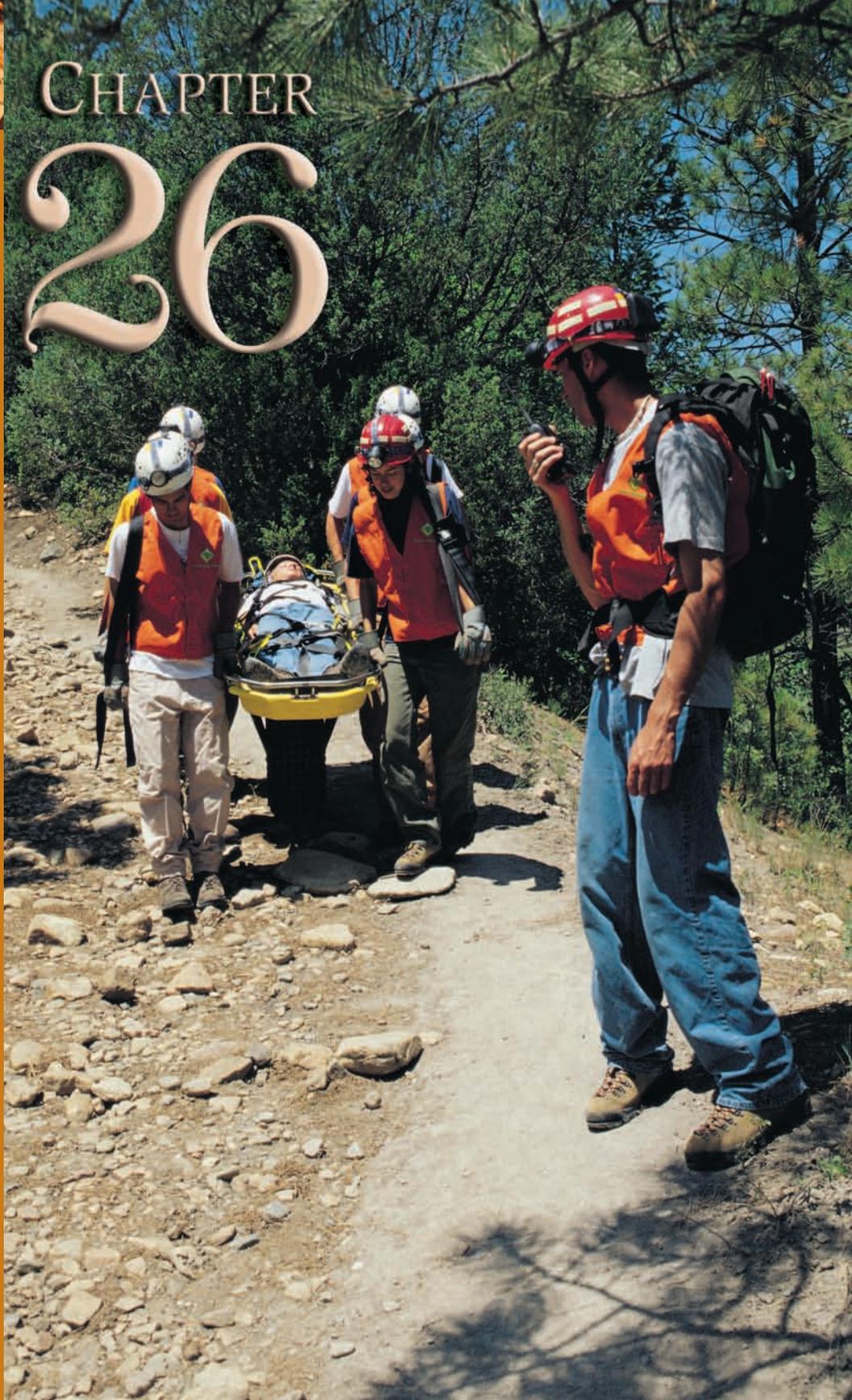




# CHAPTER 26





## Search and Rescue

*“The people who I see performing best in a crisis are people who are honest and forthright. They don’t hide their personalities or their weaknesses. They’re genuine.”*

—Sharon Wood, the first North American woman to summit Mount Everest



A mountain climber rushes down a trail to report that a companion on a snowy peak has fallen and broken an ankle. Children wander away from a picnic area and their parents are frantic. A group of hikers is overdue as night settles upon a wet, chilly forest. In each case, search-and-rescue teams are mobilized and, following well-practiced procedures, set out to meet the challenge. Before long the children are reunited with their families. By midnight the overdue hikers have been located, warmed, fed, and brought out of the woods. A rescue team has flown by helicopter to the top of the peak and rappelled down to the fallen climber. They treat his injuries and monitor his condition through the night while more rescuers approach on foot to carry the victim to the trailhead the next morning.

