Wilderness Emergency Communication Devices Analyzed

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> I sewed [my personal locator beacon] into the upper part of my pack rear stretch pouch . . .. Well, it worked. The thing successfully warded off emergencies, as planned. Electronics is magic.
>
> —P. Todd Foster, *Backpackinglight.com* forum

> If a tool exists that can help you or even save your life [or the lives of others], the question should never be "WHY?" More correctly, "Why not?" Let no one tell you otherwise. Carry your satellite tracker and be proud of it. 20 years ago people argued the same about cell phones—how many people do you think have been saved by those since they came out.
>
> —"klock" moderator on the *Trail Space* Internet forum

Central Issues Addressed in This Article

What kind of electronic communication devices (hereafter "ECDs") are currently available for wilderness use? Should I carry an ECD into the wilderness on longer backcountry trips? What are the primary factors pro and con affecting my decision? Which ECD will best fit my needs and expectations, if I decide to carry one or more of these devices on wilderness trips? How much should I depend upon ECDs like smart phones and personal locator beacons during emergencies in the backcountry?

Introduction

After making explicit some important starting assumptions, I analyze in detail four ECDs currently available: cellular phones, satellite phones, and two different types of personal locator beacons (PLBs). Included in this latter category is the

highly popular newest entry, the SPOT II Satellite GPS Messenger[1]. Because the SPOT unit and cellular phones are commonly carried on trips into the wilderness, I analyze them in greater detail than the other two devices. I then analyze the available options from a search and rescue perspective. I end this article encouraging readers their own decisions from the available options.

Starting Assumptions

This article covers only portable, battery-operated, electronic communication devices commonly used in mountainous wilderness areas. This article will *not* analyze the following battery-operated emergency devices:

- avalanche beacons or other tracking devices (e.g., TracMe, Ortovox or 121 MHz "person-overboard" locators) which require the transmitter of the party in distress to be paired to a specialized receiver carried by the rescuing party in the field

- two-way radios used by governmental and search and rescue agencies (usually in conjunction with strategically placed fixed transmitters and repeater stations)

- amateur "HAM" radio options

- medical alert or personal emergency response systems (e.g., devices worn around the neck intended for in-home and in-town use) for those who might find themselves in an emergency situation at a moment's notice, especially the elderly, physically challenged, and chronically ill.

Five additional starting assumptions:

1. The reader is not categorically or philosophically opposed to carrying electronic communication devices in the backcountry (i.e., you are open to packing one or more of these devices under some circumstances).

[1] Even though some are strongly opposed to referring to the SPOT unit as a Personal Locator Beacon, I am not. Furthermore, I don't think it is productive to spend time developing strict definitions of what is and is not a PLB.

2. ECD devices would stay in the bottom of the pack and not be used except for true *emergency* situations.

3. Cost is not a consideration; if the emergency device of choice can't be purchased, they can often be rented or borrowed.

4. The reader is not analyzing ECDs for use in organized search and rescue (SAR) activities.

5. One or more of the following non-electronic signaling devices are being carried by everyone in the party: whistle, signal mirror, fire making materials, bright colored material, blinking light, ground-to-air emergency code symbols.

Four Emergency Communication Devices (ECDs) Analyzed

The next several sections of this article analyze four different devices: two types of personal locator beacons (PBLs) plus cellular and satellite phones. The following format is used in the analysis of each:

(1) an explanation of the basic theory and operation of each device

(2) an explanation of the chain of communication from when the device is first activated to the time emergency personnel are notified

(3) additional decision making factors like size, cost, weight, reliability

(4) a summary evaluation of the effectiveness of each device for hikers and backpackers.

Understanding these four elements is usually necessary to make informed decisions, especially in selecting the most appropriate ECD(s) for wilderness use.

In the analyses below, I have tried to keep the technical details to a minimum. There is a wealth of material available elsewhere for those who desire to go into more depth. Furthermore, the information in this entire article is obviously problematic in that the technology is constantly changing. An analysis of the currently available technology is provided, however, to gain an overview of the

strengths and weaknesses of each type of device. This basic understanding will be valuable even if the technology changes greatly in the next few years.

