Boulder County Colorado

Mounted Search and Rescue
Guidelines and Training Handbook

http://www.mountedsearchandrescue.com
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Boulder County Mounted Search and Rescue

The volunteer Mounted Search and Rescue team was organized in 1997 to serve as a search and rescue function and to create positive public relations within the community. On January 1, 1998, Mounted Search and Rescue (MSAR) signed an agreement with the Boulder County Sheriff’s Office and the County Emergency Services Director that outlined the rules of engagement for volunteer Mounted Search and Rescue activities. The Sheriff’s Office is responsible for conducting background checks on qualified members and the MSAR qualifying committee is responsible for certifying horses, equipment, and riders. Each member is required to meet the minimum criteria for horsemanship, equipment, and training as outlined in this handbook. The qualifying riders are divided into smaller groups (squads) by regional location. Two members of each group (a squad leader and assistant) are selected to plan and organize group-training exercises. The squad leaders are also responsible for carrying out other leadership responsibilities as outlined in the Squad Leaders and Assistants Requirements section of this handbook. Squad leaders and other team members continuously reevaluate each other during training exercises throughout the year. The goal is to provide a valuable public service in a safe and positive manner.

Organizational Chart

Team Leader
Assistant Team Leader

Squad No. 1 Leader  Squad No. 2 Leader  Other Squad Leaders
Assistant Leader  Assistant Leader  Assistant Leader
Members  Members  Members

Mission Statement:
Boulder County Mounted Search & Rescue is a volunteer horseman’s group under the direction and control of the Boulder County Sheriff’s Office. It is organized for:

1. Search and rescue of people.
2. Evidence searches
3. Packing equipment into roadless areas
4. Parades
5. Times the Sheriff’s Office can use mounted horsemen and women to accomplish their need or presence.

To activate the Boulder County Mounted Search and Rescue, call 303-441-444.
Special Thanks: The members of the Mounted Search and Rescue team would like to give special thanks to Tracy Speich for keeping this herd of cats moving in the right direction and for all the hard work and long hours she has put in to make this project the success that it is. Thanks Tracy.

Additions and Deletions

No significant changes as of 10-17-03.

Contacts

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Future Improvements

The following suggestions have been made for future versions of the MSAR handbook:

- State of Colorado Good Samaritan Law
- Health Monitoring and Physical Conditioning for Horses
- Colorado Law concerning injury related to horse activities.

If you have information that would contribute to better search and rescue methodology and safety, please send your ideas and suggestions to:

Dave Hughes 
12212 Cash Road 
Longmont, Colorado 80503
Requirements

Squad Member Requirements

1. Members shall maintain a current Adult, Infant, and Child CPR certification (advanced level CPR certifications recognized by the American Red Cross are also accepted).

2. Members shall maintain a current Community First Aid & Safety certification (advanced level First Aid certifications recognized by the American Red Cross are also accepted).

3. Members shall attend at least 50% of all scheduled squad activities.

4. Members shall attend at least 50% of all scheduled combined squad activities.

5. Members shall carry minimum required equipment on all combined or individual squad exercises.

6. Members shall keep qualified horse fit to ride.

7. Members must be at least 18 years old.

8. Members must demonstrate adequate horsemanship skills. Qualification rides are scheduled throughout the year.

9. Members must be in good health and physical condition.

10. Members must comply with Incident Command System (ICS) guidelines.

11. Members must be reasonably accessible by phone or pager and available for emergency callouts*.

12. Members must take direction from sheriff’s office officials and squad leaders. The member assumes the risk of facing stressful, demanding, and difficult situations.

* Although we request that all members be reasonably available, this is a volunteer organization and all members have the right to refuse to participate in a search or emergency incident.
Squad Leaders & Assistants Requirements

1. Squad leaders and assistants are required to meet all regular member requirements.

2. Communication
   - Provide a quarterly memo to the Team Leader to describe squad activities, training exercises, planning and member status each March 15, June 15, Sept. 15, and Dec. 15.
   - Disseminate information from squad leaders meetings as well as announcements of planned activities to squad members.

3. Training - Organize and conduct at least four (4) riding/training activities per year.
   These activities should include but not be limited to the following:
   - Search and rescue techniques
   - First aid and CPR
   - GPS and/or compass and map exercises
   - Trail riding safety and weather condition awareness
   - Radio communications

4. Squad Member Certification
   - CPR and Community First Aid Certification
   - Compliance with Boulder County Mounted Search and Rescue Policies

5. Squad leaders and assistants (or qualified representative) are required to attend Squad Leaders’ meetings.

6. Participation as member of "evaluating team" when qualifying rides are scheduled.

7. Participation as member of "review team" when any squad leader requests that a member of his/her team be re-evaluated for compliance with Boulder County Mounted Search & Rescue policies and requirements.

8. Record Keeping
   - Keep records of squad activities and each members participation (important because each member is required to attend a minimum of 50% of all squad activities).
   - Keep records of horses qualified by each squad member.
9. Squad leaders and assistants are required to limit all MSAR activities to qualified MSAR members and MSAR qualified horses only. Exception is made for horses/riders that are conditionally qualified to participate in training activities but not in actual missions.

**Horse Requirements**

1. No horses under four (4) years of age; no stallions

2. Must be able to trailer and tie (or hobble)

3. Must be manageable going alone

4. Must have reasonable attitude in new and strange environments and situations

5. Must safely negotiate water, bridges and other obstacles

6. Must get along with other horses

7. Must be sound and in good physical condition

8. Must be shod or have Easy Boots (or equivalent hoof protection) or be able to operate in a sound manner without shoes.
Minimum Equipment Requirements

1. Towing vehicle and horse trailer (4wd preferred)
   - Trailer and vehicle must be currently registered
   - Trailer and vehicle must be in safe operating condition

2. First aid kit containing the following but not limited to:
   - Bandaids
   - Wound antiseptic
   - Non-stick gauze pads
   - Ace bandage
   - Triangular bandage
   - 1 inch adhesive tape
   - 4 inch elastic tape
   - Eye solution
   - Petroleum jelly
   - 3 large safety pins
   - Disposable latex gloves
   - Leatherman type tool or:
     - tweezers
     - single edge razor blade
     - scissors
     - wirecutters

3. Survival gear:
   - Compass & map (search area maps will be provided by sheriffs office. or squad leaders)
   - Whistle
   - Rain slicker
   - Flashlight or headlamp with extra batteries
   - Leatherman type tool*
   - Waterproof matches or equivalent fire-starter
   - Enough water for planned outing and water purification tablets
   - Enough food for planned outing and extra protein bars or equivalent
   - Hat, sunglasses, and sunscreen (riding helmet preferred)
   - Emergency shelter, solar blanket, bivvy sack or small tarp, parachute cord.
   * Or optional items listed in first aid kit.

4. Tack
   - Halter and lead rope
   - Suitable saddle with D-rings, etc.
   - Saddle bags or cantle bag of ample size

For a comprehensive list of First Aid, Emergency, Survival, Tack and Trailer equipment, see Appendix A
Incident Command System Overview

Incident Command System (ICS) is a management system designed to assist anyone who has the responsibility for the successful outcome of an incident. For this purpose, an incident is defined as any planned or unplanned occurrence or event, regardless of the cause, that requires action by emergency service personnel to prevent or minimize loss of life or damage to property and/or natural resources. Obviously, this definition describes most of what law enforcement, fire, rescue, and other emergency response agencies handle.

The following will describe the basic operating principles of the Incident Command System. There are two halves to the Incident Command Process, they are interrelated, and both are as critical to the successful outcome of the incident as the other.

Management by Objectives

The first half is the principle of Management by Objectives, the “management philosophy” of ICS. Although it sounds like something found in a corporate boardroom, management by objectives is a process used on most incidents, whether or not it is recognized as such.

Within ICS, management by objectives covers four essential steps. These steps take place on every incident regardless of size or complexity:

- Understand agency policy and direction
- Establish Incident Objectives
- Select appropriate strategy
- Perform tactical direction

Performing tactical direction involves applying tactics appropriate to the strategy, assigning the right resources, and monitoring performance.
The complexity of the incident dictates how formal the management by objectives process is. On a small or routine incident, the above process can be obvious and only verbally communicated among the appropriate people. On a large incident, the process will be very formal and fully documented in writing. The difficult part is knowing when to and actually starting to formalize the process. It can be surprising, even on a smaller incident, to discover how different people’s incident objectives can be. By writing them down, you eliminate much of the assumption process. The ICS 201 document (or similar documents) allows this process to occur in a systematic way during the initial stages of an incident.

An example of management by objectives on a search:

Incident Objectives:
- Ensure the safety of all search personnel, and all other persons involved in the search as the foremost priority.
- Confine the search area to south of the big road, west of the crooked trail, north of the wandering stream and east of the jagged peak.
- Find the subject no later than a certain time or date based on experience, equipment and subject survivability.
- Obtain 95% POD for all trails, roads and hazard areas by a certain time or date. (POD – Probability of Detection)
- Stabilize and evacuate the subject when he/she is found.

Incident Strategy:
- Utilize an active search strategy on search segments 1-11.
- Utilize a passive search strategy in segments 12-16.

Tactics:
- Hasty search segments 1-6 using ground search teams 1-4.
- Search segments 4-9 using aircraft.
- Search segments 10-11 using dog teams.
- Patrol segments 12-16 using Nederland and Indian Peaks engines using attraction devices.

Organizational Structure

The other half of the Incident Command System is the organizational structure that allows the management by objectives process to occur in an organized manner. This is the half of the system that most people would identify as the ICS but if you are not trying to accomplish something (the Incident Objectives) in a certain way (the Incident Strategy and Tactics) then there is little need for the ICS structure.
The ICS structure begins with the Incident Commander (IC). The individual designated as the IC has the responsibility for incident management. The IC starts the management by objectives process by setting the Incident Objectives. That person may elect to perform all functions, or delegate authority to perform functions to other people in the organization. Delegation does not, however, relieve the Incident Commander from overall responsibility.

It is common to have an incident that crosses jurisdictional boundaries. Unified Command is an ICS management process which allows all agencies that have jurisdictional or functional responsibility for the incident to jointly develop a common set of incident objectives and strategies. This is accomplished without losing or giving up agency authority, responsibility, or accountability.

Under Unified Command the following conditions always apply:

- The incident will function under a single, coordinated Incident Action Plan.
- One Operations Section Chief will have responsibility for implementing the Incident Action Plan.
- One Incident Command Post will be established.

As the Incident Commander fills positions in the organizational structure, these positions fall within five areas of management function. The principle ICS management functions are:

**Command** – The Incident Commander is responsible for all incident or event activity. Although other functions or positions may be left unfilled, there will always be an Incident Commander. The Command Staff assists the Incident Commander and reports directly to the IC.

**Operations** – The Operations Section is responsible for directing the tactical actions to meet the incident objectives. There is only one Operations Chief (if activated by the IC) per operational period but that position may have deputies as needed. The Operations Sections commonly uses Branches, Divisions, Groups, Task Forces, and Strike Teams to maintain unity and chain of command, and span of control. The Operations organization usually develops from the bottom up. This is due to the need to expand supervision as more and more resources are applied. For example, the Incident Commander or Operations Chief on an incident may initially work with only a few resources. As more resources are added to the incident, another layer of organization may be needed within the Operations Section to maintain proper span of control. Normally, this will be done at the Division or Group level. The goal is to keep the organization as simple and streamlined as possible, and not to overextend the span of control.
A **Division** is established to divide an incident geographically. How that will be done will be determined by the needs of the incident. Divisions covering an area on the ground are usually labeled by letters of the alphabet. Within a building, Divisions are often designated by floor numbers. The important thing to remember about ICS divisions is that they describe some geographical area related to incident operations.