The happy endings to many potential wilderness tragedies are due to the dedication and efforts of search-and-rescue teams. In the frontcountry, people seldom are far from a road. Reacting to a medical emergency is often as simple as summoning assistance and then performing first aid for a few minutes while waiting for an ambulance to arrive. The rules change as you get farther from a road, though—rescuers often have to *find* the person in distress before beginning a treatment plan. Once victims of injury or illness have been located, transporting them immediately might not be practical or even possible. Weather, location, nightfall, and other variables might

make it necessary for an aid team to stabilize patients and maintain their safety for a period of hours or even a full day or more until an evacuation can be undertaken.

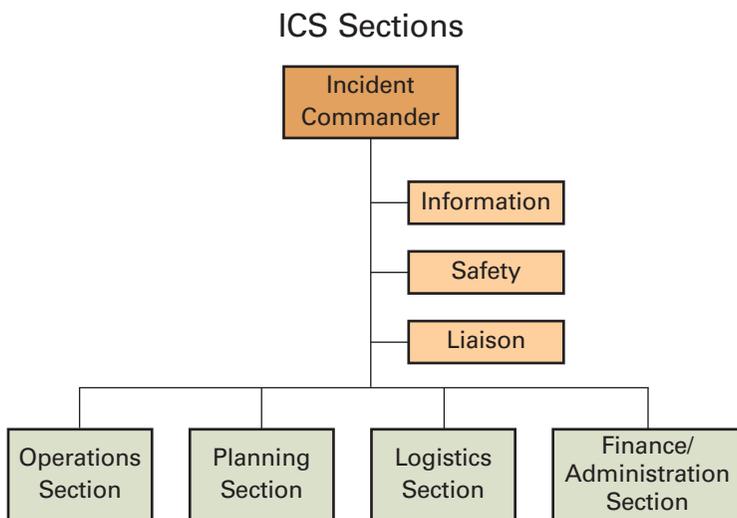
This chapter is an introduction to some of the main concepts and techniques of search-and-rescue (SAR) teams. It is not intended to teach all you need to know in order to take part in searches, but it might spark your interest in finding a SAR organization that can train you and then draw on your strengths and dedication in emergency situations.

### ***Incident Command System***

The *incident command system (ICS)* is a flexible management protocol often mandated by law to be used when conducting search-and-rescue activities. The ICS is particularly effective when two or more agencies involved in an effort (especially those with differing legal, geographic, and functional responsibilities) must coordinate their responses.

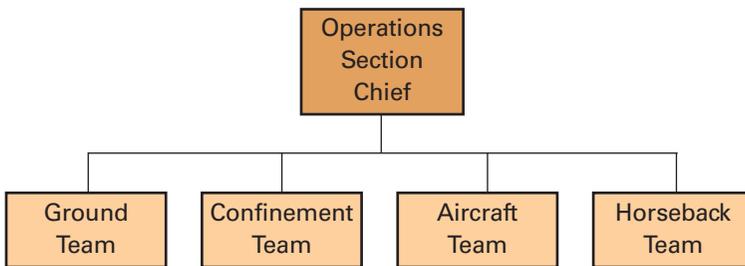
## **Organizational Plan for Search and Rescue**

The organizational plan for a search-and-rescue effort depends upon the needs of official state and local agencies, the kinds of operations the unit will be expected to handle, and the existence of other SAR organizations with whom efforts can be coordinated. A typical search-and-rescue organizational chart looks like this:



It might surprise you to learn that a search-and-rescue operation involves the participation of so many people. The expanses of territory to be searched and the effort required to bring injured persons to safety can require a large number of personnel. In addition, teams in the field must be backed by an extensive support staff responsible for everything from supplying warm blankets and dry clothing to organizing transportation home for everyone after a rescue has been completed. If there are enough people, one team member can be assigned to each position; however, each team member might be assigned to handle several jobs on a search-and-rescue organizational chart.

