

FIELDGUIDE 2010

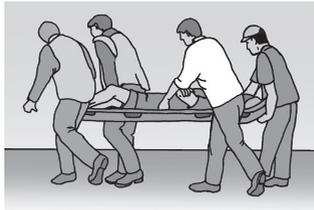


SEARCH & RESCUE
LAND SAR
NEW ZEALAND

NZ LAND SEARCH AND RESCUE

LandSAR Field Guide

October 2010



Acknowledgements

In many ways, this update of the LandSAR Field Guide shows the evolution of our organisation and the constant change that is encountered by practitioners. It was recognised that an update was needed and this manual builds on the previous work by the members of the Auckland District Committee and many others. They include Roger Curl who wrote the 2006 edition, John Walsh, Roscoe Tait, Heather Walsh, Jim Rowe, Ron Renz, Fred Gallas, Ken Whitaker, Frank Wielemaker, Lou Grant, Clive Watson, Dell Hood, Jack McConchie, Peter Davies, Trevor Burgess, Phil Callaghan, and Ross Thompson.

The manual documents standards that reflect current best practice in land search and rescue in New Zealand. To do this, the sector worked together to document its combined knowledge. This included LandSAR, SARINZ, the NZ Police, and relevant specialists. SARINZ generously permitted use of their training documents and diagrams to underpin the guide.

A steering committee provided oversight of the manual, and comprised:

- Hadyn Smith, Ross Browne, Stewart Davies, and Bayard Ralph, LandSAR.
- Paul Kelly, SARINZ.
- Joanne Holden, Hugh Flower, and Bill Nicholson, NZ Police.

As well as the generous contributions of time that was made by the various agencies, funding was provided by NZSAR and from LandSAR general funds.

The manual was written by Steve Schreiber and Stu Allan.

Hadyn Smith
Chief Executive, LandSAR

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Foreword

Effective search and rescue services

LandSAR NZ practitioners form the backbone of land-based search and rescue response in NZ. LandSAR supports the country's two search and rescue coordinating authorities – the NZ Police and the Rescue Coordination Centre of NZ. This manual ensures that this support is of the highest possible standard.

The overarching purpose of the NZSAR sector is:

To provide effective search and rescue services for people in distress throughout New Zealand's search and rescue region in order to save lives.

The New Zealand Search and Rescue Council (NZSAR) has five strategic goals to meet this purpose. This manual directly meets three of these goals:

1. To enhance the effectiveness and efficiency of NZ's SAR sector – by helping develop common procedures for LandSAR members, you improve your ability to work together with other organisations.
2. To promote continuous improvement – this manual is designed to improve the organisation, training, and operational conduct of LandSAR members.
3. To maximise the potential of SAR people – this manual will help provide a clear understanding of the potential of the LandSAR members.

LandSAR members are the heart of LandSAR. It's important that the coordinating authorities are fully aware of your potential and know how to use you to the best effect in saving lives.

After all, this is why you're reading this manual.

Duncan Ferner
Manager, NZSAR Secretariat



Introduction

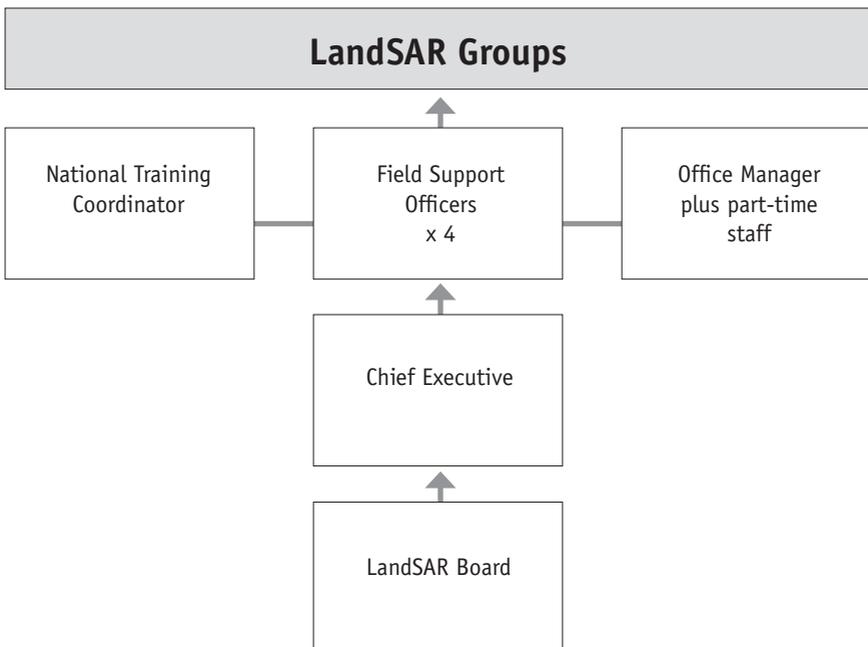
NZ Land Search and Rescue – LandSAR, is the national volunteer organisation that provides land search and rescue services to the Police, the Rescue Coordination Centre, the public, and to international visitors. It's the only national support organisation that deals with all levels of land-based search and rescue in NZ.

LandSAR has over 3,000 trained search and rescue volunteers who are members of 62 LandSAR groups which exist in every Police District with an operational need. Each group has district support for operations, training, and mentoring. LandSAR also has specialist groups including Search Dogs, Swiftwater, Caving, Tracking, and Alpine Cliff Rescue.

LandSAR is very diverse operationally as members deal with situations from alpine and cave rescue through to lost persons in the bush and in urban areas.

This LandSAR Field Guide is the foundation document for our members and, although many will move on to using more technical documents, it will remain the 'go to' support document for those learning their trade with LandSAR.

LandSAR structure



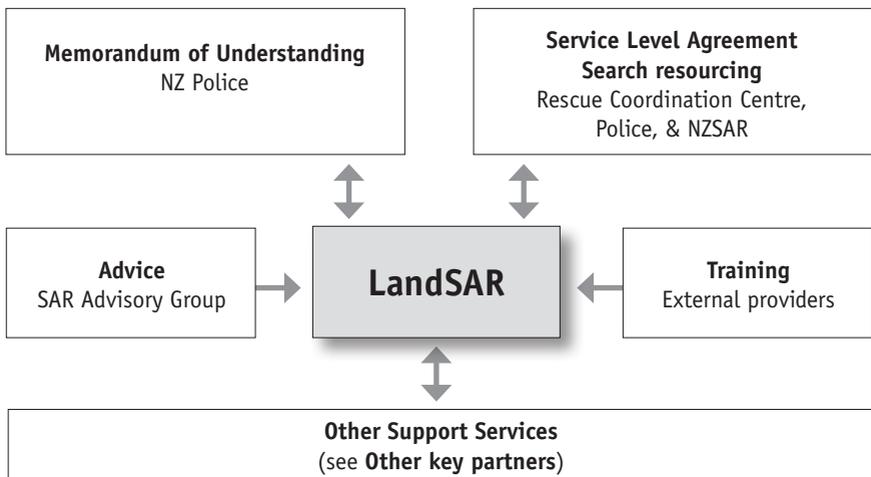
Services

The search and rescue sector supplies the following services:

- Authorities able to coordinate land, sea, and air operations.
- Trained land, sea, and air SAR teams and assets available to conduct search and rescue operations on request by the coordinating authorities.
- Long-range search and rescue assets able to conduct operations throughout NZ's Search and Rescue Region (NZSRR) – an area extending from north of Samoa to the Antarctic – and also able to support neighbouring regions.

Key relationships

Land search and rescue is a collaborative undertaking and LandSAR works alongside various agencies to do its job.



Coordinating agencies

There are two coordinating agencies in New Zealand: the Police and the Rescue Coordination Centre.

NZ Police

The Police are responsible for Category I Search and Rescue Operations (SAROPs). They're coordinated at the local level and include land, river, lake, and close-to-shore marine operations, e.g. an overdue group of fishing mates in a family runabout within 12 nautical miles of the coast, or an overdue tramping party.

Rescue Coordination Centre (RCCNZ)

RCCNZ is responsible for Category II SAROPs. They're coordinated at the national level and include missing aircraft, aircraft in distress, and offshore marine operations, e.g. an aircraft reported overdue on its planned landing time, or an offshore yacht that has activated its 406 MHz emergency distress beacon.

Other key partners

Strategic overview

The NZ Search and Rescue Council (NZSAR) provides strategic governance to the search and rescue sector.

Operational support

The following organisations offer support services, often through volunteers.

Partner	Services
Amateur Radio Emergency Communications (AREC)	AREC provides communications support to the Police and LandSAR in many areas of NZ
Civil Defence & Emergency Management	Civil Defence may support operations through Territorial Authorities
Coastguard	The Coastguard is NZ's primary maritime search and rescue service
Department of Conservation (DOC)	DOC offers local knowledge, communications, local partnerships, and active search support
Local Air Ambulance or Rescue Service	Most districts with a SAR focus have a dedicated Air Ambulance or Helicopter Rescue Service, activated through the lead agency
NZ Defence Force	The Defence Force contracts to the Police to provide support service such as helicopters (No. 3 Squadron) and four-wheel drive support
Medical Support Agencies	Organisations such as St John and Red Cross provide immediate medical support
Surf Life Saving	All clubs include a search and rescue capability

Other organisations such as the Mountain Safety Council, Federated Mountain Clubs, New Zealand Alpine Club, New Zealand Mountain Guides Association, tramping clubs, and the Mountain Radio Service – to name a few – may also provide training or support to LandSAR.



Who Does What?

Coordinated Incident Management System

The Coordinated Incident Management System (CIMS) is a standardised emergency incident management system. Organisations that use CIMS include the NZ Defence Force, NZ Police, NZ Fire Service, National Rural Fire Authority, Department of Conservation, Civil Defence, Ambulance Board, and the Prime Minister's Department. The Police and LandSAR use it in the management of searches and for related rescue operations.

The major advantages of CIMS are that it:

- Is adaptable – one person can take on several of the roles for a minor incident and the model can easily be expanded for a major SAR operation (SAROP) or multi-agency disaster type incident.
- Employs a common organisational structure.
- Uses a common coordination structure and consolidated action planning.
- Promotes use of a common terminology.

Organisation chart

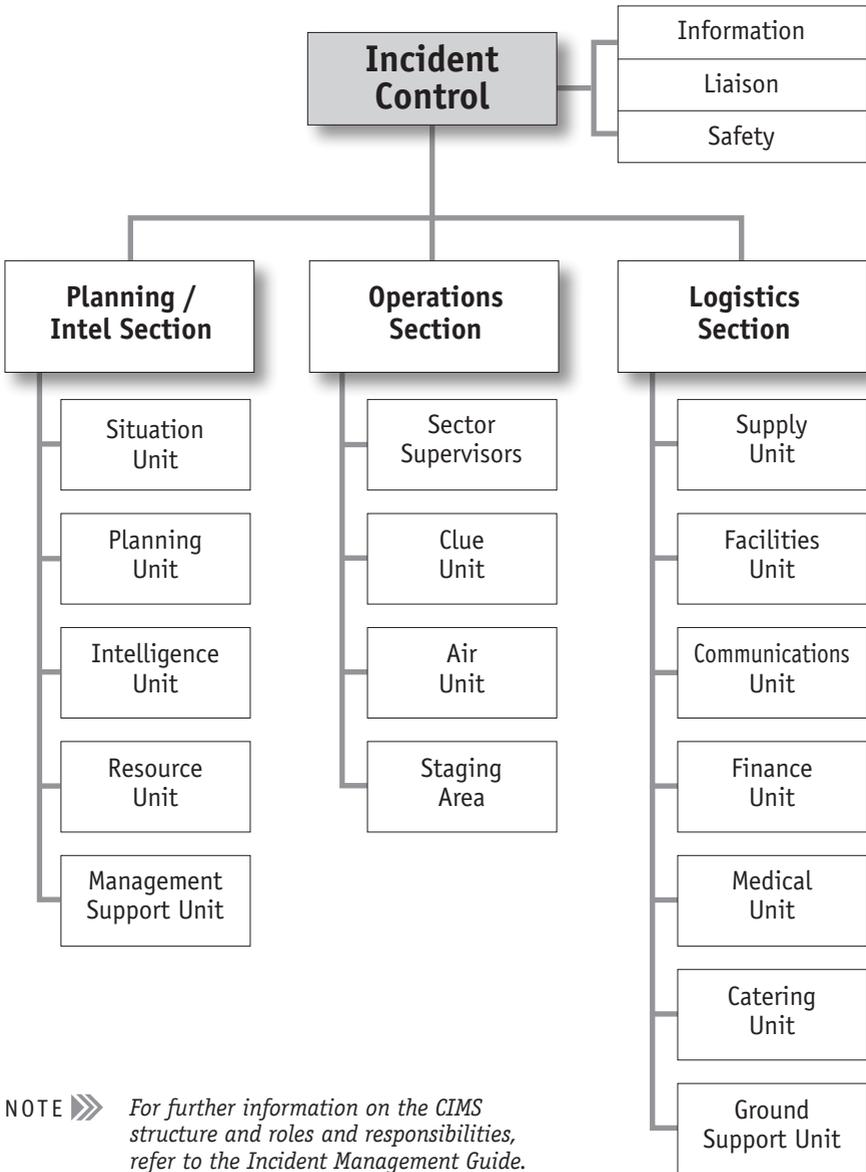
LandSAR field teams and specialist resources all come under the control of the Operations Section.

The Operations Manager (OPSM), in consultation with the Incident Controller, sets up the structure of the Operations Section for a particular search. All LandSAR field team members will fit into this structure.

Specialist resources or units can be used if required by the operation, e.g. caving, alpine cliff rescue (ACR), jet boats, kayaks, infra-red, and other resources. The CIMS organisation is very flexible and so is the structural chart.

NOTE ►► *The titles of the Incident Management Team (IMT) reflect a common terminology with other CIMS users.*

The following chart illustrates a generic CIMS structure, which has been slightly adapted for a SAR operation. It outlines the functions of a SAR operation, not the number of people that will perform them.



NOTE ➤➤ For further information on the CIMS structure and roles and responsibilities, refer to the Incident Management Guide.



Field Personnel

The field personnel involved in any SAR operation are key to its success. It's important that every person knows their specific role and what their duties are.

Search and rescue is an investigation and retrieval process. Personnel need to be inquisitive and analytical in all aspects of the search phase, as well as professional and non-judgemental in the rescue phase.

The following are descriptions of the roles of field personnel.

