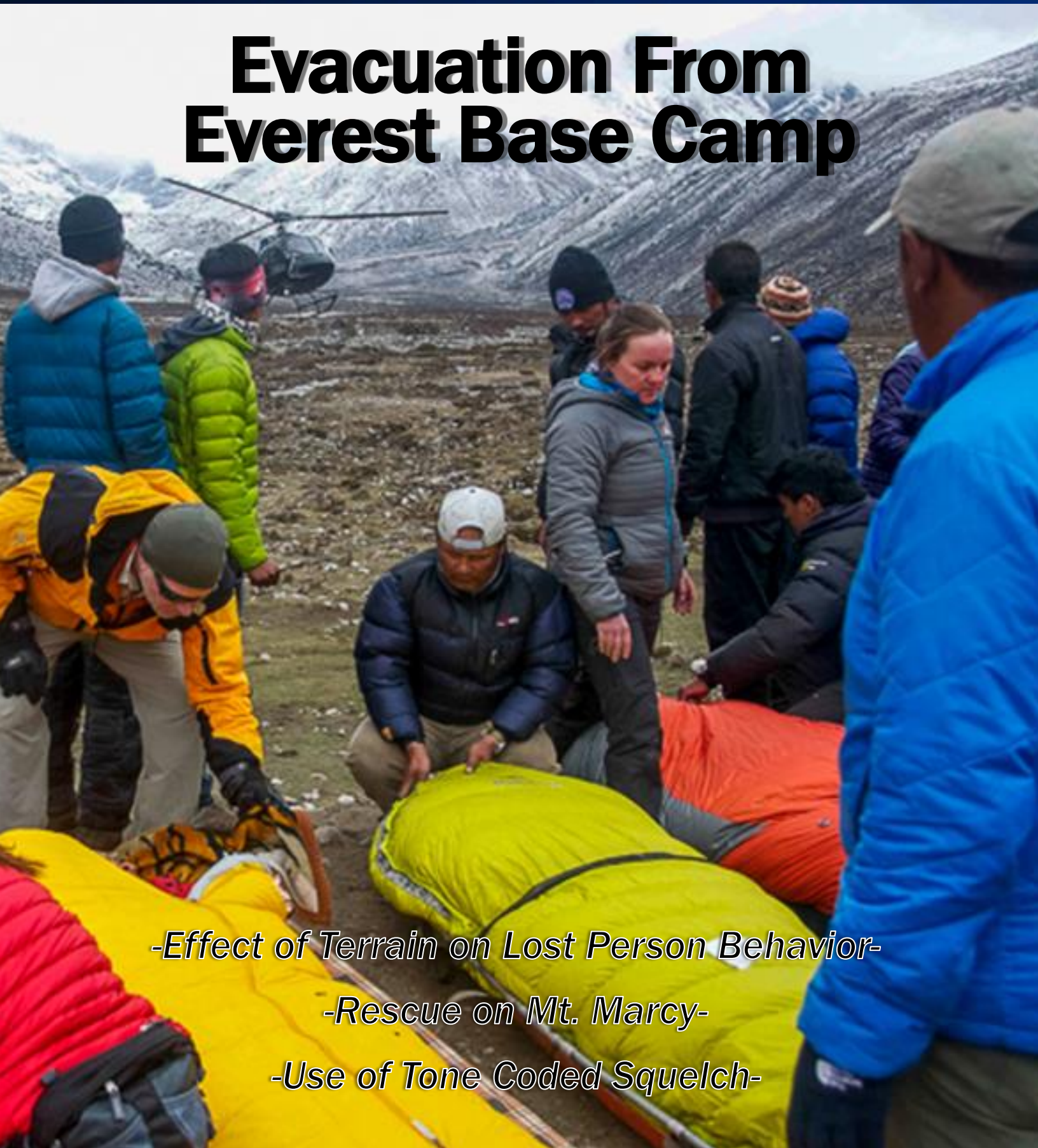


## Evacuation From Everest Base Camp



*-Effect of Terrain on Lost Person Behavior-*

*-Rescue on Mt. Marcy-*

*-Use of Tone Coded Squelch-*



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*Preparing avalanche victims for evacuation from Everest Base Camp. Photo by Ken Zafren, MD, FAAEM, FACEP, FAWM, Medical Advisor, Alaska Mountain Rescue Group, Vice President, International Commission for Mountain Emergency Medicine (ICAR Med-Com).*

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## Mountain Rescue Mass Casualty Incident: Earthquake and Ice Avalanche at Everest Base Camp



*Photo by Ken Zafren.*

By Ken Zafren, MD, FAAEM, FACEP, FAWM, Medical Advisor, Alaska Mountain Rescue Group

At about noon Nepal Standard Time on April 25, 2015 a magnitude 7.8 earthquake struck Nepal and adjacent parts of Tibet and India. The earthquake triggered a large ice avalanche from the slopes of Pumori/Lingtren far above Everest Base Camp (EBC), in Nepal. The air blast preceding the debris destroyed many tents, killed 19 people and injured dozens more, many seriously.

I was on my way to EBC as the faculty member for a continuing medical education trek. Our group was at the village of Somare a two-day walk from EBC, about to eat lunch, when the earthquake occurred. The shaking was so violent it was hard to stand up. It seemed unlikely that any structure could survive the shaking. However, after the earthquake ended, most of the nearby buildings were intact except for some cracks and some areas in which rocks had fallen out of rock walls. Just then, a large boulder came crashing down the slopes of Tawoche Peak, 6542 m (21,463 ft), directly above us. Fortunately, it came to a stop just before reaching the village.

We knew there had been a very large earthquake and soon found that all local communications had been disrupted. Our group was supposed to be carrying a satellite phone, but had been left in Kathmandu, as it had not been used in many years. The entire area

has had reasonable cell phone coverage for the last several years.

After eating lunch, we continued on our trek, crossing a few small landslides on the way to Dingboche, at 4412 m (14,475 ft). Dingboche is a large village and, like Somare, had been lightly damaged by the quake. There we spent the night in an undamaged lodge. Without communications, we were unaware of the tragedy that had occurred at EBC.

The day after the earthquake was a planned acclimatization day. While most of the group went up-valley for a hike, I walked to the top of the ridge that divides Dingboche from Pheriche. In my role as Associate Medical Director of the Himalayan Rescue Association (HRA), I had assigned the doctors who were working at the HRA Aid Post ("Hospital") in Pheriche. I usually spend at least a day or two visiting Pheriche when I am in Khumbu. As I reached the top of the ridge and looked down, I could see many buildings that had been damaged by the earthquake. There were many people standing on the main trail near the Aid Post, while helicopters were landing just below, in the riverbed.

At the clinic, the doctors told me about the avalanche. Helicopters had been flying casualties from EBC starting early in the morning. They had been unable to fly the day before due to poor visibility with wind and snow. Many seriously injured patients occupied all the available beds and floor space in the Aid Post. Less seriously



injured patients were lying on mattresses and sitting in chairs in a large room at the Panorama Lodge next door. Helicopters had dropped off all the casualties from Base Camp and were about to start reloading patients to fly them to the closest airport at Lukla.

Two doctors were treating patients, while a third doctor was prioritizing patients for further transport at the place where the helicopters were landing. The doctors had already placed a large piece of white tape on the front of each patient on which they had written the patient's name and confirmed or suspected injuries. Another volunteer was helping our senior health assistant supervise the loading of patients into helicopters.



*Photo by Ken Zafren.*

The first problem to be solved after I arrived was that there were many patients in the clinic who would need to be carried to the helicopter staging area. I asked our volunteer to announce that everyone should go to the clinic to bring patients to the staging area. The second problem was that we had run out of stretchers. I told the people who came to the clinic to carry patients; that they should not wait for stretchers but should carry the patients on mattresses. All the patients were already on mattresses.

Over the next few hours, all patients were loaded into helicopters that flew to Lukla, where the airport and a small hospital are located. The third doctor and I worked together to identify the patients for the next helicopter. Once the stretcher patients were moved, we brought the walking wounded to the staging area where they sat on chairs to await transport. The process went quickly with several smaller helicopters and one large MI-17. A few of the patients were treated in Lukla, but most were flown on to Kathmandu for definitive care.