### Resources for SAR Operations



#### **SAR Unit**

A *search-and-rescue (SAR) unit* is a highly organized group of people who understand the serious nature of their responsibilities. Long before an emergency arises, leaders of any SAR group must meet with agency officials to clarify the exact nature of their relationship and to sort out lines of authority. Embarking on unauthorized search-and-rescue efforts is poor manners at best, and at worst can create problems. SAR units—aware of the limits within which they must operate—attempt only those rescues that are within the scope of their abilities.

Called out to respond to an incident, members of a SAR unit might be divided up to serve on several teams—as individuals helping with the confinement of an area, for example, or as participants on search teams. Depending on the nature of an evolving event, incident commanders can add teams to address the needs of the search-and-rescue effort.

Teamwork is the glue that holds together every search-and-rescue effort. The food service volunteers making sandwiches and soup at a base of operations are every bit as important as the searchers following footprints in the snow. A search-and-rescue operation is no place for glory seekers unless, of course, they see the glory of serving in quiet roles that are essential to the success of the overall effort.

## Personal Equipment

The personal gear that SAR team members carry in the field will vary according to the season of the year and the environment in which they expect to operate. A *24-hour pack* contains everything a searcher will need for a full day in the field—the outdoor essentials plus additional food, water, first-aid supplies, and emergency communications equipment. A *48-hour pack* adds a sleeping bag, shelter, stove, and more provisions. In either case, searchers carry more than they expect to need; they might be out longer than intended, and they might need to share their food and equipment with the subjects of their search.



## Call-Out

Officials of each of the 50 states have determined who will be responsible for planning and managing search-and-rescue operations within the boundaries of their state. Those duties often fall within the authority of local sheriffs, state or local emergency management offices, or a state natural resources department. Using this means to coordinate the efforts of search-and-rescue personnel, most search efforts are resolved within 24 hours.

When asked to help by an agency legally authorized to request assistance, a search-and-rescue unit must mobilize quickly. SAR team members often are equipped with pagers that a unit leader can use to alert them to emergency situations. Another option is a telephone tree, with various team members responsible for calling others.



## Search Tactics

A SAR team deployed to help find missing persons will have been trained to use a variety of search tactics, each intended to be effective for a wide range of situations. The three search methods that have proven the most successful are *investigation*, *hasty search*, and *confinement*.

### Investigation

Good information is vital to the quick success of a search-and-rescue operation. Team members can be assigned to individually interview people who might have recently seen the subject of the search or who might know about the subject's current appearance, habits, health, or other factors that can help SAR teams narrow the range of their efforts. The team may expand their investigative opportunities by leaving notes on vehicles in the area with the subject's description and contact information to be used by anyone with information that might be of assistance.

### Confinement

*Confinement* is the effort made by a SAR team to prevent lost persons from wandering beyond a search area. Since the unconfined area in which a person could be lost grows in size with each passing moment, confinement must be achieved as quickly and thoroughly as the availability of resources will allow. Methods include assigning team members to monitor trailheads, roads, and other points where a lost person could leave the primary search area. Barriers such as rivers or mountain ridges can aid confinement by acting as natural barricades.

### Hasty Search

In the early stages of a search, there often are several areas that team leaders and the incident commander pinpoint as probable locations of the lost person. A child who has wandered away from a campground, for instance, might have gone up a trail, across a meadow, or down to a beach. SAR team members can split up and go immediately to each of those areas to conduct hasty, informal searches.

### Critical Separation

*Critical separation*—the distance maintained between SAR team members as they make their way through a search area—allows the incident commander to balance the need for covering an area quickly with the importance of being thorough. The technique takes into account local terrain, foliage, and weather.

To determine the distance of critical separation for a particular search, SAR team leaders select a location that is typical of the area their team has been assigned to search. They lay a backpack (or something of equal size) on the ground and, if they have it, cover the pack with clothing similar to that last seen on the missing person. Three team members walk away in different directions until each loses sight of the object. Next, they walk directly back to the object, counting their steps as they return. Team leaders average those step counts and double the result to come up with

the distance of critical separation—that is, the number of steps from one another that searchers should maintain as they sweep through an area, knowing as they go that they will have a high probability of seeing the subject of their search.

