BOY SCOUTS OF AMERICA
MERIT BADGE SERIES

SEARCH AND RESCUE

"Enhancing our youths' competitive edge through merit badges"

BOY SCOUTS OF AMERICA

Requirements

Scouts should go to www.scouting.org/merit-badges/Search-And-Rescue or check Scoutbook for the latest requirements.

34016
ISBN 978-0-8395-0014-8

2023 Printing

Contents


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FLIGHT FOR LIFE

What Is Search and Rescue?

Imagine the concern a parent or loved one has when a teenager is overdue from a hike in the wilderness, a small child is missing from a crowded playground, a rock climber becomes stranded on a precarious ledge, or an elderly person wanders away from a caregiver. These occurrences happen several hundred times each year and often may require the services of trained search and rescue (SAR) managers and teams.

While many people are able to self-evacuate from remote areas thanks to advances in technology such as cell phones, GPS (Global Positioning System) receivers, and personal locator devices, people still get injured and lost.

Be aware that earning the Search and Rescue merit badge will not qualify you as a trained searcher. You should never attempt a search or rescue on your own.

If you find yourself confronted with a missing person situation, remain calm and immediately report the situation to a Scout leader, parent, or responsible adult. If these people are not immediately available, promptly call 911 and report the missing person emergency to the authorities.

A search and rescue mission is much like solving a classic mystery. Once a person (called the *subject*) is reported missing, law enforcement officials activate search teams. The following procedure then takes place:

1. An incident commander is appointed to run the search and rescue operation using what is called the **Incident Command System (ICS).**
2. An Incident Action Plan (IAP) is developed to guide the searchers as they look for the subject.
3. The incident commander and his or her staff decide which kind of teams to deploy. These could be ground, horse, dog, ATV, snowmobile, mountain bike, or even aircraft teams.
4. Teams are deployed to search for the subject using a variety of search and rescue skills.
5. If all goes well, the subject is located and returned to safety.

As you read this pamphlet and work on this merit badge, you will learn and practice many skills that may someday help save a life!

What Is a Search? What Is a Rescue?

A *search* is an emergency situation requiring a team of trained searchers to locate a missing person. The search may be brief and simple, such as finding that a missing child is sleeping in the parents' car, or it may involve hundreds of searchers and days of coordinated, well-managed activity.

A *rescue* is an emergency situation where a person's location is known—perhaps having just been found by searchers—and he or she must be removed from danger and returned to safety. This may involve simply walking the person along a trail or it may require technical rescue skills and medical care.

The term *search and rescue* (SAR) is used because rescues are often required after the person is found. Frequently the same people are trained to do both functions—search for the subject and then treat and remove the subject.

Who Does Search and Rescue?

When a friend, fellow Scout, child, family member, or community member is missing, we expect that there will be well-trained, caring people who will search for, possibly rescue, and bring that person to safety.

Members of search and rescue teams are nearly all volunteers, although some may be Forest Service, Coast Guard, or fire and rescue workers, or members of other agencies. Staff members at Scouting high-adventure bases, including Philmont Scout Ranch, are also trained in SAR.

There are a number of organizations that play a major role in search and rescue efforts in the United States and some foreign countries. The Air Force Rescue Coordination Center serves as the single agency responsible for coordinating land-based federal SAR activities in the 48 contiguous states. It also provides assistance in Mexico and Canada.

Search and rescue is one of the United States Coast Guard's oldest missions. Coast Guard SAR response involves multimission stations, cutters, aircraft, and boats linked by communications networks. The Coast Guard is the maritime SAR coordinator and is recognized worldwide as a leader in the field of search and rescue.

The U.S. Forest Service, national and state parks, Homeland Security and its Bureau of Customs and Border Protection, State Department, Federal Emergency Management Agency (FEMA), National Transportation Safety Board (NTSB), Federal Communications Commission (FCC), Civil Air Patrol (CAP), and many other agencies are involved in search and rescue. There is even a national SAR plan available online. Check the resources section for links to agency websites.

The National Association for Search and Rescue (NASAR) is a nonprofit organization that promotes development and improved coordination among all SAR resources. NASAR offers training and certification functions to help teams worldwide be better prepared to do SAR.

How to Contact a SAR Team

A computer search or a phone call to your local police, sheriff, or state police office will help you determine the best SAR team to interview.

The governors of each state decide which state or local agency has responsibility for search and rescue activities within their borders. The Mountain Rescue Association (MRA), National Ski Patrol, dive teams, cave rescue groups, and four-wheel drive clubs all stand ready to assist with SAR as well.

Here are a few sample questions:

- Who is in charge of the SAR team mission?
- How long does it take to train a search dog?
- What is the best kind of dog for SAR?
- What kind of technology is involved in SAR?
- How old do you have to be to be on a team?
- How often does the team go on a SAR mission?

Trained search and rescue officials have skills and training that help them determine the best strategy for finding lost people.

The World of SAR

Search and rescue, much like Scouting, has its own unique language. In order to understand search and rescue, it is necessary to know some of the most common terminology and how SAR operations are structured.

Incident Command System

The **Incident Command System (ICS)** is a systematic approach to the management of emergency incidents. Used by fire departments, emergency medical services, law enforcement agencies, and search and rescue teams to manage all types of emergencies, this system is flexible and scalable to all types and sizes of incidents and events. ICS is the most effective, efficient, and economical system to manage search and rescue incidents.

History

Wildland firefighters first used the ICS in the 1970s for the management of large wildland fires. In the 1980s, the National Fire Protection Association began requiring that the ICS be used to manage all large fire and emergency medical incidents. In 2003, Homeland Security Presidential Directive 5 (HSPD-5) mandated that all federal agencies use ICS to manage all incidents.

FEMA offers a series of courses for those involved in emergency planning and response activities. Introduction to the Incident Command System, or ICS 100, is a foundational course that provides instruction on the history, organizational structure, and principles of ICS. This course serves as the basis for more advanced courses in emergency management.

Key Concepts

The Incident Command System uses five key concepts.

Unity of Command. Unity of command refers to the concept that each person or resource responding to a scene reports to only one supervisor. This eliminates the potential for individuals to receive conflicting orders from multiple supervisors. Unity of command increases accountability, prevents resources from working without the knowledge of command, improves the flow of information, and enhances operational safety. This concept is fundamental to the ICS chain of command structure.

Common Terminology. In the past, individual agencies or teams developed their own terminology. This often led to confusion when groups worked together, as some words or codes had different meanings for each group. The ICS requires that all agencies responding to an incident use common terminology and clear language during radio communications. This means, for example, responding "Affirmative" rather than "10-4" to indicate understanding. ICS has an associated glossary of terms to bring consistency to position titles, resource descriptions, and organizational structure.

Management by Objective. Incidents are managed by setting and working toward specific objectives. Objectives should be as specific as possible, ranked by priority, attainable, and if possible, given a working time frame. Objectives are accomplished by first outlining strategies (general plans of action), then determining appropriate tactics (how the strategy will be executed) for the chosen strategy.

Flexible and Modular Organization. ICS is organized so that it can grow or shrink as the incident dictates. Command is established from the top down, with the most important positions, such as incident commander, established first. Only those positions that are required need to be filled. Most incidents will require that only a few positions be filled. However, as the incident grows and more resources are required, more positions may need to be added.

Span of Control. The concept of manageable span of control limits the number of resources and responsibilities that are managed by a single supervisor. The ICS requires that any single person's span of control should be from three to seven individuals, with an optimal number of five but no more than seven. If more than seven resources are being managed by an individual, the command structure needs to be expanded by adding new command positions.

Good management in search and rescue requires capable people knowing what to do at all levels, each with a clear picture of the incident command structure. This is why everyone involved in a search and rescue operation must have basic knowledge of the Incident Command System. Everyone must know his or her position within the overall structure and must understand the terms and functional titles used. After all, what good does it do to call a person an incident commander if no one really knows what that means?

Only in very large and complex incidents would all the ICS positions be staffed. As the incident scales down, the ICS positions will be eliminated until there is only an incident commander.

Incident Command Positions

The ICS is organized by levels, with the supervisor of each level holding a specific title.

Incident Commander. The incident commander (IC) provides overall leadership for the incident response and delegates authority to others in his or her command. The incident commander performs all command responsibilities until he or she assigns people to those positions, establishes the incident objectives, and directs the development of the Incident Action Plan (IAP), a set of documents that call for details about the search and rescue. The incident commander typically has training and certification, as well as experience in multiple positions within the ICS.

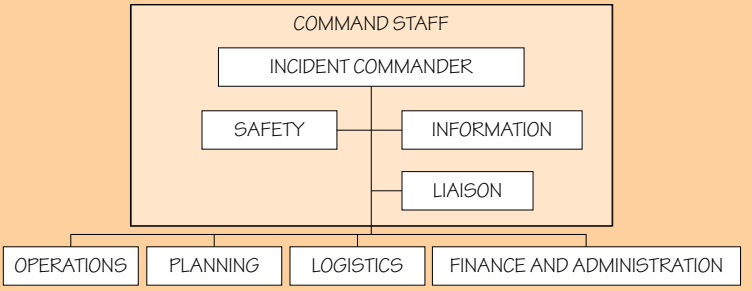
There are three types of incident command.

- **Single incident command—**This is the most common type of incident command. A single individual is designated as the incident commander and has the sole responsibility for the incident.
- **Unified command—**A unified command is often used for larger incidents when multiple agencies are involved. A unified command usually has one representative from each agency involved; these representatives act together as a single entity for the command.
- **Area command—**During multiple-incident situations, such as a large wildland fire or natural disaster, an area command may be established. The area commanders provide for incident command at separate locations. In this case, they typically manage resources and do not establish objectives or develop IAPs (Incident Action Plans).

A *briefing* is a meeting in which information is provided on what to do (the task at hand) or what to expect ahead of time. A briefing can include all known information about the subject of a search. A *debriefing* is a meeting in which the search team is questioned about its success or problems or difficulties encountered during the search.

COMMAND STAFF

An Incident Command System enables integrated communication and planning by establishing a manageable span of control. An ICS divides an emergency response into five manageable functions essential for emergency response operations: Command, Operations, Planning, Logistics, and Finance and Administration. This chart shows a typical ICS structure.



Incident Command System structure

Source: training.fema.gov/emiweb/is/icsresource/assets/reviewmaterials.pdf

The command staff consists of the safety officer, public information officer, and liaison officer. These officers report directly to the incident commander and may have assistants in major incidents.

Safety officer—The safety officer monitors the safety of all responders and bystanders and gives safety messages at planning meetings and briefings.

Public information officer—The public information officer (PIO) provides information to the public including media and government officials.

Liaison officer—A liaison serves as the primary contact for supporting agencies involved in the incident.

GENERAL STAFF

The general staff is made up of the operations, planning, logistics, and finance/administration section chiefs.

Operations section chief—The operations section chief is tasked with determining tactics and supervising resources to meet the incident objectives.

Planning section chief—The planning section chief is responsible for collecting, evaluating, and disseminating incident information; developing and documenting the IAP (Incident Action Plan); and leading the planning meeting.

The planning meeting's main purpose is to develop the Incident Action Plan for the next operational period. Most planning meetings last less than 30 minutes.

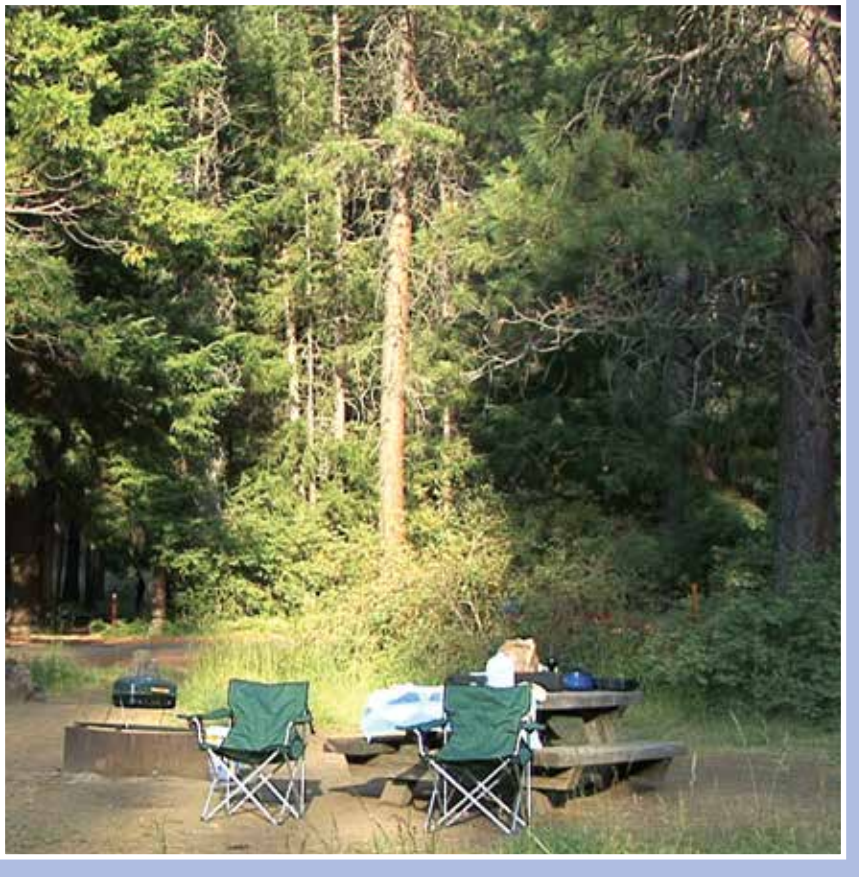
Logistics section chief—The logistics section chief provides facilities, services, and material support for the incident.

Finance/Administration section chief—The finance/administration section chief is tasked with all administrative and financial considerations surrounding an incident. This is the least used section.

Place Last Seen/Last Known Point (PLS/LKP)

While these terms are similar, they have slightly different meanings.

The PLS is where someone who can positively identify the subject actually saw the subject. The LKP could be the same as the PLS, but it may also be where the subject was known to have been but not necessarily seen. The suspect's abandoned vehicle, a log book at a trailhead, a photo taken at an ATM machine or by a security camera, or some other form of positive physical evidence can help establish the LKP.