Team member

Objective

To carry out delegated SAR tasks safely and efficiently.

Responsible to

The Team Leader.

Requirements

Bushcraft skills

You must be:

- Fit enough for the task asked of you. This could involve:
 - Carrying a multi-day pack anywhere in the SAR group's area of responsibility at track times or better.
 - An ability to search effectively both along the route and when you arrive at the scene.
- Experienced in all aspects of bushcraft, that is:
 - Navigation (map and compass, grid references, bearings, and GPS).
 - On and off track travel.
 - River crossing.
 - Shelter building.
 - Alpine skills (where appropriate).

SAR skills

Participate in your SAR group's training programme to gain experience and proficiency in all the necessary SAR skills:

- Search techniques.
- Track and Clue Awareness (TCA).
- Tracking.

- Sign cutting.
- Rescue techniques.
- Communications.
- Helicopter procedures and safety.
- Patient care.
- Stretcher handling.
- Rescue site awareness.

Special skills

Let the Resources Unit, the Operations Section, and the Team Leader know if you have any special skills such as medical skills or local knowledge.

Personal details

Ensure your LandSAR group contact has up-to-date details of your phone numbers, address, and fitness level. When your details change, advise the appropriate person.

Ensure that the Team Leader and the Operations Section are aware of any medical problems, allergies, and medication you have.

On arrival at the designated staging area

In areas where personnel are called out individually, give the Resource Unit in the Planning / Intelligence section:

- Your name, address, and contact details.
- Your next of kin and their contact details.
- Your fitness level, abilities, and specialist skills.
- Details of any medical conditions you have.
- Any specialist equipment you have.
- The length of time you're available for the SAR operation.

If you're in an area where teams of personnel are called out, the Team Leader should record and pass on team member information.

In the field

NOTE ►► *Your personal safety and the safety of the team are paramount.*

To work safely:

- Follow your Team Leader's instructions to the best of your ability.
- Advise the Team Leader if you're unhappy about your safety.
- Remain with the team at all times.
- Help anyone in your team who needs assistance.
- Advise the Team Leader of any changes in your health and ability to perform.
- Contribute to group discussions and decision making when appropriate.

Back at the base (ICP)

You should:

- Be very careful what you say: relatives or friends of the missing party may be present and may mistake what they hear.
- Return any equipment you've been issued.
- Participate in the team debrief.
- Let the Resources Unit know when you're departing from the operation.

Team Leader

Objective

To safely and efficiently lead the search team in executing its assigned tasks.

Responsible to

The Operations Manager or Sector Supervisor.

Requirements

In addition to meeting the requirements of a team member, you're responsible for your team from the briefing until the end of the operation.

NOTE  *If your team finds a missing party, you become the Sector Supervisor. You should remain in charge of your team and any other teams that arrive unless someone else is appointed as the Sector Supervisor.*

On arrival at the designated staging area

In areas where teams of personnel are called out, the Team Leader may be asked by the Operations Section to verify the details of the team members and any specialist equipment carried by the group.

Pre-departure

Task briefing

When called, attend a briefing with the Operations Manager and collect:

- Details of the missing party.
- Details of the areas to be searched and the search methods expected.
- Information on specific hazards in the area.
- Maps (you'll also need notebooks, pencils, and plastic bags for the maps).

TIP  *Make sure you write down all relevant information.*

When requested, attend or delegate a competent team member to attend a radio briefing:

- Write down the radio call sign and radio schedule times.

- Collect radio, spare batteries, and a plastic bag for the radio.
- Be sure that at least one other team member is fully conversant with radio use.
- Write down channel numbers and when they're to be used.
- Record phone numbers of the ICP (landline and cellphone).
- Check GPS accuracy against a known reference point before leaving the ICP.
- Synchronise watches.

Brief the team

You should cover the following:

- Check if any team member has medical problems.
- Make sure that all team members are capable of undertaking the search tasks.
- Make sure that all team members are suitably equipped, and check pack weights.
- Provide details of the missing party, the search area, the search techniques likely to be used, and any specific hazards in the area.
- Check the team experience and allocate duties: radio communications, navigation, first aider.
- Check the radio before leaving the ICP.
- If waiting for transport, wait near the pick-up point.

Share equipment

Make sure that any heavy or extra equipment is shared among team members.

NOTE ►► *Prepare as much as possible before the briefing so the team is ready for the field.*

In the field

NOTE ►► *The safety of the team is paramount at all times. Make sure the team is always aware of its current location and destination.*

Search procedures

Make sure the team follows the required search procedures and cover all areas thoroughly. Make plenty of noise (shouting and whistling) where appropriate.

Communicate with the ICP

Give clear, precise messages to the ICP when necessary.

NOTE ►► *Be careful what you say: friends or family will probably be at the ICP or may be in another team and may hear your transmissions.*

Monitor the team

Monitor the team members' progress regularly and make sure no one is experiencing difficulty:

- Consider slowing the pace if necessary.
- Share the load of anyone who's experiencing difficulty among team members.
- Take regular rest breaks and make sure everyone has sufficient food and drink.
- Discuss problems and situations and make sure everyone understands the decisions you make.
- If the team has to separate for any reason, such as to search stream tributaries, you must make sure that everyone has very clear instructions on where, when, and how to rendezvous, especially if there are insufficient radios for each group.

Courtesy

Always identify yourself with landowners and the public, and be respectful. Tell them about the search and seek any information on sightings of the missing party. Also tell them how they can contact the ICP in case they discover something later.

NOTE ►► *Make sure all gates and property are left as you find them.*

Area identification

Identify any of your team's areas of impact, e.g. campsites, so as not to confuse other search teams.

NOTE ►► *Make sure the area is well marked.*

Task documentation

Keep detailed notes relating to the search effort, recording such things as:

- Area covered.
- Search methods used.
- Sign or lack of sign.
- Estimated Probability of Detection (POD).
- Footprint clues (acetate).
- People met (names and contact details).

TIP ⤴ *Where possible, take photographs of objects that are found. These can:*

- Help a Coroner appreciate what items (including colour and size) were sighted by the searchers. This has proved invaluable when the missing party hasn't been found as it gives the Coroner a yardstick they can use in their subsequent deliberations.
- Help the Incident Management Team (IMT) to determine a POD assessment for a particular search area or method.

NOTE ►► *Make sure photos are kept private. You must respect people's privacy and also protect evidence.*

Back at the ICP

You should:

- Notify the Operations Section of your return.
- Make sure all your team are accounted for – Team Leaders who've been part of a rescue party must still account for their original team members.
- Hand in your radio and batteries and report any faults or problems.
- Expect to be debriefed (at least the Team Leader and the second in charge; possibly every team member). Show and state the exact areas searched, the methods used, and any other relevant details including photos and POD. Give details of the conditions you encountered, locations and descriptions of items you found, or comment on the absence of clues.
- Hand in your GPS for download if required, plus any maps, notebooks, team equipment, and items you've found.

Sector Supervisor

Objective

To safely coordinate the patient care, site management, and rescue of the missing party.

Responsible to

The Operations Manager.

Responsibilities

The Sector Supervisor is responsible for the:

- Safety of the teams and the missing party.
- Management of the rescue site.
- Management of the rescue of the missing party.
- Welfare of the teams.

The leader of the team that finds the missing party assumes the role of Sector Supervisor unless someone else is appointed by the Operations Manager. The Sector Supervisor is in charge of all teams that combine to form the rescue party.

Talking to the media

The media are a valuable tool for LandSAR because they:

- Advertise our services and help us recruit and retain administrators and volunteers.
- Attract interest and raise LandSAR's profile and community support.
- Keep the public informed and may prompt people to come forward with information on a missing party.

NOTE  *During an operation no personnel are allowed to talk to the media without the approval of the Incident Controller.*

While we encourage spokespersons to talk to the media about LandSAR matters, it's important not to stray into areas that are the Police's responsibility. In these cases, we **don't** have anything to say about the missing party, including their name or condition, until after the Police release any details.

When there is a death

You should be especially careful if a death has occurred. Generally, LandSAR comments will be confined to things such as the number of volunteers and volunteer hours involved in an operation, the weather conditions, and the general degree of difficulty for the searchers. If you're unsure, please refer to the Police, a senior person in your group, or LandSAR.

On-Scene Coordinator

The On-Scene Coordinator (OSC) is appointed by the Incident Controller (IC) to provide a leadership and coordination role at the scene when the IC is located away from the incident. In many, small, localised incidents, there will be no need for an OSC. For larger, more complex, remote incidents (particularly where multiple-response units and assets are being used), the OSC can provide the IC with local 'eyes and ears'.

At all times the OSC works to and for the IC. This will be through the Operations Manager if a full IMT is established. The OSC roles and responsibilities will be defined and allocated by the IC, and will vary depending on the nature of the incident.



Food and Equipment

As a general rule, you should be self-sufficient for at least two days (in some areas, four days), and be able to spend the night in the bush comfortably. Access by helicopter doesn't mean that you'll be picked up by helicopter – you may have to walk out.

You must be prepared for any eventuality, from carrying a heavy stretcher with a pack under a hot sun for long distances to standing about for several hours in bad weather.

NOTE ►► *You'll need extra food and gear for the missing party if you find them. Certain conditions or situations may require extra gear or clothing.*

You should be able to prepare for a search within half an hour. You should always arrive fully equipped at a SAROP (search and rescue operation) or a SAREX (search and rescue exercise).

Clothing and equipment

What to wear

Wear wool or polypropylene top, socks, shorts, sound tramping boots, and high gaiters, and keep your compass and whistle handy.

What to carry

- | | |
|--|--|
| <input type="checkbox"/> Parka | <input type="checkbox"/> Whistle |
| <input type="checkbox"/> Overtrousers | <input type="checkbox"/> Toilet paper (personal and for track marking) |
| <input type="checkbox"/> Wool or polyprop balaclava | <input type="checkbox"/> Plastic bags |
| <input type="checkbox"/> Wool or polyprop gloves or mittens | <input type="checkbox"/> Notebook and pencil |
| <input type="checkbox"/> Wool or polyprop longjohns | <input type="checkbox"/> Head and hand torches plus spare batteries |
| <input type="checkbox"/> Extra clothing for cold climates | <input type="checkbox"/> Water bottle |
| <input type="checkbox"/> Sun hat and sun block in summer | <input type="checkbox"/> TCA kit |
| <input type="checkbox"/> Wool or polyprop long-sleeve top jacket | <input type="checkbox"/> LandSAR Aide-mémoire |
| <input type="checkbox"/> Compass | |

Overnight

- | | |
|---|---|
| <input type="checkbox"/> Stove, fuel, and fire-lighting sources | <input type="checkbox"/> Food and drink |
| <input type="checkbox"/> Billy | <input type="checkbox"/> Sleeping bag and mat |
| <input type="checkbox"/> Plate, mug, and spoon | <input type="checkbox"/> Tent or fly |

Optional

- Edge kit
 Secateurs

- Leather gloves
 Ear plugs

NOTE ►► *Keep your stove and fuel in a separate bag. If you're transported by helicopter, hand this bag to the flight crew and tell them what it is. If they suspect a fuel leak, they'll jettison this rather than your entire pack.*

Survival kit

This should be sealed in a waterproof container and contain:

- A pocket knife
- A small compass
- A survival tube or blanket
- Cord
- Barley sugars
- Fire starters, short candles, or rubber strips
- Waterproof matches or fire lighter

NOTE ►► *A survival kit should only contain a few essential items. What you're carrying in your pack and wearing is your full survival kit, so never discard anything or become separated from your pack.*

First aid kit

This should be sealed in a waterproof container and contain:

- Small notebook and pencil
- Packet of anti-histamine tablets
- Crepe bandage (10 or 15 cm)
- Painkillers
- Triangular bandage
- Adhesive tape
- Sani-napkin or wound dressing
- Disposable gloves
- Safety pins x6
- Iris or fine scissors
- Outdoor first aid manual
- Tweezers
- Small cake of soap
- Paraffin or non-stick dressings
- Insect repellent
- Steristrips or butterfly closures
- Band-aids x10

NOTE ►► *Make sure you check the contents of your kit regularly and replace items that have deteriorated or passed their use-by date.*

Packs

Pack your gear in a large-sized pack (about 70 litres capacity) and also take a daypack. If the group has doubled up on some gear or you have surplus gear, you can leave it at the base (ICP) in your daypack. If you find that you'll be on a short local search and are unlikely to spend a night out, transfer your essentials into your daypack and take that.

Avoid a pack that's too high or too wide, and avoid having gear hanging off it. Securely attach a small loop to the top of your pack to enable it to be clipped to a helicopter rabbit hook.

TIP  *Line your pack with a large plastic bag or pack liner.*

Team gear

Each team should have a:

- Laminated map of the search area
- Radio (2 VHF and 1 HF minimum recommended) plus spare batteries
- GPS plus spare batteries
- Digital camera
- First-aid kit
- Cellphone
- Binoculars
- Set of plastic bags

Other possible items include:

- Machete or axe
- Cyalumes (orange or red glow sticks)
- Edge kit
- Smoke flare (orange)
- Rope
- Emergency beacon

Avoid green smoke flares and Cyalumes because night vision goggles work in the red to infrared range.

- NOTE  1. *Don't take unnecessary or heavy items – keep your pack light.*
2. *You may not be placed in a team with your mates, so wait until you've been placed in a team before equalising loads.*

Food

Food must be lightweight, nourishing, and easily prepared. Having your food ready to go will save time in preparing for a search.

TIP  *Carry your own food so that if you're separated you don't go hungry.*

Ration pack

Listed below are the contents of a suggested ration pack (rat pack) that you can buy. It's for one breakfast, two lunches, and one dinner – you might need to pack two of them. Alternatively, you can make up your own to suit yourself.

- ½ cup precooked porridge
- 2 x tea bags
- 2 x Oxo cubes
- 4 x cabin bread
- 8 x sachets sugar
- 1 x segment cheese
- 2 x chocolate bars
- 1 x flavoured drink
- 1 x dehydrated meal
- 1 x soup
- 3 x coffee sachets
- ½ cup milk powder
- 1 x cup-a-soup
- ½ cup sultanas
- 2 x muesli bars
- 6 x barley sugars
- 1 x dehydrated dessert
- 1 x tea bag
- Milo
- Salt



Communications

Maintaining communications between teams and the base (ICP) is essential during all phases of operations for incident control and safety reasons. Teams may also need to communicate with each other for tactical purposes.

