NEW ZEALAND

Avalanche Skills Course

2

MOUNTAIN SAFETY COUNCIL

Participant Workbook

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OUTDOOR SAFETY
NZ MOUNTAIN SAFETY COUNCIL

NZ Avalanche Advisory
By Mountain Safety Council

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Contents

Introduction

The Avalanche Skills Course 2 (ASC2) is a continuation of learning for those who have participated in an Avalanche Skills Course 1 (Avalanche Awareness) and have built up some backcountry experience. It will continue to develop your decision-making skills around safety when travelling in avalanche terrain.

The course will suit those who have a basic understanding of avalanche phenomena and spend time travelling in alpine terrain as part of tramping trips, hunting, mountaineering, skiing, snowboarding or other outdoor experiences. It is not for beginners entering the alpine environment. The course reinforces what was learnt in an Avalanche Skills Course 1 and expands on personal preparation, snow tests, snow metamorphism, route decision-making and rescue skills. It will suit those who are interested in progressing with their avalanche skills sets and are looking to gain knowledge to allow them to cautiously approach more challenging avalanche terrain when in the backcountry.

Have a safe and enjoyable season, from the New Zealand Mountain Safety Council team.

Acknowledgements

MSC would like to acknowledge Anna Keeling, Anna Loomes, and Karen Corcoran for their continued help and support in helping review and update all MSC's avalanche course resources. Your passion and knowledge of avalanche education in New Zealand is invaluable.

MSC would also like to acknowledge Craig Paterson and Renae Power for allowing MSC to adopt Craig's clear, concise resources on snowpack metamorphism. MSC also thanks Manuel Genswein and MountainSafety.info for the use of their excellent visual resources for the course PowerPoints and participant workbook.

Finally, Ian McCammon for re-focussing avalanche training and making us think about what we are achieving and how we can achieve more. Knox Williams, for the quote "*Avalanche education is a lifelong endeavour*", and Colin Zacharias and Mike Brown for ideas on debriefing.

Course Framework

Course Description

This course focuses on:

- Trip planning and preparation
- Avalanche formation
- Weather, terrain, snowpack factors relating to avalanche conditions
- Basic snowpack metamorphism
- Using the NZ Avalanche Advisory
- Safe travel techniques and decision-making in avalanche terrain
- Snow tests
- Human factors and decision-making tools, including mindset
- Avalanche rescue

Course Prerequisites

Participants must:

- Be 16 years or older (or 14 if accompanied by a guardian)
- Have the fitness to travel safely for eight hours in alpine terrain and conditions
- Be physically capable of walking, skiing or snowboarding in a variety of snow conditions on moderate-angled terrain (and able to skin or walk up a 400m vertical ascent with a 7kg pack).
- Have attended an MSC Avalanche Skills Course 1 (Avalanche Awareness) or have a similar level of knowledge.
- Have completed the online training and quiz at www.avalanche.net.nz/Education/

Learning Outcomes:

On completion, participants will have a knowledge of:

- Avalanche characteristics
- How to identify avalanche terrain
- How to use the NZ Avalanche Advisory
- Snowpack factors (layers, basic crystal identification, basic snow metamorphism and snowpack tests)
- How to identify when the weather is creating instability
- Trip planning using systems and checklists
- Route finding, track setting and safe travel protocols
- Small group search and rescue

Assessment

This course includes a formal assessment of avalanche rescue skills. On successful completion, a Certificate of Competence is issued by the provider. Participants also receive a Certificate of Attendance.

Duration

Pre-course online learning and at least 4 days of field and classroom instruction.

Lesson plan

Course objectives

Participants understand that avalanches are complex phenomena and that snow travellers require external training as well as lifelong learning.

Course approach

Participants will be exposed to a broad range of factors involved in avalanche decision-making. However, the focus will be on **non-technical factors and ongoing learning.**

Detailed learning outcomes

Key Concepts	**Learning outcomes**
Understand Avalanche Phenomenon	• Types of avalanches (characters or problems) • Conditions necessary for avalanche formation
Identify avalanche terrain	• Angle, Aspect, Elevation • Trigger points/slope shape • Terrain traps
Make an assessment of the current avalanche hazard	• NZ Avalanche Advisory, application and limitations • Weather and snowpack factors: Recent avalanches, cracking/whoomphing, rapid loading, wind, temperature
Use safe travel practices	• Identify safe travel routes • Spacing, visual contact, islands of safety, communication, escape routes
Understand basic Snowpack Factors contributing to instability	• Demonstrate appropriate locations for snowpack observations • Identify layers in the snowpack • Perform basic snowpack tests and understand their limitations
Use a systems-based approach to decision making	• Use the MSC Avalanche Assessor prompt card • Understand how ALPTRUTh can be used • Identify human factors that affect decision-making • Use a trip planning checklist • Use the Mindset tool
Perform a companion rescue	• Participate in a small party rescue • Understand the need for leadership and teamwork • Demonstrate current probe and conveyor shovelling technique • Locate a transceiver buried in a pack or under strike board, 60cm under a 10-20 degree slope in a 50mx50m area, (confirmed probe strike and assemble shovel in under 2 minutes 30 seconds).
Plan a trip	• NZ Avalanche Advisory • Weather forecasts • Maps and Guidebooks • Avalanche Hazard form • Trip Planning and Intentions Form, gear checklists
Identify areas for further learning in avalanche terrain	• Regular practice • More training • Experience, reflection, mentorship

Avalanche basics

What is an avalanche?

Avalanches are more than just loose snow sliding down a mountain; they are multifaceted, complex phenomena that demand our attention. Most slopes are stable most of the time, However, knowledge and skill are required to recognise this terrain and travel safely in it.

Avalanches generally do not strike unexpectedly. In over 90% of all avalanche accidents, the avalanche was set off (or triggered) by the victim or someone in the victim's party. This means that we have some control over getting caught in an avalanche, by using a safety system that includes pre-trip planning, evidenced-based decision making, safe travel techniques backed up by rescue skills and equipment. Natural avalanches do occur regularly, but there are nearly always obvious signs that conditions are ripe for the event and thus these can also be avoided.

Avalanches can occur and be triggered at any time of the year, winter, or summer, and affect anyone travelling in alpine terrain.

Avalanche types

Avalanches come in in all shapes and sizes but can be generally put into three main types:

- **Slab**
- **Loose**
- **Ice fall**

Slab avalanches

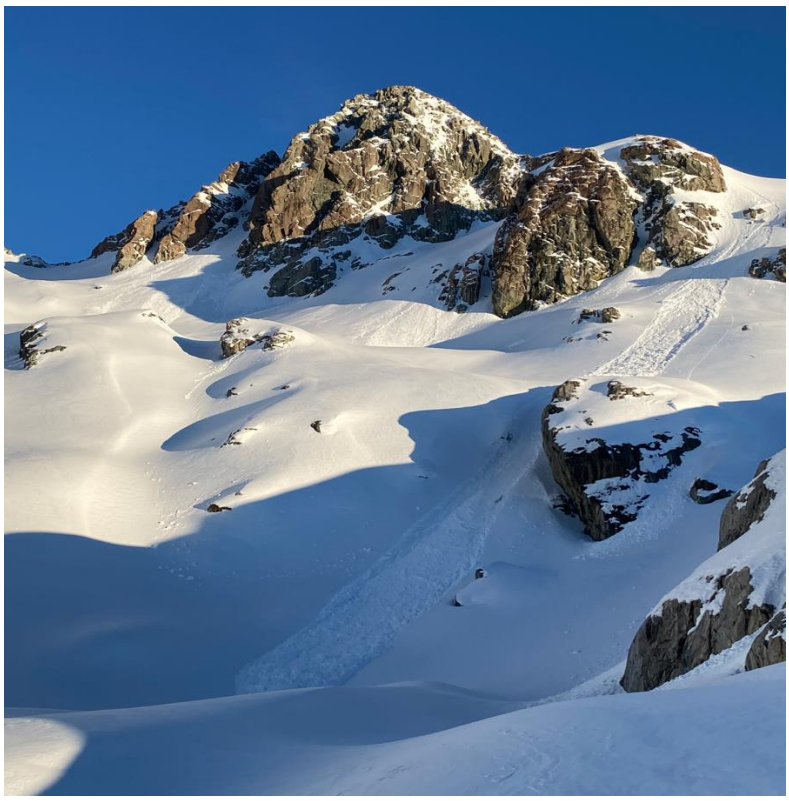
Slab avalanches are a cohesive layer of snow that slides as a unit on the snow underneath. As the slab moves downhill, it accelerates rapidly and begins to break up into smaller blocks.

Slab avalanches are the most common type to be triggered by people and are responsible for the majority of injuries and deaths. They tend to release once the victim or members of their party are on the slab, often breaking above and taking them along with it. Slab avalanches are characterised by the distinctive fracture line or crown wall that they leave behind as seen here up against the rock.

Loose snow avalanches

Loose snow avalanches can be wet or dry, start from a point and fan out, picking up more snow as they descend. They can be relatively small, only involving the upper layers of the snowpack, but are also capable of being large and destructive. Even a small one can be dangerous if it carries a person into a terrain trap such as rocks and gullies or over cliffs.

Loose wet avalanches are usually triggered naturally by new snowfall or rapid warming from the sun or rain. However human triggers are still possible. This type of avalanche is especially common during warmer months and can often catch spring ski tourers and alpine climbers by surprise.



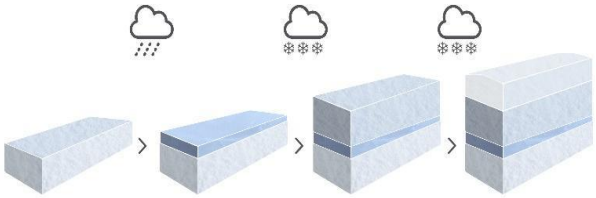
Ice fall avalanches

When glaciers flow over cliffs, they form icefalls. These occur as the glacier bends, slowly splitting apart into crevasses (cracks) and seracs (towers), when these are pushed far enough over the edge of the cliff gravity takes over and the seracs collapse causing blocks of ice to smash down the cliff in an avalanche of ice and snow. These avalanches are extremely unpredictable and occur seemingly randomly. You are rolling the dice when you choose to travel under or into an icefall especially during the heat of the day and you should never camp under an icefall for this reason. Despite this, icefall avalanches kill few people compared to slabs that people trigger themselves. Keep in mind that Icefall avalanches can also add a lot of weight onto the snowpack below them and can trigger secondary slab avalanches.