Dual Frequency Personal Locator Beacons (PLBs)

Basic Operation

Several companies manufacturer dual frequency personal locator beacons with ACR, McMurdo and GME the most popular. When activated, this unit transmits a 406 MHz signal to two different sets of orbiting government satellites. They also transmit a lower frequency (121 MHz) "homing" signal that can be picked up by rescue personnel (and most commercial airliners) when near the transmitter. (Hence, a dual frequency unit). Transmitter power is usually in the 5-6 watt range. The 406 MHz signal carries a unique code that identifies the device and its owner using a database of emergency contact information (assuming owner has completed the required registration). All 406 MHz PLB units communicate with two satellite systems called GEOSAR and LEOSAR, the same systems used in airplanes (called ELTs) and on the water (EPIRBs). A consortium of four governments (Canada, France, Russia and the United States) has been maintaining these satellite systems. These units have only one message mode: "rescue me". No text messages or voice communications are involved. Two-way communication is not an option. These dual frequency PLB units are usually equipped with an internal GPS function to determine location of the unit. If GPS coordinates are not transmitted, the satellite systems will calculate an approximate transmitter location using timing variations (a Doppler Shift technology). Each pass of the satellites narrows the search area. If GPS coordinates are transmitted to the satellite, the satellite calculates the PLB location within a few meters and transmits this information to search and rescue organizations.

Chain of Communication to Emergency Services

The chain of communication with this dual frequency PLBs is rather complex:

(1) The PLB transmits a 406 MHz frequency distress signal to two global satellite systems (GEOSAR and LEOSAR).

(2) These satellites relay the distress information (with or without GPS coordinates) to satellite-tracking dishes called "Local User Terminals" (LUTs).

(3) The LUT terminals relay the information to "Mission Control Centers" (MCCs), which are data distribution clearinghouses (there are currently 26 MCCs around the world).

(4) A human operator at the MCC distributes the distress information to the appropriate Rescue Coordination Centers (RCCs). In the USA this is generally the U.S. Air Force.

(5) The RCC uses their online database to verify the validity of the emergency signal. If validated, the RCC relays the distress information to the appropriate government emergency services office (e.g., a county sheriff).

(6) The emergency services office contacts the appropriate search and rescue unit (e.g., U. S. Coast Guard SAR helicopter base).

(7) The SAR unit uses either the GPS coordinates or an approximate location (provided by the government satellites) or the 121 MHz homing signal to locate the person(s) in distress.

Other Decision-Making Factors

One factor is the shelf life of the batteries (usually 4-5 years) and whether they are replaceable by the owner. The initial retail cost of the units is considerable, but new models are becoming cheaper. There is no annual service fee for the use of the government satellite system: it is taxpayer-funded. Supporters of this multi-government system are working to add a new capability called MEOSAR (Medium Earth Orbit Search and Rescue satellites). The MEOSAR satellite system, after being declared fully operational in approximately 2017, will be able to provide near-instantaneous detection, identification, receipt of encoded position, and to accurately determine the position of 406 MHz beacons. There is also the possibility that the MEOSAR system will be able to download information back to the distress beacon via the MEOSAR downlink

(i.e., two-way communication). Finally, eight billion dollars is being spent to upgrade the entire government GPS satellite system. Twenty-four of the new GPS satellites will go into orbit with six reserved as spares. (W.J. Hennigan, *Los Angeles Times*, June 1, 2010).

Summary Evaluation

One strength of this dual frequency system is that properly registered units will tell emergency personnel who you are, your personal emergency contact information and if you have any medical conditions. Even though this system relies on a rather complex government-based search and rescue system, reports from the field suggest that this system is very reliable, especially if the PLB contains the latest, high sensitivity GPS chip sets. If GPS coordinates are provided by the transmitter or calculated by the LEOSAR or GEOSAR satellite systems, these satellite systems can pinpoint the location of the person in distress within minutes. With GPS coordinates provided by a 406MHz transmitter, position accuracy is within 100 yards. Without GPS coordinates and without a fix on the homing signal (e.g., rescue aircraft grounded because of weather), the search area provided by the satellites is roughly a three-mile radius which covers about 15 square miles.

