Avalanche Safety Plan 2011

BC Public Service Natural Resource Sector
For General Wilderness Activities

Photo: Dave Heagy
Location: West Arm Provincial Park

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Introduction

The Natural Resource Sector (NRS) agencies undertake work throughout British Columbia, which presents diverse and varied terrain, climate and conditions. Avalanches are a common phenomenon in British Columbia's mountain ranges, and with the diversity of work undertaken by the NRS throughout these mountains, employees are occasionally exposed to avalanche risk. In order to manage this risk it is imperative that an avalanche safety plan be in place for work conducted in avalanche terrain. An avalanche safety plan ensures employees have the training, equipment and experience necessary to conduct work safely in avalanche terrain.

Purpose

The purpose of this avalanche safety plan is to support the NRS Avalanche Avoidance Policy by providing direction to *at risk* activities that must be undertaken. The NRS Snow Avalanche Avoidance Policy was developed to ensure that the principal of avoiding risk where practical is the first control considered throughout the NRS agencies to mitigate the exposure of NRS employees to avalanche risk, and to comply with Occupational Health and Safety Regulations

Scope

This plan applies to "*... all NRS staff, and volunteers. In addition, this plan may apply to other Ministries' staff that are working with NRS staff and may be used by other agencies working in cooperation with NRS staff.*"

Definitions

The terms below are defined as they relate to the NRS Avalanche Safety Plan:

Avalanche Professional:	*A professional member in good standing of the Canadian Avalanche Association.*
Avalanche Risk Assessment:	*Occurs in a variety of ways using various sources of information as is practically available and appropriate for the nature of the activity. It includes preliminary assessments as conducted under the Avoidance Policy to determine at risk conditions and determine the application of an Avalanche Safety Plan or the need for further assessment. Generally, wilderness activities are supported by preliminary planning assessments and, where available and warranted, landscape level assessments of terrain. In addition, field assessments that consider variable terrain and snow conditions as work progresses are used to inform decisions to proceed and the manner in which they should proceed. Regular worksites may require detailed assessments of avalanche terrain that include estimations of avalanche frequency and magnitude.*
Avalanche Terrain:	*Terrain that is affected by snow avalanches.*

Avalanche Terrain Exposure Scale (ATES):	*A framework that comprehensively evaluates, describes, and communicates the complexities of avalanche terrain exposure. See Appendix C for the technical model.*
Canadian Avalanche Association (CAA):	*A not-for-profit, non-government organization that serves and supports the diverse community of professional avalanche operations in Canada.*
Canadian Avalanche Centre (CAC):	*A not-for-profit, non-government organization dedicated to public avalanche safety in Canada.*
Non-avalanche terrain:	*Terrain that is not affected by snow avalanches.*
Non-traditional worksite:	*Area or route infrequently travelled by NRS employees, and which may or may not have planning information such as avalanche bulletins and terrain assessments available. An example of staff working in a non-traditional worksite would be a reactionary conservation officer response to a report of a Wildlife Act offence in a remote mountain valley accessed by snowmobile on a forest service road.*
Traditional Worksite:	*Area or travel route in terrain that is regularly travelled by staff (at least once per year) and for which some planning information is available (i.e. ATES ratings, avalanche bulletins). Traditional worksites may have professional terrain assessments and may have specific and unique operational procedures under a local ASP. Examples of traditional worksites include access routes to backcountry park facilities, and regular compliance and enforcement patrol routes travelled by Conservation Officers.*
Wilderness Activity:	*Includes routine field activities of the NRS staff typically over large areas and does not include activities related to the operation of heavy machinery or static long term work sites.*
Trip Leader:	*The group member that assumes a leadership role for the trip. This person will usually possess the highest level of training and/or experience travelling in avalanche terrain. Trip leaders are expected to act as the primary (though not exclusive) decision maker during the planning and execution of the trip.*
Public Avalanche Bulletin:	*A report containing avalanche danger ratings and discussions prepared by professional avalanche forecasters. Provides information on what the primary concerns are for the day, travel advice, information on avalanche activity and snowpack conditions, as well as forecasted weather*

	conditions. The key elements of public avalanche bulletins are avalanche danger ratings that employ a five-point, internationally recognized scale that includes a danger level, travel advice and a description of the expected likelihood, size and distribution of avalanches. The forecast period for avalanche danger varies by the individual bulletin and ranges from the day the bulletin was produced to several days into the future. In British Columbia, public avalanche bulletins are produced by the Canadian Avalanche Centre, ski areas, local advisory groups, and Parks Canada Agency.
Qualified Avalanche Planner (QAP):	*A person who meets the requirements of the CAA Recommended Minimum Training and Experience for Qualified Avalanche Planners published by the Canadian Avalanche Association in August 2008. Refer to Appendix D for qualifications criteria and the CAA website for additional information (www.avalanche.ca).*
Qualified Registered Professional (QRP):	*A person who is a member of APEGBC or ABCFP and has the appropriate training and experience.*

Exposure to Avalanche Risk at NRS Worksites

As described above, NRS employees are sometimes required to work in areas exposed to avalanche risk to carry out the duties of their job, which may include such functions as compliance and enforcement, field sampling, site inspections and scientific studies. NRS employees may work in areas that are well known or in areas which are not frequently travelled, and this terrain may be accessed in a variety of ways including by foot, skis, aircraft or snowmobile. If access will be via aircraft briefings should be held with pilots prior to the flight to ensure they understand the risk and mitigation protocols. Due to the varied nature of job functions, worksites, and mode of travel, the focus of this plan is to outline safety procedures for employees who will work in ***non-traditional worksites***.

There are some NRS worksites which are considered to be ***traditional worksites***. The NRS will review traditional *worksites* province-wide to determine if they require further professional risk and terrain assessments be conducted by a QRP or QAP. The information provided by these assessments will improve the ability to manage risk at these worksites. Where site specific risk assessments and terrain assessment are deemed necessary, site specific avalanche safety procedures may be developed and these procedures will be used to augment or supersede this ASP as appropriate.

It is beneficial for all parties involved across different agencies to promote sharing of site specific avalanche risk assessments or local avalanche safety plans. An example of a method for sharing this information is the **Ministry Avalanche Safety SharePoint site and catalogued on a Regional/Sub-regional basis - http://sharepoint.env.gov.bc.ca/asp/default.aspx**

Travel on *public highways is not affected by this plan* as the Ministry of Transportation and Infrastructure (MoT) conducts a comprehensive avalanche safety program for all public travel corridors. The MoT should be contacted for clarification if there is uncertainty as to whether or not a particular section of public road falls under their jurisdiction.

Roles and Responsibilities

- **Staff and Volunteers:** Must follow the Avalanche Avoidance Policy and, where risk dictates, this Avalanche Safety Plan or any local or site specific protocols which may be developed.

- **Supervisors** (directing the work of others): Ensure the avalanche safety plan is being followed by employees, including ensuring employees have the appropriate training, knowledge and equipment to perform their work safely. Record and document training, ensure that qualifications are current, ensure that suitable equipment is provided and adequately maintained.

- **Management:** Support supervisors and staff implementing and executing the Avalanche Avoidance Policy and the Avalanche Safety Plan, including supporting staff in obtaining the required training and equipment.

- **Executive:** Endorsing the NRS Avalanche Avoidance Policy and NRS Avalanche Safety Plan.

- **NRS Avalanche Professionals and Consultants:** Support field staff in implementing the Avoidance Policy and Provincial Avalanche Safety Plan, conduct terrain assessments, and conduct training.

- **Ministry Safety Coordinator(s) and the BC Public Service Agency:** Provide advice, guidance and support for the Avalanche Avoidance Policy and the Avalanche Safety Plan.

Avalanche Safety Planning Procedures

Failure to prepare prior to being exposed to avalanche risk increases the likelihood of an avalanche incident. Recognition of hazards and risks are based on a worker's ability to prepare, seek out information, and make knowledgeable and informed choices through appropriate training. Making a trip plan that includes such things as the time, date, location of the start and return, as well as alternate routes, is an extremely important part of the planning process. Making use of available information and resources on safety and navigation (e.g. public avalanche bulletins, maps, weather forecasts, and consultation with avalanche professionals) is an important step in the prevention of avalanche incident. Failure to bring proper equipment and having insufficient backcountry training increases the probability and consequences of an avalanche incident.

In order to minimize the chances of being involved in an avalanche incident, a number of steps must be taken to prepare. This section outlines the training, knowledge and equipment required for NRS employees to safely work where there may be exposure to avalanche risk, and when to avoid avalanche risk altogether.

Pre Season Check

Prior to work commencing in avalanche season work units should undertake and consider:

- Review of Avalanche safety Plan and other relevant Safe Work Procedures
- Any updates to terrain assessment information available or new sources of avalanche condition information
- Ensure staff refresher training is complete
- Inspect, repair or replace equipment
- Discuss geographic areas that staff anticipate operating in over the winter season and review terrain and risk mitigation measures.

Post Season-Review

Subsequent to the avalanche season:

- Review effectiveness of protocols and mitigation strategies for the season
- Maintain and properly store equipment

Training

All staff working in areas where an avalanche risk may be present must receive the required level of training necessary to give employees the ability to conduct this work safely, commensurate with the risk. Minimum levels of training are defined within this Provincial Plan, although site specific avalanche safety plans may have requirements for specific training due to varying circumstances that differ from these minimum levels. It is important to note that the level of training is based on the complexity of the avalanche terrain, the current and forecasted avalanche danger, and whether the employee is designated as trip leader.

Mandatory Training for all staff working in non-avalanche terrain where snowpack's exist

A. On Line Training- The CAC Online Avalanche Course can be found on the CAC Website (http://www.avalanche.ca/cac/training/online-course).