Snowpack

Although a snow slope looks uniform from the outside, the snowpack is comprised of layers. Weather (wind and/or snow) deposits snow in layers. Varying temperatures, winds, rain, and snow types affect the make-up of these layers. These layers will dictate how the snowpack will react under loading.

Different layers of the snowpack can be seen in the photo (right) as the sun passes through a thin slice.



Recipe for a slab avalanche

In simplistic terms, a slab avalanche requires:

- A relatively harder, more cohesive layer sitting on a weaker layer
- A firm sliding layer
- A slope steep enough to slide
- A trigger (or load) to apply enough stress to overcome the strength of the weaker layer.

Parts of a slab avalanche path

Avalanche experts have defined the various parts of an avalanche and labelled them to create a common language when describing avalanche terrain or an occurrence

Avalanche size and destructive scale

The destructive size of an avalanche - or D-scale - is used to share accurate information when describing avalanche events. The D-scale is an assessment of the destructive potential of an avalanche. Sizes range from D1 (relatively harmless to people in terms of burial) to D5 (landscape-changing, the largest snow avalanches known).

Size 1: Small (sluff)

- Minimal danger of burying a person (danger of being knocked over)
- The avalanche typically stops before the end of a slope

Size 2: Medium

- Could bury, injure, or kill a person
- Snow avalanche typically stops at the end of a slope

Size 3: Large

- Could bury and destroy a car, damage a truck; destroy a small building or break a few trees
- Snow avalanche could traverse lower-angled terrain (less than 30°) over distances of less than 50 m

Size 4: Very large

- Could bury and destroy a railway car, large truck, several buildings, or a piece of forest
- Snow avalanche traverses lower angle terrain (less than 30°) over distances of more than 50 m and can reach valley ground

Size 5: Extremely large

- Could change the landscape; disastrous damage potential
- Snow avalanche reaches valley ground; largest runout distance known

Avalanche Assessment

Avalanches are complex and require the correct combination of terrain features, snowpack and weather conditions and triggers. There are several common signs that can indicate greater likelihood of an avalanche occurring. The key is to recognise terrain features and snowpack conditions that may increase the risk of triggering an avalanche. If you are also able to identify human factors that sway your decisions to go or not, you can largely avoid ever getting caught in an avalanche. Using safe travel techniques will further increase your safety.

Terrain

Is It Avalanche Terrain?
It is key to recognise dangerous avalanche terrain and understand how to travel safely through it. The snowpack and weather conditions are constantly changing but the terrain remains the same. It is important to understand what simpler terrain is:

Angle: Slope angle is the most important factor in determining whether a slope may avalanche.

Most slab avalanches are triggered on slopes **between 30° and 45°** with 38° being the ultimate angle. This is similar to an advanced 'Black Diamond' run on a ski field. Avalanches can be triggered on slopes as low as 25° and as steep as 55°. Learn to assess the slope angle, it is a prime indicator of avalanche terrain. Learn to recognise changing slope angles. Manage your travel through steeper terrain. These are core skills for keeping you safe in the mountains.

Measuring Slope Angle: Slope angle measurements can be made by sighting upslope, downslope or parallel to the slope. Be careful not to stand below a steep slope that may avalanche while taking measurements. To measure slope angle accurately:

- Sight along the long edge of your inclinometer or phone to wherever a slope change occurs, preferably shooting a relatively long span of distance. Sight to a point approximately the same height above the surface as your eye. Take multiple measurements to corroborate your findings
- Every slope is made up of steeper and less steep sections. Try to measure both ends of the range and pay attention to the changes and the areas of critical slope angle (where the slope may roll over)
- Do not set the Inclinometer on the snow surface or on a ski pole lying on the snow unless you are going to take several measurements. These methods only indicate the angle at one spot and can be an inaccurate way to measure the true slope angle
- Use an inclinometer or smart phone app. Practice guessing then measuring slope angles. Measure more than once for better accuracy

Aspect: The aspect or direction the slope is facing in relation to the sun and wind plays an important role in the creation of avalanche conditions.

- **Lee slopes -** (facing away from the wind) – Wind-deposited snow loads weak layers and creates slab conditions. Signs of this include pillow shaped drifts and cornices
- **Shaded –** Slopes facing south (southerly aspects) will remain colder. New snow will take longer to stabilize, and weak snow crystals can last longer
- **Sunny –** Slopes facing north through west (solar aspects) receive the most heat from the sun which can cause rapid warming and resulting in loose snow avalanches. This is important to remember as the season rolls into spring
- **Matching the forecast** - Understanding aspect allows you to avoid aspects that are considered dangerous on the avalanche advisory

Measuring Slope Aspect: To measure aspect accurately use a compass and stand with your back to the slope.

Elevation: Elevation has its own role in avalanche prediction.

- As you ascend the temperature trend is colder, and windier
- As you descend the temperature trend is warmer and there is often less wind. Wet loose avalanches will occur at lower elevations sooner than they will occur at upper elevations
- You will need to know what altitude you are at so you can match it to the avalanche forecast e.g., if slab avalanches above 1800m are likely then you will want to know when you are above 1800m

Slope Shape: Will let you know the likelihood of loading and where to find likely trigger areas (or weak spots in the snow).

- Convex slopes (steep rollovers). The steepest section of the rollover is where the slope is under greatest tension. This is where a slab is most likely to release.
- Concave slopes (more supported – steep at the top and lower angled at the base of the slope)
- Planar slopes
- Ridges and gullies
- It's common to find all the above features on one slope

Likely Trigger Points: Trigger points are common places for triggering avalanches. They are generally spots where the snowpack is thinner, weaker, under tension or overloaded.

- Shallow rocky rollovers
- Convex slopes – the point of most tension is at the roll over
- Wide slopes that are unsupported at the base
- Near rocks or shallow areas of the snowpack
- Steep shaded slope or gullies
- Close to ridges and in the lee to recent winds. There may be drifts, cornices, or wind pillows

Terrain traps: What will happen if it slides? Terrain traps increase the seriousness of being caught if you get caught in an avalanche. Even a small slide with a cliff or rocks in the path can be deadly. A gully that could create a deeper burial is a terrain trap.

- Cliffs and rocks
- Abrupt angle changes to flat, gullies or hollows.

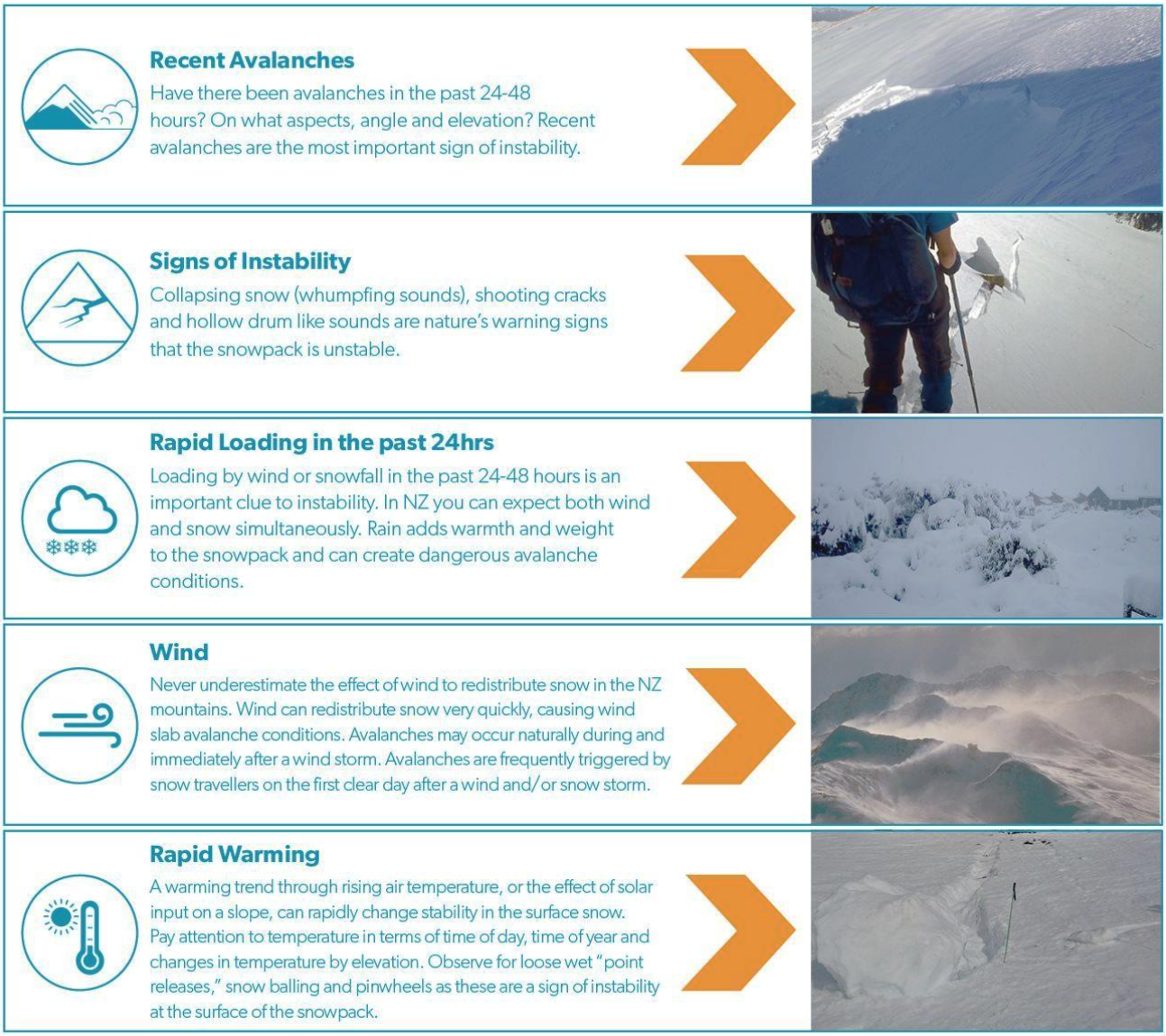
Terrain summary Image

Weather and Snowpack

Could it avalanche?

