

SUCCESSSES AND CHALLENGES OF SNOWMOBILE EDUCATION AT THE GALLATIN NATIONAL FOREST AVALANCHE CENTER

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ABSTRACT: For the last 24 years, the Gallatin National Forest Avalanche Center has achieved many successes in snowmobile avalanche education but many challenges remain. Building on the efforts of many others and the work outlined by the GNFAC at an ISSW twelve years ago, our snowmobile education has evolved considerably. Live recoveries, unheard of only 10 years ago, seemingly occur every winter now. Montana contains some of the top destinations in the U.S. for mountain snowmobiling and receives a sizable number of riders from Canada as well. While there has been a severe drop in new snowmobile sales during the last 10 years, snowmobile registrations in Montana have doubled. The good news is that number of fatalities in this time has remained flat, but Montana continues to lead the U.S. in snowmobile avalanche fatalities with 23 in the last ten years. This paper will discuss recent avalanche accidents and use them to illustrate topics in snowmobile avalanche education that work and ones that don't.

KEYWORDS: snowmobile, education, Gallatin, fatalities, classes

1. INTRODUCTION

In the mid-1990s snowmobile technology greatly improved and drastically changed mountain riding making it easy to climb high into avalanche terrain immediately following a big storm. There was a corresponding rise in snowmobile avalanche fatalities as technology leapt ahead of avalanche awareness among riders (Fig. 1). Few wore avalanche transceivers or carried rescue gear, and many rode in avalanche terrain at the same time. Avalanches were a new and deadly threat to many snowmobilers with little or no avalanche education.

Avalanche professionals took notice of the rapid increase in snowmobile avalanche fatalities (Birkeland 1992). Throughout North America, professionals were trying to educate this user group. At the GNFAC, Karl Birkeland offered our first snowmobile specific avalanche class in 1991. Snowmobile avalanche education has remained a major focus since that time because many of the top destinations in the U.S. are in southwest Montana. Our efforts accelerated in 1999 when Doug Chabot reached out to a local snowmobile dealer to get machines donated to the GNFAC.

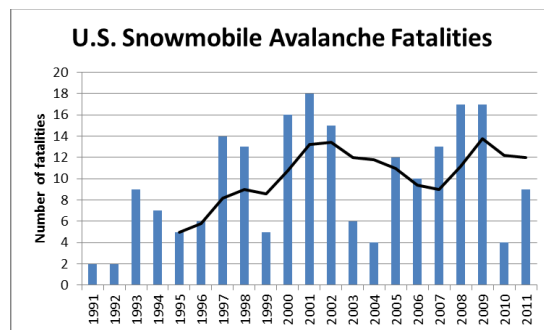


Fig. 1: In the mid-1990s snowmobile avalanche fatalities increased. The 5 year moving average is shown by the solid black line. Data from Colorado Avalanche Information Center.

The shop taught us how to ride, provided us with snowmobiles, and we learned how to teach this user group. In the last ten years, we have taught 250 snowmobile specific avalanche classes to over 8,000 riders. The combined efforts of avalanche centers, the industry, and many others, have decreased the rate of fatalities in Montana (Fig. 2). Education works, and it saves lives. Unfortunately, Montana still leads the U.S. in snowmobile avalanche fatalities and more work needs to be done.

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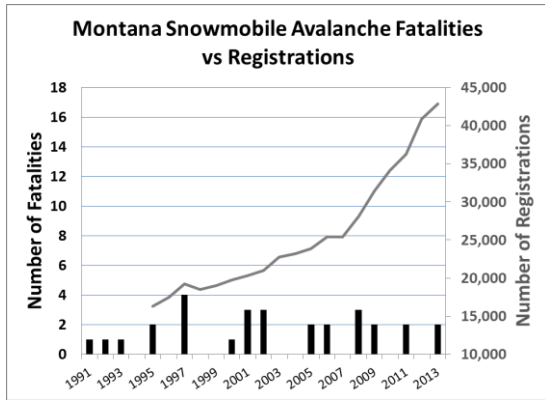


Fig. 2: Using snowmobile registrations as a proxy for use, we can see that the rate of snowmobile avalanche fatalities has decreased significantly. Since the mid-1990s, snowmobile use has risen steeply while the number of fatalities has remained flat. Fatality data from the Colorado Avalanche Information Center. Registration data from the International Snowmobile Manufacturers Association.