Incident Action Plan and Mission Objectives

Now that you understand that the Incident Command System is used in both small and large emergencies, it is necessary to know why careful planning is done at the very beginning of the mission.

Even as the (IAP) Incident Action Plan is being developed, it is vital to confirm the confinement or search area and deploy some quick responses, such as a hasty team.

Search and Rescue Objectives

Search and rescue incidents are usually managed using the Incident Command System. This system uses a technique called "management by objectives," which involves determining your next action by developing objectives that must be obtainable, measurable, and flexible. An example objective might be "search for the missing subject from trailhead to top of ridge." Would this objective be obtainable, measurable, and flexible?

Notice that no search resources were part of the objective, as you might use more than one search resource to complete this objective, i.e., a ground team and a helicopter. The kinds of resources used are very rarely identified as part of an objective.

A *hasty team* is the first team deployed during a search. Its job is to look quickly and accurately for clues that may lead team members to the subject. This quick search is called a *hasty search.*

A good way to look at an *objective* is to ask "what do you want done?" *Strategies* answer the question "how do you want it done?" *Task assignments* answer "who do you want to do it?"

Search resources are used to meet the objectives. There may be many objectives during a search or rescue incident. However, even in major disasters there are usually fewer than 10 objectives at any particular time.

Objectives are developed for a specific time period, called the *operational period.* Most operational periods are 12 hours long, though they can be any length that the incident commander orders. For instance, in the above scenario one objective could be "check all campgrounds within three miles of the hunting camp every three hours until subject is located or search incident is suspended." This objective covers multiple time periods and would be an incident-long objective.

The Incident Action Plan

Now that you know what the objectives and operational time periods are, you can add other tasks and information needed to manage the next operational period. This plan is referred to as the Incident Action Plan (IAP).

Incident Action Plan

The IAP consists of eight forms (available at training.fema.gov/icsresource/icsforms.aspx):

- Incident Objectives (ICS 202) [[12A]]
- Organization Assignment List (ICS 203) [[12B]]
- Assignment List (ICS 204) [[12C]]
- Incident Radio Communications Plan (ICS 205) [[12D]]
- Communications List (ICS 205A) [[12E]]
- Medical Plan (ICS 206) [[12F]]
- Incident Organization Chart (ICS 207) [[12G]]
- Safety Message/Plan (ICS 208) [[12H]

INCIDENT OBJECTIVES (ICS 202)

1. Incident Name:	2. Operational Period: Date From: Time From: Date To: Time To:

3. Objective(s):

4. Operational Period Command Emphasis:

General Situational Awareness

5. Site Safety Plan Required? Yes ☐ No ☐

Approved Site Safety Plan(s) Located at:

6. Incident Action Plan (the items checked below are included in this Incident Action Plan):

☐ ICS 202	☐ ICS 206	Other Attachments:
☐ ICS 203	☐ ICS 207	☐
☐ ICS 204	☐ ICS 208	☐
☐ ICS 205	☐ Map/Chart	☐
☐ ICS 205A	☐ Weather Forecast/Tides/Currents	☐

7. Prepared by: Name: Position/Title: Signature:

8. Approved by Incident Commander: Name: Signature:

ICS 202 | **IAP Page** ____ | Date/Time:

ORGANIZATION ASSIGNMENT LIST (ICS 203)

1. Incident Name:	2. Operational Period: Date From: Time From: Date To: Time To:

3. Incident Commander(s) and Command Staff:		7. Operations Section:		
IC/UCs		Chief		
		Deputy		
Deputy		Staging Area		
Safety Officer		**Branch**		
Public Info. Officer		Branch Director		
Liaison Officer		Deputy		
4. Agency/Organization Representatives:		Division/Group		
Agency/Organization	Name	Division/Group		
		Division/Group		
		Division/Group		
		Division/Group		
		Branch		
		Branch Director		
		Deputy		
5. Planning Section:		Division/Group		
Chief		Division/Group		
Deputy		Division/Group		
Resources Unit		Division/Group		
Situation Unit		Division/Group		
Documentation Unit		**Branch**		
Demobilization Unit		Branch Director		
Technical Specialists		Deputy		
		Division/Group		
		Division/Group		
		Division/Group		
6. Logistics Section:		Division/Group		
Chief		Division/Group		
Deputy		**Air Operations Branch**		
Support Branch		Air Ops Branch Dir.		
Director				
Supply Unit				
Facilities Unit		**8. Finance/Administration Section:**		
Ground Support Unit		Chief		
Service Branch		Deputy		
Director		Time Unit		
Communications Unit		Procurement Unit		
Medical Unit		Comp/Claims Unit		
Food Unit		Cost Unit		

9. Prepared by: Name: Position/Title: Signature:

ICS 203 | **IAP Page** ____ | Date/Time:

ASSIGNMENT LIST (ICS 204)

1. Incident Name:	2. Operational Period: Date From: Time From: Date To: Time To:	3. Branch: Division: Group: Staging Area:

4. Operations Personnel: Name / Contact Number(s)

Operations Section Chief:

Branch Director:

Division/Group Supervisor:

5. Resources Assigned:

Resource Identifier	Leader	# of Persons	Contact (e.g., phone, pager, radio frequency, etc.)	Reporting Location, Special Equipment and Supplies, Remarks, Notes, Information

6. Work Assignments:

7. Special Instructions:

8. Communications (radio and/or phone contact numbers needed for this as

Name/Function / Primary Contact: indicate cell, pa

/

/

/

9. Prepared by: Name: Position/Title:

ICS 204 | **IAP Page** ____ | Date/Time:

INCIDENT RADIO COMMUNICATIONS PLAN (ICS 205)

1. Incident Name:	2. Date/Time Prepared: Date: Time:	3. Operational Period: Date From: Time From: Date To: Time To:

4. Basic Radio Channel Use:

Zone Grp.	Ch #	Function	Channel Name/Trunked Radio System Talkgroup	Assignment	RX Freq N or W	RX Tone/NAC	TX Freq N or W	TX Tone/NAC	Mode (A, D, or M)	Remarks

5. Special Instructions:

6. Prepared by (Communications Unit Leader): Name: Signature:

ICS 205 | **IAP Page** ____ | Date/Time:

COMMUNICATIONS LIST (ICS 205A)

1. Incident Name:	2. Operational Period: Date From: Time From:	Date To: Time To:

3. Basic Local Communications Information:

Incident Assigned Position	Name (Alphabetized)	Method(s) of Contact (phone, pager, cell, etc.)

4. Prepared by: Name: ______ Position/Title: ______ Signature: ______

ICS 205A | IAP Page _____ | Date/Time: ______

MEDICAL PLAN (ICS 206)

1. Incident Name:	2. Operational Period: Date From: Time From:	Date To: Time To:

3. Medical Aid Stations:

Name	Location	Contact Number(s)/Frequency	Paramedics on Site?
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No

4. Transportation (indicate air or ground):

Ambulance Service	Location	Contact Number(s)/Frequency	Level of Service
			☐ ALS ☐ BLS
			☐ ALS ☐ BLS
			☐ ALS ☐ BLS
			☐ ALS ☐ BLS

5. Hospitals:

Hospital Name	Address, Latitude & Longitude if Helipad	Contact Number(s)/ Frequency	Travel Time: Air	Travel Time: Ground	Trauma Center	Burn Center	Helipad
					☐ Yes Level:_____	☐ Yes ☐ No	☐ Yes ☐ No
					☐ Yes Level:_____	☐ Yes ☐ No	☐ Yes ☐ No
					☐ Yes Level:_____	☐ Yes ☐ No	☐ Yes ☐ No
					☐ Yes Level:_____	☐ Yes ☐ No	☐ Yes ☐ No
					☐ Yes Level:_____	☐ Yes ☐ No	☐ Yes ☐ No

6. Special Medical Emergency Procedures:

☐ Check box if aviation assets are utilized for rescue. If assets are used, coordinate with Air Operations.

7. Prepared by (Medical Unit Leader): Name: ______ Signature: ______

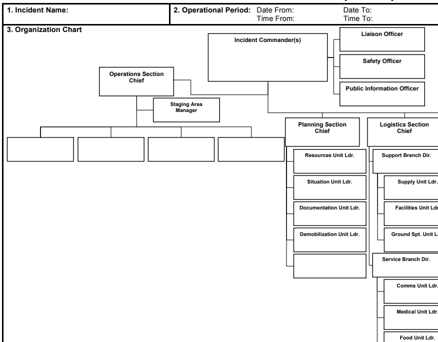
8. Approved by (Safety Officer): Name: ______ Signature: ______

ICS 206 | IAP Page _____ | Date/Time: ______

INCIDENT ORGANIZATION CHART (ICS 207)

1. Incident Name:	2. Operational Period: Date From: Time From:	Date To: Time To:

3. Organization Chart



ICS 207 | IAP Page ___ | 4. Prepared by: Name: ______ Position/Title: ______ Signature: ______ Date

SAFETY MESSAGE/PLAN (ICS 208)

1. Incident Name:	2. Operational Period: Date From: Time From:	Date To: Time To:

3. Safety Message/Expanded Safety Message, Safety Plan, Site Safety Plan:

4. Site Safety Plan Required? Yes ☐ No ☐
Approved Site Safety Plan(s) Located At:

5. Prepared by: Name: ______ Position/Title: ______ Signature: ______

ICS 208 | IAP Page _____ | Date/Time: ______

Some parts of the IAP might not be needed. For example, a traffic plan would only be used if you needed to reroute vehicle traffic to avoid congestion at the SAR incident base.

The IAP may also include an incident map, traffic plan, and subject information. Other pieces of information that might be important to document the next operational time period can also be included.

The ICS planning section is responsible for putting this plan together. When completed, the plan is presented at a command and general staff meeting, called the *planning meeting.* This meeting is normally held during the middle of the current operational time period. The purpose of this meeting is to review the current period objectives and put together a plan of action for the next operational period. The meeting has an agenda and is chaired by the planning section chief.

All elements of the IAP are discussed and modified as needed. The incident commander must approve the plan before it can be implemented. The key is finding information that could be used to help develop the IAP and completing the relevant forms. You might not have enough information to fill out any one form completely, while some information should be duplicated on every form, i.e., name of the SAR incident, next operational time period, date, and time.

A Note About Practice Scenarios

To fulfill requirement 8, you may use any of the practice scenarios presented in this pamphlet. If you prefer, your merit badge counselor might also create one for you. Search and rescue, like any other skill, is best learned by practice. For this merit badge, you will not have a real subject to search for; therefore, you and your patrol or troop should test the skills you have learned by doing practice search activities.

Practice Scenario 1

It is noon. You are assigned to the planning section and are asked to prepare for the planning meeting to be held at 2 p.m. The information available so far is the following: A Scout from Troop 1792 is missing. Emily Lopez, age 14, was last seen yesterday about noon when her patrol stopped for lunch on the Bear Canyon trail at Philmont. She was not feeling well and thought she had eaten something that upset her stomach. She has a history of stomach trouble and has medication that controls it; however, she did not bring it with her yesterday. When found, she may need medical attention. The closest ambulance is located in Cimarron and can be contacted at 575-123-4568 if needed.

For this practice scenario, you might use the following.

Objective: Search from campground road to Silver Lake

Strategy: Use a K9 dog team and aircraft

Task Assignment: K9 team 4, Civil Air Patrol (CAP) aircraft

The Scoutmaster, who is a trained incident commander (IC), has named the search the "Bear Canyon Search" and as IC has put together the following objectives for today's search actions.

1. Ensure the safety of all Scouts on the search incident.
2. Search Bear Canyon trail from the place last seen (PLS) to the old log cabin.
3. Notify all campers at campgrounds within three miles of the PLS of the missing Scout.
4. Ensure good radio communications cover the entire search area.

The IC, Stephanie Johnson, said she would stay on as the incident commander during the next operational period. Rhonda Jackson is operations section chief, Ben Sakamoto is planning section chief, Charlene Greer will stay with the family as liaison officer, and Bob Real is the logistics chief.

The operations section chief has requested that all searchers in the field use the local sheriff's radios on channel 4. Logistics has requested its section use channel 2. The sheriff's department has advised the IC that their radio network will cover the entire search area.

It has been reported that bears may be in the search area. All searchers should be notified to be alert for signs of bears. Weather in the search area tonight should be very cold. Temperatures may drop to 25 degrees, and winds are predicted to be from the north at 15 mph with gusts to 25 mph until about dawn.

The planning section is preparing posters advising all participants of the possibility of bears in the search area, as well as the predicted cold weather.

The operations section chief has requested that K9 team 4 search the Bear Canyon trail tonight. She will advise the team to be aware of any signs of bears. The K9 team will need transportation from the log cabin back to the incident base. She has also requested that one of the sheriff's vehicles check all campgrounds within three miles of the PLS every four hours tonight, as well as interview all campers about the missing Scout and tell them to call 911 if they see her.

Special SAR Environments

When many people think about search and rescue missions, they typically think of operations occurring in wilderness areas, such as canyons, forests, and other remote locations. SAR operations, however, can take place in any environment where people are missing.

Urban SAR

An urban search involves looking for a subject in a populated area as opposed to a wilderness setting. In addition to basic SAR principles, searchers working in an urban environment must also know how to use equipment suited to the situation, be aware of safety concerns relating to traffic and other hazards, and understand subject behavior as it applies to an urban environment.

The subject of an urban search is often a small child or an elderly person. Someone's toddler or an Alzheimer's patient may have wondered away and be lost and confused. The care and skill of urban search teams may turn a possible tragedy into a happy reunion.

Type 1 Urban Search

Urban SAR teams work in cities, suburbs, and even rural areas. The type 1 urban search is like a hasty search but emphasizes notification of nearby residents and quick searches of areas open to the public.

At times a search may originate in an urban area and quickly move to a less populated neighborhood or even the wilderness. An example of this might be if the last known point (LKP) is near the edge of town.

The teams must always understand that the search may be related to a crime against the subject such as abduction.

Searches in urban areas are most effective when conducted at times when residents are at home and can be alerted. Often neighbors have information about the subject that can be useful.

Being able to hand out fliers and photos of the subject and interview neighbors will create a sense of urgency and may result in a quick find of the subject. Search team leaders might identify themselves as follows:

"Hello. My name is _____. I am with (name of search organization). We are looking for (subject's name). Can you help us?"

