch:

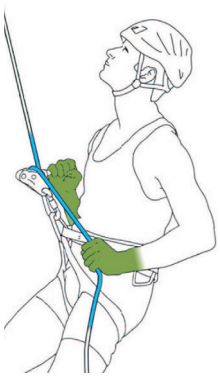
Similar to modern belay devices the Italian hitch creates friction by forcing bends into the climbing rope. Unlike manual and assisted braking belay devices, the friction creating properties of the Italian hitch are maximized when the brake rope is placed parallel to the rope connected to the climber. For this reason, the hand pattern used when belaying with an Italian hitch differs somewhat from typical belay techniques. The brake hand must continuously maintain control of the brake rope; however, it should do so in a manner that keeps the brake rope parallel to the rope connected to the climber at all times.

Rappelling

Rappelling enables a top rope leader to quickly and efficiently descend a non-loaded climbing rope or static rope. Rappelling requires the use of a manual or assisted braking device, and can be completed on a single fixed line or a doubled rope threaded through an anchor. If using a manual braking device, the rappel also requires a back-up. If the back-up is a prusik, then the belay device should be extended from the harness using a girth hitched sling.

SYSTEM SET-UP

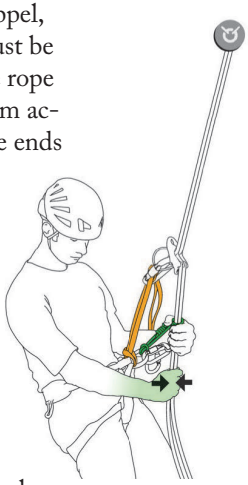
Fixed Line Rappel Set-Up:



A fixed line rappel can be completed on either a static or dynamic climbing rope by connecting the fixed line to an anchor. The connection between the fixed line and the anchor should be completed by tying a figure eight on a bight in the end of the fixed line and connecting it to the master point of the anchor with a locking carabiner. Either a manual or assisted braking device is then placed on fixed line and connected to the top rope leaders harness with a locking carabiner. If a manual braking device is being used, additional friction will be required and can be created by using a second identical locking carabiner to connect the belay device to the belay loop. Prior to commencing a rappel, a double overhand knot must be tied in the free end of the rope to prevent the rappeler from accidently descending off the end of the rope.

Threaded Anchor Rappel Set-Up:

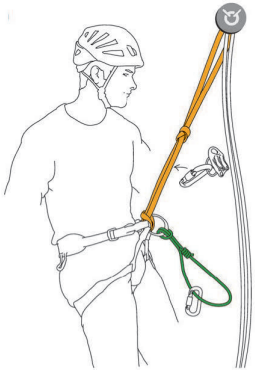
A threaded anchor rappel can be completed on either a static or dynamic climbing rope by threading the rope through the master point of an anchor, or a set of rappel rings. Both ropes are then placed into a manual braking belay device which is then connected to the belay loop of the top rope leaders harness, or a sling if extending the rappel device, with a locking carabiner. Prior to commencing a rappel, double overhand knots must be tied in the free ends of the rope to prevent the rappeler from accidently descending off the ends of the rope.



BACKING UP A RAPPEL

Backing Up a Rappel With a Prusik:

A rappel can be backed up quickly and effectively by adding a prusik to the brake strand(s) below the extended belay device. A two-wrap prusik may be used for a double rope rappel, and a three-wrap prusik should be used for a single rope rappel. The prusik is connected to the harness by tying it to the belay loop with a flat overhand knot. It is imperative that the distance between the prusik and the knot connecting it to the belay loop be kept to approximately 10 centimetres, so that the belay device does not accidentally mind the prusik.

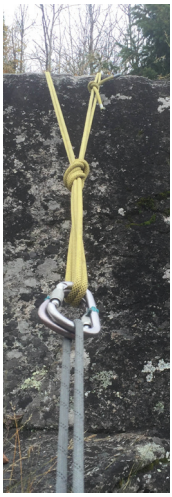


Backing up a Rappel with a Belay from Below:

A rappel can be backed up from below by a trained participant or an additional top rope leader managing the brake rope or ropes from the ground. In the event that the descent needs to be stopped, the individual on the ground applies tension to the brake rope(s) thus acting as a set of brake hands.

Anchors

A well constructed top rope anchor is one that is: able to withstand all potential forces; is efficient to construct; requires a minimal amount of equipment; and is positioned in a manner that minimizes the climbing rope abrading over an edge or moving through loose material. In instances where the anchor will be used for top belayed climbing, the anchor should also be positioned to facilitate belaying and potential rescue.



When assessing the integrity of fixed protection bolts the following criteria should be considered; the size of the bolt, the age and quality of the bolt, the quality of the rock the bolt is placed in, the quality of the bolt placement, and any potential multiplication of force that could be exerted on the bolt once it is loaded.

ANCHOR CRITERIA

The overall quality of a constructed anchor can be assessed by ensuring it meets all of the criteria listed below.

Integrity:

Integrity refers to the overall strength of the material and anchor points used throughout the anchor configuration. Whenever possible, all components of the anchor configuration should have a minimal strength rating of 22Kn. When building large anchors from natural protection such as trees and boulders, where the integrity is unknown, caution should be used to ensure that these anchor points will unquestionably hold all anticipated loads.

