# MERIDIAN

Spring 2015



The Quarterly Publication of the Mountain Rescue Association



-Avalanche Lessons From ICAR--Upcoming SARCON--ITRS 2015 Call for Papers-



## **Spring 2015**

Winds of Change in the Avalanche Theater	3
President's Message: Reaccreditation and the Final Exam	5
Three Hikers Rescued on Matanuska Peak, in Alaska	7
ProKit: Avalanche Airbag Backpacks, Generation 2	8
Book Review: Search and Rescue as a Metaphor for Life	9
2015 MRA/NASAR/CSRB	10
<u>Dislocations in Mountain Rescue</u> .	13
Rescuer Spotlight.	15
<u>ITRS 2015</u>	17
Giardia: Not Just Any Protozoa.	19
Surprising Lessons From ITRS.	20
International Alpine Solidarity Silver Plaque Given to MRA Member	23
Recognizing Those Who Excel.	
Photo Gallery.	24
Note From the Editor.	25
New Online Technical Rescue Resource.	26

Support those who support the MRA! rock exotica

Cover photo by Erik Broms, Portland Mountain Rescue.

## MRA Leadership

## **President**

Dave Clarke
Portland Mountain Rescue
president@mra.org

## **Vice President**

Bryan Enberg
New Jersey Search and Rescue
vp@mra.org

## **Past President**

Doug Wessen Juneau Mountain Rescue

## Secretary/Treasurer

Doug McCall Seattle Mountain Rescue dougmccall@msn.com

## **At-Large Member**

Skeet Glatterer Alpine Rescue Team glatterer@comcast.net

## **At-Large Member**

Art Fortini Sierra Madre Search and Rescue

## **Executive Secretary**

Kayley Bell kayley@kayley.com

## **Meridian Staff**

Editor: Laurie Clarke
Graphic Designer: Carolanne Powers

## **Submissions**

Send to Editor

## **Corporate correspondence**

Mountain Rescue Association PO Box 800868 San Diego, CA 92168-0868

## ©2015 Mountain Rescue Association



On the approach to the "Super C Couloir," in Chile. Photo by Marc Beverly.

## Winds of Change in the Avalanche Theater

By Marc Beverly, Albuquerque Mountain Rescue, New Mexico

Editor's note: Each quarter, you will see a submission from one of the four MRA commission delegates (or their alternate) to ICAR. This is from Marc Beverly, the ICAR Avalanche Commission alternate delegate.

One personal fact that is not pleasing to me is that I can't remember how many friends, instructors, and mentors I've lost to avalanches over the past ten years.

An interesting phenomenon has occurred in the USA this year, the lowest annual death rate by avalanches transpired. Obviously, this likely had to do with a slow start to the snowfall early in the season, but we would like to think that it had to do with avalanche education. Although it is almost impossible to prove cause and effect, we can hope that lessons learned are making a difference.

Avalanches are a focus of major emergency response because time equals life. It is rare that a Mountain Rescue team has only to deal with weather, snowpack observations, avalanche activity, terrain selection, and travel techniques in order to get to the avalanche scene. The planning for a team responding is, by far, more in-depth than companion rescue alone. There is a more complex process than simply using formal avalanche training through your local guide service or ski patrol when responding as a team. The ante goes up when more victims are involved, the terrain is more complex, or a multitude of other nuances specific to every avalanche accident, but perhaps none more menacing than residual hang fire from above.

Having responded to avalanches around the world in both a companion rescue role, as well as leading a formal team response, the amount of complexity can be almost overwhelming, especially if the area and conditions are unknown. Making sure the team has a plan in place is paramount, but so is keeping up to date with the latest technology and thought processes in avalanche rescue. Then, it is important to practice the response on a regular basis, even before the snow hits the ground in late autumn. If your team is waiting to practice avalanche response once there is a massive snowpack to practice in, it's too late to be efficient. Organize early on, and follow-through with training.

I had two unique opportunities this year to learn about how other professional organizations respond to, or deal with, specific situations. Attending the International Commission of Alpine Rescue (ICAR) was very informative and insightful. The other beneficial event was staying with a friend, Yann Gerome. He is the Instructor Trainer for the Gendarmerie for Air Chamonix, and he offered a different perspective in regards to responders.

Here are my top 10 insights from ICAR 2014 and Yann Gerome:

1) Avalanche triage is becoming more of a concern, especially with multi-victim burials in larger events that are somewhat prevalent worldwide, but to a lesser extent thus far in the USA.

2) Focus on triage, then *reverse triage*. "...based on the severity of injuries with the goal to treating those who need the least amount of rescue resources first to increase the total number of lives saved."

- 3) Mass Casualty Incidents (MCI) may be rare, but when they occur, can be more than problematic. Practicing for potential MCIs is important as the resources that are needed can span broad distances and expertise, but both may be limited.
- 4) Slalom probing is still being beta tested in Europe as a potentially more efficient method of probing. This should likely be performed with smaller, well-trained teams. Otherwise, continue with previous guidelines for both line probing, as well as pinpoint probing.
- 5) Beacon, shovel, and probe are the standards for backcountry travelers. Rescue teams are more than backcountry travelers, so they need to take into consideration the situation, which usually means more resources and equipment.
- 6) In regards to helicopter operations in the mountains, short/long roping is almost unheard of in the USA, but it is a common practice throughout the rest or the world. Response to high-risk scenes can involve helicopter hover as rescuers perform recovery while on constant short rope. This technique is used when potential risk exists for further avalanche from above. This technique is practiced and perfected.
- 7) Snow machine related avalanche incidents and deaths continue to be on the rise and are pandemic. Even though snow machining may be illegal in some regions, human behavior is likely a more proximal cause. Similar to the thought that a gun doesn't kill someone, someone has to pull the trigger.
- 8) Phone apps, like in Switzerland, are starting to be useful and an integrative source for rescue response and backcountry traveler safety.
- 9) Bluetooth devices can be massively detrimental, more than thought previously, with beacon and RECCO function.
- 10) RECCO devices should be considered a tool for professional responses to avalanche scenes, but require in-depth training and practice.

In discussing avalanche responses with Gerome in France, it came as no surprise that there is only a professional response, and no volunteer response. This fact has to do with a different governmental structure, but also has to do with the fact that they see the risks of response as high, and the intricacies of remaining proficient with decision-making is difficult if not used on a regular basis.

Gerome also indicated that the main issue in avalanche fatalities was really no different than in the USA, and that has to do with human behavior. There is agreement across the board in multiple countries that teaching the general public the mechanics of avalanches has not shown to diminish avalanche deaths. Likely, the movement in avalanche education will shift more towards trying to change behaviors.

In fact, safety will be one of the main focuses for the Mountain Rescue Association in the coming years. Responding on a mission for an avalanche victim can be a massive undertaking in many regards, but can be mitigated with keeping skills honed, practicing regularly with your team as well as other resources, and keeping an open mind about new techniques and technologies that could make the difference.

J. Marc Beverly has been with Albuquerque Mountain Rescue since 1989 and been performing SAR missions since 1984. He is an AIARE I and II Instructor and Course Provider, IFMGA Mountain Guide for Beverly Mountain Guides, and owner of Strike Rescue.

Genswein, M. 2008. Remote Reverse Triage in Avalanche Rescue. International Snow Science Workshop. Retrieved from: <a href="http://www.issw2008.com/papers/P\_8263.pdf">http://www.issw2008.com/papers/P\_8263.pdf</a>

Ballard, H., Atkins, D., Ballard, L.. 2006. Probing for Avalanche Victims Revisited. Retrieved from: <a href="http://training.mountainrescuescotland.org/files/2014/01/issw-2006-579-583.pdf">http://training.mountainrescuescotland.org/files/2014/01/issw-2006-579-583.pdf</a>

American Institute of Avalanche Research and Education. 2015 AIARE 1 Student Manual.

UEPPA. 2015. Retrieved from: https://www.uepaa.ch/#!/app



A raw image taken during a mission to rescue stranded snowboarders where an avalanche fractured, but did not release on the three rescuers, in New Mexico. Photo by Marc Beverly.

MERIDIAN Spring 2015

## **President's Message: Reaccreditation and the Final Exam**

By Dave Clarke, MRA President, Portland Mountain Rescue, OR

Reaccreditation! For some rescuers, having to endure their teams' reaccreditation process is about as welcome as a root canal. Yet the whole accreditation/reaccreditation process is one of the primary benefits of MRA membership. How so you ask? Well, for starters did you know that the MRA is the only organization in the US that accredits teams based on a peer evaluation? For your Sheriff or other authorities having jurisdiction (AHJs), this assures them that your team is proven in the field to be able to handle the difficult missions. Beyond that, it allows you and your teammates a chance to show your stuff and, let's face it, most teams ramp up their training leading up to the big day. How can that be a bad thing? Finally, it provides a framework for all MRA teams to receive outside feedback from their peers. This can prove to be invaluable for teams who are looking for ways to improve or want to learn about new trends. At the same time there is no doubt that going through the reaccreditation process is time consuming and stressful. Yet as mountaineers we know intrinsically that the most rewarding things in life are those that we have worked hard to achieve.



Fred Cliff, Deschutes County SAR, Oregon.
Photo by Laurie Clarke.

Last month I was lucky enough to be able to participate in reaccreditation processes in three different MRA regions. The first was the California region's, which took place at Joshua

Tree National Park. Next was my home region, Oregon, which we held at Mt. Bachelor Ski Resort. Third, the Alaska region held their exam outside of Anchorage, at Chugach State Park. Each region has developed a process and procedures that work well for them. Yet they are quite different from one another.

Years ago\* when the MRA began accrediting our member teams the board of directors made the good decision to set broad definitions and minimum standards in our policies regarding accreditation/reaccreditation but they left many of the details up to each region. This brilliant move means that teams can focus on the search and rescue techniques predominantly used in their area. However the requirements to become a fully accredited team still include being accredited in the three disciplines of technical snow and ice rescue, wilderness search, and technical rock rescue. This ensures that a fully accredited MRA team from any region will be capable of conducting mountain rescues in any season.