B. Annual Refresher:

1. Review of the NRS Avalanche Avoidance Policy and Avalanche Safety Plan.
2. CAC Online Avalanche Course

Mandatory Training for all staff working in avalanche terrain

A. Avalanche Skills Training 1

B. Annual Refresher:

1. Review of the provincial and/or site specific safety plans
2. CAC Online Avalanche Course
3. Field refresher practice of avalanche rescue skills (transceiver/probe/shovel)
4. Valid OHS Level 1 First Aid
5. Annually discuss with supervisor and document as part of the employee's performance review the requirement to undertake a refresher avalanche course (AST 1, 2, CAA Level 1 Operations) dependent upon expected winter time activities and recent work experience involving exposure to avalanche risk.

Mandatory Training for Trip Leaders

A. Refer to Table 1 – Trip Planning Matrix for minimum trip leader training requirements.

Other Training

The following training may be required as specified by site or activity specific avalanche safety plans or as determined by local management:

- Avalanche Skills Training 2
- Avalanche Operations Level 1
- Avalanche Operations Level 2
- Organized Avalanche Response Team Member
- Wilderness First Aid
- Level 2 or 3 OHS First Aid
- Wilderness Survival Course

Documentation of Training

Supervisors are responsible to ensure records are maintained of their staff's participation in avalanche training. It is important that these records be available upon request by management or WorkSafe BC for audit or work site inspection purposes.

Training Resources Information can be found in Appendix F Training Information and Background.

Trip Planning

Thorough planning and preparation is essential in managing the inherent risks of winter backcountry travel. The amount of preparation necessary varies depending on the nature of the trip. Shorter trips into familiar, lower-risk terrain requires less preparation while longer trips, trips into more complex terrain, or trips to less familiar terrain require more preparation and planning to ensure there are options available for a variety of contingencies. If preliminary assessments under the avalanche avoidance policy indicate at risk work then the protocols under the ASP must be followed.

Appendix A contains a Pre-Trip Planning Form which identifies key information components which should be considered when working or travelling in avalanche terrain. The use of this form is not mandatory, but it is highly recommended that this form be used for trips requiring travel in avalanche terrain where a local avalanche safety plan is not in place.

Hazard – Risk Evaluation

Identifying potential avalanche risk or probability is complex. Many variables must be considered including:

- terrain characteristics (elevation, aspect, wind exposure, slope angle, shape, forest cover, etc.);
- time of day;
- recent and prevailing winds;
- current and expected temperature , precipitation and snowpack conditions;
- activities proposed; and
- group size and experience

Clearly many of these factors vary daily, and even during the course of one day there can be significant changes with respect to many of these variables.

Short trips into simple, known terrain require less extensive preparation, but the basics of data collection and analysis may include:

- Analysis of the terrain that will be accessed;
- Gathering or review of available and appropriate weather, snowpack, and avalanche activity observations. Some examples of appropriate avalanche hazard information sources:
    - Public Avalanche Bulletins
    - Consultation with local avalanche professionals.
    - Morning and/or evening avalanche hazard assessment meetings held by professional avalanche workers in collaborating agencies or organizations such as ski areas and highway avalanche safety programs, industrial avalanche safety programs, etc.
    - Consult with local industry or colleagues working in the area
    - Check relevant on-line forums (snowmobile, ski touring, etc.)
- Avaluator Trip Planner Tool - http://www.avalanche.ca/cac/pre-trip-planning/overview
- Appropriate weather forecast data.
- A determination of current avalanche hazard that identifies the likelihood and consequences of potential avalanche activity as well as where avalanche activity is likely to occur.
- A forecast of expected avalanche hazard trends over time and terrain for the duration of the trip.

Trip Planning Matrix

Training and experience are critical elements to increasing margins of safety when travelling and working in avalanche terrain. The NRS Avalanche Safety Plan utilizes a trip planning matrix (Table 1) which identifies the minimum level of training and experience for the trip leader based on the forecasted avalanche danger rating and the complexity of the avalanche terrain that will be accessed. Trip leaders are required for all trips in avalanche terrain unless exceptions are specified in site specific avalanche safety plans or in the Avalanche Avoidance Policy.

This trip planning matrix is to be used to guide employees when making trip planning decisions. The matrix defines whether a planned trip should proceed and specifies the minimum level of training required by the trip leader in order for the trip to proceed. All NRS staff working in at risk conditions will have the minimum levels of training identified. Each group of 5 or fewer employees will be accompanied by a person with the training and experience required for a trip leader associated with that terrain classification (see Table 1). Teams larger than 6 people will require an additional trip leader to maintain the 5:1 participant to leader ratio. The expectation is that these staff groups will remain together as a work unit for the duration of their exposure to avalanche risk.

Experience with travel in avalanche terrain plays a key component in reducing avalanche risk. An employee's experience is defined as "where avalanche safety knowledge and skills have been used to travel safely through mountainous terrain in winter". Table 1 identifies situations where experience must augment training based on a combination of the terrain complexity and forecasted avalanche danger rating.

As a guideline, supervisors selecting trip leaders in avalanche terrain should look for the following criteria:

- Active recreationist (backcountry skier or snowmobiler) with ≥ 5 days in each of previous 5 winters travelling in and around avalanche terrain; or
- Active occupational work experience (using backcountry skis, snowmobiles, or helicopter) with ≥ 5 days in each of previous 5 winters travelling in and around avalanche terrain; or
- Active Organized Avalanche Response team member with local volunteer search and rescue organization that undertakes rescues in avalanche terrain.

In addition to the minimum training and experience requirements the Avaluator Slope Evaluation card (refer to Appendix B) must be used for all unguided travel in avalanche terrain.

If glacier travel is required, all party members must be trained in glacier travel and crevasse rescue.

Preliminary terrain assessments may be completed by field staff in the office prior to the trip using maps, aerial imagery, terrain photos, and the Avalanche Terrain Exposure Scale (Appendix C). Depending on the quality and resolution of these products, it is possible to be quite accurate when classifying terrain remotely. However, it is not always possible to identify smaller avalanche terrain features or subtle characteristics such as slope angle and shape. For this reason the terrain encountered in the field must be re-evaluated on an ongoing basis, with work activities adjusted accordingly. It must be stressed that accurate on-site terrain assessment requires good visibility.

It is important to be aware that small slopes can be equally as dangerous as large slopes. Crews should be aware that short, steep slopes within harvested areas or open areas and road cuts present avalanche hazards that could be easily overlooked. The terrain features may not be identifiable during the preliminary assessment prior to going in the field. Field teams must be aware of the hazards these terrain features present and be diligent in avoiding exposure.

TABLE 1. MINIMUM *TRIP LEADER* TRAINING AND EXPERIENCE REQUIREMENTS

Avalanche Danger*	Non-Avalanche	Simple	Challenging	Complex
Extreme	Online Avalanche Course	NO GO	NO GO	NO GO
High	Online Avalanche Course	***Emergency work only. AST 1 plus experience.	***Emergency work only. AST 2 or CAA Level 1 *plus* Experience	NO GO
Considerable	Online Avalanche Course	AST 1	AST 2 or CAA Level 1 *plus* Experience	Avalanche Professional
Moderate	Online Avalanche Course	AST 1	AST 2 or CAA Level 1 *plus* Experience******	Avalanche Professional
Low	Online Avalanche Course	AST 1	AST 1 *plus* Experience	AST 2 or CAA Level 1 *plus* Experience
******Unknown (avalanche bulletin not available)**	Online Avalanche Course	AST 1 *plus* Experience	AST 2 or CAA Level 1 *plus* Experience	Avalanche Professional
	*******Non-Avalanche**	**Simple**	**Challenging**	**Complex**
	Avalanche Terrain Rating**			

= Follow ASP Protocols

= Emergency Work Only

= No Go

* Forecasted Avalanche Danger for the date(s) of the trip, as provided in the applicable Canadian Avalanche Centre or Partner Bulletin, or in a locally obtained bulletin prepared by an Avalanche Professional

** Avalanche Terrain Ratings may be obtained from the Canadian Avalanche Centre, the applicable land manager, or from an Avalanche Professional. The terrain rating for a trip may also be pre-determined by the trip leader and verified in the field. An avalanche terrain rating assessment by an Avalanche Professional is recommended for all routine travel routes. Non avalanche terrain is identified as terrain which does not meet the criteria established under the ATES classification.

*** Emergency work is defined as non-routine work to mitigate the potential for loss of life, injury, or catastrophic damage to the environment. It is highly recommended that an Avalanche Professional be engaged as a trip leader to facilitate emergency work under a High danger rating.

**** When it has been determined that the avalanche danger in the terrain to be accessed is HIGH, the addition of an Avalanche Professional to the team is highly recommended before proceeding and is limited to emergency work only.

***** The Non-Avalanche terrain designation does not meet the Simple, Challenging or Complex classifications under the ATES rating. Refer to Appendix D for further information on Non-Avalanche terrain.

****** Staff may cross through areas of challenging terrain below tree line with trip leader having AST1 training and experience provided they avoid crossing areas of challenging terrain where the chance of human triggering is the highest (see "TERRAIN FEATURES TO WATCH OUT FOR" section of Field Work Procedures Appendix G).

Equipment

As a minimum, the following safety equipment is required in each field team that will travel as a self-contained unit in avalanche terrain:

- First aid kit
- Communication equipment. All field teams ***must*** have at least one means of contacting outside assistance. A second system is recommended to provide redundancy where available. Some options include:
    1. Cell phones
    2. Radios
    3. Satellite Phones
    4. SPOT devices
- Appropriate navigational equipment (GPS, compass, maps, etc.)
- Other equipment and preparations as expected by applicable field protocols

As a minimum, each team member is required to carry the following equipment:

- Avalanche Shovel
- Avalanche Transceiver(457 kHz standard, modern multi-antennae digital transceivers recommended)
- Avalanche Probe
- Appropriate clothing that provides protection from sun, wind, rain, and snow.
- Protective eyewear (sunglasses or goggles) appropriate to the conditions.
- Sufficient food and water for trip and a short-term emergency situation.