**Groups** are established to describe functional areas of operation. The kind of group to be established will be determined by the needs of the incident. For example, in an earthquake incident with widespread structural damage, search and rescue activity would be organized geographically, using divisions. A specialized resource team, using dogs or electronic equipment in an earthquake, or a salvage group in a maritime incident may be designated as functional groups. Groups will work wherever they are needed, and will not be assigned to any single division.

Divisions and Groups can be used together on an incident. Divisions and Groups are at an equal level in the organization. One does not supervise the other. When a functional group is working within a division on an assignment, division and group supervisors must closely coordinate their activities.

**Planning** – The Planning Section is responsible for the collection, evaluation, and display of incident information, maintaining status of resources, and preparing the Incident Action Plan and incident related documentation.

**Logistics** – The Logistics Section is responsible for providing adequate services and support to meet all incident or event needs.

**Finance/Administration** – The Finance/Administration Section is responsible for keeping track of incident related costs, personnel, and equipment records, and administering the procurement contract associated with the incident or event.

Each of these functional areas can be expanded as needed into additional organizational units with further delegation of authority. As positions are filled, the agency radio designations are replaced with ICS position titles.
<table>
<thead>
<tr>
<th>Primary Position</th>
<th>Title</th>
<th>Support Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incident Commander</td>
<td>Incident Commander</td>
<td>Deputy</td>
</tr>
<tr>
<td>Command Staff</td>
<td>Officer</td>
<td>Assistant</td>
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<tr>
<td>Section</td>
<td>Chief</td>
<td>Deputy</td>
</tr>
<tr>
<td>Branch</td>
<td>Director</td>
<td>Deputy</td>
</tr>
<tr>
<td>Division/Group</td>
<td>Supervisor</td>
<td>N/A</td>
</tr>
<tr>
<td>Strike Team/Task Force</td>
<td>Leader</td>
<td>N/A</td>
</tr>
<tr>
<td>Unit</td>
<td>Leader</td>
<td>Manager</td>
</tr>
<tr>
<td>Single Resource</td>
<td>Use Unit Designation</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The ICS adheres to a “form follows function” philosophy. In other words, the organization at any given time should reflect only what is required to meet planned tactical objectives. The size of the current organization and that of the next operational period is determined through the incident action planning process.

A number of organizational elements may be activated in the various sections without activating sectional chiefs. Each activated element must have a person in charge of it. In some cases, a single supervisor may initially be in charge of more than one unit. Elements which have been activated and are clearly no longer needed should be deactivated to decrease organizational size.

There are a number of pre-designated incident facilities. The two most common to be encountered on an incident are the Incident Command Post and Staging Areas. The Incident Command post (ICP) is the location from which the Incident Commander oversees all incident activities. There is only one ICP for each incident. Every incident must have some form of ICP. The ICP can be a vehicle, a building, or just a spot on the ground but it should remain in the same place and have resources to match the complexity of the incident.

Staging Areas are locations at which resources are kept while awaiting incident assignment. A large incident may have several staging areas. A staging area manager reports to the Operations Section Chief or Incident Commander if an Operations Section hasn’t been established. It is not required to have a staging area but the use of them can greatly facilitate the control of resources coming into the incident. It is common to locate the check-in function at the staging area.

One of the greatest challenges of running an incident is to maintain control of the resources and to keep open communications both down and up the organizational structure. The principles of Unity of Command, Chain of Command, and Span of Control ICS allow this to take place. These three
principles are also critical for maintaining the safety of the incident personnel.

**Unity of Command** means that every individual has a designated supervisor, knows who that supervisor is, and how to contact that supervisor.

**Chain of Command** means that there is an orderly line of authority within the ranks of the organization with lower level subordinate to, and connected to, higher levels. This greatly facilitates the communication process. In probably ninety–five percent of incidents, chain of command will consist of command and single resources.

However, as incidents expand, the chain of command is established through an organizational structure which can consist of several layers as needed; Command, Sections, Branches, Divisions/Groups, Units, and Resources.

**Span of Control** pertains to the number of individuals one supervisor can effectively manage. Maintaining an effective span of control is particularly important on incidents where safety and accountability have top priority.

In ICS, the span of control for any supervisor falls within a range of 3 to 7. If a supervisor has fewer than three people reporting, or more than seven, some adjustment to the organization should be considered. The rule of thumb for span of control in ICS is one supervisor to five subordinates.

Span of control is accomplished through the timely use of delegating and use of good resource management. For example: You are a Division Supervisor that has ten engines assigned to you. You have exceeded your span of control guidelines. You designate two strike team leaders and assign the engines under the two strike team leaders. Now you are interacting with two strike team leaders instead of ten engine supervisors.

**Incident Action Plan**

Finally, every incident needs an Incident Action Plan. The purpose of the plan is to provide all incident supervisory personnel with the appropriate direction for future actions. The plan may be written or oral.
Written plans should be used when it is essential that all levels of a growing organization have a clear understanding of the tactical actions associated with the next operational period. It is important to use written action plans whenever:

- Two or more jurisdictions are involved.
- The incident will overlap major changes in personnel or go into a new operational period.
- There is extensive or full activation of the ICS organization.

The written IAP will document what your incident organization is and what actions you are undertaking. These are commonly started using the ICS 201 form and they become the starting point for moving into the large incident organization, if needed.

Just as every incident requires an Incident Action Plan, every incident requires a communications plan. The ability to communicate within ICS is absolutely essential. Like the action plan, it can be very simple and stated orally, or it can be quite complex, and form part of the written Incident Action Plan.

See Appendix B for a glossary of common ICS terms.
General Characteristics of Lost Persons

The following are commonly used general categories of lost persons. Pertinent characteristics set each category apart. Although each of the groups exhibit specific traits, there are always exceptions, and good search strategy concentrates on the most likely.

Children (1 to 3 years)
- Unaware of the concept of being lost.
- Navigational skills and sense of direction are practically non-existent.
- They tend to wander aimlessly with no specific objective.
- They might seek out the most convenient location to lay down and go to sleep:
  - Inside a log.
  - Under a thick bush.
  - Under an overhanging rock.
  - Under a picnic table.

Children (3 to 6 years)
- These children are more mobile and capable of going further than those in the one to three year old category.
- They have a concept of being lost and will generally try to return home or go back to someplace they are familiar with.
- They have definite interests and may be drawn away by animals, following older children, or just exploring.
- When tired, they generally will try to find a sleeping spot.
- Many have been instructed to stay away from strangers and as a result will not answer or talk to searchers when called by name.

Children (6 to 12 years)
- Their navigational and directional skills are much more developed.
- They are generally oriented to their normal familiar surroundings and become confused in a strange environment.
- They may intentionally run away to avoid punishment, gain attention, or sulk.
- Whether it is intentional or accidental circumstances, they will often not answer when called.
- Darkness usually brings on a willingness to accept help and be found.
- Children this age suffer from the same fears and problems that adults would, but with a greater sense of helplessness.
• The circumstances of loss often reflect their being transplanted into a foreign environment or surroundings by parents or other adults.

**Elderly (above 65 years)**
- Often the person is suffering from senility or Alzheimer’s disease.
- They are easily attracted by something that strikes their fancy.
- Their orientation is to past environments rather than the present.
- Many pose the same supervision problems as children.
- The more active and lucid ones are likely to over-extend and exhaust themselves rapidly which can result in heart attack or other potentially fatal complications.
- They are often hard of hearing or deaf.

**Mentally Retarded (all ages)**
- They act and react much the same as children from the age of six to twelve.
- Generally will not respond to their name.
- They most often will be hidden from view as a result of fright or seeking shelter from the elements.
- Many times they will hold up for days in the same location.
- They really have no physical impairments except that they will do nothing to help themselves.

**Despondents**
- Most often they are seeking solitude.
- Generally will not respond to searchers, feeling that it is an intrusion on their solitude.
- They will generally be within sight and sound of civilization.
- They tend to be found near prominent locations:
  - Lakes or scenic hills
  - Lookout or area with a view
  - Seldom, if ever, found in underbrush

**Hikers**
- Generally, they will rely on trails with a set destination in mind.
- Problems or complications usually arise with navigation when trail conditions change or become obscure:
  - Slide over trail
  - Trail not maintained
  - Trail covered intermittently with snow in the spring
  - Poorly defined junctions
Hikers (Cont.)

- Often hiking parties are mismatched in abilities and one person falls behind, becomes disoriented and ultimately lost.
- Cutting switchbacks will many times lead to disorientation or going down the wrong hill or drainage.
- They are very dependent on travel aids and trails for navigation.
- In analyzing behavior (501 cases), the following patterns have emerged:
  - 46% followed a trail or path during some portion of trek while lost or overdue.
  - Drainages often used as path of travel.
  - Significant numbers of persons wander about and go cross-country.
  - 43% walked out on their own.
  - 54% went downhill.
  - 20% stayed on the same level.
  - 25% went uphill.
  - 34% were found within a mile of the PLS (Prediction of Lost Subject)
  - 90% of lost or overdue persons were moving for 24 hours or less were also found within the first 24 hours.
  - 2 miles/hour estimate is a reasonable speed for plotting a theoretical search area.
  - Those who traveled the greatest distance from the PLS also descended by roughly proportional amounts.
  - 33% traveled at night.
  - The subjects were usually responsive to searchers.
  - The subjects were usually young and in good physical condition but not prepared.

Hunters

- They tend to concentrate more on the game than on navigation.
- In the excitement of pursuing game, they are often led into deadfall areas, boulder fields, underbrush, and deep snow with little regard for exhaustion or navigation.
- They tend to over-extend themselves into darkness and push beyond their physical abilities.
- They are typically unprepared for extremely foul weather (heavy storms in the fall often signify the movement of animals and thus an improvement in hunting).
- In analyzing actual behavior (167 cases), the following patterns emerged:
  - The subjects were usually mobile.
  - The subjects were usually communicative.
  - 40% followed drainages.
Cone pickers, berry pickers, mushroom pickers, etc.
- Intentions are to stay in one location.
- Usually carry no provisions or survival gear.
- They go in good weather and as a result do not wear anything but light clothing.
- Because their attention is focused on or near the ground, they are often misled by subtle terrain changes.
- Attempts to return to familiar ground only puts them further out of contact because of their complete disorientation.
- They are at high risk for survival.

Fisherman
- Generally, they are very well oriented because of the directional flow of a river or the position of a lake.
- The reason they are overdue is most often accident related, such as slipping into the water, falls over cliffs trying to move up or down stream, or swept off feet in fast moving water.
- A very high percentage of this category is boat related.
- Often this will be a recovery mission.

Climbers
- The individuals in this category are generally well equipped and self-sufficient.
- They tend to remain on or near designated routes.
- A primary factor for these incidents is weather or hazardous conditions which limit an individual’s abilities.
- Other major factors are falling debris and avalanche.

Skiers
- Most are young, generally under 35
- Almost all are in good physical and mental condition.
- One in three have “much” experience and significant numbers have “some” experience.
- The subjects are generally well equipped and clothed.
- In analyzing actual behavior (87 cases), the following patterns have emerged:
  - 60% have had survival training of some sort.
  - The subjects usually caused their own situation through human error.
  - Weather was a factor 33% of the time and darkness 20% of the time.
  - Most got lost because they became disoriented or misjudged time and distance.
  - 20% of the subjects had either a poor map or no map at all.
Skiers (Cont.)
  o Once lost, they generally followed paths, trails or drainages.
  o 50% were mobile while lost.
  o 54% were found within 2 miles of the PLS; 82-85% were found within 5 miles.
  o 83% did not move more than 24 hours.
  o 30-45% moved at night.
  o Almost all were communicative to the searchers.
  o 50% found themselves.
  o 50% were found by the SAR effort using hasty searches and visual tracking.