SPOT II Satellite GPS Messenger [2]

Basic Operation

The SPOT device is the latest entry into the family of PLBs and is owned by a subsidiary of Globalstar, a satellite oriented company. The unit relies on the government (public) satellite system to obtain GPS coordinates. The rest of its emergency communications involve commercial Globalstar satellite systems. It does not utilize the dual frequency operation of the PLCs discussed above. Because the SPOT uses the Globalstar simplex data network, all communications from the unit are one-way. These communications involve a minimum of three different message modes: I am Ok (check-in), I Need Help (from friends and family) and SOS 911 (rescue me). These three services are

[2] There is a device similar in operation to the SPOT called "Yellowbrick." Instead of Globalstar, it is based on the Iridium satellite system and is designed for outdoor adventures where weight is not a critical factor. At last check, Yellowbrick weighs 26.5 ounces (750 grams) compared to just under five (5) ounces for the SPOT II.

provided for a yearly subscription fee. For an additional fee, SPOT devices also have an automatic tracking mode ("SPOT casting") that transmits positional information every ten minutes to the SPOT website using Google Maps for reference. All four message modes integrate a GPS fix from the GPS satellites to provide real time and location information. Depending upon the mode being used, messages from the SPOT unit currently go to one or more of the following: Emergency Response Center, Internet website (a Google map coordinated with an email message) and a cell phone text message. SPOT has a network of 13 "gateways" around the globe to support the SPOT services. Each gateway is a satellite terminal which receives and sends signals to and from satellites passing in view. Spot uses "spread spectrum technology" to allow the signal to pass through multiple satellites to be recombined on the ground. This allows for lower power usage plus higher reliability.

The above description of the SPOT unit "basic operation" does not include additional services that can be purchased (often requiring the purchase of additional hardware).

Chain of Communication to Emergency Services

With the current SPOT system, there are seven links in the communication chain:

(1) When activated, this unit transmits a 0.4 watt —406 MHz signal to orbiting government GPS satellites in order to obtain a GPS fix. *Note*: If the unit is in its Tracking mode (extra subscription cost), it will attempt to get a fix every 10 minutes.

(2) The unit transmits a 0.4 watt —1.6 MHz signal to send the appropriate message (with or without GPS coordinates) up to orbiting commercial Globalstar satellites. There satellites are in low Earth orbits and pass overhead at least every 20 minutes.

(3) The Globalstar satellite relays this message down to the nearest Globalstar ground station (gateways). There are currently 13 gateways around the globe with redundant backup equipment to transfer messages.