To achieve this, ideally both Very High Frequency (VHF) and High Frequency (HF) radios should be carried. This is necessary to ensure teams have backup when equipment fails, and to ensure terrain or atmospheric conditions can be managed. Cellphones may also be used to back up search and rescue activities in areas that have coverage.

Very High Frequency

Role

VHF radios provide line-of-sight communications within the search or rescue area. Line of sight means a straight line free from solid obstacles – the actual distance can be hundreds of kilometres if conditions are good.

VHF has the advantages of being lightweight and being able to be used on the move. Their disadvantage is they must have a line of sight with other radios or a repeater to communicate, meaning users may need to change location to communicate.

LandSAR uses portables for field use and mobiles for the ICP or vehicle use. The difference is essentially just weight and power.

Equipment allocation

It's recommended all field teams carry two VHF radios. VHF should be used with the team's HF radio in backcountry operations, not as a substitute for HF.

Channel selection

Two types of channels are available in all search and rescue VHF radios – simplex and repeater. Simplex means radios talk directly to each other; repeater means radios talk through a relay device, usually located at an elevated location overlooking the search area.

All LandSAR VHF radios must have the following channels programmed as a minimum – these are common throughout New Zealand:

Channel	Name	Use
1	ESX07	SAR Simplex
2	ESX53	SAR Simplex
3	ESB57	SAR Portable Repeater
4	ESB58	SAR Portable Repeater
5	ESB59	SAR Portable Repeater
6	ESB60	SAR Portable Repeater
7	MS08	SAR Fixed Repeater
8	MS17	SAR Fixed Repeater
9	EE122	SAR Fixed Repeater
10	EE196	SAR Fixed Repeater
11	ESX39	Liaison Simplex
12	ES164	Liaison Repeater
13	MSX27	Ground-to-air and RNZAF
14	DOC20	DOC Portable Repeater
15	MM06	Marine Simplex for ship-to-ship
16	MM16	Marine Simplex for emergency and calling

Liaison channels are common to all emergency services agencies (including Police, Fire, Ambulance, and Civil Defence) and can be used when working with these agencies during search and rescue operations.

Marine channels should normally only be used for operations involving water-based searching.

Channel numbers shown above are those used by existing LandSAR radio equipment. Newer equipment and radios belonging to other agencies involved in search and rescue may not have channels in the same order or may use different channel numbers. To avoid doubt, the channel name, e.g. ESX07 should always be referenced.

The Ground-to-air channel isn't always available on civil aircraft, and RNZAF aircraft must manually set the frequency of 158.725 MHz into their radio for operation on this channel. This is normally arranged by the ICP but, in unusual circumstances, air crew may ask you what frequency to use for communications with your team.

Antenna selection

The performance of VHF radios depends on the type of antenna attached to them.

Two types of antenna are typically used – the short ‘rubber ducky’ and the long tape (Floppy Jim) or spring-wire whip. The rubber ducky is compact, and the tape or wire whips are larger but give better overall performance. Tape or spring-wire whips should be used where possible.

Terrain influence

VHF relies on having line of sight between radios to work. This means that hills, ridges, and spurs can block radio signals. To overcome this, teams may need to change positions to get a clear view in the direction of the radio they want to contact. Another method is to use a repeater if one is available.

Using repeaters

Repeaters are used to extend VHF radio coverage over longer distances or over objects that would otherwise prevent line-of-sight contact, like high points. They’re usually located at an elevated location overlooking the search area and essentially work as an automatic relay – your radio contacts the repeater and the repeater contacts everyone else.

Some repeaters have a sleep mode to save battery power, and they may take a second or two to ‘wake up’ from idle. Sometimes, repeaters are linked and this too might cause a slight delay in transmission. When you depress the ‘Push to talk’ button on your VHF radio, pause for a second or two before speaking. Usually, but not always, repeaters transmit an audible ‘tail’ (static) at the end of each transmission. Hearing this tail lets you know you’re able to talk through the repeater. If you’re not certain about this, ask the ICP radio operator.

High Frequency

Role

HF radios provide medium to long-range communication within the New Zealand search and rescue area. HF doesn’t require line of sight to work, and operates without any supporting infrastructure such as repeaters needing to be installed before it can be used on operations.

The two main challenges using HF radios is the need to deploy a long antenna before use, and the ‘skip’ effect. Because HF uses the atmosphere to bounce its transmission down to earth again, sometimes it’s difficult to talk between two radios close together. To do so may require relays.

Equipment allocation

It's recommended all field teams carry one HF radio for backcountry operations.

NOTE ►► *VHF radios usually supplement HF radios – they don't replace them.*

Channel selection

The correct channel to use will depend on the time of day you wish to contact the ICP. Generally, either the 'Day' frequency (5680 kHz) or the 'Night' frequency (3023 kHz) will be used.

In some operations additional channels may be fitted to your radio. You should be briefed which frequency to use before departing the ICP. RNZAF and some civil aircraft carry HF radio.

Antenna selection

Each channel has different length antennas – see the instructions stored with the HF radio for details. When there are no natural supports such as trees, team members may need to hold up the ends of the HF antenna.

HF radio conditions

Solar activity influences how the HF radio operates. Conditions and the time of day may require you to try alternate channels or to use distant stations to relay messages.

Cellphones

Cellphones should never be relied on for search and rescue operations. However, if you have cellphone coverage, it may be the most practical option for getting quick communications or for conveying sensitive information.

NOTE ►► *Make sure the ICP is aware of the cellphone numbers of team members and that you have the numbers of key people in the IMT. Conserve your battery by switching off your cellphone if you're in an area of patchy coverage or in heavy rain or dense bush where the phone is seeking a cell site.*

Standard Operating Procedures

Team equipment

Field teams should carry a minimum of one HF radio and two VHF radios. Equipment should be tested before departing the ICP. Call the ICP and ask for a 'radio check'.

Communications Plan

Teams should get a copy of the Communications Plan before departing the ICP. The plan should contain scheduled contact times, applicable phone numbers, and Repeater and Simplex channel names for the operation.

It's recommended that the Communications Plan requires each team to have one VHF radio per team on a designated Simplex channel at all times. Maintaining contact with the ICP is the priority if one radio should fail. Teams should be aware of the location of VHF repeaters in use, in case they need to move to improve reception.

Situation reports

Purpose

The purpose of this Standard Operating Procedure (SOP) is to ensure search management is kept updated on the current whereabouts of a field team, the status of their task, and the intentions of the team. By following this SOP, field teams can expect fewer delays between tasking, more effective utilisation in the field, and fewer requests for information from search management. This SOP applies to both radio and cellphone communications.

Execution

Field teams will give a SITREP when one or more of the following trigger conditions are met:

- When requested by the ICP.
- After a specified time period has elapsed (typically, one hour) since last contact with the ICP.
- When a significant event occurs, that is, finding a clue, completing a task or entering another catchment.

The contents of SITREPS must be approved or written by the Team Leader.

Field teams should follow the following message format when contacting the ICP.

Who we are calling	Call sign of the ICP
We are	Your team's call sign
We are at	Grid reference plus a physical description of the location
We have found	Any relevant clues, objects not on the map, or the missing party, etc
We have done	Information about the task completed since the last transmission
We intend to	What the team plans on doing next, e.g. wait for instructions or follow footprints down the river

Example

Field team	Otaki Ops, Otaki Ops, this is Otaki Seven. Over.
ICP	Otaki Seven, Otaki Ops, Send message. Over.
Field team	The SITREP follows in four parts: <ol style="list-style-type: none">1. We are at grid reference 752, 989. More to follow. Over.2. We have found footprints heading up river. More to follow. Over.3. We have completed the first part of our task as requested. More to follow. Over.4. We intend to continue our task searching up river. End of message. Over.
ICP	Otaki Seven. SITREP received. Otaki Ops.

The operator at the ICP will confirm reception of each part of your message by saying 'Roger' or 'Copy'.

Voice procedures

Some words with specialised meanings are used in radio communication. If in doubt, use plain English.

- **Affirmative** – yes.
- **Negative** – no.
- **Over** – I've finished talking and I'm listening for your reply. (Short for 'Over to you').
- **Out or Clear** – I've finished talking to you and don't expect a reply.
- **Roger / Romeo** – information received.
- **Copy** – I understand what you just said (after receiving information).
- **Go ahead** or **Send your traffic** – send your transmission.
- **Send Grid** – please send me your grid reference.
- **Say again** – please repeat your last message.
- **Standby** or **Wait one** – pause for the next transmission. This usually entails staying off the air until the operator returns after a short wait.
- **Priority** – a message with priority over routine calls.
- **Pan-Pan** – maritime or aviation urgency call, repeated three times. It has priority over safety calls.
- **Mayday** – maritime or aviation distress call, repeated three times and at beginning of every following transmission relating to the current distress situation. It has priority over urgency and safety calls.

Phonetic alphabet

The phonetic alphabet may be used to clarify radio transmissions where necessary.

Letter	Code word	Pronunciation
A	Alpha	AL FAH
B	Bravo	BRAH VOH
C	Charlie	CHAR LEE or SHAR LEE
D	Delta	DEL TAH
E	Echo	ECK OH
F	Foxtrot	FOKS TROT
G	Golf	GOLF
H	Hotel	HO TELL or HOH TELL
I	India	IN DEE AH
J	Juliet	JEW LEE ETT
K	Kilo	KEY LOH
L	Lima	LEE MAH
M	Mike	MIKE

Letter	Code word	Pronunciation
N	November	NO VEM BER
O	Oscar	OSS CAH
P	Papa	PAH PAH
Q	Quebec	KEH BECK
R	Romeo	ROW ME OH
S	Sierra	SEE AIR RAH or SEE AIR AH
T	Tango	TANG GO
U	Uniform	YOU NEE FORM
V	Victor	VIK TAH
W	Whiskey	WISS KEY
X	X-ray	ECKS RAY
Y	Yankee	YANG KEY
Z	Zulu	ZOO LOO

Numbers

Numbers should be pronounced as below.

No.	Pronunciation	No.	Pronunciation
0	ZE RO	5	FIFE
1	WUN	6	SIX
2	TWO	7	SEV EN
3	TREE	8	AIT
4	FOW ER	9	NIN ER



Helicopters

With the increasing use of helicopters in search and rescue operations, it's important that you're fully conversant with all aspects of helicopter operation and safety. Helicopter operations can be high risk. If in doubt, ask!

Roles and responsibilities

Making a decision about using a helicopter in SAR operations lies with the Incident Management Team (IMT) and the pilot. Once that decision is made, it's the responsibility of all team members to work safely around the helicopter. You should be equipped to spend a night out even if that's not the intention.

The pilot, the Team Leader, and each team member have the following duties.

Pilot

- Overall responsibility to ensure safety.
- Calculates weight and fuel required.
- Briefs the team on requirements for the operation.
- Makes all flying decisions.

Team Leader

- Responsible for all ground-based safety decisions.
- Consults with the pilot regarding: the landing zone site selection and hazards, and weather conditions.
- Liaises with the pilot, IMT, and the team members.

Team members

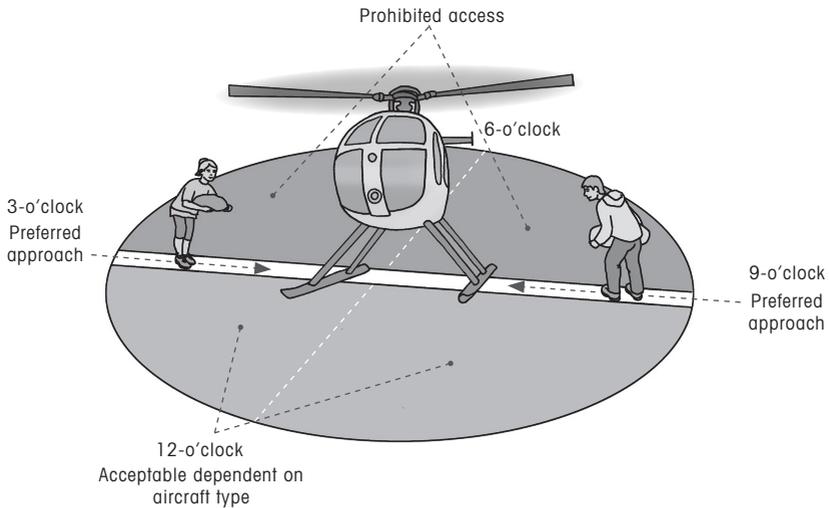
- Are trained and current.
- Have enough equipment to do the job and spend the night should conditions warrant.
- Support the pilot and Team Leader as required.

Safety around a helicopter

It's essential that all personnel who approach or leave a helicopter or its landing area are visible to the flight crew or the pilot at all times.

In the past, it's been common practice to approach from the front of the helicopter. However, with new types of rescue helicopters being used, this isn't always safe practice because some main rotor disks are much lower at the front of the helicopter.

In the interests of consistency, it's therefore better to approach from either the 9-o'clock or 3-o'clock positions **unless otherwise instructed by the flight crew on the day.**



Use safe approach angles after you have permission from the flight crew

- NOTE** ►►
1. *At no time should anyone be behind the 3 and 9-o'clock positions due to the danger of being hit by the tail rotor.*
 2. *Always wait for a thumbs up from the flight crew before approaching or leaving a helicopter.*
 3. *Put cooking stoves and fuel containers in a separate bag, hand them to the flight crew as you enter, and tell them what it is. (The flight crew will jettison this bag rather than your entire pack if they suspect a fuel leak.)*
 4. *All sharps should also be put into a separate bag, e.g. crampons, ice screws, and ice axes.*

Selecting a landing site

All helicopter landings are at the discretion of the pilot. Pilots prefer to land into the wind and appreciate you indicating the prevailing wind as the helicopter approaches the landing site. Position one visible person at the edge of the landing site with their back to the wind and arms held out at shoulder height, or use a scarf, a handkerchief, or a smoke flare.

The size of the landing site required will depend on the helicopter type and the prevailing conditions. Experienced SAR personnel can assist the pilot with site selection.

Considerations for landing sites:

- Adequate clearance for main and tail rotors.
- Clear approach and departure paths.
- Visibility (in low light situations visual marking is required).
- Loose objects are secured.

- Distance from the rescue site is minimised.
- Access to the landing site is restricted.