Others Lost and Overdue
  • There are generally more missions for younger (under 8) and older (over 60) subjects.
  • Subjects are generally in good physical condition and 65-70% are in good mental condition.
  • Incidents are generally caused by the subject’s human error.
  • In analyzing actual behavior (279 cases) the following patterns have emerged:
    o 40-50% were adequately equipped.
    o 45-55% were properly clothed, 30% were questionably clothed, and 15% were inappropriately clothed.
    o Most were lost because they became disoriented, were poorly supervised, or intentionally separated from a group.
    o They had a greater likelihood to wander about or go cross-country.
    o 50% followed a trail or drainage at some time while missing.
    o High percent communicated with searchers.
    o 33% were found within a half mile of the PLS.
    o 69% were found within two miles of the PLS.
    o 90% were found within five miles of the PLS.
    o 90% were not moving more than 24 hours.
    o 30-50% moved at night.

General information relevant to the Prediction of Lost Subject (PLS) behavior.

The following is a summary of the major points that must be considered when trying to predict an individual’s movements or whereabouts:
  • Category and circumstances of the loss:
    o Children are different from hikers, etc.
    o Loss elements add much to the prediction.
  • Terrain:
    o Flat terrain generally yields different travel distances than hilly / mountainous.
The area should be examined for barriers, escape routes, confusing drainages or ridges, etc.

- Weather:
  - Restricts the subject’s movements.
  - Principle contributor to hypothermia.
  - Time criticality of the situation may call for increased efforts.

- Personality:
  - Consider the aggressive person verses the ponderer or pessimist.
  - Has a substantial effect on the person’s ability to survive.

- Physical Condition:
  - Are capabilities encumbered or not?
  - A poor condition means increased susceptibility to environmental injury / illness, e.g. hypothermia, etc.
  - Has a direct bearing on the distance a subject will travel.

- Medical Problems:
  - Anything that could possibly precipitate abnormal behavior.
  - Could have a direct bearing on the distance a subject could travel.

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Search Strategy and Tactics

Search Terminology

**Search Perimeter or Search Area**
- Can be very difficult depending on the incident circumstances.
- Many ways to define but instinct is usually best.

**Search Segments**
- Can be searched in an operational period.
- Defined by recognizable features.
- Trails are their own segments.

**Probability of Area**
- How likely is the person to be in the search area.

**Probability of Detection**
- How likely are you to find the person/clues.

**Rest of the World**
- How well did you do on your search perimeter definition.
- “Bastard Search”
- Typically the trigger to suspend a search.
Search Strategy: Horses are used in practically all phases listed below. Some categories of lost persons are more apt to approach a horse/rider than to approach a searcher on foot.

Passive

Containment
- Trail/road blocks
- Lookouts
- Traps

Attraction
- Lights
- Noise

Active

Hasty Searches
- Limited resources
- High POAs/High PODs (trails)
- High hazard areas
- 90+% of searches end with hasty search.

Purposeful Wandering
- Medium resources
- Balance POA/POD

Line Searches
- Extremely resource intensive
- Rare
- Critical spacing

Tracking
- Search Dogs
  - Air scent
  - Trailing
- Human Foot Search Teams
- Horse/Rider

Air Search
ROW Search (Recovery on Water?)
- Divers
- Dogs trained to scent underwater victims

Final Considerations
- Search for clues.
- Fill out your ICS 214.
- Don’t freelance – ask for direction if your assignment isn’t clear.
- Be disciplined about not making extraneous noise (talking, radio volumes, etc.) – Listen!
Being a member of a search and rescue team comes with certain risks. Our responsibilities include searching for people who are lost, injured or possibly dead. Locating a severely injured or deceased person can cause serious post-traumatic effects on the search and rescue team members involved. This section describes the possible critical incident stress reactions and what you can do to alleviate these feelings.

Following a critical incident experience, it is normal to experience the reactions listed below:

**Physical Reactions**
- Fatigue
- Insomnia (which may turn into hyper-somnia)
- Exhaustion
- Health problems such as change in appetite, headaches, and digestive problems.

**Behavior Problems**
- Hyperactivity or under-activity
- Difficulty in concentration
- Inability to attach importance to anything other than this incident
- Flashbacks
- Nightmares
- Startle reactions
- Memory disturbance
- Isolation and crying

**Psychological Reactions**
- Fear and guilt
- Emotional numbing
- Over sensitivity
- Anger, which may be manifested by: scapegoating, irritability, frustration with bureaucracy, and violent fantasies
- Anxiety
- Depression
- Feelings of helplessness
- Amnesia for the event

These are normal reactions, and although painful, are part of of the healing process. There’s not a lot anyone can do to make you not experience these uncomfortable feelings but there are things you can do to feel more whole.
Things to do:

- When physically able, exercise can help.
- Structure your time. Keep busy.
- You’re normal and having normal reactions. Don’t label yourself crazy.
- Talk to people. Talk is the most healing medicine.
- Be aware of numbing the pain with overuse of drugs or alcohol, you don’t need to complicate this with a substance abuse problem.
- Reach out. People do care.
- Keep your lives as normal as possible.
- Spend time with others.
- Give yourself permission to feel rotten and share your feelings with others.
- Keep a journal, write your way through those sleepless hours.
- Do things that feel good to you.
- Realize those around you are under stress.
- Don’t make big life changes.
- Do make as many daily decisions as possible which will give you a feeling of control over your life; ie, if someone asks you what you want to eat, answer them even if you are not sure.
- Take advantage of Victim’s Advocates personnel within the Sheriff’s Office.
First Aid and CPR

This is intended as a supplement to information learned in a complete Community First Aid course instructed by the American Red Cross. It is not to be used as your only guide for First Aid unless in emergency situations. Please use this only as a guideline for the proper steps in First Aid. For more information please contact your local American Red Cross for class information.

In a search and rescue operation, you may locate a subject that needs medical attention. The important thing to remember is to stay calm and think before you act. You have to ask yourself “What do I need to do? What is the best help I can give?” To answer these questions, you should know three basic steps you can take in any emergency:

- Check the scene and the victim.
- Call for help.
- Care for the victim.

**First Aid**

**Bleeding**

Use a clean cloth or piece of gauze to cover the wound. Apply firm pressure to the wound with your hand, holding the edges of the wound together. Maintain firm pressure until the bleeding has stopped. When it has stopped completely, sponge the wound gently with antiseptic such as rubbing alcohol or hydrogen peroxide and spread in a thin layer over the wound. Cover with wound with a bandage.

Note: If you can’t stop the bleeding within a few minutes, press the artery against the bone. Squeeze the inside of the arm close to the shoulder for arm wounds. If bleeding is from the leg, press with the heel of your hand where the leg bends at the hip.

**Bruises**

Apply a cold compress (a washcloth soaked in cold water works well) to the bruised area immediately after the injury, if possible. To alleviate continued pain and swelling, apply cold compresses or an ice bag to the area for 15 minutes at a time several times a day.
Cuts

Wash the area with antiseptic solution or warm water and soap. If the bleeding is severe, apply pressure to the wound with a clean cloth. If the bleeding is minor, apply gentle pressure until the bleeding stops. Apply an antibiotic ointment or rubbing alcohol, thoroughly cleanse the wound and remove any debris or dirt. Cover the wound with an adhesive strip. If the cut is large, use sterile gauze and adhesive tape.

To relieve initial pain or throbbing, hold an ice bag on the bandaged wound for 15 to 20 minutes. Change the bandage daily and monitor the cut for signs of infection. Reapply ointment or rubbing alcohol with each new bandage.

Puncture Wounds

Wash the wound well with soap and water. If bleeding is persistent, apply direct pressure until it stops. Apply sterile gauze. Seek medical help in cases of a deep puncture; a tetanus shot may be needed if you have not been immunized within the previous five years.

Splinters

Thoroughly wash the area around the splinter with soap and warm water and rinse well. Swab the area gently with rubbing alcohol. Sterilize a needle by holding its end in flame for ten seconds. If the end of the splinter is sticking out of the skin, grasp it with a pair of tweezers and pull it out at the same angle it entered the skin. Go slowly and avoid breaking off a bit of the splinter under the skin. If the splinter is embedded in the skin and cannot be pulled out with tweezers, use the needle to loosen the skin around the splinter and expose its end. Then grasp the end with tweezers and remove it gently.

Gently squeeze the wound to encourage slight bleeding, which will wash out some bacteria. Apply antibiotic ointment or swab the wound with rubbing alcohol. Cover the wound with a bandage.

Note: You should seek medical help if the splinter is buried to deep to be removed, if infection develops (indicated by redness, pain, tenderness, pus, or fever), or if the splinter was deep and you have not had a tetanus shot in the last five years. Also seek help if you are unable to remove the splinter completely.
**Blistering, Burns and Frostbite**

**Blisters**

Sterilize a needle by holding it for ten seconds in a flame. Carefully puncture the edge of the blister next to the skin. Apply gentle pressure, squeezing the accumulated fluid out of the blister. Make sure not to peel back or brush off the skin that formed over the blister as it guards against infection. Treat the blister with either antibiotic ointment or rubbing alcohol and cover with several layers of sterile gauze.

Note: You can prevent some blisters from forming by covering the area with several layers of sterile gauze at the first sign of discomfort.

**Burns**

Note: You should attempt first aid treatment only for first-degree burns -- those in which the skin is reddened, slightly swollen, and sometimes covered with welts. If you receive a second- or third-degree burn (the skin is blistered or charred) or if the burn covers a large area of skin, you should seek medical treatment immediately.

For a first degree burn, immediately immerse the burn in cold water and keep it immersed until you no longer feel pain. If necessary, periodically add ice cubes to the water to keep it cold. Do **not** put butter or any other greasy product on the burn. Apply one of the following to the burn: a commercial burn ointment, a thick layer of honey, petroleum jelly or a thick paste of baking soda and water. Cover the burn with a loose protective bandage that allows some exposure to air.

**Chemical Burns**

Flush the burned area with plenty of running cold water to remove traces of the chemical. Apply either a commercial burn ointment, a thick layer of honey, petroleum jelly, or a thick paste of baking soda and water to the burned area. Cover with a loose protective bandage.

Note: If the chemical burn involves the eye, immediately flush the eye with plenty of running water, cover the eye with a sterile pad to keep the lid still and contact immediate medical help.

**Electric Shock**

Someone who has sustained an electrical shock can be in extremely critical state. **Do not touch the victim** if he is still touching the electrical equipment which caused the shock. The rescuer should disconnect the
attachment plug from the socket or disconnect the main house electrical switch, if possible. If not possible, separate the victim from the source of the contact by means of a long, dry stick, a dry rope or a long length of dry cloth. Be sure that your hands are dry and that you are standing on a dry surface.

Once you've removed the person from the source of the contact, check to see if he is breathing. If not, begin mouth-to-mouth resuscitation immediately. If there is someone else available, have him call for resuscitation help -- the fire department, ambulance, police, etc. Continue mouth-to-mouth breathing until the ambulance arrives. A second person may initiate CPR if necessary.

Electrical burns are difficult to detect. A person who has received a severe electrical shock may have badly burned underlying tissue, thought the surface skin shows little evidence. Get the victim prompt medical attention. Unattended electrical burns can lead to serious complications.

**Frostbite**

Note: Frostbite initially looks like a reddened first-degree burn. A tingling sensation follows, ice crystals may form on the skin and the skin will become yellowish-gray color and feel numb.

Re-warm the frozen skin by submerging it in warm, not hot, water. **Do not** rub the frozen skin to warm it with friction. When a reddish color returns to the frostbitten skin, take it out of the warm water and pat it dry gently. Take care not to break any blisters that may have formed and do not rub the skin. Cover the skin with a loose bandage and seek medical help immediately. If the feet or legs are frostbitten, do not attempt to walk.