Depending on the duration, location and circumstances of the trip, overnight survival equipment (e.g sleeping bag, stove, etc.) may also need to be carried by the group.

Essential safety equipment must be routinely inspected to ensure it is in good working order and meets any appropriate manufacturer's specifications.

If essential equipment is subjected to conditions or handling that may have caused damage (e.g. if a transceiver or radio is dropped on a hard surface), it must be immediately checked for appropriate function prior to putting it back into service. If there is any question as to the item's reliability do not risk using it in the field.

Field Procedures

For Field Teams not in an enclosed vehicle: Each team of 5 or fewer employees will be accompanied by a person with the training and experience required for a trip leader associated with that terrain classification(see Table 1). As a standard practise a minimum of two employees should travel together when in at risk avalanche terrain, unless exceptions are specified in site specific avalanche safety plans or Avalanche Avoidance Policy. Should any member of the field team be uncomfortable with proceeding at any point during the trip or planning, the remaining members will respect the concern and alter the plan until consensus can be achieved.

Travel along access routes

- Look for signs of current or recent avalanche activity (e.g. fracture lines, avalanche debris, etc.) and report to all field staff and project leader

- Monitor weather and changes to the weather, including precipitation type and rate, recent and prevailing winds (speed/direction), and temperatures
- Avoid exposure by not stopping or parking in avalanche paths (start zones, tracks, run out zones) or below steep open slopes, including large steep road cuts or terrain traps

At the work site

Terrain and hazard assessments must be conducted in the field on an on-going basis by field staff at the worksite(s).

1. Evaluate terrain
   - Open slopes, sparsely treed slopes, wide-spaced glades, cut blocks >60%
   - Slope shapes: convex, unsupported
   - Existing avalanche paths above, at or below work site
   - Terrain traps (gullies, depressions, trees, cliffs, road beds)

2. Assess avalanche activity
   - fracture lines, avalanche debris
   - Dig test snow profiles to monitor conditions when the hazard is increasing

3. Evaluate unstable snowpack conditions
   - whumpfing sounds or shooting cracks at the snow surface while travelling
   - signs of significant weak layers buried in the snowpack (dig test snow profiles)

4. Monitor weather conditions for critical signs of deteriorating conditions
   - Precipitation: type/rate (snowfall >2 cm/hour)
   - Winds: speed/direction (>25 km/hour)
   - Temperatures: critical warming with recent rapid rise in temperatures (to near 0 deg.C, rain-on-snow)
   - Melting snow at the surface on solar aspects due to significant sun effect

5. Maintain appropriate communication when crossing or working in avalanche terrain
6. Maintain overall decision-making and risk management of the field crew

On-going avalanche hazard assessments may be supplemented by more specific assessments of potential avalanche slopes by using the **Avaluator Slope Evaluation Tool-V.2.0** (Refer to Appendix B) This tool is designed to be used while in the field to help with continual on-site assessment of local conditions and terrain – before committing to avalanche slopes.

If the on-going avalanche hazard assessments indicate that the hazard may be greater than originally rated or if the on-going terrain assessments reveal the terrain to be more serious than originally expected, the acceptable risk level and safety of the trip must be re-evaluated and possibly reschedule the field activities

Other Worksites

Employees may cross or enter other worksites that are operating under a different Avalanche Safety Plan. Short term visits to other worksites do not result in the establishment of multi employer worksites, however a site orientation is warranted to ensure mutual understanding of hazards and

mitigation measures. This circumstance should prompt discussion and reflection of the two Avalanche Safety Plans' operating protocols to ensure compatibility and consideration of hazard information.

Other Safety Procedures

Employees should be aware of and review relevant sections of applicable safety programs prior to entering avalanche terrain.

Emergency Response Procedures

The following section outlines generic emergency response procedures applicable to all field incidents. **These procedures must supplement work unit specific "emergency measures**". The intent is to prevent incidents whenever possible. It also highlights guidelines for levels of response, reporting incidents and emergencies, and communications in time of emergencies.

- All teams must carry a "field copy" of the incident response plan which includes companion rescue protocols and work unit emergency response protocols (avalanche rescue plan) with them into the field.
- An incident response plan (avalanche rescue plan) must be located in an obvious and easily accessible location where a field emergency might be reported.
- Avalanche companion rescue field card outlines avalanche rescue procedures for companion rescue (refer to Appendix E). It is recommended that this card be carried by all field personnel working in avalanche terrain.

General Response

1. Ensure the safety of the remaining party members.
2. Deal with immediate life threats.
3. Alert other group members and/or outside agencies
4. Analyze your ability to cope with the situation – request assistance if needed.
5. When requesting assistance provide the following:
   - Name, exact location & how to contact you;
   - Nature of the Incident and numbers involved; and
   - Level of response required.
6. Ongoing care for both injured and uninjured upon evacuation
7. Retain any witnesses
8. Report to supervisor as soon as practical.

Levels of Response

Most emergencies can be responded to in a self-contained manner by the group members. However, there will be times when outside assistance is required. Incidents and emergencies are grouped into three categories, each requiring a different level of response. Supervisors should be notified as soon as possible in the event ***any*** level of incident response is initiated.

Level 1 – This is an incident which can be handled by the staff members and others onsite. The group will be able to provide first aid and evacuation with the resources on hand. Examples: injury where the victim is able to self-evacuate with assistance from the group - minor sprains, cuts, broken arm etc.

Level 2 – This is an incident which requires outside assistance to evacuate people (helicopter, snow machine, etc.). Air evacuation, with or without medical assistance; this may be under the auspices of BC Emergency Health Service or directly by the NRS. Examples: broken lower leg, medical emergency, conditions change rendering travel unsafe.

Level 3 - This is an incident with significant complications. It will require the assistance of an organized rescue group. Calling or delegating someone to call the appropriate agency (RCMP for local SAR callout) is the responsibility of the senior staff member on the scene. Examples: multiple victim avalanche accident and/or significant injuries, broken back, broken femur, fatality, etc.

Regional Emergency Contact Information should be up-to-date prior to the trip and carried with staff.

Involvement of Professionals and Avalanche Safety Plan Review

Involvement of Professionals:

This avalanche safety plan has been reviewed and supported by a Qualified Avalanche Planner and Qualified Registered Professional.

Review of the Avalanche Safety Plan:

It is the commitment of the NRS to ensure that the Provincial Level Avalanche Safety Plan is reviewed annually and updated at a minimum every five years. Worksite-specific avalanche safety plans must also be reviewed every 5 years or more frequently as necessary.

During ASP routine reviews incident information related to this plan will be reflected upon. This does not preclude altering or adjusting the plan in response to routine incident investigations.

Appendix A – Trip Plan and Checklist

Trip / Route Information

Trip Date(s):

Trip Objective:

Geographical Location:

Primary Route Plan:

Alternate Route Plan(s):

Map Attached w/ route plans?

☐ **YES** ☐ **NO**

Site Specific Avalanche Safety Plan Available?

☐ **YES** ☐ **NO**

Group Information

Team Members

	Name	Avalanche Training	Avalanche Experience (yrs)	Level of First Aid Training	Known Medical Conditions	Experienced with mode of travel? (Yes/No)
1. (Trip Leader)						Choose a value
2.						Choose a value
3.						Choose a value
4.						Choose a value

Equipment and Communications Checklist

Equipment/Safety Gear

Equipment	Do you have the required and appropriate equipment for the trip (yes/no)?
Personal Equipment:	Choose a value
Group Equipment:	Choose a value
Pre-trip transceiver practice completed?	Choose a value

Communications Equipment

Equipment to be Used (radio, sat phone, cell phone, SPOT etc.):	Contact Number (if applicable):	Batteries Charged?
Choose a value		Choose a value
Choose a value		Choose a value

Check-in/Check-out

Check In Method/System:	

Local Emergency Contacts

Do you have an up to date contact list or Emergency Measures Manual?	Choose a value

Avalanche Hazard Assessment

Weather History and Weather Forecast:

Weather History:	
Weather Forecast:	

Snowpack Structure Summary (presence and of weak layers, primary concerns etc):

Current and Forecasted Avalanche Danger:

Elevation Band	Current Danger (1st day of trip)	Forecasted Danger (2nd day of trip)	Forecasted Danger (3rd day of trip)
Alpine	Choose a value	Choose a value	Choose a value
Treeline	Choose a value	Choose a value	Choose a value
Below Treeline	Choose a value	Choose a value	Choose a value

Avalanche Terrain Rating of Proposed Trip:

***Note**

- ***if route travels through multiple terrain classes, default to highest class***
- ***if avalanche terrain ratings are not known, preliminary ratings may be assigned during planning phase and must be supplemented by ongoing assessments in the field on an ongoing basis***

Route	Avalanche Terrain Rating (Simple, Challenging, or Complex,)	Empirical or Preliminary Rating?**
Primary Route Plan:	Choose a value	Choose a value
Alternate Route Plan(s):	Choose a value	Choose a value

**** Empirical means the terrain has been classified by an avalanche professional. Preliminary means the terrain has been rated by the field staff that will be accessing it.**

Decision Making Framework

Training and Experience Requirements

Minimum level of training required by the trip leader to participate in the planned trip, as defined in the trip planning matrix (Table 1) below:

Route	Minimum Level of Training Required by Trip Leader
Primary Route Plan:	Choose a value
Alternate Route Plan(s):	Choose a value

Trip Planning Matrix (Table 1)

TABLE 1. MINIMUM *TRIP LEADER* TRAINING AND EXPERIENCE REQUIREMENTS

Avalanche Danger*					
	Extreme	Online Avalanche Course	NO GO	NO GO	NO GO
	High	Online Avalanche Course	***Emergency work only. AST 1 plus experience.	***Emergency work only. AST 2 or CAA Level 1 *plus* Experience	NO GO
	Considerable	Online Avalanche Course	AST 1	AST 2 or CAA Level 1 *plus* Experience	Avalanche Professional
	Moderate	Online Avalanche Course	AST 1	AST 2 or CAA Level 1 *plus* Experience******	Avalanche Professional
	Low	Online Avalanche Course	AST 1	AST 1 *plus* Experience	AST 2 or CAA Level 1 *plus* Experience
	******Unknown (avalanche bulletin not available)**	Online Avalanche Course	AST 1 *plus* Experience	AST 2 or CAA Level 1 *plus* Experience	Avalanche Professional
	= Follow ASP Protocols	*******Non-Avalanche**	**Simple**	**Challenging**	**Complex**
	= Emergency Work Only				
	= No Go	**Avalanche Terrain Rating****			

* Forecasted Avalanche Danger for the date(s) of the trip, as provided in the applicable Canadian Avalanche Centre or Partner Bulletin, or in a locally obtained bulletin prepared by an Avalanche Professional

** Avalanche Terrain Ratings may be obtained from the Canadian Avalanche Centre, the applicable land manager, or from an Avalanche Professional. The terrain rating for a trip may also be pre-determined by the trip leader and verified in the field. An avalanche terrain rating assessment by an Avalanche Professional is recommended for all routine travel routes. Non avalanche terrain is identified as terrain which does not meet the criteria established under the ATES classification.