We finished at about 12:30 PM and returned to the Aid Post. We were standing outdoors when the first large aftershock (magnitude 6.7) hit. There had been many significant aftershocks on the day of the quake and were to be more in subsequent days. The first large aftershock was not as severe as the original quake, but seemed to last longer. I walked back to Dingboche in the afternoon.

The next day, I walked to Pheriche with the doctors from my trekking group. We witnessed the somber process in which the bodies of those who had been killed in the avalanche were staged in Pheriche, en route to Lukla and Kathmandu.

The relatively smooth evacuation of 83 casualties, 16 of whom had serious injuries, from Everest Base Camp to definitive care was only possible because of planning that occurred the year before in the aftermath of an avalanche on the Khumbu Icefall, above EBC,

that killed 16 people. The evacuation of 83 casualties in a high altitude area with no roads was all the more remarkable because it took place during a national disaster that killed over 8,000 people and injured many thousands more.



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## President's Message

*By Dave Clarke, MRA President*

Another MRA Spring conference has come and gone and I would like to take this opportunity to thank the folks who worked so hard to make it a success and to report on some of the decisions and issues from the business meeting.

But first a bit of history; typically, our spring conference is hosted by one MRA team and they handle all of the planning, and take the risk for any financial loss. It's a big undertaking for any team but also has great rewards as the host team gets its turn in the lime-light and most team members are there at the conference. Usually teams sign on to host a conference two to three years ahead of time in order to have enough time to gear up and manage the workload.

Recently, we've partnered with NASAR on conferences and since they have paid staff they stepped up to do much of the planning and logistical work in a partnership with the local MRA team. These joint NASAR/MRA conferences were held in 2012 at Lake Tahoe, and 2014 at New Jersey.

For 2015 the initial plan was for another joint NASAR/MRA conference to be held at Estes Park CO. The Colorado Search and Rescue Board (CSRB) was also on board as a partner. However things change and NASAR had to step back from its organizing role to deal with other priorities. This left the MRA with less than a year to come up with an alternate plan. Everyone was in favor of the Estes Park location; we just needed to find folks willing to take on the planning tasks with a relatively short timeframe. Since no local team was willing to take the financial risk, the MRA Officers voted to take on that burden. Skeet Glatterer MRA "Member at Large" Officer from Alpine Rescue Team (ART) in CO took on the assignment to find a host team. Larimer County SAR took the challenge and with George Janson as IC the work began. Luckily, Colorado has a wealth of good SAR teams and a great network formalized in the CSRB. SAR members from Larimer County, ART and other teams rose to the challenge and filled the numerous assignments. A command structure came together and the work got done and done very well in spite of the shortened time frame.

So the 2015 SARCON was another great conference but even more, it is a testament to the great work of MRA members who rose to the challenge and delivered big time. I won't list all of the folks who contributed to the effort but there are many, they all deserve our great thanks. The next time you see a SAR member from Colorado, be sure to thank them for their extraordinary contribution. And as for the financial risk, I'm please to say that we came out in the black with the profit shared between the MRA, Larimer County SAR, CSRB and NASAR.

Finally, I can't write about the conference without mentioning our keynote speaker, Tom Hornbein. Tom is famous of course for the first ascent of the west ridge of Everest with Willi Unsoeld in 1963

which remains one of the greatest feats in the history of mountaineering. His life as a mountaineer and climber is truly inspirational and his presentation shared that inspiration with the audience.

That was the history lesson but what about the business meeting and what's the MRA up to as we move forward? I'm glad you asked. Beyond the usual budget and committee reports the big issue of the meeting was liability insurance for the MRA. Prior to the meeting I sent you all some proposed policy quotes and I received a variety of comments back both pro and con so I knew it would generate a hearty discussion. The end result was that the Board agreed that insurance was a necessary evil but the proposed cost seemed too high. The Board gave the Officers three months to look into ways to make sure we are getting the best policy for our premium dollars. They also authorized money to pay for legal advice to achieve this. Currently we are in the process of negotiating a better deal using in house expertise. Stay tuned for the details of how this evolves.

Other significant issues discussed include the scholarships for first time conference attendees. At the winter meeting the Board voted to provide \$1,000 to each Region to encourage "new blood" to attend our conferences. There were a variety of suggestions offered as to how to improve the program so rather than just renew this commitment the Board assigned Antonio Arizo (from Ventura County SAR) to look into options and have a proposal for the Board to vote on at the 2016 winter meeting.

For several years we have budgeted money to pay for the "SAR Teams" software (a comprehensive team management program) so that it could be used by any MRA team at no cost to the team. As other similar commercial products have become available fewer teams are using the "SAR Teams" product. The Board decided to stop paying for access but has reached agreement with "SAR Teams" that any team that chooses to continue using the software can do so for \$20/month. Skeet Glatterer is coordinating this for the Officers, If you have questions contact him at [Glatterer@comcast.net](mailto:Glatterer@comcast.net)

The final order of business was Officer elections. Incumbent Skeet Glatterer ran unopposed for a second two year term as Member at Large and was unanimously elected. Doug McCall also ran again for his second term as Secretary Treasurer. Initially Antonio Arizo also threw his hat in the ring for this position but Antonio withdrew saying he thought that Doug was not going to run for a second term. In the end, Doug was elected unanimously for his second term. Thanks to all for offering up your time and efforts to keep moving our Association forward.

If you're still reading this I want to thank you for your interest in the business side of the MRA. I doubt that anyone joins a SAR team because they enjoy this stuff. However I think you'll agree that it is important to keep our organization viable and allow us to keep doing what we do best which is to help all MRA teams provide the best possible service to those in need in the mountains.. Now go out and enjoy summer.



## Effect of Terrain on Lost Person Behavior

By Matt Jacobs, Bay Area Mountain Rescue Unit, CA

Much of our understanding of where and how to look for people on land comes from work done by the US Navy and Coast Guard, originating with submarine hunting during WWII and subsequently applying that knowledge to maritime SAR. These searches are generally characterized by a smooth probability distribution, in which small changes in position result in small changes to the probability of a find.

While their techniques are mostly applicable to land SAR, one fundamental difference is the presence of terrain and manmade features, which can cause the chance of a find to vary significantly with small changes in position. It is my opinion that generally accepted land search practices have not adequately accounted for this difference.

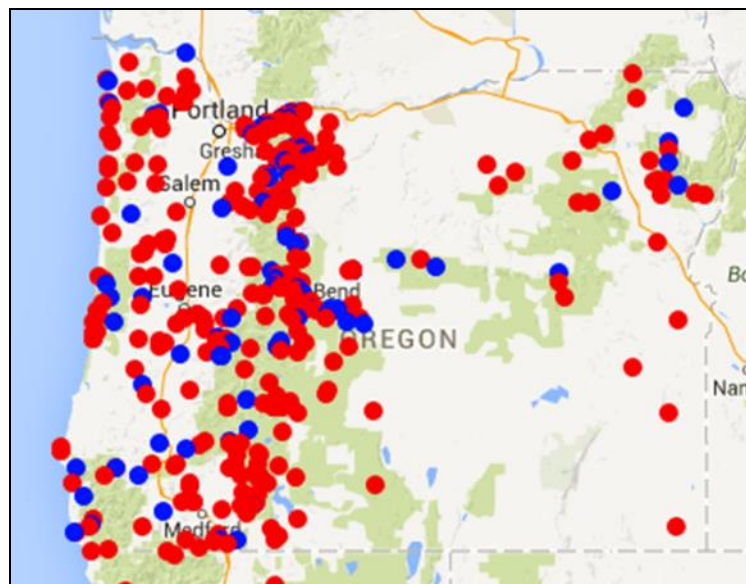
Most people who go missing are eventually found; in that sense, our current approaches clearly work. On the other hand, how many outcomes might have been improved had the subject been found sooner? How many fatalities might have been mere injuries? After being involved in several large incidents where mostly "textbook" searches either failed to locate the subject, or failed to do so in a timely fashion, I decided to take a closer look at the impact of terrain and develop some defensible, evidence based suggestions for how it should guide searches.

### How This Differs From Existing Research

Much of the existing research into lost person behavior takes a top-down approach, developing large-scale models based on factors such as expected travel distance, elevation change and dispersion angle. These models help paint the big picture, but generally do little to answer questions about small-scale features. Perhaps the closest we currently get to addressing small-scale features is the use of historical find percentages along features, such as those supplied in Koester (2008).