**Heat Exhaustion (Heat Prostration)**

Symptoms may include fatigue, irritability, headache, faintness, weak rapid pulse, shallow breathing, cold clammy skin and profuse perspiration. To treat, instruct the victim to lie down in a cool, shade area or air-conditioned room. Elevate her feet. Massage the legs toward the heart. Give cold salt water (1/2 a teaspoon to 1/2 a glass of water) or cool, sweetened drinks, especially iced tea and coffee, every 15 minutes until victim recovers. **DO NOT** let victim sit up, even after feeling recovered.

**Sunstroke (Heat Stroke)**

Symptoms may include extremely high body temperature (106 degrees Fahrenheit or higher); hot, red, dry skin; absence of sweating; rapid pulse; convulsions; unconsciousness.
Caution: Sunstroke is a life-threatening emergency. To treat, get professional medical help immediately. Lower the body temperature quickly by placing the victim in a partially filled tub of cool, not cold, water. (Avoid overcooling.) Briskly sponge the victim’s body until her temperature is reduced; then towel dry. If a tub is not available, wrap the victim in cold, wet sheets in a well-ventilated room or use fans and air conditioners until the body temperature is reduced. DO NOT give stimulating beverages such as coffee, tea or soda.

Sunburn

Apply cool compresses to the burned area to reduce pain and swelling, or take a cool shower. If the sunburn involves your back or an area you can't reach, soak in a tub of cool water. Take aspirin or another non-aspirin pain reliever to reduce pain. Apply a thin paste of baking soda and water or calamine lotion to alleviate pain. If blisters form, never break them intentionally. If blisters do break, apply an antibiotic ointment and cover the blisters with a sterile dressing.

Note: Most sunburn is minor, but you should seek medical help if the sunburn is severe, covers more than one-fourth of your body, or involves extensive blistering.

Hypothermia

Hypothermia, sometimes mistakenly referred to simply as "expo- sure", is a lowering of the body's core temperature caused by over-exposure to cool or cold air or water.

One need not be subjected to near zero air temperatures or icy waters to be overcome, in fact, most cases of hypothermia occur during the spring, summer and fall. While the basic effects of air or water induced hypothermia are similar, the speed of occurrence and progression differs. Examine the case of a muskie fisherman or duck hunter whose boat capsizes in 50 degree water. From the moment of immersion, body heat will begin being lost via the skin. Seconds later, once saturated, more precious heat is drawn from such vulnerable body areas as the groin and sides of the chest. Shivering, a natural form of body heating, occurs and becomes intense; blood circulation slows to the arms and legs, saving heat for the vital body core area. In under two hours, when the body core temperature drops to about 87 degrees, the average person will lose consciousness. If the victim is not wearing a proper flotation device, drowning is likely. Should he be so equipped, yet not soon rescued, within the next hour the core temperature will reach the mid 70's, at which time the heart fibrillates and death follows.
With air/wind induced hypothermia, depending on air temperature and wind speed (chill factor), the symptoms may not be so apparent, both to the victim or any companions. Indeed, in the primary stages, the victim may even refuse to acknowledge there is a problem. Progression begins with a natural sense of cold accompanied by shivering. A feeling of numbness then occurs while shivering increases to where it's soon uncontrollable. Speech is garbled or incoherent, and the thought process slows. Body movements are erratic, and uncovered skin swells and appears blue. If the victim or members of his group do not spot the problem soon, unconsciousness will take place, followed by the possibly fatal lowering of the body core temperature.

Before noting treatment, beware of some special problems akin to water related hypothermia. While a sufferer on land can exercise, build a fire or make use of a sleeping bag to recover, such options are not available to the victim in the water. Indeed, exercise in water can cause heat to be lost over 30% faster than if one were to remain motionless.

So the question arises as to whether one should try to swim for the shore or remain still in the hope that rescue will take place before becoming overwhelmed. Naturally such a life or death choice rests with the victim, so recalling the aforementioned case of water immersion and its progression, also note the fact that, in 50 degree water, the average person could not swim even one full mile, before being rendered helpless.

The treatment for both types of hypothermia are alike. Basically it requires that the body core temperature be raised to a normal level, aided by outside sources of heat. **Note: It is important to warm the body from the core outward.** Heating the extremities, such as placing hands under hot running water, warms the blood that flows back to the heart too rapidly. This can cause fatal results. Some recommended suggestions include: stripping the victim, who is then placed into a sleeping bag along with one or two likewise attired companions (in such a situation there’s no room for modesty); get dry clothes on the victim then huddle together; the use of fire, alone, or with either of the foregoing; administer hot, non-alcoholic drinks; or the warm breath of rescuers (or steam) can be used via the victim’s inhalation. Once the victim is properly re-warmed, he can be moved. Seek medical assistance as soon as possible.

By using the layer effect of several pieces of clothing instead of one heavy garment, you can better maintain proper body temperature and reduce the chance of sweating. Clothing which has become wet from sweating, rain or snow is the primary cause of air related hypothermia. Too many outdoors people die needlessly each year because of hypothermia; keep alert, be careful and dress properly so it doesn’t happen to you.
Breathing Difficulty, Choking and Fainting

Breathing Difficulties
To help a person who appears to be unconscious, first tap and shout to see if the person responds. If there is no response, have your assistant call for help immediately. If you are by yourself, take the time to call for assistance. Check the victim closer and look, listen, and feel for breathing for about five seconds. If the person is definitely not breathing, first position the victim on his/her back while supporting head and neck. Take necessary precautions if you suspect the person may have sustained a back or neck injury. Tilt the victim's head so that her chin is pointing up by placing one of your hands under her neck. Lift up gently while you press down gently on the victim's forehead. Check to make sure that the victim's tongue is not blocking her throat. Look, listen, and feel for breathing again for about five seconds.

Using the hand that is on the victim's forehead, pinch her nostrils shut to prevent leakage of air. Open your mouth wide, take a deep breath, and seal your mouth over the victim's mouth. Blow two slow breaths into the victim. If the victim does not begin to breathe on her own after the two breaths, continue to breathe into her mouth at the rate of two breaths every ten seconds, or 6 times per minute. In between breaths, check pulse for 5 to 10 seconds. Continue mouth-to-mouth resuscitation until help arrives.

Choking
Choking is a life-threatening emergency. First, ask the victim if she is all right. This question is less to ascertain how the victim feels and more to gauge if the victim can speak, which would mean the food is not lodged in the windpipe; persist in asking until the victim verbalizes their answer or obviously cannot speak. Do not slap the victim on the back -- this may further lodge the food in the windpipe. The Heimlich Maneuver can be performed on victims who are either conscious or unconscious.
unconscious and can be performed on victims who are standing, sitting or lying down. You can even perform the maneuver on yourself.

**For a victim who is standing:**
Stand behind the victim and wrap your arms around the victim’s waist. Grasp your hands in front of the victim; the hand that is resting against the victim’s abdomen should be in a fist. Make sure that the fist is positioned between the tip of the breastbone and the navel.

With your hands tightly grasped, press thumb side of fist against middle of abdomen just above the navel. Give a quick, upward thrust. The piece of food should come flying out of the victim’s mouth with force. If it doesn’t, repeat the thrusting motion several more times until the food is dislodged.

**For a victim who is sitting:**
Repeat the procedure as with a victim who is standing; stand behind the chair, and grasp the victim around the waist.

**For a victim who is lying down:**
Roll the victim onto his or her back. Kneel at the victim’s side, straddle her hips, or straddle one of his/her thighs. Your position isn’t that important: choose the one that is most comfortable and affords you the greatest strength.

Place one of your hands on top of the other; the heel of your bottom hand should be positioned between the top of the breastbone and the navel. Move forward so that your shoulders are directly above the victim’s abdomen.

Press your hands forcefully into the victim’s abdomen with a rapid, upward thrust. Repeat the thrusting until you can see the piece of food; you may have to remove it from the victim’s mouth. Act quickly so that the victim doesn’t breathe it in again.

**For a victim who is a child:**
Place the child on its back across your thigh. Using two or three fingers of one hand, position your fingers between the tip of the breastbone and the navel. With a quick, upward thrust, push your fingers into the child’s abdomen. Don’t use as much force as you would use with an adult.
To perform the maneuver on yourself:
Quickly locate a firm, rigid, preferably non-moveable object that is about
the height of your abdomen. Rest your abdomen across it so that it is
positioned between the tip of your breastbone and your navel. You can
use the edge of a counter, the edge of a table or the back of a chair.
Quickly and forcefully press your weight downward so that the object
works to thrust upward into your abdomen. Repeat this motion until the
food is dislodged.

Fainting

If you feel faint, immediately lie down; if you can't lie down, sit down and
put your head between your knees. If you can, lie or sit in fresh, cool air.
Stay in a head-down position for at least ten minutes. If someone does
faint, help him or her to lie down in a comfortable position, preferably with
his/her head lower than the rest of the body. After regaining
consciousness, rest in a lying-down position for at least ten minutes before
resuming activity.

Ears, Eyes and Nose

Foreign object in ear

Lay on your side with the affected ear up. Put several drops of warm
mineral oil or warm olive oil into your ear until you feel the sensation of
fullness; wait five minutes. Sit up and tilt your head to the side, with the
affected ear pointed downward. If the object was small or was an insect, it
should float out with the oil.

Note: Do not put oil in your ear if the object is one that would swell -- a
bean, wood, or any other absorbent object. If a large object is lodged in
your ear, or if you treatment is unsuccessful, seek medical help.

Foreign object in eye

If you can see the object, lift it gently away from your eye with the corner of
a clean handkerchief or a clean cotton swab. If you can't see the object,
gently pull your upper eyelid out and down over your lower lid. The tears
should wash the particle from your eye. If you still aren't successful, gently
pull your upper lid upward, inverting it. If you see the object, remove it with
a cotton swab or the corner of your handkerchief. If you still haven't found
it, gently pull your lower lid outward and remove the object. Flush your eye
gently with clear, cool water.
Note: If you are unable to remove a large object of if you have particles of metal in your eye, seek medical help immediately. You should also seek medical help if you eye burns for a prolonged period after removing the foreign object or if the surface of your eye is cut.

Nosebleed
Note: If you suspect your nose is broken, do not try to treat it yourself, but seek medical help.

For minor nosebleeds that result from minor injury, allergy or change in altitude, first sit down and lean your head forward to allow any blood to trickle out of the mouth. Apply pressure to your nose by firmly grasping the area just below the bridge of you nose between your thumb and forefinger and apply pressure for five to ten minutes. If the bleeding does not stop within ten minutes, pack the bleeding nostril with sterile gauze and apply firm pressure at the tip of the nose. Apply a cold compress or ice bag to your face and to the base of your skull at the neck. Once the bleeding has stopped, remain quiet and avoid laughing or blowing your nose.

Note: If you cannot control the bleeding within 15 to 20 minutes seek medical help. The nosebleed may be due to high blood pressure or to a fracture of the nose.

Animal/Insect Bites

First control bleeding. Flush the wound immediately to remove saliva and cleanse thoroughly with mild soap and cool water for 5 minutes; flush with cool, running water. Cover with a sterile pad or clean cloth. Instruct the victim not to move affected area until a physician has been consulted. Consult the doctor for more detailed instructions as well as protective measures against rabies and tetanus infection.

If the victim has been bitten by an unknown animal including cats, dogs, raccoons, coyotes, foxes, rats, mice, squirrels, skunks or bats, the animal should be captured alive so it can be tested for rabies. If necessary, notify police. If the animal must be killed, do not damage the skull. If the animal cannot be caught, the victim may have to undergo anti-rabies treatment.