2. THE BASICS

We've learned a lot about educating snowmobilers. In the process we've become snowmobilers ourselves. We've worked to break down negative stereotypes, bust myths and learn the differences between how skiers and snowmobilers travel.

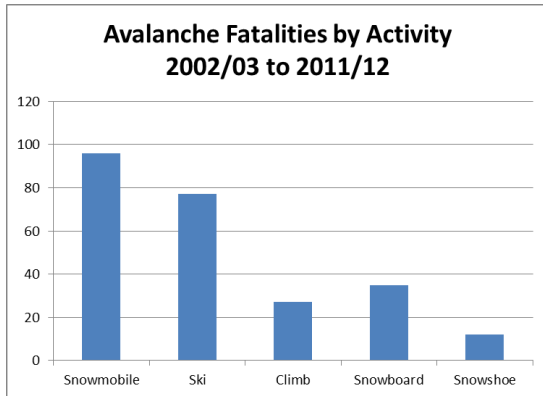


Fig. 3: When user groups are separated while all snowmobile groups are combined, it appears that snowmobilers are dying in much greater numbers than other backcountry users. Data from the Colorado Avalanche Information Center.

One problem has been the perception that snowmobilers have been dying in avalanches in much greater numbers than other user groups (Fig. 3). While there was a sharp increase in fatalities,

snowmobilers have always been lumped into a single category without taking into account different types of machines and different riding styles. When non-motorized users, like skiers and snowboarders, are put in a combined group the number of fatalities compares with snowmobiling (Fig. 4).

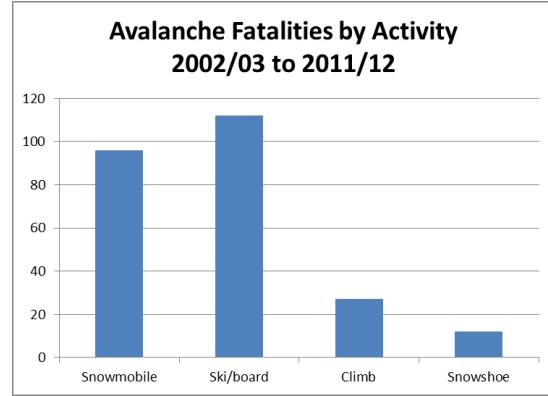


Fig. 4: When non-motorized skiers and snowboarders are combined just as all types of snowmobilers are combined, we can see that more of them have died in the last ten years than snowmobilers. Data from the Colorado Avalanche Information Center.

To develop our curriculum we took lessons from local snowmobile avalanche fatalities and focused on three basic ideas (Chabot 2002). While not new, these ideas were a critical starting point for snowmobile avalanche education. Many snowmobilers would be alive if they had followed these three points.

1. Expose one person at a time. Nine snowmobilers who died in Montana in the 01/02 winter would still be alive if they had followed this simple rule.
2. Carry rescue gear and know how to use it. In the past it was rare to see riders wearing transceivers and carrying shovels and probes. Most rescues were body recoveries.
3. Recognize obvious signs of instability like recent avalanches. Too many riders have died when recent natural avalanches have occurred.

February 2002: Five snowmobilers were high-marking the south face of Mt. Abundance near Cooke City. All five were on the slope when the avalanche released. Two were fully buried and died. None in the group had rescue gear. A search dog found the victims about five hours later buried 2-3 feet deep. A smaller slide was evident on a

similar aspect. It occurred about 200 feet away from and 48 hours prior to the fatal one.

We work hard to push these simple concepts because they work. These basic rules need to be the core of any curriculum for snowmobilers because too many STILL DO NOT follow them and die in avalanches.

January 2009: Three snowmobilers died in three separate avalanches in southwest Montana. One died on Crown Butte near Cooke City when riding with his wife and three friends. At lunch he turned off his transceiver but forgot to turn it on again. On his final climb for the day, he was caught in a large avalanche and not found until the following day by a search dog.

March 2014: An 18 year old from Minnesota also died near Cooke City on Crown Butte. There was an Avalanche Warning in effect. Everyone in the group was aware of the Avalanche Warning but none carried rescue gear. The victim was parked mid-slope on Crown Butte while two others were climbing and triggered the avalanche. They escaped. He was buried, killed, and found by a probe team about an hour and a half later.

3. CHALLENGES

3.1 Class Attendance

Getting snowmobilers to sign up for classes to the same degree as other user groups has always been a challenge. Other user groups in southwest Montana not only fill up classes but also the waiting lists. Snowmobilers have been attending classes in increasing numbers but not to the same degree, and we need to do better. One problem for any user is the necessity to devote an entire weekend and several nights for an avalanche class.