To get back to the reaccreditations that I saw this year, the California Region is a huge affair with all of the regions' 19 teams and 400 rescuers all testing on the same day. Sierra Madre Mountain Rescue was in charge of this year's process and they spent several weekends scouting the Park for appropriate sites to conduct 19 simultaneous rock rescue scenarios, provide camping facilities, and most importantly, a site for the après test BBQ. The planning and logistics involved are impressive and if there were any problems they were dealt with efficiently so that everything was wrapped up by the end of the day on Saturday. The process in California is to reaccredit all of its teams in one discipline per year on a three-year rotation. This keeps them well ahead of the five-year cycle required by the MRA and allows for an occasional year off which happened recently when they were slated for the ice and snow reaccreditation during a year with very little snow.

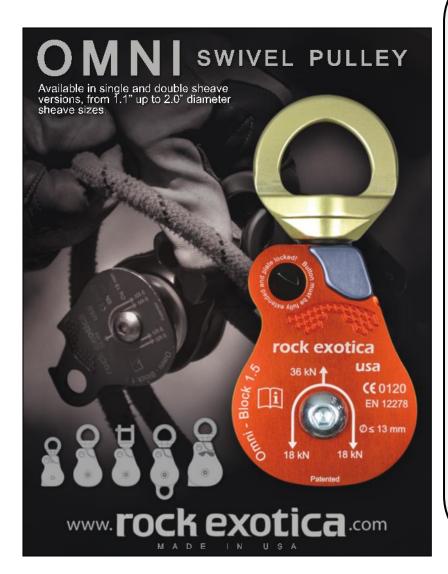
Next up was Oregon. Speaking of low snow year, crikey! Our usual winter exam site had no snow at all. Fortunately, Oregon is blessed with several high elevation volcanic peaks and the Deschutes County team has a great relationship with the Mt. Bachelor Ski Resort so we were able to conduct our exam on a large steep cinder cone on the fringe of the resort. The Oregon region model uses a predetermined rotation of exam disciplines and dates so that each of our five teams is tested in all three disciplines every five years. This year, two teams, Deschutes County SAR and Corvallis Mountain Rescue, were up for the technical snow and ice test. In comparison with the California region the logistics are simple yet for the teams being tested, the preparation is similar, i.e. demanding. A lot of hard work by dedicated volunteers goes into every reaccreditation process.

The following week I traveled to Anchorage for the Alaska regions' testing of the Alaska Mountain Rescue Group (AMRG). With only three teams in the region and the expense of flying to get to another team's area their process involves testing in all three disciplines in one weekend. The evaluators arrive from out of town on Wednesday and spend Thursday and Friday morning scouting and preparing the exam sites. On Friday afternoon we held the snow and ice exam followed by the search and rock scenarios on Saturday. Sunday is reserved for any

retesting but since the AMRG aced all three tests this was unnecessary. However as it turned out they still had to pass a final exam.

After Saturdays' tests everyone reconvened at the AMRGs' cache where the evaluation team delivered their verdict: "Pass" on all three modules. As the debriefing and decompressing commenced, a call came in for a mission. What follows is the mission report written by Dean Knapp of AMRG. After reading my message and Dean's report, you will have learned about some of our regional differences. What I hope will stay with you though is that through our accreditation/reaccreditation process the MRA is helping our member teams to be the best that we can be to improve our service to those in need in the mountains. I would like to personally thank everyone who has been involved in these tests or any reaccreditation exam for your efforts to better yourselves and your teams. Yes it's hard work but as I mentioned at the start, as mountaineers we are hardwired for the challenge...climb on.

\*I have been trying to ascertain exactly when the MRA began discussing and implementing the accreditation/reaccreditation process. So far I'm told that we began in the mid seventies. If you have any insights or recollections about this I would love to hear from you. You can reach me at <a href="mailto:president@pmru.org">president@pmru.org</a>.





Mark Miraglia, Scott Guess and Jeremy Lilly from AMRG's reaccreditation event. Photo by Allyson Youngblood.

# Do you know where to find the MRA?



https://www.facebook.com/ MountainRescueAssociation



http://twitter.com/MtRescueassoc



http://mtrescueassoc.blogspot.com

MERIDIAN Spring 2015

## Three Hikers Rescued on Matanuska Peak, in Alaska

By Dean Knapp, AMRG

AMRG chairman Eric Huffman had just stood up to congratulate the group on the highly successful reaccreditation when the phone rang. It was a trooper dispatch (the AHJ for SAR in Alaska), asking us to go to Matanuska Peak to rescue three hikers who slid out of control off the ridge on their descent during a day trip. One had a broken leg; one sustained a head injury with brief loss of consciousness and slid down the steep snowfield over 800 feet before stopping, regaining consciousness, and climbing back up to his companions; the third was not injured. The three subjects, teenage guys with one cell phone and a low battery, were huddled together in the gathering darkness, trying to keep warm, off trail, with no way to get out. Sunset would come in about an hour. Fortunately, the night would be beautiful: warm with clear skies, calm wind, and moonlight.

Mat Peak rises east of Palmer, to 6,119 feet, meaning 5,670 feet elevation gain on the four plus miles of trail. The subjects told dispatch that their position was about 500 to 1,000 feet below the summit (they were actually 1,200 to 1,500 feet below the summit). Eric asked about helicopters. The single Air National Guard helo on duty was busy hundreds of miles north in the Alaska Range, working on the successful rescue of a snowmachiner who had fallen deep into a crevasse. It would be tied up for hours, and the crew would be out of flight time when it returned. The Alaska State Troopers suffered a helicopter crash two years before (March 30, 2013) with loss of the pilot, a trooper, and the subject they were attempting to rescue. Troopers now operate two A-Stars for rescue, but currently do not allow the pilots to make night wilderness landings – which was exactly what we needed.

It looked like we would not have a helicopter Saturday night. Our initial plan was to send two four person teams of technical rescuers to drive 46 miles north to the trailhead and begin hiking. Butte Volunteer Fire Department could offer ATV rides the first mile and a half, but most of the distance and altitude gain would be by foot. The two teams were assigned and out the door quickly. They would get updates by cell phone during the drive. They were assigned to locate the subjects, stabilize and warm them through the night, and hope for helicopter evacuation of subjects after sunrise.

Troopers then asked LifeMed to lift rescuers up onto the mountain with their A-Star. LifeMed pilots fly with night vision goggles and do night wilderness landings. They did some great flying for us. The LifeMed helo scouted the mountain, got its searchlight on the subjects, and then found a wide flat landing zone approximately 1,000 feet below the subjects. Butte Fire set up a lower landing zone on the huge lawn of a helpful neighbor. The helo began ferrying technical team members one at a time up the mountain. On the first flight up the mountain the passenger and gear load was limited to 150 pounds, so Carrie Wang went in first at 2100 hours. After several laps and burning off more fuel, the helo could carry 350 pounds. One by one, nine team members were dropped off at approximately 3,600 feet, with the last one inserted at 0130 Sunday. Thirteen other AMRG members worked all night at road level in support of the operations on the mountain: command, communications, mapping, lower landing zone operations, logistics, medical advice, and talking to subjects' family members who had gathered to wait and worry. Helpful neighbors appeared during the night with coffee, hot chocolate, and brownies.

Up on the mountain, Carrie and Wayne Todd climbed a ridge, crossed a steep snowfield, and at 2330 hours located the subjects at about 4600 feet. Assessment: two could walk with assistance to the landing zone. The third would require a lengthy litter transport. As more team members arrived on scene, we equipped the less-injured subjects with micro spikes, and then Wayne guided them down to the high landing zone—roped, for the steeper sections. With extra clothes, food, water, and exercise, the two subjects were no longer hypothermic when LifeMed flew them off the mountain to MatSu Regional Hospital at 0305.

The subject who had initially been described as having an open tibia/fibula fracture actually had a closed mid-femur fracture and was hypothermic when our team arrived. He was packaged with a sleeping bag and tarp wrap, and strapped into a litter. The team then lowered the litter and medic, Jeremy Lilly, 900 feet down the main snow gully (snow anchors and two knot bypasses), then raised 150 feet to get the litter out of the gully to the ridge (human anchors with re-direct), then lowered 500 feet to the main access route (human anchors and knot bypass), then accomplished 1/3 mile litter evacuation traversing a 20 degree snow slope, and arrived at the upper landing zone at 0549. The first LifeMed crew had maxed out on flight time and returned to base just minutes earlier. A fresh LifeMed crew returned and flew the subject to MatSu Regional Hospital at 0711. The subject had rewarmed under our care and was at normal temperature upon arrival at hospital.

Sunrise was 0732. Trooper Helo-3 took over ferrying duties from the LifeMed helo, bringing the nine person technical team and a huge pile of gear down from the mountain in four trips, finishing at 0918 Sunday. All AMRG members on the mission had worked 24 hours straight through, from beginning the second day of the recert at McHugh Creek at 0930 Saturday to the group photo at the end of the Matanuska Peak rescue at 0931 Sunday. With travel time, that's at least 26 hours. The climbers joked that the mission was the technical part of the recert all over again—except at night and with more knot bypasses.



Photo by Jon David Wright, AMRG.



Photo by Wayne Todd, AMRG.



Photo by Matt Greene, AMRG.

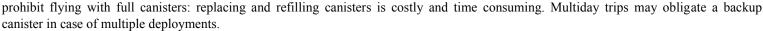
## ProKit: Avalanche Airbag Backpacks, Generation 2

By Christopher Van Tilburg, MD, MRA MedCom and Crag Rats, Hood River, OR

I spied an interesting image in a recent issue of *Backcountry* magazine. Professional skier Nina Hance wore both a Backcountry Access Float avalanche airbag backpack *and* a Black Diamond Equipment Avalung II artificial air pocket sling. Although wearing both probably lessens risk of injury and death compared with wearing just one, the practice of doubling up has not been widely adopted. Enter the new Black Diamond JetForce avalanche airbag backpack: it is inflated *and* deflated with a battery powered fan, which may obviate the need for wearing both devices. The JetForce works to prevent avalanche trauma and snow burial like all airbag backpacks. In addition, great potential exists to delay carbon dioxide displacement asphyxia by creating an artificial air pocket.