Doubled:

Doubled refers to ensuring there is redundancy throughout the anchor configuration. This means there should be a minimum of two anchor points, and that the master point of the anchor is comprised of a minimum of two strands of anchor material. In instances where the anchor will not be directly monitored, the critical connection between the climbing rope and the anchor must be comprised of two locking carabiners.

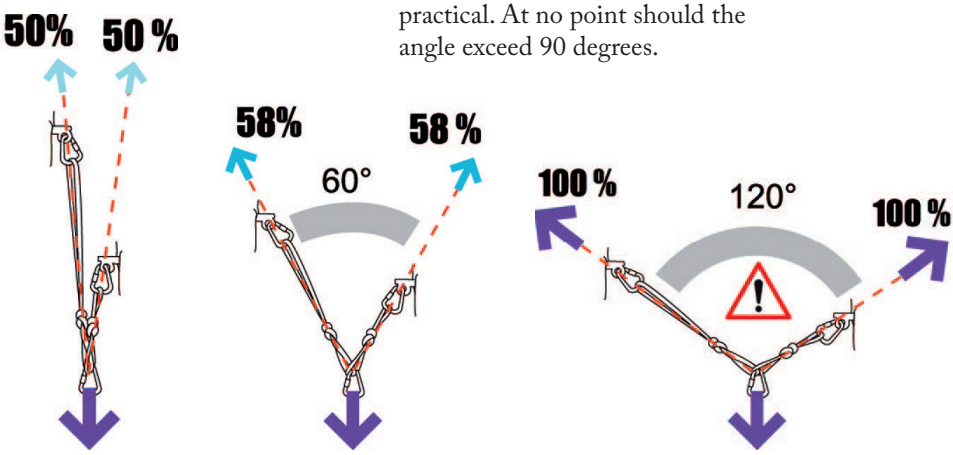
Equalized:

Equalized refers to the load being evenly distributed to each anchor point. This can be achieved by ensuring that the master point evenly bisects the angle created by the anchor arms.

Due to the many variables that affect load distribution on an anchor, it is nearly impossible to attain true equalization. A top rope leader should strive towards distributing the anticipated load as evenly as possible on each anchor point, recognizing that true equalization may not be achieved.

Angle:

In order to minimize the multiplication of force on the anchor points, the angle between the anchor arms should be kept between 20 and 60 degrees when practical. At no point should the angle exceed 90 degrees.



Limited Extension:

Any potential extension, and subsequent shock loading of the anchor that could occur due to the failure of an anchor point, needs to be limited. In the case of a unidirectional anchor this can be achieved by creating a master point. Whereas in a multi-directional anchor configuration, extension limiting knots must be used.

Sharp Edges:

Any sharp edges in contact with an anchor should be addressed. This can be done by ensuring that no moving components within an anchor are laying or abrading against or over a sharp edge.

ANCHOR CONFIGURATIONS

Anchors can be constructed in one of two manners, either in a unidirectional configuration that is designed to take force in a single direction only, or in a multi-directional configuration that is designed to adjust itself to a moving load. In the top rope climbing context, all large anchors or anchors that incorporate natural protection such as trees and boulders, should be configured in a unidirectional manner. Small anchors connected to bolts can be constructed as multi-directional anchors when practical.

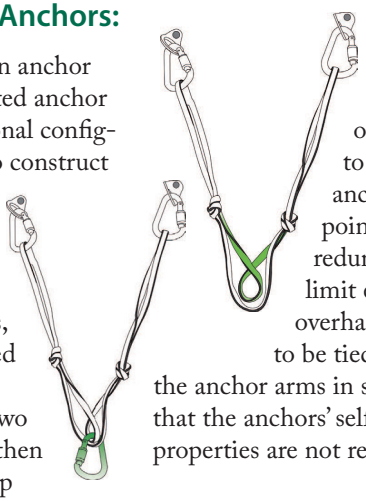
Unidirectional Anchors:

Unidirectional anchors are created by connecting full strength anchor material such as a static rope, sling(s), or one-inch tubular webbing, to two independent anchor points. The material can then be aligned with the anticipated direction of loading and a master point created by tying a figure eight on a bight. Static rope and one-inch tubular webbing may need to be folded back on itself prior to tying the figure eight on a bight to create redundancy at the master point. If this is the case, the closed tail should also then be passed over the master point to capture it.

If constructing a unidirectional anchor from bolts, the anchor material can be connected to the hangers with non-locking carabiners. If building a large unidirectional anchor from trees or boulders, the anchor material can be tied directly to the anchor point, or the anchor point can be initially slung and the anchor material then connected to the sling or slings with non-locking carabiners. In instances where the non-locking carabiner(s) connecting the anchor material to the anchor point is contacting rock, the ground, or any other object, a locking carabiner should be used in lieu.

Multi-Directional Anchors:

In instances where an anchor is being built from bolted anchor points, a multi-directional configuration can be used. To construct a multi-directional anchor, a sewn sling can be connected to the hangers with non-locking carabiners, and a single twist placed in one strand of the sling creating a loop. Two locking carabiners are then passed through the loop



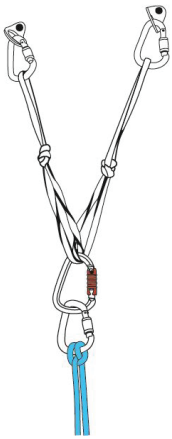
and the other strand of the sling to create the anchors' master point. To create redundancy and limit extension, overhand knots need to be tied into each of the anchor arms in such a manner that the anchors' self-adjusting properties are not restricted.