When avalanche hazard and risk is heightened, there are often common signs that can be observed.

"Recent avalanches" and "signs of instability" are known as **class one indicators**. If you observe any of these class one factors, they are a sure sign that avalanches are running or are likely to run, and this information should **never be ignored.**



Pre-trip planning

Understanding the New Zealand Avalanche Advisory (NZAA)

Always check the Avalanche Advisory forecast for the latest avalanche warnings at https://www.avalanche.net.nz/. This will assist in greater understanding of current avalanche danger, the aspect and elevation where avalanches are more likely to occur and how the forecasted weather might affect the snowpack throughout the day.

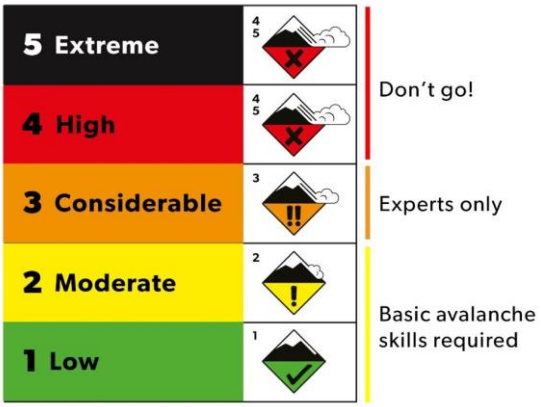
Understanding the New Zealand Danger Scale and the avalanche problems are essential to you making informed decisions in avalanche terrain.

New Zealand Avalanche Danger Scale

Avalanche dangers is determined by the likelihood, size and distribution of avalanches.

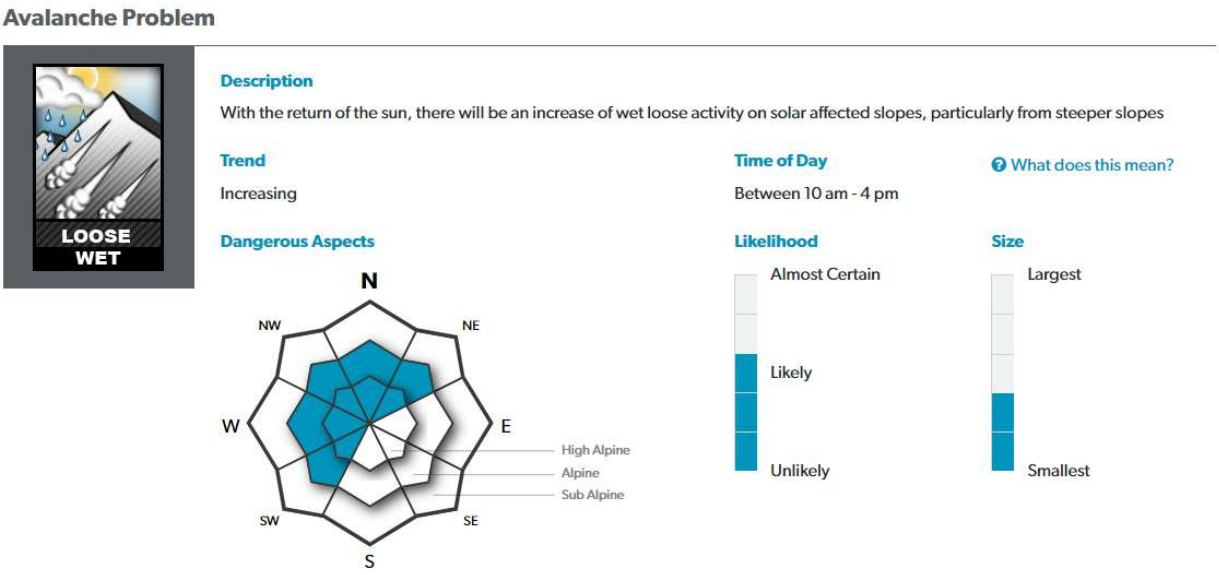
DANGER LEVEL		TRAVEL ADVICE	LIKELIHOOD OF AVALANCHES	AVALANCHE SIZE AND DISTRIBUTION
5 Extreme	4 5	Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
4 High	4 5	Very dangerous avalanche conditions. Travel in avalanche terrain not recommended.	Natural avalanches likely, human-triggered avalanches very likely.	Large avalanches in many areas, or very large avalanches in specific areas.
3 Considerable	3	Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible, human-triggered avalanches likely.	Small avalanches in many areas, or large avalanches in specific areas, or very large avalanches in isolated areas.
2 Moderate	2	Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely, human-triggered avalanches possible.	Small avalanches in specific areas, or large avalanches in isolated areas.
1 Low	1	Generally safe avalanche conditions. Watch unstable snow on isolated terrain features.	Natural and human-tiggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.
Safe backcountry travel requires training and experience. You control your own risk by choosing where when and how you travel.				
No Rating	1	Insufficient information to establish avalanche danger rating.		

Visit: avalanche.net.nz



Avalanche danger: This is a broad overview of the avalanche forecast. The mountain is divided into elevation bands. Pay particular attention to the elevation band where you will be recreating. Different elevation bands may have different danger ratings. This lets you know where the area of greatest concern is.

Avalanche problem: An avalanche problem is the specific type or character of avalanche that is a concern in the forecast period. When you know which avalanche problem(s) to look out for then you can plan for how best to identify and avoid the hazard. In the avalanche forecast, there may be multiple avalanche problems, and described by avalanche character, location, size, and likelihood of trigger.



The avalanche problem will be one of nine possible avalanche types; all of which have different characteristics. The avalanche type is displayed on the top left of the avalanche problem section. The nine avalanche types are:

Avalanche location: The Aspect and Elevation Rose shows you where you can expect to encounter the specific problem. Imagine the star-shaped diagram as the view looking directly down on a mountain. The inner section is the upper mountain or High Alpine, the middle section is the Alpine and the outer section is the Sub Alpine. Each aspect, or direction, is labelled with a compass direction.

Likelihood: The likelihood scale shows how likely you are to trigger an avalanche of this type if you travel through terrain where this problem exists. The likelihood is described by the words *unlikely*, *likely*, and *almost certain*.

Size: Much like likelihood size of an avalanche is shown on a bar graph. The size is described using the words smallest to largest and reflects the destructive size scale. If you are unaware of the destructive size scale, check out our free online avalanche course, or in the avalanche basics section of this workbook.

Combining the above information describes the avalanche hazard in more detail than just a danger rating. By considering all the available details, you can make a plan to avoid or safely manage the expected hazard.

Recent Avalanche Activity A summary of recent avalanche activity in the region. This information comes from observations made by local operators, the forecasters themselves and Public Observations. You can contribute to this by submitting a Public Observation.

Current Snowpack Conditions Specific information such as the depth of the snowpack, new snow, and layers of concern. It may include the results of snowpack tests and a description of how the snowpack varies within the forecast region. This is generally a broad description of the snowpack in the region, but it may give a specific location where observations were made or snowpack tests were carried out. Reading the advisory regularly and referring to previous forecasts will help you to form a more in-depth understanding of snowpack conditions.

Mountain Weather A brief summary of the weather expected in the region for the forecast period and how this relates to avalanche conditions. You will also need to gather your own, more detailed, weather forecast when planning your trip.

Sliding danger Due to New Zealand's maritime climate, we often experience icy conditions caused by the melting and re-freezing of surface snow and rain crusts. This section of the forecast provides a warning when these conditions occur and may include a recommendation to carry crampons and ice axe.

Recent Avalanche Activity

Plenty of results from explosive control work producing many size 1 to size 3 avalanches on all aspects, some crown alls 70 cms deep. Backcountry observations were again limited, expect more activity today with plenty of snow available for transport and winds from the SW increasing in strength. Windslab development and scouring at ridge-tops with wind from several directions over several days.

Current Snowpack Conditions

This SW airflow certainly does not want to release us from its grip. We have in excess of 100 cms of recent new snow. Winds strong from the Western half much of the past week and more today, the combination of wind and snow has seen the development of windslab conditions. Cold temps mean new snow bonding has stayed weak, pockets of stiff windslab failing with light loads. Expect avalanche conditions on many aspects. Areas of windslab near ridge-crest and lee aspects will be of most concern with some drifts in excess of a 1 1/2 m or more, we still need to avoid all steep terrain over the next 24 hrs.

Mountain Weather

Cloudy this morning and a few snow showers mainly in the south. Freezing level rising to 1600 m this morning. Winds from the SW strong and easing this afternoon.

Sliding Danger

Forecast by Loic Lassueur

Weather

Knowing the weather history and being able to anticipate changes in the weather is one of the most important parts of planning your trip. What do I need to know?