*** Emergency work is defined as non-routine work to mitigate the potential for loss of life, injury, or catastrophic damage to the environment. It is highly recommended that an Avalanche Professional be engaged as a trip leader to facilitate emergency work under a High danger rating.

**** When it has been determined that the avalanche danger in the terrain to be accessed is HIGH, the addition of an Avalanche Professional to the team is highly recommended before proceeding and is limited to emergency work only.

***** The Non-Avalanche terrain designation does not meet the Simple, Challenging or Complex classifications under the ATES rating. Refer to Appendix D for further information on Non-Avalanche terrain.

****** Staff may cross through areas of challenging terrain below tree line with trip leader having AST1 training and experience provided they avoid crossing areas of challenging terrain where the chance of human triggering is the highest (see "TERRAIN FEATURES TO WATCH OUT FOR" section of Field Work Procedures Appendix G).

Other Trip Related Safety Hazards

Hazard Present?	Type of Hazard (glaciers, thin ice, open water, cliffs etc.)	Considered, Addressed, and Mitigated?
Choose a value		Choose a value

Trip Planning Decision

Route	Minimum Level of Training and Experience Met? (Yes/No)	Proceed with Planned Trip? (Yes/No)
Primary Route Plan:	Choose a value	Choose a value
Alternate Route Plan(s):	Choose a value	Choose a value

Signature of Trip Leader: _____ **Date:** _____

Leave a copy of this trip plan/checklist with your supervisor!

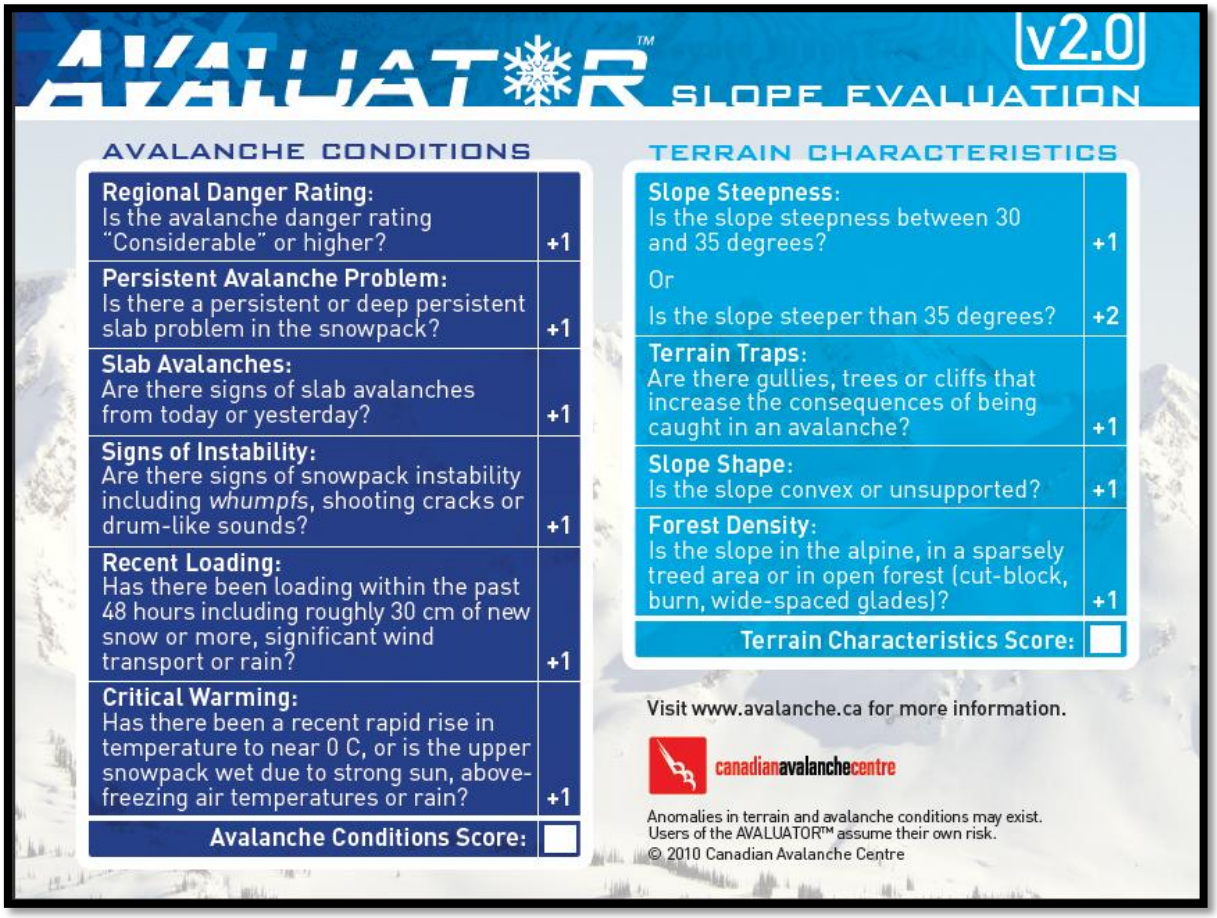
Appendix B – Avaluator Slope Evaluation

The Avaluator Slope Evaluation tool is designed to be used while in the field to help with continual on-site assessment of local conditions and terrain – before committing to travel in avalanche terrain.

On-slope ratings are independent of the original NRS Trip Planner rating. Discrepancies are likely, so the Slope Evaluation score could override original rating. Factors include: local, small scale variations in terrain; rapid changes in conditions; and variations in conditions over the terrain.

Accurate slope evaluation relies on your ability to see the terrain and conditions around you. Remember your ability to gather accurate info may be limited by: distance; blocking terrain features; and poor weather

- Be prepared to downgrade a rating based on the results of a slope evaluation (i.e. from Green to Yellow)
- Upgrading a rating (i.e. from Yellow to Green) is discouraged


AVALUATOR™
v2.0
SLOPE EVALUATION
AVALANCHE CONDITIONS
Regional Danger Rating: Is the avalanche danger rating "Considerable" or higher? +1
Persistent Avalanche Problem: Is there a persistent or deep persistent slab problem in the snowpack? +1
Slab Avalanches: Are there signs of slab avalanches from today or yesterday? +1
Signs of Instability: Are there signs of snowpack instability including whumpfs, shooting cracks or drum-like sounds? +1
Recent Loading: Has there been loading within the past 48 hours including roughly 30 cm of new snow or more, significant wind transport or rain? +1
Critical Warming: Has there been a recent rapid rise in temperature to near 0 C, or is the upper snowpack wet due to strong sun, above-freezing air temperatures or rain? +1
Avalanche Conditions Score:
TERRAIN CHARACTERISTICS
Slope Steepness: Is the slope steepness between 30 and 35 degrees? +1
Or
Is the slope steeper than 35 degrees? +2
Terrain Traps: Are there gullies, trees or cliffs that increase the consequences of being caught in an avalanche? +1
Slope Shape: Is the slope convex or unsupported? +1
Forest Density: Is the slope in the alpine, in a sparsely treed area or in open forest (cut-block, burn, wide-spaced glades)? +1
Terrain Characteristics Score:
Visit www.avalanche.ca for more information.
canadianavalanchecentre
Anomalies in terrain and avalanche conditions may exist.
Users of the AVALUATOR™ assume their own risk.
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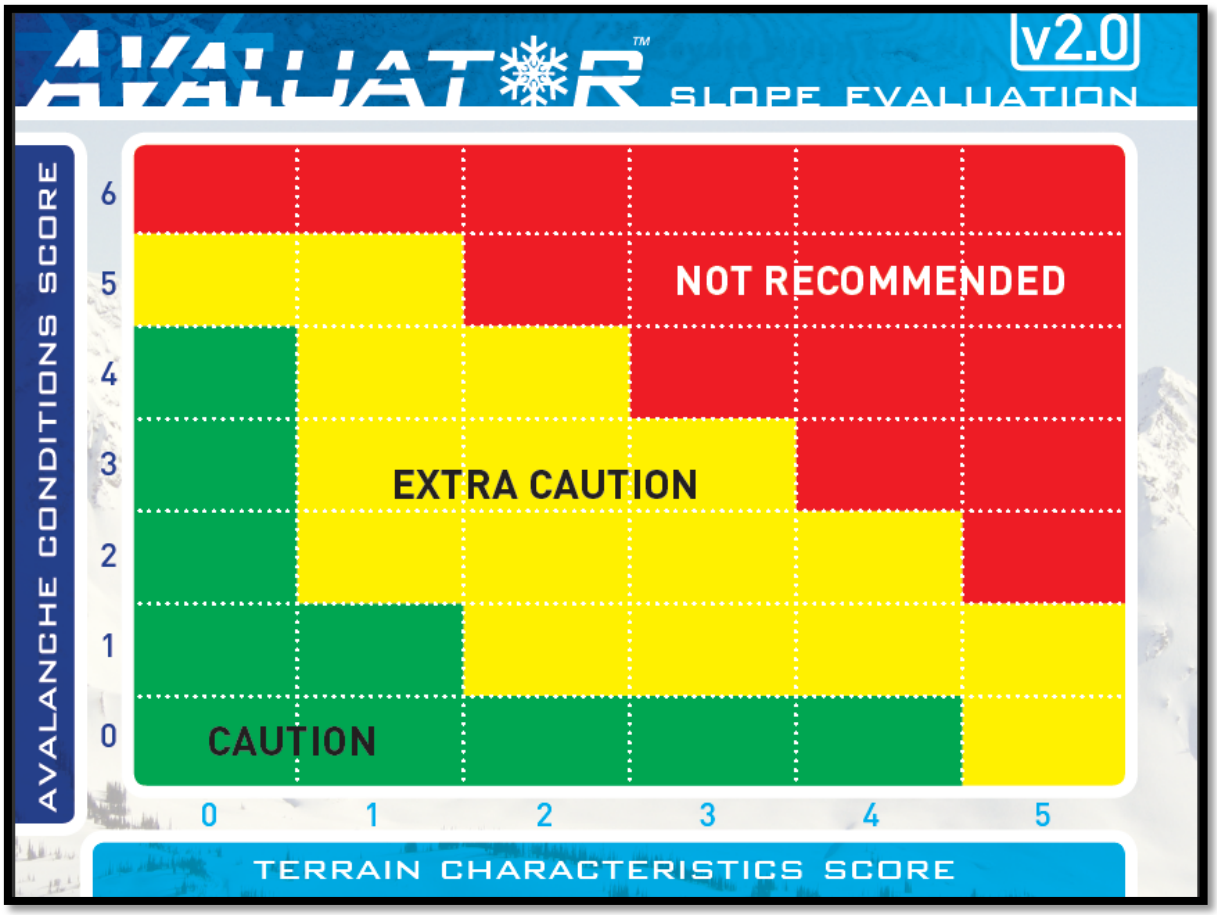