Anchor Extensions:

In instances where it is not practical or possible to safely create a master point on a unidirectional anchor where desired, an anchor extension enables the initial master point to be created and then extended from. Anchor extensions must meet the same anchor quality criteria as the initial anchor. They are most often completed by basket hitching a sewn sling, a tied loop of one-inch tubular webbing, or a section of static rope through the master point of the initial anchor, and then tying a new master point in the extension.

TETHERING TO ANCHORS

In situations where the top rope leader will be belaying from above, constructing an anchor from a position with a significant fall potential, or the top rope leader is threading an anchor in preparation for rappel, the leader should be tethered to the anchor to prevent them from falling. This can be achieved by using the climbing rope if belaying from above, or by using a sling or dynamic tether if constructing an anchor or preparing to complete a rappel.



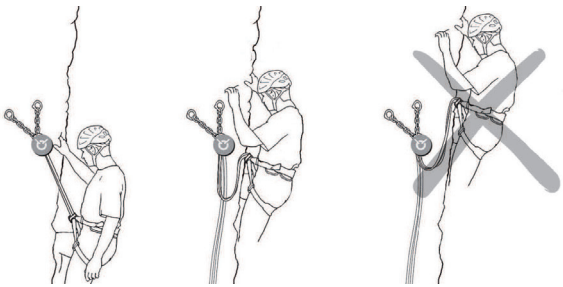
Tethering with the Climbing Rope:

Tethering to an anchor with the climbing rope enables the top rope leader to efficiently adjust the length of the tether. This is desirable in situations where top belaying techniques are being applied, as it allows the leader to position themselves in a manner where they can see the climber. To tether to the anchor using the climbing rope, the top rope leader needs to be tied into the climbing rope with a figure eight follow through knot, and the rope then connected to the anchor with a clove hitch on a locking carabiner.

Tethering with a Sling:

Due to the low elongation properties of sling material, whenever tethering to an anchor with a sling it is important to keep the sling tensioned at all times. Even a short fall directly onto a sling can create significant impact forces that can cause injury. In situations where potential for a fall onto a tether exists, it may be preferable to use a commercially manufactured dynamic tether or a Purcell Prussik.

When threading an anchor to rappel, tethering to the anchor can be completed using a sling. For this configuration a sling should be girth hitched through the top rope leaders' tie-in points, and a locking carabiner used to connect the sling to the master point of the anchor.



THREADING AN ANCHOR

When threading an anchor to either lower or rappel from the permanently fixed hardware, a series of load transfers is required. The initial transfer should be from the belay system to the anchor and is often achieved by using a tether to connect he climber to the anchor with a locking carabiner. Once secured to the anchor the climber can facilitate threading the rope through the permanent hardware while ensuring the rope is continuously connected to themselves so that it can't be dropped. Following the threading of the anchor the climber can then either re-tie into

the rope or set up to rappel. A thorough check of their system must be completed. Lastly, the climber can then transfer themselves back on to the belay system or on to the rappel system and complete their descent.

Directionals

The use of directional quick draws in a top rope climbing context is often over looked. However, well placed directionals on top rope routes can increase safety and facilitate participant success. In instances where the route being top roped has existing fixed protection bolts, directional quick draws can be used for the following purposes:

- To keep the rope aligned with the route if the anchor is not positioned directly above the line of ascent;
- To keep the top rope or the climber away from loose rock;
- To create a point of aid to assist the climber past a challenging section of the route;
- To create two separate climbing lines from a single top rope anchor;
- To create an alternate success point or end to the climb in instances where it is preferable for the climber not to climb all the way to the anchor; and/or
- To prevent a pendulum swing or fall on routes that traverse or have overhangs.

Improvised Rescue

Through the diligent management of risk, and careful assessment of participant competency, the need for rescue can often be avoided or prevented. That said, when dealing with the natural environment occasionally factors outside of ones' control may lead to accidents. In the top rope climbing context, improvised rescue can be relatively straight forward if the injured participant is being belayed from below, or can be relatively complex if the participant is being belayed from above.

BASIC RESCUE FROM BELOW

If a participant is injured while being belayed from below on a top rope climb, rescue is relatively straight forward. Assuming no additional hazards are on the ground, they can immediately be lowered and first aid can be administered.

COMPLEX RESCUE FROM ABOVE

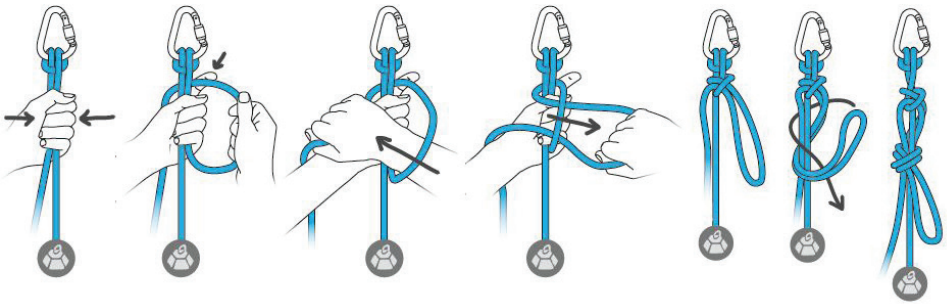
The nature of some top rope climbing venues is such that accessing anchors and belaying from above may be the only means of completing the day's activities. If these sites are being utilized for an outing, it is imperative that the top rope leader recognize and mitigate the potential fall hazard that top access presents and be adequately prepared to complete a complex rescue from above in the event of an emergency.