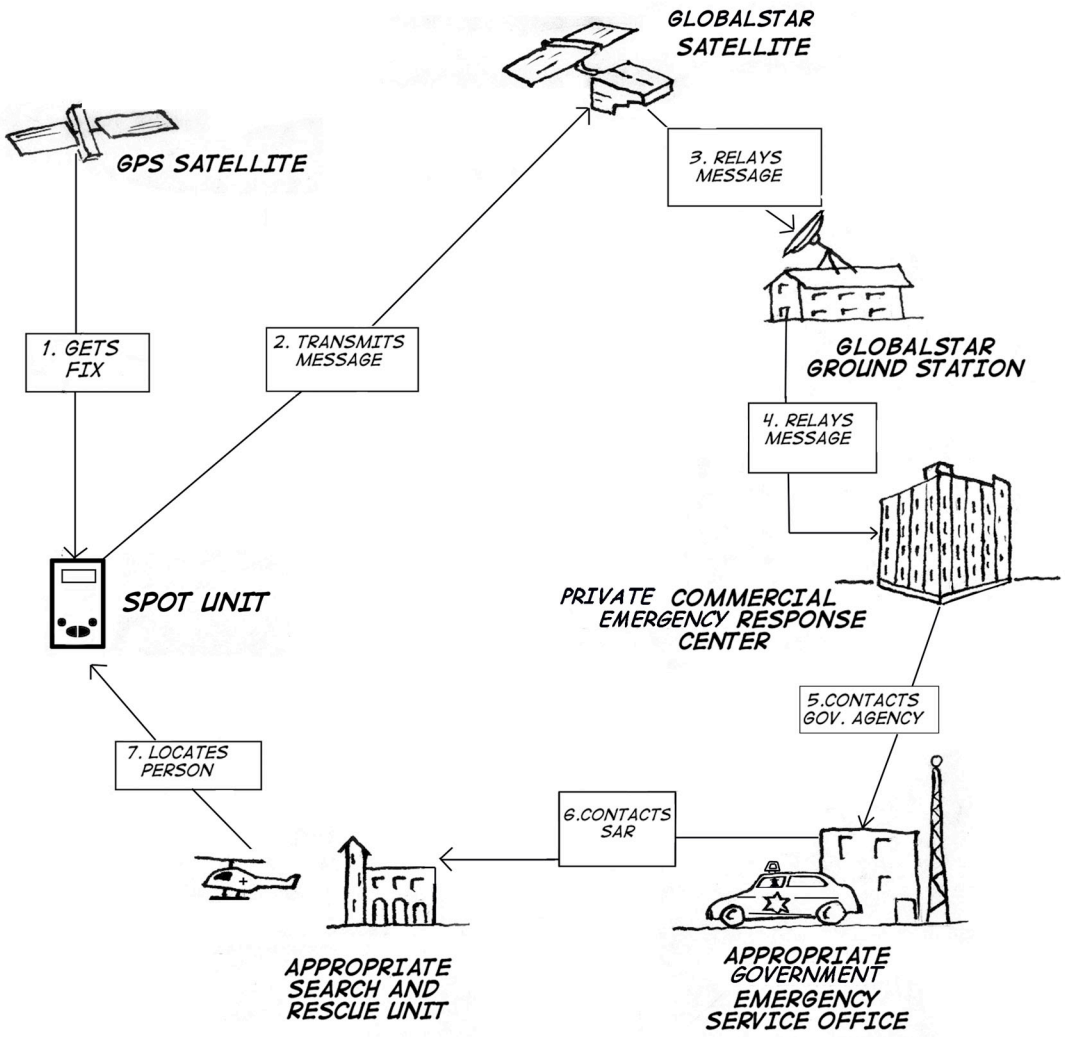
(4) The Globalstar ground station relays the SPOT emergency message to a commercial, international emergency rescue coordination center (IERRC). The IERRC center is manned 24/7 by highly trained personnel with access to emergency response units worldwide.

(5) Upon receipt of an emergency signal, IERCC personnel: i) contact the primary and secondary contacts listed in your Registration Data to attempt to validate the emergency signal, ii) use the IERCC database to identify appropriate emergency responder(s) according to available location coordinates; iii) contact the appropriate emergency responder (e.g., county sheriff) and inform them of the relevant facts in IERCC's possession.

(6) The emergency responder contacts the appropriate search and rescue unit (e.g., U. S. Coast Guard SAR helicopter base).

(7) The SAR unit uses the information provided by the SPOT unit (including GPS coordinates if available) to locate the person(s) in distress.

Following is a pictorial diagram showing the above described chain of communication:



CHAIN OF COMMUNICATION TO EMERGENCY SERVICES

JIM MORRISON

Other Decision-Making Factors

The SPOT II has a relatively low initial unit cost, but yearly subscription fees are significant. The current five-year cost of the unit, with all features activated including the automatic tracking program, is roughly $900 (not including the AAA lithium batteries). The unit is relatively light (5 ounces with

batteries). The batteries provide long life and are field replaceable. For a nominal fee the private emergency service company for this unit (GEOS) provides up to $100,000 insurance per year to cover the costs of emergency services provided when the SPOT-911 function is activated. However, there are many policy exclusions and qualifications that would make it fairly easy for GEOS to deny coverage. SPOT has also partnered with other companies to provide roadside and maritime assistance ("SPOT ASSIST") when the dedicated "Help" button is programmed for these services.

Summary Evaluation

In general, the upgraded SPOT-II unit holds a lot of promise, but there are still potential glitches. On the promise side, the four SPOT-II functions not included with a standard PLB ("I'm OK", "I Need Help", custom messages, and the tracking option) are invaluable. Especially useful for many is the "I'm OK" message when running late or a decision is made to stay out an extra day or two. Another plus for the SPOT is that it utilizes both public and private rescue services worldwide. In states and countries which allow public agencies to charge for rescue services, the inexpensive rescue insurance provided by GEOS might be a deal maker.