When searching a neighborhood, search team members ask residents if they or any members of their family have seen or know the subject. They are requested to search their own yards and outbuildings or other places where a subject may seek shelter on their property.

Searchers also ask about any known trails or possible places in the area where the subject could seek shelter. (Children sometimes know more about trails than adults.) Parks, beaches, school yards, urban trails, trash bins, and open public buildings should be quickly searched.

The team scribe or note taker will record information about who has been contacted and their address, the public areas that have been checked, and where additional SAR efforts are needed. If the searchers find the person or something that might help in the search, they should log the information and then communicate via phone or radio with the SAR team base.

Any areas that present a safety concern or are occupied by a suspicious person must be searched by law enforcement personnel. The well-being of team members must always be considered.

Should these search tactics not be successful, a type 2 search is warranted.

Type 2 Urban Search

The type 2 urban search is a systematic search of yards and buildings and all places within the assigned area. The interview and introduction are as in a type 1 search except that the team members will seek permission to do the search themselves. If a residence is the LKP, it must be searched by highly trained searchers. The landowner or a representative should be present if at all possible. This type of SAR is generally used within one-quarter mile of the PLS or LKP.

Type 3 Urban Search

Although seldom used, a type 3 search may be necessary in instances where a very thorough search is needed to cover an area. This is very similar to how and when SAR would be conducted in a wilderness setting.

As this search becomes more complicated, be aware that the incident may be leaning toward the commission of a crime. Additional personnel who have advanced skills and a positive mental attitude, are very clue aware, and are able to fully document their actions in writing will be used.

Areas that are woody, brushy, or have high grass may have to be grid searched utilizing wilderness tactics.

On an average day, the U.S. Coast Guard responds to 64 SAR cases and assists 117 people in distress.

Water Rescue

Search and rescue is one of the Coast Guard's oldest missions. Preventing and minimizing the loss of life, injury, or property damage or loss by rendering aid to people in distress in a maritime environment has always been a Coast Guard priority. The Coast Guard monitors distress (mayday) signals and responds on the waters of the Atlantic and Pacific oceans, the Gulf of Mexico, and several inland waterways.

The Coast Guard responds to a SAR situation using cutters, small patrol boats, motor surf boats, and aircraft (both fixed wing and helicopters), all linked by a very high-tech communications network. The Coast Guard also provides maritime safety programs, including recreational boating safety and commercial vessel safety.

All families should have a list of emergency numbers posted near their phone. If you live near a large body of water, you should include the phone number of the nearest U.S. Coast Guard Rescue Coordination Center.

Rescue 21

Rescue 21 is the Coast Guard's advanced command, control, and direction-finding communications system. It was created to better locate mariners in distress and to save lives and property on the water. Rescue 21 harnesses technology to enable the Coast Guard to execute its search and rescue missions with greater agility and efficiency.

The state-of-the-art system provides search and rescue radio communications and supports digital-selective calling (DSC). It allows boaters with properly installed equipment to transmit an automated distress signal, including vessel location and other information, at the push of a button. It also features high-quality audio recording and playback to help watchstanders (or lookouts) better understand distress calls and monitor multiple channels simultaneously.

Looking up a Rescue 21 radio tower in Cape May, New Jersey.

The system is operational along the coasts of the contiguous United States; Hawaii; Puerto Rico; Guam; the U.S. Virgin Islands; the Northern Marianas Islands of Saipan, Tinian and Rota; in parts of Alaska; and in much of the Mississippi, Missouri, and Ohio rivers and their major tributaries.

Rescue 21 helps identify the location of callers via towers that generate lines of bearing to the source of radio transmissions, thereby significantly reducing search time. Rescue 21 extends coverage to a minimum of 20 nautical miles from the coastline. It improves information sharing and coordination with the Department of Homeland Security and

Reporting an Emergency to the Coast Guard	
By Telephone	Look in the front of your telephone directory for an emergency number listing for the U.S. Coast Guard. or Dial 911. or Call the nearest U.S. Coast Guard Rescue Coordination Center listed in the front of most telephone directories.
By VHF-FM Radio (This is the preferred method for reporting emergencies from vessels on the water.)	Follow this procedure to call the Coast Guard: 1. Make sure the radio is on. 2. Select channel 16 VHF-FM (156.8 MHz). 3. Press and hold the transmit button. 4. Clearly say, "Mayday, mayday, mayday." 5. Give the name and description of the vessel, the position or location, the nature of the emergency, and the number of people on board. 6. Release the transmit button. 7. Wait for 10 seconds. Repeat the call until you receive a response.
By Cell Phone	Look in the front of your telephone directory for an emergency number listing for the U.S. Coast Guard. or Dial 911. or Call the nearest U.S. Coast Guard Rescue Coordination Center listed in the front of most telephone directories.
By Email	If you are in distress or need to report an emergency, do **not** send a message via email or text messaging. Contact the Coast Guard via telephone or radio. You must have a two-way voice conversation.
By Other Methods	There are nationally and internationally accepted visual and sound distress signals (using flares, horns, mirrors, flashing lights, and flags).

other federal, state, and local first responders, and can also help watchstanders recognize potential hoax calls by identifying discrepancies between callers' reported and actual locations.

Rescue 21 meets the safety requirements needed for the expanding Marine Transportation System and for International Convention for the Safety of Life at Sea standards. It also provides modernized command and control capabilities and improved maritime domain awareness, both critical to the performance of Coast Guard missions.

Rescue 21 has supported more than 98,000 rescue cases since November 2005, when the first rescue attributed to the system occurred off the coast of the Eastern Shore of Virginia.

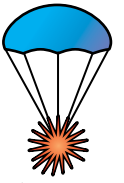
The U.S. Coast Guard has been a regular participant in National Scout Jamborees. At the 2013 event, the USCG ran a simulation to show Scouts how to use wood to plug leaks in a pipe in event of an emergency.

Standard Marine Distress Signals

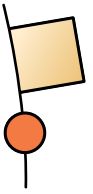

FLAMES IN A BUCKET


CODE FLAGS NOVEMBER AND CHARLIE

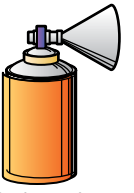

HANDHELD FLARE OR SMOKE

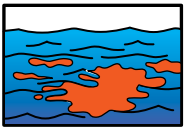

PARACHUTE WITH A RED FLARE


SHOTS FIRED IN THE AIR AT ONE-MINUTE INTERVALS


SQUARE FLAG AND BALL

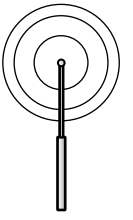
MAYDAY CALL BY RADIO

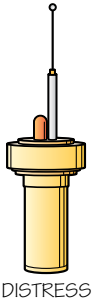

FOGHORN SOUNDED CONTINUOUSLY

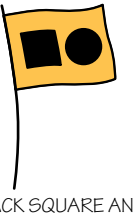

WATER DYE MARKER OF ANY COLOR


WAVING ARMS


RED METEOR FLARES


RADIO BEACON


RADIO DISTRESS ALERT


BLACK SQUARE AND BALL ON ORANGE FIELD


MORSE CODE SOS SIGNAL

Unofficial but still widely recognized distress symbols include flying an inverted U.S. flag or waving a red-orange flag of any size.

Searching in Snow

When people become lost, the environment in which they find themselves is often a critical factor in their survival. The weather, along with poor decision-making, often causes problems for both the searchers and the subject. Some of the most demanding SAR environments are those in which snow is a factor.

Snow can be a challenging weather condition in which to perform search and rescue. However, one nice thing about snow is that often you can visually track a subject, although the tracks can be lost quickly due to wind and additional snowfall. Among the many considerations when preparing to search in snow are proper clothing, additional gear, terrain, and specialized teams and training.

As when dealing with any challenging search and rescue situations, be careful to keep yourself safe and know when to stop and ask for help before you are in over your level of training and experience. **Do not become an additional subject.**

When looking for someone who is lost or injured in a snowy environment, among the primary concerns are hypothermia and other cold- or exposure-related injuries. In such cases, you need to be almost as aware of your own health and that of the searchers around you as the subject's. Hydration is key, as well as fueling your hard-working body, so you need to make sure you have plenty of water and food and maybe even a stove and fuel to prepare some morale-lifting hot food and drinks.

Avalanche Rescue

Avalanches are one of nature's most powerful events and can cause a great deal of damage and loss of life. Avalanches occur when three variables combine—snowpack, terrain, and weather. Each of these aspects is important, but avalanches are not hazardous without the addition of property or people. Avalanche rescue is conducted only by trained and qualified personnel and never by Scouts.

Only trained personnel should participate in avalanche rescue. To find an organization in your state that provides such training, search on the internet for your state's emergency management agencies.

Practice Scenario 2

You and your troop are camping out at Oak Flats campground for the weekend. It is a sunny spring Saturday and everyone in the troop has been busy working on skills and merit badge requirements. Suddenly, a woman looking distraught and worried approaches your group. She explains to your troop leader that her 4-year-old daughter, Annie, has disappeared from their picnic site just across the campground. She says that Annie was playing with the family's dog, and the next thing she knew, her daughter and the dog were gone. She is asking for help.

Annie is wearing a blue cotton top, red cotton shorts, and tennis shoes. She is in good health and has never wandered off before. The surrounding terrain has a lot of scrub oak trees and bushes, and it is hard for a short person to pick out landmarks. Your troop leader says he will call the Forest Service to alert them about the missing girl and request they start a search and rescue mission.

He instructs you, as the senior patrol leader, to have your patrols conduct a hasty search of the area, including checking all structures in the area. They should tell other campers they encounter about the missing girl and give them a description. If anyone finds her, they should come to your troop's campsite. He tells you to instruct the patrol search teams to use attraction to find Annie by calling out her name and the dog's name and then listening for an answer. He reminds you to be clue aware and to look for her tracks while searching.

Finally, he tells you to have all search teams return to the troop campsite in one hour to report their findings and be ready for a new assignment when the SAR coordinator arrives.

Be Prepared…Safety First

Before searchers go into the field, some thought must be given to their and their fellow team members' personal safety. It does the subject no good if the search is delayed because a team member gets injured.

The physical condition of the searchers and their equipment, and the suitability of their clothing must be checked by the safety officer or team leader. There will also be an environmental briefing describing possible hazards and weather conditions the searchers are likely to encounter.

Staying Found

For more than a century, Scouting has taught young people and adults the skills needed to safely enjoy the outdoors. Scouts who read the *Scouts BSA Handbook* and *Fieldbook* and practice good hiking and camping principles will become proficient in outdoor skills. As you progress in the earning of this merit badge, you will learn more about skills that are important for search and rescue. Here are some pointers to keep from becoming the subject of a search and rescue.

- Always have a trip plan and share it with your parents.
- Stick to your trip plan.
- Know what the weather is like where you are going and be aware of how quickly the weather can change.
- Never hike or camp alone; go with your patrol or troop.
- Use the buddy system.
- Have proper gear and clothing and take care of it.
- Log into trailhead log sheets if available.
- Get and stay in top physical condition; be prepared for the level of activity planned.

If your plans must change while on an outing, be sure to alert your parents. Call ahead to your destination if someone is expecting you.

And finally, discuss safety and good decision making with all the members of your patrol and troop. Get everyone's agreement to be safe and prepared.

Buddy System

The buddy system is a way for Scouts to look after one another, especially during outdoor adventures. You keep track of your buddy, and your buddy keeps track of you. The buddy system should always be used when a troop or patrol is hiking, camping, and participating in any aquatic activities. The chances of a Scout becoming lost decrease when use of the buddy system is encouraged.

After you discover how search and rescue missions for lost people are reported in your area, discuss the procedure with your parents. Post the phone number of the local agency responsible for search and rescue along with other emergency telephone numbers.

In December 2011, members of PhilSAR (Philmont Search and Rescue) rescued a family whose vehicle had become disabled in a blizzard not far from the BSA high-adventure area. Their SUV was completely buried in the snow. The family had packed food and water for their trip and was able to survive for two days trapped in their vehicle. They called the state police on their cell phone and gave their approximate location. The PhilSAR team found the vehicle by using ski poles like avalanche probes and rescued the occupants as they were getting low on oxygen. This rescue had a happy ending because the family was prepared and did the right things to "stay found."

First Aid

Searchers should also be prepared to handle some typical first-aid situations that may arise, including snakebites, dehydration, shock, environmental emergencies such as hypothermia or heatstroke, blisters, and ankle and knee sprains.

Shock

The circulatory system of a person who is injured or under great stress might not provide enough blood and oxygen to the tissues of the body. This condition is called *shock.* Left untreated, it can be deadly (as organs can begin to fail). A shock victim can have some, all, or none of the following symptoms:

- Restlessness or irritability
- A feeling of weakness
- Confusion, fear, and dizziness
- Skin that is moist, clammy, cool, and pale
- A quick, weak pulse
- Shallow, rapid, and irregular breathing
- Nausea and vomiting
- Extreme thirst

Serious injuries and sudden illnesses are almost always accompanied by some degree of shock, but the victim might not be affected right away. Treat every accident victim for shock even if no symptoms appear. Prompt first aid may prevent shock from setting in.

1. Try to eliminate the causes of shock by restoring breathing and circulation, controlling bleeding, relieving severe pain, and treating wounds.
2. Summon emergency aid.
3. Monitor the victim closely to make sure the airway stays open for breathing.
4. If the victim is not already doing so, help him or her lie down. If you do not suspect back, neck, or head injuries, or fractures in the hip or leg, raise the feet about 12 inches to move blood from the legs to the vital organs.
5. Keep the victim warm with blankets, coats, or sleeping bags.

Blisters

A *hot spot*—the tender area as a blister starts to form—is a signal to stop immediately. To treat a hot spot or blister, cover the pinkish, tender area with a piece of moleskin or moleskin foam slightly larger than the hot spot. Use several layers if necessary.

If you must continue your activity even though you think a small blister will burst, you might want to drain the fluid. First, wash the skin with soap and water, then sterilize a pin in the flame of a match. Prick the blister near its lower edge and press out the fluid. Keep the wound clean and covered with a sterile bandage or gel pad and moleskin. Change bandages every day and treat the area to help keep wounds clean and avoid infection.