Rescuing an injured participant from above is a complex skill that requires advanced knowledge and ongoing practice to complete effectively. Whenever possible, situations that could require a participant to be rescued from above should be avoided. If a rescue from above is needed, the top rope leader will need to complete some or all of the following steps depending on the severity of the injuries:

- Tie off an Italian hitch;
- Descend a fixed rope to the injured participant via rappel and perform first aid;
- Construct an improvised chest harness;
- Ascend a fixed rope; and/or
- Create a raising system.

Tying off an Italian-Hitch:

Tying off an Italian hitch is typically the first step in completing a rescue from above as it secures the injured participant and enables the top rope leader to then carry out other components of the rescue. It is always desirable for a tie-off to be releasable under load, the preferred method for tying off the Italian hitch is to tie an overhand slip knot around the loaded rope with the brake rope and then secure the tail of the slip knot by tying the bight around both the load and brake strands of the rope with an overhand knot.



Improvised Chest Harness:

In instances where injuries or level of consciousness prohibit the injured individual from maintaining a seated position in their harness, an improvised chest harness should be used to prevent them from inverting. An improvised chest harness can be created using a 120 centimetre sewn sling by putting one twist in the sling and passing the injured individuals arms through the two loops created, so that the twist crosses their back. The front of the improvised chest harness can then be connected to the climbing rope the injured individual is tied to, using a short prusik, to keep them in an up-right seated position.

Rope Ascending:

If it has been deemed necessary to descend a fixed line to the injured participant in order to perform first aid prior to completing any other improvised rescue actions, the top rope leader will be required to ascend the fixed rope back to the belay at the top of the cliff.

Two 5 metre sections of 7 millimetre cord are required to ascend a fixed rope. The process involves creating two three-wrap prusiks around the fixed rope and setting the upper prusik at roughly wrist height when an arm is extended above the head. The second prusik should be set directly beneath the first with the top prusik then being connected to the tie-in points of the harness with an overhand knot. An overhand knot should be created in the tails of the lower prusik 10

An improvised etrier for ascending, can be created by girth hitching the lower prusik cord around one's foot.

When ascending an unloaded rope, figure eight on a bight back up knots should be tied in the rope at roughly 3 metre intervals.

centimetres below the prusik as well as roughly 6 inches below foot height with a bent knee. The tail end of the sling which has been used to extend the belay device to complete the rappel on the fixed line, should then be connected to the small closed loop below the lower prusik with a locking carabiner. The top rope leaders' weight can then be transferred from the belay device to the prusiks' enabling the belay device to be removed and an ascent of the fixed rope to be completed.

Raising Systems:

Minimizing friction in a raising system will greatly increase its efficiency. If a sharp edge exists between the anchor and the injured participant, padding it with a pack or other similar material to round it, may make the task less laborious.

If all other options have been exhausted and it is deemed necessary to raise the injured participant to the top of the cliff, then a 3:1 raising system can be used. To complete a raise, the top rope climbing leader will require additional specialized equipment in the form of a rope-grabbing pulley such as a micro traxion. One procedure for constructing a raising system is as follows:

Step 1: Create a three wrap prusik around the loaded rope carrying the injured individual with a 5 metre section of 7 millimetre cord.

Step 2: Immediately behind the prusik tie an overhand knot in the tails of the cord to create a small closed loop.

Step 3: Connect the tail ends of the cord with a double fisherman's knot creating a closed loop that can then be connected to the anchor with a locking carabiner.

Step 4: In the brake strand behind the tied off Italian hitch, add a rope grabbing pulley and connect it to the anchor with a locking carabiner.

Step 5: Set the prusik as far down the loaded rope as possible.

Step 6: Release the tied-off Italian hitch and lower the load of the injured participant onto the prusik.

Step 7: Remove the Italian hitch and all slack between the loaded prusik and the rope grabbing pul-

ley by pulling the rope through the pulley.

Step 8: Place a carabiner in the small closed loop directly behind the prusik and redirect the brake strand of the climbing rope through that carabiner.

Step 9: Pull firmly on the brake strand ensuring that as the raise is completed rope is moving smoothly through the rope grabbing pulley.

Step 10: When the prusik reaches the pulley, reset the system by extending the prusik down the loaded rope as far as possible.

The assistance of additional participants in completing the physical component of the raise will make the task significantly less challenging for the top rope leader. However, if significant resistance is met while completing the raise it is important to confirm that the injured participant is not unduly stuck under an overhang or other obstruction.