Snake Bites

Mild to moderate symptoms include mild swelling or discoloration, mild pain with tingling sensation at bite site, rapid pulse, weakness, blurred vision, nausea, vomiting, shortness of breath. Severe symptoms include rapid swelling, numbness, severe pain at bite site, pinpoint pupils, slurred speech, shock, convulsions, paralysis, unconsciousness, no breathing or pulse.
**Caution**: Poisonous or nonpoisonous snake bites should have medical attention. The victim should be taken to a hospital as soon as possible, even in cases when snakebite is only suspected. DO NOT give alcohol, sedatives, aspirin, or medications containing aspirin to relieve pain. DO NOT apply cold compresses, ice, dry ice, chemical ice packs, spray refrigerants, or other methods of cold therapy. Get medical help immediately. Telephone the nearest hospital, Poison Control Center or doctor for additional instructions. Have the victim lie down and keep as still and calm as possible. Adjust victim’s body so that the sight is below her heart level. Be alert for breathing difficulties and begin rescue breathing techniques if necessary. If pulse is not present, begin CPR immediately if you are trained in it. Treat for shock if necessary.

For mild to moderate symptoms, tie a constricting band between the bite site and the heart. Check for a pulse to ensure the band is not too tight. Adjust the bandage so fluid oozes from the wound. If severe symptoms develop and medical help is not readily available, first sterilize a knife or razor blade in a flame. Make a vertical cut in the skin 1/2 an inch long over each fang mark. DO NOT cut deeply and DO NOT make a crosscut incision. Suction should be applied with a suction cup for 30 minutes. If a cup is not available, such venom from the bite with your mouth. Wash the bite thoroughly with soap and cool water. Blot dry. Apply a sterile or clean dressing, but only for a short period of time. If the snake has been killed, take it with you to the hospital for identification.

**Insect and Other Bites**

**Ant, Bedbug, Chigger, Mosquito**
Wash thoroughly with soap and cool water. Apply a paste made of baking soda and water or use calamine lotion. For swelling, cover the bite with a very cold wet cloth.

**Bee**
Treat as for ant, bedbug, chigger and mosquito bites. Remove and discard the stinging apparatus and venom sac. If there is a severe reaction, seek medical help.

**Black Widow**: a shiny black spider with long legs, 3/4 of an inch in size marked on the underside with a red hourglass-shaped spot. Symptoms may include severe pain, nausea, muscle cramps, fever, profuse sweating and breathing difficulties. A tingling or burning sensation may spread throughout the body.
**Brown Recluse:** a brown spider, 1/2 to 5/8 of an inch in size with long legs and a dark brown fiddle-shaped marking on the back. Symptoms may include severe pain, later possibly followed by chills, fever, joint pain, nausea and vomiting.

**Tarantula:** a large hairy spider, which may accompany imports of bananas and fruits from South America. Symptoms may include severe wound, intense pain at the bite site; generalized body reactions are uncommon.

**Treatment:** Keep the victim quiet and warm. Be sure the bite is below heart level. Watch closely for breathing difficulties. Begin rescue breathing techniques if necessary. Place a constricting band 2" to 4" above the wound. Be sure it does not bind too tightly. Check for a pulse below the bite site. If a pulse is not evident, loosen the constricting band until a pulse can be felt. Apply a very cold, wet cloth to the affected area. Get professional medical help as soon as possible.

**Tick:** a small, leathery black or dark-brown insect. Symptoms include the tick attached to the skin or scalp.

**Caution:** If fever, headache and chills develop a few days after finding an attached tick, consult your physician.

**Treatment:** DO NOT pull, tear or crush the tick. Apply turpentine, Vaseline, rubbing or drinking alcohol or any heavy oil to the tick. IF the tick does not remove itself within 30 minutes, carefully remove all parts of the tick with a tweezers by twisting counterclockwise. (DO NOT use your fingers!) Scrub the area with soap and water for 5 minutes. Search the entire body for other possible tick sites.

**Food Poisoning**

**Staphylococcal:** a common type of food poisoning due to bacterial contamination of foods. Symptoms occur within a few hours after ingestion and may include pain or tenderness of the abdomen, nausea, vomiting, painful spasms, diarrhea and weakness. No specific treatment is necessary.

**Mushroom:** symptoms include dimmed vision, drunken behavior. To treat, induce vomiting. Give adult one ounce of syrup of ipecac (or 1/2 ounce for a child) followed by four or five glasses of water. If vomiting doesn't occur, repeat procedure in 20 minutes. After victim has vomited, follow with one ounce of activated charcoal in water, if available. If victim still has not vomited, insert your finger into the victim's throat to stimulate vomiting. Keep the victim warm and get medical help as soon as possible.
Botulism: the most serious and possibly fatal type of food poisoning caused by contamination of improperly canned foods. Symptoms occur about two days after ingestion and may include dimness of vision; double vision; drooping eyelids; difficulty in talking, swallowing and breathing. To treat, as soon as symptoms are recognized, call the National Communicable Disease Center in Atlanta, Georgia for availability of a specific antitoxin (404) 633-3311. Then seek medical assistance for further instructions.

Salmonella: bacterial contamination of cooked or uncooked foods. Symptoms occur after eight or more hours and may include nausea, chills, fever, abdominal cramps, severe diarrhea and localized infections. Seek medical help immediately.

Plant Poisoning

Swallowed Plant: Symptoms may include cramps, vomiting, burning sensation in mouth and throat, impaired vision and convulsions. Call the Poison Control Center or other professional medical help immediately. If professional medical help cannot be reached, follow the treatment for swallowed poisons. If breathing difficulties develop, apply emergency breathing techniques immediately.

Contact Plant: skin reaction due to contact with offending plants. Symptoms may not begin for 48 hours after exposure and may include: a severe rash with redness, blisters, swelling, burning, itching and high fever. To treat, carefully remove contaminated clothing. Wash the exposed areas thoroughly with mild soap and water. Apply rubbing alcohol and calamine lotion. If a severe reaction occurs, consult professional medical help.

Swallowed Poisons

If poisoning is suspected, encourage the victim to drink water or milk immediately to dilute the poison. If the victim is unconscious, having convulsions, becomes nauseated or vomits, do not force fluids. At the same time, call the Poison Control Center or professional medical help. Describe the poisonous substance and the victim's condition. Ask for first aid instruction.

DO NOT give any other first aid if victim is unconscious or is having convulsions. Get professional medical assistance. Apply emergency
breathing techniques or CPR if necessary. If the victim is convulsing, protect her from further injury; loosen tight clothing if possible. If the victim is conscious, administer the antidote recommended by the Poison Control Center as soon as possible. Instructions for treatment on product labels may be wrong. If professional help cannot be reached immediately,

DO NOT induce vomiting if the poison is unknown, a corrosive substance (I.e. acid, cleaning fluid, lye, drain cleaner) or a petroleum product (I.e. gasoline, turpentine, paint thinner, lighter fluid.) DO NOT use activated charcoal.

Induce vomiting if the poison is known and is not a corrosive substance or a petroleum product. To induce vomiting, give an adult one ounce of syrup of ipecac (or 1/2 ounce for a child) followed by four or five glasses of water. If vomiting doesn't occur, repeat the procedure in 20 minutes. After the victim has vomited, follow with one ounce of powdered activated charcoal in water, if available. Take the poison container (or vomitus if poison is unknown) with victim to hospital.

**Injury to Muscles, Bones, and Joints**

Signals of serious muscle, bone, or joint injuries are:
- Significant deformity
- Bruising and swelling
- Inability to use the affected part normally
- Bone fragments sticking out of wound
- Victim feels bones grating; victim felt or heard a snap or pop at the time of injury.
- The injured area is cold and numb
- Cause of the injury suggests that the injury may be severe

**Splinting**

- Splint only if the victim must be moved or transported by someone other than emergency medical personnel.
- Splint only if you can do it without causing more pain and discomfort to the victim.
- Splint an injury in the position you find it
- Splint the injured area and the joints above and below the injury
- Check for feeling, warmth, and color which indicates proper circulation before and after splinting
Fractures

Note: Fractures **must** receive medical attention. To avoid further injury, don't try to move the fractured area; if you suspect injury to the neck or spine, don't move the person at all--send for medical help. If the fracture is compound (the bone is sticking out of the skin) take measures to stop bleeding while medical help arrives.

Sprains

Immediately immerse the sprained area in ice water for 20 minutes to control swelling. Repeat, using ice water or cold compresses, every four hours until the swelling has stopped. Elevate the sprained limb to at least waist level until swelling has stopped. Once the swelling has stopped, soak the sprained area in contrasting baths three times a day: first in very warm water for 20 minutes, then in icy water for 20 minutes. Once the swelling has stopped, begin gently exercising the sprained area by moving it slightly from side to side, an important step in maintaining flexibility. Don't move it so rapidly or so far that you cause much pain. Continue these flexibility exercises several times daily until the pain begins to diminish.

Limit use of the sprained area; if it is an ankle, you need to use crutches until the motion of walking slowly heel-to-toe no longer hurts. If it is a wrist, avoid using your hand to eat, write, or do other things until a waving motion no longer hurts.

Shock

Note: Shock, which generally occurs to some degree after any injury, can, when severe, cause death. A person who is in shock may look dazed and confused. He may either be pale or flushed, depending on the type of injury. He will probably be breathing irregularly and his breathing may be weak. He may vomit; in severe cases he will lose consciousness. **Immediate** medical help is needed. Until that help arrives, do the following:

Have the person lie down on his back; keep the head level with the body or slightly elevated. Do **not** tilt the person so that the head is lower than the body. Loosen tight clothing at the chest and neck. If the skin is pale and cool, cover the person with one or more blankets to provide warmth, but be careful not to overheat the person. If the skin is hot and read, apply bath towels soaked in cool water until the skin returns to normal temperature and then cover the person with a blanket to keep him warm.

**Never** give a person in severe shock anything to eat or drink.
CPR

This is intended as a supplement to information learned in a complete CPR course instructed by the American Heart Association. It is not to be used as your only guide for CPR unless in emergency situations. Please use this only as a guideline for the proper steps in CPR. For more information please contact your local American Heart Association for class information.

Adult CPR

Check the victim for unresponsiveness.
Tilt head, lift chin: check breathing.

Position the person flat on their back. Kneel by their side and place one hand on the forehead and the other under the chin. Tilt the head back and lift the chin until teeth almost touch. Look and listen for breathing.

Give two breaths.

If not breathing normally, pinch the nose and cover the mouth with yours. Give two full breaths. The person's chest will rise if you are giving enough air. If airway is obstructed, check for foreign body and sweep with finger to remove.

Check pulse.

Put the fingertips of your hand on the Adam's apple, slide them into the groove next to the windpipe. Feel for a pulse. If you cannot feel a pulse or are unsure, move on to the next step.

Position hands.

Position your hands in the center of the chest between the nipples. Place one hand on top of the other.
Pump 15 times.

Push down firmly two inches. Push on chest 15 times. Continue with three more sets of two breaths and 15 pumps. Recheck pulse and breathing for about 5 seconds. If there is no pulse, continue sets of two breaths and 15 compressions.

**Child CPR**

CPR for children is similar to performing standard CPR for adults. There are, however, 2 differences.

1. Use the heel of **one hand** for chest compression’s
2. Give **1 breath** followed by **5 chest compression’s**

**Infant CPR**

**Shout and Tap**

Shout and gently tap the child on the shoulder. If there is no response, position the infant on his or her back.

**Open The Airway**

Open the airway using a head tilt lifting of chin. Do not tilt the head too far back.
**Give 1 Slow Breath**

If the baby is NOT breathing give 1 slow breath. Cover the baby's mouth and nose with your mouth. You should see the baby's chest rise with each breath.

**Determine Pulse**

Try to feel for a pulse in the inside of upper arm.

**Give 5 Compression's**

Give five gentle chest compression's. Position your 3rd and 4th fingers in the center of the chest half an inch below the nipples.