Sprains

A sprain occurs when an ankle, wrist, or other joint is bent or twisted far enough to overstretch the ligaments, the tough bands that hold joints together. Minor sprains cause only mild discomfort, but more serious sprains might be temporarily disabling. A sprained joint will be tender and painful when moved and might show swelling and discoloration.

Assume that any injury to a joint also may include a bone fracture. To treat sprains and prevent further injury, have the victim take any weight off of the injured joint and instruct him or her not to use the joint. Do not try to move or straighten an injured limb. Cover any open wounds with a sterile dressing. Apply ice packs or cold compresses to the affected area for no more than 20 minutes at a time. Be sure to place a barrier such as a thin towel between the ice pack and bare skin. Seek medical treatment if the pain is persistent or severe.

Hypothermia

A hypothermia victim may experience numbness, fatigue, irritability, slurred speech, uncontrollable shivering, poor judgment or decision making, and loss of consciousness. Treat a hypothermia victim by preventing the person from getting colder. After summoning help, use any or all of the following methods to help bring the body temperature back up to normal:

- If the person is fully conscious and able to swallow, have him or her drink warm liquids (soup, fruit juices, water; no caffeine or alcohol).

- Move the person into the shelter of a building or a tent. Remove wet clothing. Get him or her into dry, warm clothes or wrap the person in blankets, clothing, or anything handy that could be used, like jackets or a sleeping bag.
- Wrap towels around water bottles filled with warm fluid, then position the bottles in the armpit and groin areas.
- Monitor the person closely for any change in condition. Do not rewarm the person too quickly (for instance, by immersing the person in warm water); doing so can cause an irregular and dangerous heartbeat.

Dehydration

To treat mild dehydration, drink plenty of water or a sports drink to replace fluids and minerals. Drink one to two quarts (or liters) of liquids over two to four hours. See a physician for moderate dehydration. Severe dehydration requires emergency care; the victim will need intravenous fluids. Rest for at least 24 hours and continue drinking fluids. Avoid tiring physical activity. Although most people begin to feel better within a few hours, it takes about 36 hours to completely restore the fluids lost in dehydration.

Heatstroke

Left untreated, heat exhaustion can develop into heatstroke, which can lead to death if not treated immediately. In heatstroke, the body's cooling system begins to fail and the person's core temperature rises to life-threatening levels (above 105 degrees). One type of heatstroke develops in young, healthy people from dehydration and overexertion in hot weather, especially in high humidity. Signals of exercise-related heatstroke can include any signals of heat exhaustion as well as hot, sweaty, red skin; confusion; disorientation; and a rapid pulse.

The other type of heatstroke usually happens in elderly people when the weather is very hot, especially with high humidity. The signals are similar to exercise-related heatstroke except that the skin is hot and dry because there is no sweating.

Heatstroke is always a life-threatening condition. Call for medical assistance immediately. While waiting for medical personnel to arrive, work to lower the victim's temperature. Move the person to an air-conditioned or shady area. Loosen tight clothing and further cool the victim by fanning and applying wet towels. Wrap ice packs in a thin towel and place them under the armpits and against the neck and groin. If the person is able to drink, give small amounts of cool water.

Snakebites

The bite of a nonvenomous snake causes only minor puncture wounds and can be treated as such. Scrub the bite with soap and water, treat with an antiseptic, and cover with a sterile bandage. However, a venomous snakebite requires special care.

Because snakes are not warm-blooded, they cannot carry rabies.

The venomous snakes of North America are pit vipers and coral snakes. Pit vipers, including rattlesnakes, copperheads, and cottonmouths, have triangular-shaped heads with pits on each side in front of their eyes. Signs of a pit viper bite include puncture marks, pain (perhaps extreme) and swelling (possibly severe), skin discoloration, nausea and vomiting, shallow breathing, blurred vision, and shock.

Coral snakes have black noses and are marked with side-by-side red and yellow bands, separated by bands of black. They inject a powerful venom that affects the victim's nervous system. Signs of a coral snakebite include slowed physical and mental reactions, sleepiness, nausea, shortness of breath, convulsions, shock, and coma.

The bite of a venomous snake can cause sharp, burning pain. The area around the bite might swell and become discolored; however, a venomous snake does not inject venom every time it bites. Here are the steps for treating the bite of venomous snakes.

1. Get medical attention for the victim as soon as possible so that physicians can neutralize the venom.
2. Remove rings and other jewelry that might cause problems if the area around the bite swells.


Copperhead


Cottonmouth moccasin


Rattlesnake


Coral snake

3. If the victim must wait for medical attention to arrive, wash the wound. If it is a bite of a coral snake, wrap the area snugly (but comfortably) with an elastic roller bandage.
4. Have the victim lie down and position the bitten part lower than the rest of the body. Encourage him or her to stay calm.
5. Treat for shock.

Do not make any cuts on or apply suction to the bite, apply a tourniquet, or use electric shock such as from a car battery. These methods could cause more harm to the victim or are not proven to be effective.

For more information about first aid, see the *First Aid* merit badge pamphlet and the *Scouts BSA Handbook for Boys* or *Scouts BSA Handbook for Girls.*

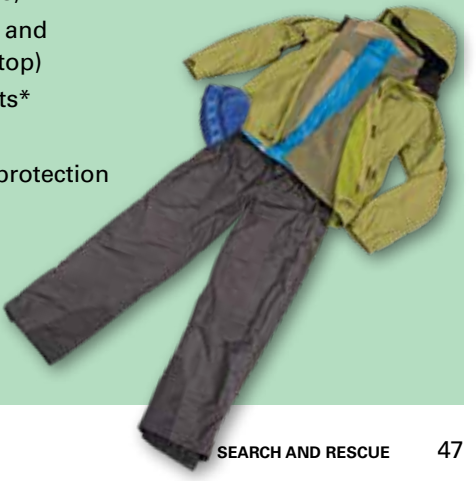
Gear and Clothing

Search team members are called out on very short notice, so having a pack ready to go, called a *ready pack,* is important. The kind of clothing and gear a team member must have is dictated by the climate in the area. Most search teams require their members to have sufficient clothing and gear to enable them to stay in the field for at least 24 hours.

Clothing

- Sturdy hiking boots
- Sturdy work gloves
- Head cover(s)
- Gloves and/or mittens
- Socks and sock liners (and extras)
- Inner layer of basic underwear* and long underwear* (bottoms and top)
- Middle layer(s) for warmth (pants* and shirt*)
- Outer layer for wind and water protection (bottoms and top with hood)

(Waterproof/breathable clothing is recommended. Items marked with an asterisk [*] should be made of wool or a warm synthetic fabric. Remember: "Cotton kills.")



When preparing your gear, be sure to take into account the weather, temperature, and potential storms.

Fabrics for Outdoor Wear

Wool can keep you warm even when it is damp from rain. If wool feels scratchy against your skin, wear long underwear or a T-shirt beneath it.

Cotton is good for warm, dry weather. Once wet, though, cotton will not keep you warm. That can make it dangerous to wear on trips when conditions might turn chilly, rainy, or snowy.

Many *synthetic* fabrics offer the comfort of cotton and the warmth of wool. Clothing made of polypropylene, polar fleece, and other modern materials can insulate you whether it is wet or dry.

Gear

- Pack or container to carry/hold the required gear and clothing
- Eye protection (such as sunglasses or goggles)
- Food for 24 hours (should be high in caloric content and able to sustain your energy over a long period of time)
- Water (2 quarts minimum)
- Swiss Army knife or Leatherman multitool type knife (one that has several blades and other attachments)
- Fire starter
- Compass with 5 degree accuracy
- Map of search area
- Whistle
- Signal mirror
- List of phone numbers including the number for Incident Base

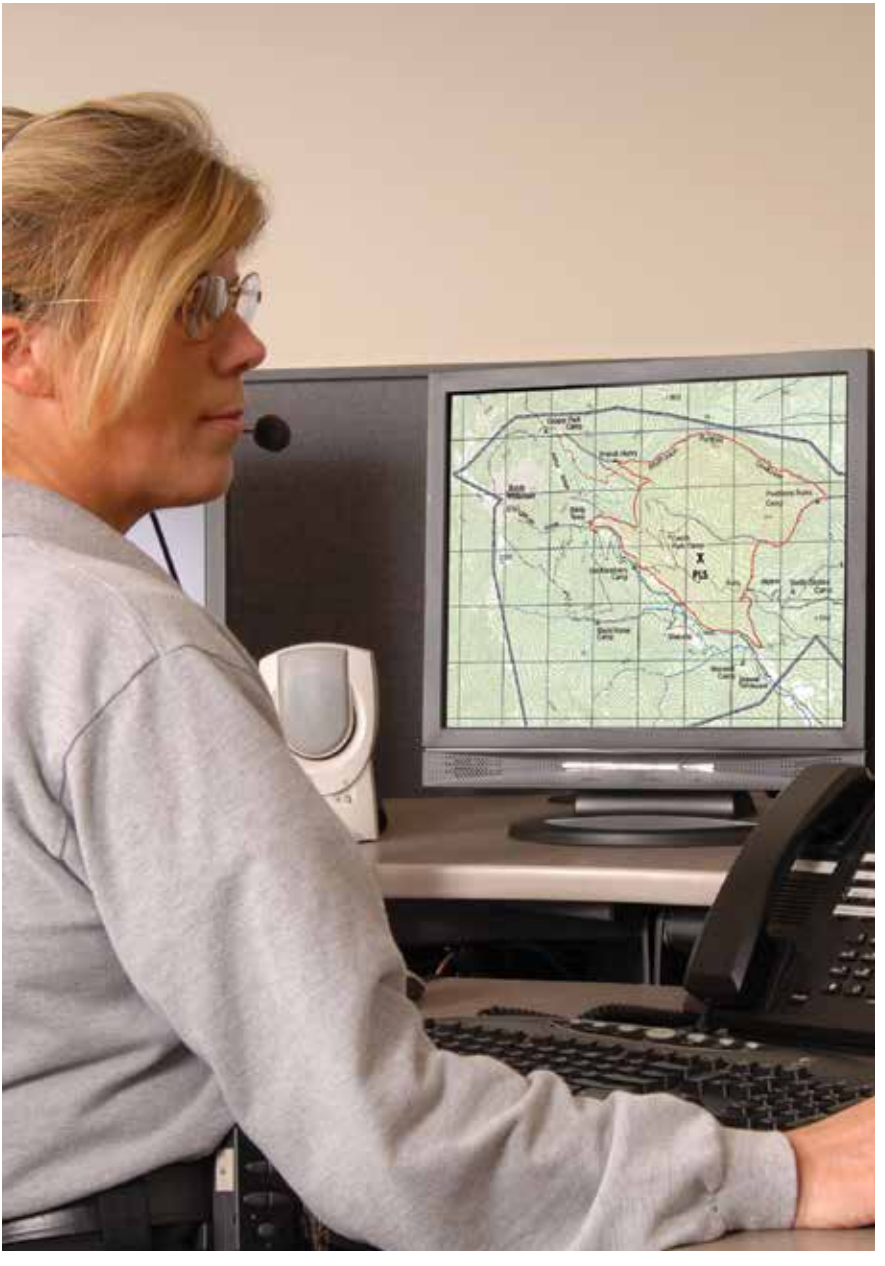
- Two light sources (flashlight and/or headlamp, plus extra batteries and replacement bulbs)
- Personal first-aid kit
- Space blanket
- Pencil or pen and waterproof paper
- 20 feet of 1-inch tubular nylon webbing

The following items are optional:

- Tools needed for particular functions such as navigation, record keeping, marking, and communication
- Subject find and stabilization supplies, such as basic first-aid equipment and an extra space blanket to keep the subject warm; these can be based on weather and availability of medical services
- Safety equipment, generally including an ANSI Class 2 vest and other equipment required by command team

Practice Scenario 3

At approximately 9:15 p.m. Sunday, a Scout was reported missing at summer camp. She was last seen hiking back to the troop campsite after the Sunday evening opening campfire. She is a Second Class Scout, 11 years old, and dressed in Scout shorts, a T-shirt, and tennis shoes. It is her first time at this camp and it is her first summer camp. The limited information available makes it extra challenging for SAR officials.



Interviewing and Investigation

When a person is believed to be missing, it is considered an emergency, and someone must report it to the proper authorities. That person is called the *reporting party* and the lost person is called the *subject* of the search. Gathering as much information as possible, as soon as possible, about the subject is important for a successful search.

To fulfill requirement 4 for the Search and Rescue merit badge, you need to find out which agency in your area has the jurisdiction and responsibility for search and rescue. This varies from state to state and community to community, so you will need to do a little investigating on the internet, but that is also a skill a good searcher must have. Also, make sure you know the reporting process in your town and in the area where you will be hiking or camping.

Interviewing

After a person is reported missing, a police officer or other trained investigator interviews the reporting party and any other witnesses who may have some knowledge about the subject. The interviewer is trying to get an accurate physical description, including type of clothing the subject was wearing, the equipment he or she may have had, and the subject's level of outdoor training and skill. It is also important to have an idea of the subject's mental state at the time he or she went missing.

It is important that the interview be done as carefully as possible. Remember that it is an interview, not an interrogation. The subject's friends or fellow Scouts may harbor feelings of guilt because their friend is lost. Most often the interviewer will ask questions of individuals rather than a group because there may be a strong personality in the group who offers the most—but not always the correct—information. By interviewing several people, the interviewer can get a much clearer idea of the circumstances that caused the subject to go missing. The interviewer will ask questions calmly so that the information gained can be as accurate as possible. This helps the incident commander begin to formulate a search plan or Incident Action Plan (IAP).

If it is determined that a search is necessary, a series of events unfolds in rapid succession.

A number of forms can be used during the interview to help the IC and command staff plan the search. These forms typically ask for the source of information, the reporting party, the reporting party's relationship to the subject, how to contact the reporting party later if he or she leaves the search scene, and what the reporting party believes happened to the subject.

The interviewer next seeks out basic information about the subject, including the following:

- The name of the subject
- Address and phone number
- Age and date of birth
- Height and weight
- Physical description including distinguishing marks
- Whether the subject wears glasses or contacts and whether these have been left behind or lost
- Type, style, and color of all clothing the subject was wearing when last seen

Having a photograph of the subject can really help the search.

If the subject left his or her pack or an article of clothing behind, it might be used as a scent item for a canine search. This is discussed later in the "Specialized SAR Teams" section.