Notes:

Rock Climbing Movement

The ability to apply basic rock climbing movement techniques on a variety of rock types, enables the top rope leader to perform a range of necessary tasks. Proficiency in movement ensures they can efficiently lead routes to create top rope anchors in addition to providing participants with basic movement modelling, instruction, and coaching. In this chapter we will highlight some basic climbing movement techniques that can be applied when face climbing, crack climbing, and slab climbing.

Face Climbing

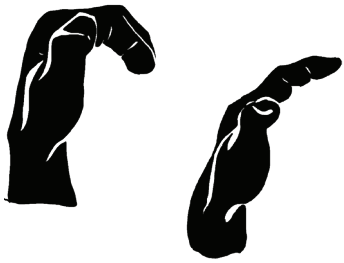
Face climbing activities are typically completed in terrain that is featured with a variety of edges, pockets, incut, and sloping holds. Limestone, sandstone, gneiss, quartzite, and conglomerate rock types often present face climbing opportunities.

HAND POSITION

Three grip positions are commonly used while face climbing. These positions can be used in a variety of orientations depending on the alignment of the hold's most positive aspect.

Open Hand Position:

The open hand position is the most relaxed and ergonomic grip. It is often used for sloping holds, pockets, and large incut holds. This hand position requires the climber to create a 'C' shape with all five fingers of the hand prior to placing it on the hold.



Crimp Position:

The crimp position enables the climber to grasp small edges by creating a closed finger position with the thumb wrapped over top of the index finger. This position is extremely powerful, and enables the climber to grasp small holds that an open hand position could not.

Pinch Position:

The pinch position allows the climber to grasp holds from two sides by opposing the thumb to the fingers. Unlike the open and crimp grip, it also enables the climber to articulate their body around the hold without adjusting the orientation of their grip.

A top rope leader's ability to demonstrate smooth and efficient movement, will enable them not only to model movement skills for the group, but will also inspire the participants' confidence in the leader. Efficient movement is fluid, precise, thoughtful, and should appear relatively effortless.

FOOT POSITION

In addition to the smear position that is discussed in slab climbing techniques, the inside edge position, outside edge position, and front-point position are commonly used foot placements when face climbing.

Inside Edge Position:

The inside edge position enables the climber to use the most powerful aspect of the foot and climbing shoe. This foot position involves aligning the foot parallel to the positive aspect of the hold, with the big toe positioned on the hold and the heel turned outward slightly. This position is typically used on edges and incut holds that possess a positive aspect, and is the most commonly used foot position while face climbing.

Outside Edge Position:

The outside edge position can be applied on small edges as well as larger holds, and is best suited to use in steep terrain or when the climber is moving laterally. Contrary to common belief, the outside edge uses the big, second, third, and fourth toes, and not the pinky toe. The outside edge position involves aligning the foot parallel to the positive aspect of the hold with the outside edge of the climbing shoe, and angling the heel out from the rock roughly 60 degrees due to the asymmetric shape of most climbing shoes. This foot position is less intuitive than the inside edge position, but enables maximum hip and shoulder rotation and therefore greater reach when moving laterally or moving through overhanging terrain.

Front-Point Position:

The front-point position is commonly used in pockets, cracks, and seams that are poorly suited to the inside and outside edge position. This position involves using the point of the climbing shoe where the inside and outside edges meet, and placing it in or on the most positive aspect of the hold. With the front-point position, the heel is typically positioned perpendicular to the aspect of the hold the foot is being placed on, in order to maximize the contact between the climbing shoe and the hold.

BODY POSITION

The optimal body position for face climbing will vary greatly depending on the orientation and placement of the hand and foot holds. Whenever possible it is ideal to orient the body so that the hand holds are being used in alignment with their optimal direction of pull. However, it is also important that the centre of gravity remain over the feet whenever possible. At times it may be preferable for the climber to position themselves so that they are balanced over their feet at the expense of using a hand hold in a

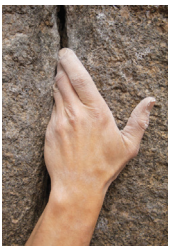
less than optimal position.

The general sequence for face climbing involves initiating upward momentum by pushing with the legs and feet before reaching up for a higher hand hold. Once a higher handhold, or set of handholds, has been reached; the centre of gravity should then be repositioned to enable the movement of the feet to higher footholds. Once the feet have been positioned on the higher foot hold or holds, and the next set of hand holds spotted, the centre of gravity can be repositioned and the feet and legs can again generate upward momentum.

Crack Climbing

In certain instances, where the rock does not present notable face climbing holds, and the terrain is too steep to effectively slab climb, large cracks in the rock may enable the climber to make upward progress. Crack climbing is a unique skill that takes significant practice to become proficient with. Granite, basalt, quartzite, and occasionally gneiss, often present long continuous crack systems that require crack climbing techniques to successfully complete.

HAND POSITION



The optimal hand position for crack climbing will vary greatly depending on the size of the crack and the size of the climbers' hands. That said, regardless the width of the crack, the general concept is consistent. The climber must create a space-filler with the fingers, hand, fist, or body that matches the size of the crack, thus creating outward force between the opposing sides of the crack, or an obstruction that will jam above a constriction. Hand and fist sized cracks tend to be easier to learn on because they often offer solid jams in addition to positive foot placement opportunities. Thin finger cracks and large off-width cracks are typically far less secure and more challenging to climb as the jams are more difficult to create, and often the crack is either too narrow or too wide to accommodate positive foot placements.