- NOTE ►►
1. *Unless a natural landing site exists nearby, in most cases it will be easier to have an injured person or personnel winched or stropped in and out of the helicopter rather than spending time clearing a special landing site.*
 2. *Pilots prefer to land into the wind and appreciate you indicating the prevailing wind as they approach the landing site. Position one visible person at the edge of the landing site with their back to the wind.*



Show wind direction at the landing site

Working in and around a helicopter

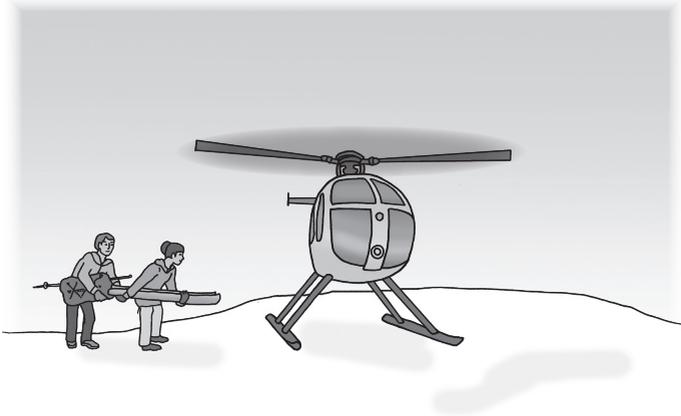
In New Zealand, several types of aircraft are used, e.g. Aerospatiale Squirrels, Hughes 500 models, BK117s, Jet Rangers, RNZAF Iroquois, Agusta 109 and NH90, Agusta Koala and the S76 Sikorsky. Although these machines are quite different, key principles apply when working around a helicopter:

- Approach and leave from the side – 9 o'clock and 3 o'clock unless otherwise instructed by the flight crew. (There are exceptions for aircraft with a very high tail rotor used for medical evacuations).
- Maintain eye contact with the flight crew and keep visual contact with the helicopter in flight.
- Approach and leave the helicopter in a crouching manner.
- One person (the Team Leader or nominee) will be in charge of loading and unloading, unless this role is taken by the pilot or the helicopter crew.



Approach and leave the helicopter in a crouching manner

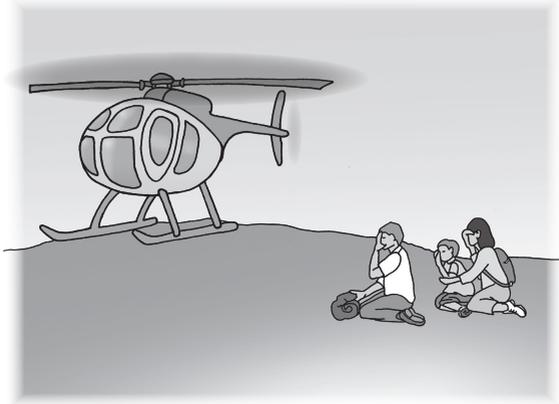
- On sloping ground, leave and approach the helicopter on the downhill side for maximum clearance.
- Carry equipment horizontally, below waist level, and never upright or on your shoulder. Remove or secure loose clothing, e.g. hats.



Keep long objects horizontal

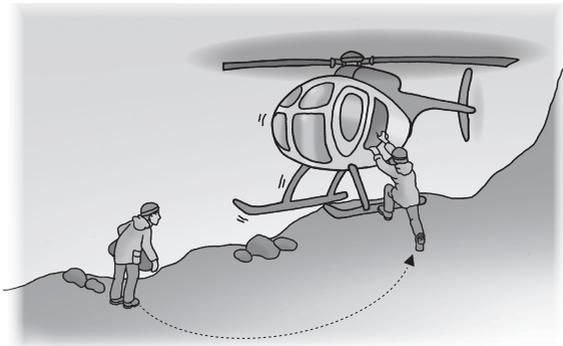
NOTE ►► *Make sure no loose items are on your pack, tighten pack straps, and fasten the belt buckle behind the pack. This will help loading and reduce instances of snagging inside the helicopter.*

- Teams being picked up or dropped off should stay well to one side of the landing site. You must be ready to board on a signal from the pilot or flight crew and be aware of rotor wash (air driven downwards by the main rotor of the helicopter). You should remain facing the helicopter but protect your eyes by crouching and covering them with a hand until the rotor wash subsides.



Kneel and face the helicopter

- If embarking onto a helicopter with one skid resting on the slope, approach from the downhill side and remain close to the front and uphill side of the helicopter frame. The reverse applies for disembarking.



Approach from downhill; board from uphill

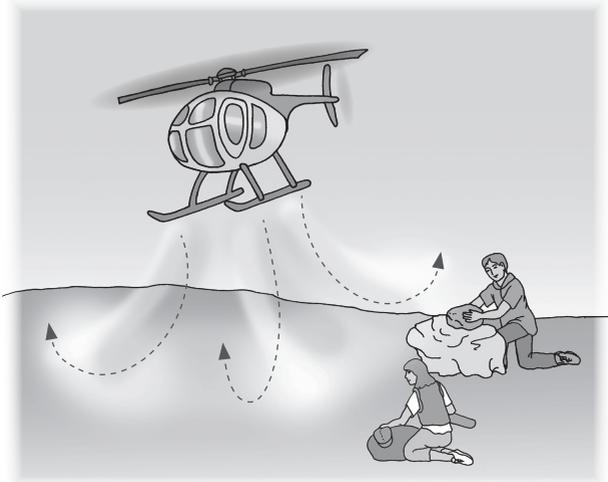
- If the helicopter is hovering, step smoothly onto and off the skid in an unhurried manner. Only one person may be on the skid at any time. Enter and exit only on a signal from the pilot or flight crew.



Move slowly and smoothly

NOTE ►► *Never jump onto or off the skid as you could unbalance the helicopter.*

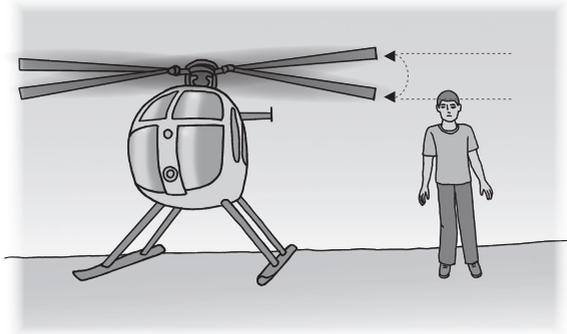
- Keep the landing site clear of loose clothing, equipment, and debris.



Secure loose articles and remove hats

- Shut down is a particularly dangerous time as the rotor will 'sail' when it loses speed and wind gusts can cause the rotor to dip to head height or lower. The same situation can result at start up until the rotor reaches ground idle speed.

NOTE ►► *Don't approach or disembark a helicopter when the rotor is slowing down or speeding up.*



A slowing rotor can dip

Briefing

It's imperative that personnel who aren't familiar with helicopter safety are fully briefed before being escorted to the helicopter. There may be occasions when you could be asked to assist the pilot or flight crew. You should:

- Explain the basic danger areas and safety rules.
- Have a competent person check and unload any firearms, and remove the bolt if applicable. Make sure muzzle is **always** pointed in a safe direction even when it's unloaded.
- Escort them to the helicopter. Keep a firm hold on children or anyone you think may panic.
- Check that their safety belts are correctly fitted and hearing protection is provided if available.
- Load their equipment after ensuring the passengers are secured inside the helicopter.
- Check that all doors are firmly secured before takeoff.

Inside the helicopter

- Keep an eye on the flight crew as much as possible so you're able to follow any directions.
- Be careful to maintain your balance and avoid bumping the flight crew, damaging equipment, or interfering with the controls.
- Remain seated with your seat belt firmly fastened at all times.
- Look outside the helicopter in order to spot any potential hazards, particularly during takeoff and landing.

- Ask for a headset if you need to talk to the flight crew (due to the noise you may have to use hand signals). Some headsets have a push button on the lead to activate the microphone; others are voice activated. Position the microphone as close to your mouth as possible. Avoid talking while the pilot is manoeuvring or the flight crew are conversing unless you need to convey a safety message that may affect the flight, e.g. wires, pylons, birds, other aircraft, and loose debris in the vicinity.

NOTE ►► *You're part of the flight crew. Don't assume other flight crew members have sighted these hazards. A good flight crew will verbalise observations of potential hazards so there is no doubt they're talking about the same threat.*

- When leaving the helicopter, re-fasten your seatbelt behind you to prevent it becoming caught in the door and banging on the frame.

Winching (human sling load)

There may be occasions when a suitable landing site isn't available and a team needs to be winched or stropped in or out of a helicopter. It's essential that the following procedures are carefully followed.

- Don't rush – cost isn't an issue.
- Move smoothly and efficiently so that hovering time is kept to a minimum.
- Make sure any loose head wear is removed.
- Once the winch cable is under load, it's very important that there is no slack introduced to the cable as they're not designed for shock loads.

NOTE ►► *Don't stand on the skid – allow your legs to dangle instead.*

- Use a horizontal thumb to signal to the flight crew that you're happy to be lifted.
- If at any stage you feel uncomfortable, wave a horizontal arm.

Winching into the helicopter

You should follow these procedures:

- Stand in the centre of the pickup zone.
- When the strop or winch cable is lowered from the helicopter, allow it to touch the ground first to earth any static charge and prevent electric shock. This is particularly important in moist conditions.
- Don't chase the hook. Let the flight crew bring it to you.
- Put the chest sling over your shoulders and under arms with the adjusting ring at the front.
- Slide the adjusting ring towards you until the sling is secure. Some slings have buckles. Adjust and clip up accordingly so you're snug in the sling.
- Attach your pack to the cargo hook preferably through straps rather than the loop as this tends to be stronger.
- When ready, give a horizontal thumbs up sign to the flight crew (with your thumb pointing backwards so that it can be seen from the air).

- As the slack is being taken up check that the cable isn't wrapped around any vegetation.
- If at any stage you wish to abort the winch, wave a horizontal arm in a rapid fashion.
- Once the helicopter has your weight and assuming you're still comfortable, give a second horizontal thumbs up. The flight crew will then commence to winch you in.
- Immediately put your arms down by your sides and keep them there at all times or you could slide out of the sling. Alternatively, hold the strop or your pack, keeping your elbows down at your sides.

NOTE ►► *Avoid holding onto the hook attachment, which could jam your fingers.*

- Periodically look up to assess your distance from the skid.
- As you approach the skid, steady any spin by placing a hand on the skid or frame so you're facing the flight crew.
- If on the way up you spin severely, place an arm or leg out into the airflow to try and arrest the spin, that is, if spinning to the left, place your right arm or leg out. This shouldn't be attempted however if you feel insecure in the sling. Closing your eyes periodically may assist with reducing dizziness.
- In a severe spin situation the flight crew may put you back on the ground or into a tree to stop this.
- Allow the flight crew to assist you into the helicopter and to stow your gear. Follow their instructions carefully.
- Keep the sling on until you are seated and your seat belt is secured.

Winching out of the helicopter

You should follow these procedures:

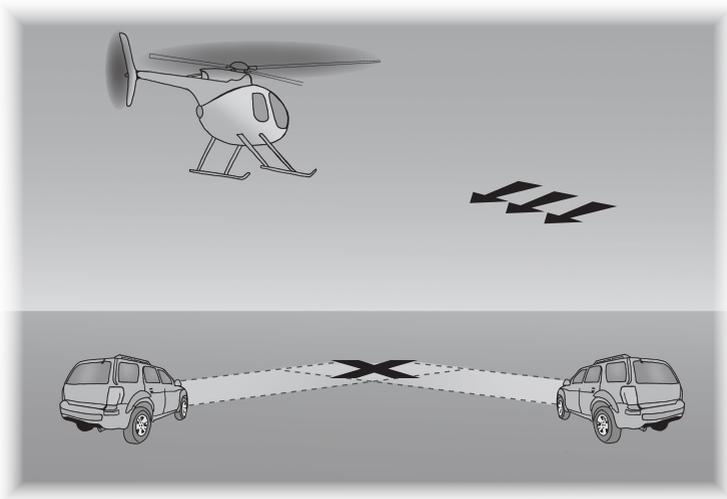
- Leave your seat belt on until the sling is firmly in place.
- Put the sling over your shoulders and under your arms with the adjusting ring to the front.
- Slide the adjusting ring towards you until the sling is secure.
- Release your seat belt and allow the flight crew to attach your pack to the cargo hook.
- The flight crew will then indicate for you to move to the doorway and sit on the floor facing outwards with your lower legs over the side.
- The flight crew will then let the winch take your weight and boom you out before winching you down/out. Let your feet dangle outside the skid or frame.
- As before, avoid standing on the skid so as to reduce the chance of any slack in the winch cable.
- You will now be lowered to the ground. Make sure you keep your arms to your sides at all times or you could slide out of the sling. Alternatively, hold the strop, keeping your elbows down by your sides.
- If you start to spin proceed as outlined above under **Winching into the helicopter**.
- If you consider your landing site to be a hazard, use the horizontal arm wave to signal this.

- When firmly on the ground with slack in the cable, kneel down and get out of the sling as soon as possible and only then remove your pack.
- When all is clear, give the flight crew the horizontal thumbs up (remember to have your thumb pointing towards the back, so it can be seen from the air).
- Monitor the cable as it is being winched in to ensure it doesn't snag on vegetation.

Night operations

Searching at night is increasingly common practice and, if you're suitably trained, you may be deployed or picked up at night by landing, hover loading, or winching. Night operations bring added dangers:

- The chances of being dropped off but not picked up are higher than normal. It's therefore especially important that team members are sufficiently skilled to get out from wherever they may end up.
- Given the reduced visibility, it's all the more important that you adhere to the basic safety rules.
- Helicopters' approach and take-off angles are steeper at night due to the increased difficulty in spotting hazards. Pick landing sites with plenty of rotor clearance and take extra care to identify hazards such as wires, poles, and loose objects. Light the landing site so the helicopter can approach the landing area from behind the light source and into the wind. Try to establish radio contact with the flight crew.



Light the landing site without blinding the pilot and flight crew

Night vision goggles (NVGs)

For night operations, helicopter flight crews are likely to be operating with NVGs which use ambient light to see better in the dark, enabling safer flight operations.

Lost subjects using a light source can be easily detected and their position pinpointed.

While they're an important tool, there are many hazards around the use of NVGs:

- Their field of view is narrow (like looking through two toilet rolls) requiring regular head movement in order to properly scan.
- There's a risk of blinding the flight crew if a bright light is shone directly at the helicopter.
- Depth perception is difficult and hazards such as wires can be impossible to see.
- Never shine a light source directly at a helicopter, nor should you illuminate any light source in the helicopter unless authorised by the flight crew.