Finally, the interviewer will ask what the subject's plans were. This basic knowledge helps determine the degree of urgency that the search must take.

A search manager (the IC) is then appointed and teams are activated.

Evaluating Search Urgency

Occasionally during a high-adventure backcountry experience an entire group can go missing. Hikers may have made a wrong turn at a trail intersection or failed to consult their map. If they have their gear, food, and water with them, and if weather conditions are favorable, the group may be considered overdue rather than missing. They very well may self-evacuate and get back on their planned itinerary. Searching for such a group would not hold very high urgency.

On the other hand, a missing young child or elderly person is an urgent situation.

Factors to be considered in determining search urgency include the subject's medical condition, his or her outdoor experience, the equipment he or she may be carrying, current weather conditions and the eight-hour forecast, and the terrain or hazards in the area. Each of these factors is assigned a number value. The lower the number, the greater the urgency.

See the resources section for links to examples of search urgency worksheets.

Lost Person Profiles

By analyzing the behavior of previous lost people, it may be possible to "predict" what subjects in similar situations might do, where they might go, or where they might be. This will be helpful as you complete your IAP (Incident Action Plan) and work on your clue awareness and tracking.

The analysis of thousands of search and rescue reports has found that people of certain ages and with certain interests have some of the same reactions to being lost. This section lists some examples.

Children Ages 1 to 3 Years

Children this young are unaware of the concept of being lost. Their navigation skills and sense of direction are almost nonexistent, and they tend to wander aimlessly. They tend not to respond to whistles or calls.

These children often seek out a place to lie down and go to sleep. This could be under thick brush, an overhanging rock, or a picnic table; inside a car trunk, camper, or building; or curled up with a pet. Other places to look are nearby bodies of water. Young children are difficult to detect and rarely walk out by themselves.

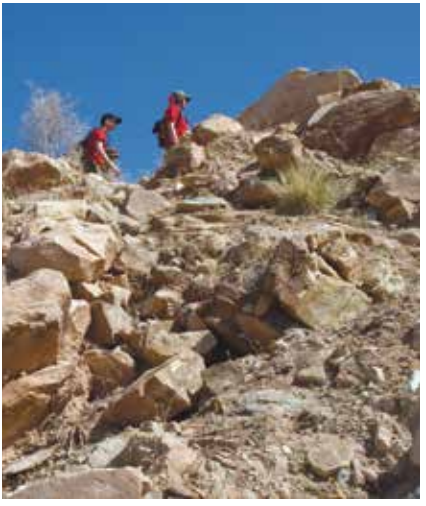
Children Ages 4 to 6 Years

Children this age have a developing concept of being lost and will attempt to return home or go to a familiar place. They may panic and become further lost as they attempt to "find" themselves. They are more mobile than 1- to 3-year-olds and may also use tracks, trails, or shortcuts that do not readily appear well-defined to an adult. These children sometimes become lost when they follow an animal or a group of older children. Children this age are often found in the same places as children ages 1 to 3.

Children Ages 7 to 12 Years

While children in this age group have more developed navigation and directional skills than 1- to 6-year-olds, the "mental maps" they have constructed of their environments may be highly inaccurate, and they frequently become lost while attempting a shortcut to a familiar location. They may also become lost during fantasy play or adventuring, and may become upset or confused and react irrationally, which can include trail running, putting them some distance from the PLS/LKP (place last seen/last known point). They may respond more maturely if they are with a friend or sibling. While they will attempt to find themselves, they often lack adult tactics.

To find children this age, check with friends about tracks, trails, shortcuts, and any "secret" or favorite places, hideouts, or routes. These children may have followed wildlife into wooded areas. Other places to search are buildings, parked vehicles, bodies of water and watercraft, and children's attractions such as playgrounds.



Using the buddy system whenever you are enjoying outdoor activities like hiking makes it less likely that you will get lost, because you keep track of each other.

Youth Ages 13 to 15 Years

This is the age of many Scouts BSA high-adventure participants at national and council bases. Those in this age group have more highly developed navigation and directional skills than 7- to 12-year-olds, and frequently become lost in groups while engaged in exploring or adventure activity. They rarely travel far if in a group and will usually respond to calls and whistles. Some may try "direction sampling" as they look for a familiar place. While they will attempt to find themselves, they often lack adult tactics and may panic and resort to irrational tactics. Places to search for this age group include tracks, trails, and shortcuts. Check with friends about any "secret" or favorite places, hideouts, or routes. Also be sure to search landmarks, high points, and water features.

Trained searchers and search managers know the characteristics of many more categories of lost subjects. They also know how people who are despondent or have developmental delays or cognitive disorders may behave if lost.

Practice Scenario 4

On August 2, a Scout troop from Iowa hiked to the search and rescue camp at Philmont Scout Ranch as part of their prearranged itinerary. Because one of the hiking leaders took a wrong turn, the group lost valuable daylight and arrived at the camp after sunset. They pitched their tents, hastily ate dinner, and fell into their sleeping bags, exhausted.

At 7 a.m. the next day, a group of boys sharing one of the tents woke up to find that one of them, Tommy, age 13, was missing. The boys vaguely remembered that he had left the tent in the middle of the night, saying he had to go to the latrine. The boys fell back to sleep but later were awakened slightly when thunder rumbled and a light rain began to fall.

No one knows exactly what time Tommy left or what he was wearing, as it was dark, but most of his gear is in the tent and undisturbed. He had brought a soft pair of moccasins to wear as camp shoes, and they are missing. The boys walked to the latrine to look for Tommy, but there was no sign of him.

Tommy, who is a cross country runner at his school in Iowa, is known to be afraid of the dark. He has not been in Scouting very long, and this is his first time to Philmont.

Orientation and Navigation

Navigating in search and rescue requires the constant determination of distances, including distances the search team will travel and has traveled, distances within the search area, and distances to and from landmarks. The most important tools for any search and rescue team member are a map, compass, GPS unit, and the knowledge to use them.

Map and compass are fantastic tools and don't need batteries, but you must have a map of the area you are searching. Sometimes a reporting party will sketch a map of the area, which can be helpful. GPS units are great, too, as they can be very precise about your location and can carry lots of maps, but they require a power source.

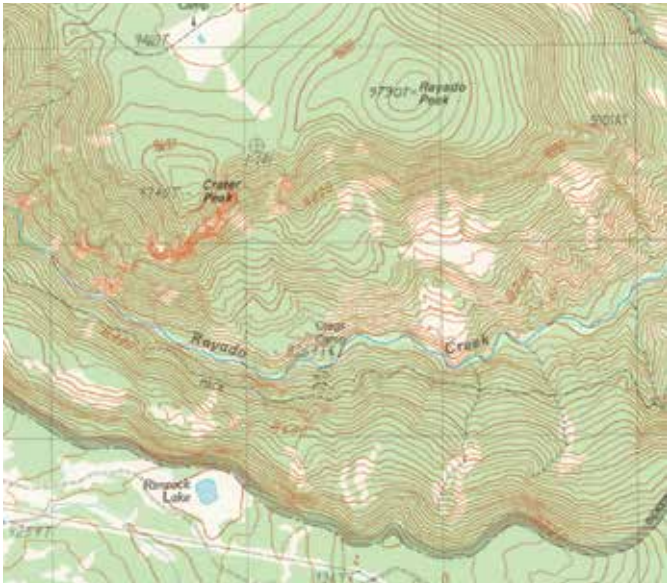
So what is the best answer? Use the map, compass, and GPS unit together.

Maps and Compasses

Several kinds of maps are commonly used in search and rescue. Online maps are popular but are limited because most portable computer devices are too small for the maps to be useful. Road maps, the kind you can pick up at a gas station or convenience store, are most useful in an urban search. Maps called *charts* are used in water-based search and rescue, and are readily available through nautical supply stores. The type of map that is most often used in search and rescue, especially in wilderness settings, is a United States Geological Survey (USGS) or topographic map.

Maps provide a lot of useful information in the margins. If you are using a map that was not printed by the USGS, double-check that the scale uses the same distance ruler; this is usually in the bottom margin. Latitude and longitude and usually the Universal Transverse Mercator (UTM) grids are along the edges of the map as well.

One of the most important margin notes is called the *map datum;* this is a reference to the base of information used to build the map. Most maps in the United States use North American Datum 1927 (NAD 1927) and the World Geodetic System 1984 (WGS 1984), which is also used commonly in GPS units. You need to make sure that the datum is consistent throughout your team and that you have communicated which you are using to the incident command.



Some additional helpful features include a declination scale or adjustment of some sort, a sighting mirror, and a clinometer for measuring slopes or inclines.

Using a map and compass together is a skill any searcher must have. Maps alone can be useful, as can a compass. However, their combined use allows searchers or rescuers to more effectively communicate and navigate with incident command's help.

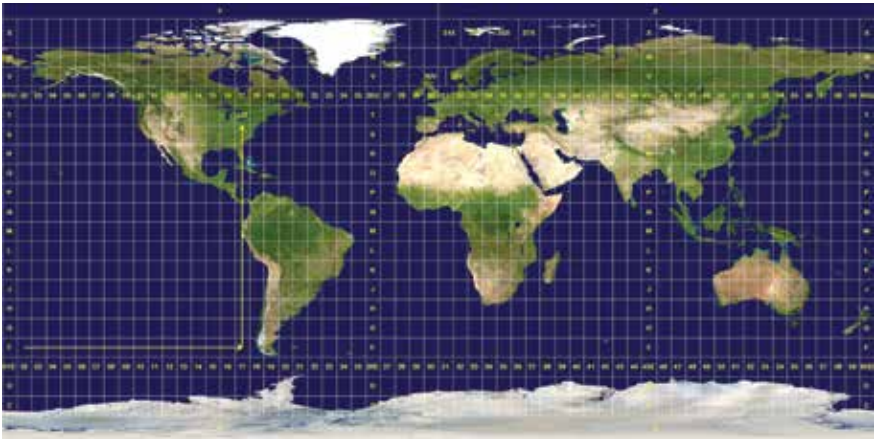
Declination corrections are further discussed in the *Fieldbook* chapter on navigation and other sources listed in the resources section of this pamphlet.

Latitude/Longitude and Universal Transverse Mercator

Something common to all accurate navigation systems is the use of a method to indicate where you are. Saying "I'm by the house on the river" is a very imprecise method of orientation in search and rescue. Instead, the coordinate systems, or grids, most often used are latitude/longitude (or lat/lon) or Universal Transverse Mercator (UTM). Each grid type uniquely identifies each point on a map.

The grid most people are familiar with is lat/lon in which the world is divided into lines of latitude and lines of longitude. Latitude lines are parallel to the equator and divided into 90 degrees north and south. Longitude lines run from pole to pole and are divided into 180 degrees east and west.

More information about using a map and compass can be found in the *Orienteering* merit badge pamphlet, *Scouts BSA Handbook,* and the *Fieldbook*.



In each case, the full designation is read hemisphere, degrees, minutes, and seconds. For example, the national office of the Boy Scouts of America is designated N 32° 53' 5.8" W 96° 58' 13.7". Lat/lon is often utilized in air and sea SAR operations and is understood worldwide.

Coordinates for the Boy Scouts of America's national office in Irving, Texas, are N 32° 53' 5.8" W 96° 58' 13.7".

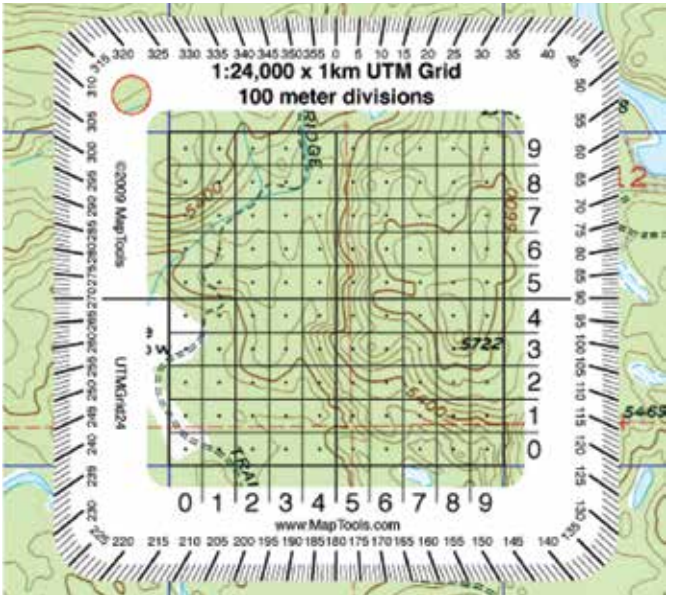
The grid used in most nonurban searches is the UTM grid. In this system, Earth is divided into 60 zones, each of which is 6 degrees of longitude and 8 degrees of latitude. The numbers across the top of the map are *eastings* and the numbers along the side of the map are *northings.* As you read a location on a map using the UTM designation, you read "right and up." In UTM terms, the BSA national office is located at 14* 6 89 852m E 36 40 358m N.

To find a location on a USGS topographic map, you will need to know whether it is a 7.5-minute map (also known as a 1:24,000 scale or quad map) or a 15-minute map. In most cases, it will be a 7.5-minute map. Once you have this information, you can start to estimate the location you want to find. A useful tool here is the grid tool or a corner ruler, both of which help you identify a point on the map by overlaying a clear plastic gridded template or ruler scaled to your map. If you don't have such a tool, you can still estimate your location somewhat accurately because each UTM square represents 1 kilometer by 1 kilometer and is divided into 10 100-meter segments. Distances are easy to calculate using UTM because it is accurate to 1 meter.

By starting with a UTM coordinate or an estimated location on a map, you can estimate your location using lat/lon coordinates by reading the side and top of the map. This method is approximate at best. Your two best options are to use a computer or phone application to convert the coordinates, or to use your GPS unit and enter the coordinates and switch from UTM to lat/lon and back as needed.

Why would you need to switch back and forth? In some instances, the subject may be using lat/lon and has given his or her location in that format and the search team is working in UTM.

See the *Geocaching* merit badge pamphlet for more information about latitude/longitude and the UTM system.