As an example, in the subset of the International Search and Rescue Database (ISRID) that I studied, 30% of hikers were found within 100m of a trail, compared to only 10% of hunters. Based on those numbers, it seems reasonable that a search should focus more heavily on trails when looking for hikers, which is in keeping with traditional wisdom that hikers are more trail oriented than hunters.

The problem with this approach is that it ignores the composition of the surrounding terrain. For hikers, 8% of the search area was within 100m of a trail, while this number was only 2.5% for hunters. If trails had no effect on subject behavior, find percentages



**Figure 1.** Find locations for Oregon. Uninjured subjects are shown as red dots, injured or deceased are blue. These incidents comprised the bulk of the data examined.

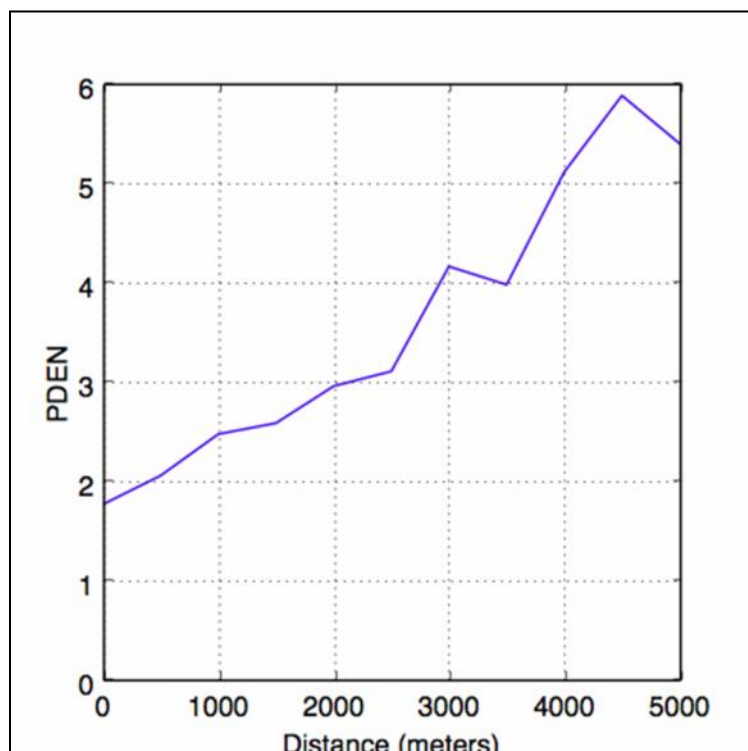
should roughly match the search area, and 8% of hikers and 2.5% of hunters would be found near trails. Instead, both groups were found near trails approximately 4 times more often than would be expected if trails had no effect, suggesting that trails influence hikers and hunters similarly. An alternate approach to effort allocation would then be to treat trails as being 4 times likelier than generic search terrain to contain missing subjects.

That was my research in a nutshell: compare the percentage of finds near a given feature type to the percentage of search terrain. I think of it as looking at the problem from the bottom up; the results complement rather than invalidate top-down models such as distance rings.

### Some Interesting Findings

One of my initial goals was to examine how attributes such as slope angle, aspect and vegetation affect find probability within a typically sized area segment. It seemed likely that a subject would prefer easy travel routes rather than dense brush. However, whether due to my methods or because no relationship actually exists, I was unable to find a relationship between those attributes and find probability.

On the other hand, almost every linear feature examined had some degree of elevated find probability. Overall, linear feature find probability was higher in hilly terrain than flat and also higher at greater distances from the initial planning point (IPP) (Figure 2). While it is impossible to definitively answer why that is the case, it is likely that terrain helps guide subjects into linear features, and that lost subjects are unlikely to leave a major linear feature once they find one.



**Figure 2.** Road and trail probability (Y axis) plotted against distance from the initial planning point (X axis). The farther a subject was from the initial planning point, the more likely they were to be found along a road or trail.

One result that surprised me was that injured subjects behaved differently—or at least, were found in different locations—than uninjured ones (Table 1). Injured subjects were more likely to be found in streams and canyon bottoms, at stream/trail interfaces and near (rather than on) linear features. Under the assumption that injury has some correlation to responsiveness, this allows a search to initially focus high probability of detection (POD) efforts on those areas, and cover more ground with lower POD searching elsewhere.

### Some Inadvisable Approaches

My findings failed to support several commonly used search strategies. Chief among the findings is that many searches transition to gridded area searching too rapidly. As an example, over half of all injured off-trail subjects were found within 80m of a stream (approximately 20% of the total search area), at a low or high point, or in a drainage. These features cannot all be searched in the initial operational period or even the first 24 hours due to the area they cover, but should still be prioritized.

I have often seen searches emphasize high-POD sweeps near roads and trails (corridor searching) without paying similar attention to streams and drainages. Surprisingly, at least to me, my findings support giving streams and drainages equal weight to manmade features during focused high-POD search activity.

**Table 1.** Comparison of Uninjured and Injured Subject Probability Multipliers for Various Terrain Features

Feature	Uninjured	Injured
Roads	3x	1.5x
Trails	5x	7x
Lakes	2x	2x
Streams	2x	3.5x
Capillary Streams	–	1.5x
Stream/Trail Interfaces	7x	12x
Low Points	2x	5x
High Points	1.5x	2x
Ridges	2x	–
Drainages	1.5x	3x

*Approximate probability multipliers for various terrain features. Road and trail probabilities in particular will be higher during on-feature hasty searches and lower when searching nearby.*

Another technique that I have seen practiced is creating large area assignments centered on a road and trail network, for example searching everything within 1/4 or 1/2 mile of a road or trail. However, I only found linear features to have elevated probability within 100m, possibly less. Beyond that point, a location's proximity (or lack thereof) to a road or trail had no bearing on its likelihood of containing the subject.

### An Alternate Model

To me, the findings suggest adapting the common bicycle wheel model into a spiderweb: area searching at the core surrounded by a web of linear features, with several long-ranging stringers at the periphery. While the bike wheel model is generally taught as a progression from hasty searches of "spokes" to area searches of the remainder, it is impractical to check off all the linear features identified in this paper, at all distances, in a timely fashion. Instead, searches would need to expand by growing the entire web: as gridded area searching is extended farther out from the IPP, high-POD searching of trails and drainages would be similarly extended to greater distances. Figure 3.

The exact shape of the "web" requires balancing the dueling influences of terrain and distance from the IPP. An important question in striking this balance is the predictive ability of the IPP, i.e. "how strongly does this IPP help predict the find location?" A child wandering away from a campsite may call for an immediate emphasis on close-in area searching, while a search for backpacker last seen at a trailhead may never move beyond linear features before exhausting available resources.



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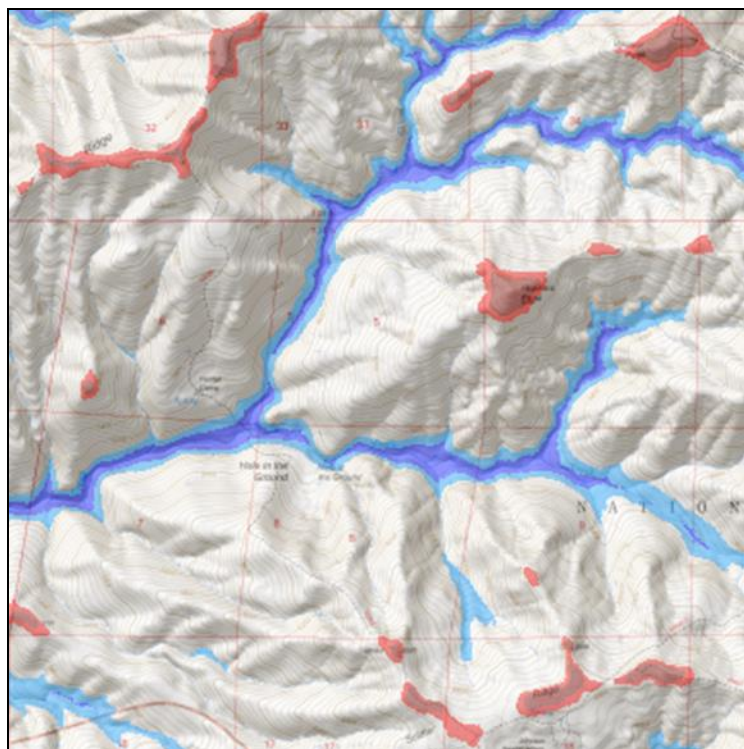
Want to learn more? Check out the paper or the executive summary at <http://www.mra.org/member-services/grant-information/current-grants/terrain-models>. You can also listen to the August 4, 2015, Webinar on this paper, (to be posted soon on the MRA website: [Webinar training](#)).