Navigation

Navigation is an essential SAR skill – all team members should be proficient with this skill. It's a very broad field and is well covered in many excellent publications, e.g. NZ Mountain Safety Council *Bushcraft Manual*, 2010.

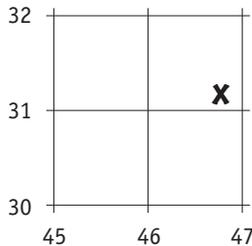
Mentioned below are brief reminders on topics that often cause confusion, plus a section on the use of GPS in a SAR operation.

Grid references

Accurate grid references are essential in a SAR operation. The base (ICP) must know where each team is whenever they call in. Much valuable time can be lost during a search when a team gives an incorrect grid reference.

NOTE ►► *Always make sure you're referring to the same map that the ICP is using.*

To give a 6-figure grid reference



The map grid reference for the point marked with a cross is 467312

1. Locate your position on the map. You may know your position if you are near a recognisable feature that is shown on the map or you may be able to triangulate from known features. Another method is to use dead reckoning – estimating your distance travelled from a known feature.
2. Take the west edge of the square in which the feature lies and read off the number of the grid line from the map (46 in the example).
3. Estimate the number of tenths east of the line to the feature (7 tenths in the example).
4. Write the number of tenths after the line number. The number in the example becomes 467. If the feature is on the grid line, add a 0 after the line number. These are the first three figures of the grid reference, sometimes referred to as the easting.

5. Take the south edge of the square in which the feature lies and read off the number of the grid line from the map (31 in the example).
6. Estimate the number of tenths north of the line to the feature (2 tenths in the example).
7. Write the number of tenths after the line number. The number in the example becomes 312. If the feature is on the grid line, add a 0 to the line number. These are the last three figures of the grid reference, sometimes referred to as the northing.
8. Combine the numbers. The six-figure grid reference in the example becomes 467312. The grid square is referred to as 4631.
9. Communicate the six-figure grid reference along with the map number and a feature if possible, e.g. a track junction or a spot height.

NOTE ►► *Instructions for obtaining grid references are on all NZ topographical maps.*

Compass bearings

It's often necessary to take a compass bearing from a feature and use it to help locate your position on a map. Because magnetic north varies from true north by approximately 22 degrees in NZ, it's necessary to convert the bearing. For detailed instructions, see Mountain Safety Council's *Bushcraft Manual*, 2010.

NOTE ►► *Although true north and grid north are not exactly the same, for the purposes of bush navigation the terms are interchangeable.*

Magnetic to grid add

To convert a magnetic bearing to a grid bearing, **Add 22 degrees.**

Degrees Magnetic	Degrees Grid
180	202
350	12
341	3

Grid to magnetic subtract

To convert a grid bearing to a magnetic bearing, **Subtract** 22 degrees.

Degrees Grid	Degrees Magnetic
153	131
13	351
341	319

- NOTE ►► 1. *When communicating bearings, always state whether they're magnetic or grid bearings.*
2. *The magnetic variation differs throughout the country and from year to year – see the map.*

GPS

The Global Positioning System (GPS) provides users with positioning, navigation, and timing services. This system consists of three segments: the space segment, the control segment, and the user segment. The US Air Force developed, maintains, and operates the space and control segments.

- The space segment consists of 24 to 32 satellites that transmit one-way signals giving the current GPS satellite position and time.
- The control segment consists of worldwide monitor and control stations that maintain the satellites in their proper orbits and adjust the satellite clocks. It tracks the GPS satellites, uploads updated navigational data, and maintains their health and status.
- The user segment consists of the GPS-receiver equipment, which receives the signals from the satellites and uses the information to calculate the user's three-dimensional position and time.

How the handheld GPS works

The unit reads signals from multiple satellites. The extent of visible sky will determine how many satellites can be 'seen', and hence sailors tend to pick up more satellites than trampers do.

The more satellites the better – generally a minimum of three and up to 12, depending on the GPS model. A wide spread of satellites gives a better reading than a condensed cluster.

Heavy rain and heavy bush canopy may reduce the satellite signals – a similar effect to 'rain fade' for satellite TV.

Grid references

The grid reference on a GPS screen is a 14-figure reference (seven digits for the easting and then seven digits for the northing) and it can be accurate to a metre. The GPS screen will indicate the accuracy.

The six-figure grid reference sent to the ICP is the middle three digits of the easting and then the middle three digits of the northing, e.g. easting 16**467**14; northing 54**312**07: the 6-figure grid reference = 467312.

- NOTE ►►
1. *Don't apply rounding when reading a 6-figure grid reference.*
 2. *Make sure you are familiar with how to convert a grid reference to a latitude / longitude reference and vice versa. This procedure will vary depending on the GPS you're using.*

Setting up your own GPS

When setting up your own GPS, it's desirable to:

- Write your name on the unit and the pouch.
- Put your name and contact details in the welcome screen (if this facility is available).
- Set to save the track log to the data card (if this facility is available) – that way you reduce the likelihood of overwriting the start of your track log.

When on a SAREX or SAROP

You should:

- Clear the track log before heading into the field and make sure the track log is activated.
- Make sure that the correct datum is in use, that is, for Topo50 use NZTM.
- Make sure you have spare batteries and you recalibrate the compass if the batteries are changed.
- Make sure that you carry the GPS so that it has a clear view of the sky.
- Leave the GPS switched on for the duration of your task (it can be switched off overnight if the task spans two days). Most GPSs will hold a signal if left on in dense bush, but may not pick up a signal if turned on in dense bush. If camping in the bush, allow at least 30 minutes for the GPS to get a signal before starting in the morning.

Finishing

Before you finish, make sure that:

- Your data is downloaded (if required) before leaving the ICP. Management will use this information to locate gaps in the area searched.
- You've retrieved your own GPS or handed back the group-issued GPS before heading home.

NOTE ►► *The GPS is a very useful tool but it doesn't remove the requirement for ensuring that you're aware of your location. Map and compass skills are the backbone of the navigation skills you require.*



Searching

Searching is a team effort: the Incident Management Team (IMT) plans where you should search and skilled search team members do the searching. You're the 'eyes and ears' of the Operations Manager, gathering information that is part of the jigsaw puzzle the IMT is trying to solve.

This information may come from:

- Family, friends, and colleagues.
- Land owners and members of the public.
- Clues discovered in the field.
- Lack of clues, which is also of high value.

Who are we looking for?

Lost Person Behaviour

Lost Person Behaviour (LPB) data comes from the study of people who have gone missing and / or have been lost. Sets of statistical data have been compiled recording the actions of different groups or types of lost person. These give information on matters such as the average distance travelled and the direction of travel, based on the characteristics of each group or type of missing person.

LPB deals with generalities and not absolutes and therefore is a useful tool for the IMT in the initial planning of a search, e.g. reflex tasking, while a profile of the missing person or party is being developed.

Profiling

Profiling is the gathering of information specific to a particular person. It's built up during the course of the search.

Some 'lost persons' aren't lost in the traditional sense of not knowing where they are and being unable to reorient themselves. Instead, they choose to be missing or they're simply overdue:

- Runaways, despondents, and dementia sufferers may not want to be found.
- Overdue trampers and hunters may be delayed by the conditions. Sometimes, they may take a wrong turn but remain capable of walking out of the bush themselves.

On the other hand, some groups are lost, and a solo trumper or hunter may be immobilised through injury.

Because there are behavioural characteristics commonly associated with each type of missing person, profiling a missing person is useful. This considers both mental and physical characteristics.

Missing person matrix

Using lost person behaviour data from the missing person type and minimal profile information, the Planning / Intelligence Team can place the missing person in one of four matrix positions to help decide what reflex tactics to use and what resources may be required.

The missing person may be categorised as mobile or immobile, and responsive or unresponsive. Where they fit at the beginning of a search is often quite different from what the built-up profile suggests. What IMT do get is a tool to focus their thinking on what they know at the time.

	Mobile	Immobile
Responsive	MR	IR
Unresponsive	MU	IU

You could be searching for any of the following.

Missing	Characteristics
Hunters or trampers	They could be experienced or inexperienced
Accident victims	Including vehicle accident victims, rafters, canoeists, kayakers, windsurfers, boaters, fishers, hunters, cavers, hang gliders, climbers, and trampers
Children	Including runaways who may not want to be found
Elderly people	They may be confused or not want to be found
People who are mentally disturbed, suffer from dementia, or have an intellectual disability	They may be irrational and avoid being found, or may not realise they're lost
Suicide victims	It's often not known whether the missing person is a potential suicide victim and they're always assumed to be alive unless proven otherwise
Homicide victims	Usually, you'll be searching for items of clothing or a weapon under Police guidance
Criminal evidence	Usually, the Police will give you clear guidance
Aircraft, boats, cars, or wreckage	

The Operations Manager will structure the search according to the circumstances and the possible behaviour of the missing person.

While you're searching, the Police, the Planning / Intelligence Manager, and the Operations Manager will be collecting more information about the missing person from friends, relatives, workmates, and the public. This may change the focus of the search, the areas of high probability, and the search methods.

Any search has the possibility to involve foul play which isn't evident at the beginning, so treat evidence and clues with this in mind until proved otherwise.

The bike wheel model



The bike wheel model shows the initial response

The bike wheel model is a tool that simplifies the initial response (or reflex tasking). The parts of the model are outlined below.

Part	What is it?
Axle	The axle represents the initial planning point (IPP). This is usually the last known point of the subject (LKP) or the point where they were last seen (PLS). The IPP is the point from which all search planning is conducted.
Hub	The hub represents the area immediately surrounding the IPP. Extensive searching of this area will usually occur to find either the subject or clues.
Rim	The rim represents the maximum statistical distance that 95% of all previous subjects of this type have been located within.
Spokes	The spokes represent the linear travel routes or 'travel corridors' that lead away from the IPP. These will usually be searched quickly by small, skilled teams. Travel routes may include paths, roads, drainages, and ridges.
Reflector	The reflector represents locations that the subject may be drawn too, e.g. hunters to clearings or trampers to scenic locations. Reflectors may also represent known hazardous areas or locations where subjects have previously been located.

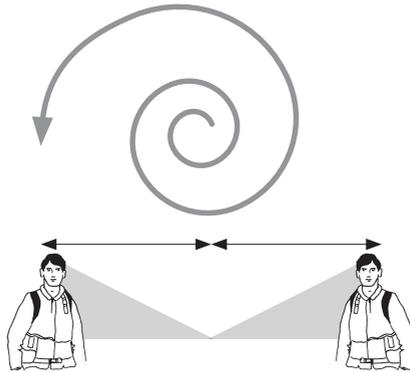
How to search

Critical separation

This is a method of determining the suitable spacing between searchers in a visual ground search. You can determine critical separation by a procedure called the Rain Dance.

The Rain Dance steps are as follows:

1. Select an object that's similar in size to the object you're searching for.
2. Place the object in terrain similar to that in which you'll search.
3. Walk around it, spiralling outwards until the object is on the edge of your peripheral vision.
4. Double this distance for the spacing between searchers – the critical separation. This ensures a good probability of detection from one or both the searchers on either side of the search object using their peripheral vision.



Determining the critical separation – the spacing between searchers

NOTE ►► *This should be used as a guideline when setting up the search, but it may need to be altered during the search, e.g. if the bush becomes more dense and you can't see as far.*

Using your eyes

Where to look

An area is usually searched physically but, in some cases such as open country, an area may be visually searched from a vantage point.

NOTE ►► *Sometimes cannabis areas are booby-trapped. If you come across a cannabis area, leave the way you came in. Watch for trip wires, sharpened stakes, or covered holes. Inform the base (ICP) of its location.*

What to look for

Be observant: look for clues such as:

- Camp sites or shelters.
- Flattened or broken vegetation.
- Footprints or scuff marks.
- Clothing.
- Blood.
- Notes or signs left by the missing person.
- Hut book entries – use a digital camera, particularly during reconnaissance flights when time is limited.
- Discarded equipment.
- Places where the missing person may have left the track or river.

NOTE ►► *Don't forget to look for the missing person as well.*

You should report to the ICP any areas such as pools and cliffs that you're unable to search adequately or safely.

TIP ⤴ *Use binoculars for looking in close, e.g. when looking through the bush and underneath it when you can't see clearly, as well as when looking into the distance.*

Remember when reporting your PODs to consider the three categories of factors that will impact on how well you observed your search area:

- Searcher factors.
- Environmental factors.
- Subject object factors.

Communicating

Talk to people

If you come across people during your search, check that they're not the missing party – some missing parties may not be aware that there's a search underway for them.

Report to the ICP the fact that you've met people, the areas they've travelled, and the people they've met and seen.

TIP ⤴ *If possible, ask the people to wait while you contact the ICP in case the Operations Manager needs more information from them.*

Before they go:

- Record their contact details.
- Ask them to record the details of any people they meet.
- Ask them to contact the Police or the ICP should they see or remember anything later.
- Tell them where the ICP is and how to contact it.

Be noisy

Where appropriate, call out the name of the missing person or use a whistle (block your ears) and listen for replies. See the **Sound Line** section for information on being systematic.

TIP  *If you're searching for children or people with an intellectual disability, don't sound aggressive or do anything that may frighten them. A command such as "Bill, come here" may be more effective than calling out just their name. Consider using women to call out.*

Track and Clue Awareness

All searchers should have at least a working knowledge of Track and Clue Awareness (TCA) so they don't contaminate areas. However, TCA requires specialised training and many hours of practice.

The use of searchers trained in TCA techniques can provide information that determines the:

- Direction of travel (DOT) of the missing party.
- Areas of high or low probability.
- Areas where no one has been.

These searchers may also be able to track and find the missing party.

What is TCA?

Every person who moves through the bush or over any terrain leaves small clues of their passing. One USA estimate is that a person leaves at least 1250 pieces of evidence in every kilometre walked. We may see these pieces of evidences but, unless we're trained, we may not identify them as clues. Trained people can examine these clues and determine a direction of travel.

They may match tracks against the missing person's footwear if that's known, and they may use clues such as toilet waste to help determine who has travelled that way.

NOTE  *A lack of sign is just as important as finding physical clues. If there's no sign of anyone having been there, the area may be given a lower priority.*

Assess clues

Teams should report their own assessment of the relevancy of a clue in relation to the missing person, e.g. on a scale of ten, one being of no relevance to the missing person and ten being physically attached to the missing person.

This assessment is invaluable to the IMT.