AVALUATOR™
v2.0
SLOPE EVALUATION
AVALANCHE CONDITIONS SCORE
6
5
4
3
2
1
0
NOT RECOMMENDED
EXTRA CAUTION
CAUTION
0
1
2
3
4
5
TERRAIN CHARACTERISTICS SCORE

Appendix C –Avalanche Terrain Exposure Scale

Terrain characteristic	Simple	Challenging	Complex
Slope angle	Angles generally < 30^{0}	***Mostly low angle, isolated slopes >35º***	***Variable with large % >35º***
Slope shape	Uniform	Some convexities	Convoluted
Forest density	Primarily treed with some forest openings	Mixed trees and open terrain	Large expanses of open terrain. Isolated tree bands
Terrain traps	Minimal, some creek slopes or cutbanks	Some depressions, gullies and/or overhead avalanche terrain	***Many depressions, gullies, cliffs, hidden slopes above gullies, cornices***
Avalanche frequency (events: years)	1:30 ≥ size 2	1:1 for < size 2 ***1:3 for ≥ size 2***	1:1 < size 3 ***1:1 ≥ size 3***
Start zone density	Limited open terrain	Some open terrain. Isolated avalanche paths leading to valley bottom.	Large expanses of open terrain. Multiple avalanche paths leading to valley bottom.
Runout zone characteristics	Solitary, well defined areas, smooth transitions, spread deposits	Abrupt transitions or depressions with deep deposits	Multiple converging runout zones, confined deposition area, steep tracks overhead.
Interaction with avalanche paths	Runout zones only	Single path or paths with separation	*Numerous and overlapping paths*
Route options	Numerous, terrain allows multiple choices	A selection of choices of varying exposure, options to avoid avalanche paths.	*Limited chances to reduce exposure, avoidance not possible.*
Exposure time	None, or limited exposure crossing runouts only	***Isolated exposure to start zones and tracks***	*Frequent exposure to start zones and tracks*
Glaciation	None	***Generally smooth with isolated bands of crevasses***	*Broken or steep sections of crevasses, icefalls or serac exposure*

* Recently harvested cutblocks are included in the definition of open terrain.

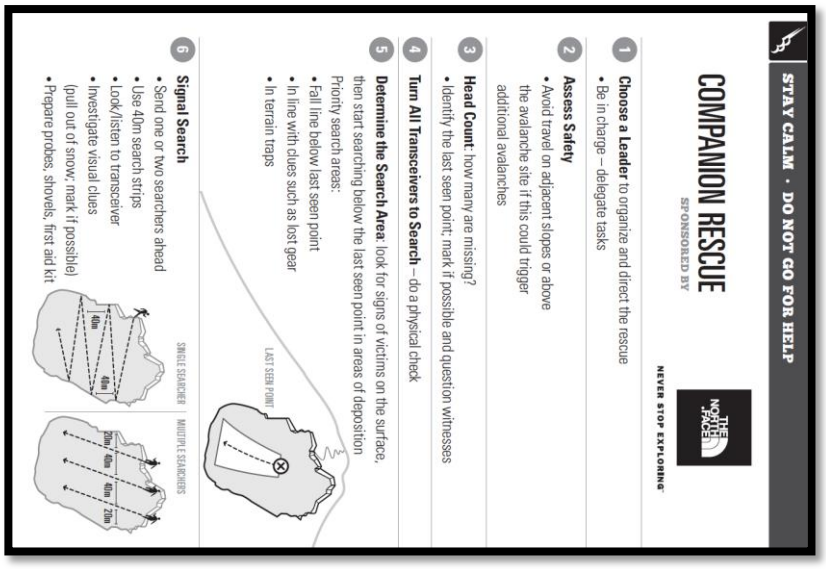
** Terrain that qualified under an italicized bold descriptor automatically defaults to that terrain class or a higher terrain class.

Appendix D - Non-avalanche Terrain

Non avalanche terrain is defined as terrain that is not categorized as simple, challenging, complex under the ATES scale. The following table provides a description of parameters associated with non-avalanche terrain.

Terrain characteristic	Non-Avalanche
Forest Density and Slope Angle	Slopes greater than 25 ° have more than 1000 stems per hectare exceeding the height of the snowpack with no avalanche hazards directly upslope. Slopes less than 25° with fewer than 1000 stems per hectare have no avalanche hazards directly upslope.
Interaction with avalanche paths	None
Avalanche frequency (events: years)	N/A
Route options	Route selection avoids avalanche terrain.

Appendix E – Companion Rescue



STAY CALM · DO NOT GO FOR HELP

COMPANION RESCUE

SPONSORED BY THE NORTH FACE

NEVER STOP EXPLORING

1 **Choose a Leader** to organize and direct the rescue
- Be in charge – delegate tasks

2 **Assess Safety**
- Avoid travel on adjacent slopes or above the avalanche site if this could trigger additional avalanches

3 **Head Count**: how many are missing?
- Identify the last seen point; mark if possible and question witnesses

4 **Turn All Transceivers to Search** – do a physical check

5 **Determine the Search Area**: look for signs of victims on the surface, then start searching below the last seen point in areas of deposition

Priority search areas:
- Fall line below last seen point
- In line with clues such as lost gear
- In terrain traps

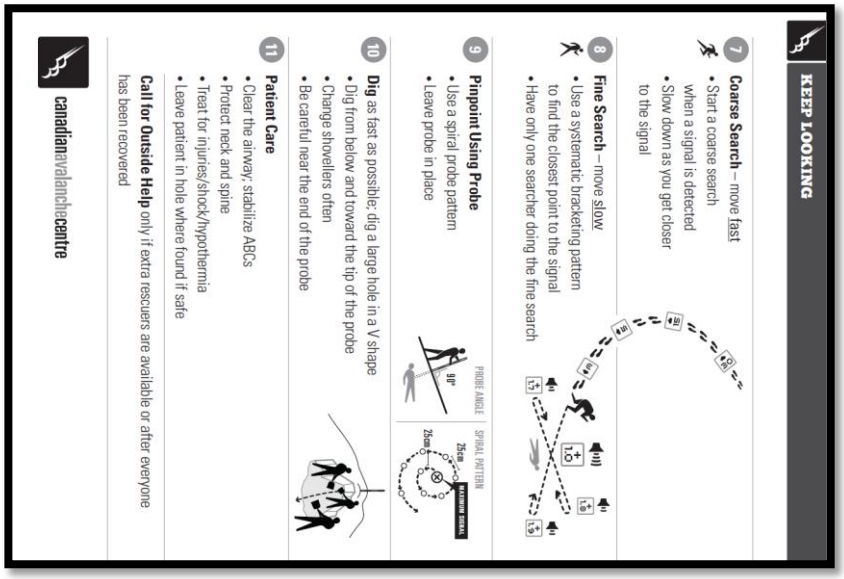
LAST SEEN POINT

6 **Signal Search**
- Send one or two searchers ahead
- Use 40m search strips
- Look/listen to transceiver
- Investigate visual clues (pull out of snow; mark if possible)
- Prepare probes, shovels, first aid kit

SINGLE SEARCHER | MULTIPLE SEARCHERS

40m

40m / 20m / 40m / 20m



KEEP LOOKING

7 **Coarse Search** – move fast
- Start a coarse search when a signal is detected
- Slow down as you get closer to the signal

8 **Fine Search** – move slow
- Use a systematic bracketing pattern to find the closest point to the signal
- Have only one searcher doing the fine search

9 **Pinpoint Using Probe**
- Use a spiral probe pattern
- Leave probe in place

PROBE ANGLE

90°

SPIRAL PATTERN

25cm

25cm

10 **Dig** as fast as possible; dig a large hole in a V shape
- Dig from below and toward the tip of the probe
- Change shovellers often
- Be careful near the end of the probe

11 **Patient Care**
- Clear the airway; stabilize ABCs
- Protect neck and spine
- Treat for injuries/shock/hypothermia
- Leave patient in hole where found if safe

Call for Outside Help only if extra rescuers are available or after everyone has been recovered

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Appendix F – Training Information and Background

Canadian Avalanche Centre provides Recreational Avalanche Training courses (http://www.avalanche.ca/cac/training/overview), including:

On-Line Avalanche Course – gain an understanding of avalanche safety basics or refresh you avalanche knowledge - http://www.avalanche.ca/cac/training/online-avalanche-course

AST courses are also available through qualified AST trainers within the Ministry of Environment. For an up-to-date list of Ministry AST trainers, please visit the avalanche SharePoint - http://sharepoint.env.gov.bc.ca/asp/default.aspx

Avalanche Skills Training (AST) Program Curriculum:

AST Level 1

The Avalanche Skills Training Level 1 Course will provide an entry-level decision-making framework that is based on the most advanced knowledge available. It is suitable for use by people with basic training and little experience. In addition, the course will: Provide the prerequisite knowledge required for further avalanche training and introduce and promote the Avalanche Skills Training Level 2 Course as the logical next step for gaining intermediate-level decision-making skills.