Motivating climbers can be a challenging component of the top rope leader's responsibilities. It requires the ability to strike a balance between ensuring the participant is successful, while also ensuring they are adequately challenged. Encouraging a participant to the point of repeated failure often leads to a sense of unsuccessfulness, frustration, and overall decreased motivation. That said, a lack of difficulties and only attempting routes that are well within a climber's abilities, may not provide adequate challenge to maintain their enthusiasm, interest, or foster their growth in the sport.

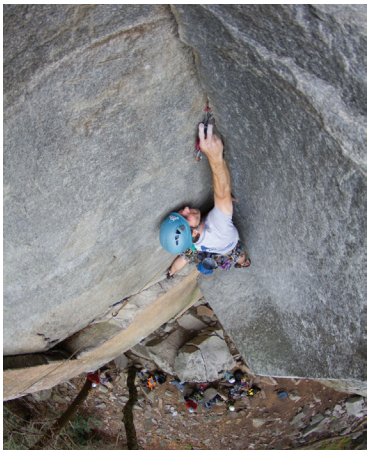
FOOT POSITION

The optimal foot position for crack climbing depends on the width of the crack being climbed. Very thin cracks that will not accommodate foot jamming require a combination of smearing and front-pointing to climb efficiently. Moderate size cracks typically allow foot-jamming techniques to be applied. Foot jamming involves rotating the foot into the crack to wedge the toe of the shoe between the crack walls or above a constriction. Large cracks may require the foot to be turned perpendicular to the crack walls and jammed sideways rather than straight in. Regardless of the size of crack being climbed, good footwork is still critical in ensuring efficient upward progress.

BODY POSITION

The body position for crack climbing differs from the positions used for face climbing, slab climbing, and corner climbing, as cracks generally force the climber to position their hands and feet in-line with one another. This body position is less stable laterally and therefore the climber needs to be acutely cognisant of their centre of gravity and ensure that it remains well balanced over the feet or beneath the hands at all times. Similar to slab climbing, shorter deliberate moves tend to be more effective when crack climbing than large dynamic ones.

Corner and Chimney Climbing



Prominent corner and chimney systems in certain rock types such as granite, basalt, limestone, gneiss, and sandstone, often allow a climber to ascend steep terrain with minimal, if any, significant holds. Corner and chimney climbing requires good balance, confident foot positioning, creative body positioning, and effective pushing and pressing between opposing rock features.

Slab Climbing

Slab climbing activities occur in terrain that is less than vertical and devoid of prominent holds. In this terrain, friction between the climbers' climbing shoes, the climbers' palms, and the rock, enable upward progress. Limestone, granite, and occasionally sandstone as well as some conglomerate rock types often present slab climbing opportunities.

HAND POSITION

Occasionally while slab climbing, small crimp grip position hand holds may present themselves, however, the typical hand position for slab climbing involves palming the rock with relatively flat hands. This hand position is rarely intuitive, novice participants may have the tendency to grasp onto features in the rock, rather than using their palms. The palming position does not allow for the rock to be grasped, instead it generates friction between the palm of the hand and the rock surface. This enables the climber to remain balanced and adjust their centre of gravity and reposition their feet. The palming hand position typically involves orienting the fingers in an upward manner, but occasionally a reverse palm position with the fingers pointed downwards, may be preferable.

FOOT POSITION

The commonly used foot position for slab climbing is referred to as the smear position. The technique involves pressing the sole of the climbing shoe under the ball of the foot against the texture of the rock or against any small convex or concave features in the rock. Unlike edging and front-pointing, which require the foot to be placed parallel to the positive aspect of a hold, smearing involves flexing the foot below the toes, and dropping the heel down slightly to maximize surface contact between the sole of the shoe and the rock surface. The heel should be positioned perpendicular to the surface that is being smeared against, and the centre of gravity adjusted to ensure the climber's weight is being directed to the foot placement and adequate friction created to maintain the smear.

BODY POSITION

As slab climbing occurs in terrain that is less than vertical, the body position differs from that which is typically used for steeper forms of climbing. The general body position for slab climbing involves slightly shifting the hips and centre of gravity away from the rock surface to ensure the climber's weight is positioned directly over the feet. Slab climbing movement is often slow and balanced, with smaller static moves being preferable and more stable than large dynamic ones.