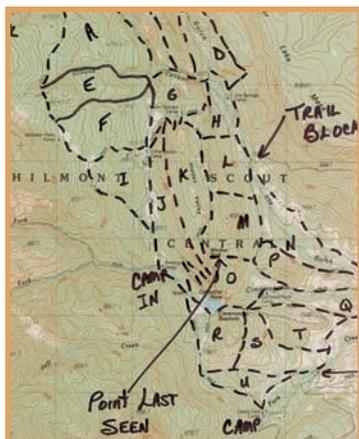
### **Probability of Area**

A means found effective by many teams to limit the initial area of a search draws upon the input of five experienced team members who are knowledgeable of the terrain, studying a map overlaid with a grid. Using all they know about the terrain, climatic conditions, time of day, the subject of the search, and details of the subject's disappearance, each of the team members independently rates the likelihood that the subject will be found in each section of the map grid. When these *probability of area (POA)* predictions are tallied, the team will have a consensus on the order in which areas should be searched to achieve a high possibility of early success.

Seasoned team members might also draw upon their expertise to estimate the *probability of detection (POD)* of clues and search subjects in a particular area. As with POA considerations, they take into account all the variables of a search situation, then predict their expected success rate. For example, if experts predict there are likely to be 10 useful clues in a grid section on the map but time and personnel are limited, the incident commander might order that the segment be searched with sufficient care to locate half the clues—a POD of 50 percent.

### **Clue Finding**

Despite the emphasis on Leave No Trace methods of travel, no one can move about without leaving some signs of passing, especially if the traveler is making no effort to hide. While it takes considerable skill to recognize many of these clues, some signs are obvious even to untrained observers, provided they are looking for them. Footprints on a damp shoreline or in patches of snow are easily seen, and a candy wrapper in the brush had to be left by someone. Finding and evaluating even a few clues can substantially reduce the potential area of search.



Two critical factors in clue finding are preserving the clues and evaluating them effectively. Searchers must take care not to disturb areas where footprints are likely or where other subtle signs might exist. Team members also should document all they can about clues—where they were found, in what condition, etc.—so that SAR leaders and the incident commander can effectively consider and use the information presented to them.



## Advanced Search Methods

Some search methods require advanced expertise or equipment. Among them are the following:

### Trailing Dogs

Certain breeds of dogs, notably bloodhounds, have such keen senses of smell that after being allowed to smell an article of a lost person's clothing, they can follow the scent trail left by that person. Success is dependent upon many factors including the training of the dogs, air temperature and humidity, and presence or absence of wind.

### Air-Scenting Dogs

Unlike trailing dogs, air-scenting dogs will follow to its source any human scent they find in a search area. As a result, they might locate the subject of the search, though they are just as likely to follow the scent of a SAR team member or a passerby. Air-scenting dogs (frequently German shepherds) have the greatest success when there have been few persons in the area they are to search.

### Tracking

A trained and talented tracker may be able to follow the trail left by a lost person. It is very important to prevent other people from entering the search area if a tracker is to be successful.

## Vehicle Search

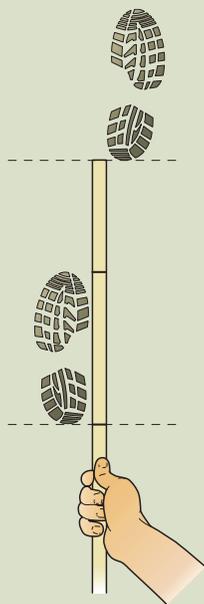
Using four-wheel-drive vehicles, team members can travel backroads to gather information about the terrain and to set up roadblocks to prevent lost travelers from wandering away from a search area.

## Aircraft Search

Searches from the air can be very effective, but they are highly dependent upon weather and the density of ground cover. Most searches from fixed-wing aircraft are conducted by the Civil Air Patrol. Helicopters might be supplied by the military, or by municipalities and corporations. The efforts of airborne searches can be greatly enhanced by SAR incident commanders drawing upon the resources of satellites, emergency location transmitters (ELTs), and the Air Force Rescue Coordination Center (AFRCC).

Airplanes are equipped with emergency location transmitters (ELTs), devices that are activated by significant impact. If an airplane goes down, the ELT on board sends out a signal that can lead rescuers to the crash site.

## Tracking Stick



Searchers engaged in tracking can increase the likelihood of success by using a *tracking stick*—a rod about 4 feet long. (A straight branch with notches cut for measurements will work nicely, too.) When trackers find two footprints in a row, they can measure the distance from the heel of one print to the heel of the next and mark that distance on the stick with a rubber band. Then, by measuring the same distance ahead and slightly to the side of the forward print, they'll know approximately where the next track should be. At night, a lantern or flashlight held near the ground will produce shadows that make tracks more visible.