*Lost Person Behavior*. Koester, Robert J., *Lost Person Behavior: A Search and Rescue Guide on Where to Look—for Land, Air, and Water*, dbS Productions, 2008.

### Acknowledgments

MRA graciously supplied a grant to host the dataset and tools online, so that others would be able to peer review my work or conduct their own analysis. If interested, email me at [matt@mattj.net](mailto:matt@mattj.net).

The data studied came from the International Search and Rescue Incident Database (ISRID). Most of the incidents were located in Oregon, with the remainder in Arizona and New York. Thanks to Robert Koester for making the data available to me.



**Figure 3.** Example illustration of low elevation (blue) and high elevation (red) areas. These areas were found to have increased find probability, especially the darker extremes.

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## Rescue on Mt. Marcy

*By Jim Giglinto, New York State Forest Ranger, NY*

On the morning of March 21, 2015, a mother and two sons, aged seven and eleven, left the main trailhead for the High Peaks Wilderness Area of New York State. Their intent was to camp at the interior campsites at Marcy Dam, summit Mt. Marcy (New York State's highest peak) and to then snowboard the summit cone. The weather was seasonal; temperatures were moderate, with light southwest winds and clear to partially clouded skies. However, a strong cold front was forecast for later in the day, with severely declining conditions.

At 5:25 p.m. on March 21, 2015, Ray Brook Dispatch received a call transferred from Essex County 911 from lost hikers on the summit of Mt. Marcy. The 39 year old female stated she was on snowshoes with her sons, had left the summit at 4 p.m. and lost the trail above tree line due to declining weather conditions. Text contact was established with the caller. They had reportedly left their backpack with coats and two snowboards at tree line before ascending to the summit and could not find their gear or the trail upon their descent. Essex County 911 did obtain coordinates from the initial cell phone call, which they "re-bid" numerous times, but coordinates put the lost hikers in Keene Valley instead of the summit of Mt. Marcy. The hikers were asked to contact 911 again to get another set of coordinates; this second 911 call went to Franklin County 911 in Malone, indicating coordinates in Tupper Lake. When Ray Brook Dispatch was able to speak with the hiker's husband, he indicated that the cell phone she was using was an older model purchased in China and may not be compatible with U.S. GPS systems. The first Forest Ranger left immediately for the Mt. Marcy summit at 5:45 p.m. Four more Rangers left from South Meadow by snowmobile and were met at 8:50 p.m. on the Mt. Marcy plateau near the Hopkins trail junction by three more responding Rangers on snowmobiles. The Rangers reached the Mt. Marcy summit at 9:30 p.m. and began to search the summit area. Weather forecasts for the summit included winds of 30-40 mph with gusts to 50 mph after midnight. Temperatures were forecast at -10° F and, coupled with the wind, could create dangerous wind



*Approaching the summit of Mt. Marcy. Photo by Jim Gaglinto.*

chills of -30°F to -40° F. Search efforts continued throughout the night, with two crews of three rangers leaving at 3:30 a.m. to replace the initial crew. There was no sign of the subjects by daybreak. Additional Rangers with snowmobiles, started in at 7:30 a.m. to supplement and replace the crews already on the mountain. New York State Police (NYSP) aviation with a Ranger on board launched at first light but was turned back by weather in the Mt. Marcy area. Additional Rangers and an overhead team were requested in anticipation of going into additional operational periods, based on the conditions experienced on the mountain. Search efforts continued through morning hours with negative results. An additional NYSP aviation asset was requested with better stability in windy conditions to supplement the Lake Clear helicopter in the search efforts.

Rangers searched for the subjects in the summit area without success. By mid-morning, the weather broke allowing NYSP Aviation from Lake Clear to fly and search the summit area. On board the helicopter was one ranger as hoist operator and an additional observer for insertion, if the subjects were found. The subjects were located around 11:00 a.m. by the NYSP helicopter on Schofield Cobble, approximately 1/3 mile southwest of the summit. A ranger was inserted to evaluate the subjects' medical condition and prepare them for helicopter evacuation via hoist. The two children were extracted first at 11:50 a.m. and brought to Adirondack Medical Center, Lake Placid, for evaluation and treatment. The mother



was hoisted out at 12:38 p.m. and brought to Adirondack Medical Center, Saranac Lake, for treatment. The incident concluded at 4:50 p.m.

All subjects suffered from hypothermia and frostbite to their extremities. Both boys were transferred to a higher-level medical center, due to the severity and depth of their frostbite, and spent significant time there. There are number of events that followed this incident because two minors were involved. The initial receiving hospital notified child protective services and the mother of these two children was both vilified and maligned in the social media with some even calling for formal criminal charges.

I would like to take minute and make some personal observations. In my 20 plus years as a New York State Forest Ranger, this was the first backcountry rescue with this kind of complexity that involved minors. I was shocked at not only the social media reaction to this, but the Forest Ranger reactions, as well. We, as rescue professionals became too emotional because minors were involved. It is not our job to judge someone's decisions. Our job is to assist and rescue those people who need our help.



*Mt. Marcy, after the storm. Photo by Jim Gaglinto.*

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## Cliff Notes: A Case Report From the Rockies

*By Alison Sheets M.D., Rocky Mountain Rescue Group (RMRG), Boulder, CO*

As is so often the case in these kinds of missions, the weather was warm and mellow for late October and the day had been uneventful. Just before 5:00 pm a page came out to rescue a “climber with head injury” at a popular rock climbing venue in Boulder County. My house is within walking distance, and I often am first on scene for calls in this area. I glanced at the time, estimated how much daylight was left, and headed to the scene with my rescue pack. A few minutes later two Fire Department paramedics, another RMRG rescuer, the reporting party, and I were hiking up to the accident scene.

Details soon emerged. The patient had been top roping a difficult (5.11) climbing route. When he reached the bolted anchor, some friends had arrived on the trail below him and a discussion ensued about who else might want to try the climb. When the patient then leaned back, assuming he would be lowered, he fell 60 feet to some ledges as his partner had taken him off belay. He did not remember falling or bouncing. He ultimately stopped with his legs straddling a small juniper tree about 30 feet off the ground. As we arrived, a friend was on the wall with him and had wrapped a t-shirt around his bleeding head.

I scrambled up to evaluate the patient and assess evacuation options. His lower extremities were clearly injured but moving, and he was in an awkward position with his chest and face towards the rock. A large scalp wound was visible although the bleeding had mostly ceased. Although awake and alert, he said to me “I’m weak, can’t push myself up.” He had mid back pain but no cervical spine pain or tenderness. However, his arm and hand strength were very decreased. He could barely squeeze my fingers even though he had just climbed a 5.11. A C-collar was placed and the patient was secured, by his harness, to an anchor we had established above him.

As a rescuer, I could see he would need to be raised up off the juniper tree prior to any lowering. As a physician, and medical director of the team, I felt we needed to protect the patient’s spine the best way possible. I took control of the rescue site, and handed off direct medical care to the fire department paramedic team who were able to access the patient via our fixed ropes. I next considered whether the evacuation would entail a pick off to the ground



*Mid wall litter loading for patient with multiple injuries. Photo by Dave Christenson.*

for litter loading or a mid wall litter loading; I chose the latter.

The pros and cons of mid wall litter evacuation are debated but my choice was clear. The patient was awake, appeared stable from a hemodynamic standpoint and likely had multiple unstable injuries to the spine and extremities. I was concerned about Central Cord Syndrome (CCS), and wanted to move or manipulate the patient as little as possible. I felt the added complexity of the mid wall litter loading would be worth the reduced risk of further injury to the patient. We were able to perform a simple 1:1 raise from above and gently lay him in the litter. We packaged him with a full body vacuum splint while still 30 feet from the ground. The evacuation proceeded from there with a short vertical section, a long scree descent, a hand carry over the river to the ambulance with a short drive to a helicopter landing zone. The flight took the patient to a level 1 trauma center in Denver.

Spinal cord injuries can be devastating. It is important to recognize partial cord injuries in the field in order not to worsen potential recovery. This patient had CCS in addition to his other injuries. Although CCS is the most common partial spinal cord injury syndrome, it is rare in the mountain rescue environment.