To overcome this problem, many of our field based snowmobile classes consist of lectures during the week followed by one day in the field typically on a Saturday so that the students have Sunday free to ride. We also offer short companion rescue clinics. These clinics are taught in the field and last about 6 hours.

The lack of perceived need for avalanche education is one potential obstacle in getting more snowmobilers to attend classes. On a deep powder day, snowmobilers do not need steep slopes to the same degree as skiers and boarders. For this reason, snowmobilers may have less of a perceived need to get avalanche training. Some feel

no need to take an avalanche class because they mostly ride on trails or in flat meadows.

Lastly, avalanche education is newer for snowmobilers, whereas it has been a part of backcountry skiing, boarding, and ice climbing for a long time. The snowmobile culture has quickly embraced avalanche safety and we hope the momentum will continue and increase class attendance.

3.2 Course Time Requirements

We do not think snowmobilers require the same amount of time as non-motorized users to cover a similar curriculum. The logistics of taking a group of novice backcountry skiers and boarders into the backcountry often do not allow the group to see much avalanche terrain. A group of snowmobilers, however, can look at many paths in a short amount of time.

We don't have a formal proposal to change the time requirements but have noticed a clear difference in how much can get done in a given time with the two groups. It would be easy to conduct a Snowmobile Level I in 16-20 hours instead of the recommended 24. One example could be four hours of classroom lectures and 1 ½ days in the field (18 hours total).

3.3 Terrain Recognition

From the beginning, we knew that digging snowpits was neither practical nor a good use of time. Sledgers cover a lot of terrain at different aspects and elevations compared to skiers and boarders who might ride only a couple slopes. It was more important to stress the idea of exposing only one person at a time. Too many accidents occurred in obvious avalanche terrain with multiple people on the slope.

Unfortunately a growing number of accidents have occurred in less obvious avalanche terrain. In some cases, the riders were trying to avoid avalanche terrain.

January 2010: A rider from Billings, MT died on Scotch Bonnet Mountain near Cooke City. He and his partner were familiar with the terrain, carried rescue gear, and had read the avalanche advisory 2 days prior. They knew the danger was HIGH and chose a low angle slope in the trees. They failed to recognize the steep slope partially hidden above them. When they triggered the avalanche, one was able to out run it; the other was caught, buried and killed.

Most riders can identify steep slopes and obvious avalanche paths but many fail to recognize avalanche run out zones. They do not understand how far a slide might run, how fast an avalanche travels, or how a rider can trigger avalanches from low angle slopes during certain conditions. The concept of a remotely triggered avalanche is hard to grasp for many. This difficulty is a problem because snowmobilers spend much of their day in run out zones.

January 2014: A dad, his son and a friend were riding near Big Sky, MT on New Year's Day during an Avalanche Warning. They played in meadows beneath nearby avalanche paths. The friend and the dad continued under another path not knowing the son was stuck some distance away. While crossing a 20 degree slope, they triggered an avalanche from above and were both caught. The friend was buried with just his hand exposed and dug himself out of the debris. The dad was fully buried and died. All carried rescue gear and knew of the Avalanche Warning.

3.4 Decision Making

Decision making continues to be a challenge for all user groups including seasoned professionals. Because of their speed, snowmobiles compress time and decision making becomes especially difficult. Wearing a full face helmet, side-hilling a slope, keeping up with the group, and maintaining track speed, all have the combined effect of reducing the time for decision making. Often time is compressed to the point where no decision making process is possible. Pre-trip planning can help some; however, a day of riding requires many small decisions made in split seconds. Stopping to consult with you partner can be difficult.

When parked near a big bowl or peak and trying to set the high mark or climb to the top, there are opportunities for discussion. However, travelling to these big slopes or boondocking through rolling terrain and tight gullies requires many small decisions on slope steepness, consequence, and the location of one's partners who may be out of sight. It's not uncommon to lose sight of ones partners, especially in big groups.

3.5 Group Size

Large groups are common. In fact there are many advantages to traveling in a large group such as helping each other get unstuck, dealing with mechanical troubles and having more resources available in the event of an accident. In some cases there may be enough people to warrant imme-

diately sending someone for help. However, the obvious problems of traveling in large groups may outweigh the benefits.