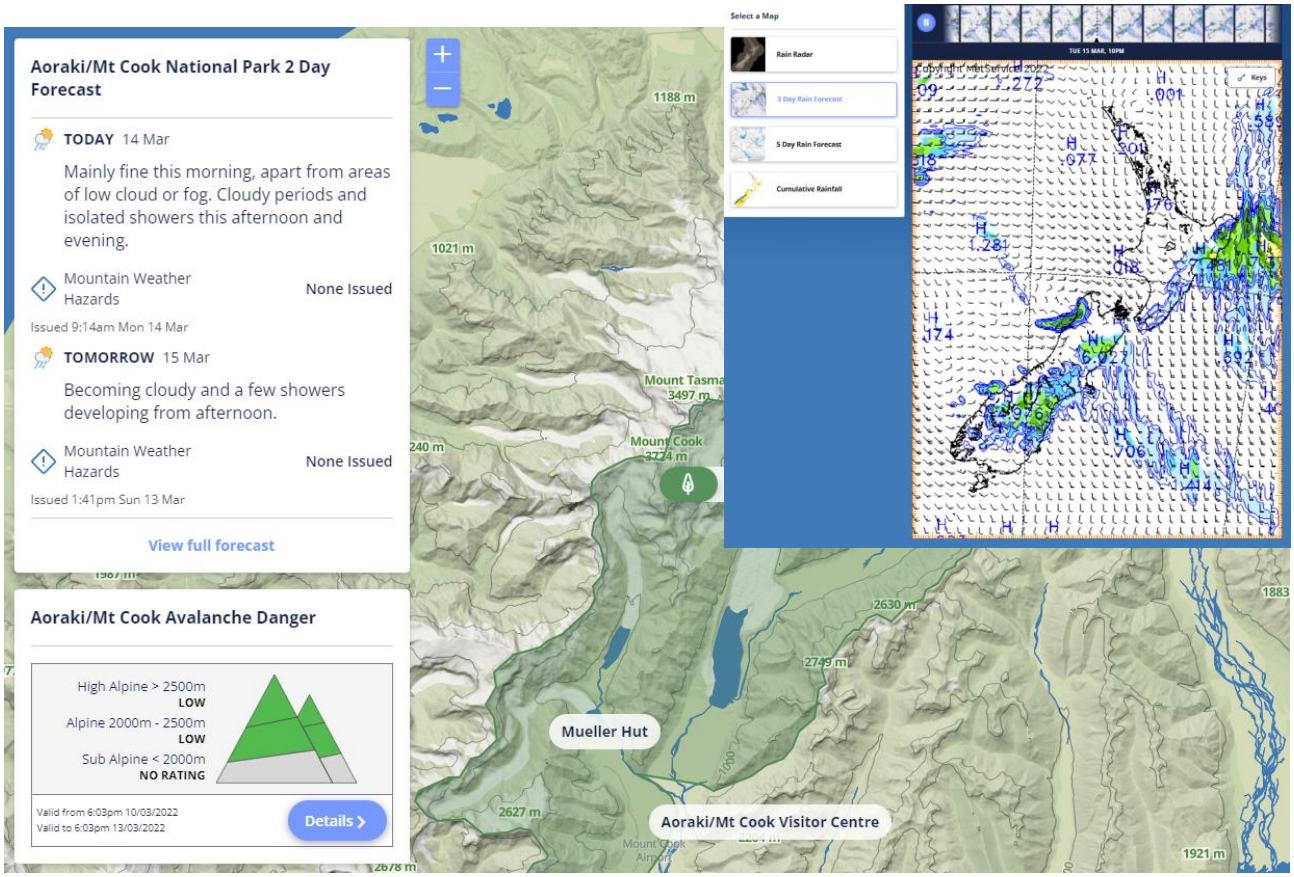
- Wind strength and direction - wind moves snow. Where is it going and how far will it move? Will wind direction change during your trip?
- Precipitation type and amount - are you getting snow or rain. How much and when? Timing is important.
- Temperature at different elevation bands – are the trends warming or cooling? Will the snow get slushy or start to refreeze?
- What is the 24-48 hour weather history leading up to your trip? Avalanches in the past 24-48 hours are important clues to likelihood of further avalanches. What happened in the last storm? What has the prevailing wind direction been? How much snow or rain has fallen?

Where to find weather information?

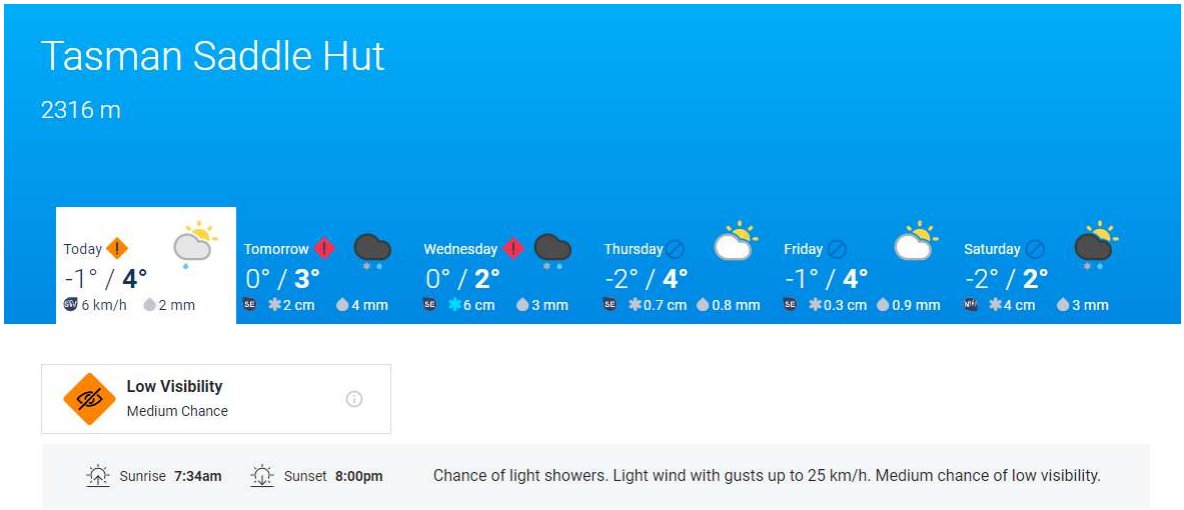
1. MetService has great NZ weather information at www.metservice.com. Click on mountains and parks, or maps and radars for brief or extended forecasts and weather maps.
2. NIWA Parks Weather is the official DOC weather forecast. https://weather.niwa.co.nz/parks
3. metVUW: www.metvuw.com for more weather maps and information from a different source.
4. Talk to locals, ski patrollers or other backcountry users who have been out recently to understand the effects of recent weather.

It is important that your data is both up-to-date and relevant to the area where you plan to travel.
Trip planning resources

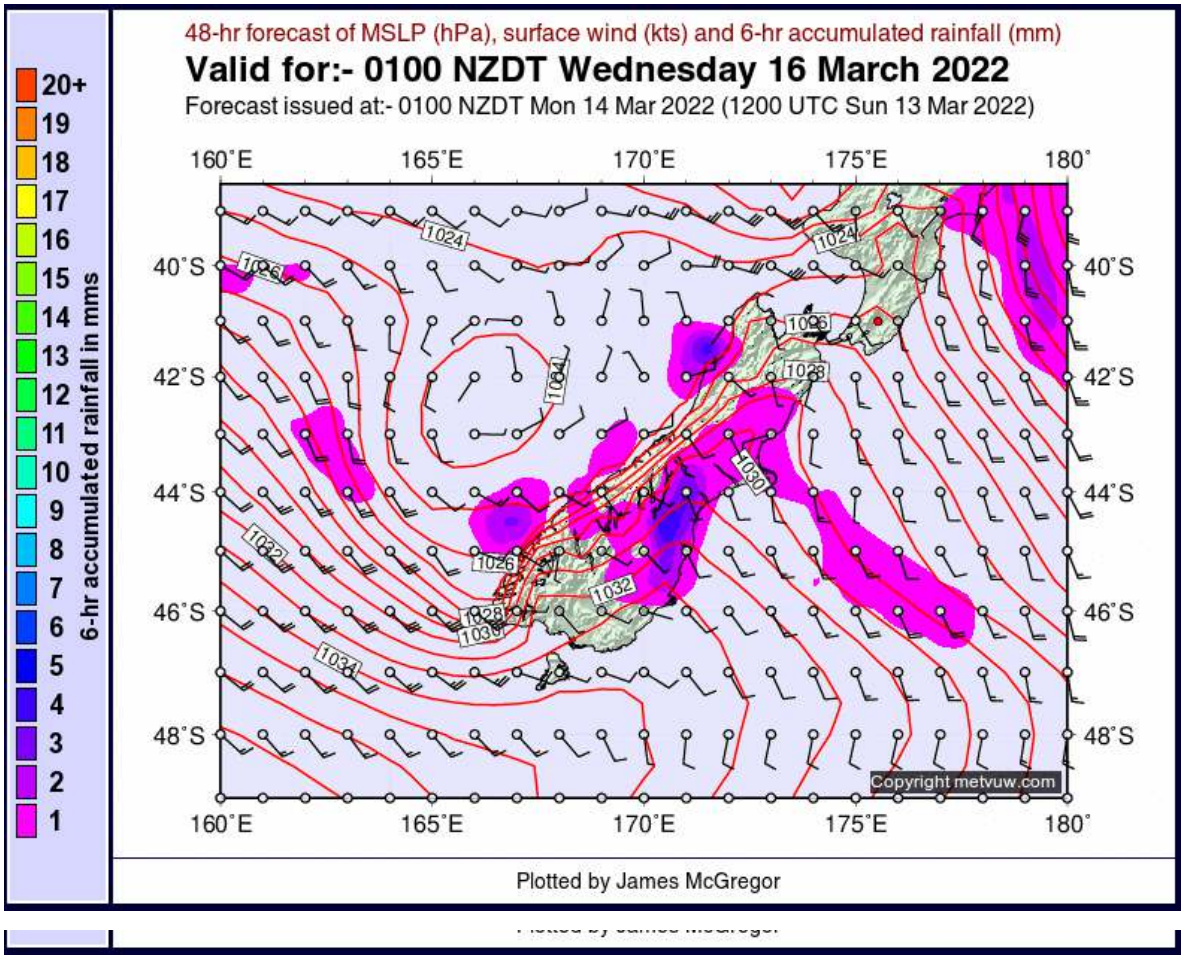
MetService:



NIWA Parks Weather:



MetVUW:



