

A Taste of Mountain Flying



If terrain prevents you from flying from point A to point B in a straight line – you are mountain flying. Every pilot in New Zealand needs mountain flying techniques and skills because no one is ever far from terrain, or its influence.

This year the CAA presented 29 AvKiwi Safety Seminars on Mountain Flying to 2485 pilots around New Zealand. Here is an overview for those who missed it.

Threats

Terrain is the most obvious threat in the mountains, but with knowledge, training, experience, and respect, this threat can be mitigated. Here are a few others:

Lack of Horizon

The horizon is the line where the sky meets the sea. Without a defined horizon, it is difficult to maintain a consistent aircraft nose attitude. Carlton Campbell, CAA Training Standards Development Officer and co-presenter of this year's AvKiwi Safety Seminars, says pilots should overlay an imaginary horizon by visualizing where the real

horizon would sit if the terrain or weather around them was transparent.

“Learning to superimpose an imaginary horizon on any background is not an innate ability. It is a skill that must be learnt. It generally takes the average pilot five hours of training and practice to achieve this with reasonable accuracy.”

Visual Illusions

The mind can be fooled in the mountains. Different lighting conditions can create definition and depth perception problems, and in winter, snow cover makes it even harder to determine if what you see is real.

» Bright sunlight can cause areas of deep shadow that are impossible to see into. If you are aware of the sun's position, you can avoid being surprised by bright light as you come around a ridge or peak.

» An overcast sky while flying over snow can cause 'whiteout'. If the snow, sky, and cloud are the same colour, all trace of surface texture and terrain definition is hidden. It becomes impossible to judge height, gradient, and distance, see patches of lower cloud, or determine what is terrain and what is cloud.

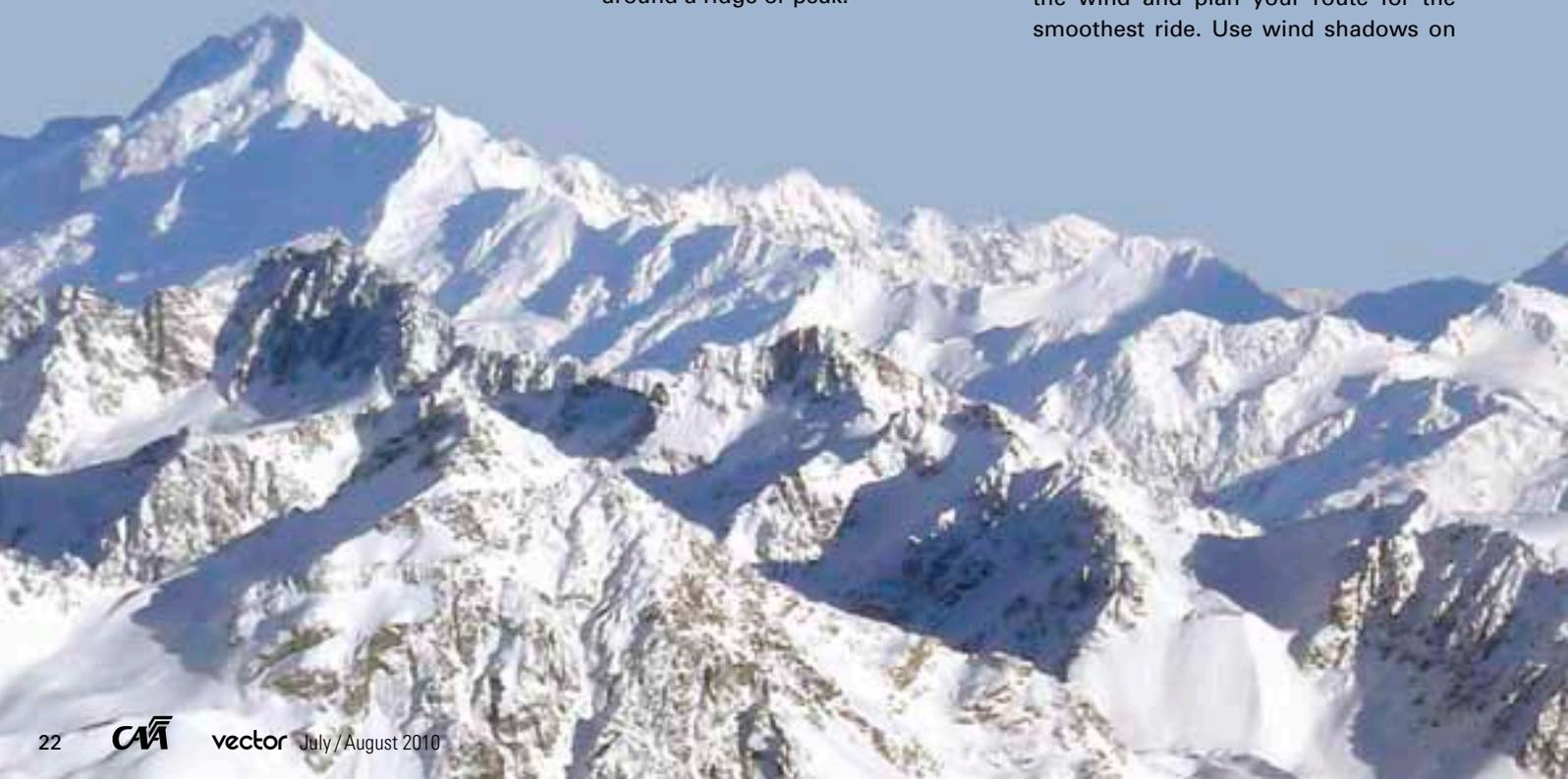
Other illusions include terrain in the foreground merging into, and appearing part of more distant terrain, as well as difficulties judging gradient, scale, and how much space you have available.