**Repeat**

Repeat with 1 breath and 5 compression's. After one minute of repeated cycles call for help. Check for pulse and breathing. If there is still no pulse, continue sets of 5 compressions and 1 breath. Recheck for pulse and breathing every few minutes.
Maps

If you are riding on marked trails or bushwhacking to areas not far from trails, a good topo map may be the only tool you need to plan your route. You will need to have a good understanding of map symbols and features, and know how to use a legend and a scale. It is also helpful to have a working knowledge of contour lines so that you can read the ups and downs of the terrain, if you happen to venture off the beaten path or if you wish to evaluate the vertical profile of your route.

A topo map will tell you how far you've traveled, the coordinates and elevation of nearby peaks, and where you'll emerge from the woods to cross a steep talus slope. It can show you a good place to set up camp and how far away it is. Contour lines and curves in the trail can show you how difficult the upcoming terrain is and how much elevation you will gain.

Symbols will point out campsites or points of interest and let you know whether or not you can ride your horse on a particular trail. Map colors will show you where water sources or stream crossings exist and where you can find wooded cover to hide from the midday sun. A topo map can be considered a piece of safety equipment. If an emergency occurs or a freak storm rolls in, it may be critical to know that there's a spring .5-mile up the trail, or a sheltered area nearby.

When you get in the habit of working with a topo map on marked trails, you'll start to recognize what the actual terrain looks like in relation to the map.
Distance

The scale in the map legend gives you the means for measuring distances on a map. On most good topo maps, the scale is given as a fraction, such as 1:24,000 or 1:100,000, and as a bar scale, which is a ruler that is divided into miles and kilometers. On a map in the scale of 1:24,000, one inch on the map is equal to 24,000 inches or 2,000 feet in the field. To find a distance between two points, measure the number of inches and multiply by 2,000 to get the distance in feet. A scale of 1:63,360 indicates that one inch on the map equals 63,360 inches on the ground, or one mile.

To use the bar scale, mark off along the edge of a piece of paper the map distance between the two points for which you want to find the actual distance, then measure it against the bar scale in the map legend. Or, make a ruler by copying the bar scale along the edge of a piece of paper.

UTM Grid Coordinate System

Most USGS maps utilize the Universal Transverse Mercator (UTM) grid coordinate system in addition to the true coordinate system. UTM was developed in order to reduce the distortion error that occurs when mapping our spherically-shaped planet on a flat surface (map projection). The Transverse Mercator Projection, which divides the earth like the slices of an orange and flattens the slices out, induces the least amount of distortion for map scales typical of most topographic maps.

The UTM Grid Coordinate System superimposes a perpendicular grid over these earth "slices" with constant linear surface distance values between each of its grid lines in all directions. Since the pattern of UTM grid lines were superimposed on the grid zones after they were flattened, these grid lines are straight, perpendicular, and they are not distorted. This grid is designed so that any point on a map can be designated by its latitude and longitude or by its grid coordinates, and a reference in one system can be converted into a reference in another system.

The UTM grid divides the earth into 60 north-south grid zones, each covering 6 degrees of longitude. The zones are numbered consecutively, with zone 1 being between 180 degrees and 174 degrees west longitude. The zones progress eastward to zone 60, which lies between 174 degrees and 180 degrees east longitude. The conterminous 48 states are covered by 10 zones, from zone 10 on the west coast through zone 19 in New England. The world is further divided into east-west bands which are 8 degrees wide and are labeled with letters.

In each zone, coordinates are measured north and east in meters. The northing values, called false northings, are measured continuously from
zero at the equator, in a northerly direction. Southerly values are similarly measured from the equator, south. A central meridian through the middle of each 6 degrees zone is assigned an easting value, called a false easting, of 500,000 meters. Grid values to the west of this central meridian are less than 500,000; to the east, more than 500,000.

Determining a UTM grid value for a point on the map: The UTM grid is shown on all quadrangle maps prepared by USGS. On 7.5-minute quadrangle maps (1:24,000 scale) and 15-minute quadrangle maps (1:50,000, 1:62,500 and standard-edition 1:63,360 scales) the UTM grid lines are indicated at intervals of 1,000 meters, either by blue ticks in the margins of the map or with full grid lines. To use the UTM grid, a transparent grid overlay can be used that subdivides the grid, or lines can be drawn on the map connecting corresponding ticks on opposite edges. The distances can be measured in meters at the map scale between any map point and the nearest grid lines to the south and west. The northing of the point is the value of the nearest grid line south of it plus its distance north of that line; its easting is the value of the nearest grid line west of it plus its distance east of that line. From a map user standpoint, the chief advantage of the UTM coordinate system is that it makes estimating distances (in meters) from one position to another quite simple.

Contour Lines

Topographic maps use contour lines to portray the shape and elevation of the land. Contour lines are the twisting, curved brown lines that connect points of equal elevation and give topo maps their three-dimensionality. The space between the lines represents a set distance, called the contour interval.

The scale unit, feet or meters, varies from map to map. If the contour interval is 80 feet, for example, the vertical distance between two contour lines is 80 feet. Basically, contour lines make it possible for a topographic map to render the three-dimensional ups and downs of the terrain on a two-dimensional surface. When planning a route, know that contour lines that are closer together represent steeper terrain and contour lines that are farther apart represent flatter terrain. The elevation, in feet or meters, is written on the darker contour lines, known as "index" contour lines. The contour interval can be found near the scale, in the map legend.

Symbols

Topographic maps show both natural and man-made (cultural) features. They use symbols, lines and colors to portray map features. Topo maps show areas shaded in various colors to represent land cover. Areas on a
A topo map that are shaded green represent vegetation, usually wooded cover (trees) or brush. Areas of blue and blue lines indicate bodies of water. Areas that are white are usually areas with little or no vegetation, such as desert or rocky alpine areas. Wilderness, national park, and national forest boundaries consist of black, dashed, dotted lines tinted with green, brown or gray shades. Consult the map legend for specific tints.

Features that are denoted by lines are: topographic contours, shown in brown, streams, rivers and lakes in blue, and roads, trails, and boundary lines, usually in black. Some lines are solid, some are dashed, and the width and darkness of lines often vary in order to distinguish features from one another. Symbols, or icons, point out features such as buildings, trailheads, visitor centers, trail use information, springs, highway numbers, or points of interest.

In order to read a topographic map, you need to understand what these symbols, lines and colors mean. Symbols are defined in the map legend, found in the map margin or on the map itself.

**Coordinate Systems**

The earth is divided by meridians of longitude; great circles that run from true north to true south (North Pole to the South Pole). Numbers, called degrees of longitude, are attached to these lines and are figured westward from the prime meridian. The prime meridian is at 0 degrees longitude and runs through Greenwich, England. The earth is also divided into parallels of latitude - lines that run east to west, parallel to the equator. The numbers attached to these lines, degrees of latitude, are figured northward from the equator in the Northern Hemisphere and southward from the equator in the Southern Hemisphere. The equator is at 0 degrees latitude.

The measurements of these lines are further broken down into minutes and seconds. Around the perimeter of the map are small numerals showing latitude and longitude numbers, and tiny lines, or ticks. By referring to the ticks and lat/long numbers you can find the exact place on the planet where you are located. The numbers on the top and bottom of the map are longitude degrees; numbers on the sides of the maps are latitude degrees. Connect the tick marks, north to south and east to west, drawing a line through your exact position on the map, and read the corresponding lat/long degrees. The latitude/longitude coordinate system is called the true coordinate system and is used on most maps.
Map and Compass

When traveling in the backcountry, whether on or off-trail, it is always a good idea to carry a compass and know how to use it. There are several types of compasses. A basic directional compass has a magnetized needle surrounded by a fixed azimuth ring, 0-360 degrees. By simply pointing the needle to "N" north or 0 degrees, a bearing can be found. These small, portable compasses are excellent for finding a quick direction in which you are traveling and for simple navigating.

A map compass has a magnetized needle surrounded by a rotating vial and azimuth ring marked in 0-360 degrees graduations every 2 degrees. Declination, discussed below, is adjusted by rotating the orienting arrow inside the vial either east or west according to the azimuth ring. Map compasses can feature magnifiers, various map scales or a variety of sighting systems.

Directional, gun sight or prismatic sighting systems allow for greater accuracy when aiming or sighting to an object to take a bearing. Map compasses can be used for navigating precisely with or without a map.

The magnetic needle on a compass points to magnetic north when the compass is held flat. The graduated dial, orienting arrow and sighting line will help you to find East, West, South and the points in between. The graduated dial has a total of 360 degrees. The numbers show the number of degrees from North. North is 0 degrees, East is 90 degrees, South is 180 degrees, and West is 270 degrees.

Declination

The earth's magnetic pole is not located at the true or geographic pole. The magnetic needle points to the earth's north magnetic pole. The angle
that the magnetic needle points away from the true north direction is called declination. For very accurate compass readings, in many areas, it is necessary to adjust your compass to eliminate this deviation.

Some compasses have a built-in declination adjustment that allows you to compensate automatically for differences between magnetic and true north. To adjust your compass, refer to an isogonic chart to find the declination for your area or refer to the compass rose or declination diagram on your map. For example, if you are in central Colorado, you will have an east declination of about 12 degrees. You then need to change the declination setting on your compass by about 12 degrees toward the East. The declination can be either east or west depending upon where you are. If the magnetic needle points west of true north, it's called west declination. If it points east of true north, it's called east declination.

Generally, Boulder County SAR personnel use Grid North. In Boulder County, Grid North, True North and Geographic North are equivalent.

**EAST DECLINATION**

**WEST DECLINATION**

**Taking a Bearing**

A bearing is a degree reading or direction from your position to another object. Thus, if you were in the field and a mountain peak was directly east of your position, the bearing of the mountain would be 90 degrees. If the peak were directly south, its bearing would be 180 degrees, and west, 270 degrees.

Sighting a bearing or aiming the compass at an object differs from one compass to another. Accuracy increases when the object being sighted, magnetic needle and the azimuth ring
can all be read at the same time. Compasses with prismatic sighting can do this. The magnetic needle and azimuth ring are read in a mirror while the object or direction is sighted.

With a directional compass, the compass is simply aimed at an object or direction, and the bearing is read at the azimuth ring closest to the object being sighted. To take a bearing, hold the compass level in front of you. The sighting line or direction of travel arrow should be pointing toward the object on which you are taking a bearing. With the sighting line pointing straight to the object, carefully turn the dial until the orienting arrow and magnetic needle (usually red) are lined up. Be sure the arrow and needle are lined up correctly and not backwards. The bearing to your object is now the degree reading indicated at the sighting line.

**Obtaining Your Bearings from a Map**

Topo maps have a diagram showing the magnetic declination angle. On most topo maps, the declination angle is incorporated into the compass rose. Check to see that your compass is adjusted for that angle. If you wish to obtain the bearing of a particular spot on your map, place your compass on the map so that the long edge of the base is on a line from your present location to the desired destination. Hold the compass steady, rotate the dial so the N on the dial is pointed north on the map. Your bearing now appears on the dial at the sighting line.

Pick the compass up and hold it in a horizontal position so the magnetic needle is free to rotate. Pivot yourself until the orienting arrow is aligned with the magnetic needle. The compass now points in the direction you need to travel to reach your desired destination.
Altimeter

Another useful tool for finding your position on a map is an altimeter. An altimeter measures altitude or elevation with respect to a reference level, usually mean sea level, by means of air pressure. As you ascend, air pressure decreases. As you descend, it increases. The altimeter reads the changes in air pressure in feet or meters, and tells you your elevation. When you locate the contour line on the map that is marked with that elevation, you can then look for distinctive features such as a stream that crosses that contour line, or a nearby peak or ridge. You can use these land features to give you a position fix.