Decision making tools

Useful tools for decision-making when travelling through the backcountry are the Assessor card, the ALP TRUTh mnemonic and Mindset. They can assist in the analysis of weather, snowpack and terrain and are useful methods for making decisions when there is a lot of information. Several different avalanche specific decision-making tools are available. We focus on three:

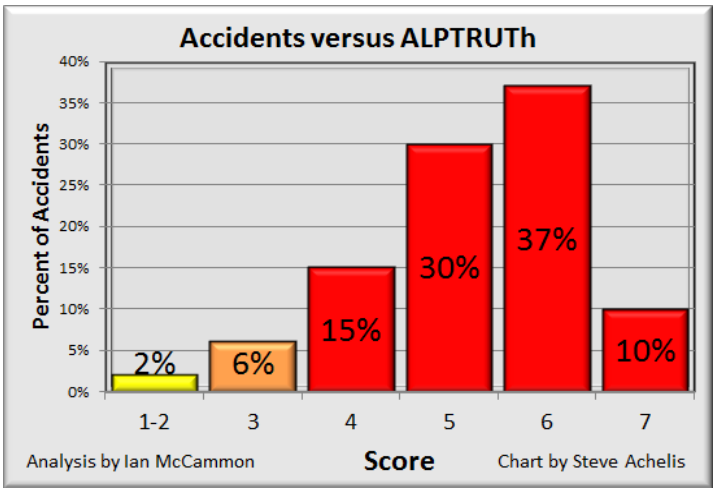
Avalanche assessor card

The Avalanche Assessor card is a checklist to help you make evidence-based decisions in avalanche terrain. It will not provide an absolute go/no answer. It offers a framework for considering conditions and terrain that can cause avalanches. It takes into account human factors that affect our decisions. It also includes safe travel techniques to increase safety in avalanche terrain. Take this card with you when travelling in avalanche terrain to help you make evidenced -based decisions.

ALP TRUTh

ALPTRUTh is an acronym developed by avalanche researcher Ian McCammon. He looked at over 700 avalanche incidents to find common patterns. McCammon then identified 7 common factors to create ALPTRUTh.

The table below outlines these 7 factors that offer clues to the likelihood of an avalanche occurring. The graph to the right gives a percentage of avalanche accidents when a certain number of these obvious clues are present. **The bottom line is that when you can identify 3 or more of the factors being present, caution becomes prudent**. Memorising ALPTRUTh provides a useful tool when travelling through avalanche terrain, especially in times of greater uncertainty.



ALP TRUTH Situation

Clue	Description	Points
Avalanches	Has there been one in the area in the last 48 hrs?	
Loading	Loading by snow, wind or rain in the last 48 hrs?	
Path	Is there a noticeable and obvious avalanche path that is identifiable by a novice?	
Terrain traps	Are there terrain traps that increase the consequence?	
Rating	Is the overall avalanche rating Considerable or higher on the current avalanche bulletin?	
Unstable	Have you seen or heard collapsing, cracking, whoomphing or other clear signs of snow instability?	
Thaw	Has there been recent warming of the snow surface due to sun, rain, or warm air temperatures?	

Give one point for each of the conditions that exist

1 – 2 Points: Normal caution (2% of accidents)

3 – 4 Points: Extra caution (21% of accidents)

5 – 7 Points: Travel is not recommended (77% of accidents)

(McCammon & Hägeli, 2004)

Mindset

Mindset or pre-bias is designed to help you look at the facts and information without outside influences like awesome snow, perfect conditions, and weather (hot, cold, windy, snowy) affecting your thought process. Avalanche workers frequently use mindset as a method to match expectations and approach before going into the field. We have modified this for ease of use by recreationalists.

Using mindset is a part of PRE-TRIP PLANNING. Mindset should be agreed upon daily by the group somewhere warm, dry, and comfortable before you head out on your trip. Write your mindset in your notebook.

Assessment:	We lack information	Avoid avalanche terrain. Observe and gather data.
Stepping out:	We have enough information to feel more confident	Start to explore more terrain cautiously.
Stepping back:	We were confident but weather and/or conditions changed, or we encountered something unexpected, and we need to pull back and reassess.	Plan to limit your exposure. More conservative than yesterday. Collect information.
Status quo:	Things remain the same	No change, same terrain as yesterday.
Open Season:	Stable Conditions	Game on, have fun but remain alert.
Entrenchment:	A persistent weak layer exists.	Be extra cautious. Avoid terrain where this problem exists. If unsure, stay on low angle slopes away from run-outs, or stay in the ski area as it has avalanche mitigation. This mindset requires strong avalanche awareness.
Spring Diurnal:	Ride according to the time of day morning = slide for life risk afternoon = loose wet avalanche risk	Go early, return early. Look for signs of weakness on the snow surface.

Movement in avalanche terrain

Safe travel techniques

Safe travel techniques greatly increase your safety in avalanche terrain by creating space between travellers.

Before entering an avalanche slope ask: What avalanche problem do I expect here? What are the consequences if the slope slides and what are my alternatives?

Spacing:	Travel one at a time or with good spacing. Identify the next island of safety to enable regrouping and communication.
Visual contact:	Watch each other, from safe spot to safe spot. Don't forget the last person!
Islands of safety:	Stop in safe zones - never in or beneath an avalanche path. Make the use of Islands of Safety a habitual practice.
Safe travel routes:	Use safe travel routes – low-angle slopes or ridges. Avoid travelling directly below or above a partner or group.
Communication:	Discuss decisions with each other. For example, escape routes: Plan your escape route and identify your safe spots before you move. Don't assume that people are thinking the same as you.
Escape route:	Plan your escape route and identify your safe spots before you move. If someone calls "avalanche," know where you will escape to, without hesitation.

Etiquette in avalanche terrain

Use good etiquette around others and in crowded places, this includes:

- Avoid dropping in on people below you.
- Avoid booting or skinning up the prime riding slope.
- Don't traverse above other people or groups on steep slopes.
- Give people room at transitions, don't crowd other groups.
- Don't purposefully steal someone else's line, talk to each other.
- If another group catches you on the up track let them pass, or if you catch up offer to break trail.
- Try to avoid boot packing or snowshoeing in a skin track or vice versa, make your own track when possible.
- Speak up if you're uncomfortable. Respect those who voice doubts.
- Be friendly and polite, you never know when you might need someone's help.

The key concept: Be considerate.

Human Factors

People (the human factor): Studies into avalanche accidents have found that the victims often had the skills and knowledge to recognise the signs of instability but chose to go anyway. They ignored the facts and based their decisions on emotions. These human traits have been recognised for some time by the medical and aeronautical industry, the military and even stockbrokers.

By understanding a little about these factors, you can assess whether they affect your decision-making.

FACETS

Familiarity: Are you feeling confident because you've been there before?
Always approach a slope as if you have never been there before

Acceptance: Needing to be accepted or 'fit in' can make us hesitant to speak up when we have concerns.
Choose your touring and climbing partners wisely, start with low-risk objectives.

Commitment: Are you too committed or fixed on an objective?
The day's goal should always be to return home safely. Have a plan B and C

Expert Halo: Are you following someone because you think they know better? Question authority.
Develop an atmosphere where everyone in the group has an opinion and voices it. Use a team approach to decision-making.

Tracks/ Social Proof: This is the feeling that it must be ok because others are doing it.
Ask yourself 'would we do this if no one else was here'?

Scarcity: Powder fever, competition, limited time or resources.
Learn to recognize this feeling and slow down. There will be more opportunities, make sure you are around to enjoy them.

OTHER TRAPS

- Blue sky/fun factor
- Commercial pressure
- Logic vs. emotion
- Real vs. perceived risk
- Get-home-itis
- Negative vs. positive feedback loops
- Under confidence / overconfidence
- Lack of experience
- Lack of Self awareness

Snow Profiles

Is the snow stable or unstable? Digging for information

How deep to dig a snowpit:

Since it's difficult for humans to trigger avalanches more than about 1.5 metres thick, (unless they are triggered from a shallower spot) you seldom need to dig a deep snowpit unless you specifically know there's a deeper weak layer that may cause problems. If you already know that there are no deep layers of concern, then just concentrate on the upper snowpack snow. Each situation is a little different and in time you will get a feel for it. *But in general, keep your snowpits less than 1.5 to 2 metres deep unless you have a good reason to dig deeper.*

Where to dig a snowpit:

Where to dig a snowpit is probably more important than how to dig one. Choosing a representative location is an art, and art is difficult to describe:

Dig on a slope most representative of the slope you are interested in (aspect and elevation) - *without putting yourself in danger*. Often you can find a small representative test-slope – one that won't kill you if it does slide. Never dive into the middle of a dangerous avalanche path without first gathering lots of additional data about the stability of the slope.

A common mistake is to dig on or below ridgelines where the wind has affected the snow. Avoid this. Although the crown face of an avalanche may sometimes break right up to the ridge, the place where we most often trigger avalanches is 100 or more feet (30 metres) down from the ridge. Avoid places where the snow is compacted (tracked out).

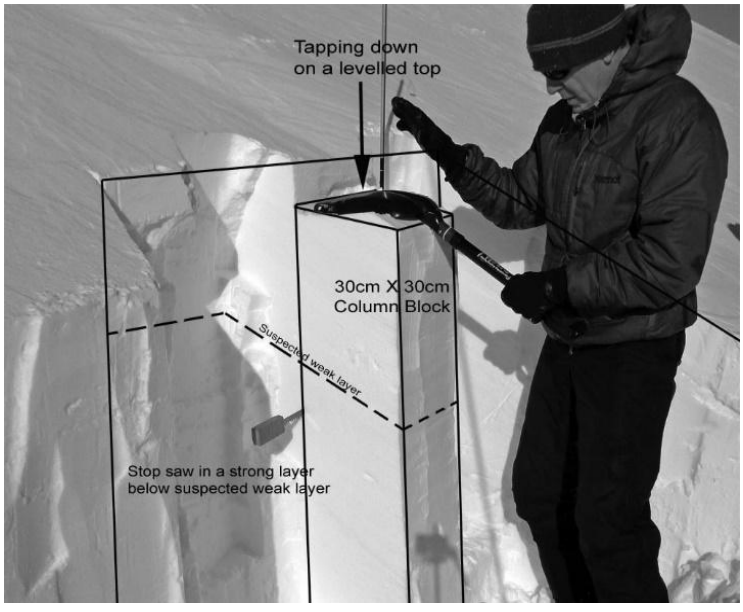
Bottom line: LOOK FOR A NEUTRAL, OPEN AREA AT MID SLOPE WITH LITTLE WIND EFFECT and LOW CONSEQUENCE. (You are not threatened by steep terrain over 30° or cornices above you.)