What are the potential glitches or weaknesses of this unit? *First*, even though SPOT obtains GPS coordinates from the highly reliable system of government satellites, for emergency communications it depends upon a private system of satellites (Globalstar) and a private emergency services company (GEOS). Globalstar has had some problems over the years (financial and technical) with its satellite phone service business. In contrast, the well-established system for the Dual Frequency PLBs relies on the COSPAS/SARSAT system (a network of satellites, ground stations and rescue coordination agencies). This system has proven reliable over the years during countless rescues on land and at sea. This already reliable government based system is reportedly undergoing an $8 billion upgrade. In response, the company that sells the SPOT units claim a high degree of reliability for its improved SPOT-II system. Accumulating field reports seem to be verifying that claim.

A *second* weak link is getting a GPS fix. The SPOT II unit contains a higher quality GPS chip set than the original model, but the unit's single antenna is optimized for transmission of messages to Globalstar satellites, not for the

GPS function. The SPOT company claims a high degree of detection of GPS coordinates because its units communicate only with the moving LEOSAR satellites that are closer to the Earth. One positive is that even if SPOT cannot acquire its location from the GPS network, it will still attempt to send a distress signal—without a location—to the Emergency Response Center.

A *third* potential glitch of the SPOT system is related to transmitting power, frequency and geography. A high rate of success has been reported for SPOT messages sent with a perfect view of the entire sky (e.g., high mountains, desert and open water), when given 20 minutes to uplink and when the unit is horizontal (i.e., pointing skyward). Connections can be problematic otherwise. One potential reason for problematic connections is that the transmitting power of the SPOT is only 0.4 watts (compared to 5-6 watts for most other PLBs). Another reason is the higher frequency (1600 MHz) being used to transmit messages.

The Globalstar system, using one-way satellite communications for the SPOT, is responsible for a *fourth* possible area of weakness. Since SPOT doesn't have a Globalstar receiver for two-way communication, there is no readout indicating the specific GPS coordinates received from the government satellites that could be given to someone using a cell or satellite phone or that could be used to coordinate with a map. Nor is there any verification that a message has been successfully delivered through the SPOT emergency notification system. (The blinking LED lights on the unit will indicate, however, that a GPS fix was obtained.) If you knew the message had failed, you or someone else could climb to a higher point in hopes of more success. To be fair, this fourth area of weaknesses is also a problem with the current technologies used by Dual Frequency PLBs.

In summary, anecdotal reports by hikers with the original SPOT units suggest a wide range of success and lack of it. This wide range is partly based on a difference in expectations. Hikers with the upgraded SPOT –II units are reporting a much higher rate of success and satisfaction.

Cellular and Smart Phones

Basic Operation

To not overload the carrier's system, standard cellular phones are purposely designed as short distance communication devices. The standard transmitting power is 0.3 watts, a level that is satisfactory if the unit is a mile

or less from a cell tower. However, the transmissions must be two-way. It is common in rural areas to receive a strong signal from the tower, but not have enough handset power to make a connection. Long distance cell tower communications can occur under the following conditions: (1) calling from a high point; (2) connecting with a cell tower near a major highway or popular National Park where they are designed to be more sensitive; (3) using a phone with a more sensitive internal antenna; (4) hooking up an external antenna.

The first two conditions turned out to be in operation in the summer of 2002 when I needed rescuing from a 6200-foot ridge deep in Washington's North Cascades. A member of another party in our vicinity (none in our party were carrying cell phones) was able to connect, after several tries, with a 911 operator about 80 direct line miles away. The cavalry (in the form of a U.S. Navy helicopter) arrived about five hours after the accident to winch my pack and me aboard for a trip to the emergency room.

There are several other notable features of cell phone technology that are important for hikers in the wilderness. The following article on my website goes into depth on these features: Carrying Cell Phones For Backcountry Emergencies.

Chain of Communication to Emergency Services
Call 911 or the operator for assistance.

Other Decision Making-Factors
Totally dependent upon the features, cost of service (both voice and text messaging) and weight of the desired phone.

Summary Evaluation
As most hikers know, cell phone communication in most backcountry wilderness areas is hit or miss. It is a complicated technology. However, cell phones sometimes work even when there is little expectation for a connection. Cell phones are playing an ever-increasing role in emergencies. Consider activating the text messaging function as the first line of emergency communication.