Types of sign

Bottom sign

These are clues at ground level, and include:

- Broken twigs or branches
- Broken seals, e.g. stones indented into a track
- U bolts – broken twigs sticking up
- Bruised vegetation
- Disturbed vegetation
- Toilet waste
- Shine and shadow
- Compression
- Straight lines
- Flattening
- General disturbance
- Discarded articles
- Transfer of dirt etc to other surfaces such as rocks
- Transfer top and bottom
- Blood
- Pattern
- Shape and outline patterns
- Dislodgment
- Degraded items
- Campsites and rest spots
- Water collection and washing sites
- Footprints

TIP  *To mark bottom sign, you can make effective clue markers from brightly painted ice cream sticks or bamboo skewers, or you can improvise with sticks or stones.*

Top sign

These are clues above ankle level, and include:

- Bruised or scuffed vegetation
- Re-positioned vegetation (swept) pointing in the direction of travel
- Broken twigs or branches
- Lighthouses (upturned leaves, twigs, or branches)
- Tension and release
- Transfer of dirt etc to other surfaces
- Discarded articles
- Possible hand prints
- Missing dew or rain

TIP  *To mark top sign in the bush, use toilet paper.*

Clue processing

NOTE  *You must manage the area around any significant clue such as a hut or vehicle in order to preserve any sign for analysis by trained people.*

It's critical that the direction of travel of the missing party is established, which is why preserving the area is so important.

Controlled entry

To preserve an area for future inspection, search teams must cordon off the area by whatever means are available.

TIP  *The use of trail tape is ideal and can be written on with a marker pen.*

You should:

- Clearly mark and define entry and exit points.
- Limit access to authorised people only to ensure that it doesn't become contaminated.
- Mark a trail around the area.
- Make sure that people entering the area follow the same path to make sure they don't disturb clues.

Sign cutting

When a piece of evidence is found or a decision point is identified, sign cutting is a procedure used to process that clue or 'hot spot'. The terms 'to cut sign' and 'to sign cut' are also used to mean the same thing.

Sign cutting technique is often used to establish:

- The direction in which the missing party has gone (DOT).
- The number of missing persons.
- Special characteristics of a missing person, e.g. if they're injured.

Methods

There are various methods, the main one being the Standard Circle Pattern around a clue or decision point. This involves searchers methodically circling a clue or decision point four times (clockwise looking in, anticlockwise looking in, clockwise looking out, and anticlockwise looking out).

Other methods include:

- Expanding and collapsing circle patterns.
- Vehicle processing.
- Perimeter sign cutting.
- Zigzag pattern.
- Feature sign cutting.

NOTE  *Remember STOPPER:*

- **Stop:** physically stop – rushing in may miss things.
- **Think:** concentrate on what's happened.
- **Observe:** place sign in the context of the whole operation.
- **Plan:** with your team, choose your route that's least likely to contaminate the evidence, and choose the best sign-cutting methods for the situation.

- **Process:** implement a systematic process.
- **Evaluate and collate:** evaluate the information and put it all together, and then come up with some conclusions as a team.
- **Record and report:** first identify the facts, and then add your opinions separately.

TIP  *Sign cutting requires experienced personnel, so report your find and make sure the site isn't contaminated.*

Footprint communication

Searchers need to communicate footprint clues to the ICP, including the particular sole pattern.

Tracing the print onto acetate is the most common means of recording and communicating a footprint clue. The acetate is also used as a template for identifying sign on the ground. It helps you:

- Sort through multiple prints in an area by holding it over print sign for comparison.
- Identify the parameters of the sign.

However, as cellphone coverage and quality improves, we can expect cellphone photographic communication of prints to become common.

NOTE  *Photographs must include an object that gives scale, a ruler being the ideal but anything of a known length will do, e.g. a radio or a GPS.*

Clock method

You can communicate key characteristics of prints by voice via cellphone or radio using the 'clock method'. The method assumes that two clocks are superimposed on the print – one on the front section (sole) and another on the heel section.

Four pieces of information are communicated for each shape found:

1. L (left) or R (right).
2. S (sole) or H (heel).
3. A number from 1 to 12 indicating the clock position for the shape.
4. Shape description, e.g. a star.



The clock method is used to communicate footprint clues

Toilet sign

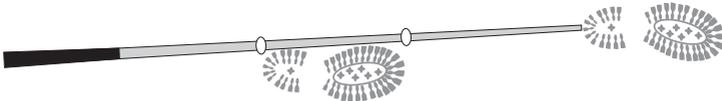
Males and females tend to have different toilet habits and toilet-related sign can provide information on who's been there. The privacy of the toileting area, the direction the person faced, the spread of the waste, the effort made to cover the waste, the presence of additional paper products and items, and any bodily by-products may help determine whether the sign was made by a male or a female.

Tracking stick

A tracking stick is a stick with adjustable rings which enables you to record a person's footprint and stride length. It could be a walking pole or a tree branch, as long as it can record lengths.

Before it's used, a tracking stick must be calibrated. Place rubber bands or similar markers on the stick to represent the lengths of the missing person's footprint and stride.

- NOTE ►►
1. *The footprint length is equal to the distance between the inner edges of the markers on the stick.*
 2. *When you find a footprint, search for the next footprint in a 10–2 o'clock range.*



Calibrate a tracking stick before it's used

Ageing

Ageing is the discipline of determining whether the sign is old, new, relevant, or irrelevant.

Factors that affect ageing are human, mechanical, e.g. vehicle or bike tyres, weather, animals, and biological decay and healing.

Ageing is most useful when expressed relative to natural events (timeframes) such as rainfalls, frost, tides, or snowfalls, e.g. you may be able to determine that:

- Footprints were made after a snowfall or after a period of rain because they're clearly imprinted.
- A twig was broken before the last fine period because it's discoloured inside the bark.
- Discarded food scraps are inedible, indicating they weren't discarded on the day you've found them.

TIP ►► *Look for more than one piece of evidence, compare the clues, and average the age of different clues.*

Comparison is a powerful tool to help you age what you're looking at. To age the end of a broken twig, snap it further back from the break and check if there is a colour difference. Place a footprint on the same ground as a print and note possible differences.

Decision pointing

A decision point is a place where a lost person has to make a decision on which way to go. These decision points are often at track junctions or a spur off a ridge. Making the wrong decision can cause a person to go off route. Many wrong decisions are not conscious decisions.

Decision points on the ground will differ depending on whether:

- You're travelling in the same or the opposite direction as the missing party.
- The missing party was travelling during the day or the night.

TIP  *A person who makes one wrong decision at a decision point is likely to make some further wrong decisions at subsequent decision points.*

Search methods

There are various search methods, each suited to a different situation.

NOTE  *Whichever method is used:*

- *Searchers should be aware that you may work with a dog team, or a dog team may later search the area you've been in. See **Chapter 11** for more information on SAR dogs.*
- *Team Leaders should concentrate on managing and not doing.*

Purposeful Wandering

This method is used to look for clues or unresponsive subjects in areas of high probability.

Teams

Purposeful Wandering teams often consist of six or nine people, depending on terrain and conditions.

Depending on the terrain, searchers may need secateurs and leather gloves, gaiters, and leggings for protection.

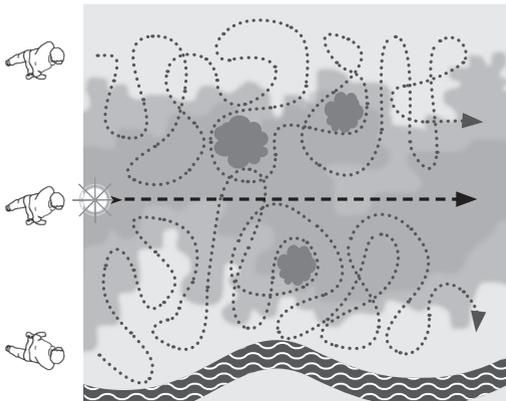
Technique

Key aspects of the technique are:

- The team consists of two or three sub-teams, each sub-team with one compass bearer and a searcher on either side – see the diagram on page 54.
- The spacing between each searcher depends on the openness of the terrain and must enable adjacent searchers to communicate with each other and the compass bearer to ensure all areas are thoroughly covered. It's preferable to overlap slightly rather than risk missing areas. Although the line doesn't need to move forward in unison, it's important that searchers continue to be able to communicate with each other.

- While the people with compasses follow the bearing, the searchers on each side of the compass bearers are free to wander and search within their area.
- While compass bearers are chiefly responsible for the navigation, they should also visually search the areas close to them.

NOTE ►► *The Team Leader and compass bearer/s must make sure that the two wanderers do their job well and that the Team Leader doesn't get drawn into actively searching.*



Purposeful Wandering is often used in areas of high probability

Sound Sweep

Sound Sweeps are for searching large areas during the day. Usually they will find only a conscious person who wants to be found.

Teams

Normally teams comprise three or four searchers. Each searcher should ideally have a handheld radio, a whistle, and a compass.

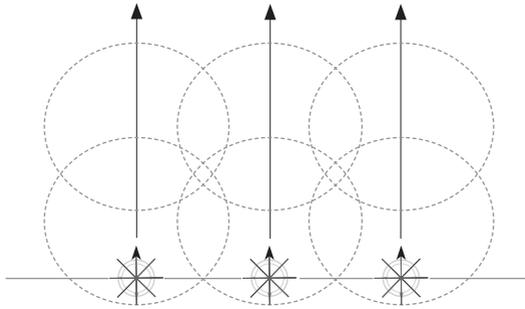
Technique

The Sound Sweep technique is systematic:

- The spacing between each person will be about 50 metres but it'll depend on various circumstances, including the terrain.
- Because of the distances involved, each searcher should have a handheld radio. If some don't, position them between those that do and make sure someone is responsible for passing instructions to them. Especially make sure they're given any instructions to regroup or they could get lost. In difficult terrain, it may be better to divide into smaller groups, each with its own Team Leader.

- Every 50 metres or so, the Team Leader instructs the team to stop. Each searcher then blows their whistle or calls out on a predetermined signal, e.g. "One, two, blow." They then remain still and listen carefully for any response from the missing person.
- If a response is heard nearby, the closest searchers should investigate. If a distant reply is heard from an uncertain direction, the line should move forward and the process repeated until a definite location is established.

TIP  *Block your ears when you whistle or you might be deafened and not hear a reply. Also turn your radio down.*



The Sound Sweep technique is systematic

Sound Line

Sound Lines vary from Sound Sweeps in that they usually follow a lineal feature such as a track, stream, or ridge.

Teams

Teams should comprise three to five people and line up along the stream, track, or ridge behind the searcher with the best TCA skills. The Team Leader should be in the middle.

Each searcher should ideally be equipped with a handheld radio and a whistle.

Technique

The differences from a Sound Sweep are:

- If you don't start your search at a definite feature such as a track junction, mark your start and finish points clearly with strings, markers, or notes so other people can determine the areas covered. Record your grid references at your start and finish points.
- Team Leaders of nearby teams should agree on whose responsibility it is to search adjacent areas to make sure that no area is missed.
- The spacing between each person depends on the thoroughness required, the terrain, and the people involved.

- If insufficient handheld radios are available, the team members take their lead from the Team Leader's whistle blasts. The Team Leader should give a short whistle blast when in position.
 - Each team member then counts to five before giving a full whistle blast.
 - If a searcher establishes contact with the missing party, they should give three short blasts.
 - If there's no contact, the Team Leader gives two short blasts to signal to the team to move forward.
 - Other signals may be established within the team if necessary.
- The searcher in front should mark their position so that the following searchers can stop at the correct place for the next sound burst. If no response is heard, the line moves forward until the rear person has passed the point where the front person was for the previous blast.
- If a response is heard nearby, the closest searchers should investigate. If a reply is heard from an uncertain direction, repeat the process from a slightly different position until you establish a definite location.



Sound Lines usually follow a lineal feature

Sound and Light Line

This is a variation on the Sound Line and is used at night.

Technique

The technique's the same as for a Sound Line, but the searchers also shine torches on the bush canopy to attract the attention of the missing party.

TIP  *Waving the torch in a figure-of-eight motion is the most effective method.*

Contact Search

This is a very detailed search method used as a last resort or in special circumstances, e.g. evidence gathering for the Police or when searching for an immobile and unresponsive person. It's only used in defined areas of high probability as it requires many searchers and much time to cover even a small area.

Environmental techniques

Some environments require special techniques.

Searching coastlines

NOTE  *The safety of the team is your first priority.*

Make sure you know the tide times and keep a close eye on waves and the tide. Be aware that a rising tide may trap a search team.

On a coastline search, you could be looking for a body or boat wreckage, either in the water or washed up on shore. You could also be looking for a person who has swum ashore, made it to above the high-water mark, and moved inland. Look for areas or signs where this may have happened. Similarly, a flooded river may have deposited a body or clues at a higher level than its current level.

Technique

The person directing the search follows the waterline with the other searchers in a line at right angles to the coastline.

Depending on the terrain, you may be able to search some areas from a distance, while gaps and holes in rocks and bushy areas above high-water mark may need thorough checking. In some cases, it may be necessary to zigzag across the area to ensure thorough coverage, while in other cases you may have to do two or more sweeps.

There may be rocky outcrops offshore or other areas that you can't search. Note these and inform the ICP so they can be searched at low tide or from a boat.

TIP  *Make sure you also check out to sea.*

Night searching

It's often necessary for a search to be started at night. The missing party is far less likely to be moving around then and may be alerted by the light from torches. However, areas searched unsuccessfully at night usually need to be searched again in daylight.

All searchers should be familiar with night searching. However, some people may not feel comfortable with searching at night for a variety of reasons.

Searchers should have at least two torches. Some torches are better than others, and it's a good idea to test several types. Make sure you have plenty of spare batteries and bulbs.

Torches held low and shone across the ground will sometimes pick up footprints and other clues not normally visible during the day.

NOTE ►► *It's essential that night searchers take extra care to avoid injury.*

Searching lineal features

Lineal features include tracks, ridges, and streams.

Technique

This is similar to the Purposeful Wandering technique. However, the person directing the search stays on a lineal feature – on the track or ridge, or beside or in the stream – with the other team members on either side.

The critical separation depends on the terrain, visibility, and the Operations Manager's instructions. Normally, you should be close enough to be able to thoroughly check the area. There may be areas where the terrain closes in, making it impossible to remain spread out for a time. When the terrain allows, you should reorganise the line.

Suburban searches

Many SAR operations occur in urban or suburban areas. Missing persons are commonly small children, dementia sufferers, or people with an intellectual disability.