#### Trauma and Burial

Avalanche airbag backpacks have been around in Europe for three decades. However, adoption in North America has been fraught with difficulties. The packs are costly and heavy. Compressed gas canister has been cuffed with import regulations. US airlines





Avalanche airbag backpacks work by two mechanisms. First, given the large volume of cushioning surrounding the head and neck, airbag backpacks help minimize trauma, which accounts for 25% of avalanche deaths. Second, more to the point, the inflated airbag increases the volume of a person wearing it. This employs the principal of particle segregation called sifting, often referred to as inverse segregation, with larger particles rising to the top of a collection of moving particles.

### Air Pocket

Whereas all airbags help prevent trauma and burial, the new JetForce potentially creates an air pocket. The JetForce uses a fan powered from a rechargeable lithium ion battery to inflate the airbag; after three minutes, the fan reverses to deflate the bag. Until recently, the Avalung was the only commercially available artificial air pocket device, made in a sling worn over clothing or incorporated into a backpack. About a third of those who die from avalanches, do so immediately from either trauma or abrupt suffocation by airway compromise. For those who survive initial onslaught, buried people die more slowly from carbon dioxide displacement asphyxia, rebreathing expired air. The Avalung helps prevent this latter mechanism, shunting expired carbon-dioxide-rich air to the back, and drawing in oxygen-rich air through a chest port. Wearing both an Avalung and airbag backpack is a bit cumbersome: travel in tight or technical terrain can be problematic with a larger, heavier pack and donning and doffing both can be laborious. Thus in addition to helping to prevent trauma and full or partial burial, the JetForce may—a big unproven hypothesis—help prevent asphyxia.

### **JetForce**

Compared to similar canister packs, the JetForce weighs a scosh more (the JetForce Halo 28 clocks in at 7.5 pounds) and the cost is on the upper end (\$1250-\$1300). But JetForce backpacks can be taken on an airplane. The lithium-ion battery allows at least 4 deployments or 120 hours of standby with a single charge. Practice is free: I deployed the JetForce multiple times in my living room and at a Mount Hood Sno-park.

Canister airbag backpacks are still a great option. Fortunately, cost is decreasing, availability is increasing, and refilling and replacing canisters is easier. I've refilled and exchanged canisters in Chamonix, Davos, and Portland, Oregon. Moreover, the Scott Alpride system uses carbon dioxide and argon in small, inexpensive, airline-friendly cartridges similar to those used in personal flotation devices.

It is too early to tell if the JetForce will become standard issue. But the added function of a potential air pocket, may dramatically increase safety. Aside from avalanches, a possibility exists that air pocket created by the JetForce might help delay non-avalanche deep snow and tree well submersion asphyxia.

Dr. Christopher Van Tilburg is purveyor of prokit.info and author of <u>Mountain Rescue Doctor</u> and Adrenaline Junkie's Bucket List.



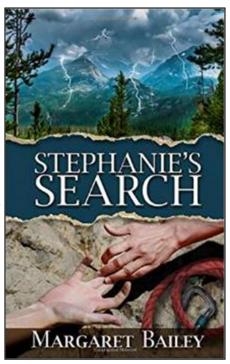
## **Book Review: Search and Rescue as a Metaphor for Life**

By Anna deBattiste

The real story: on an August afternoon in 1988, a journalist named Keith Reinhard walked through the streets of Silver Plume, Colorado, telling everyone he saw that he planned to climb Pendleton Mountain. He was last seen at 4:30 pm, far too late to begin such a hike, and that evening he didn't return. Alpine Rescue Group was called out to search.

What made the search so interesting, aside from the fact that the subject was never found, is a series of coincidences that some believe were more than coincidental. Reinhard was a newspaper journalist who moved from Chicago to Silver Plume for a sabbatical. He rented a shop on Main Street and opened an antique store. A man named Tom Young, who ran a bookstore, had previously rented the same shop. In August of 1987, Young told people he was taking a vacation in Europe and then disappeared. Reinhard was fascinated with the disappearance and began writing a novel based upon it. Young's body was found ten months later in the nearby mountains, with the body of his dog, both with gunshot wounds to the head. The sheriff ruled it a suicide, but others continue to question it. One week later, Reinhard disappeared.

The search lasted for seven days and involved 250 rescuers, 18 dogs, extensive military assistance, and a Civil Air Patrol crash that killed the pilot and badly injured an observer.



Like most unsolved disappearances, theories abounded. Some believed both men were murdered for something they found in the shop. Others believed Reinhard died in a fall on the mountain and couldn't be found due to rugged terrain, and others believed he planned his own disappearance, perhaps because he wanted to immerse himself in the subject of his book. The television show, *Unsolved Mysteries* featured the case, and conspiracy theories were bandied about for decades and continue even today.

Dan Burnett, a mission coordinator and veteran member of the Summit County Rescue Group (SCRG), has always been fascinated by the case. He and his wife Patti handled their first and now famous avalanche dog Hasty during the search. Due to the fact that Hasty tracked Reinhard's scent to the highway entrance ramp, they believe Reinhard most likely planned his disappearance. Dan tried for years to interest a writer in the story, believing it would make a great novel, and he finally found Margaret Bailey, who published *Stephanie's Search* in 2014.

Rescuers reading the novel may be tempted to get hung up on the few details about search and rescue that Bailey got wrong, or may be deterred by the fact that it is essentially a romance story. I urge you to resist such a reaction, because this is truly a fun read. With Dan Burnett's help, Bailey gets most of the details right and does a great job of representing what it's like to be part of a rescue team. But even better, the novel has a message beyond the romance story.

The main characters are two lonely, resentful young people named Stephanie and Doug. Doug is a volunteer rescue member of SCRG (the team's real name is used, although all its members are fictional) and Stephanie is a civilian searching for her missing politician father, a character loosely based on Reinhard. Like the real search, Stephanie and Doug's search is unsolved in that they never find the missing man—it is possible that he ran away, was abducted, or was perhaps even murdered. But it doesn't matter, because their search for self-acceptance, love and companionship is fully rewarded and leaves us with a sense of closure we wouldn't have gotten if the characters had merely found the missing man.

Along the way, readers without a rescue background learn a lot about how search and rescue missions work. They learn that on a SAR team there are no lone wolf heroes; team members put their own safety first, and they do not go into the field alone. This standard becomes more than just a policy in the book; through a series of painful mistakes, Doug learns how important the power of teamwork truly is, and this becomes a mirror for the lesson Doug and Stephanie must learn as they each leave behind a personal history of bitter, solitary self-doubt and begin to trust and rely on each other.

What I love about this book is that it gives us search and rescue work as a metaphor for life. Those of us with a passion for going out into the woods in the middle of a cold, miserable night have always felt driven by something more than just a need to be useful to missing and injured people. Perhaps what we really seek is human connection, the synergy of a team becoming more than the sum of its parts.

Proceeds from the novel are being donated to the Summit County Rescue Group.

About the reviewer: Anna DeBattiste is a former member of the Summit County Rescue Group and a former editor of Meridian. She hates living on the east coast and not being part of a rescue group anymore, so she writes book reviews, talks to her former teammates and reads rescue-related news instead. Someday she will move back to Colorado. Maybe she will fake her disappearance from the east coast when she does it.



## MRA / NASAR / CSRB National Search and Rescue Conference

June 4-7 • Estes Park, Colorado

## **Special Guest Speakers**

**Tom Hornbein** a member of the 1963 US team that summited Everest via the West Ridge. In his book *Into Thin Air*, Jon Krakauer writes that "Hornbein's and Unsoeld's ascent was--and continues to be--deservedly hailed as one of the great feats in the annals of mountaineering." Tom was at one time a member of Rocky Mountain Rescue Group in Boulder, Colorado. For more information, visit Wikipedia - Tom Hornbein

Mark Magnuson - Chief Ranger Rocky Mountain National Park will tell us about <u>High Mountain SAR</u> in this rugged national park.

**Barb Scott - RMNP Centennial Coordinator** will describe the history and centennial of neighboring Rocky Mountain National Park.

**Jordan White** who at age 23 is the fifth and youngest person to ski all of <u>Colorado's 54 14ers</u> (a 14,000 foot peak). In 2014 he skied the big three in Alaska: Mt. Hunter, Mt. Foraker and Mt. McKinley. Visit his blog at <u>Blog - Jordan White</u>

#### **Presentations:**

Conference activity tracks are Friday the 5th and Saturday the 6th with possible overflow to Sunday the 7th in the morning concurrent with MRA Business Meetings.

This year features more than 30 top SAR training sessions, including:

## **Pre-conference** Activity

Tuesday and Wednesday, June 2 and 3, 2015

#### **Urban Search Management Courses**

Urban Search Management - Tuesday, June 2, 2015 Urban Search Management - Train the Trainer -Wednesday, June 3, 2015

For more information click the following link:

**Urban Search Management** 

Classes are to be held in Fort Collins, Colorado.

The State Search and Rescue Coordinators Council(SSARCC) meeting.

Thursday, June 4, 2015 – (11:00 am - 3:00 pm)

## If you haven't registered yet, what are you waiting for?!

http://www.coloradosarboard.org/SARCON.shtml

Preparations for SARCON 2015 are moving right along. Conference registrations continue to rise, and if they continue at the present pace, this may be one of the most successful and well-attended joint MRA/NASAR conferences in recent memory.

The conference, a joint effort between the MRA, NASAR and the Colorado Search and Rescue Board will be hosted by Larimer County SAR, and promises to be an action-packed and educational conference that has something for everyone.

Whether you're a seasoned search manager, a canny canine handler, a righteous rope rescue expert, a caring cave rescuer, a savvy SAR medical professional or a hardworking helicopter SAR pilot, you'll find our list of presentations by some of the best and brightest SAR professionals to be top-shelf.

Located just outside Rocky Mountain National Park, this year's conference is being held at YMCA of the Rockies.