Objectives:

At the end of the course, students should be able to:

- Understand the basics of avalanche formation and release.
- Identify avalanche terrain.
- Know the steps required to plan and carry out a trip.
- Use the Avaluator™ as a decision-making tool in areas where trips are rated using the Avalanche Terrain Exposure Scale (ATES) and where Avalanche Danger Ratings and Avalanche Bulletins are available.
- Find resources for obtaining ATES terrain ratings if their trip is not rated.
- Find resources for obtaining Avalanche Danger Ratings and Avalanche Bulletins if these are not available.
- Use appropriate travel techniques in avalanche terrain.
- Carry out a companion rescue.
- Understand the limits of their training.

Minimum Classroom Time Requirement:
A minimum of seven hours classroom time is required.

Minimum Field Time Requirement:
A minimum of one day in the field is required

AST 2

AST Level 2 - The Avalanche Skills Training Level 2 Course will provide an intermediate level decision-making framework that is based on the most advanced knowledge available. It is suitable for use by people with a moderate degree of training and experience. In addition, the course will: Provide the prerequisite knowledge required for further avalanche training and introduce and promote the Canadian Avalanche Association Industry Training Program as the accepted standard for advanced avalanche training.

Objectives:

At the end of the course, students should be able to:

- Use the Avaluator™ as a filtering tool to determine when additional planning and travel techniques are required to travel safely.
- Be familiar with Avalanche Danger Ratings verification techniques for personal use on a local scale.
- Be familiar with the ATES technical model as a means to develop personal, local terrain ratings.
- Use route finding to take advantage of nuances in terrain to manage personal risk.
- Use travel techniques in avalanche terrain appropriate to the avalanche conditions.
- Proficiently carry out a companion rescue.
- Understand the limits of their training.

Minimum Classroom Time Requirement:
A minimum of 9.5 hours classroom time is required.

Minimum Field Time Requirement:
A minimum of three days in the field is required.

Operations Level 1

Program Goals:

- State the formation & nature of avalanches & the hazards involved
- Apply personal & group safety measures & perform companion rescue
- Recognize avalanche terrain
- Participate in organized search & rescue
- Describe significant properties of the mountain snowpack
- Collect & record weather, snowpack and avalanche occurrence data
- State the factors that are applied in snow stability evaluation
- State elements of operational risk management and decision making

Prerequisites

Applicants must meet the following prerequisites in order to apply:
A minimum of an Avalanche Skills Training Level 1 - AST 1* or equivalent training.

Advanced backcountry travel skills in either skiing or split-boarding including proficiency with touring bindings, skins, and split boards.
Proficient & consistent multiple burial transceiver skills (2 beacons buried at least 70 cm deep found in under 5 minutes in a 30mx 30m area)
19 years of age or older

* Participation on an AST 1 course before your Level 1 is acceptable for those that don't have AST 1 at time of registration. For those with training and experience similar to the AST program (e.g. from another country) you can apply for exemption using one of our Prior Learning Assessment (PLA) forms, available for download in the right hand column of this page.

Operations level 2

Program Goals

- collect & evaluate detailed weather, snowpack & avalanche data
- travel safely in avalanche terrain
- evaluate & forecast snow stability for different geographic areas
- manage personal wellness & performance
- evaluate terrain & its interaction with the mountain snowpack
- develop & apply effective communication and teamwork skills
- evaluate & forecast avalanche hazard
- develop concepts of risk management for the workplace

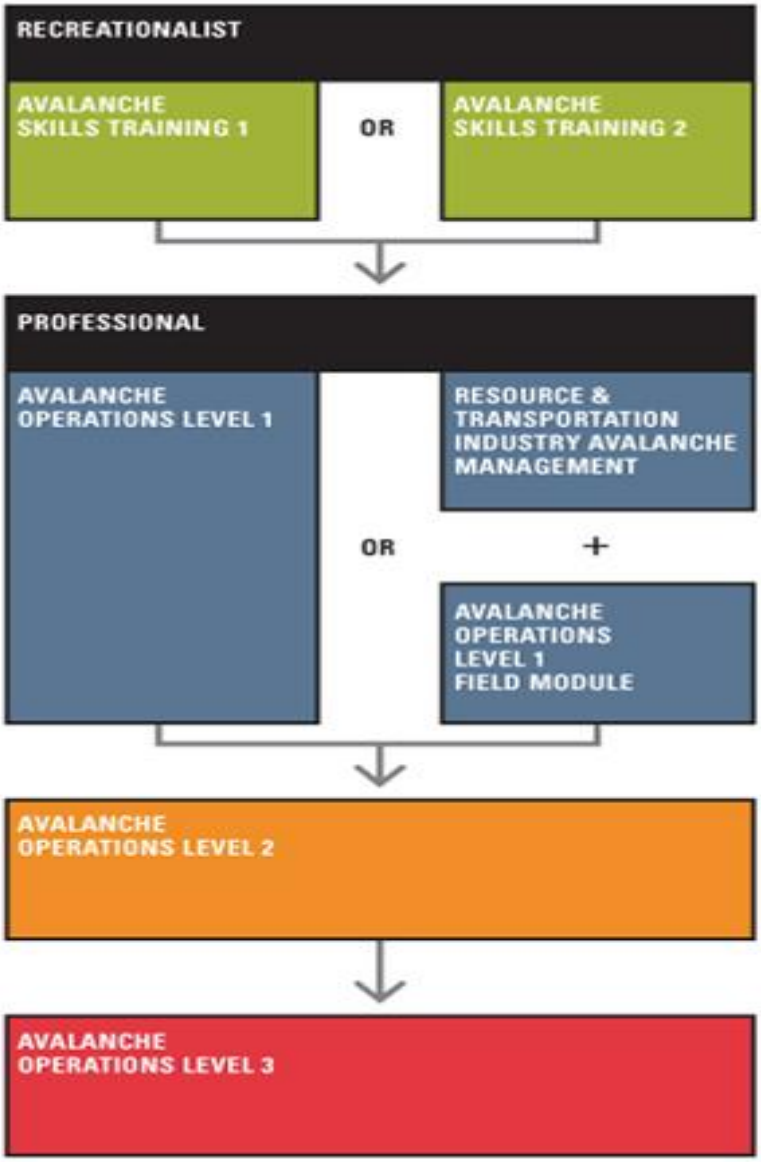
Prerequisites:

- CAA Avalanche Operations Level 1 certification or equivalent
- Thorough working knowledge of the CAA Observation Guidelines & Recording Standards (OGRS 2007)
- >100 days of operational field experience in weather, snowpack & avalanche occurrence observations & analysis
- Advanced backcountry skiing, boarding or snowmobiling skills, good fitness
- A minimum of 2 letters of reference from CAA Professional Members
- Participation on at least 2 operational avalanche rescue scenarios

Other Training information available at:

http://www.avalanche.ca/

This flow chart illustrates the general training progression through the CAA's Training Program. All professional development courses can be taken upon completion of the CAA Avalanche Operations Level 1 course.


RECREATIONALIST
AVALANCHE SKILLS TRAINING 1
OR
AVALANCHE SKILLS TRAINING 2
PROFESSIONAL
AVALANCHE OPERATIONS LEVEL 1
OR
RESOURCE & TRANSPORTATION INDUSTRY AVALANCHE MANAGEMENT
+
AVALANCHE OPERATIONS LEVEL 1 FIELD MODULE
AVALANCHE OPERATIONS LEVEL 2
AVALANCHE OPERATIONS LEVEL 3
RECREATIONAL DEVELOPMENT
INTRODUCTORY WEATHER SKILLS
PROFESSIONAL DEVELOPMENT
AVALANCHE CONTROL BLASTING
ADVANCED WEATHER SKILLS
MEDICAL ASPECT OF AVALANCHE RESCUE
SNOW AVALANCHE MAPPING

Appendix G – Safe Work Procedures Field Guide

Appendix G Safe Work Procedures Field Guide

AVALANCHE SAFETY PLANNING AND PROCEDURES

- ✓ Review Avalanche Avoidance Decision Guide (see Avalanche Avoidance Policy)
- ✓ Ensure all personnel have appropriate training refer to NSR Avalanche Safety Plan
- ✓ Complete avalanche hazard assessment
    - Determine weather, history and forecast
    - What is the snow pack structure
    - Current and forecasted avalanche danger
      If avalanche danger is not known or available, on site field assessment must be made using the Avaluator Slope Evaluation tool prior to entering avalanche terrain
    - Consult other reliable sources for additional information i.e. backcountry or resource operations in the area.
    - Determine Avalanche Terra Rating of Proposed Trip using the Avalanche Terrain Exposure Scale
    - Complete and document Appendix A - Trip Plan and Checklist (recommended)
- ✓ Review Trip Planning Matrix
- ✓ Ensure TRIP LEADER is assigned
- ✓ Check safety gear and emergency response equipment
- ✓ Ensure Sign-out/in.
- ✓ Ongoing monitoring of on-site weather conditions and ongoing terrain evaluation

APPLICABLE SAFETY EQUIPMENT

As a minimum, the following safety equipment is required in each field team that will travel as a self-contained unit:

- First Aid Kit
- Communication equipment. All field teams ***must*** have at least one means of contacting outside assistance.
  Options include: Cell phones, radios, Satellite phones, SPOT devices
- Appropriate navigational equipment
- As a minimum, each team member is required to carry the following equipment:
    - Avalanche Shovel
    - Avalanche Transceiver
    - Avalanche Probe
    - Appropriate clothing that provides protection from sun, wind, rain, snow.
    - Protective eyewear (sunglasses or goggles) appropriate to the conditions.
    - Sufficient food and water for trip.