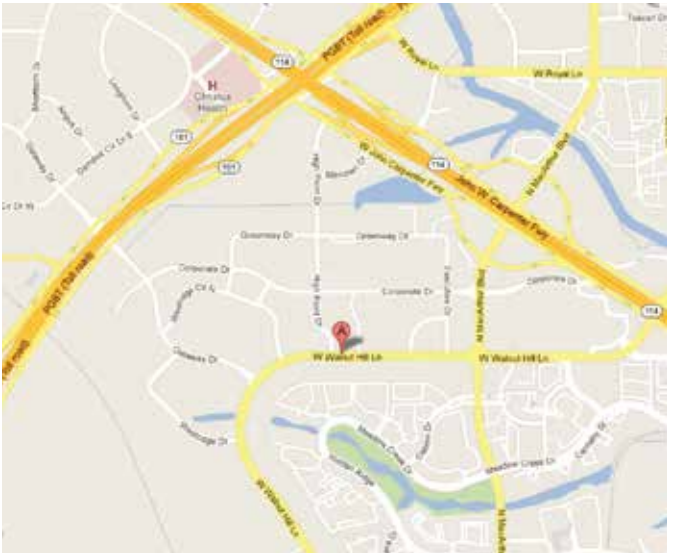


GPS Units

Both lat/lon and UTM methods are common, and each has benefits and shortcomings.

GPS units have become standard navigation tools around the world and are very useful in search and rescue. One particularly useful feature that most units have is a track log that stores your location at regular, preset intervals while the unit is turned on. At the end of a search period, the incident base team can download that information into their computers so that they know exactly which areas have been searched.

Note that, just like a map and compass, you must master your GPS unit prior to relying on it in the wilderness. Always carry the instruction manual with you. GPS units do have limitations, most notably battery life and "shadowing" of the satellite signals by trees, tall buildings, or steep hills and cliffs. They do not work well, or at all, inside buildings, tunnels, caves, and narrow steep canyons and require a straight line of sight of most of the sky (as that's where the GPS satellites are).



You can practice your GPS and map skills using an online mapping system such as Google Maps and others. A detailed topographic map and a Google Earth map used together make it fun.

Be sure to hold the GPS unit just like you would hold a regular magnetic compass, level and with the top of the GPS receiver pointing straight ahead (see the picture). Otherwise it will think it is going backward. When the arrow is pointing straight ahead, you are on the correct track.

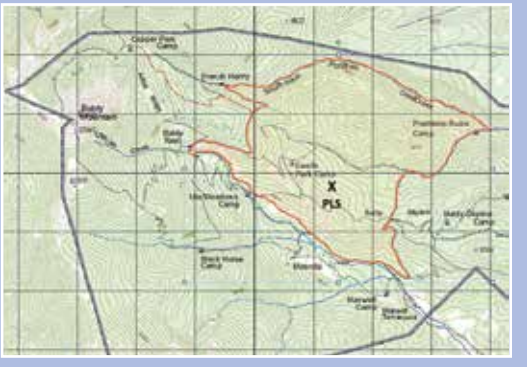
A GPS unit can be easy to use. One of the easiest things to do with your GPS unit is to determine your exact location right now. The first step is to turn on the unit. The next step depends on your individual unit; in many cases the first screen indicates your current coordinates, while in other cases you will need to move through a menu or two. Your location will likely be noted in either lat/lon or UTM. To switch back and forth between these systems, you need to change the coordinate system on the unit setup screen. It is best to consult the owner's manual for the GPS unit you are using.

The technical details of using GPS units can be extensive. If you decide to purchase and use one, be sure to read the owner's manual. You can also refer to the *Geocaching* merit badge pamphlet or check the resources section.

Search Tactics

Search managers and teams use many tactics but always start by establishing the search area. This is called *confinement*, an effort to establish a search perimeter that encompasses the subject and beyond which he or she is unlikely to pass without being detected. Confinement may involve setting up roadblocks or trail blocks and posting lookouts of individuals in strategic locations on high ground. Searchers may build track traps and frequently check for footprints indicating that the subject has moved through the perimeter.

Barriers made of string lines, light sticks, or flagging tape may lead the subject to the searchers.



SAR personnel establish confinement by plotting on a map the PLS (place last seen) or LKP (last known point) and then drawing a large circle around that point to coincide with the distance an average person can walk in that terrain during the time the person has been missing. For example, if the subject has been missing for one hour and the average person walks about 4 mph, the outside diameter of the circle has to be four miles from the PLS in all four directions. This theoretical search area is about 50 square miles; after two hours it is about 200 square miles, and so on. This is why it is important to establish confinement and get searchers in the field as soon as possible. Within the circle the planning section chief identifies features such as roads, trails, streams, or ridges that can be considered natural confinement areas.

Where Do You Search First?

As hasty teams are being sent into the field to do quick searches, the planning section back at the incident base is busy formulating a more detailed search plan. One important task they will do is determine the probability of area.

The probability of area (POA) is the probability that the subject or clues leading to the subject are in a specific area. This is based on the terrain, time of day, subject, details of the subject's disappearance, and other factors. Teams use this information to decide where the subject is most likely to be and search those areas.

There is also a way to determine the probability or chance that the searchers would have found the subject or clues relating to the subject had the subject or clue been in the area searched. This is called probability of detection (POD). POD is usually expressed as a percentage value, i.e., "we searched our assigned area with a 50 percent POD." Many factors have to be considered, such as the terrain, weather conditions, experience level of the team, critical separation, and even past searches in the same area.

In a wilderness setting, achieving a 100 percent POD is next to impossible, but the goal is to always search—and sometime re-search—all areas of high probability until a POD of at least 85 percent to 95 percent is reached.

Determining Search Tactics

Search tactics are categorized as passive, where you make the subject come to you, and active, where you go find the subject. An **active search** is carried out by teams in the field in a deliberate attempt to find the subject or clues left by the subject.

A **passive tactic** that is often effective is an *attracting lookout.* A two-person team is sent to a high location to try to spot the subject's campfire or tent, or another sign that the subject may be in the area. The team may build a campfire or use strobe lights, whistles, air horns, sirens, or other signals in the hope that the subject will respond.

Information gathered during the interview and investigation phase of the search will dictate the first response. The subject may have shared his or her plan to hike to a certain place along a certain trail. An appropriate search method might be a *trail sweep* by a hasty team. Teams are sent out to search a subject's suspected travel route, a trail, a ridgeline, a creek bottom, or a forest road. Searchers must look very carefully close in and far out. They must look on both sides of the trail to detect whether the subject left the trail. Team members should walk beside the trail so as to not disturb any footprints that may be the subject's.

If the PLS is known but the direction the subject went is unknown, a quick perimeter search is done. This is also a tactic for *sign cutting,* or looking for clues that will help searchers find the subject's trail. Another fast, systematic search is where a team of five to six members checks a larger area such as a canyon, valley, or ridgeline using fairly wide spacing and good critical separation between searchers.

Critical Separation

How far team members are spaced apart and still able to search effectively is called critical separation. Here is how it works.

1. Place an object on the ground that bears some relation to the size of the subject being sought. For example, a backpack standing upright may be about the size of a small child. The vegetation and terrain should be similar to that in the area being searched.
2. The team walks around the object so that it is kept in view. The distance between two opposite searchers is the critical separation.
3. To make sure the distances are correct, after making the initial estimate, turn 90 degrees to the object and scan as if you are searching. If you can no longer see the object, you may have to adjust your critical separation.

During this type of search, team members do not walk in a straight line. Instead they wander around in a purposeful manner, stopping often to look around and check behind trees, boulders, and other objects. This is known as *purposeful wandering.* This is an important tactic, as it forces the searchers to stay focused and attentive so they don't walk right by the subject if he or she is unresponsive.

More clues will be found than belong to your subject.

If these tactics yield no results, a highly systematic search using very close spacing and more team members (six to 12) may be ordered by the IC (incident commander). This search is often done in an area of high probability if the subject is expected to be immobile or where a valid clue has been found.

Sound Sweeps

A very effective tactic that is often done at Philmont is a *sound sweep.* This tactic can often help locate a subject quickly.

To conduct a sound sweep, each searcher must have a radio and a whistle. They space themselves along the search area boundary at a distance of 500 to 600 feet, depending, of course, on the terrain and how far sound may travel. As they enter the search area, the team leader or incident base may transmit "whistle blast in five seconds" and then count down "5-4-3-2-1." All searchers blow their whistles simultaneously and then listen for a response from the subject. A modified tactic would be for the searchers, spaced closer, to call out the subject's name.

Searching at Night

Night searches are very difficult and present added hazards. They should only be done after the command staff takes into account the search urgency, the best tactics to be used, the probability of success, and the safety of the searchers.

People are often reported missing late in the day after friends or relatives have spent considerable time looking for the lost person with no success. Therefore, getting a rapid-response team into the field as quickly as possible to effectively use the last hours of daylight is crucial.

Advantages and Disadvantages of Night Searches

Some advantages of night searches are that dogs work better at night, tracks show up better when illuminated by flashlights, footprints do not dry up as quickly, human voices carry farther, and subjects usually hole up rather than travel at night.

A major disadvantage to night searches is that searchers have an increased risk of accidents because of the darkness. Other disadvantages include that it is more difficult to transport a subject if found, clues may be destroyed or missing, lights hamper searchers' night vision, and it is difficult for the team leader to see and guide team members. Additionally, the same area may have to be searched again in daylight.

Becoming Clue Aware

Scouts take pride in using Leave No Trace principles; however, it is almost impossible to be in the woods without leaving behind some evidence. Clues often are very subtle, and searchers need to be extremely vigilant to find them and determine their importance.

A simple footprint, a dropped article of clothing, or disturbed vegetation might just be the clue that leads searchers to the subject. It is more likely that a series of found clues will lead to the subject. Remember, there are many more clues out there than there are subjects.

Clues can be categorized into six broad areas:

- Physical —The subject's vehicle, lost or discarded items, footprints, scent
- People—Witnesses, family, friends
- Recorded—Trail register, summit log, trip plan, photo at an ATM
- Event—A light, campfire, signal, human voice
- Investigative—Information, often subtle, generated by investigative techniques
- Analytical—Probability calculations, lost subject behavior statistics, subject's personality profile, terrain analyses (such as identifying travel aids and barriers)

Finding a clue known to be left by the subject will often change the action plan and search tactics. Searchers must always be "clue aware" and should mark and record all clues. Teams should radio or phone the type of clue and its location to the incident base and make every attempt to preserve the clue without disturbing it. Clue locations should be precisely documented and surrounded with surveyors tape. As a Scout, you have learned to be observant of the things around you. These same skills apply to SAR as team members become clue aware.

Practicing SAR Skills

An excellent SAR practice drill is one in which the IC (incident commander) writes a scenario and completes a lost person questionnaire, then scatters sample clues over a one- to two-acre area. Teams are briefed, using the scenario and interviewer, and then sent into the field to see how many clues they can find. Some clues will tie directly to the subject and must be considered valid clues, some will be bogus, and others are "unknown," meaning they may or may not relate to the subject. The team marks the location of the clue on a map and radios it in to the incident base where the clue is logged on a clue log sheet.

At the end of the practice, the IC debriefs the teams, and each discovered clue is discussed. The team decides whether each clue is real, bogus, or unknown. The IC who planned the activity will then inform the team about the validity of each clue.

Some clues last longer than others. A footprint may be blown away by the wind or washed away by rain in just minutes; a plastic wrapper may last up to 30 years.

Specialized SAR Teams

Now that you understand how searches and rescues are reported, who is in charge of them, something about the behavior of missing persons, who does the actual searching and some tactics they use, it is time to learn about some specialized teams and how they save lives in the woods and cities where their skills are used.

Search and Rescue Dogs

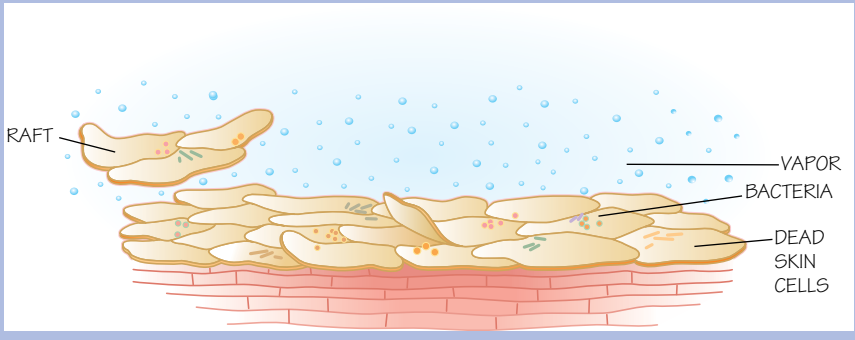
Search and rescue dogs are a valuable resource on a search mission. They can search large areas efficiently and determine which direction the subject went from where he or she was last known to be. SAR dogs work together with other SAR teams and can play a key role in the overall effort to find a lost person.

Search dogs tend to love socializing with people and other dogs. They are confident and not easily scared by sights or sounds. They have energy, stamina, agility, and are physically sound. SAR dogs almost always have a high drive for toys and food. Breeds well-suited for SAR include those from working dog bloodlines such as retrievers, herding dogs, hounds, and German shepherds.

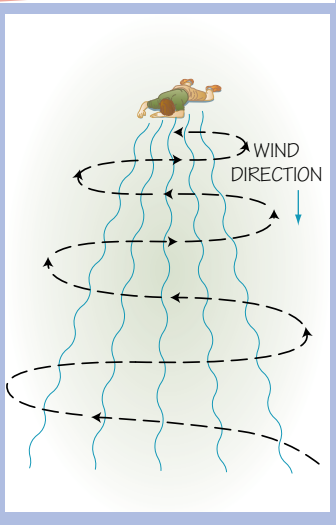
Drive is the dog's strong desire to persist in certain behavior. Dogs are born with traits for drive that will develop as they mature, but dogs with high drive will show these traits as early as six weeks of age. These drive traits determine the dog's basic personality, so drive is only mildly influenced by training. A high toy drive dog, for example, may be obsessed by a ball, constantly pestering nearby humans to play a game of fetch or tug of war. Most SAR dog handlers use toys or food as rewards, so the dog needs to have a high interest in those things.

What Is Scent?