Changes in temperature and variations in air pressure caused by weather can affect an altimeter's readings. Carry your altimeter in an outside pocket on your pack so it stays close to the temperature of the air. The weather, which causes shifts in barometric pressure, will constantly mess with your altimeter. The best way to get accurate readings is to adjust the altimeter whenever you get a chance. Each time you pass an area that has its elevation marked on the map, check your altimeter and reset it.

Finding your Line of Travel When You Know the Bearing

If you know your bearing, in degrees, to an object (B) from your present location (A), you can easily find your line of travel to that object. First, rotate the compass dial until the known bearing is next to the sighting line. Then, hold the compass in a level position so that the magnetic needle is free to rotate. Pivot yourself until the orienting arrow is aligned with the magnetic needle. The sighting line of the compass now indicates the appropriate direction of travel to reach your objective.
Compass & GPS Navigation Skills

If your map and compass skills are strong, you will probably have no trouble finding your way around the backcountry, but what about when a thick fog or a freak snowstorm rolls in and the moraine that you had been using as a visual checkpoint suddenly disappears? Or what about when you're riding in a drainage and you get caught in a downpour? There are times when you would like to know exactly where you are, so that you can find that spot on your map, quickly, and make your next move. With a GPS (Global Positioning System) receiver, you can find your location on the earth, plot a route ahead of time, and determine the distance between waypoints along that route. Sometimes this information can be interesting or convenient, and sometimes it can be critical to your safety and to the success of your adventure.

Global Positioning System

About 20 years ago, the Department of Defense developed the Global Positioning System - a high-tech simulation of the ancient method of navigating according to the position of the stars. They launched 25 satellites into orbit. These satellite "constellations" have a steady orbit, so GPS receivers use them as fixed points from which to determine their own position. The satellites transmit coded radio signals which are picked up by GPS receivers. When a GPS receiver locks onto the nearest satellite, it determines how long it's taking for the coded signal to reach it. Using this figure, the GPS calculates its physical distance from the satellite. With a distance reading from at least three satellites, a GPS unit can pinpoint its current position on the earth, similar to the way a hiker determines where he is on a map by referencing three or more distinct locations. This is called trilateration. With a reading from a fourth satellite, a GPS can determine altitude.

The government's primary purpose for GPS is as a navigational system for military use. It is also widely used for surveying and mapping by industries that rely on position information. With the new hand-held GPS receivers,
GPS satellite information can be accessed by anyone – sea kayaker, pilot or mountaineer. Some of the new devices are only a few inches long and are quite light. With this device, you can find your location in a matter of minutes and plot a route with several waypoints.

**Plotting a Route with GPS**

When you use your GPS for the first time, you'll need to set it for the local time, choose a unit of measurement for distance (feet, miles, meters), and decide whether you want the GPS to operate in terms of the true (lat /long) coordinate system or the UTM grid coordinate system *(MSAR typically uses UTM)*. You'll then need to initialize it by punching in the coordinates of the general area you are in. For example, for a particular trailhead you might enter, N 38 degrees 23'14" and W 109 degrees 52'13". The only time you'll need to do this again is if you are more than 300 miles away from that spot the next time you pull out your GPS.

To plot your route ahead of time, you'll need to save your first position, at the trailhead, into the memory of the GPS, by giving it a name or number. Next, using your map, you can enter coordinates along a route. Give each waypoint a name and/or a number.

Selected GPS waypoints are located on some topo maps. These latitude and longitude coordinates were determined using software and GPS equipment that has a plus or minus accuracy tolerance. When used with map datum *WGS84* *(The default datum used varies between different agencies. Make sure your GPS is set according to the map you are using.)*, these coordinates represent an approximate location fix. Some topo maps will print the coordinates of prominent places, such as trailheads, roads, lakes, emergency locations or water sources, for your convenience. If you punch in a topo map waypoint, your GPS will give you a bearing and a distance toward that position.

As you travel, each time you turn on your GPS it will give you your current position. You can also obtain a bearing toward and a straight-line distance to your next waypoint. This information is most useful when used in conjunction with a map and compass. The GPS will give you a bearing, but you will need to use your compass to orient yourself so that you can follow that bearing. Since the GPS distance reading is a straight line distance, and it's usually inconvenient to travel in a straight line in the backcountry, you'll need to be able to interpret the topography of the land that lies between you and that next waypoint. For example, a lake may be 3.5 miles away as the crow flies, but you'll need to consider the steep, exposed switchbacks and the 1500' elevation gain that lie between you and the lake.
The fact that a GPS can tell you exactly where you are and where you have been is really its most valuable feature for search and rescue personnel. In the case where the weather is stormy and visibility is limited, you can get a position fix from your GPS, locate the coordinates on your map, quickly evaluate the topography of the surrounding area and decide whether it is better to move on, turn around, or stay where you are.

Likewise, after searching an assigned segment, the GPS tracking information can be downloaded using GPS mapping software to determine if any part of the search segment has been missed.

Boulder County Mounted Search and Rescue currently owns several Garmin GPS12 units that are available for search and rescue or training exercises. A comprehensive explanation of the model GPS12 features and operation can be located at:

Basic Survival Techniques

There are a wide variety of opinions on some of these topics, so don’t take this guideline as the gospel. If you consider even a few of these ideas before going out on a trail ride, you have taken the most important step; To Be Prepared. Survival is 80 percent attitude, 10 percent equipment, and 10 percent the skill and knowledge to use that equipment.

The Psychology of Survival

The Wilderness Institute of Survival Education (W.I.S.E.) makes a general assumption that “if you can stay alive for 72 hours, you will almost assuredly be rescued by any one of a number of agencies that specialize in search and rescue.” If you get lost, your main focus should be on staying alive for those 72 hours.

Make Plans

Survival depends not only on what you do once you get lost, but also on what you do before you get lost. Always tell someone the following:

- Where you are going
- How you are going to get there (Highways, back-roads, etc.)
- When you plan to return
- How you are coming home

Once you make a plan - Stick to It

Be Where You Are

If you should get lost, the first thing to do is Stop and Think. About 87 percent of people who get lost in the wilderness are going to panic - 50 percent will try to run which complicates the problem tremendously. They immediately lose any chance they may have had to backtrack to a familiar point, they run the risk of injuring themselves, they become exhausted and disoriented. The best thing to do is sit down and take 30 minutes to think about the following:

- What was the last familiar landmark you remember?
- When you left, did you cross one ridge or two?
- Did you cross that little stream going out?
- Where you walking uphill or downhill?
Chances are you’re going to remember where you took the wrong turn, and you’ll be able to get back out the way you came in.

**Improve Your Situation**

If you have concluded that you are definitely lost, you need to start thinking about your survival. The three most important elements for survival are **Shelter**, **Fire**, and **Signal**. The next section describes the basic materials you should carry with you to significantly improve your chances of being rescued.

**The Survival Kit**

- Two Emergency Blankets - Thin Mylar sheets coated on one side with reflective material.
- One 60”x90” Sheet of Plastic - Provides strength for emergency blankets.
- 50’ Nylon Parachute Cord
- One roll of cold-resistant electrician’s tape (Scotch Brand 33® or equal)
- Signal Mirror
- Plastic Whistle
- Strike-Anywhere Matches in Waterproof Container
- One 35 mm Film Can of Calcium Carbide
- A Metal Match® or Magnesium Firestarting Tool®
- 2’-3’ Heavy-duty Aluminum Foil
- A bottle of water-purification tablets (Portable Aqua® or equal)
- Flashlight
- Leatherman Tool - Fold-up pliers with knife.

Good options: A film canister of honey, dental floss with a fishing hook, butane lighter with a visible fuel supply, and EZ-Fire.

**Shelter**

If you have nothing else going for you - no fire or food or anything - and you have adequate shelter, you’re probably going to be alive when search and rescue finds you.

In the desert, we have to protect ourselves from the sun in the day and the wind and cold at night. In the mountains we contend with snow, cold, and wet. On the plains, you can have all of the above. Natural materials may or may not be available, that’s why the survival kit is so important.
Shelter can be as simple as a tree where the lower branches touch the ground. Caves are good but look out for bears and cats. Look for bones, skin, feathers, or droppings around the entrance of a cave. A cave that is being used by a large predator typically smells very bad.

Never enter a mineshaft as a shelter. Mines typically have vertical shafts that may or may not be covered securely.

A Lean-to shelter is probably the easiest shelter for a person to build. Collect fallen branches that can be used as a frame for your shelter and construct something similar to Figure 1. Try to orient your shelter so that the wind is coming over the back of the shelter. Choose a site near a large clearing so that signals can be seen from an aircraft or search and rescue teams.

Once your leaning poles are in place, cut pine boughs to lay over them. The boughs should be laid with the cut ends up. This provides the maximum water-shed properties and insulation for your shelter. In order for it to be effective, it needs to be approximately one foot thick. If you have selected your trees carefully, you can probably stopper up the ends by placing material over the openings.

Place one of the emergency blankets on the ground, reflective side up, and place 8 - 10 inches of pine boughs on top. Body heat is reflected back
up from the emergency blanket and the pine boughs provide a dead air space to hold the heat beneath you.

Your fire pit should be located in front of the shelter. If you have a second emergency blanket, piece of plastic, or garment like a poncho or raincoat, you can place it over the top of your shelter, leaving a lip that hangs down about a foot over the front of the shelter. This will help hold heat in the shelter.

If natural materials are not available, use the parachute cord, electrical tape, emergency blankets, and plastic to build a shelter. Tie some cord between two trees or whatever is available and drape emergency blanket over the cord. Pin down the edges of the blanket with rocks or other heavy objects. The emergency blankets are simply heat reflectors. The plastic is necessary to give the shelter some strength. Place the reflective side (silver side) of the emergency blanket toward the interior of the shelter to retain heat. The gold on the exterior of the shelter is an excellent signaling device.

Rock or cave shelters save valuable time and energy that may be vital to your survival. Placing branches and pine boughs over a naturally occurring formation can create a cozy retreat.

Snow shelters can be risky. “If you cannot stay dry in the process of building your shelter, or if you cannot get dry after you have built it, then you don’t build a snow shelter”. Figure 2 illustrates how to construct a snow cave. Note the ventilation hole necessary for circulating air.

Figure 2 - Snow Cave
**Signaling**

Each morning, go into a clearing and blow your whistle three times, pause and repeat. This sure beats yelling for help. According to W.I.S.E., search and rescue dogs are trained to respond to whistles.

If you had to travel to find adequate shelter, build arrows on the ground with rocks or ground litter indicating which direction you went. Build arrows approximately one mile apart. This will significantly reduce the time necessary for search and rescue teams to locate you.

If you hear aircraft, go into the clearing and use the signaling mirror to catch the pilot’s attention.

You can also prepare signaling fires to draw attention to yourself. Green vegetation placed on a good fire will create white smoke that is easily seen against a forest background. In winter conditions, you want dark smoke. Wood that is heavy in resin is a good source. Look for a tree that has been struck by lighting, the sap flows to the bottom and loads the wood with resin. Work on improving your signal fire in your spare time. Fire bases must be ready and sheltered from the elements. They must be dry ready to blaze at a moments notice.

*W.I.S.E. suggests that you build three signaling fires 30 - 50 feet apart. Three of anything is a universally-recognized distress signal. I have some reservations about this idea because an out-of-control fire will bring the search to an undesirable end. Be very careful or use other methods when conditions are un-safe.*

Flares, strobe lights, and firearms discharged three times are other methods for signaling if you happen to have these items with you. The rule of thumb for signaling is to make yourself show up against your surroundings.

**Firecraft**

A fire provides many things: It acts as a signaling device; It provides security, warmth, and light; It has a psychological effect of companionship; And it sustains a will to live.