For the folks that like to break things, Rocky Mountain Rescue Group is hosting a pre-conference session at their headquarters in Boulder on Thursday afternoon on their drop tower. If interested in attending this informal preconference activity, please contact Presenter Coordinator Tom Wood at <a href="twood@pmirope.com">twood@pmirope.com</a> to make reservations at this fun and informative session. Snacks will be provided. On Friday, there will be presentations and live helicopter demos.



Colorado's Air National Guard will be performing a live external hoist demonstration in conjunction with Vail Mountain Rescue and Flight for Life Colorado on Friday as part of SARCON 2015. Photo by Adam Perou Hermans.

#### Search

- Destructive Testing and Small Group Force Analysis at Rocky Mountain Rescue Group's drop tower in Bouder, Colorado.
- Cell Phone Forensics for Search, A Case Study – Paul Woodward and Loren Pfau, Alpine Rescue Team.
- How Consensus Can Help with POA/ PDEN - Joseph Bobot, Ohio Special Response Team.
- Clue Awareness Field Session Howard Paul, Alpine Rescue Team.
- Recent Advances in Search Practices -Robert Koester, SAR professional, researcher and author.
- Error Prevention Science Applied to SAR
  Navigation Guy Mansfield, Everett
  Mountain Rescue Unit.
- Colorado Landslide MCI Response -Mark Hart, Mesa County Search and Rescue Team.
- Meta-Training: Maximizing Your Training Results Regardless of Team, Topic or Time – Dan MacLellan, Deschutes County S.O. SAR.
- Interview and Investigation Techniques for Search and Rescue Responders -Chris Young, Contra Costa County SAR.
- Risk Assessment and Mitigation for SAR - Mike Vorachek, Bonneville County SAR.

### Air Rescue

- When Angels Fall: Accidents in Medevac Helicopter Operations -Charley Shimanski, Alpine Rescue Team/American Red Cross.
- Proper Use of AFRCC and COANG
  Aircraft (classroom) LTC Josh
  Day, Colorado Air National
  Guard High Altitude Training
  Site.

#### Rescue

- Evidence-based Decision-making for Rope Rescue - Tom Evans, Sarah Truebe, NCRC.
- External Hoist and Patient Packaging for Hoist Operations Colorado National Guard High Altitude Aviation Training Site ("HAATS") staff and helicopters.
- Cave Rescue Awareness Kenneth N. Laidlaw, Alameda County SAR Team.
- **Technical System Components Testing**(field session) RMRG drop tower in
  Boulder Andrew Blackstock, Rocky
  Mountain Rescue Group.
- KISS: Knots In Successful System and the PAARC: Practical Application of Anchors, Rigging & Changeovers -Patrick Bentley and Eric Gunnerson, Utah State University Ropes Course.
- Avalanche Rescue Dale Atkins, Alpine Rescue Team and RECCO.
- Rope ascending techniques (field demonstration) Allen Padgett, National Cave Rescue Commission.
- Mini-Wilderness Survival (field session)
  George Dresnek, Sonoma County
  SAR, retired and NASAR.
- Go Light, Go Fast Testing of Lighter Anchoring and Lowering Options -Zephyr Feryock, Sitka Mountain Rescue, Tufts University engineering student.
- **Destructive Testing and Small Group Force Analysis** at Rocky Mountain
  Rescue Group drop tower in Boulder, (THURSDAY PRECONFERENCE 11:00 am 3:00 pm).
- Parallel Plaquettes Put Into Action -Mike Lukens and Kevin Sturmer, Rocky Mountain National Park rangers.

#### Medical

- ICAR Overview and Medical Commission Dr. Ken Zafren.
- Altitude Sickness Dr Alison Sheets, Rocky Mountain Rescue Group.
- Altered Mental Status: Beyond the Glasgow Coma Scale, What Do Rescuers Need to Know? - Dr. Alison Sheets, Rocky Mountain Rescue Group.
- Oxygen Therapy Tanks Compared at
  Moderately High Altitude Mark
  Nelson, physician assistant student,
  former member Alpine Rescue
  Team.
- Field Management of Hypothermia and Avalanche victims for Mountain Rescue: Many are Cold, but Few are Frozen – Dr. Ken Zafren, ICAR Medical Commission, MRA.
- Wilderness Trauma Care for Mountain Rescue: You Maul 'em, We Haul 'em - Dr. Ken Zafren, ICAR Medical Commission, MRA.

## Helicopter Field Demonstrations

The SARCON 2015 Presenter Committee is excited to announce that we will have not one, but **two**, rotary-wing aircraft field demonstrations as part of this year's conference.

- Colorado's Army National Guard High Altitude Aviation Training Site (HAATS) will have one of their Blackhawks on hand to work with members of Vail Mountain Rescue Group to demonstrate patient packaging for live external hoist operations. CW5 Jeff Girquard and LTC Tony Somogyi of Colorado Air National Guard.
- Flight For Life Colorado will have their Aerostar B3 on site to demonstrate the Toe-to-Toe patient transfer protocols they've developed with the Colorado Air National Guard. Chris Carr and Matthew Bowe of Flight for Life Colorado.

#### Canine

Positive Strategies for Negative K-9 Behaviors / Tools to Improve Common SAR Dogs Behavioral/Obedience Challenges - Jody Davidson, California Rescue Dog Association.

Man Made Canine Hazards in the Wild -Chuck Melvin, K-9 Search & Rescue Team, Inc. and 1st Special Response Team.

Avalanche Dog Training Methods, Process and Opportunity - Janie Merickel, Summit County Rescue Group.

Trailing: The Right Start - Kasie McGee, El Paso County Sheriff's Department, Investigations K9 Support Unit.

Canine Motivational Tools (field session)
- Jill Reynolds, Larimer County
Search and Rescue.

Reward, Drive and Building Engagement - Nicholas Hodgen.

The Colorado Pre-Veterinary Care Act and its Impact on the Working Canine - Ethan Costain, Larimer County SAR.

Lessons Learned from the 2014 Highway 530/Oso Landslide - Chris Terpstra and Guy Mansfield, PhD, Everett Mountain Rescue.

Using Distance Alerts to Help Further the Search Effort - Marcia McMahon, Park County SAR.

## **Communications**

First Net, mobile cell towers and communication for SAR - Ed Mills, Colorado Governors Office of Information Technology.

**SAR Operations Interoperability** - Earl Tilton, NASAR.

Enhancing Backcountry Radio Communications - Inexpensive Equipment and Simple Technique Changes - Paul Robertson, Grand County SAR.



This year we have a full schedule of excellent canine classroom presentations and field demonstrations from some of the most respected handlers in the biz on the schedule. Photo by Tom Wood.

#### Other

Risk assessment profiles for Solo Wilderness Hikers - Dan Hadley, Salt Lake County SAR Team.

Air-medical classroom and field demo with Colorado National Guard High Altitude Aviation Training Site -Flight for Life - Colorado.

Near-Misses in SAR Panel Discussion -John Meyers, Olympic Mountain Rescue and Rocky Henderson, Portland Mountain Rescue.

Website Optimization for SAR Teams -Kristin Smaltz, Alpha Search and Recovery.

**Beyond the USGS Topo** - Matt Jacobs, Bay Area Mountain Rescue Unit.

Using Cloud-Based Software for Incident Planning, Deployments and Reporting - Eric Hanigan and Chris Steven, San Diego County Sheriff and Desert Sheriff SAR Team.



# Dislocations in Mountain Rescue

By Gregory Stiller M.D., Alpine Rescue Team in Evergreen, Colorado

Your rescue team is five miles into the backcountry on a mission to litter evacuate a climber with a leg fracture. One of your team members who is helping carry the litter slips, but catches himself by reaching back and grabbing the litter. He then drops to the ground with severe shoulder pain. You examine him and find his shoulder looks odd and he is holding his arm out in front of him. The pain is so severe he can't walk. You now have two litter carries to complete—or do you?

Dislocations are common in the wilderness setting and can be incapacitating due to loss of function as well as extreme pain. A dislocation is the separation of a joint with a loss of alignment of the bones. Most joints can be dislocated with enough force. However, the most common in the wilderness are the shoulder, patella and fingers. Other potential dislocations include the hip, knee, ankle, elbow and wrist. Reduction of an upper extremity or patella dislocation can change a patient from a litter carry to a walk out in the SAR setting.



Improvised sling and swath with a cravat and 2-inch medical tape after reduction of dislocated shoulder on a round-the-mountain hiker, Eliot Glacier, 6300 feet, Mount Hood, Oregon. Photo by Chris Van Tilburg.

Early reduction of dislocations has several medical benefits.(1) Reduction of pain and return of function are the most obvious at the time of injury. Early reduction can also decrease ligamentous and neurogenic injury (nerve damage), later development of arthritis, as well as improve long-term function.

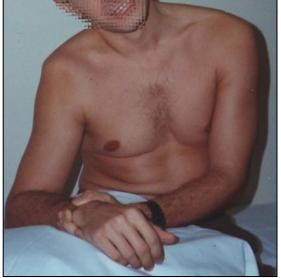
Traditional teaching is that only specially trained personnel should attempt reductions. More recently, research has shown a low rate of complication and high rates of successful reduction by non-medical personnel.(2) Traditional concerns of worsening fractures, causing neurovascular damage or additional ligamentous injuries have not been substantiated by the literature.

Practitioners of wilderness medicine have been encouraged to attempt reductions of dislocations since the 1980's.(3) Multiple wilderness first responder courses teach how to reduce dislocations. They typically recommend assessing the risk and benefit based on time to definitive treatment, need for self evacuation and rescuer skill set. Ultimately, the capability of SAR teams to perform reductions rests on their local medical control.

There are myriad techniques described to reduce locations. While full descriptions of all dislocations and treatments are beyond the scope of this article, a brief review of the more common is warranted. Further details can be obtained from local protocols and medical directors.

The most common debilitating upper extremity dislocation is that of the shoulder. The shallow ball and socket design of the shoulder that gives it an amazing range of motion also makes it susceptible to injury. A direct trauma to the shoulder usually leads to a fracture of the clavicle, humerus, or disruption of the acromial clavicular ligament (AC separation). The injury mechanism that is most often related to a dislocation is from indirect trauma of twisting or pulling the arm. Clues to the clinical diagnosis of dislocation include severe pain, a deformity described as a loss of the deltoid contour (shoulder muscle loses its curve), inability to reach across and touch the other shoulder and holding the extremity out in front of the body (the elbow is not being held against the body). The critical part of the evaluation is the neurovascular status, which includes checking sensation over the deltoid muscle, strength and sensation of the arm and hand, and assessment of pulse and capillary refill.