Essential safety equipment must be routinely inspected to ensure it is in good working order and meets any appropriate manufacturer's specifications.

If essential equipment is subjected to conditions or handling that may have caused damage (e.g. if a transceiver or radio is dropped on a hard surface), it must be immediately checked for appropriate function prior to putting it back into service. If there is any question as to the item's reliability do not risk using it in the field.

EMERGENCY RESPONSE PROCEDURES

General Response (follow Companion Rescue Guide)

1. Ensure safety of the remaining parties
2. Address immediate life threats
3. Alert other group members and /or outside agencies
4. Analyze your ability to cope with the situation-request assistance if needed
5. Requesting assistance provide the following
   - Name, location and how to contact you
   - Nature of the incident, numbers involved
   - Level of response required (Level 1 = onsite, Level 2 = outside assistance, Level 3 = outside assistance RCMP, SAR multiple victims)
6. Ongoing care for both injured and uninjured upon evacuation
7. Retain any witnesses
8. Report to supervisor as soon as practical
9. Monitor communication channels

TERRAIN FEATURES TO WATCH OUT FOR:

Avalanche terrain in BC comes in many shapes and sizes. The most obvious features are large avalanche paths with distinct starting zones, tracks, and run out zones. These prominent paths are often crossed by resource roads and can be easily recognized by vertically-oriented open swaths through the forest. The most obvious indicator is the presence of fewer and/or younger trees, damaged trees, or trees of a different species than in the adjacent forest.

But there are a number of smaller, more subtle terrain features that are commonly encountered along resource roads that regularly produce avalanches. They are often located at low to mid-elevations, may be difficult to recognize as avalanche terrain, and are often under-estimated. These places can present a serious hazard if located up-slope of the travel route and avalanches may be triggered remotely from below by people on foot, snowmobile, or in an enclosed vehicle:

- ✓ **Recently Harvested Cut Blocks and Recent Burns**
- ✓ **Large, Steep, Road Cut Banks**
- ✓ **Talus Slopes and open glades below tree line**

Be especially diligent if:

- the local avalanche bulletin describes a **persistent weak layer** in the snowpack;
- you are travelling on a resource road directly below a terrain feature of this type
- you are travelling on a resource road that has had little or no recent use (i.e. you are 'breaking trail')

AVALANCHE TERRAIN EXPOSURE SCALE			
Terrain characteristic	**Simple**	**Challenging**	**Complex**
Slope angle	Angles generally < 30^0	***Mostly low angle, isolated slopes >35º***	***Variable with large % >35º***
Slope shape	Uniform	Some convexities	Convoluted
Forest density	Primarily treed with some forest openings	Mixed trees and open terrain	Large expanses of open terrain. Isolated tree bands
Terrain traps	Minimal, some creek slopes or cutbanks	Some depressions, gullies and/or overhead avalanche terrain	***Many depressions, gullies, cliffs, hidden slopes above gullies, cornices***
Avalanche frequency (events: years)	1:30 ≥ size 2	1:1 for < size 2 ***1:3 for ≥ size 2***	1:1 < size 3 ***1:1 ≥ size 3***
Start zone density	Limited open terrain	Some open terrain. Isolated avalanche paths leading to valley bottom.	**Large expanses of open terrain. Multiple avalanche paths leading to valley bottom.**
Runout zone characteristics	Solitary, well defined areas, smooth transitions, spread deposits	Abrupt transitions or depressions with deep deposits	**Multiple converging runout zones, confined deposition area, steep tracks overhead.**
Interaction with avalanche paths	Runout zones only	Single path or paths with separation	***Numerous and overlapping paths***
Route options	Numerous, terrain allows multiple choices	A selection of choices of varying exposure, options to avoid avalanche paths.	***Limited chances to reduce exposure, avoidance not possible.***
Exposure time	None, or limited exposure crossing runouts only	***Isolated exposure to start zones and tracks***	***Frequent exposure to start zones and tracks***
Glaciation	None	***Generally smooth with isolated bands of crevasses***	***Broken or steep sections of crevasses, icefalls or serac exposure***

*** Recently harvested cutblocks are included in the definition of open terrain.**

**** Terrain that qualified under an italicized bold descriptor automatically defaults to that terrain class or a higher terrain class.**

TABLE 1. MINIMUM *TRIP LEADER* TRAINING AND EXPERIENCE REQUIREMENTS

Avalanche Danger*	Non-Avalanche	Simple	Challenging	Complex
Extreme	Online Avalanche Course	NO GO	NO GO	NO GO
High	Online Avalanche Course	***Emergency work only. AST 1 plus experience.	***Emergency work only. AST 2 or CAA Level 1 *plus* Experience	NO GO
Considerable	Online Avalanche Course	AST 1	AST 2 or CAA Level 1 *plus* Experience	Avalanche Professional
Moderate	Online Avalanche Course	AST 1	AST 2 or CAA Level 1 *plus* Experience******	Avalanche Professional
Low	Online Avalanche Course	AST 1	AST 1 *plus* Experience	AST 2 or CAA Level 1 *plus* Experience
****Unknown (avalanche bulletin not available)**	Online Avalanche Course	AST 1 *plus* Experience	AST 2 or CAA Level 1 *plus* Experience	Avalanche Professional
= Follow ASP Protocols	*****Non-Avalanche	**Simple**	**Challenging**	**Complex**
= Emergency Work Only				
= No Go	**Avalanche Terrain Rating****			

* Forecasted Avalanche Danger for the date(s) of the trip, as provided in the applicable Canadian Avalanche Centre or Partner Bulletin, or in a locally obtained bulletin prepared by an Avalanche Professional

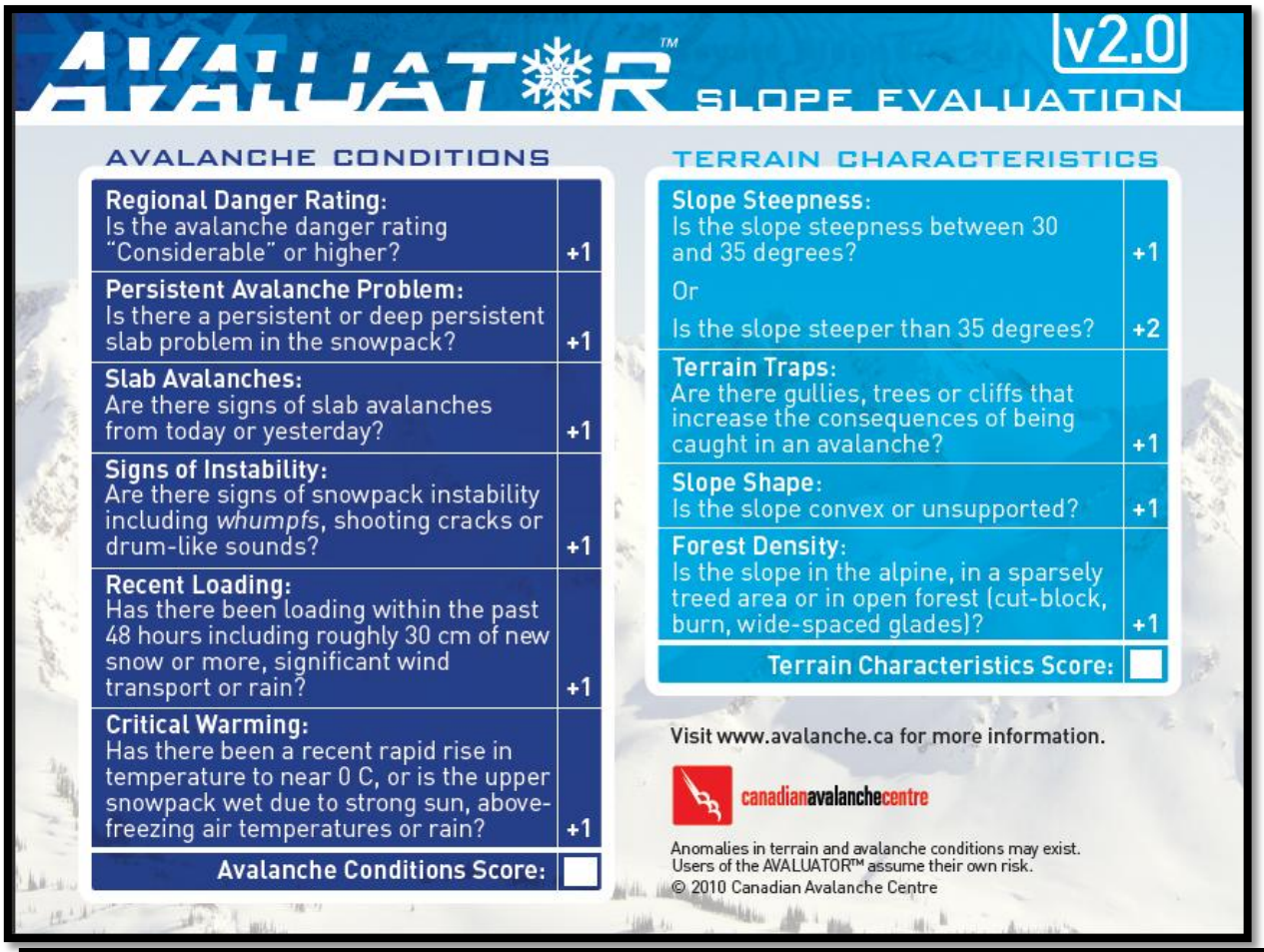
** Avalanche Terrain Ratings may be obtained from the Canadian Avalanche Centre, the applicable land manager, or from an Avalanche Professional. The terrain rating for a trip may also be pre-determined by the trip leader and verified in the field. An avalanche terrain rating assessment by an Avalanche Professional is recommended for all routine travel routes. Non avalanche terrain is identified as terrain which does not meet the criteria established under the ATES classification.