Spatial variability and a hot tip:

Use your avalanche probe to find a representative place with average snow depth. Probing can save a lot of time digging in the wrong place - like on top of a rock or where a previous party had lunch. Most important, dig lots of snow pits in lots of different areas as snow structure varies between different aspects and at different elevations (this is known as "spatial variability" in avalanche speak). Look for patterns of instability. Establishing snow depth by probing can often give you a lot of information quickly.

Compression Test (CT):

Isolate a column 30 x 30 cm, and 20 cm below the layer of interest, using either a saw or 3mm knotted cord. Take the blade of the shovel and lay it face down. Tap progressively harder on the shovel blade until the column fails: 1. Start with 10 taps by articulating from your wrist, 2. Tap 10 more times by articulating from your elbow, 3. Then tap ten more from your shoulder using the full weight of your straight arm. Don't push your arm into the snow, but let it fall with its own weight. A result will occur when a weak layer fails. Easy taps (1-15) are bad news and hard taps (16-30) are better. **However,** even with hard taps it's advisable to also do an ECT (Extended column test - described below) to establish the likelihood of a propagation failure of the weak layer or layers. The CT is tricky to interpret. You are advised to also include an ECT (below).

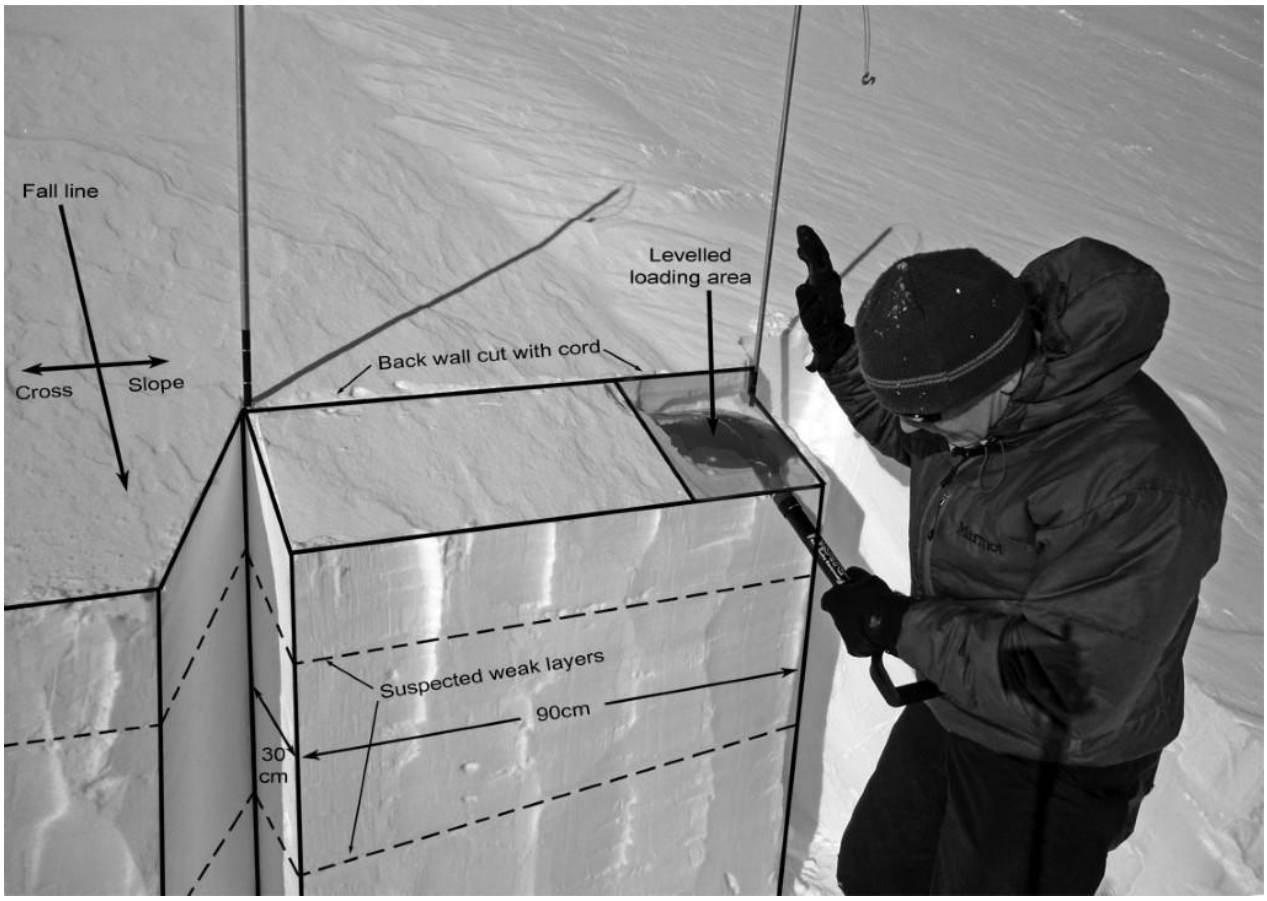


Extended Column Test (ECT):

Extended column tests (ECTs) have become the standard stability test in the backcountry and are effective for establishing whether there is *propagation potential* within the weak layers of the snowpack.

How to: Isolate a block 90 cm wide by 30 cm deep and tap on the face down shovel at the end of the column using the same loading taps as the compression test (see above). As with the compression test, you aim to find how many taps it takes to fracture the block.

Interpretation: More importantly however, note whether the fracture propagated across the entire block or not. Any fracture that propagates across the entire block is a red flag, **no matter how hard you tap**.
Avoid slopes with conditions where you are able to propagate an ECT
Propagation = ***Don't go***
No propagation = ***Don't know*** - you need additional information and indicators of stability or lack of instability to make a decision, a non- propagating ETC is only one piece of information.



Avalanche Rescue

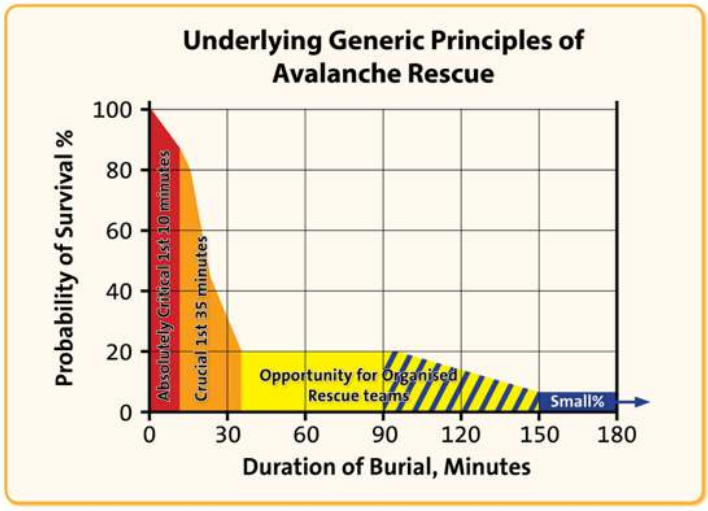
You only have minutes to live if you are buried in an avalanche. If you are wearing a transceiver, you have a significantly higher chance of being found quickly, but only if the people with you know what to do.

When someone has been buried in an avalanche, time is critical. As shown in the graph below (published in the Canadian Medical Association Journal), the probability of survival drops to approximately 40% within the first 15 minutes.

If someone you're with is caught in an avalanche, you need to rescue them. To find the buried person fast, everyone entering the backcountry must have avalanche rescue equipment and know how to use it.

At a minimum this is:

- Transceiver
- Probe
- Shovel
- At least one Personal Locator Beacon (PLB) in the group



An avalanche transceiver could save your life

You only have minutes to live if you are buried in an avalanche. If you are wearing a transceiver you have a significantly higher chance of being found quickly, but only if the people with you know what to do.

Time is critical. Modern digital transceivers perform very well at locating the victim's signal and it is through proficient and organised probing and digging that precious minutes can be saved.

Once the victim has been uncovered, good patient management skills will further increase the chances of survival. A CPR course is highly recommended.

Transceivers

Transceivers are electronic devices (worn by each person) that transmit a radio signal. In the event of an avalanche, searchers can switch their transceivers to search mode and follow the signal to the buried person.

A range of transceivers are imported into New Zealand and all of them transmit on 457kHz. They are all compatible with each other but differ in the way they display information and any additional functions they can perform.

Newer digital transceivers convert the signal from the buried set into visual distance and direction indicators and audible signals that aid the searcher. Older analogue transceivers do not apply any enhancement to the signal; the beep you hear is the actual unprocessed signal from the transmitting set and a change in volume indicates that you are getting closer to the buried signal.

If you choose to go into avalanche terrain, you have a duty of care to yourself, your partners and your friends and family. Understand how to use the features on your transceiver and practice avalanche rescue frequently.

When should a transceiver be replaced or retired?

Aside from how old it is, one of the biggest factors in deciding whether to retire your transceiver is how well has it been looked after. As a general rule, if your transceiver is five years or older you should consider replacing it or at least getting an electronic diagnostic check or systems upgrade (if available). If your transceiver is older than 10 years you should stop using it, disable it and throw it away. Then replace it with a new digital model.

The bottom line is that your transceiver is a life-saving device requiring 100% reliability and the best way to ensure this is to avoid exposing it to extreme temperature ranges - e.g. don't leave it in the car overnight. Remove the batteries in summer and service it or replace it.

