KEEPING THE TOOLS SHARP

Case study of four avalanche fatalities during the snow season 05-06 in Alaska

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ABSTRACT:

Each human involved avalanche is unique and the outcomes of subject location and recovery are influenced by the availability of search tools and resources. Alaska has distinctive challenges with organized avalanche rescue due to its size, remoteness, and scarcity of roads and rescue resources. In Southcentral Alaska, rescuers practice avalanche specific skills in the beginning of each winter at an Interagency Avalanche Rescue Workshop. The two day training event is organized by the Alaska Mountain Rescue Group and Alaska Search and Rescue Dogs, with the goals of bringing responding agencies together to sharpen skills, build working relationships and learn new techniques. Staged at a remote location curriculum includes skill stations, lectures and mock avalanche scenarios, which help first responders to prepare for winter rescue operations. During the snow season 05-06, four people died of avalanches in Alaska. Each subject was recovered with a different tool, avalanche transceiver, avalanche dog, RECCO detector and probing. The depicted season illustrates the value of keeping all of the rescue techniques up to date and well practiced.

KEYWORDS: Alaska, organized avalanche rescue, avalanche training, avalanche incident case studies, avalanche fatalities.

1.WHAT IS SO SPECIAL ABOUT ALASKA?

Alaska is the largest of the 50 United States. Most of its land area is mountainous and hard to access. The population is a mere 670,000 and population density of 1.1 people per square mile (U.S. Census 2006), most Alaskan communities are small and have limited rescue resources. Remote and vast Alaska is a unique place for avalanche rescues. When a human involved avalanche occurs in the last frontier, it commonly requires complex travel over a long distance to the scene of the accident. Alaska has its fair share of avalanche incidents, as it ranks the second among all the states with 115 avalanche fatalities from 1950 to2006 (CAIC 2008). Alaska has a substantial pool of winter backcountry users and thus far all avalanche

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fatalities have been state residents. But with additional visitors from out of state recreating on the Alaskan snow, the potential for deaths of non-locals looms.

The Alaska State Troopers coordinate all the backcountry rescues in the state, but most commonly delegate the tasks to other agencies and organizations that have additional manpower and more specialized training to complete the rescue missions. In avalanche incidents State Troopers usually call out for the Alaska Mountain Rescue Group (AMRG) and Alaska Search and Rescue Dogs (ASARD) as field resources with snow safety support from Alaska Mountain Safety Center and Alaska Avalanche School. The State Troopers helicopter is used for urgent transportation of hasty teams. Depending on the geographic location of the incident, professional and volunteer ski patrollers, helicopter ski guides and pilots, as well as Alaska Railroad and Alaska Department of Transportation employees may be utilized as additional resources for, for example, forecasting & mitigating avalanche hazard en route or on scene or transporting rescue resources. Also, Alaska Air National Guard's 212th Rescue Squadron is an excellent military rescue team that can assist civilian SAR missions. However, the list of all potential local resources is incomplete. Finding available and appropriate help in many areas of the state is often difficult.

During each rescue, several resources get mixed together for an intense period of time and *all of them are expected to work seamlessly together*. Succeeding at this as a goal takes practice and training. Two unpaid rescue organizations of Southcentral Alaska, AMRG and ASARD, have responded to this challenging situation by hosting a yearly training that brings many of the possible rescue resources together. The key goals for this training are to practice rescue methods in a complex setting, network with each other and get positive and constructive feedback on actual operations through mock avalanche rescue scenarios.

Risk management in avalanche terrain requires effort and training. Safe travel through Alaska's three different snow climates involves good understanding of snow safety and group management. In organized rescue, a mix of different resources may increase risk. Each group of rescuers has its own safety culture. Risk tolerance and mitigation techniques vary greatly between the different groups. The acceptable risk is commonly different in possible live rescue as compared to known body recovery. To run safe missions, different groups can learn to understand each others' risk tolerance in the interagency trainings.

This case study looks at four incidents from the snow season 05-06 in Alaska. Each mission utilized most of the common rescue tools (i.e. avalanche transceiver, avalanche dog, RECCO detector and probing) and multiple rescue organizations. Some locations were quite accessible, one very remote. Each of the subjects was recovered using a different rescue tool. These incidents illustrate well some complexities of Alaskan avalanche rescue scenes. Even more importantly, the benefits of and the need for common training are apparent in each of the cases. The study of these incidents leads to suggestions about how to improve interagency avalanche rescue missions in Alaska.