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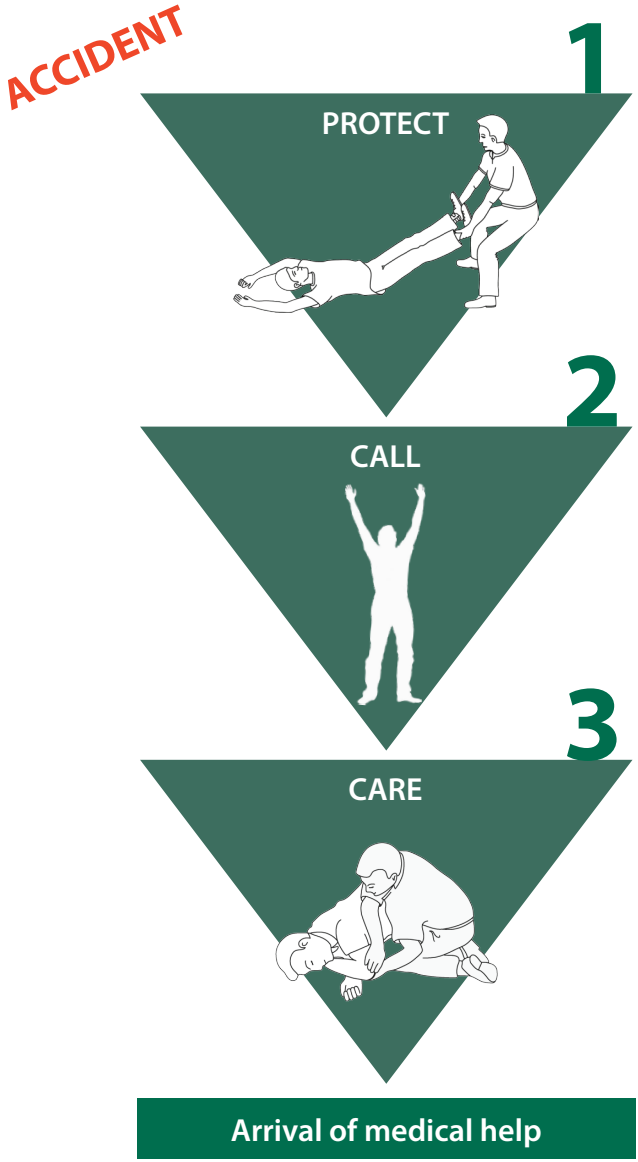
Responding to Emergencies

Despite best laid plans, top rope leaders may at times be required to respond to accidents or emergencies within their group or other recreational climbing groups in the area. It is therefore imperative that top rope leaders maintain first aid currency and be properly equipped to manage minor emergencies and if necessary seek the assistance of organized rescue for major emergencies. There are many approaches to managing emergencies, in this chapter we will explore the basics of first aid, emergency communication, and how to manage the group if an accident occurs. The basic principles outlined in this chapter are not a replacement for formal first aid training; all top rope leaders should possess current standard first aid and CPR certificates.



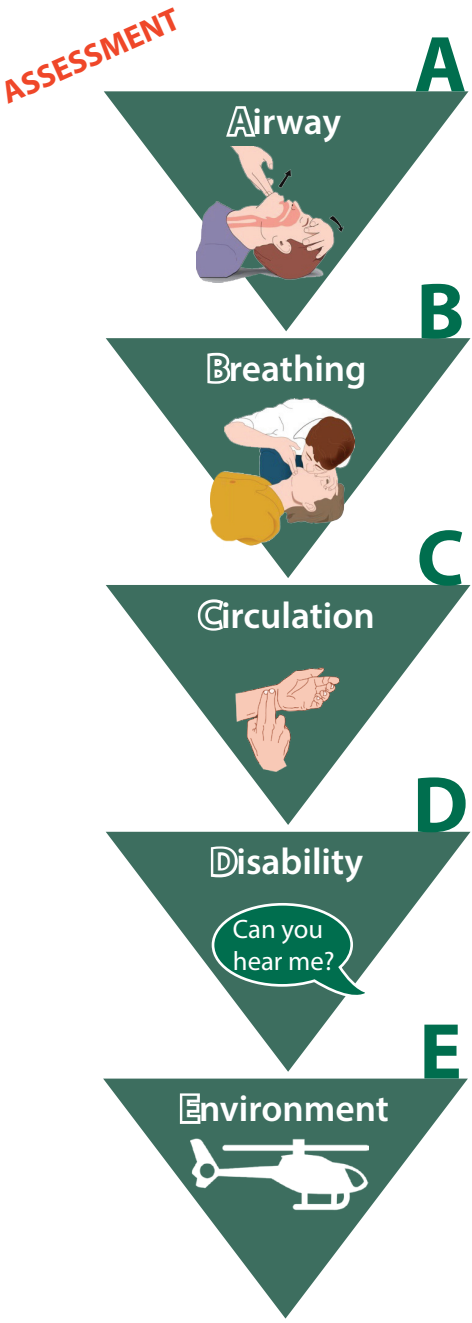
The underlying principles in any emergency situation include; protecting the patient, calling for help if required, and providing initial care and treatment.

Performing First Aid

Once the scene has been assessed and deemed safe, or the patient has been moved to a safe location and a call for organized rescue (if required) has been made, the top rope leader can then provide initial first aid to the victim. Depending on the severity of the injury the general first aid procedures include:

- A (airway), ensuring the patient's airway is unobstructed;
- B (breathing), establishing that the victim is breathing and determining the quality of breath;
- C (circulation), checking for a pulse and the general heart rate over the period of one minute in addition to a quick check for severe bleeding;
- D (disability), determining the victims level of consciousness and awareness, checking for sensation in all extremities; and
- E (environment), determining the effects the weather will have on the ability to treat the patient, effectuate a rescue, and manage the remaining group members.