Reduction of a shoulder dislocation may be attempted using any one of a multitude of techniques. Rescuers should use techniques for which they have been trained and which are authorized by their medical directors. The cardinal rule of reductions is slow, steady pressure with an emphasis on relaxing the patient. Once muscle relaxation or fatigue is achieved, successful reduction becomes much more likely. In the wilderness setting this is



Shoulder dislocation and pre-reduction.

Photo by Jeffrey Isaac, PA-C.



Shoulder dislocation and post-reduction.

Photo by Jeffrey Isaac, PA-C.

often challenging due to the austere environment and limited pain control. After a reduction, it is critical to reassess neurovascular status and splint the shoulder using a shoulder sling to avoid re-injury.

Fingers are also common locations for dislocations. Most dislocations of the distal and middle joints of the fingers are easily reduced. Simply pulling the finger in a straight line and gently pushing the deformity into place will usually restore alignment. Exceptions to this rule include dislocations of the joint where the finger joins the hand. This joint can be very difficult to reduce. As with the shoulder, it is critical to re-evaluate neurovascular status after reduction and splinting.

Lower extremity dislocations usually cause significant joint instability and with the exception of the patella (knee cap), reduction does not restore the patient to ambulatory status. The human knee has a tendency to put traction on the patella in a lateral direction (away from the midline). This predisposes the patella to dislocate out to the side. Clinically this is diagnosed by

# Put it on, leave it on

...'til laundry do you part.

The new Patagonia® Nano-Air™ Hoody puts an end to layering spats once and for all. It's warm, incredibly breathable, and stretchy—an all-in, committed partner for every moment of high-output, stop-and-go missions.

## #LeaveltOn

SEE MORE AND LEARN MORE AT
PATAGONIA.COM/NANOAIR

## patagonia

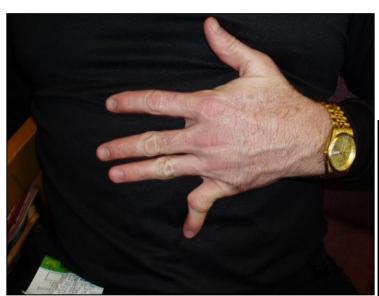


appearance and mechanism. The knee is bent and the patella is visibly displaced to the outside. Reduction is accomplished by stabilizing the patella and preventing it from turning over while the leg is straightened. The patella will reduce on its own or with gentle pressure inward. The patella can be immobilized by splinting the knee with 10 to 15 degrees of flexion. The patient is often able to bear weight. It is important to differentiate a patella dislocation from a knee dislocation. A knee dislocation is a serious condition with possible vascular injury and reduction is better left for a hospital.

Dislocations are very painful and they limit function. Finger, shoulder and patella dislocations can be safely reduced in a wilderness setting with appropriate training, protocols and medical oversight. Key concepts include steady traction with assessment of neurovascular status before and after reduction and splinting of the extremity. The decision to reduce, or not, in the field depends on multiple factors, but can dramatically change a rescue, converting a litter evacuation to a walk out.

Greg Stiller is an Emergency Physician who is active with the MRA and the WMS (Wilderness Medical Society). He is a member of the Alpine Rescue Team in Evergreen, Colorado.

1. O'Donoghue, D.H. Treatment of Injuries to Athletes, 4th ed. Philadelphia: W.B. Saunders, 1984.



Finger dislocation. Photo by Jeffrey Isaac, PA-C.

- 2. Ditty J, Chisholm D, Davis SM, Estelle-Schmidt M. Safety and efficacy of attempts to reduce shoulder dislocations by non-medical personnel in the wilderness setting. Wilderness & Environmental Medicine [2010, 21(4):357-361]
- 3. Iserson, K.V.; ed. Orthopedic injuries in the wilderness. In *Wilderness Medical Society Position Statements*, Point Reyes, CA: Wilderness Medical Society, 1989.

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.

Skeet Glatterer, MD, FAWM, Alpine Rescue Team, Evergreen, CO Chairman, MRA Medical Committee, At-Large Member, MRA

Glatterer@comcast.net 303-880-9922

## **Rescuer Spotlight**

Interview with Bree Loewen, Seattle Mountain Rescue

To suggest someone for an interview submit his or her name to Meridian Editor

### Can you tell us what first attracted you to mountain rescue?

Next year will be my twentieth year doing SAR. I wish I could remember back far enough to identify what got me in the door, but I can't.

I do know that I've stayed with it for so long because this group of solid people are there for me, no matter what, and have been, in the field and just day to day, for most of my life. Rescuing injured people in the mountains has been such a wonderful venue for friendship. I learned that increased hardship increases camaraderie, and being thrown into one difficult situation after another has created a unit that is close knit, fiercely loyal and strangely intuitive. It's such a blast to be part of a team that really has its s\*it together and can pull off some amazing stuff.

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

That the politics (of a MRU) don't matter nearly as much as the people do. Now, I don't care what color our jackets are, whether the jump kits have easy-carry handles, or who got turned around in the fog on a mission. None of it is a big deal; we can work though just



Selfie. Photo by Lee Loewen.

about anything. What I do know is that after meetings, trainings, rescues, or after any climbing or ski trip, we're all going to grab a beer together, enjoy each other's company, and work on helping each other gain the knowledge and tools to succeed—without getting turned around in the fog—the next time.

## You have worn many hats as a member of Seattle Mountain Rescue. How do you balance spending time with your family, SAR training and missions, your other interests and finding time for yourself?

I've been on one hundred and two rescues in the past three years. The only reason I'm able to do what I do is that I have the support of my husband, my parents, and my in-laws, as well as numerous family friends. My daughter literally has her little pink suitcase packed all the time. Every time I get a text message she starts putting her shoes on. At this age she's usually disappointed if it's not a mission, because if it is, then she gets to stay up late and play Uno with her grandparents. I think it helps a little bit that she did her first rescue last summer. She was hiking with her daddy when they ran into a woman with a broken ankle. My daughter got to help splint and then she kept the woman company for six hours discussing the merits of Care Bears, so I know she knows what I do when I leave. Of course I think I'm good at saying that I can't go on a rescue when I need to stay home, but whether I'm actually successful enough will be determined in another twenty years by my daughter and her therapist, I suppose...

## Can you share a story about an event that involved you and the MRA or Seattle Mountain Rescue that was a game changer for you?

Every year we go after members of the Seattle climbing community, our community. We go to get our friends; sometimes we go get our own members. For me it always blurs the lines of what defines a rescuer. Our hobbies can be kind of dangerous, so a rescuer one day can easily be in need of assistance the next, which, I guess, is probably why many of us got into doing this in the first place, to help our friends, and to hedge our bet that our friends will come help us.

Yeah, enacting rescues can be dangerous too. I've never had a problem seeing that if I put myself into exactly the same 'bad-ass' situation that the subject got into, right before they got crushed, or fell, or ended with bones sticking out, then I too need to be cautious. But last spring there was a rescue for a guy with a sprained ankle on an easy foothill, with a wide, winding trail on a sunny morning. The plan was to go splint the leg and carry him out. As we were jogging up the trail, remarking back and forth on how beautiful trillium and butterflies are, my teammate, who I've known for years, and who is a fit, veggie-eating, climber kind of dude, and who, apparently, has a genetic disposition for arterial plaque build-up, had a cardiac event. It was just so unexpected. It took me a heck of a lot longer to recognize what it was than if he had been someone I'd just met on the trail because...well, because we were in rescue mode AND in a safe environment. The GAR\* indicated no problems, and therefore, in my mind it was very unlikely anything bad was going to happen to us. Anyway, my teammate survived, but it was a large wake up call for me that there isn't just a dividing line for each person where on some days we take risks as climbers and on some days we swoop in as rescuers thinking we're being extra careful and it's unlikely anything bad will happen to us. I finally realized that even if it's something that is so easy we can do it in our sleep, and all our years of experience and group evaluation indicates it'll be fine, it doesn't

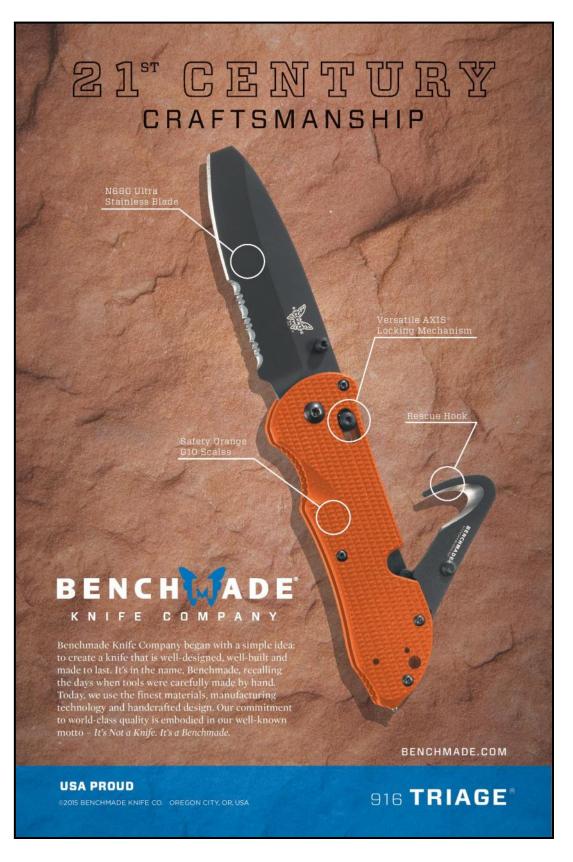
mean it will be. It turns out that it still pays to pay attention. It rocked my world a little bit at the time to learn I didn't know the universe as well as I thought I did. I'd never even had a member of my crew get injured beyond needing a few stitches while on a mission before, and I (and my teammate) both feel that it would have been really horrible to have him die on my watch on our most innocuous mission of the entire year. Also, consider this a reminder to give your fellow rescuer a hug, since you really never know.