Using your transceiver

Different models of transceiver vary in their on/off function, search mode and buried signal indication/location. Read the manufacturer's instructions and learn to operate yours.

- Put your transceiver on before you leave your car. Wear it under a layer of clothing, preferably on top of your base layer and keep it switched on transmit at all times.
- Check everyone's transceiver is transmitting properly. Get one person to listen while the others file past one at a time. The last person then checks the first person's transceiver before the party sets out.
- Ensure that the transceiver is at least 50 cm from cell phones, radios, go pros or any device with a GPS function as electronic devices can interfere with effective functioning of the transceiver.
- Make sure you don't place items such as foil type chocolate bar wrappers too close to your transceiver as this will also adversely interfere with its functioning.
- Check and change your transceiver batteries regularly. Never use rechargeable batteries as the range and working life of these batteries is significantly shorter. Remove the batteries for the summer and replace them with new batteries for winter.

Other safety devices

Avalung: A ventilation device that disperses expelled air and prevents the victim from rebreathing hazardous CO2 levels. These can potentially limit the chances of asphyxiation if buried. Ideally this should be put in your mouth before you are caught in an avalanche.

Avalanche airbag: These backpacks inflate from the top or sides of a backpack when a ripcord is pulled, similar to the life jackets on an aeroplane. This potentially allows the victim to float or stay near the surface of the avalanche. This may reduce burial depth or even prevent burial.

If you are caught in an avalanche:

- Yell and wave to others in the group.
- Attempt to get out of the flow. Attempt to escape to the side at a 45-degree angle.
- Roll onto your back with feet down hill, swim hard and fight to remain on the surface. Insert Avalung, and/or deploy airbags. This requires practice and many avalung users actually place the mouthpiece into their mouth prior to riding the slope.
- Discard equipment (avoid skiing in the backcountry with pole straps).
- As the debris starts to slow, attempt to create an air pocket in front of your face.
- Remain calm and trust that your team will find you.

If your party is involved in an avalanche incident

Stop. Think. Plan. Act

1. **Appoint a leader to take charge of the rescue -** Activate PLB if you have one. Only call for help with cell phones/radios if you have a large group with people to spare but keep everyone on site – DO NOT send them to get help. Time is critical and 100% effort from everybody is required for at least the first 20 minutes.

2. **Assess the site for further avalanche danger -** If there is a minimal risk of further avalanches then proceed with the search but limit the number of people exposed to the risk. Have escape routes and a lookout (if possible). If the risk is too great, abandon the search and send for help.

3. **Assess who is missing -** Talk to any witnesses and establish the last seen area. From this you can define the search area in the fall line below this point. The search area can be narrowed further by the presence of clues on the surface, such as lost gear, or an obvious terrain trap.

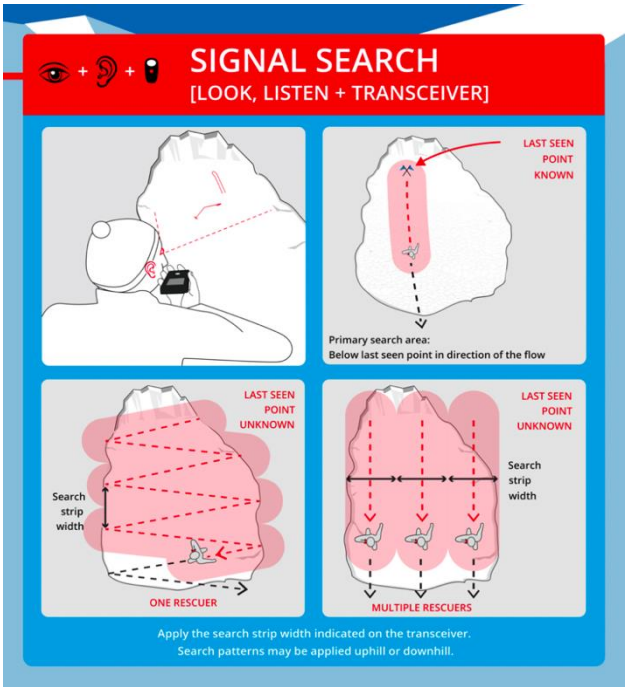
4. **Start the transceiver search -** All searchers should turn their beacons to receive. Check each other. Everyone should also be ready to turn their sets back to transmit in case of a second avalanche.

Survival of buried people depends on YOU. You may have less than 10 minutes to find and dig out the buried people

5. Signal search – Move fast

You are trying to find the buried person's signal.

- Use a 40m search strip width in order to pick up the buried person's signal.
- All electronic devices such as cell phones, go pros or radios should be turned off or have at least 50cm separation from the transceiver to avoid interference.
- Look at the avalanche path for visual clues as you search.
- Swivelling your transceiver right and left and tilting it up and down helps you orientate it with the field lines being transmitted from the buried set, and so assist your search.
- When you pick up a signal, shout 'SIGNAL' to inform other searchers and follow the indicators on your transceiver.
- If there are other people buried, the initial search should continue while one rescuer follows through to the next phase (coarse search).



1: *From Mountainsafety.info*

6. Coarse search – Move as fast as possible

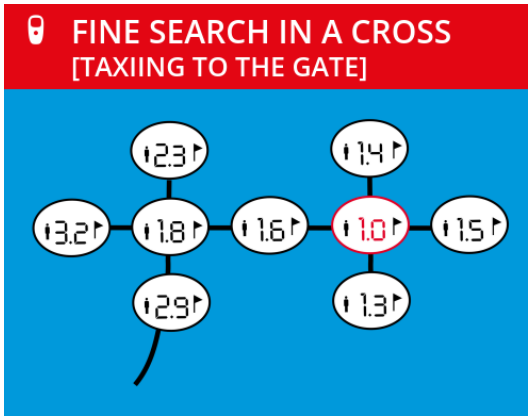
You have heard the signal and are trying to narrow the likely burial spot down to a small area.

- Follow the indicators on your transceiver. Count down the numbers out loud. This will alert others to your proximity to the victim.
- Once your transceiver indicates that you are 10m away from the buried victim, slow down.

7. Fine search – Slow down and get down

You have identified a small area and are looking for the place to probe and dig.

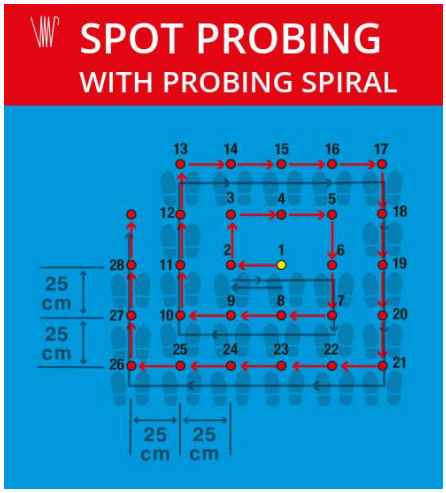
- When you are within 3m of the buried person, start moving very slowly and systematically.
- Get down low to the snow. Hold your transceiver close to the snow (skim the surface) and move it along the surface in a straight line. The signal will usually get stronger before weakening. Keep going until the signal weakens then go back to the area of the strongest signal. Try to find the lowest number.
- Keeping yourself oriented the same way, move it at right angles to your first line until the signal fades away. Then move back in the opposite direction until you find the strongest signal again. Repeat to the other side of the strongest signal.
- Mark the area with the lowest number and start probing.



2: *From Mountainsafety.info*

8. Probing:

- Use your probe to find the buried person and their depth of burial. Start from the point with the strongest signal/lowest number and probe 25cm apart in an outward spiral. Be systematic and precise.
- Probe should always be perpendicular (90°) to the snow surface.
- Once the victim has been struck, leave the probe in place and shout "strike" to let others know.
- If you don't have a probe, start digging and use further fine searching with the transceiver from within the hole to find the victim - this is a lot slower than probing.
- If your beacon has a marking function, only use it once you have a confirmed strike.



3: From Mountainsafety.info

9. Digging:

Digging is exhausting and the most time-consuming part of the rescue, but an all-out effort and good technique can save precious minutes and lives.

- Dig as quickly as possible.
- Start digging down-slope of the probe 1-1.5 x the depth of the strike and dig toward the tip of the probe.
- For groups with 3+ diggers, organise the diggers into a V shape with everyone a wingspan apart and facing inward.
- Chop snow into blocks, then scoop and slide it back to the other diggers to clear.
- Rotate the diggers often.
- Be careful as you reach the victim.

10. Patient care

Good patient management skills will greatly increase the chances of survival

- **Responsiveness –** Call out to the patient to determine levels of consciousness.
- **Airway –** Gently clear the face and airway as fast as possible. Take note of whether the airway was clear or snow filled as emergency services will want to know this. Then begin digging around the chest.
- **Breathing –** Assess the patient's breathing for 10 seconds. If the patient is unconscious and there is an absence of normal breathing, then begin CPR (30 compressions to two ventilations). If a rescuer is unable or unwilling to provide ventilations, then continuous CPR should be performed.
- **Circulation –** If circulation has stopped, start CPR (30 compressions to two ventilations) and continue until a medical professional takes over. Note: a pulse may be difficult to detect due to cold, the position of the patient and their clothing.
- Ensure the patient is completely clear of the debris before trying to move them and do so as slowly and gently as possible.
- Treat any severe bleeding and other injuries/shock/hypothermia.
- Prevent further cooling.
- Turn the patient's transceiver off as soon as you can if searching is underway for other buried people.
- Monitor and care for the victim very carefully.
- Evacuate to a medical facility.

Searching for multiple burials

If multiple burials are spread out, search as if for a single buried person. For multiple burials in close proximity, overlapping field line patterns from the buried transceivers make it nearly impossible to follow a specific line. Use a search pattern with a 2.5m search-strip width. Concentrate on any increase or decrease of the distance indicator, respective to the volume. When you pick up a signal from a buried transceiver do not try to be exact, instead use a probe to find the victim.