## First Aid

Search-and-rescue teams must number among their members persons trained to provide first-aid treatment to victims of accident or illness. The challenges facing first-aiders can be heightened because of weather conditions, location of a victim, distance from a road or aircraft landing zone, and the need to render aid using only the supplies and equipment the team has carried with them. Advanced first-aid training with an emphasis on wilderness emergencies prepares team members with the medical skills they need and a methodology for addressing emergencies in remote settings.

Upon finding an injured or ill person, a SAR team's routine generally will follow the same protocol as for incidents in the frontcountry:

### Take Charge

Team members will focus their attention on the job of making people safe. Their training and experience will nearly always infuse their efforts with an air of authority.

### Approach With Care

Rescuers must be aware of falling rocks, slippery footing, steep slopes, and other hazards as they come to the aid of ill or injured persons. Becoming injured themselves or causing further injury to the subject can dramatically compound the seriousness of an emergency situation.

### Provide Urgent Treatment

The first rescuers on the scene will make a quick assessment of the victim's situation and address any conditions that could be life-threatening; this includes checking and treating for shock if necessary.





## Evacuation

Once the subject of a search has been found, evaluated, treated, and stabilized, the team must decide on the best way to transport that person to safety. Searchers in radio contact with an incident commander can develop a coordinated effort to bring the victim to the frontcountry.

### Foot Power

Evacuees who can walk without further injuring themselves should be encouraged to do so. SAR team members must continue to monitor the person's physical condition and respond to significant changes.

### Hand Carry

If the subjects are not seriously incapacitated, they may be carried short distances piggyback or with a two-person carry. Rescuers must use proper technique to protect themselves from injury.

### Horseback

Gentle saddle horses or mules can be used to transport victims whose illness or injuries would not be further complicated by the ride. Team members might need to ride double or walk alongside the animals to steady the evacuees.

### Vehicle

Where there are convenient roads, four-wheel-drive vehicles generally provide the easiest and most efficient means of evacuating subjects of searches to a rendezvous with an urban ambulance service. In some areas, specially equipped ambulances can bring out ill or injured parties.

### Aircraft

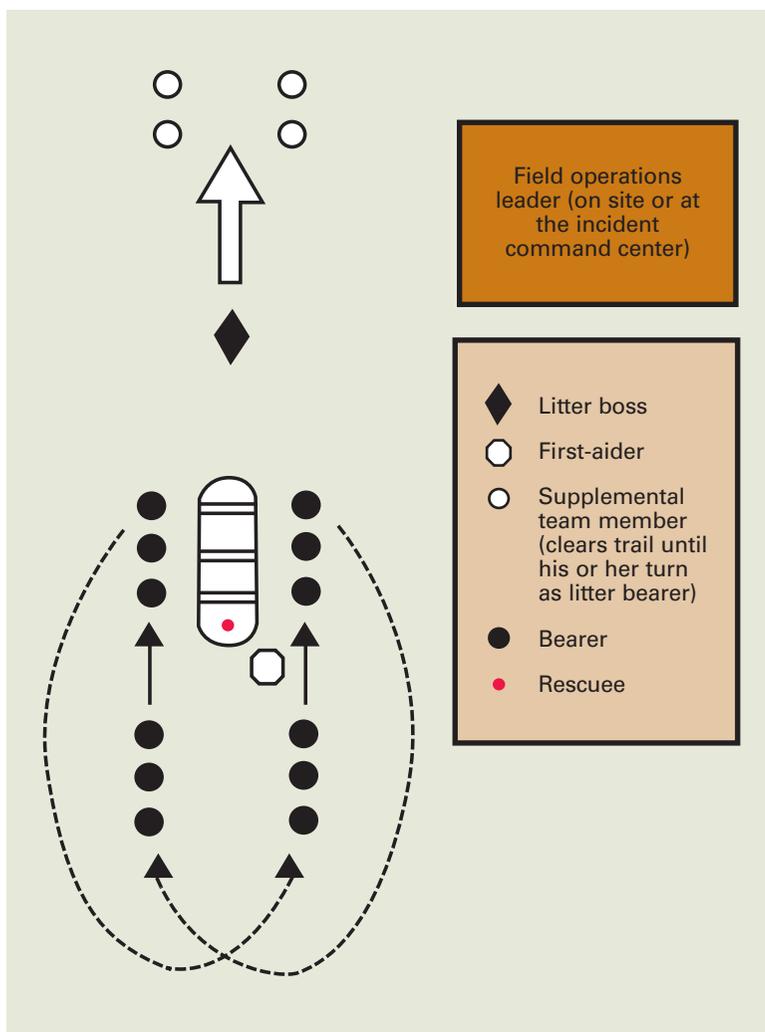
If a rescue helicopter is available, it might be used to evacuate a subject by winch lift from a remote site or it might land at a nearby helispot to pick up the subject. Fixed-wing air ambulances also can be used for evacuations from remote locations if there is a suitable landing strip nearby. Ideally, subjects are flown directly to a medical facility for further evaluation and treatment.