2. RAGGEDTOP. 1:30PM, JANUARY 3.

Rescue resources: Alyeska ski patrol, Chugach Powder Guides, Alaska Search and Rescue Dogs, Alaska State Trooper Helicopter

Rescue tool: Avalanche transceiver

A 30 year old male died in an avalanche incident while backcountry skiing on Raggedtop Mountain, located across the valley from Alyeska ski resort. His ski partner skied the slope first. The victim triggered a large soft slab avalanche in his first couple of turns. After watching the avalanche run 1800 feet, the partner skinned back up to locate the subject

with a transceiver. He performed all the right steps of companion rescue including unburying the upper body of his friend and administering CPR until the organized rescue arrived on the scene (CNFAIC 2006).

Amazingly, the initiation of the avalanche was observed by a patroller at the Alyeska ski resort and the patroller called for the rescue. Alyeska patrollers and Chugach Powder Guides, a local helicopter skiing operations, put together a hasty rescue party of professional ski patrollers and ski guides. They were staged at the local airstrip within 30 minutes. The party waited for helicopter transportation and arrived on the scene approximately 80 minutes after the avalanche. Meanwhile, the secondary rescue response from Alaska State Troopers and Alaska Search and Rescue Dogs was delayed 20 minutes by dispatching difficulties. These rescuers got to the scene after the hasty party was already there. Despite the efficient companion rescue and the arrival of additional resources, the subject was deceased. (CNFAIC 2006)

Alaskan backcountry travelers need to be well-versed in companion rescue for any live rescues to occur. Raggedtop is relatively nearby as an Alaskan backcountry skiing location, in proximity to the town of Girdwood and Alyeska Ski Resort. Yet even this locale was too far for the organized rescue to be on scene within the golden hour. Avalanche education and the continuous practice of basic avalanche rescue skills is the last frontier's best tool against the fatalities.

Alyeska Ski Patrol, Chugach Powder Guides and Chugach National Forest Avalanche Information Center have a strong working relationship, with some individuals are cross-employed. The ability to build a team quickly facilitated a smooth response. The delay in transport happened because the helicopter was in Anchorage and had to fly to Girdwood to meet the team. On the secondary response, Alaska State Troopers got dispatched through Soldotna dispatch center, which is 100 miles from Girdwood. Some unfamiliarity with the appropriate resource allocation caused a delay in the dispatching. Dispatching the resources accurately and in a timely manner is a key to successful avalanche rescue. This step should be well preplanned to gain fast response with appropriate resources.

3. FLATTOP. 7PM, FEBRUARY 8.

Rescue resources: Anchorage Fire Department, Alaska Mountain Rescue Group, Alaska Search and Rescue Dogs, Alaska State Trooper helicopter

Rescue tool: avalanche dog

A 32 year old male died in a small avalanche while snowshoeing with a partner on Flattop Mountain, on the hillside of Anchorage, only a 20 minute hike away from the most popular trailhead in Alaska. The weather was stormy and it was dark at the time of the incident. Neither man in the involved party carried any avalanche safety gear. The rescue was initiated by the survivor who called 911 on a cell phone. Anchorage Fire Department (AFD), Alaska Search and Rescue Dogs and Alaska Mountain Rescue Group arrived on the scene. The subject was located under 4 feet of hard slab debris by an avalanche dog team within two hours of the avalanche (AMRG 2006a).

Flattop is possibly the closest location with most avalanche rescue resources available in Alaska. In this incident, an avalanche dog team was on the scene within 90 minutes of the 911 call, and the dog located the subject within 15 minutes of arrival. Avalanche dogs are the resource that can find the subject fastest if the victim is not wearing a transceiver and they should be dispatched on the scene as soon as possible. Unfortunately, even in this location close to the city of Anchorage, too much time had elapsed for the organized rescue effort to make a live rescue. Dispatching all the appropriate resources right away can make a difference. The two stage response, initiated by fire

department and followed by unpaid rescuers, is worth of mentioning. Anchorage Fire Department had just finished continuing avalanche rescue training earlier that week. After being dispatched to the scene AFD proceeded with their standard avalanche rescue response on foot and on snow machines.

The secondary flow of rescuers consisted of Alaska Search and Rescue Dogs dog teams and Alaska Mountain Rescue Group members using State Trooper helicopter for transportation. This facilitated a faster response than what fire department was capable of at the time. While the fire station responding to the incident is a designated backcountry rescue station, it is not very common for them to get called on an avalanche incident or to work together with unpaid rescuers or avalanche dogs. On Flattop, the incident commander from the fire department allowed the secondary rescue effort to proceed. Fire department excels in incident command, communications and medical response and can help in any rescue with these tasks, but at times the fire department appears to aim towards completing the rescue with their own available resources. In avalanche rescues usually a mix of resources is needed and the mix needs to work together well. An efficient operation can be achieved through mutual training. It allows units to learn their own strengths and weaknesses in avalanche rescue and how other types of rescuers can make the missions run even better.