Central Cord Syndrome involves a pinching type injury to the cervical spinal cord, most commonly at the C4-C5 level, as the spinal cord is relatively larger in this area. Typically, it is seen after a fall in an older patient with pre-existing spinal stenosis (narrowing of the spinal canal). The central region of the cervical spinal cord is preferentially affected by a hyperextension injury when the ligaments connecting the vertebrae bruise the cord in its narrowed spinal



opening. The part of the spinal cord that conducts motor control to the body (the corticospinal tract), is located centrally in the spinal cord with upper extremity nerves towards midline and lower extremity nerves more lateral. The spinothalamic tract, which transmits pain and temperature sensation, although less centrally located, is also at risk in these injuries. Upper extremity sensory deficits and lower extremity weakness and sensory deficits may also occur. Our patient had classic physical findings with upper extremity motor weakness and spasticity with variable sensory loss.

Central Cord Syndrome usually occurs without any fracture of the spine. Lack of tenderness to the cervical spine does not rule out CCS. A good neurologic exam is difficult to perform in the technical rescue environment, but it is vital to make a thorough assessment prior to moving a patient. Strength and sensation should be evaluated independently and levels of function or lack thereof identified. After the ABC's, have a patient squeeze your fingers with both hands, then push and pull. Do the same for the feet and toes. Have the patient push, pull, then flex at the hip and at the knees. Check sensation. This quick check, along with palpation of the entire spine will identify most problems and can be done even while the rescuer and the patient are hanging in harnesses.

Pre-hospital treatment of CCS or any spinal cord injury involves the ABC's, addressing life threats on scene and protection from further injury. In hospital treatment is variable depending on the need for surgical stabilization and treatment of other injuries. Our patient had multiple injuries including a large scalp laceration, facial fractures, central cord contusion with ligamentous injury at C4-C5, L1 compression fracture, pelvic fracture, tibia-fibula fracture and a calcaneus fracture. He had lost a lot of blood, but never needed transfusion. He required two operations for his lower extremity fractures. He spent 1 week in the intensive care unit, 2 additional weeks in the trauma center and 3 weeks as an inpatient at Craig Hospital for rehabilitation. His central cord injury and L1 compression fracture were treated non-surgically with a cervical collar and a Jewett (Thoracic-Lumbar) brace.

Seven months later our patient still suffers from persistent neurologic injury. He cannot differentiate hot from cold in his lower extremities or lower torso. His right foot has sensory loss to multiple toes and he has hyperesthesia (any touch being painful) in both thumbs. His right upper extremity remains the most significantly affected with residual weakness and numbness. Despite his injuries he is now walking a mile and a half to work every day. He was able to start climbing in the gym, although he did confess he had to "take" while top roping a 5.10.



All medical articles for the Meridian are reviewed and endorsed by the MRA Medical Committee; however, this article is for general information only. The MedCom makes no representation regarding the medical or legal information provided, and the views expressed do not necessarily reflect those of the MRA.

As always, your suggestions and comments are encouraged—either directly to the author, to me, or via the ListServ to the MedCom.

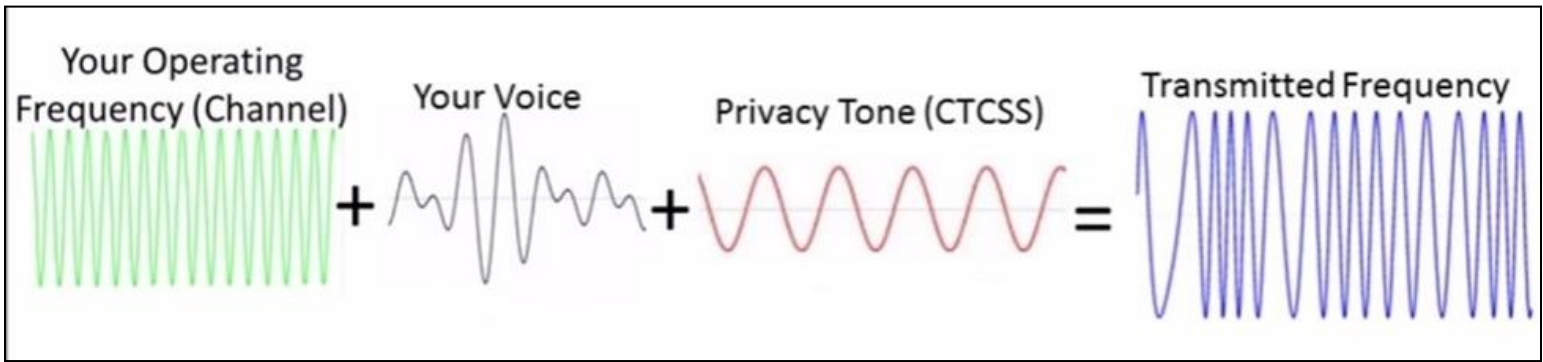
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Low frequency (~100 Hz) privacy tone is superimposed on transmit audio, then filtered out of the receive audio. Image courtesy of CommsPrepper.

## Use of Tone Coded Squelch on VHF Radios—Using the MRA Nationwide FCC License

*By Bill Laxon, MRA Communications Committee Chair, Alaska Mountain Rescue Group, AK*

MRA maintains a VHF license (call sign WPUA365 on frequency 155.160 MHz), that allows member teams to operate mobile and portable radios nation-wide during practices and missions. While some teams hold their own license for this frequency many teams depend on the MRA license for operation of their radio system. It is incumbent on all teams using the MRA license to conduct their operations in a manner that does not incur any FCC violation notices.

Throughout the US, there are (potentially) thousands of other licensees operating fixed radio systems that are considered primary users in their licensed geographic area of operation. The FCC considers MRA's nation-wide operations to be a secondary use; MRA teams must accept radio interference on the channel and must not generate interference to a primary user. In my opinion, the possibility of generating interference to a primary user is the most likely scenario that could generate an FCC notice of violation against the association, though this has never happened during my tenure with MRA.

The manufacturers of portable/mobile radios include an option to reduce the annoyance of listening to other users on a shared radio channel. This commonly goes by the name TONE CODED SQUELCH (although there are also digital versions). It is a sub-audible signal that shares the voice channel and tells the radio to unsquelch so the user can hear the incoming call. If each licensee on a shared channel programs a unique tone frequency into his own radios, then no licensee has to listen to another licensee's radio traffic.

As a practical matter (and required by the FCC), each user must disable this feature before making a series of transmissions so as to know if the channel is idle or busy before transmitting. If he blindly transmits without making this check, he may be interfering

with another licensee who was simultaneously transmitting first. This is accomplished in many mobile radios by disabling the tone coded squelch when the microphone is removed from the dash mike hanger (if properly wired to do so). Portable radios are programmed with a function button on the side of the radio that disables the tone coded squelch. Modern radios manufactured within the last decade can also often be programmed to inhibit transmission while there is any receive channel activity.

I am sometimes asked if MRA teams should program this feature into their radios, and if so, what tone frequency to use. My recommendation is not to use tone coded squelch on your radio receiver if possible. My experience is that casual and infrequent users of portable radios (a.k.a. team members operating in the high stress and rapid fire environment of a rescue) do not have the discipline/training to manually disable tone coded squelch on their radios before each transmission. And if the radio is in a chest pack, and the rescuer is using a speaker mike while hanging in his harness, he will not be able to access the radio function buttons. If tone coded squelch is not disabled:

- 1) This could result in a transmission unknowingly interfering with a primary channel user.
- 2) More importantly, it is likely is that the primary user could interfere with the portable radio and the operator will not be aware it is happening because the interference will destroy the tone frequency that unsquelches the portable radio. I feel it would be better to occasionally hear other users on the channel and time your own transmissions to avoid them than to suffer the confusion of missed calls and responses.
- 3) If teams join up on a mission and do not use the same tone frequency, the radios will not interoperate unless the tone function is disabled. If Team A has tone coded squelch enabled, and Team B does not, transmissions will only be heard from A to B. If anyone uses tone coded squelch in your region, a desirable option is to put a common tone coded squelch on the transmit side of all team radios in the region, and let the team decide if they wish to enable tones on the receive side. All teams and other mutual aid users would then remain interoperable (as long as they used the same tone frequency).
- 4) I do not like to enable the transmit inhibition function on a receiver because I have found that there are times it will falsely inhibit my transmitter when I don't want it to (some types of





interference, distant weak signals that should not affect local operations, and repeater squelch tails when operating on a repeater channel).