Searchers need to take considerable care to check out the numerous nooks and crannies in a built-up area. This may include house-to-house enquiries and, possibly, property checks with residents' or Police permission. If a resident asks you to leave or is threatening, leave immediately. Questioning residents or other members of the public is best done by people who interact with people in their work, e.g. the Police, sales people, nurses, and call centre staff.

There are so many potential clues in a suburban search that you need to be clear on what you're looking for and how to record and report your findings.

NOTE ►► *Be wary of dogs, especially on private property and, if confronted by an aggressive dog, don't run or make a sudden movement.*



Rescue

A rescue is all the SAR actions following the finding of a missing person until they're evacuated safely and receiving medical care if required. Occasionally, this includes the removal of a dead person.

Many rescue situations are solved by specialised resources. However, LandSAR teams must be up to speed with rescue options.

The entire process of a SAR operation (locating, reaching, stabilising, packaging, and evacuation) must be based on training and planning. Every rescue should have the same underlying structure as that used on a search. The 'six-step process' provides a reliable means to organise thinking and apply field management principles. This process is a tool that can be combined with CIMS, and involves six steps that are repeated virtually every operational period.

The six-step incident response process

The six steps are:

1. Size up the situation – what's the nature of this rescue?
2. Identify contingencies – what could happen to make the situation worse?
3. Determine goals and objectives – what and by when?
4. Identify required resources – what resources are needed and what is their availability?
5. Build a plan and structure – complete a Rescue Action Plan.
6. Take action – deploy existing resources and obtain sufficient expertise, personnel, and additional resources as required.

Rescue Action Plan

Planning is the key to effective rescue and, to carry it out effectively, some planning must begin immediately after the first notice of the search. Alternatives must be constantly analysed and revised. Contingencies are based on factors such as:

- Elapsed time since the operation began.
- Possible missing party locations or likely spots.
- Weather and associated environmental hazards.
- Availability of specialised resources.
- Reported changes in the patient's condition.
- Medical resource availability.

Completing the Rescue Action Plan (RAP) is the responsibility of the Operations Manager. The Rescue Action Plan will draw information from the area pre-plan and detail personnel skills and resources. (Pre-plans outline local area SAR information).

Building the Rescue Action Plan

The core elements of rescue / recovery can be arranged into the six-step response process outlined above.

1. Size up

This is the total information gathering process about a situation in order to affect an efficient rescue or recovery. Through pre-planning and the Vulnerability Assessment, the Operations Manager should have identified not only potential problems and environments but also the whereabouts of any specialised resources to solve those problems.

Size up should be ongoing, starting even before the notification of a find and is linked to the next phase.

Information is needed about the:

- Missing party.
- Environment, e.g. terrain, hazards, and weather.
- Availability of resources at the missing party's location.

NOTE ►► *This information would have been gathered by the management team.*

Beyond special situations that require an accelerated rescue, conventional evacuation of an injured or incapacitated person involves stabilising that person, packaging for safe transport, and evacuation or transport out.

Notification of the base (ICP) should take place immediately on contact with the missing party. A status report is essential to begin planning for potential resources needed for an evacuation. Much will depend on the condition of the patient.

Status usually refers to one of the following:

Status	Requirements
No injury	Able to walk out on their own
Slight injury	Able to walk, although they may need some assistance
Major injuries	Needs considerable assistance including immediate evacuation (consider seeking medical advice)
Deceased	Seek Police direction

2. Identify contingencies

Identify contingencies immediately when the notification of the missing party's whereabouts and condition comes in, e.g. unhurt, injured, or dead. The notification that the missing party has been found changes the incident from a search to a rescue or recovery. Is speed a factor in evacuation? Safety factors for the team members must

always dictate specific strategy and tactics in rescue. Daylight or visibility is a major factor.

3. Determine goals and objectives

Determine goals and objectives that are based on an on-scene assessment (time critical, weather factors, air support, patient condition).

4. Identify required resources

This is a planning stage where resource expertise and capabilities are identified, or other resources are contacted for support. If the terrain and environment dictate, this probably should have been detailed early in the operation. (See the Pre-plan).

5. Build the Rescue Action Plan and a structure

After choosing one course of action, at least two alternative plans should also be formulated. Whatever plan is chosen should be flexible.

- Four elements (reaching, stabilising, packaging, and the haul out) should be considered simultaneously.
- If carryout is required, consider the manpower that will be necessary. (Carrying a stretcher isn't easy and requires a lot of people).

6. Take action

This is doing the job. The actual rescue / recovery phase is based on the previous planning steps.

- This step has its own technology and many references are available relating to the skills and techniques that may be required.
- This phase is often the most dramatic and highly publicised.

When the missing party is found

Rescue site management

Rescue site management is the responsibility of the Incident Management Team (IMT) and its success depends on good management, delegation, and communication.

The Team Leader of the team that finds the missing party assumes a leadership role unless or until someone else is appointed. The Team Leader becomes the Sector Supervisor.

NOTE  *It's important that the Sector Supervisor establishes their authority with the other teams as they arrive on the scene. They should determine if there are any specialist skills within teams that arrive on the scene and use these to the best advantage.*

Priorities

The priorities are:

1. Team safety

The safety of the team is your first priority.

2. Missing party / patient safety

Make sure that nothing you do will worsen the condition of the patient.

3. Delegation

As many tasks as possible should be delegated.

4. First aid and patient care

Delegate the Nominated Field First Aider/s to prioritise and treat all urgent injuries and to arrange patient care. The LandSAR casualty assessment form is a good guide.

5. Communication

Delegate the Radio Operator to send relevant details as soon as they're available.

6. Evacuation

Delegate

It's important that the Team Leader delegates all tasks wherever possible. Obviously, the number of people available will dictate how much can be done straight away – therefore it's important to prioritise. As more teams arrive on the scene, there will be more people available to take care of other jobs.

Delegate team members to the following tasks where necessary (give clear instructions and make sure your instructions are carried out):

- Nominated Field First Aider.
- Patient Minder.
- Radio Operator.

NOTE ►► *As more teams arrive, insist that their radios are shut down unless required for logistics within the group and that all communications with the ICP are through this operator. The Radio Operator should stay in touch with the Team Leader at all times.*

Communicate with the ICP

You should communicate:

- An initial message to the ICP (found missing party and your location). If the missing person is found dead or near death, see the section on **Death or dying**.
- Further details once established.

Monitor the site

You must ensure:

- The ongoing safety of the missing party and the teams.
- That correct first aid procedures are being used.
- The patient is being correctly cared for.

Further assess the situation

You should:

- Determine the best method of evacuation, e.g. helicopter, overland stretcher, or walk the missing party out.
- Determine if any other equipment is required for the evacuation, e.g. stretcher, ropes, axes, sleeping bags, blankets, and medical supplies.
- Determine if any specialist personnel are required for the evacuation, e.g. alpine cliff rescue team or medical.
- Determine whether more personnel are required at the site.
- Ensure that full and correct details of the missing party's condition and evacuation requirements are transmitted to the ICP.
- Determine whether immediate evacuation is possible or if you are likely to be at the site for some time, e.g. overnight.

Delegate further tasks

The Team Leader should delegate the following tasks:

- Route finding.
- Track clearing for the evacuation.
- Setting up shelter.
- Setting up camp for the night
- Caring of the patient's property.
- Guiding for incoming teams.
- Preparing the helicopter landing site.
- Preparing the stretcher.
- Preparing drinks and meals.

Long-range planning

If the evacuation is delayed, the following planning will be required:

- Setting up camp for the night.
- Caring for and monitoring an overnight missing party.
- Looking after the team's welfare – food and drinks, shelter, and warmth.

Team welfare

Make sure all team members are adequately clothed and fed, especially if the evacuation is likely to take some time.

- Consider stopping for a meal or snack. The welfare of the team is just as important as that of the missing party and will have to be weighed against the urgency of the situation.
- Keep an eye on team members. People in a rescue party often push themselves beyond normal limits. Consider giving lighter duties to those who are showing signs of strain or fatigue.

Death or dying

There's sometimes a chance that the missing person may be found dead or dying, either as the result of an accident, foul play, or suicide. If this is the case, the correct procedures are essential. If the missing person is dead or dies later, you'll probably be required to testify in a Coroner's Court. It's also possible that other people may be involved.

Sometimes a team will have a Police Officer as a team member. If so, they will take charge of the scene and, from that point, the Team Leader and team members must follow Police instructions.

If the missing person is dead or dying, observe the following procedures:

Initial action

NOTE ►► *The safety of the team is your first priority!*

You should:

- Stop the team where it is.
- Treat the death or injury as suspicious.
- Instruct one person only to approach the missing person close enough to establish death or the extent of injuries. In some cases death will be obvious from a distance; in others you must check for vital signs.
- Administer first aid to the best of your ability.
- Keep the missing party warm, comfortable, and reassured.
- Avoid trampling the area: disturb as little as possible. Should foul play be involved, it's essential that evidence is left untouched.
- Have non-essential members of the team move away from the scene along the same route they took when they approach the area, disturbing as little as possible.
- Secure the area around the missing person or the body to prevent other teams, the news media, or the public from disturbing the area.
- Start a log detailing all your actions and the times involved.

Radio procedure

Remember that there could be family members or friends of the victim at the ICP or in another team, so discretion is vital.

- Call up the ICP, e.g. "Huia Ops, Huia Ops, this is Huia 1. Over." The first message should be: "We have a message for the Incident Controller, over."
- Transmit details only as prompted by Ops.

Local groups may use their own codes. These need to be agreed upon by all involved before the search. In the absence of an agreed code, you may wish to use the standard Police code.

Police code

TIP  *It's preferable to use the standard Police code when transmitting messages. For a sudden death, use 1 S (One Sierra), e.g. "We have found a One Sierra."*

Situation reports

Radio in frequent situation reports (SITREPS) detailing:

- The patient's condition.
- The party's location and progress.
- Requirements.

Working with a conscious patient

You should:

- Write down everything that the patient says in their own words. Don't put words into their mouth. Write down all questions and answers.
- Comfort the patient, but don't offer false hope.
- Ask what happened, when, how, why, and who else was involved.
- Avoid offering your theories.

Other considerations

- If third parties are involved, don't question them other than to seek a history of the injuries in order to aid treatment.
- Record accurately all relevant details and your observations.
- If you disturb the body or scene in any way, it's important that you record details and advise the Police.
- Record the names and details of all people present including team members and members of the public.
- Make a note of any other people or vehicles in the area.
- If a possible suspect is present, don't question them.
- If possible, photograph the scene and give the film or files to the Incident Controller on your return to the ICP. They may be used at a subsequent Coroner's Court hearing.

Crashed aircraft

NOTE  *Don't place yourself or your team in any danger – take time to properly assess the situation before rushing in.*

You must:

- Avoid the risk of fire.
- Only move wreckage to save lives. All crash sites will be investigated in minute detail.

- Secure the site to keep members of the public away.
- Save any papers or logbooks found in or near the aircraft.
- Be extremely cautious when dealing with military aircraft because they may be carrying weapons and they may have ejector seats fitted.
- Establish if there are any other missing or injured people involved.

You may need to discuss things with other team members before organising the site.

If a member of the Police is in your team, they'll take responsibility for the crash site.

Evacuation options

Method of evacuation

Remind searchers that they're now rescuers and the safety as well as the comfort of the missing person is paramount.

NOTE ►► *Don't be reluctant to call for medical assistance and advice.*

After the patient has been stabilised, it's always a good idea to remind team members of several basic points during the packaging phase of the operation to ensure patient comfort:

- If conscious, put something in their hands to hold.
- Apply pressure to and support the bottom of the feet. The stretcher will inevitably bump and jolt the patient and being able to flex uninjured legs could well help to ease the discomfort.
- If the patient is conscious, make sure that they can see. Protect their eyes during events like a helicopter hoist and high-angle extraction.

NOTE ►► *In some cases, the patient's injuries or condition may be such that it's necessary to camp to stabilise their condition before they can be evacuated. This is often the situation with severe injuries when air evacuation isn't possible due to bad weather.*

While each of these presents unique problems to the team member in the field, the Team Leader's job may change very little. Proper use of specialised resources is the key factor in each case.

Air evacuation

Also see **Chapter 6: Helicopters**.

For severely injured patients, helicopter evacuation is the most common method. It enables swift and comfortable evacuation and enables the patient to get urgent medical attention.

Give very accurate details of your location. Include grid reference and terrain description. Also include any local hazards, e.g. overhead wires.

Water evacuation

You must:

- Make sure the safety of the patient and team members at all times.
- Make sure the vessel has safe access to the landing point.
- Give very accurate details of your location – include a grid reference, terrain description, and any local hazards, e.g. submerged rocks.
- Make sure you're visible by means of smoke flares, strobe lights, bright clothing.

Land evacuation

This could be by four-wheel drive vehicle, ATV, or by stretcher – see the section on **Stretchers**.

Consider the:

- Safety of the patient and team members.
- Time and manpower required.
- Patient's injuries and comfort.
- Terrain, rivers, and weather.

By walking out

If the patient's injuries are relatively minor or not life threatening, consider walking them out to a vehicle. Consider the:

- Safety of the patient, their injuries, and their comfort.
- Time it would take for alternative evacuation options.
- Terrain.

TIP  *When carrying across easy ground, make sure the stretcher carriers don't walk in step. This causes a rhythmic bounce in the stretcher and can make the patient uncomfortable or even ill.*

Patient care

This section is intended to be used as a guide and checklist only. For further details, refer to the Mountain Safety Council *Outdoor First Aid Manual*. All people involved in a SAR operation should hold a current Outdoor First Aid certificate.

The management of patient care is the responsibility of the Team Leader. However, as much as possible should be delegated.

NOTE  *In some cases all you can do is stabilise the patient and wait until professional medical care arrives.*

Personal safety

NOTE  *Your safety and the safety of the team are your first priority.*

Stabilise

This includes caring for any injuries as well as providing for physical comfort and safety of the patient and any other survivors of an accident. The injuries may be potential ones or they may be real such as fractured femur or severe hypothermia.

A mistake is often made on-scene by concentrating solely on the casualty, when their companions may be suffering from post-traumatic stress as a result of the incident.

Multiple patients

If there's more than one injured person, it will be necessary to prioritise the injuries and spread team members among the patients (see **Site management**).

Medical advice

If necessary, seek medical advice through the ICP to determine the correct treatment. Keep a note of all messages and times on a *LandSAR Casualty Assessment* form.

Primary assessment

Check and treat A.B.C. (Airway, Breathing, Circulation).