## Of the SAR missions that taught you the most, what factors contributed to that learning?

Coming on the heels of that last question?! My own mistakes! Fortunately, we're really good about debriefing after missions. It's a safe environment to really work though the issues that came up. The more we trust each other, the more awesome our crew gets, and I think that trust comes with both just straight hours logged doing the job and training - so you really get to know who you're working with but also from admitting mistakes, learning from them, and taking the time to become awesome at that skill before it's needed the next time. Can I add more things that contribute to the awesome? Doug Caley—channel your voice when people start getting nervous. Steve Allen--in any morally tenuous situation I think, "What would Steve do?" And the rest of you guys, you teach me something new every day and I couldn't be prouder to have the opportunity to work with all of you.

#### \* Editor's note

GAR, a risk calculation or assessment model that was developed by the US Coast Guard, adopted by the National Park Service, and used by many MRA teams. (Green: low risk, Amber: caution, Red: high risk.)

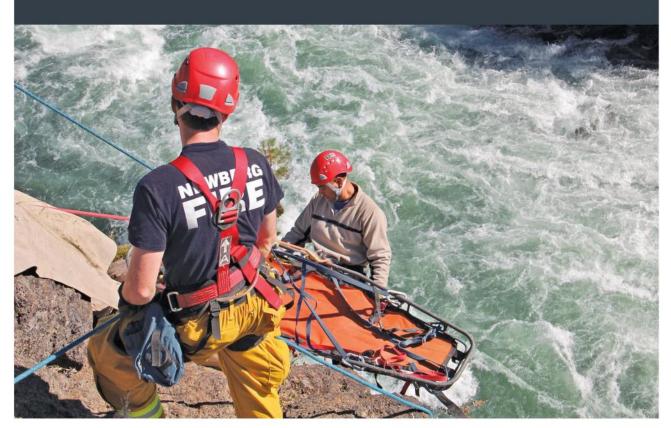


# ITRS

International Technical Rescue Symposium

Red Lion Hotel on the River Portland, Oregon November 5-8





For more information visit itrsonline.org or call 503.283.4466



Jointly Presented By





## International Technical Rescue Symposium ITRS 2015

Sponsored by (CMC Rescue, and PMI), and co-sponsors (NASAR, SPRAT, NCRC, MRA, and HRRA), ITRS will be in Portland, Oregon in November 5-8, 2015.

The yearly symposium is the leading forum for up to date, state-of-the-art, technical rescue information. Rescuers representing mountain, cave, fire, industrial, and swiftwater gather to discuss ways to improve safety and performance, and answer questions. http://www.itrsonline.org

### **ITRS 2015 Call for Papers**

It is time to submit your proposals for the **2015 International Technical Rescue Symposium!** This year's event is occurring <u>November  $5^{th}$ </u>  $8^{th}$ , 2015 in Portland, Oregon. Details can be found at <u>www.itrsonline.org</u>.

Please consider sharing your latest research, experiences, and testing with others – just like you - in the rescue field. ITRS is gathering persons from across the spectrum of rescue disciplines to share theoretical and practical news and views on:

Controversial Issues

New Equipment

New Developments in Gear Technology

Research and Testing Results

Technique and Systems Discussions

Medical Considerations in Rescue

Analysis of High Angle Accidents

Development in Helicopter Rescue

### **ITRS 2015 Presentations Proposals**

Presentation proposals must be submitted to <a href="ITRSProgram@pmirope.com">ITRSProgram@pmirope.com</a> by August 14, 2015 and should include:

One-page abstract of the presentation

One-paragraph presenter bio for each presenter

All presentation submissions will be reviewed by the ITRS Program Committee. If approved, those presenters will need to fill out a Presenters Agreement Form and send it to <a href="ITRSProgram@pmirope.com">ITRSProgram@pmirope.com</a>. Final Proceedings Papers (2-8 pag-es total in length) will be due by **October 1**, 2015.

### **ITRS 2015 Presentation Awards**

To encourage and reward excellence in presentation, the co-hosts have inaugurated a "presenter award" program. The program is looking to award and acknowledge pre-sentations which reflect experience in facts and data (rather than opinion or conclusion); choice of topic (applicable to field work); and state of the art technical rescue. After the final presentation, the attendees will vote on the presentations based on seven categories; one award going to each category. Each winner will receive a \$200 honorarium.

## **Limited Enrollment**

In order to encourage the informal free flow of information involving all participants, enroll-ment has been limited to 150 persons. If necessary, a waiting list will be available.

#### **ITRS Sponsors**

The International Technical Rescue Symposium is presented jointly by Pigeon Mountain Industries (PMI), Inc. and CMC Rescue, Inc. ITRS 2015 is co-sponsored by the Mountain Rescue Association (MRA), National Association for Search And Rescue (NASAR), Society of Professional Rope Access Techni-cians (SPRAT), National Cave Rescue Commission (NCRC) of the National Speleological Society, and the Helicopter Rescue & Response Association (HRRA).

Thank you for your consideration in presenting your topic at the International Technical Rescue Symposium in 2015. We look forward to your participation and for contributing to the ITRS community!

## Giardia: Not Just Any Protazoa

By Jody Davidson, CARDA 918, Mission-Ready Handler (Reprinted with permission from author.)

I thought it was a really ugly stomach bug. Two weeks and a dozen tests later, I learned I had Giardiasis (Giardia), caused by *Giardia Lamblia*, a microscopic parasitic flagellate protozoan that exists in the intestinal tract of a wide range of warm-blooded mammals, including dogs, cats, beavers, birds and humans. Giardia is a zoonotic infection that can be transmitted trans-species. In other words, you can infect your dog or visa versa.

Hosts, both human and canine, develop Giardia primarily by ingesting Giardia cysts (hard shells containing Giardia) found in contaminated food, water or soil. Cysts are instantly infectious once they leave the host through their feces. An infected person might shed as many as 1–10 billion cysts daily, and dogs can shed nearly as many. The cysts are so tiny that that 8,000 can fit on the head of a pin, and as few as ten ingested cysts can cause an infestation.

The two primary stages in the Giardia life cycle are the cyst or egg stage and trophozoites, the adult and mobile stage. In the cyst stage, Giardia is protected by an outer shell that allows it to survive outside the body for long periods and even to survive chlorine disinfection.

Transmission is, unfortunately, extremely easy. You or your dog drink from what you believe to be a clear mountain stream; you soak your bandana in the stream and then brush your hand across your mouth. Your dog grazes on some lush grass growing near the river. Your dog sniffs or licks some interesting scat and then greets you with a big, sloppy kiss. Or your dog splashes through a marshy area, leaving her with millions of cysts on her coat, which she can ingest when she cleans herself.

How did I get it? I was working as the training director at a private no-kill animal shelter in Van Nuys, CA. We rescued dogs from high-kill county facilities. In the

process, I administered behavioral assessment tests that required me to hold, hug, touch, pat and relate to the dogs, many of whom greet me with sloppy kisses.

Giardia is rampant in the county shelters and half of the dogs we see are likely to have it. County shelters hose down the runs with dogs in them, and so the dogs get covered in a nasty "soup" of feces/urine. I washed my hands several times during assessments, but all that needed to happen was to wipe my mouth with the back of my hand. Both my doctors and the Los Angeles Department of Public Health believe this was the source of my infection.

By the way, in Los Angeles, if you receive a positive report of Giardia, both the lab and your doctor are required by law to report you to the Department of Public Health. I was deemed an "acutely infectious individual" and a "public health hazard," so I spent ten days on house lockdown, forbidden to leave my home until I had completed treatment and/or was asymptomatic.

The symptoms of Giardia in humans and dogs are much the same—loose, watery, foul-smelling stools, stomach upset and loss of appetite, stomach cramps and gas, dehydration and weight loss. I lost 9 pounds over three weeks with no change in diet, as Giardia causes mal-absorption of fats and other nutrients. While the immediate symptoms are bad, Giardia infestation can also lead to some serious long-term illnesses in humans. The Giardia trophozoites attach themselves by suckers to the lining of the intestines, excreting a neurotoxin that can kill the mucus lining. A recent study documented that nearly 50 percent of those infected by Giardia develop long-term, ongoing irritable bowel syndrome and/or chronic fatigue syndrome. In children, Giardia is the major cause for failure to thrive.

Treatment for Giardia is much the same in canines and humans. A course of Flagyl (Metronidazole), running 5–7 days will usually clear up the infestation.

So, how do you prevent infestation in the first place? While working in wilderness areas, carry enough water for both you and your dog. Many filtration systems will not filter out Giardia cysts. If you need to use water from the area, boil it first. If swimming in wilderness lakes or rivers, avoid swallowing water. If your dog splashes through a stream or pond, bathe or rinse her afterwards. Though you're using a plastic bag, wash your hands or use a hand sanitizer after "poop scooping."

If your dog becomes infected, until treatment is successfully completed, keep him isolated from other dogs and limit contact with your family. Items that have come in contact with fecal matter should be washed with soap and hot water or steam cleaned. Your best defense against Giardia infestation from your food is to thoroughly wash all raw fruits and vegetables.

There are no vaccines to prevent Giardia, and hosts who have been infected can become re-infected multiple times.

They say an ounce of prevention is worth a pound of cure. Where Giardia is concerned, this can't be overstated. Four weeks, three different medications and four doctors later and the count is: Giardia, billions; Jody, one!



Left: G. intestinalis trophozoites in Kohn stain. Center: G. intestinalis cyst stained with trichrome. Right: G. intestinalis in in vitro culture, from a quality control. Photo courtesy the CDC.

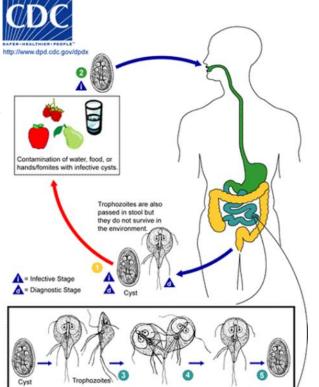


Image courtesy of CDC.