Trip planning resources

Research has shown that checklists are effective methods for ensuring that a systematic approach is taken for complex decision-making tasks (such as backcountry travel). Referring to the NZAA, weather forecasts and maps/guidebooks - then using a checklist such as these to evaluate your options and areas to avoid, is a system of risk management used by professional guides and ski patrols

Checklists Included:

- Avalanche Hazard Form
- Trip Planning and Intentions Form

Avalanche Hazard Form

Date: **Time:** **Name:** **Location:**

Weather, Past hrs: - (12, 24, 48hrs) *(Circle appropriate answers below)*

Precipitation: Nil Snow **Rain** *Intensity:* Light (1mm/hr) **Moderate (2mm / hr)** **Heavy (3mm / hr+)** *Total new:* *cm* ***(>21cm)***

Wind Speed: Calm Light **Moderate** **Strong** Gale Extreme

Wind Direction: N NE E SE S SW W NW

Humidity: Low (clouds high above) Moderate (clouds near) **High (in the cloud)**

Solar Radiation: Weak Moderate **Strong**

Air Temperatures: *Present:* *FAFL:* *Night freeze?:* Y N

Barometer: *Trend:* Rising **Falling** Steady **Rapid** Slow

Weather Forecast: *(how will it change, what signs of deterioration/improvement will we see, how will this affect our day?)*

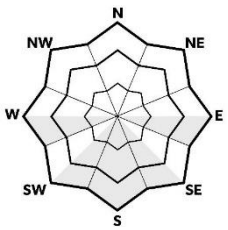
NZAA Forecast danger rating (avalanche.net.nz): (LOW, MODERATE, **CONSIDERABLE, HIGH, EXTREME**)

High Alpine _____ **Alpine** _____

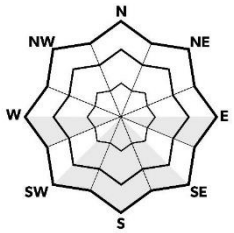
Sub Alpine _____

Avo forecast summary- next hrs: *(Altitude, Aspect, Size, Likelihood, Trend, Time of day, Where in the terrain? What features to avoid?* ***Uncertainty)***

Avalanche Problem 1:



Avalanche Problem 2:



Avalanche Problem 3:

Other hazards today: *(slide for life, rockfall, icefall, crevasse, human factors, poor vis, variable conditions, thin snowpack etc)*

Mindset: (*Circle one)*

Assessment (gather info) **Stepping out** (begin to explore) **Stepping back** (lost confidence, reassess)

Status quo (nothing changed) **Open season** (stable, have fun, but remain alert)

Entrenchment (avoid avalanche terrain with persistent weak layers) **Spring diurnal** (leave early, back early)

Terrain to avoid: (*Write here or mark on map)*

Info to target: *(what don't we know? how will we find answers?)*

Trip Planning and Intentions Form

Date: _____ **Location:** _____

Time leaving: _____ **Car/s parked:**_____

Time/Date Returning:_____ **Leader:** _____

What is the plan for the day?: *(Intended route, turn-around time, decision points, return time, escape routes)*

Option 1:

Option 2:

Emergency and survival equipment: (*Tick what the group has)*

Shelter ☐ PLB ☐ In-reach/Spot ☐ 2nd Comms. ☐ Shovel, Transceiver, Probe ☐ Spare food and water ☐ Repair kit ☐
Wet weather gear ☐ First aid kit ☐ Whistle ☐ Warm clothing ☐ Personal Meds ☐ Torch ☐ Fire lighting kit ☐
Navigation tools: Other:

Contact details of group:

Name:	Phone # and car reg (if taking)	Experience and skillsets e.g., first aid, Avalanche etc	Emergency contact name and #

Have you:

- Checked the Weather and Avalanche forecast for the area and completed the Avalanche Hazard form?
- Checked all equipment is present and in working order?
- Informed someone reliable of your intentions?
- Checked for any medical issues/injuries within the group (meds with them if required)?
- Checked that everyone is happy with the plan and knows to speak up if this changes?

Have you considered:

- Is there knowledge of the conditions and terrain within the group?
- What are the group's strengths and weaknesses?
- Are there any human factors present? (FACETS)
- What pressures are we under?
- Are these affecting our decisions?

Land Safety Code – Know before you go

1. Choose the right trip for you

Learn about the route and make sure you have the skills for it.

It's important to choose a trip that suits you and everyone in your group.

When you are looking at the options, make sure you think about everyone's fitness levels and experience in the outdoors.

Some questions to consider are:

- How long will it take to complete your trip? Will you be able to finish it during daylight? Remember to add extra time for travel, lunch and rest stops.
- How hard is the trip? Will everyone in the group be able to do it?
- Do you know which way to go? Will it be easy to follow the track and not get lost? Packing a map and track description will help.
- What is the landscape like? Are there any dangerous parts or difficult sections?
- If the weather is bad, can you still do the trip? What would you need to do differently?
- Will you need to cross a river? Make sure you'll be able to do that safely. You should also be able to recognise when a river is unsafe to cross.
- How will you get to the trip? Many tracks start and finish in different places – plan how to get back to your car.
- What clothing and gear do you need? Does everyone in the group have it?

There are lots of places to find information to help you answer these questions. You could try:

- Advice from people who know the area
- Department of Conservation website
- Information centres (for example, iSITES)
- NZ Mountain Safety Council's Plan My Walk app
- Walking Access Commission's Find My Adventure tool

2. Understand the weather

It can change fast. Check the forecast and change your plans if needed.

Weather can make or break a trip. It's one of the most important things to consider when going into the outdoors.

No matter what the weather is, it will impact your trip. Bad weather (such as strong wind, rain and cold temperatures) can be very dangerous. The weather changes fast in New Zealand and you should be prepared for any weather. It can be sunny, rainy and windy all in one day.

Before any trip, check the weather using New Zealand's public weather forecasting service, metservice.com. If there is bad weather forecasted, think carefully about whether your trip will be safe and consider changing or cancelling your plans. Pay careful attention to weather watches or warnings in the area you're planning on visiting.

There are three weather forecast options:

- Towns and Cities forecasts
- Rural forecasts
- Mountains and Parks forecasts (covering national parks, ski fields and other mountainous areas)

When reading the forecast, ask yourself what it means for your plans. For example, heavy rain will cause river levels to rise, and strong wind will make exposed ridges unsafe. Pack sunscreen, sunglasses, a sun hat and plenty of extra water in hot weather.

Make sure you have a back-up plan. While on your trip, keep an eye on the weather and be prepared to turn back or change your route if needed.

3. Pack warm clothes and extra food

Prepare for bad weather and an unexpected night out.

Any trip, even if it is short or easy, needs preparation. Packing the right things makes trips safer and more enjoyable.

If you are going on a short trip, always pack:

- A waterproof jacket
- Warm clothes
- A warm hat
- Gloves
- A torch
- A sun hat
- Sunscreen
- Some extra food and water
- A communications device (e.g. cellphone)

For a longer trip (e.g., an overnight trip or a long day walk), pack:

- Everything on the short trips list above
- An extra day's worth of food and water
- A first aid kit
- An emergency shelter (e.g., tent, bivvy bag or a large pack liner)
- An emergency communications device (e.g., a distress beacon)

These things will help keep you safe if the weather turns bad, you have an accident, get lost or are delayed. Some outdoor equipment stores will hire clothing and equipment if you don't have your own.

4. Share your plans and take ways to get help

Telling a trusted person your trip details and taking a distress beacon can save your life.

We all want our trips to go as planned – but sometimes they don't. If you got hurt or lost on your trip, how would you get help?

Any time you are going into the outdoors you should:

1. Share your plans with someone you trust. Tell them where you are going and when you will be back. If they don't hear from you by an agreed time, they should call 111 and ask for the police. There are lots of ways to share your plans such as PlanMyWalk.nz. You can also write down the information on paper for your trusted person, email them, text them, or use the outdoor intentions form.
2. Think about how you would call for help if you needed to. Cellphone reception can be patchy or non-existent outside towns and cities, so consider taking a distress beacon (see more below).
3. If you visit a Department of Conservation hut (even if you aren't staying the night), fill in the Intentions Book.

Distress beacons can be used in emergencies to alert rescuers of your location and that you need help. Unlike cellphones, they work everywhere. You can rent distress beacons throughout New Zealand (e.g., outdoor equipment stores). If you own one, make sure it's registered – it gives rescuers important details when providing help.

5. Take care of yourself and each other

Eat, drink and rest, stick with your group and make decisions together

The best way to enjoy your experience in the outdoors and make it home safely is to look out for one another.

- Stop regularly to eat, drink and rest.
- Discuss how everyone is feeling. If someone is struggling, don't keep going – have a break and consider changing plans.
- Make decisions together. It's important that all group members agree to changes in the planned route or transport arrangements.

Groups splitting up is a common cause of search and rescue callouts. If someone in the group is slower, put them at the front or make sure you are walking at a pace that suits them. You should also stop and wait at every track junction/bridge to ensure you're still all together. Don't just walk on ahead and leave them to meet you at the end of the trip.

Course Self-Quiz

1. What is the slope angle range for avalanches?

2. Avalanches occur most commonly at which angle?

3. What does ALPTRUTh stand for?

4. How many factors of ALPTRUTh need to be present for increased caution?

5. Name the 9 avalanche problems (as described by avalanche centres)?

6. What does temperature gradient refer to?

7. Which danger ratings are associated with the most avalanche occurrences?

8. Define one of these danger ratings in terms of natural avalanches and human triggered avalanches?

9. What does the acronym FACETS refer to?

10. Which of the FACETS do you think you are most likely to succumb to?

11. What are the three most important factors when considering terrain?

12. You dig and get a result of ECTP21. What does this stand for? What is most important; the number or the P?

    Why?

13. What does the mindset "Stepping back" look like in the field?


TRAINING
FORECAST
SAFETY IN AVALANCHE TERRAIN
EQUIPMENT