Due to the nature of rock climbing activities, the most common accidents are trauma related, and involve bleeding

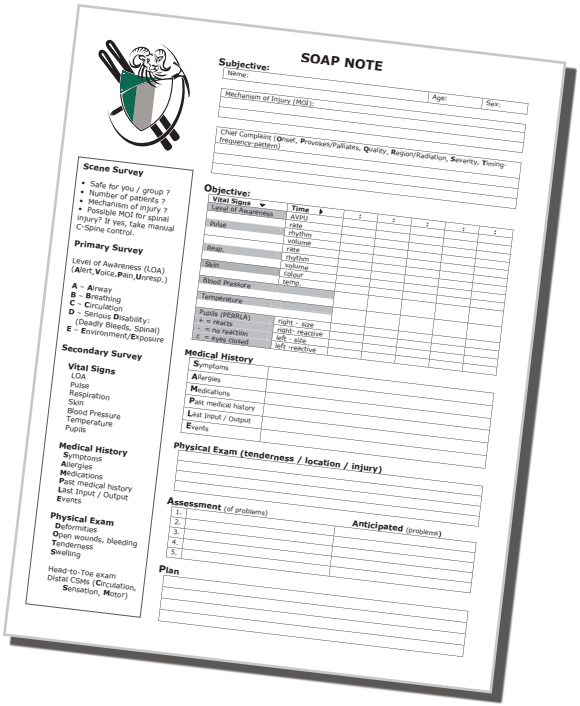


Documenting patient information, in the event of an accident, can be beneficial in determining whether the patient's condition is improving or deteriorating, can be useful for organized rescue and emergency medical services, and can occupy a member of the group during an emergency.

and/or fractures. In the case of bleeding, direct pressure should be applied to the wound site using sterile, non-stick dressings, and if practical the wound elevated above the heart. When dealing with bleeding injuries, the top rope leader should ensure they protect themselves and their victim from blood-borne pathogens by wearing gloves. In the case of fractures, small bones should be splinted, immobilized and sensation below the break should be confirmed. Fractures of long bones, such as the femur, require immediate evacuation and may necessitate gentle traction to ensure continuous blood flow below the break to the extremity of the leg.

Common items to include in a first aid kit for a day of climbing include:

- Latex gloves;
- Antiseptic wipes;
- Pressure bandages or dressings;
- A good selection of adhesive bandages;
- Sterile non-stick pads;
- Adhesive elastic bandage;
- Non-adhesive elastic bandage;
- Medical tape;
- Steri-strips;
- Moleskin or second skin;
- Small scissors;
- Nail clippers;
- Compact mouldable splint; and
- Triangular bandages.



Emergency Communications

If organized rescue is deemed necessary, communication should be initiated immediately and the following information provided to the local agency:

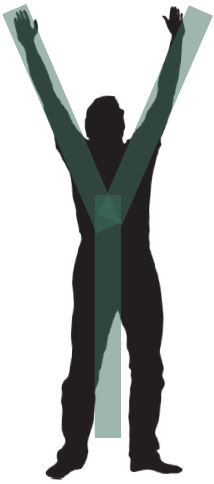
- The caller's name and telephone number, if the communication is being initiated by phone;
- The nature of the accident and the number of patients;
- The severity of the patient's injuries, if known;
- The level of consciousness of the patient;
- The exact location of the patient;
- The time of the accident;
- The local weather conditions;
- The size of the group; and
- Any first aid actions that have been initiated.

Ensuring that contact information for organized rescue is readily accessible is of crucial importance if an emergency necessitates this service. Phone numbers, radio frequencies and communication devices should be kept together and placed in an easily accessible location in the top rope leader's pack. Further, the leader should instruct participants in the use of all communication devices at the start of the outing so they can initiate the call for help if required.

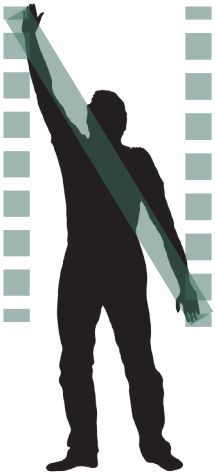
Table to keep in first aid kit:

WHO?	Your first and last name, and where you can be reached.
WHY?	Nature of the accident, number of victims, seriousness of the situation. Is the victim conscious?
WHERE?	Location, route, altitude, Etc.
WHEN?	Time of the accident.
CURRENT WEATHER CONDITIONS?	Winds, visibility, Etc.

If organized rescue is coming by air, simple arm signals can assist the pilot in locating the injured party quickly.



Call for a rescue (Yes)



No need for a rescue (No)

If organized rescue is coming by ground, designating one or two runners from the group to meet rescue personnel at the trail head and direct them to the accident site is advisable when the site is difficult to locate or unfamiliar to rescue personnel.

Group Management in Emergency Situations

Top rope leaders need to be cognisant of all group members in the event of an accident. While the patient may require immediate attention, uninjured members of the party often also require care and monitoring. If possible and practical, providing uninjured group members with tasks that assist in the management of the emergency situation may help occupy them. Common tasks group members could complete in an emergency include:

- Assisting with first aid and documenting patient history and vitals;
- Creating a shelter or fire;
- Meeting organized rescue at the trail head; and
- Monitoring patients with non-life threatening injuries.

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The purpose of this field handbook is to support the Alpine Club of Canada's top rope rock climbing leader training program, as well as to act as an ongoing resource for top rope leaders. It is designed to highlight techniques and applications commonly used by top rope leaders to assist in the delivery of a successful top roping outing.

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