## **Surprising Lessons From ITRS**

## What's New in Technical Rescue: International Technical Rescue Symposium

November 2014, Golden, Colorado; By Gordon Smith, Seattle Mountain Rescue

Ever wonder where rigging instructors get all that information about strengths of rigging and the pros and cons of different rigging techniques? A lot of it may come from presentations at the International Technical Rescue Symposium (ITRS). ITRS is held every fall, and is the leading forum for sharing information among technical rescue practitioners from the disciplines of mountain, fire, and industrial rope access and rescue. The conference is coordinated by PMI Rope and CMC Rescue. There are a large variety of presentations ranging from showing new equipment, to testing gear or systems, information about how people learn, avoiding human failures, and medical issues.

Many years there is a presentation that shows an error in some aspect of our beliefs about rescue systems. This year, that presentation was by Kirk Mauthner. Kirk lives the principle of testing our assumptions. He builds on the work of Arnor Larson, who led the development of the main/belay tandem prusik raising and lowering systems that many MRA teams have used for the last several decades. It is possible that Kirk has done more drop tests than any other person.

#### Misunderstanding the Untensioned Belay

At the most recent ITRS, Kirk was going to do a presentation on using possible peak forces to determine the minimum adequate strength of rigging systems, instead of the ten to one (10:1) static system safety factor. Doing preliminary work for this talk, Kirk made a discovery: he showed that one of our key assumptions behind the use of a mainline and separate, untensioned belay is false.

For many years it has been taught that our belay lines should be untensioned so it is less likely that they will be cut if a mainline fails. This is because it is well documented that the greater the tension on a line, the easier it is to cut that line, and once there is more than 4 kN or so of tension on a standard kernmantle rescue rope, it is pretty easy to cut that line. Thus, the logic goes, having an untensioned belay line makes that line more resistant to being cut, and is safer than if the belay line were tensioned.

Kirk Mauther tested this assumption. Kirk compared the performance of our standard system (with a mainline and hand tight belay) to a mirrored system. In a mirrored system both lines simultaneously serve as a competent main or belay, and the load can be shifted from one to the other. In Kirk's tests the lines were approximately evenly weighted and laid over a square metal edge that was sharp, but not knife sharp. The ropes were protected by placing four layers of canvas over the metal edge. Following the BC belay competency test, the drops used a 200 kg mass on 3 m of rope with a 1 m drop.

The results were surprising. With our standard system of a single weighted main line, the main line was cut through and the sheath of the belay line damaged slightly. In contrast, with the mirrored system, where both lines were weighted approximately evenly, neither line was cut through. However, both lines sustained some sheath damage.

With a weighted belay line, the system remained intact enough to function. With the unweighted belay line, the system was damaged to the point that it could not continue to be operated normally—the main line had been severed.

What we have been teaching is wrong.

Thinking through the dynamics of the interactions of the ropes and the edge, this test result makes sense. We know that ropes under higher tension are easier to cut. The single weighted mainline was under higher tension than either of the two lines in the mirrored system. Also, the mirrored system had twice as much rope surface area against the edge, with two weighted ropes instead of just one.

Given that the main mode of mainline failure in practice seems to be cutting, a system configuration that reduces cutting failure decreases the risk that the system will fail.

This risk of severing a main line is a reason to consider switching from our standard main and belay line system to a mirrored system where the load is shared between the two lines, either line can catch a fall, and where the load can be shifted from one line to the other.

## Analyzing System Strength in Terms of Peak Force Instead of the 10 to 1 Static System Safety Factor

Many teams teach that if a system is strong enough to hold 10 times the potential hanging load on the system it is strong enough to withstand shock loading from a fall or drop, with an adequate margin for error, called the ten to one static system safety factor (10:1 SSSF). We started using the 10:1 SSSF as a simple rule, to account for complex dynamic forces that we either didn't understand or that were hard to predict. This theory has been well tested, showing that plausible drops and resulting shock loads on rescue systems result in peak forces such that the system strength is 1.5 to 2 times the peak force.

However, this logic makes us concerned about violating our safety factor on steep angle terrain (approximately 30-60 degree slopes), where there may be three or four attendants on a litter. Potentially there could be a 5 kN load on a system built to hold 20 kN, and the concern is that this is only a 4 to 1 safety factor, that might not be adequate to avoid failure in a shock loading situation. For readers who do not have these things memorized the standard assumption is that a rescue load of rescuer, patient, litter, and gear is 2 kiloNewtons (kN), which is about 200 kilograms (kg) which is about 450 pounds (lbs).

It turns out that blindly using only a simple SSSF to determine whether a system is safe can keep us from doing safe things, or require us to carry gear that is much heavier than what we need.

A different way to look at the situation is to make sure the system can handle 1.5 times the maximum possible load on the system. This rule is

part of the logic within the 10:1 SSSF.

When our systems are shock loaded, the tightening of knots, rope stretch, prusik stretch and prusik slippage spread the force over time and keep the peak force in a fall on any of our systems to no more than about 12 kN.

We test systems to make sure that forces in the worst potential case don't exceed these values, and we use the 1.5 safety factor to determine that we need a 20 kN system strength.

This is the approach we use to determine the strength we need for our typical main and belay systems. We figured out the worst possible shock load that plausibly could occur on a properly operated system. This worst shock is the attendant/patient package falling at the edge, with little rope in service. After much debate, this was standardized to be a 1 m drop on 3 m of rope, with a 200 kg mass. The peak force has to be low enough not to do too much harm to the attendant and subject (about 6 kN on each person), and you must be able to finish the cycle if this bad event occurs. Our predecessors tested systems to find a system that meets these design criteria. The result is our standard raising and lowering systems, with independent main and belay lines, and the tandem prusik belay.

Alternatively, you can engineer your systems to have configurations or equipment that limit the peak forces, and keep the rule that the system has to be at least 1.5 times stronger than that peak force. With a load limiter, we have the opportunity to design a maximum force of less than 12 kN, and have a lighter system that still preserves our safety factor of having a system strength of at least 1.5 times the peak force.

### Implications for steep angle systems

This has implications for steep angle systems. We have worried that steep angle systems can overstress our systems, and we have added complexities to try to mitigate these perceived risks. Remember that "high" angle is the term we use for slopes that are effectively vertical, and the attendants are mostly hanging on our rope systems. Steep angle is the term we use for slopes that are steep enough that you can fall down them, but flat enough that you get a fair amount of weight on your feet when you are on the slope. Generally, "steep" angle is from about 30 to 60 degrees of slope.

The problem with steep angle is that it is work to keep the litter off the ground. My team's steep angle system is to have three attendants on the litter. This is a 4 kN load. Using the 10:1 SSSF you might conclude that we need a system that has a breaking strength of 40 kN, because the attendants could fall over a small cliff in the slope, dropping their full weight on the system. Do we need a 40 kN system strength for this steep angle system? Fortunately, we don't.

To explain why our 20 kN system is strong enough for steep angle use, first we need a bit of engineering theory. For elastic materials (and, by the engineering definition of elastic, almost everything we use is elastic) if you have a hanging load, and you drop it a zero distance on to a different rope, the peak force of this "settling in" is about 2 times the static load, and because of slack and stretch, in practice may be up to 2.5 times the load.

So, back to the steep angle system with three attendants and a subject. Even if the team goes over a vertical step, and all four people are hanging on the system, and while they are hanging the mainline fails and they "fall" onto a snug belay, 2.5 times the 4 KN load gives a peak

force on the belay of about 10 kN. Having a safety factor of 1.5 means the system has to have a 15 kN breaking strength. We have that. Even with a safety factor of 2, our 20 kN system is strong enough, as long as the belayer is belaying correctly. So if we do the analysis looking at peak force, we can do a steep angle with a four person load and still stay within our safety factor. And we don't need prusik bypasses to isolate the interlocking long tail bowlines.

Thanks to Kirk Mauthner of Basecamp Innovations for articulating this.

## A Few Other Points Relevant to Mountain Rescue

There is a new edition of the National Park Service technical rescue manual. This fairly comprehensive manual is available for free from the Mountain Rescue Associate website at <a href="http://www.mra.org/images/stories/docs/nps-technical-rescue-">http://www.mra.org/images/stories/docs/nps-technical-rescue-</a>

handbook-2014.pdf. Anyone who wants to have a substantive knowledge of mountain rescue practices should read this handbook. You don't have to memorize all 285 pages, but a competent rescue rigger should know



most of this stuff.

The evidence continues to pile up that soft goods (ropes, cord, webbing, etc.) get weaker from wear and environmental damage, not age. Prusiks are the piece of gear that we should worry about most. They are subjected to sharp bending and high forces (relative to their strength), and they aren't that strong to start with. "Old" prusiks that many teams would consider to be serviceable can have half the breaking strength of new prusiks, and often have 2/3 the breaking strength of new prusiks. "Old" is not well defined. In the test results reported at ITRS, these "old" prusiks were either still in service or just retired, less than 10 years old, and not showing any damage to the naked eye. Usage was not tracked, but the test prusiks were used regularly and probably had 100 to 300 days of use. It seems to me that a rough rule of thumb might be that if your prusiks have more than 100 days of raising system use on them (where they are tensioned), you probably should start thinking about replacing them.

The material and weave of cordage has a significant effect on the strength of knots. Ignoring the variability between different makes of 8 mm accessory cord, a rough rule of thumb is that shock loading an 8 mm prusik on 11 mm rope typically will hold 12-14 kN before slipping, but under slow pull forces this same prusik may skip and jump at about 10 kN. And, an old prusik might break at 8 kN.

Here is more destruction of what we have been teaching for years: Recall that we talk about knots weakening soft goods by 25-40%. This would make you think that in testing to failure, ropes, webbing and prusiks would break at the knot. However, testing shows something else. In anchors, when the knot is in a leg of an anchor, the break occurs somewhere other than the leg with the knot. In prusiks, the break usually occurs where the short, or "uphill," strand goes under the bridge, not at the double fisherman's knot used to join the ends of the prusik cord. Apparently, a knot—especially if it has not been previously tightened by loading with hundreds of pounds of force—tightens as it is weighted. This tightening makes the leg with the knot longer than the other legs, and shifting force to other legs, and causing another leg to fail before the knot fails. So don't worry about the knot of a wrap-three-pull-two anchor weakening the anchor if the knot is in one of the legs, instead of being isolated from the legs. But you still probably want to isolate the knot to keep it easy to untie after use.