Another point this case makes well is that many of the Alaskan public land managers don't have the resources to conduct rescues within their jurisdiction independently. Despite the fact that Flattop is located in the Chugach State Park, the third largest state park in the nation, the park has only four full-time rangers (Alaska Department of Natural Resources, 2008). In this incident, the chief ranger was advised about the situation without the need to participate in the rescue. Chugach State Park does not have an ability to conduct rescues without help from other organizations and agencies. This turns almost every rescue effort within the park into an interagency mission. Agencies that train together will be prepared for the mix of resources beforehand.

4. RAINY PASS. 3 PM, FEBRUARY 14.

Rescue resources: Alaska Mountain Rescue Group, Alaska Air National Guard 212th Rescue Squadron, Alaska Search and Rescue Dogs, Alaska Avalanche School, Alaska State Trooper Helicopter

Rescue tool: RECCO detector

A 46 year old male died in an avalanche while preparing the route of the Iditarod sled dog race. He was riding a snow machine. Dalzell Gorge, in Rainy Pass, is a famous steep gully within the race route about 200 miles north of Anchorage. Four other party members were unharmed but ill-prepared to do a rescue. They retreated to the village of Rohn to make a satellite phone call to initiate the rescue. State Troopers asked for help from Alaska National Guard, which provided Pavehawk helicopters with pararescue personnel to transport members of Alaska Mountain Rescue Group and Alaska Search and Rescue Dogs to the scene later that evening. Aerial reconnaissance in the dark and stormy night proved the area too prone to further avalanches and the SAR was postponed. The following days rescue parties, including Alaska Avalanche School personnel to assess and mitigate the avalanche hazard, were flown in several other times. Twelve days later, a dog handler from Alaska Search and Rescue Dogs located the subject's snowmachine with a RECCO detector. The body of the subject was found buried under 10 feet of snow near the snowmachine (ADN, 2006).

Rainy Pass is a typical remote location for an Alaskan avalanche incident. It is 94 nautical miles (190 miles) from Anchorage in the middle of the Alaska Range and has minimal local resources. Alaska has the benefit of having the Alaska Air National Guard's professional rescue team available for some of the civilian rescues.

The competent pararescuers with HC-130's, Pavehawks and other technical resources have been part of many successful missions in the state. Their transportation capabilities make the state feel smaller than it really is. Unfortunately, pararescuers' priority is in military operations and live rescues and they are not always available for civilian incidents.

Avalanche mitigation with explosives in remote areas is problematic in Alaska due to limited resources with explosives mitigation training and access to explosives. In Rainy Pass, no explosives were used and, despite an initial delay, a safe body recovery was facilitated later. One of the issues with explosives in Alaska has been about who has the ability to do explosives mitigation from the air. While Alaska State Troopers coordinate the rescues, state policy has changed over the years as to whether explosive mitigation is allowed from their helicopters. Alaska Railroad, Alaska Department of Transportation and Alaska Mountain Safety Center have provided their services to many rescue operations. Explosives work is also expensive. This raises the question as to when the use of this resource is appropriate.

The avalanche specific rescue tools were all present on the scene but the deep burial and extended time frame made both probing and dog alert difficult. A RECCO detector was able to detect a diode on the snow machine. Interestingly, there are only three body recoveries done with RECCO in the United States, two of them have been in Alaska according to RECCO Company.

5. MARMOT MOUNTAIN. 2PM, FEBRUARY 28.

Rescue resources: Alaska State Parks, Alaska Mountain Rescue Group, Alaska Search and Rescue Dogs, Alaska State Trooper Helicopter, Alaska Mountain Safety Center, Alaska Department of Transportation, a contracted helicopter