*** Emergency work is defined as non-routine work to mitigate the potential for loss of life, injury, or catastrophic damage to the environment. It is highly recommended that an Avalanche Professional be engaged as a trip leader to facilitate emergency work under a High danger rating.

**** When it has been determined that the avalanche danger in the terrain to be accessed is HIGH, the addition of an Avalanche Professional to the team is highly recommended before proceeding and is limited to emergency work only.

***** The Non-Avalanche terrain designation does not meet the Simple, Challenging or Complex classifications under the ATES rating. Refer to Appendix D for further information on Non-Avalanche terrain.

****** Staff may cross through areas of challenging terrain below tree line with trip leader having AST1 training and experience provided they avoid crossing areas of challenging terrain where the chance of human triggering is the highest (see "TERRAIN FEATURES TO WATCH OUT FOR" section of Field Work Procedures Appendix G).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Recent Loading: Has there been loading within the past 48 hours including roughly 30 cm of new snow or more, significant wind transport or rain? +1
Critical Warming: Has there been a recent rapid rise in temperature to near 0 C, or is the upper snowpack wet due to strong sun, above-freezing air temperatures or rain? +1
Avalanche Conditions Score:
TERRAIN CHARACTERISTICS
Slope Steepness: Is the slope steepness between 30 and 35 degrees? +1
Or
Is the slope steeper than 35 degrees? +2
Terrain Traps: Are there gullies, trees or cliffs that increase the consequences of being caught in an avalanche? +1
Slope Shape: Is the slope convex or unsupported? +1
Forest Density: Is the slope in the alpine, in a sparsely treed area or in open forest (cut-block, burn, wide-spaced glades)? +1
Terrain Characteristics Score:
Visit www.avalanche.ca for more information.
canadianavalanchecentre
Anomalies in terrain and avalanche conditions may exist.
Users of the AVALUATOR™ assume their own risk.
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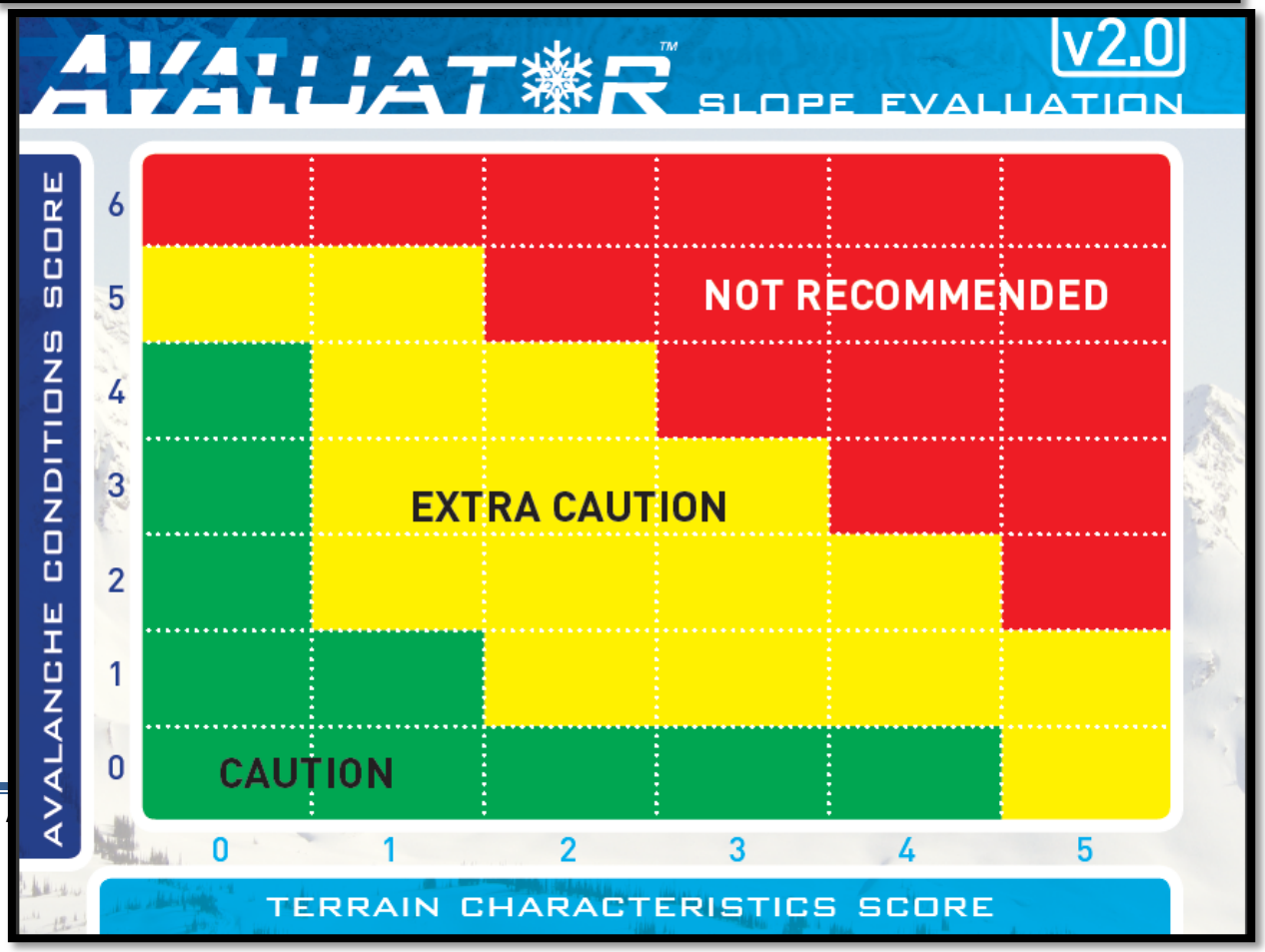
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EXTRA CAUTION
CAUTION
0
1
2
3
4
5
TERRAIN CHARACTERISTICS SCORE

COMPANION RESCUE

SPONSORED BY

THE NORTH FACE

NEVER STOP EXPLORING

1 **Choose a Leader** to organize and direct the rescue
- Be in charge – delegate tasks

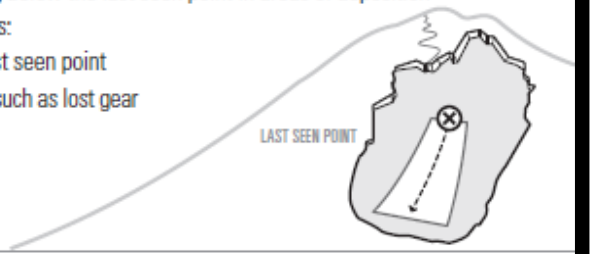
2 **Assess Safety**
- Avoid travel on adjacent slopes or above the avalanche site if this could trigger additional avalanches

3 **Head Count**: how many are missing?
- Identify the last seen point; mark if possible and question witnesses

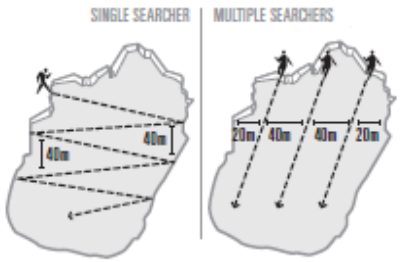
4 **Turn All Transceivers to Search** – do a physical check

5 **Determine the Search Area**: look for signs of victims on the surface, then start searching below the last seen point in areas of deposition

Priority search areas:
- Fall line below last seen point
- In line with clues such as lost gear
- In terrain traps

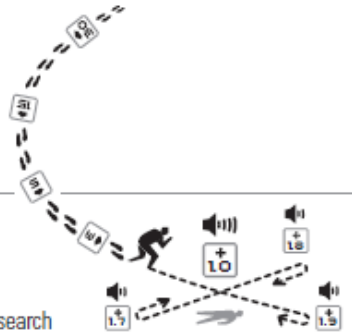


6 **Signal Search**
- Send one or two searchers ahead
- Use 40m search strips
- Look/listen to transceiver
- Investigate visual clues (pull out of snow; mark if possible)
- Prepare probes, shovels, first aid kit



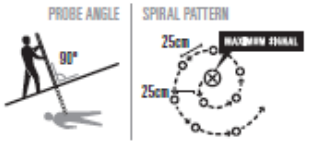
KEEP LOOKING

7 **Coarse Search** – move fast
- Start a coarse search when a signal is detected
- Slow down as you get closer to the signal



8 **Fine Search** – move slow
- Use a systematic bracketing pattern to find the closest point to the signal
- Have only one searcher doing the fine search

9 **Pinpoint Using Probe**
- Use a spiral probe pattern
- Leave probe in place



10 **Dig** as fast as possible; dig a large hole in a V shape
- Dig from below and toward the tip of the probe
- Change shovellers often
- Be careful near the end of the probe

11 **Patient Care**
- Clear the airway; stabilize ABCs
- Protect neck and spine
- Treat for injuries/shock/hypothermia
- Leave patient in hole where found if safe

Call for Outside Help only if extra rescuers are available or after everyone has been recovered

canadianavalanchecentre