Humans constantly shed dead skin cells known as *rafts,* which are discarded from the body at a rate of about 40,000 skin cells per minute. Each raft carries bacteria and vapor representing the unique, individual scent of the person. Rafts fall all over our clothes, bedding, home, and car interiors, as well as outside. They are picked up and carried by wind currents, drift to the ground, and stick to vegetation. They combine with the smell of crushed vegetation along a person's traveled path.



Scent eventually dies as it dehydrates, so moist, humid conditions help preserve scent longer. (Scent can, however, be washed away by torrential rain.) If there is no wind, the scent drops off the body and lands nearby. If wind is present, the scent is dispersed downwind in a cone-like shape that is narrow at first but widens as the distance from the body grows. This is called a scent cone. The scent then catches on downwind vegetation, fences, and buildings.



Terrain features, vegetation, and wind conditions determine the path of scent dispersal. Heavy brush, light brush, woods, drainages, and slopes all affect scent differently. Over time, scent can travel and collect in areas far away from where the person actually walked. This creates an interesting, yet puzzling, "scent picture" for both the dog and handler to figure out.

Dogs make good searchers because they are incredible athletes and have such a good sense of smell. However, they tend to overheat easily, cooling themselves by panting. Drinking water helps dogs cool off, so handlers have to carry a lot of water. The SAR dog's training sessions and missions are usually scheduled in the cool of the day. Dogs detect scent mostly through their noses, so if they are having to mouth breathe (pant), they are less effective. Dogs use all of their senses to search, but their sense of smell is the strongest.

Dogs can be taught any of several ways to search, including area air scent, trailing, and disaster. Before responding to missions, the dog and its handler should have an active training schedule and current certification to qualify for SAR deployment. Most dog teams are affiliated with and deployed by their local state or county law enforcement organizations. Incident base staff must be familiar with the various search dog disciplines to give each dog team an appropriate search assignment. Each field-assigned dog team consists of a dog, handler, and at least one field support person who may also act as a navigator. As with all searchers, the handler must be fully prepared with appropriate equipment for the assignment, as well as extra water and food for the dog.

Additional dog gear may also be required depending on the search conditions; this could include a dog first-aid kit, booties, and a cooling or warming dog coat.

Area Air Scent Dogs

Area air scent dogs are worked off leash and usually wear a bell and glow stick at night, as well as an ID vest. They move away from their handler in search of the subject's scent on air currents and frequently return to keep track of their handler. The bell allows the handler to hear the dog moving about. The glow stick allows the handler to see the dog at night.

A typical search assignment for an air scent dog is to clear an area of land that is defined by natural borders, such as a stream or road. The area borders could also be defined by navigational markers such as latitude/longitude or UTM coordinates. This type of area-specific search assignment is also commonly given to ground search teams.

The handler is the team leader and must have a plan in mind to approach the search assignment. This search plan is determined by the terrain of the area, vegetation, and wind direction. The search area may dictate that the most efficient way to cover the area for a high probability of detection is to search in a back-and-forth pattern, called a *grid search.* In some cases, the topography may dictate that the search is best accomplished by following a ridgeline or searching a canyon floor.

Think of area air scent dogs as ground searchers with four legs and an excellent sense of smell.

An effective air scent dog responds to voice and/or visual directions from the handler and can be sent into specific areas. This way, the dog can cover areas that the handler may not be able to easily access. In ideal conditions, consistent wind direction and speed conditions can cause scent to travel long distances. This allows the dog to "clear" certain areas even though it may not have physically gone into the area. Air scent dog teams can also provide a hasty search along a hiking trail and adjacent area.

An air scent dog checks for scent mainly by keeping its head up and checking the wind. The dog needs to be downwind of the subject in order to detect him or her, and it is the handler's job to work the dog in a pattern that will achieve this. The handler watches the dog for changes in body language that indicate scent has been detected and modifies the search plan accordingly. GPS waypoints are often marked at areas of interest.

When the dog finds someone, it performs an alert (a trained behavior) that lets the handler know it has made a "find." Examples of an alert are for the dog to stay and bark at the subject, or for the dog to return to the handler and bark or jump on the handler, then return again to the subject (called a "recall/refind alert"). The type of alert the dog uses is determined by what comes naturally to the dog and what the handler teaches it to do.

Ginny, a Dutch shepherd, is the first SAR dog ever trained to assist with both surface and underground mine rescues.

Usually area air scent dogs are not scent specific, which means that they will find any person in the area, not just the subject of the search. They may occasionally find other searchers in the area, hikers, or bystanders. When this happens, the handler rewards the dog and tells it to continue to search. If the dog has been trained to be scent specific, a scent item of the subject's will be required. (See the following section for an explanation of scent items.)

Area air scent dogs work best on a mission where a trail or area needs to be searched, in moderate to cool temperatures, with light to moderate steady breezes. They work quickly and are good for night searches and searches involving nonresponsive subjects.

Trailing Dogs

Trailing dogs usually work on a long leash and harness, but occasionally work off leash. The handler starts the search where the subject was last seen, using a scent item from the subject, and the dog follows the general trail of scent that the subject left behind. Trailing dogs are scent specific, which means they search specifically for the subject and ignore other scents that may be in the area. Bloodhounds have traditionally been used to trail, but many breeds can be used.

A *scent item* is an article of clothing or another object that belonged solely to the subject and therefore is saturated with his or her scent. It should not be freshly cleaned or laundered, or have been directly touched by another person. It is given to the dog to sniff at the beginning of the search assignment so that the dog knows who it is searching for.

Collecting a Scent Item

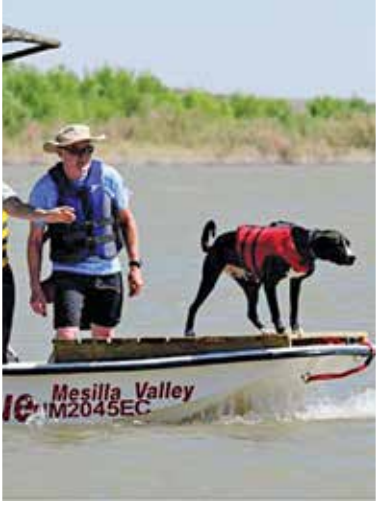
Scent items must be collected in a way that prevents the item from being contaminated by anyone else's scent. This is accomplished by using a one-gallon resealable plastic bag to collect the item. With the bag inside out, collect the item, then pull the bag over it. You could also use a stick or coat hanger to place the item in the bag. Scent items are collected by trained incident base staff or a dog handler.

Searching for a lost person is like putting together a puzzle based on many clues. These include information from onlookers and friends of the subject, the dynamics of the situation, and alerts or indications of interest from dog teams.

An appropriate search assignment for a trailing dog is to start at the place the subject was last known to be or to start at a footprint positively identified as belonging to the subject. Trailing dogs can also be used to *cut track,* which is to sweep through an area hoping to cross the subject's path. Once the dog has been given the scent item or footprint to smell and is on the scent trail, it can determine the direction of travel of the subject and will follow the scent path wherever it goes. Trailing dogs usually work with their noses close to the ground, unlike area air scent dogs, which hold their heads higher when working.

The dog generally follows the scent on the ground, rather than on the air currents. It may follow the actual footprint track or may parallel the track, depending on how the scent may have drifted since the subject passed through the area. As the scent trail ages, there is less scent available for the dog to detect due to dehydration of the subject's skin rafts.

Trailing dogs are scent specific, and a scent item or positively identified footprint are required. A nonresponsive subject and nighttime searching conditions do not pose a problem. These dogs are best utilized when the place the subject was last seen is known, so they can determine the direction of travel. Because scent dehydrates and deteriorates with time, it is best to deploy the trailing dog as soon as possible. They are most effective with calm wind conditions, light moisture, and cool temperatures.

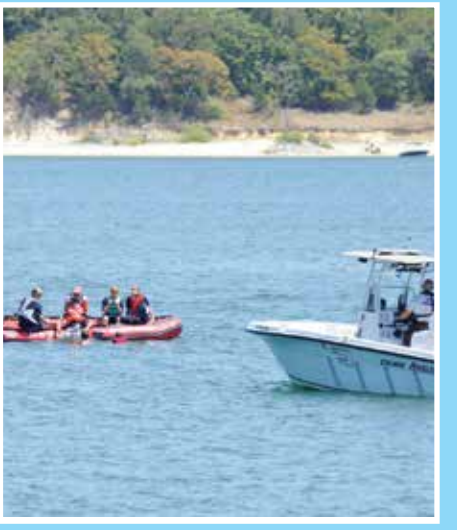


Disaster Dogs

Disaster dogs are used to search areas of natural or human-made disasters, such as earthquakes, hurricanes, or destruction from terrorist activities, to find trapped subjects in piles of debris. Many of these dogs were deployed in the aftermath of the September 11, 2001, disaster. Most of these dog/handler teams are part of the FEMA Urban Search and Rescue system or belong to state teams that are similarly structured. They are certified by and deploy with their rescue teams based on directives from the federal or state government.

Search Teams

There are many kinds of teams that work in SAR. Ground teams and dog teams search on foot, while other teams search from horseback, ATVs, mountain bikes, or aircraft. There are also dive teams that search underwater; emergency locator transmitter (ELT) teams whose responsibility is to home in on a radio signal from a downed aircraft; and SAR support teams that provide communications support, radio relay stations, and food for hungry searchers.



Dogs trained to deploy to disaster situations must have all the qualities of previously described search dogs and must also be acclimated to stressful conditions. They must remain focused and not be distracted or stressed by their unusual search environments, which commonly include noisy generators, unnatural lighting, collapsed buildings, and large piles of debris with unstable footing. Many strong odors are present in a disaster setting, and the dogs work intensely. For this reason, they are worked for short periods such as 30 to 60 minutes, then rested and rehydrated before working another session.

Disaster dogs are trained to search in the same way as area air scent dogs. They are used off leash but without ID vest or collar to prevent entrapment by debris. They search areas of rubble and destruction, moving quickly to search and clear the area. The dogs are carefully trained in obedience and will search areas as directed by the handler from a distance. The required alert of the disaster dog is a "stay and bark" at the spot where live human scent is detected. While humans can search the rubble and call out to trapped subjects, the dogs are especially adept at quickly detecting those who are alive but nonresponsive. When a dog alerts, the handler approaches the dog and marks the spot with GPS waypoints and flagging tape. Rescue personnel are then brought in to the area to find and rescue the trapped subject.

Technical Rescues

Rescue as a part of search and rescue can occur in one of two situations. The first and most common is that a person in the wilderness or another remote area is injured or incapacitated such that evacuation to a hospital for further medical care is required. The second situation is that a person who has become lost or disoriented in a suburban or wilderness setting becomes the object of a search mission and, once located, requires evacuation for medical treatment. Rescue missions tend to be shorter in length than search operations but are much more focused and intense events that require good planning, quick decision making, and directed effort with the right resources to evacuate the subject.

Rescues should follow a procedure known as LAST:
L = Locate
A = Access
S = Stabilize
T = Transport

Locate the site of the emergency, safely ***A***ccess the patient, medically ***S***tabilize the patient, and safely ***T***ransport the patient out of the situation. Following this simple principle helps to quickly prioritize what needs to be done to accomplish the successful evacuation of a patient.

During the initial report of an incident requiring the rescue of a subject, information is often sketchy and incomplete. This forces the incident commander to assess probable scenarios and then make a plan to execute using resources that will evacuate the patient in the most efficient and safe manner possible.

Trauma Classification System

1st Priority (Immediate)—Patient who has injuries that are critical and needs immediate intervention by a medical provider and transport to definitive medical care.

2nd Priority (Secondary)—Patient who has debilitating injuries but does not require immediate attention.

3rd Priority (Delayed)—Minor injuries. These patients, often called "walking wounded," can wait for treatment and can even be used in certain situations to help with the rescue effort.

The patient's medical condition needs to be determined as soon as possible to dictate the urgency and resources needed to evacuate him or her in a prompt and safe manner. Patients are classified by applying a trauma classification system to their symptoms. Rescuers must have a high level of training (EMT or above) to be able to apply this system.

Dispatch as soon as possible a hasty medical team, which is a quick response team made up mostly of medical personnel. There should be a minimum of two medically qualified personnel (EMT, paramedic, physician's assistant, medical doctor) to assess and stabilize the patient and report back to the operations section their evaluation of the patient's condition and their recommendation for manner of evacuation. It is essential that the medical hasty team have good communications with incident base to keep the operations section advised of the mission's progress. In certain situations, it is also necessary for the hasty medical team to have rope access and rescue capabilities, as many injured parties are in vertical terrain.

Helicopter Rescue

Critically injured patients may require immediate evacuation via helicopter. Once the operations section has determined the appropriate means of evacuation and has weighed the risk versus benefit of using air resources, the operations section requests the IC (incident commander) to call for launch of the aircraft. A general rule of thumb to decide whether a helicopter is needed to evacuate a patient is to determine whether the patient will die or lose a limb or eyesight. These cases warrant helicopter evacuation.

Helicopter rescues—while a vital SAR function—are not approved BSA activities.

Helicopters provide an excellent resource to assist in search and rescue operations in harsh or remote locations. Unlike fixed-wing aircraft, helicopters can operate and land virtually anywhere without the need for airports, runways, or improved concrete surfaces. However, the use of a helicopter requires taking many factors into consideration, the most important of which are available light, weather conditions, and the safety of the aircrew. Helicopter medical evacuations can be surprisingly hazardous.

When planning a helicopter rescue mission, it is essential that the IC also plan for a backup evacuation method in case the need arises. The most common of these is an over the ground litter evacuation utilizing a wheeled litter. This method requires at least 24 people making up three teams of eight people each to keep the litter moving at an approximate rate of 1 mph down trail. This method is also most preferred for less critical patients who may not qualify for helicopter evacuation.

For more information about litter evacuation, see the *Fieldbook*.

Rescue Hoist Operations

There may be situations when a helicopter will be unable to land due to terrain, obstructions, or other hazards. Some helicopters are equipped with a rescue hoist system. **See the helicopter hoist system depicted here.** This system allows the aircrew to hover the helicopter over a selected area, insert an aircrew member with the hoist, then extract the aircrew member and patient in the same manner. Helicopters that are equipped with rescue hoist systems provide the aircrews with more options to safely complete their mission. The aircrew will assess a number of factors when planning rescue hoist operations including weather, winds, temperature, altitude, and aircraft weight.