Rescue tool: Probe, snow meltdown

A 24 year old man died in an avalanche while snowboarding in the Hatcher Pass area. The party members tried to do companion rescue, but they could not find him or receive a signal from his beacon. This means that the subject either did not wear a beacon, the beacon was not turned on, or it was malfunctioning. After they had searched for over an hour trying to locate their friend, one of the party members initiated the organized rescue by making a 911 call from a cell phone after accessing a nearby road. State Troopers sent in a hasty team of Alaska Mountain Rescue Group and Alaska Search and Rescue Dogs rescuers. Alaska Mountain Safety Center evaluated the snow safety on the scene to be poor recommending explosives mitigation, which could not be executed that evening. The following day Department of Transportation did the explosives mitigation from a local contracted helicopter, and the organized rescue made an unsuccessful attempt to locate the subject. A unique factor complicating this search was the fact that the avalanche debris was particularly deep and extensive, extended nearly 1,800 feet down the mountain in a narrow gully with no surface clues. From March through May AMRG and ASARD with State Trooper support followed up with several unsuccessful attempts of finding the subject. The subject was finally located 91 days later when snow pack had diminished with spring melt out and his snowboard became visible (AMRG 2006b).

In this case, the family of the subject put pressure on organized rescue to do the mitigation work to facilitate faster body recovery. Jill Fredston documents a very similar case well in her book Snowstruck (2005), portraying the conflict between the Coyne family and the rescuers when the avalanche conditions did not allow immediate rescue response. From an organized rescue point of view, protocols should be in place to do explosives mitigation in a timely manner. At the time of the incident, State Trooper helicopter had no ability to do explosives work; this has since changed.

6. TRAINING TOGETHER

In order to help rescuers keep the avalanche skills sharp, two main rescue organizations, Alaska Mountain Rescue Group (AMRG) and Alaska Search and Rescue Dogs (ASARD), organize a training weekend in the beginning of each snow season. This gathers together agencies, organizations and clubs that participate in avalanche rescues in Southcentral Alaska. Each year the Interagency Avalanche Training has grown with the number of involved participants and agencies. Besides the volunteer and unpaid search and rescue organizations (including AMRG, ASARD and Nordic Ski Patrol), the weekend gathers public lands managers from Forest Service, National Park Service and State Parks, paid rescuers such as Fire Departments and military personnel, and educational institutions like Alaska Avalanche School, National Outdoor Leadership School and Alaska Pacific University.

The first day of the training consists of lectures and skill stations. The basic avalanche rescue skills, including transceiver search, extrication and probe line techniques and the use of RECCO, are part of the curriculum each year. Additional stations offer specific training on incident command, helicopter safety, medical response, or snow safety decision making. To assure new learning for returning participants, the event organizers include current and changing themes each year, e.g. differing multiple burial transceiver techniques or efficient shoveling methods. In the evening everyone gathers for a lecture and briefing for the next day's activities.

The second day is dedicated to putting skills into practice. A mock avalanche scenario allows rescuers to go through the complex steps of a real incident in a safe learning environment. The incident command team will practice good rescue management by making decisions for each specific situation. The field personnel get to apply the particular avalanche rescue skills and more importantly practice together with other agencies that they will encounter in real life missions. The biggest learning challenge might be how to plan the logistics of transporting people to the site or how to make snow hazard evaluation on the scene. The weekend closes with a detailed debriefing to discuss the learning points from the training weekend.

Throughout the training interaction with different organizations and individuals is highlighted. The weekend is about networking, both in the field and in the incident command post. This adds familiarity with each other for future avalanche missions. The interactions between student and teacher are dynamic and each participant will find themselves in both roles over the two days.

Another emphasis in the training is to create a successful learning environment by mentoring. The overhead team and field team leaders have more experienced mentors from other organizations working by their side to assist making good decisions on the fly. The philosophy is to catch common mistakes before they are made so that the rescuers can practice making the right decisions most of the time.

7. BENEFITS OF TRAINING

In Alaska, it is very rare to have organized rescuers on the scene to do a live rescue. Even if body recovery does not have the same urgency as trying to find the subject alive, using the tools and techniques effectively and accomplishing all the tasks involved safely, are the main goals of every mission, be it rescue or recovery. Incident commanders should have enough training to keep the situation safe for the rescuers and ask for appropriate and adequate resources. Also, any unpaid or professional rescuer on the scene needs to be sufficiently trained with multiple modes of rescue. As the overview of 05-06 snow season shows, any common tool can prove useful and successful during missions.

Interagency trainings provide an opportunity to bring together all the different rescuers to learn

proper techniques. While practicing how to use transceivers and probes in the beginning of the season is mandatory, it is not enough, since rescues easily develop into more complicated situations. Adding complexity to team trainings allows everyone to improve all the needed skills in a less stressful setting. This also gives unprecedented leadership training for overhead teams. It allows the practice of good decision making regarding resource allocation and effective communication between different rescue teams. Good training raises overall standards for all the organizations involved.