Satellite Phones

Basic Operation

Most satellite phones operate in a manner similar to other phones. A special number is first dialed to connect to the system and then the desired number is dialed (e.g., 911). When a connection is made with a company's system of satellites (i.e., Iridium, Globalstar or Inmarsat), voice and data messages are relayed to an earth base station when one comes into view. The clarity of voice transmission is usually excellent. A full range of services similar to land line and cellular phones (e.g., voice mail, conference calls and email) is usually available. Currently, the most popular phone for wilderness emergency use in the Northern Hemisphere is the Iridium phone and satellite system, a product of a French company (France Telecom Mobile Satellite Communications). They currently have 50+ Earth-orbit communication satellites in operation.

Beyond the Basics

Recent technological advancements have complicated the satellite phone scene. Two companies (TerreStar and SkyTerra Communications) plan to launch new satellite based phone systems. The initial plan, by at least one of the companies, is to partner with a large cellular provider to combine satellite and ground phone service in one cell phone size unit. TerreStar units are now available with AT&T smart phones.

Delorme, with its "inReach" communication device, has partnered with the Iridium satellite system and Android based smart phones to provide two-way text messaging when outside cell phone range, in addition to the standard SOS emergency function.

Chain of Communication to Emergency Services

See the section above.

Other Decision Making-Factors

Prices seem to go up and down, relative to which system is currently offering the best coverage and service. The newer Iridium 9555 model (weighing 9.4 ounces) is a popular choice for wilderness communications even though it costs more to operate.

Summary Evaluation

Satellite phones, similar to the SPOT unit described earlier, work best when there is a full sky view (such as a high point or open water). High mountains,

tree cover, buildings, etc., can cause reception and transmission problems. There are several companies that market satellite phones for normal communications in out-of-the-way places but, at this writing, only the Iridium phones are recommended for backcountry *emergency* communications. They seem to have the most dependable coverage. At this writing, Iridium is also on a sound financial footing with strong plans for future upgrades. When satellite phones other than Iridium are utilized, it is often recommended that another source of communication be available for emergencies. Globalstar phones are commonly used for wilderness communications, but its two-way voice and data system currently suffers from problems with limited coverage and degrading satellites.

Search and Rescue (SAR) Perspectives on ECDs

A 406 MHz signal coming from an ECD is recognized by SAR as a true emergency and they usually act immediately. By law, SAR is required to find and turn off any personal locator beacon (PLB) once activated. Search and Rescue has made it clear that *tracking* devices like SPOT II are to be treated as a missing persons report: until they get a clear distress message, they are going to wait and see, and not deploy their forces for the possibility that someone simply has a flat tire on the side of the road and needs help.

From a search and rescue (SAR) standpoint, it is location, location, location! The Dual Frequency and SPOT II units provide location information when the operator sends a distress message. Cell and satellite phones rely on the operator knowing where they are in the wilderness. An experienced SAR person puts it this way:

> A PLB or SAT tracker makes SAR easier by locating the victim for us. We risk much less by not having to do as much grid searching in unknown territory, very often in the wrong area. PLBs can remove as much as 80% of the time we spend looking. That means an 80% risk reduction *for us*. I like those figures.
>
> —"klock" moderator on the *Trail Space* wilderness Internet forum

SPOT units transmitting in the "Tracking" mode are potentially the most useful locating devices since they update the last known location every ten minutes without the user doing anything (i.e., someone will eventually notice a

lack of movement as a sign of trouble). In its other modes, the SPOT device must be activated manually.

The downside of all PLB units (including the SPOT) is that they do not tell SAR the exact nature of the emergency or get other vital information. Whereas with cell or satellite phone contact, it is possible to give medical advice or other useful information. Sometimes it turns out that there is no real emergency and the calling party can be advised against doing something rash, something which could itself cause an emergency.

A major problem with all four ECDs analyzed in this article is that I know of no serious or scientific attempts to gather reliability data on *negative* experiences. In other words, under what conditions did these devices *not work* in an emergency? There are ample statistics and anecdotes about successful use of these devices (especially from those making a profit from their sale), but this is only half of the story.