## Litter Carry

Carrying an ill or injured person over a long distance can be demanding and difficult. It might require a large, well-drilled team, especially if the terrain is rough or the victim's location is far from a road. Because of the complexity of a litter evacuation, many SAR units have special litter teams to handle the procedure.

The field operations leader is responsible for the evacuation and for the safety of all personnel. The litter boss supervises the carrying of the litter. In matters pertaining to the well-being of the evacuee, the first-aider has the last word. Trail clearers lead the way and prepare the route for the litter bearers until it is their turn to serve as litter bearers. Belayers and rope handlers are required if there might be a need for a technical evacuation.



### **Litter-Carrying Techniques**

Prepare a litter by padding it with foam pads and a sleeping bag. To place an injured person on a litter, six team members kneel next to the subject, three on each side, and work their hands beneath the person. On command, they raise the patient high enough for the litter to be slipped underneath, then lower him or her gently into position. Depending on the weather, more sleeping bags and perhaps a nylon tarp can be used to insulate the patient in a warm, protective cocoon.



#### **Cross Section of a Litter**



*An injured or ill person might be carried on a litter.*

Having sent the trail clearers ahead to remove any obstacles, the litter boss in charge of the carry will have bearers of similar height pair off on opposite sides of the litter. The SAR team member with primary responsibility for first aid will take a position near the victim's head, and all other team members will follow behind. The bearers kneel by the litter and, if available, place carrying straps across their backs and over their shoulders. By holding onto a knot in the strap, a bearer can distribute the weight of the load across his or her back and opposite arm, rather than bearing the weight with only one arm.



### **UNIVERSAL LITTER WHEEL**

**With a universal litter wheel, a small SAR team can roll a loaded litter over trails, rough roads, and open, low-angle terrain.**

On command from the litter boss, the bearers lift the litter and move forward, walking out of step to avoid swinging the victim. Litter bearers change positions every few minutes. A fresh pair of bearers grasp the foot of the litter while the pair of bearers at the head of the litter step to the side of the trail. The active bearers adjust their grips to ensure correct

spacing on either side of the litter. Using this technique, bearers can keep the litter moving, refreshing the carrying team without setting down the litter.

## **Communications and Navigation**

Reliable communications are essential to the success of an SAR operation and for the safety of everyone involved. For this reason, portable two-way radios are carried by team leaders, litter bosses, field coordinators, and members of the support staff, giving the incident commander control over the entire search and evacuation. (Many SAR teams use ham radio technology, especially the two-meter band and the FCC “technician” license, to facilitate communications. During operations involving large numbers of searchers and rescuers, coordinators sometimes rely on Family Radio Service radios for inter-team communications.)

Search-and-rescue teams can use global positioning systems (GPS) for finding their way, plotting the parameters of search areas, and generating records of locations pinpointed during their activities. Transmitters can relay information about a team’s position back to a search base where the data can be downloaded into laptop computers and incorporated with topographic mapping software to give the incident commander real-time awareness of the progression and status of every team in the field.



## Evaluation and Training

At the conclusion of every SAR mission, unit members review and evaluate everything that happened. This is not a faultfinding session, but rather an objective attempt to uncover weaknesses in a team's performance and to determine ways to rectify them. Good SAR units improve their operations with each mission; with honest evaluations and effective training, they seldom repeat a mistake.

SAR training must include instruction and practice in search methods, evacuation, wilderness navigation, first aid, and the maintenance of personal and team equipment. Field exercises and simulated searches and rescues should be conducted on various types of terrain in all weather conditions. SAR missions might be risky for both subjects and rescuers. Training and preparation of rescuers maximizes the chances for success and minimizes the chances for further injuries.

*"SAR providers conduct ground search-and-rescue incidents to safely locate, access, stabilize, and transport the subject in the shortest possible time frame with the most efficient type and number of resources while following any applicable laws, rules, regulations, and policies."*

—Robert Koester, *Field Operations Guide for Search and Rescue*, 1996