The annual interagency avalanche rescue training is a good start to get the diverse rescue resources in Southcentral Alaska on the same page. The basic concept of the training works well to polish the basics, and add new information each season. Most importantly, it allows both rescue management and field personnel practice the steps of rescue. These trainings are important in keeping all the tools sharp for each snow season.

The key benefits of interagency avalanche trainings are that the participants are:

- learning to use the rescue and recovery tools safely and effectively,
- building on the strengths that are already in place
- identifying the weaknesses in the system and problem solving how to improve upon them
- strengthening the pool of rescuers at large by building on the individual skills and the ability to work together well on missions.

8. SHARPENING THE TOOLS FURTHER

The structure of the interagency trainings is working well to maintain a functional avalanche rescue community in Alaska. Building on the good foundation, this paper gives few suggestions for future improvements.

1. *Consistent and continuous participation*

   Consistent participation from all the possible rescue entities in the region is the key for gaining even more value from the training events. When the agencies don't practice together, the unfamiliar protocols and modes of operation can slow down the process or in the worst case hinder the best possible decisions. For example, a communication gap between career rescuers and unpaid rescuers can manifest itself in poor co-operation and misunderstanding of each others' strengths and weaknesses. Knowledge of each others' protocols, chain of command, communication styles, and even actual resources and skill sets, becomes part of the learning in the interagency avalanche weekends. *Especially when the practice is repeated every year*, the different rescue entities can start to work well together. An excellent example of this is the healthy working relationship between AMRG and ASARD, who practice together and go on missions together on regular basis, not just once a year.

2. **Common or integrated protocols**

   It takes more than two days of playing in the snow together to really understand where other organizations or agencies are coming from. The SAR community needs to cultivate the culture of cooperation, finding ways how each entity could work well together instead of looking at shortcomings in each other. Planning ahead, i.e. pre-planning, and documenting well the possible common venues for avalanche rescue can ease any lapses in familiarity.

   For example, if Anchorage Fire Department gets dispatched to an avalanche incident on Flattop, they will respond according to their standing protocol for avalanche rescue. What if other resources could be more

helpful early on in the rescue, e.g. avalanche dogs? Since fire department does not have avalanche dogs, it should notify in its procedures how to get the dogs on board as soon as possible.

Another fascinating example is that while Chugach National Forest has three seasonal avalanche technicians in advisory role. Should their expertise be needed in an accident site away from the road corridor, their protocol will not allow them to board the Alaska State Trooper helicopter for transportation to the location.

Preplanning, creating and practicing common protocols would help agencies and organizations adapt their own approach into *the best mutual system*. And then all the individual resources, every unpaid and professional rescuer, should comprehend how the plans are put into practice when the call comes.

3. *Clear documentation of the missions*

   Ability to communicate about actual Alaskan avalanche rescues in detail and in timely manner would be an important next step for rescue organizations. Such communication could include detailed, published mission reports with maps, photographs and basic information on terrain, snowpack and weather. Right now the avalanche accident reporting is done with varying detail and standard in Alaska. Additionally, mutual debriefings of any rescues that involved several agencies, especially if the cooperation is rare, would offer another venue to improve on effective and safe rescue methods.

4. *Familiarity with local resources*

   In three incidents presented in this paper, during the mission there was a lapse in either dispatching or using the most appropriate resource in a timely manner. When time-is-of-the-essence, the ability to tap into a well documented list of qualified and useful local resources is worth a pot of gold. Some of the competent resources can be found outside of the normal rescue community (like helicopter skiing operators). Some resources with the most specialized training are not paid rescuers. Each dispatcher and incident commander should have the list of potential resources available for them and they should be familiar with all the different options for the benefit of the search subject.

9. SUMMARY: DEVELOPING THE SHARPEST TOOL - THE BEST MUTUAL SYSTEM - THROUGH INTERAGENCY TRAININGS

The stories of four avalanche fatalities in 2006 are great examples of complexity involved with any avalanche rescue and recovery mission in Alaska. The mission outcome depends on how well the different rescue organizations and entities work towards the common goal of rescuing the subject with the least amount of distress to the subject and/or their family and friends. Resetting the rescues in training scenarios would help rescuers to practice doing things right. It would be helpful in developing the sharpest tool which is the best mutual system.

In the ideal of the best mutual system, all the parties arriving at a rescue work safely and effectively together and afterwards revise their protocols and culture to run the next common avalanche rescue together even better. In the real world, the rescuers that work safely and effectively together probably attended the same interagency training earlier that season.

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