Recent test results were reported for strength losses caused by knots in polyester rope. Generally cited numbers of strength loss caused by knots of rescue rope are mostly measured in ½" nylon rescue ropes. For the knots we use in rescue systems, the strength loss caused by knotting nylon ropes was about 20-33%, which means that the knotted rope retains 66-80% of its unknotted strength. In these old tests, there was one pull test where a figure 8 reduced the rope strength by 40% so we use that number for the figure 8 knot. In these new tests on polyester rope, the bowline reduced the rope strength by 42%, and most knots reduced the strength by 30-40%. The outlier is the double fisherman, which only reduces rope strength by about 20%. Also, in both nylon and polyester ropes, in-line figure 8 knots reduce the end-to-end rope strength by half. Use a butterfly instead of the in-line figure 8.

The effect of different disinfectants on webbing was reported. In 2013, test results showed that a 10% bleach solution used to disinfect nylon rope weakened the rope by 2-7%. Webbing is the material that is most likely to come in contact with a leaking person, so we want to know if webbing responds to disinfection like rope. After five disinfecting cycles (with rinsing after each disinfection, and drying between cycles), 1" tubular webbing lost 0-4% of its strength when disinfected with hot water (176 degrees F), Lysol IC, Formula 409, or Cavacide. A 10% bleach solution caused 8% strength loss and 100% bleach caused 56% strength loss. If you disinfect your webbing with bleach, use a 10%



## Sterling Double Prusik Minding Pulley

DESIGNED & MADE IN THE USA

A critical, trusted hardware solution for any rescue setup. Readily compatible with a wide variety of ropes and hardware. NFPA certifed for general use.

Visit **sterlingrope.com** for more information.



solution (not full strength), rinse well, and consider throwing away your webbing after 5-10 disinfections.

By now your brain should be addled by the overflow of information in this meeting summary. An ITRS presentation on how people learn reported that coming back to material multiple times enhanced learning. Summarizing and synthesizing material enhanced learning, but just re-reading does not help much. Knowing that you will be tested enhances learning, but high-stakes tests can reduce learning.

There were several more presentations. The presentation on helicopter pick-offs from El Capitan in Yosemite was particularly exciting. A presentation on how to rescue the people who repaint the Golden Gate Bridge gave some really cool pictures of the inside of the bridge towers. A list of presentations is on the website: <a href="http://itrsonline.org/">http://itrsonline.org/</a> and many of the presentations are available from that website.

The next ITRS will be November 5-8, 2015, In Portland Oregon. You can register at <a href="http://itrsonline.org/">http://itrsonline.org/</a>.

# International Alpine Solidarity Silver Plaque Given to MRA Member

By Doug Wessen, Juneau Mountain Rescue, AK

On September 17, 2014, Dan Hourihan, (past MRA president) was presented the 43<sup>rd</sup> International Alpine Solidarity Silver Plaque Award, in Pinzolo, Italy. The Committee of the International Alpine Solidarity Silver Plaque Award, presided over by Cavalier Angiolino Binelli, made the presentation. Many of Dan's friends and family were present: Soren and Tara Orley, MRA team members from the Alaska Mountain Rescue Group, Art and Barbara Fortini, of Sierra Madre SAR,

Pinzolo church tower with the Dolomites in the background. Photo by Doug Wessen.

Doug Wessen a member of Juneau Mountain Rescue, and delegates from the United States Consulate in Italy were in attendance during the ceremonies in Pinzolo. Dan is the fourth American to win the award.

The 43<sup>rd</sup> International Alpine Solidarity Silver Plaque Award ceremony: given to Mr. DAN HOURIHAN, "an extraordinary man, with the mountain rescue in his DNA, endowed with passion for his work, courage, altruism, initiative and organizational skills".

The award was delivered during a ceremony in the Municipal Town Hall of Pinzolo with the presence of Italian and foreign civil, military,

and religious authorities. The award serves as an example of the boundless solidarity in the mountains where people are brothers and sisters in time of need.

Dan has participated in more than 1,000 mountain rescues and in the recovery of more than 60 deceased persons during rescue missions. He has provided mountain rescue, and preventive search and rescue training to more than 6,000 persons during his 35-year career.

## The Pinzolo International Alpine Solidarity Award was born in 1972, in Pinzolo, Italy. The award goes to those who have distinguished themselves in alpine rescue operations.



From left to right, The Mayor of Pinzola; Art Fortini, MRA Member-at-Large; Doug Wessen, Juneau Mt Rescue, MRA past president; Soren Orley, Alaska Mt Rescue Group, and MRA Honor Guard member. Photo by Tara Orley.

## Recognizing Those Who Excel

The MRA is seeking nominations for group or individual awards to be presented at our annual Spring Conference in Estes Park, CO, June 3-7, 2015. Per MRA Policy 502 (13)(d), award categories include, but are not limited to:

- Conspicuous bravery or heroism, above and beyond the normal demands of duty, displaying extreme courage while consciously facing imminent peril. Shall not have violated reasonable safety standards.
- Life Saving award. Actions resulted in the preservation of a life that otherwise would have almost certainly been lost.
- Death or injury in the course of duty.
- Outstanding mountain safety education program(s).
- Outstanding contribution of an outside agency to Mountain SAR.
- Outstanding contribution of a unit or person.
- Distinguished service, special recognition.

Submit nominations to <a href="mailto:dfhourihan@yahoo.com">dfhourihan@yahoo.com</a> with a copy to MRA President, Dave Clarke, <a href="mailto:president@mra.org">president@mra.org</a>, by May 23, 2015.

## Please include a narrative, as an attached document, with all nominations.

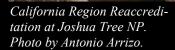
Recipients may be from outside of the MRA. All nominations will be evaluated for completeness prior to acceptance.



## Photo Gallery



2015 Alaska Reaccreditation. Photo by Dave Clarke.





2015 Deschutes MRU Reaccreditation, Oregon. Photo by Laurie Clarke.

2015 Deschutes MRU Reaccreditation, Oregon. Photo by Laurie Clarke.

## Note from the Editor—

Many of you have never met me; I am not a rescue level member. I coordinate prodeals for my own team, Portland Mountain Rescue, and edit this newsletter. It's not very exciting, but it is interesting, and I hope it helps.

However, in the middle of March, I was able to tag along with the Deschutes County SAR team, and Corvallis Mountain Rescue Unit, in Oregon, as they made their way through their technical snow and ice tests for reaccreditation.

As an observer, I was able to see just how difficult what you do is. I always thought that individuals who do Search & Rescue are awesome but I didn't realize the extent of the effort that goes into being ready to conduct a search and rescue. It takes physical strength, emotional intelligence, a zillion hours of training, working (well) with a team, communication skills, higher cognitive abilities, compassion, patience, sacrifice, endurance, excellent problem solving, and a sense of humor. You also have to have a strong stomach, have the ability to maintain boundaries, be able to adapt yourself to the needs of the moment, and sometimes, to survive.

Thank you for everything you do. You have my abiding respect.

-Laurie Clarke





Tom Evans and Sarah Truebe have presented their research at ITRS numerous times over the years. Their work is always interesting and useful to rescue practitioners, researchers and backyard testers. Now they are sharing rescue information more widely with their new nonprofit website <u>SAR3</u>. The text below is reprinted, with permission, from their home page. Thank you to Tom and Sarah for sharing this with the MRA! –*Dave Clarke*, *MRA President* 

## New Online Tech Rescue Resource

#### **Our Mission**

To provide free and open access to rope-related resources, to expand rope science knowledge through user-driven research, and to facilitate teaching, learning, and knowledge sharing of rope skills across disciplines and cultural boundaries.

#### **Our Vision**

Our vision is of a world where:

- Rope skills are taught effectively and efficiently
- Rope skills are learned effectively and readily accessible in times of need by new and experienced practitioners
- Rigging decisions and protocols are based on evidence
- Rigging community members
- Know where to find rope-related resources for evidence-based decision-making
- Feel comfortable contributing to rescue science or suggesting ideas in need of research
- Could view themselves as a competent teachers and learners
- All communities, regardless of socioeconomic situations, are prepared for timely rope related disaster response utilizing the available equipment and methods
- Rescuer egos do not hinder the saving of lives.

### Our Name

Our name is SAR^3 (SARRR or "SAR cubed"). Only, we don't know what it stands for. The idea is that users can pick what it means for themselves depending on their rope use, because it could mean so many things! Our current favorite is Sport, Access, and Rescue Rigging Resources, but we're open to suggestions. Here are a few other alternatives....

## Name Meaning Possibilities:

Sport And Rescue Rigging Resources
Sport And Rescue Rigging Research
Search And Rescue Rigging Resources
Search and Rescue Rigging Research
Sport, Access, Rescue, Rigging Resources
Sport, Access, Rescue, Rigging Research
Search, Access, Rescue, Rigging Resources
Search, Access, Rescue, Rigging Research
Scientific, Academic, Rescue Rigging Research
Scientific, Academic, Rescue, Rigging Resources



PMI 8mm accessory cord on 11mm EZ Bend, testing prusik behavior during slow pull. Six of 24 prusiks caused mantle failure as seen in the photo. The other 18 prusiks broke at the single cord strand strength of 15.46 kN. Photo by Thomas Evans.



Seen here, 1,260 feet of old & retired webbing (donated by Seattle Mountain Rescue and the Southern Arizona Rescue Association), tied into slings for Wrap-3-Pull-2 and basket hitch anchor testing. After testing new and old webbing with knots in the anchor limbs, we have learned that the screw link is the weak spot for both anchor types (where webbing is most compressed). Photo by Sarah Truebe.

## Show your support of your team!

Outfit yourself with goods from the MRA store.

Log on to the MRA website, and place your order!

**SHOP HERE (Members Only)!** 