Teams operating in dense urban environments (Southern California for example) tell me they are forced to use tone coded squelch in defense against multiple local and distant users and interference that render the channel unusable otherwise. If your team decides to use tone coded squelch, we can look to the National Public Safety Interoperability Field Operations Guide (Version 1.5) for tone frequency hints. The Federal/Non-Federal VHF SAR Operations Interoperability Pan lists 155.160 MHz for ground search but does not recommend a tone frequency. The list of SAR (Search and Rescue Frequencies) again lists 155.160 MHz and recommends 127.3

*The original Motorola tone coded squelch sub-system used a mechanical tuning fork as a transformer core to generate/detect the sub-audible tone. The modern equivalent takes up less than one ten-thousandth of the space on an integrated circuit.*

*Image courtesy of RepeaterBuilder.com.*

Hz (Code 3A). The table of Non-Federal VHF Interoperability Channels does not specifically list the SAR mutual aid channel 155.160 MHz, but does recommend all other nation-wide simplex channels transmit using 156.7 Hz (Code 5A), with a recommendation to use carrier squelch for receive. All teams should check with their local emergency services frequency coordinators to see what tone frequencies local agencies are programming in their SAR mutual aid channels.



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Our modern radios often have many more channels available to the user than we are licensed for. One option that could be considered is to put the MRA frequency in multiple channel positions. One channel would be clear (no tone coded squelch). Others would be programmed to use one or more tone coded squelch frequencies. This does introduce an operational complexity that must be carefully managed. Drop me a line if your team has decided to use tone coded squelch and what tone frequency your region has chosen.

William Laxson – [wlaxson@gmail.com](mailto:wlaxson@gmail.com)

MRA Communications Committee Chair

Alaska Mountain Rescue Group

## Scenes From a Reaccreditation

*Michael McCusker, Corvallis Mountain Rescue, OR*

On March 21<sup>st</sup>, the Corvallis Mountain Rescue Unit participated in its 5-year winter reaccreditation. I was asked to provide my view on the day, and up-front I should indicate that not every detail below may be 100% congruent with reality. I've been a member of CMRU for about 6 years, but came into this via an atypical trajectory. Meaning, I've never been a hard-core mountaineer, not even really a soft-core one. My entrée into the world of CMRU was via my medical background, and the unit continues to pretend that my skills are somehow useful to the larger group. It is from that perspective that I offer my views on our latest reaccreditation.

Thanks to our diligent unit leadership, we had been preparing for this reaccreditation for quite some time. In fact, we started preparing about 25 minutes after the last reaccreditation five years ago. But it pays off in the end, as we have practiced the needed skills so often, under so many conditions, that the actual reaccreditation seems like a comparatively straightforward training day. The only thing that caused a slight increase in our collective pucker factor as we approached reaccreditation day was the fact that Mother Nature apparently forgot that "winter" was supposed to mean abundant snow in the Cascades. The past two winters, She seems to have moved to the Northeast part of the US. This made it challenging for us to find suitable terrain for training. In the end, we built giant mounds of baking powder in which to practice our snow anchors and avy rescue technique. Because as anyone knows who's spent any time in the Pacific Northwest, our snow is some of the lightest, driest and fluffiest around.

As we entered March, it became apparent that the only viable options for doing a snow reaccreditation on actual snow were to have it at Mt. Bachelor or Mt. Hood. Deschutes County, who was also reaccrediting this year along with us, stayed out past curfew on too many recent missions and was not allowed to leave the county, so we would be working on Mt. Bachelor's non-lift served cone for the day. Deschutes would go in the morning, which meant we would have the sun-softened snow, and the almost-tropical 48-degree temps. Again, typical for the PNW in winter...

When our time arrived, the scenario presented was that a group of six had been skiing, when one of them triggered an avalanche by going off a ski jump. The reporting party got away on his own, and miraculously made his way to the parking lot where he found an intact, fully-prepared, state SAR-certified, mountain rescue team. From our interview (and from just peeking up at the cone), it was determined that there were at least 2 victims visible, and my Spidey sense told me they each would require full backboard and/or vacuum-splint immobilization with a full technical evacuation.

Once our hasty team reached the scene, the first thing they did was to dig an avy pit to assess for snow stability—despite the fact that in the scenario, there was already a known avalanche. So one could maybe reasonably assume the snow was not stable. Never-



*Approaching the mock avalanche on Mt. Bachelor during reaccreditation, 2015. Deschutes County Sheriff's SAR prepares the snow for Corvallis Mountain Rescue Unit. Photo by Laurie Clarke.*

theless, pits were dug, and they revealed the snow stability to be "bomber." That's a highly scientific snow-science term that you North Carolina mountain rescue units may not be aware of, but essentially it means we could drop several American-sized Americans on the snow, from a great height, and it would not slide further.

Having demonstrated our ability to dig snow, we moved on to look for the other avalanche victims. Per the reporting party, there were three other folks buried in the avalanche, and they had been buried for well over an hour. CMRU is a relatively small unit, and on this day we had about 14 people in the field. Instead of focusing our resources on the 2 victims we knew to be alive (who each needed full cervical immobilization and lowering down the mountain with a full rescue system—surprise!), we set up a probe line...to search for "survivors"...that had been buried for over an hour... because that's realistic! Once the examiners were satisfied that we could probe for corpses with the best of them, we set about rescuing the survivors.

One victim was higher up the mountain, but she did not get the benefit of our (relatively) warm and (relatively) comfortable full-body vacuum splint because, well, mainly because we didn't want to carry it any higher up the mountain than we had to. The upper victim was assessed, placed in C-spine immobilization, and packaged so well that she later needed to be unwrapped a bit, given the relative tropical temperatures and blazing sun. Meanwhile, other members of the unit were building our technical evacuation system with a series of pickets as anchors. The plan was to lower



this first victim to the level of the second victim (who had the benefit of being placed in the full-body vacuum splint), and from there, alternately lower them down to the bottom.

Missions being what they are (even mock missions), everything takes longer than desired, and the sun has a terrible habit of not waiting around for us to do what we'd like to. This meant that once we lowered the upper victim to the level of the lower victim, the scenario was called.

I can hear the other MRA members out there now: "What's the matter? Afraid of doing a little rescue work in the dark? Finish the complete evacuation!" To that I would say, you're right in a technical sense. But this is the Pacific Northwest, and Sasquatch rules the night here. We have reached a mutual understanding—he stays hidden during the day, and we do not venture outdoors at night. Ever.

Plus, one of the members was having beer and pizza at his house, and word was spreading that the Deschutes people had already headed over there and were scarfing down all the Hawaiian pizza. At this point, the scenario wrapped up and we packed up our gear, returning to the parking lot for a debrief. This is the time of day when the evaluators get to point out how they would have done it, and why that would have been a better way, and how when they were kids, they walked six miles each way to school, uphill, in the snow. With no shoes.

\*\*\*\*\*

While some of the above details may be slightly exaggerated or mildly inaccurate, every single member of our unit knows the incredible value of these exercises, and truly appreciates the efforts of everyone involved in the process. Knowing a reaccreditation is approaching helps focus the entire unit toward a goal, and assists everyone in learning their strengths and improving upon their weaknesses. Even the things that may not be completely realistic on reaccreditation day serve a valuable purpose in allowing a unit to demonstrate all the skills needed to effect a rescue under any conditions. Here in Oregon, since all units are tested every 5 years, and are required to demonstrate competence in numerous aspects of snow and rock skills, as well as general search and rescue abilities, we know that we can show up on any mission and count on the person from a different unit to perform at the same level as any of us, and vice versa.

We want to acknowledge the many people who help make reaccreditations happen – from the leadership at the Oregon Mountain Rescue Council, to the individuals from the various Oregon MRA units that volunteer countless hours over many months to develop the scenarios, find the location, and make it all come together relatively seamlessly on the day of the testing. To all of you, we offer a sincere thank you!

Except to the folks from Deschutes who drank all the Jubelale. You guys suck.