Technical or Terrestrial Rope Rescue

This is a specialty of rescue that deals with evacuating injured patients from high to low angle cliff faces, out of canyons, crevasses, or caves, off of snow fields, and out of industrial areas or damaged buildings. Rescuers who participate in this type of rescue must be proficient in rock and ice climbing and also have advanced levels of medical training to be able to manage an injured patient for hours in difficult terrain. This type of rescue takes many hours of training and practical experience to become proficient. There are many organizations in the United States that are accredited by the Mountain Rescue Association to perform such rescues.

Technical and terrestrial rope rescues are not approved activities for Scouts or Scout units.

Civil Air Patrol

All youth ages 12 to 18 may join the Civil Air Patrol (CAP) as cadets and receive education and training toward their certifications to participate in search and rescue. CAP is the official civilian auxiliary of the U.S. Air Force. CAP has three primary missions mandated by the U.S. Congress: aerospace education, cadet program, and emergency services.

Active membership in a local CAP unit will open the door to a variety of emergency services activities that include disaster relief efforts working with Homeland Security and FEMA (Federal Emergency Management Agency), communications support to operations both in CAP and in your community, and active support to SAR incidents managed by the U.S. Air Force Rescue Coordination Center or local authorities responsible for managing SAR incidents.

Some public service agencies charter Venturing crews that specialize in firefighting, law enforcement, and search and rescue. Venturing crews are open to young men and women ages 14 through 20 and function in a manner similar to a troop but frequently with a special area of interest.


SEARCH & RESCU

Careers in Search and Rescue

The experience of helping others in need while combining one's passion for the wilderness and the adventures it offers may seem like a natural fit for you.

Search and rescue operations in the United States are primarily conducted by volunteer teams. Many of these teams are members of professional organizations such as the National Association for Search and Rescue or the Mountain Rescue Association. They usually are run by local sheriff's offices or city or state agencies and may have paid positions. The Las Vegas Metropolitan Police Department Search and Rescue is a prime example.

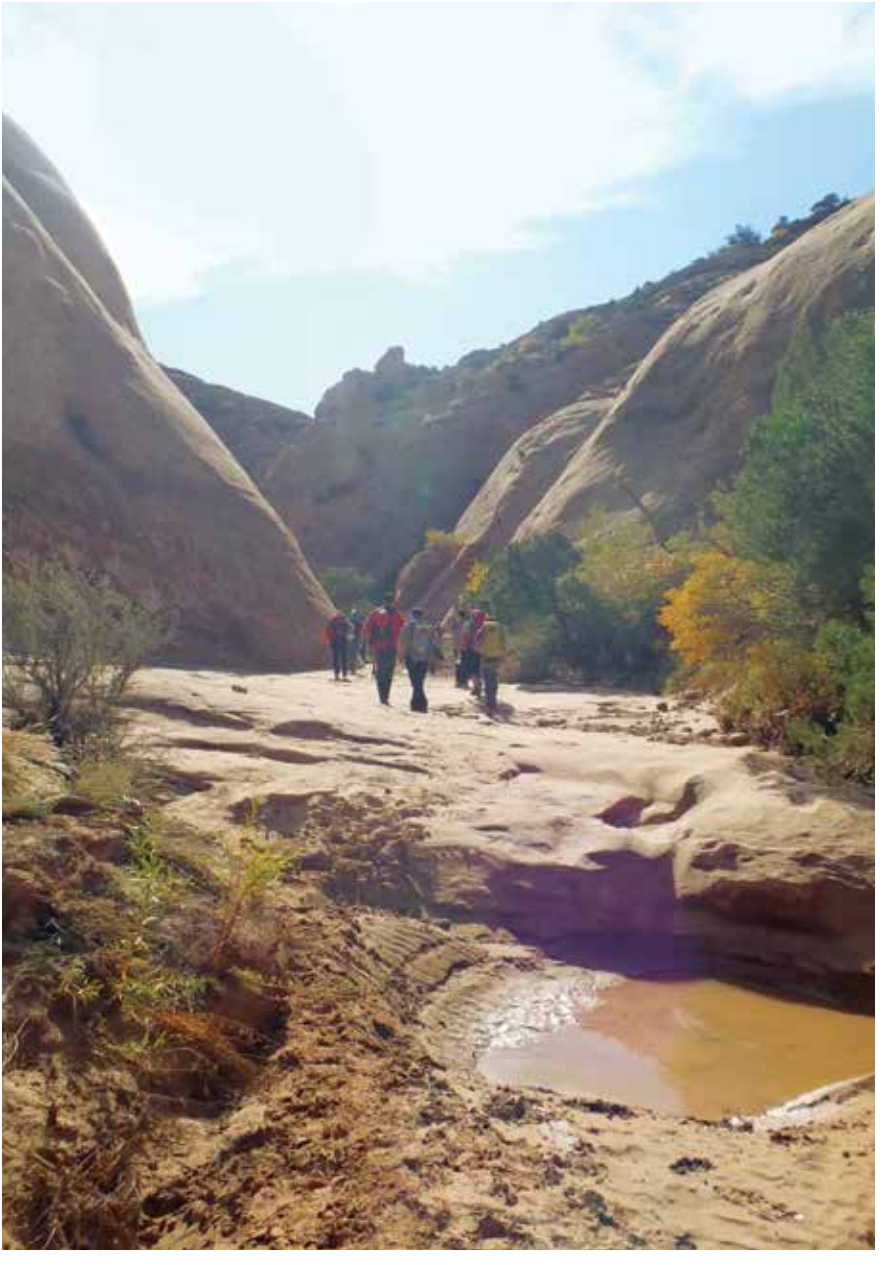
The National Park Service also employs SAR personnel throughout many national parks, most notably Denali, Grand Canyon, and Yosemite national parks. Many of these national and state park positions require emergency medical, law enforcement, and fire/rescue credentials. They may also prefer certifications from organizations like the American Mountain Guides Association.

If you are thinking about a military career, you may want to look into the U.S. Air Force Pararescuemen (PJs) or Combat Rescue Officers (CROs). You may have heard the motto "That others may live." This motto originally came from the PJs, who are the only full-time special operations unit of the military that focuses solely on SAR.

SAR careers also exist within fire departments and ambulance services throughout the United States. This depends on the capabilities and training of local resources. For employment with either a fire department or ambulance service, an EMT or Paramedic license is needed. A good example of a SAR ambulance service is the American Medical Response Reach and Treat Team. There are also many colleges across the United States offering degrees in Emergency Medicine, as well as some offering degrees in Austere and Mountain Medicine, and Emergency and Disaster Management.

SAR careers dealing with the Incident Command System and emergency management can be found from the lobbying floors of Washington, D.C., to disaster zones such as areas hit by hurricanes or earthquakes. Many of these professionals lead urban search and rescue teams or Disaster Medical Assistance Teams (DMAT).

Outside of the United States, search and rescue is primarily provided by private entities that employ paramedics and mountain guides. One such group is the Alpine Rescue Center by Air Zermatt in Switzerland.



Search and Rescue Resources

Scouting Literature

Scouts BSA Handbook for Boys; Scouts BSA Handbook for Girls; Fieldbook; Backpacking, Climbing, Emergency Preparedness, Fire Safety, First Aid, Geocaching, Hiking, Lifesaving, Motorboating, Orienteering, Radio, Rowing, Safety, Scuba Diving, Small-Boat Sailing, Swimming, Weather, Whitewater, and *Wilderness Survival* merit badge pamphlets

With your parent's permission, visit the Boy Scouts of America's official retail website, www.scoutshop.org, for a complete listing of all merit badge pamphlets and other helpful Scouting materials and supplies.

Books

Cook, Mike, Guy Kerr, Rick LaValla, et. al. *Urban Search Management for the Initial Response Incident Commander.* ERI Canada Inc. and ERI International Inc., 2004.

Eng, Ronald C., ed. *Mountaineering: The Freedom of the Hills,* 9th ed. The Mountaineers Books, 2010.

King, Rick, and Chuck White, eds. *Mountain Travel and Rescue Manual.* The Mountaineers Books, 2012.

Kjellstrom, Bjorn, and Carina Kjellstrom Elgin. *Be an Expert with Map and Compass: The Complete Orienteering Handbook.* John Wiley & Sons, 2009.

Letham, Lawrence, and Alex Lethham. *GPS Made Easy: Using Global Positioning Systems in the Outdoors.* The Mountaineers Books, 2008.

NASAR. *Fundamentals of Search and Rescue,* 2nd ed. Jones and Bartlett Publishers, 2018.

NASAR, *Introduction to Search and Rescue.* National Association for Search and Rescue, 2008.

Setnicka, Tim J. *Wilderness Search and Rescue,* 1981.

Smith, Richard; Rick LaValla; Rick Hood; Norm Lawson; and Guy Kerr. *Basic Search and Rescue Skills: A Practitioner's Guide to Search and Rescue.* ERI Canada Inc., 2007.

Online Resources

ICS Forms

training.fema.gov/icsresource/icsforms.aspx

Mapnitude Coordinates Mobile App

mapnitude.com

National Association for Search and Rescue (NASAR) Hug-A-Tree program
nasar.org/education/hug-a-tree

National SAR Plan
www.dco.uscg.mil/Portals/9/CG-5R/manuals/National_SAR_Plan_2016.pdf

New Mexico SAR Field Certification Study Guide
www.nmsarc.org/resources.html

Suunto's 'The Lost Art of Navigation'
www.suunto.com/en-us/sports/News-Articles-container-page/The-lost-art-of-navigation/

Urgency Determination Worksheet
www.k7rdg.org/ICSforms

A Note About Unauthorized and Restricted Activities

The BSA's *Guide to Safe Scouting* states under "Unauthorized and Restricted Activities" that flying in aircraft as part of a search and rescue mission is an unauthorized activity for youth members. For complete information, see www.scouting.org/health-and-safety/gss/.

Organizations and Websites

Air Force Rescue Coordination Center
www.1af.acc.af.mil/units/afrcc/

American Avalanche Association
www.americanavalancheassociation.org

American Institute for Avalanche Research and Education
www.avtraining.org

American Medical Response Reach and Treat Team
www.summitpost.org/amr-reach-and-treat-who-we-are-and-what-we-do/172226

American Mountain Guides Association
www.amga.com

CalTopo
sartopo.com

Colorado Geological Survey
www.avalanche.state.co.us

Federal Emergency Management Agency (FEMA)
Telephone: 202-646-2500
For literature requests only:
800-480-2520 or email femapubs@gpo.gov
www.fema.gov

Inland SAR School
www.forcecom.uscg.mil/Our-Organization/FORCECOM-UNITS/TraCen-Yorktown/Training/Maritime-Search-Rescue/Inland-SAR/

Mapnitude Coordinates App
www.mapnitude.com

Mountain Rescue Association
www.mra.org

National Association for Search and Rescue (NASAR)
P.O. Box 232020
Centreville, VA 20120-2020
www.nasar.org

National SAR School
www.forcecom.uscg.mil/Our-Organization/FORCECOM-UNITS/TraCen-Yorktown/Training/Maritime-Search-Rescue

National Ski Patrol
www.nsp.org

New Hampshire Fish and Game Department Specialized Search and Rescue Team
www.wildlife.state.nh.us/law-enforcement/sar.html

New Hampshire Outdoor Council
www.nhoutdoorcouncil.org

New Mexico Search and Rescue Council
www.nmsarc.org

New Mexico State Police Search and Rescue
www.sp.nm.gov/search-and-rescue

Urban Search and Rescue
www.fema.gov/urban-search-rescue

U.S. Air Force Pararescuemen
www.airforce.com/careers/combat-and-warfare/special-warfare/pararescue

U.S. Coast Guard
www.uscg.mil

U.S. Geological Survey
www.usgs.gov

USGS Topo Maps
www.usgs.gov/programs/national-geospatial-program/topographic-maps

Acknowledgments

The Boy Scouts of America thanks the following members of the Search and Rescue Merit Badge Development Team, who diligently worked to develop the requirements and content for this merit badge.

Doug Palmer, chair—retired, associate director of Program, Philmont Scout Ranch; New Mexico Certified Type II field co-coordinator/ Incident Commander

Mark Anderson—Eagle Scout; retired, director of Program, Philmont Scout Ranch; field coordinator, New Mexico State Police Search and Rescue

Mary Berry, D.V.M.—founder, Sandia Search Dogs, certified trainer, Search and Rescue dogs in trailing, area air scent, cadaver, and FEMA disaster dogs

Nathan Lay—Eagle Scout; wilderness emergency medical technician; paramedic; field coordinator, New Mexico Search and Rescue; health officer/chief of Support, Philmont Scout Ranch

Owen McCulloch— Eagle Scout; associate director of Program, Philmont Scout Ranch; field coordinator, New Mexico Search and Rescue

Michael H. Ritterhouse—Eagle Scout; retired, backcountry manager, Philmont Scout Ranch; instructor, National Ski Patrol; instructor, Wilderness First Responder

Gary D. Williams—Eagle Scout; volunteer search and rescue area and incident commander, New Mexico State Police; lead instructor, flammable liquids emergencies, New Mexico State Fire School

Jason Williams—Eagle Scout; program director, Paramedic programs, University of New Mexico School of Medicine; rescue leader, Albuquerque Mountain Rescue

The following individuals served as reviewers and contributors in a variety of capacities: Scott H. Chappell, program coordinator, urban search and rescue/hazardous materials, Division of (Florida) State Fire Marshal; Sid Covington, logistics manager, Philmont summer programs, Rick Goodman, retired, New Mexico State Police Search and Rescue Officer; Rick LaValla, president and senior consultant, ERI International Inc.; Roger Ramsdell, urban search and rescue consultant; Tom Richardson, University of New Hampshire Fire Department, retired; Lt. Cmdr. Wayne A. Stacey, Eagle Scout and USCG retired, boating education specialist, Program Operations Branch Boating Safety Division, Department of Homeland Security, U.S. Coast Guard, and Office of Auxiliary and Boating Safety; and John Van Dreese, director, Outdoor Adventure, Orange County Council BSA.

Thanks also to the National Association for Search and Rescue; Camp Bell staff, Daniel Webster Council; Chicago Area Council; Philmont NAYLE summer class of 2011, and Sea Scout Ship 911, Pottsboro, Texas, for their assistance.

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