Wires and Structures

Wires can be particularly hard to see when they span valleys, and wind farms and masts are often installed in mountainous areas.

Wind and Turbulence

Assess the strength and direction of the wind and plan your route for the smoothest ride. Use wind shadows on



water, cloud formations, wind on crops, trees and tussocks, smoke and dust, and interpretation of drift and ground-speed.

If you imagine the airflow as water, it can help you figure out how the wind will behave at different points along your route. Think about how it will flow over the terrain; where it will accelerate through passes, divert along valley floors or be forced over a ridge. Rapids (or turbulence) will occur where flows mix together, and where deceleration occurs in the lee of obstacles. Below 15 knots, wind flows are generally predictable. Above 15 knots, wind becomes more difficult to predict. If you are inexperienced or uncurrent, and the wind is stronger than 15 knots, consider either staying on the ground or avoiding flight amongst terrain.

Cloud

The lower the cloud, the more restricted your options, and the more you will confront other traffic. Understanding what conditions are required to produce different cloud types will help you to figure out what flying conditions may be like in that area. Be aware that the terrain creates its own weather. This can be very changeable and limit your escape options.

Other Aircraft

Traffic can be harder to see in the mountains, and everyone can be exactly where you want to be – especially if you have all figured out the smoothest line to take, or you are forced down into the same valley systems by cloud.

Aircraft Performance and Your Performance

At altitude, your performance and the aircraft's performance are both degraded. Never rely on aircraft performance to get you out of trouble – only good decision-making will do that.

Density altitude calculations are particularly important for helicopter pilots. The density altitude for a particular landing site can vary depending on the ambient conditions. Just because a landing was successfully made on one particular day, doesn't mean it will be achievable on another.

Here is a sample density altitude calculation:

- » On a standard day, sea level pressure is 1013 hPa and the temperature 15 degrees.
- » At 5000 feet, the temperature should be 5 degrees, because the temperature lapse rate is 2 degrees per 1000 feet.
- » If the temperature at 5000 feet is actually 15 degrees, then it is 10 degrees warmer than standard and the density altitude will be greater.
- » To calculate density altitude, multiply the temperature difference by the lapse rate. $10 \text{ degrees} \times 120 \text{ feet per degree} = 1200 \text{ feet}$.
- » So, at 5000 feet with a temperature of 15 degrees, the density altitude is 6200 feet.

Don't forget the effects of pressure altitude. Many aerodromes in New Zealand are high enough for this to have a considerable impact on your aircraft's performance, particularly on hot, low pressure days.

Route Planning

There are always a number of different routes you can take – which one to choose will generally depend on the weather. One route may be safer or more comfortable in north-westerly conditions, for example, but unsafe or extremely turbulent in south-easterly conditions. Seek local knowledge.

Syllabus Changes are Coming

Changes have already been incorporated in the helicopter training syllabus, and promulgated fixed wing syllabus changes are coming in 2011. These will require anyone training for a PPL or CPL to undergo specific terrain awareness and mountain flying training with an appropriately qualified instructor.

You Need Training

If you already have a licence, ask for mountain flying training at your next BFR. Attending this year's AvKiwi Safety Seminar, and watching the CAA's new *Mountain Flying* DVD is not enough – you need training. Invest in your skills – you don't know what you don't know. ■