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Daniel Jung on route in the Ellingham Quarry, Siegen, Germany. Photographer: Matthias Fredriksson

## Call for Speakers

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NATIONAL SPRING CONFERENCE  
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**T**he MRA National Conference is the largest gathering of mountain rescue professionals in the world. The 2016 conference will feature instructional courses, technical field sessions, equipment demonstrations and social events that cater to all experience levels. From Search and Rescue professionals and incident commanders to first year members, all will have the opportunity to learn new skills and share their knowledge with peers.

Subject matter includes mountain rescue techniques and skills, search skills, incident command management, and pioneering technology discussing the future of mountain rescue. Attendees will include professionals, both paid and non-paid, and all facets of search and rescue from throughout the United States and abroad. Attendees will represent many job functions and all will share a favorite pursuit: search and rescue.

Please come join us in Port Angeles, Washington located on the Olympic Peninsula. Just minutes away from Olympic National Park, encompassing nearly one million acres and home to glaciated mountains, old growth rain forests, undisturbed rivers and a vast network of wilderness trails. This years conference will take advantage of all that Olympic National Park has to offer.

Interested parties will be able to present to a captivated audience, lead an interactive field session, or demonstrate the latest technology. Presenters will be given a discounted registration fee for the 2016 MRA National Conference. Deadline for submission is January 18, 2016. Please provide the following information for program consideration or questions to the Presentation coordinator: Jonathan Evarts - [jsevarts@gmail.com](mailto:jsevarts@gmail.com).



## 2016 MRA Presenter Request Form

Presentation Title \_\_\_\_\_

Organization \_\_\_\_\_

Presenter(s) Name \_\_\_\_\_

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NATIONAL SPRING CONFERENCE  
PORT ANGELES, WASHINGTON

Presentation Type ☐ Lecture ☐ Demonstration ☐ Field Session ☐ Panel

Length of Lecture ☐ 30 mins ☐ 45 mins ☐ 60 mins

Length of Field Session ☐ 2 hours ☐ 4 hours ☐ 8 hours ☐ Other

A/V Equipment Required ☐ Laptop ☐ Projector ☐ Speakers ☐ Wifi

Presenter Biography

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Presentation Description

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For a field session what logistical/equipment needs do you have?

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Presenters will be given a discounted registration fee for the 2016 MRA National Conference. Deadline for submission is January 18, 2016. Please provide the following information above for program consideration or questions to the Presentation coordinator: Jonathan Evarts - [jsevarts@gmail.com](mailto:jsevarts@gmail.com).

## Check out the MRA Website for Some New Educational Offerings!

A great 35 minute video [Introduction to Search Management Best Practices](#) has been produced by the Coconino County Sheriff's Office Search and Rescue Unit (a MRA member team) in conjunction with the National Park Service Branch of Search and Rescue, and with the help of the Arizona Department of Public Safety Aviation Bureau and Guardian Medical Transport.

The National Park Service, (NPS) has provided us with a "[Facilitated Learning Analysis \(FLA\)](#)" for one of their high-angle training incidents. It's definitely worth a read both for the lessons learned and the excellent process the NPS used to capture and share those lessons.

We have new webinar training videos courtesy of our Presidential Partner, [PMI](#)! They produce a great series of training webinars and they are well worth investigating! Past [Webinars](#) are kept on the website for your review, and you can be notified about future live webinars by subscribing to the MRA email list in the [Members Only](#) section of our website under "mailing list subscriptions."

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## Quarterly ICAR Representative Report

ICAR MEDICAL COMMISSION (ICAR MEDCOM): HOW THE ICAR MEDCOM HELPS THE MRA

By Ken Zafren, MD, Vice President, ICAR MEDCOM

While rescuers on Mountain Rescue Association (MRA) teams go about their business (rescuing people), the MRA provides a lot of support behind the scenes. One activity that isn't always apparent to rescuers in the field is participation of the MRA in the International Commission for Alpine Rescue (ICAR). The ICAR is an international (big surprise!) organization that exists to develop and disseminate guidelines or "best practices," for mountain rescue. Member organizations, including the MRA, contribute knowledge and expertise, and benefit, in turn, from the resulting guidelines.

The ICAR has four commissions: Air Rescue, Terrestrial Rescue, Avalanche, and Medical. With the guidance of the MRA ICAR Advisory Committee chaired by John Chang, the MRA provides a representative and an alternate representative to each of the commissions. I have the privilege of representing the MRA on the Medical Commission. Skeet Glatterer is the alternate. The representatives attend the annual meetings of the ICAR, but that is only a small part of what they do. Between meetings, the commissions collect and analyze data and work on developing evidence-based guidelines. At the meetings, the members of the commissions discuss and finalize the guidelines. Examples of ICAR guidelines that have been adopted worldwide are the current frequency for avalanche transceivers based on research by the Avalanche Commission and the widespread use of vacuum mattresses based on the work of the Medical Commission.

The ICAR Medical Commission is composed of doctors and paramedics who represent rescue organizations. Most of the rescue organizations are European and, like the MRA, are national in scope. Although often referred to informally as ICAR MEDCOM, the official name of the commission is the International Commission for Mountain Emergency Medicine.

All the ICAR MEDCOM guidelines are written in English. Traditionally, the business of the commissions was conducted in German and French. The ICAR MEDCOM began conducting all meetings in English in 1994. The guidelines have evolved from informal, expert-based guidelines to guidelines that are based on evidence when possible. For the last 15 years, in order to ensure high quality, ICAR MEDCOM has required that the guidelines be published in peer-reviewed medical journals. Some recent guidelines of the ICAR MEDCOM include Resuscitation of Avalanche Victims<sup>1</sup> and Termination of Cardiopulmonary Resuscitation in Mountain Rescue.<sup>2</sup>

The members of the ICAR MEDCOM are aware that mountain rescue in Europe differs from that in the rest of the world. The guidelines are written to take regional and worldwide variations

into account. The ICAR MEDCOM works closely with the other commissions when appropriate. The ICAR MEDCOM also works closely with the Medical Commission of the International Climbing and Mountaineering Federation (UIAA MEDCOM). The UIAA MEDCOM makes general recommendations concerning mountain medicine while the ICAR MEDCOM covers mountain rescue. The UIAA MEDCOM recommendations are available at [http://www.theuiaa.org/medical\\_advice.html](http://www.theuiaa.org/medical_advice.html). Examples include "Drug Use and Misuse in Mountaineering" and "Water Disinfection in the Mountains." Guidelines for prevention and management of lightning injuries in the mountains were developed jointly by ICAR MEDCOM and UIAA MEDCOM.<sup>3</sup>

The ICAR MEDCOM has been increasingly reaching out to make the guidelines accessible to rescue organizations and rescuers. One project has been to transform the flowchart from the avalanche resuscitation guidelines into a checklist printed on a card that can be used easily by rescuers in the field. This card can be found in the 2013 ICAR MEDCOM report on the MRA web site. The "Avalanche Checklist," is currently undergoing testing in Europe and in Summit County, Colorado.

If you have questions about the ICAR MEDCOM or have suggestions for future guidelines, please contact me at [kenzafren@gmail.com](mailto:kenzafren@gmail.com).

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**BONUS SECTION: HIGHLIGHTS OF RECENT PAPERS**

In addition to developing official guidelines, members of the ICAR MEDCOM are active in advancing medicine for mountain rescue. Here are two papers of interest.

**Delayed and intermittent CPR for severe accidental hypothermia.<sup>4</sup>**

“Conclusions: Continuous CPR is recommended for [cardiac arrest] due to primary severe hypothermia. Mechanical chest-compression devices should be used when available and CPR-interruptions avoided. Only if this is not possible should CPR be delayed or performed intermittently. Based on the available data, a patient with a core temperature  $<28^{\circ}\text{C}$  or unknown with unequivocal hypothermic CA [cardiac arrest], evidence supports alternating 5 min CPR and  $\leq 5$  min without CPR. With core temperature  $<20^{\circ}\text{C}$ , evidence supports alternating 5 min CPR and  $\leq 10$  min without CPR.”

Take home message: If you can't start CPR right away or can't perform CPR continuously in a severely hypothermic patient, delaying or interrupting CPR is unlikely to worsen the outcome.

**The effectiveness of avalanche airbags.<sup>5</sup>**

“Results: ...The adjusted mortality is 44% for critically buried victims and 3% for non-critically buried victims. The adjusted absolute mortality reduction for inflated airbags is -11 percentage points (22% to 11%; 95% confidence interval: -4 to -18 percentage points) and adjusted risk ratio is 0.51 (95% confidence interval: 0.29 to 0.72). Overall, non-inflation rate is 20%, 60% of which is attributed to deployment failure by the user.