**The Fire Pit**

Clear an area three or four feet larger than your fire pit. You must be able to get down to the mineral soil so that the fire does not spread. Rocks are a good way to build a pit but be careful of smooth round rocks as they may contain water and explode when heated. Stack rocks in a ring and make the back of the ring considerably higher than the front.
Building Your Fire

Build your fire with extremely dry, fine tinder on the bottom, something that will catch fire immediately. On top of that put lots of dry kindling material that will burn fast and hot, and on top of that stack dry fuel like a teepee.

Kindling can be made from larger sticks by shaving thin layers into a pile with your knife. Larger fuel that is wet can be placed around the edge of the fire pit to dry. Green wood burns better if it is split. Always gather at least an hours worth of fuel before attempting to start the fire. Once you have gathered your fuel, protect it from the elements.

Lighting The Fire

Wooden matches are the easiest and most reliable method for starting a fire. Easy being the key word in a survival situation. Wooden matches burn hotter and longer than paper matches and are less susceptible to moisture. Butane lighters are less reliable and most do not allow you to see how much fuel is left.

The Metal Match and the Magnesium Firestarter are long lasting sparking devices. The Magnesium Firestarter provides fire-starting material which is easily ignited with a spark. With your knife, scrape a considerable amount of magnesium filings onto your tinder material. Then, reversing your Magnesium Firestarting Tool to the sparking side, drop a spark into your accumulated pile of filings.

A fire can be started in wet conditions with the Calcium Carbide from the survival kit. When water is added to Calcium Carbide crystals, acetylene gas is released which can be ignited to build your fire. The trick to this method is to create a small hole in the fire pit underneath the tinder. This keeps the tinder from laying right on top of the crystals and allows a pocket of gas to form.

Fine steel wool (#0000) and a 9-volt battery provide another method for building fires. A small flame can be created by touching the business end of the battery to the steel wool. This method works well with the Calcium Carbide.

EZ-Fire or napalm can be purchased in small packets designed to build fires. Be sure to place the EZ-Fire on top of your fuel so it flows down onto the kindling and tinder.
There is a product called SafeLight which is commonly used to ignite fireplaces. It is difficult to light but once its going, it will burn under running water.

Emergency flares, available at automotive parts stores, are a good way to build fires in the most adverse conditions however, they can be somewhat impractical to carry out into the woods.

If you have to build a fire on snow, gather several large green logs and place them tightly together to provide a platform. If the platform is too thin, the fire will burn through and the fire will extinguish itself.

**Water**

The benefits of keeping yourself hydrated can be quickly cancelled out if that water contains disease-causing organisms. A bout of vomiting or diarrhea can quickly dehydrate you and burn valuable energy.

You should boil water for a minimum of 5 minutes at sea-level and 1 minute longer for each 1,000 feet. The aluminum foil from your survival kit can be made into a small pan for boiling water. Boiling for at least one minute will take care of Giardia lamblia which causes Giardiasis. However, anything used to carry the contaminated water can still cause a problem. Water purification tablets will remedy this situation for most cases as long as directions on the labels are followed explicitly.

When using snow as a water source, note the color. White snow just below the surface is your best bet. Don't use yellow snow for obvious reasons. Pink snow, found on mountainsides in the spring, contains a poisonous algae that can be quite dangerous. Black streaks in snow are snow fleas. Snow fleas will die rapidly at temperatures above freezing but a cup full of these guys is no way to start the morning.

**Food**

There are documented cases where people survived without food for up to a month. If you don't have any food along with you, try to eat only what you know is safe for the first 3-5 days.

95% of White/Yellow Berries are poisonous
50% of Red Berries are poisonous
15% of Blue/Black Berries are poisonous

Bugs are a good source of food. Ants cooked on foil are highly recommended. Don't eat leaf-eaters without cooking first. Soak night-crawlers in water first to clean.
Carrying a small fishing kit is a good idea. A hook and some waxed dental floss are very handy. You can fish, sew up large wounds, and get bug legs out from between your teeth. Don’t eat porcupines, they are slow and easy to catch but they are carriers of many diseases and parasites.

Appendix A Comprehensive Equipment List

This list is a comprehensive list of equipment that, in one situation or another, may come in handy. Many items on this list are optional and are not required for participation in MSAR. Please see the minimum required equipment list in the requirements section of this handbook.

Tack
- Saddle and pad
- Bridle or hackamore that is comfortable for your horse (It's strongly recommended that you not try new equipment on search and rescue exercises)
- Halter and cotton lead rope
- Breast Collar
- Saddle or horn bags that are balanced when packed with required equipment
- Hobbies
- Crupper
- Spare tack and repair materials e.g. curb strap, reins, Chicago screws, D-rings, leather scraps, hole punch, etc.
- Horse blanket
- Saddle cover

Vehicle and Trailer
- Current registration for trailer and tow vehicle
- 4WD recommended
- Chain or towrope
- Jumper cables
- Tie-downs or adjustable straps
- Spare Tire for Vehicle and if different size, spare for trailer
- Manure Shovel or Apple Picker
- Emergency tool-kit with road warning reflectors or flares
- Portable Potty will plenty of toilet paper
Horse Care

- Extra water for horses
- Feed for two-three days
- Buckets (collapsible bucket for trail)
- Salt/Electrolytes
- Brushes, hoof pick
- Fly spray
- Portable electric fence
- Hay nets
- Fly masks
- Wound dressing
- Vetraps and cotton wraps
- Shoe puller, file
- Easy boots or equivalent
Survival

- Cell phone and/or two-way radio.
- Compass and topo map of area, GPS
- Tarp or Emergency Solar blanket
- Mini shovel
- Rope or parachute cord
- Axe or cord saw
- Duct tape
- Flashlight with extra batteries
- Headlamp or headband flashlight holder
- Rain slicker, Chaps
- Appropriate outerwear for potential adverse weather conditions
- Riding helmet
- Extra set of clothes and extra wool socks
- Waterproof, insulated boots
- Hat, sunglasses, and sunscreen
- Waterproof matches and fire-starter material
- Flint or see-thru lighter (so you can see fuel level)
- Water bottle with metal cup (cup used for cooking)
- Water filter or purifier tablets
- Whistle, Mirror or other signaling device
- Foil (for cooking bugs)
- Trash bags
- Protein bars
- Medications for three days
- Sugar or Honey for diabetes
- Insect repellant
- Trail marker material
- Binoculars
- Light weight sleeping bag or bivvy
This is a great list of stuff to have together around the house or even better, keep it in your trailer

Assemble first-aid and survival items in a bucket with secure lid and store the kit in your stable or trailer for emergency situations. Be sure to replace all borrowed items promptly and renew medications as expiration dates approach. The following includes medications and materials for both human and animal application.

**Barn First Aid Kit**

- Thermometers (human and equine)
- Bandage scissors
- Tweezers
- Swiss Army knife (or similar pocket tool)
- Eyedropper or ear bulb syringe (for irrigation of eyes or wounds)
- Stethoscope
- Tourniquet (e.g. rubber tubing) to control bleeding
  - Large safety pins (to fasten a sling or bandages)
- Wooden tongue depressors
- Canteen for water and/or water purification tablets
- Cord or nylon rope
- Wire cutters
- Hoof pick
- Extra cotton lead rope
- Whistle (for signaling)
- Large box of matches in waterproof container
- Flashlights and fresh replacement batteries
- Glo-sticks
- Shoelaces for instant tack repairs
- Hoof boot

**Dressing/Bandages**

- 1 Box Band-Aids, assorted sizes
- 6 Butterfly wound-closure tapes
- 1 Box sterile gauze pads (4x4”)
- 2 Rolls gauze (3 & 4” wide)
- 2 Rolls adhesive tape (1 & 2” wide)
- 2 Rolls of self adhesive elastic bandages
- 2 Non adhesive elastic bandages
- 6 Pre-moistened antiseptic towelettes
- 1 pack of Vaseline gauze pads
• 2 Disposable diapers (to use a absorbent dressings with waterproof backings)
• 1 Large bandanna (to use as sling)
• 1 Box each tissues and Handi-wipes
• Clean cotton towels

Medications

• Desitin ointment
• Neosporin ointment
• Aspirin, Ibuprofen, and Tylenol
• Eyedrops
• Sterile water in plastic pouch
• Swat ointment
• Bee-sting kit, if allergic to bees
• Sunscreen
• Insect repellant
• Syrup of Ipecac
• Activated charcoal

Miscellaneous Trail Stuff

• Granola bars, Power Bars, and peanut butter protein bars
• Bottled drinking water
• Pens or pencils and small notepad
• Change for payphone or Cell phone
• Identification, including phone numbers for your physician and vet
• Phone number for poison control
• First Aid manual

Trail First Aid For Your Horse

• 2 Rolls self-adhesive wrap to bind wounds, secure splints
• 3 individually wrapped gauze pads and non-stick wound dressings
• 6 Individually wrapped surgical prep pads to sterilize skin
• Small squirt bottle of saline solution to rinse wounds
• A tube of non-steroidal antibiotic ophthalmic ointment, safe for use on eyes and on wounds anywhere else on the body
• Pocketknife with multiple "tools"
Appendix B – Glossary of Common ICS terms

Branch – The organizational level having functional/geographic responsibility for major segments of incident operations. The branch level is organizationally between section and division/group level.

Camp – A geographic site, within the general incident area, separated from the base, equipped and staffed to provide food, water, and sanitary services to incident personnel.

Check-in – Locations where assigned resources check in at the incident. Locations for check-in are: incident command post (resource unit), incident base, camps, staging areas, helibases, division supervisors. Only check in at one location.

Division – That organizational level having responsibility for operations within a defined geographic area. Organizationally between strike team and group.

Group – A functional division.

Incident Base – The location where primary logistics functions are coordinated and administered.

Incident Command Post – The location where the primary command functions are executed and is usually collocated with the incident base. There is only one command post per incident.

RESTAT – Acronym for the resources unit. The planning unit that tracks resources.

Section – The organizational level having functional responsibility for primary segments of incident operations such as: operations, planning, logistics, and finance. Organizationally between branch and incident commander.

SITSTAT – Acronym for the situation unit. The planning unit that provides intelligence about the incident.

Staging Area – The location where incident personnel are assigned on a available status. Usually the location is where the check-in takes place.

Strike Team – A specified combination of like resources with a common communications leader.

Task Force – A group of unlike resources with common communications and a leader temporarily assembled for a specific mission.

Unit – That organizational level having functional responsibility for specific incident planning, logistic, or financial.
Appendix C  Boulder County Mounted Search and Rescue
Application Form

Note: The Boulder County Sheriff’s Office will conduct a background check on all applicants.

Name: __________________________  First Aid Cert Date: _____________
Address: __________________________  CPR Cert Date: ______________

Phone: __________________________ (home)  __________________________ (work)
                 __________________________ (pager)  __________________________ (cellular)
Profession:____________________________________________________________________
Truck: __________________________  Horse Trailer: ______________

* Does your vehicle have four-wheel drive? __________________________

Your Horse(s):
1. Name: __________________________  Age: __________________________
   Breed: __________________________
2. Name: __________________________  Age: __________________________
   Breed: __________________________

Why are you interested in participating in a Search & Rescue Team?

Please describe your horsemanship ability:

Please describe your horse’s experience and ability:

What type of riding do you do with your horse?

How long have you been riding?

On a scale of 1 to 10, how committed are you to participating in a program such as this and why?

Return completed form to: Sheila Ranegar P.O. Box 837 Nederland, Co. 80466 303/258-7944 Fax 303/258-7596
References


2. *Community First Aid and Safety*, American Red Cross St. Louis MO., 1993


5. [http://www.uio.no/~kjetikj/compass/](http://www.uio.no/~kjetikj/compass/) How To Use A Compass, Kjetil Kjernsmo’s Illustrated Guide on How To Use A Compass


9. Member Contributions the Boulder County Mounted Search and Rescue 6/5/2000