NOTE  *These basics must be attended to first before dealing with other injuries. Note your findings on the LandSAR Casualty Assessment form.*

Secondary assessment

Once the basics (A.B.C.) have been attended to, it's important that a secondary survey is performed on the patient to establish if there are any other injuries or conditions.

Talk to the patient and their companions to gain a history of their injuries and details of any medication required or allergies they may have.

Stretchers

To ensure a safe, comfortable stretcher carry, the Team Leader should appoint a Stretcher Leader and a nominated Field First Aider and delegate tasks to them.

Stretcher Leader

This person is appointed by and is responsible to the Team Leader for coordinating and monitoring the correct loading and handling of the stretcher.

Nominated Field First Aider

This person is appointed by and is responsible to the Team Leader. The nominated Field First Aider should be a calm, caring, and competent person.

Preparing to carry

Before loading

You should follow these procedures:

- Make sure the Stretcher Leader and nominated Field First Aider supervise.
- Make sure those who aren't directly involved with the first aid or stretcher loading move away or are given other tasks.
- Make sure all first aid requirements have been completed.
- Attend to the patient's toilet requirements. (It's important to respect the patient's privacy and dignity). A person in pain or discomfort may not be aware of toilet needs and the pain will make urinating difficult.
- Change the patient's clothing if it's wet and the carry is likely to take some time. Use the patient's spare clothing first. Quite a lot of warm clothing and sleeping bags may be required to maintain body warmth. If injuries require removal of the patient's clothing, cut it along the seams.
- Make sure the patient's circulation isn't restricted by tight clothing, belts, or bandages.
- Make sure the patient won't be caused discomfort or further injury by articles in their pockets, zips, or domes, and remove them if necessary. This is critical if the patient is unconscious.
- Make sure the stretcher is well padded with blankets or sleeping bags and the straps are correctly positioned.
- Check the patient's extremities regularly for signs of loss of circulation due to constrictions.

Loading

You should follow these procedures:

- Make sure that the Stretcher Leader and nominated Field First Aider supervise the loading (and the carry).
- Tell people what's required and how it's to be achieved. It may be necessary to discuss the best methods first, and rehearse manoeuvres on a team member of the same size as the patient.
- Load the patient in the recovery position if they're unconscious.
- Take every care and consider the patient's injuries. Handle the patient extremely carefully if they have suspected back or neck injuries. The head, neck, or back mustn't be allowed to rotate or bend.
- Log roll the patient onto a blanket or sleeping bag if possible and then lift onto the stretcher by lifting the rolled edges of the blanket or bag.
- Support above and below any injury sites with extra pairs of hands. Injuries may be worsened if moved or jarred, e.g. blood vessels may be severed or crushed or bleeding may restart.



Handle the patient extremely carefully

In the stretcher

Once the patient is loaded, you should:

- Place a pad between the patient's knees and ankles to prevent chafing and a pad between the patient and the stretcher to prevent movement, taking care to avoid aggravating injuries.
- Adjust the foot board of the stretcher to give the best support.
- Make sure the patient is warm but doesn't overheat.
- Tighten the straps firmly.
- Protect the patient from the sun (sunglasses and hat).
- Cover the patient with a parka or flysheet if it's raining.

Stretcher carrying

Decide on the easiest route before starting the active transportation. Appoint an experienced searcher to act as a route finder, equipped with a radio and flagging tape, to report potential hazards and problems while selecting the best route.

Use stretcher carrying teams of at least six and rotate them frequently. Normally work to no more than 20-minute shifts per adult. You need at least three teams minimum (about 20 people), depending on terrain and conditions. You may also need others to carry equipment such as the patient's pack and additional gear.

NOTE ►► *A night evacuation on foot will require adequate lighting for route finding as well as for the carrying teams.*

Handling commands

The commands must be positive, loud and clear and should be preceded by a warning of a command where possible, e.g.

“Prepare to lift...	Lift”
“Prepare to move forward	Move”
“Prepare to turn left/right	Turn”
“Prepare to stop	Stop”
“Prepare to lower	Lower”

The stretcher bearers must be told clearly what’s expected of them, especially when negotiating difficult obstacles. They must also be prevented from going faster than is necessary.

For clarity and convenience, it’s common for the commands to be given by the person in a particular position on the stretcher, e.g. front right. This establishes a pattern and avoids confusion.

TIP  *The people at the front of the stretcher must warn the rest of the stretcher bearers of uneven ground such as tree roots, rocks, or slippery ground.*

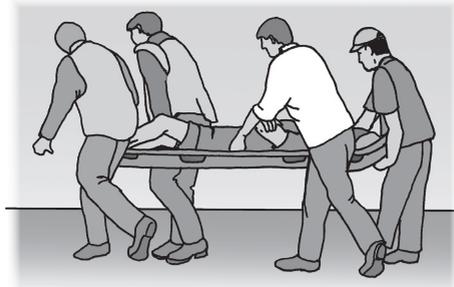
Steep areas

Wherever steep areas are encountered, or where control of the stretcher could be lost, use a rope belay to take the weight of the stretcher.

Stretcher orientation

Normally, carry with the patient’s feet first unless going uphill. Unless injuries or shock dictate otherwise, keep the patient’s head level with their feet or raised slightly above their feet.

TIP  *Ask the conscious patient which way is most comfortable.*



Consider the patient’s head level



After the SAR operation

Debrief

After a SAR operation a debrief is essential to enable everyone to learn from the operation, both the search phase and the rescue phase. Often there are two debriefs:

- A general debrief for Team Leaders, Incident Management Team (IMT), and Police. Often team members are also invited to attend.
- A more in-depth debrief for the IMT and senior SAR and Police personnel. Often Team Leaders are also invited to attend.

SAR operations (SAROPS) and training exercises (SAREX) are often debriefed as soon as they're completed, that is, on the same day.

NOTE  *Police require a debrief within 21 days of the conclusion of the operation if a land operation exceeds 300 person hours or a marine operation exceeds 50 person hours.*

Purpose

A debrief should enable people to:

- Build up an overall picture of the search.
- Learn from any mistakes made.
- Recommend any improvements for future searches.
- Determine the suitability of the equipment used.
- Learn what happened at the Incident Control Point (ICP) and to other teams in the field during the search.

Debrief topics

Topics discussed should include:

- The callout.
- Search phase.
- Rescue phase.
- Logistics, including transport.
- Communications.
- Lessons learned.
- Claims form for vehicle use, loss of wages, and lost or damaged equipment.

TIP  *Those invited should make every effort to attend the debrief as it's an important part of a SAR operation.*

Stress

The stress of a SAR operation, especially the shock of finding a body or a badly injured person, can be traumatic and can affect people in different ways. Signs may be immediate or they may occur several days later. Team Leaders and team members should check affected members over the following few days.

Team Leaders should report to the Operations Manager (OPSM) or the Incident Controller (IC) any concern they have about a team member who seems distressed, or if they feel distressed themselves.

Remaining for the debrief provides a good opportunity to talk about your experiences and to unwind.

Signs of stress

Stress during searches, particularly long searches, is common and everyone should watch for the signs.

Common signs are:

- Frustration or being argumentative over tasks.
- Withdrawn.
- Silent or distressed.
- Lacking motivation.

Follow up

Stressed people should be quickly removed from further involvement and:

- Debriefed thoroughly.
- Provided counselling and ongoing help if required.

NOTE ►► *Professional counselling is available via the Police (Psychological Support Policy). The Police Incident Controller or local Police SAR Coordinator can arrange this.*

Fatigue

People travelling long distances to a SAR operation should ensure they're rested and alert before driving. This may mean that some people will decide not to drive but rather to travel as passengers.

When the search operation is over, those people travelling long distances home should seek rest before travelling. It's important that you're refreshed before undertaking a long journey as distractions caused by stress combined with fatigue can be a dangerous combination on the road. The Team Leader should ask the OPSM or IC if accommodation is available.

TIP ▲ *If there isn't an opportunity for rest, you should travel in groups and share the driving.*



Specialist Teams

Various environments require searchers and rescuers with specialist skills. There are teams throughout New Zealand that have the necessary expertise, local knowledge, and equipment. Some of the specialised environments and associated problems that searchers and rescuers may have to deal with are listed below.

Mountain and hill country

- Steep / vertical snow and ice.
- Vertical rock faces.
- Glaciers and crevasses.
- Heavily forested areas.
- Long scree slopes.
- Avalanche.

Water

- Lakes and ponds.
- Frozen surfaces (thin ice).
- Coastal whitewater and surf.
- Swiftwater streams and rivers.
- Flash floods.
- Slowly rising floods.

Restricted access

- Natural areas: caves and tomos.
- Manmade structures: mines, pits / quarries, tunnels, air shafts / wells, drains / sewers, offal pits, dams / and ponds.

NOTE ►► *As with general SAR operations, the Police administer specialist SAR operations and organise the incident management, while specialists carry out the field operation.*

Alpine Cliff Rescue (ACR)

These teams have rock climbing and alpine skills and equipment. Members have extensive personal climbing experience. They're sometimes referred to as High Angle SAR teams because they sometimes work on steep ground that's neither rock climbing nor alpine territory, e.g. a vehicle down a steep bank.

Avalanche search and rescue

Avalanche rescue tends to be self-rescue, that is, rescue by members of the group that's avalanched. If that doesn't occur, avalanche victims are likely to die.

Avalanche SAR teams tend to be put together as needed under the CIMS structure. Usually they will be led by an experienced professional.

Professionals train for avalanche search and may be able to include other searchers into their teams under direction, at least at the stage of probing for bodies. Trained avalanche dogs will speed up this process considerably.

NOTE ►► *An avalanche indicates wider snow instability, so searchers must be careful to follow expert direction.*

Cave rescue

Caving is a specialist sport and, although there's some overlap between ACR members and cave rescue members, cavers tend to be rescued by cavers. Cave rescue teams tend to be based in clubs where people know each other well from personal trips.

However, the incident management requirements of supporting a major cave rescue are huge and require many people to support the team members, both underground, e.g. ferrying supplies, and above ground, e.g. preparing food and equipment.

Swiftwater rescue

Increasingly, kayakers and rafters are pursuing their sports in remote valleys and tight gorges.

Another major development is the sport of canyoning where people travel down steep canyons by walking and climbing, abseiling, sliding, jumping, and swimming. Few rescue teams are equipped and trained to work in the more extreme situations that canyoners are exposing themselves to.

New Zealand has become an international venue for these activities. Often, recreational groups will be highly skilled but have little local knowledge.

Specialist rescue groups for kayaking and rafting incidents exist in various centres.

NOTE ►► *Although swiftwater rescue courses are offered in New Zealand, the personnel in these groups have extensive swiftwater experience that can't be learnt simply by attending a training course. Swiftwater Rescue Teams may also work well on foot when initial searches in flooded rivers are required.*

Dog teams

SAR dogs can significantly decrease the time required to find a missing party. They're particularly useful for finding non-responsive people and discarded articles, establishing the direction of travel, covering large areas quickly, and working at night and in difficult terrain.

The dog team must:

- Have met the operational standards set by the NZ Police and LandSAR.
- Be well known to the local Police and LandSAR group.
- Have experience in the environment that they're working in.

NOTE ►► *You may be asked to assist the handler and search dog, especially with navigation, defining the area searched, and relaying information to the base (ICP). This enables the handler to concentrate on the search and on working the dog.*

Get to know your dog teams, what their expectations are, and what their capabilities are. Dogs are a search tool, no more and no less, but understanding their capabilities and limitations is important for all SAR personnel.

Tracking

Tracking teams provide expertise to management. Trackers have operational SAR experience in backcountry and suburban environments.

Specific skills provided include:

- Advice for deployment of tracking resources.
- Strategic and tactical applications, including tracking and trailing techniques.
- Clue-site processing.

Glossary

Abbreviations

CIMS	Coordinated Incident Management System
IAP	Incident Action Plan
IC	Incident Controller
ICP	Incident Control Point
IMT	Incident Management Team
IR	Immobile Responsive
IU	Immobile Unresponsive
LOGM	Logistics Manager
MLSO	Managing Land Search Operations
MR	Mobile Responsive
MU	Mobile Unresponsive
OPSM	Operations Manager
PIM	Planning / Intelligence Manager
POA	Probability of Area
POD	Probability of Detection
POLF	Probability of Live Find
POS	Probability of Success
RAP	Rescue Action Plan
SAR	Search and Rescue
SAREX	Search and Rescue Exercise
SAROP	Search and Rescue Operation

Definitions

Initial Response Period (IRP)	The first period of the SAROP and before formal planning. Resources are deployed using reflex tasking, e.g. decision points to be checked along a track that's already been marked on a map. The aim is to solve the SAROP quickly using a pre-determined response.
Incident Control Point (ICP)	The location where the Incident Controller (IC) and members of the Incident Management Team (IMT) provide overall direction of response activities in an emergency situation. Also known as 'Base' or 'SAR Base'.
Incident Management Team (IMT)	The group of incident management personnel carrying out the functions of the Incident Controller (IC), Operations Manager (OPSM), Planning / Intelligence Manager (PIM), and Logistics Manager (LOGM).
Incident Action Plan (IAP)	A statement of objectives, strategies, and critical functions to be taken at an incident.
Lead agency	This is the organisation with the statutory control of the incident. For Search and Rescue (SAR) operations the lead agency is normally the Police.
Operational period (first, second, third...)	<p>A period of time that one group of people work. Each operational period can be from two to 12 hours depending on the nature of the incident.</p> <p>This begins when the situation hasn't been resolved through the IRP. A larger organisational structure is needed to escalate the response.</p> <p>A period of time for handover should be allowed for so important information can be passed on to the next IMT.</p>
Pre-plans	Pre-plans outline local area SAR information, including available personnel, available resources, and information learnt from previous SARS.

Rescue Action Plan	Planning is the key to effective rescue and, to carry it out effectively, some planning must begin immediately. Alternatives must be constantly analysed and revised. Contingencies are based on factors such as: <ul style="list-style-type: none">• Elapsed time since operation began.• Possible missing party locations or likely spots.• Weather and associated environmental hazards.• Availability of specialised resources.• Reported changes in the missing person's condition.• Medical resource availability.
Sector	A defined portion of an incident. Sectors can be created to maintain a manageable span of control, or to manage specific functions, geographic areas, or types of personnel.
Segment	An area that divides the total areas into manageable units so that a team can achieve the assigned task within the operational period. Decisions on segmentation include the task required, terrain, and team capabilities.

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