In summary, of the four ECDs analyzed in this article, the Dual Frequency PLB, based on the GEOSAR and LEOSAR government satellite and rescue coordination systems, is currently the most dependable *emergency* communicator for hikers in mountainous or heavily forested regions (assuming only one such unit will be carried). However, it must be acknowledged that hikers carry portable electronic communication devices for a variety of reasons (cost, weight, dependability, simplicity of operation, slick advertising, tracking features, availability of inexpensive emergency insurance coverage), not just for dire emergencies. Some have a higher risk tolerance level and have chosen not to carry the most dependable ECD for some of the reasons given. I suspect most SAR personnel would likely disagree with this decision.

Should satellite phones come remotely close to the cost, weight and size of cellular phones, this option would likely surge in popularity among wilderness users, especially if such devices combined both satellite and ground network functions into one unit.

As mentioned at the beginning of this article, the above analysis of four types of ECD units is obviously problematic in that the technology is constantly changing. The analysis of currently available technology in this article should provide a solid starting point for assessing new technologies as they become available.

Author's Experience with Search and Rescue (SAR)

In the 50+ years I have been hiking and climbing, I have been directly involved in SAR operations nine times (excluding practice sessions): One was as seasonal climbing ranger at Mt. Rainier National Park; four as a member of the Central Washington Mountain Rescue Council; four as a member of a wilderness climbing or hiking party actually needing emergency assistance. Four of the operations involved helicopter pickups (including the one pictured above); two of the four used cell phones as the primary mode of contact. Three involved individuals who were deceased before SAR personnel arrived on the scene.

From this limited experience, it is my judgment that only one of the nine situations involved a critically injured person where having an ECD might have made the difference between life and death. Even though I have never been on a SAR operation where a PLB (personal locator beacon) or satellite phone was available, all would have benefited from having such a device. The two operations involving cell phones as the mode of SAR contact allowed for a much quicker helicopter extraction than going out on foot to get help.

Reader Participation: Making Decisions Regarding ECDs

Based on available information, which of the following ECDs would you most likely carry on longer trips into the wilderness (assuming cost were not a factor)? Rank order them from 1st to 6th. Before making your decision, consider reviewing the following article: Carry a Personal Locator Beacon?—A Pro-Con Checklist.

____Dual Frequency Personal Locator Beacon (PLB) with Built-In GPS

____SPOT (Satellite Personal Tracker) with Built-In GPS and Tracking Function

____Satellite Phone

____Cellular or Smart Phone with Built-In GPS

____Smart Phone and Satellite Phone Functions Combined into One Unit

____ Smart Phone and Satellite Phone Functions *plus* a Dual Frequency PLB with GPS readout of coordinates all combined into one unit

[Note: This last option is not commercially available at this writing. It is included because it will likely become available in the near future.]

Author's Conclusions About Carrying Emergency Communication Devices

In the process of making my own decisions in this matter, I have published another article detailing my conclusions and the reasoning behind it: Conclusions About Carrying Personal Locator Beacons into the Wilderness.

Emergent Wilderness Communication Technology

This technology is constantly changing. This article makes no attempt to keep up with what is available. However, I have written a separate article that provides an outline to assist in making decisions regarding these emergent technologies: High-tech Wilderness Communication Devices: An Overview

Additional Issues for Reflection

1. What is the best way to obtain reliable data about the negative (i.e., when activated ECDs did *not work* well in wilderness emergencies)? How much weight should be given to advertisers' claims about the successful use of their ECD in emergencies?

2. Should I focus my attention on the latest and greatest multi-purpose, multi-function devices or stick to single purpose 911 devices (i.e., contacting search and rescue for help)?

3. What responsibilities do I have towards strangers who find themselves in emergency situations? Do I have a responsibility to do whatever I can even if it means a total disruption of my plans? Should I carry an ECD primarily to assist others in trouble?

4. When should I activate the ECD I am carrying? What counts as a serious, life-threatening, or emergency situation? What about a badly sprained knee or ankle? What about a serious cut or wound that needs stitches? What about a person suffering from hypothermia when accompanied by a well equipped group? What about being lost in good weather conditions?

5. Are there portable emergency communication devices (ECDs), other than those analyzed in this article, which might be effective in wilderness emergencies? What new communication technologies are being developed that might function well in this context?

6. Would carrying an ECD detract from my wilderness experiences? If so, in what way?