Conclusion: Although the impact on survival is smaller than previously reported, these results confirm the effectiveness of airbags. Non-deployment remains the most considerable limitation to effectiveness...”

Take home message: Backcountry skiers in avalanche-prone areas should use avalanche airbags and should probably practice deploying them to decrease the incidence of non-deployment.

**References**

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## Rescuer Spotlight

Interview with Craig McClure,  
Deschutes County Sheriff's SAR, OR

To suggest someone for an interview  
submit his or her name to [Meridian  
Editor](#)

**Can you tell me what it was that  
attracted you to mountain rescue, in  
the first place?**

I came to Deschutes County with a strong SAR background but had never worked with an mountain rescue team. I joined up because it was a new challenge and I gravitated to the people involved. They were the kind of dedicated professional volunteers I wanted to be around and frankly, if you don't like the people you train and work with, it isn't fun. They were fun and I could learn a ton from them.

**What do you wish you had known when you started, that you know now?**

A few things: First, learn the physics and forces up front. Too often, I relied on "this is how we do it" and I trusted that. Later on I dove into the physics and learned how to make smart choices and improvise safely. There are very few wrong ways to do things but rather, variations of the right way, modified to fit the location, load, and risks. Second, are personal rope skills; I could work on this every day. Just being comfortable moving on rope makes the job so much easier. I'm building a course in my yard for this. Come play!

**Can you tell us a bit about what you do when you are not on a mission, or training for one?**

I work. My business is still in the public safety and EMS realm so I'm always involved in a community that exists to help others. I also now have a two-year-old daughter so I'm fumbling through finding the balance between my different families. Rescue is a family too.

**Five years from now, what do you want to have accomplished or contributed to the MRA?**

I spend quite a bit of time working with agencies responsible for rescue that have little understanding of the some of the benefits of Mountain Rescue principles. We tend to work lighter and faster which is a real benefit in some situations. I'd like to see us work to bridge the gap between NFPA accepted practices and mountain rescue practices. More cross training and education would help on both ends of the spectrum.

**Can you share a story about an event that involved you and the**



**MRA that was a game changer for you?**

Sure, but it actually has little to do with Mountain Rescue but rescue is rescue from the subject's perspective. Ten years ago, I was working an air-scent dog on the Oregon Coast for a missing hunter. His family was in camp and I left my dog on a 'down stay' outside the command post door during my briefing. When I came out of the trailer the father was cradling my dog's head in his hands and whispering, "Go find my boy." repeatedly. That moment drove home how great our responsibility is once we don the uniform and present ourselves to do the job. We need to be trained, professional, and up to the task we say we can do—every time. Someone's life depends on it and we may be the last hope. That's huge.

**What other "hats" do you wear, and how do you manage the duties you have with them.**

I'm actually giving away hats. Anyone want one? For a while, I got in too deep with too many teams in our organization. I had to choose what's most important so I could do it well. The advice I give new members is to pick one specialty and be good at that one. When your passion changes, go do something else.

**Of all the SAR missions you have been on, what one mission taught you the most?**

I was recently on a mission that started as an avalanche rescue but because of safety reasons we had to back out and wait for better conditions. That was the first time I had to make that call and leave a subject in the field. In retrospect I felt as good about that decisive moment as I do about "successful" missions. Our work has risk and we listened to our training and experience. It would have been easy to accept additional and unacceptable risk in the moment. I never wanted to have that test but I'd be more comfortable making that decision again. I trust my team and myself more after that day.



## Members From Coconino County SAR, Gran Canyon National Park, and the US Air Force Participate in World's Largest SAR Exercise

By Ken Phillips, Branch Chief of Search and Rescue, National Park Service, Washington Office. Reprinted from **Inside NPS**, a publication of the National Park Service, U.S. Department of the Interior, with permission from Ken Phillips. (June 2015.)

On June 3rd, National Park Service SAR personnel participated in a portion of the Operation Angel Thunder exercise occurring in Northern Arizona. Angel Thunder is the largest personnel recovery exercise in the world, combining joint military, international coalition and civilian interagency personnel.

The event spans two weeks and involves aerial, ground, and maritime exercises in Arizona and California, with 2700 participants from 11 partner nations and nine agencies. Participants train through the full spectrum of personnel recovery and rescue capabilities.

NPS personnel from Grand Canyon National Park participated jointly with Coconino County SAR and US Air Force pararescuemen in an exercise that involved helicopter transport by a CH-47 from Flagstaff to a landing one on the Mogollon Rim sixty miles away. The Mogollon Rim, which extends 200 miles across the State of Arizona, forms a 1500-foot escarpment that defines the southern edge of the Colorado Plateau.



Photo by Bonnie Taylor.



Exercise participants working on rigging during the Angel Thunder 2015 high angle rescue training. U.S. Air Force photo by Senior Airman Betty R. Chevalier.



U.S. Air Force photo by Senior Airman Betty R. Chevalier.



## SARCON 2015 Report From a Scholarship Recipient

*By Tom Hayward, Tacoma Mountain Rescue, WA*

At a Tacoma Mountain Rescue meeting in 2014, Fran Sharp reported that the 2015 MRA Conference would be held in Estes Park, Colorado and hosted by Larimer County SAR. As a former member of Larimer County SAR, this immediately piqued my interest. I have a lot of good friends in that group and had not had the opportunity to see many of them since moving back to Tacoma, Washington. Months later, I received word that the MRA had decided to offer scholarships to send members to their first conference. With both the interest and the means, it seemed I was destined to attend the national conference.

After a short application, plane ride, and beautiful canyon drive, I found myself in Estes Park.

Flipping through the conference brochure, I quickly noticed it was peppered with familiar names. Some I knew from SAR missions, but many were names I respected for their research and publications. What a great opportunity to meet and hear them speak! My largest challenge was choosing which talk to attend for each time slot; none were easy to miss.

My primary goal was to learn new things. In the first time-slot, Kevin Sturmer was scheduled to speak about parallel plaquettes. This was a new term for me, so of course I attended. I left with knowledge of a new descent control system to add to my repertoire, and a realization that despite being involved with mountain rescue for many years, there are still many more things for me to learn.

I also enjoyed talks by Dr. Ken Zafren on hypothermia; modern mapping resources by Matt Jacobs; Dyneema anchor testing by Zephyr Feryok; and high altitude medicine by Dr. Alison Sheets. It was clear that each of these presenters has made themselves experts in their field through research, innovation, and no shortage of hard work. I appreciate the time these, and all of the other presenters, put into preparing their material.

Outside of presentations, I caught up with some old friends and made some new ones. All had experiences to share and I came away with a number of ideas to implement back home.

The MRA Conference is an invaluable learning opportunity for members of the mountain rescue community at any level of experience. I'm looking forward to seeing all of you in Port Angeles next year!

## Note From The Editor—

I would like to thank Todd Lemein from Corvallis Mountain Rescue, and Shelley Littin, from Southern Arizona Rescue Association for their fine editorial assistance on this issue. As all volunteer jobs go, the pay is not what attracts us; it's the chance to drink all the water we want, for free.

October 1, 2015 is the content deadline for the Fall edition. Please get your articles in on time.

Submit your articles, photos, nominations for someone to interview, and notices to the editor at [Meridian Editor](#).



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## Photo Gallery



*After a 4 year, around the world tour, past MRA president Tim Cochran's ashes were transferred by past MRA President Doug Wesson to LTC Somogyi, of the High Altitude Aviation Training School (HAATS), for Tim's final ride home on the Blackhawk and laid to rest on Mt Cross. Photo by John Chang, Bay Area Mountain Rescue Unit, CA.*



*Public education event inspires the next generation. Photo by Tiffany Royal, Olympic Mountain Rescue, WA.*



*High angle training. Photo by Glenn Henderson, Riverside Mountain Rescue Unit, CA.*



## Photo Gallery



*Too old and frail to go rock climbing anymore, Woody and Skeet refuse to give up. Photo by An O. Nymous.*



*Working hard for the cause, at SARCON 2015, John Chang looks for future MRA officers. Photo by Laurie Clarke, Portland Mountain Rescue, OR.*



*Suffering through a SARCON 2015 event, Jon Meyer, Olympic Mountain Rescue. Photo by Laurie Clarke, Portland Mountain Rescue, OR.*



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