January 2009: A group of 14 snowmobilers was riding in the Gravelly Range of southwest Montana. All carried rescue gear, and some had taken avalanche classes. They knew the danger was elevated, had spotted a recent natural avalanche, and did not plan on riding in avalanche terrain. One person rode away from the group. They eventually noticed he was missing and found his body buried 1-2 feet deep in an avalanche on a very small slope. He was wearing a transceiver and an avalanche air bag pack which was not inflated.

3.6 Snow bikes

Snow bikes are a new and rapidly evolving technology that works like a snowmobile. A track replaces the rear wheel and a ski replaces the front wheel. The first snow bike avalanche fatality in Montana occurred just south of Glacier National Park in February 2012.

Snow generally cannot go uphill as well as snowmobiles, but they travel across the fall line very easily. Snow bikers seem to spend much of their time in less obvious avalanche terrain like tree covered slopes and gullies. For this reason, one of our instructors commented "those guys live in terrain traps!" We have not changed our curriculum or offered special classes for this new user group, but the need is growing.

3.7 Oil Fields

Energy development in North Dakota and Eastern Montana as well as parts of Canada has fueled an increase in use especially in the Cooke City area. These riders work hard and play hard. It's difficult to convince these guys with limited days off to take an avalanche class or shelve their excitement to test themselves and their machines on steep slopes. We hope to recruit the help of oil companies in Billings, Montana to reach this group of riders.

4. THINGS THAT WORK

How we teach snowmobilers and how we reach out to them continues to evolve as we learn what works and what doesn't. Overall we've adopted a three pronged approach.

March 2014: On a field day near West Yellowstone with our instructor in that area, we spotted a group of snowmobilers from out of town crossing a run out zone. Two were crossing at the same time,

but one stopped in a safe zone to watch them. We quickly rode to him and commented on his smart travel despite his partners actions. Then we discovered his group had attended our free 1-hour awareness classe the night before. That morning, before going riding, they had all purchased rescue gear. With a class we were able to change at leaset one person's behavior and give his group the ability to save someone's life.

4.1 Guerrilla Warfare

To run our snowmobile education program, we follow a guerrilla warfare model using a small group of experienced riders; enlisting support of the local clubs and dealers; and keeping our efforts cheap, simple, and constant. We maintain a core group of instructors who are active riders in the area and bring credibility to our program. These instructors ride with us frequently and help us assess stability and avalanche danger. Most importantly, our instructors have stories to share from local accidents and can discuss the specifics of local terrain.

Support from local snowmobile clubs and dealers is crucial to running successful classes. With their help we get the best turn out because they work with us to advertise, schedule and host classes. In addition to clubs and dealers, we enlist the help of rental shops, guides and trail groomers. These folks work on the front lines and interact with riders on a daily basis. We teach classes specifically for these influential people, and they share their knowledge with their clients, customers, and members.

Two years ago at the request of several local snowmobile guide services, we taught a snowmobile Level II course. Now we routinely get quality observations and even snow profiles from them. To show their clients why they are avoiding avalanche terrain, some guides will perform a quick ECT to show the instability to their clients. These moments are invaluable.

We don't let the details weigh us down or drive up costs. Our focus is to push the basic curriculum. If someone knows how to ride, knows the basics of avalanche awareness, brings credibility and a passion for teaching, we'll use them. The message is simple and repeatable, and by keeping our costs down, we can broadcast our message repeatedly to different groups throughout Montana.

No single class or instructor will make a difference with this group as a whole. Instead, it is a slow, long term process that will bring success.

4.2 Rescue Skills and Gear

While our core curriculum has three elements, we focus on rescue skills and gear. A large portion of our field days are spent practicing rescue skills. Last year we started offering Companion Rescue Clinics. Why? Everyone likes technology. Snowmobilers especially spend a lot of time using technology because it's the nature of the sport. If there's a problem, there's a mod to fix it. Not enough power, get a turbo. Worried about avalanches, get rescue gear. When we teach rescue, we give our students a tangible skill that may save their life.

*January 2014: A group of six riders from North Dakota were playing on Henderson Mountain near Cooke City. All had rescue gear, intimate knowledge of the snowpack from previous trips and reading the local avalanche advisory but no formal training. One climbed a slope to test his buddy's turbo and triggered the avalanche 4-12 feet deep as he crested the ridge onto safe terrain. At the same instant, two other riders jumped off a cornice on the same ridge. One landed on the slab, was caught in the avalanche, and was fully buried. His partners used the location of the partially buried sled and the last seen point to perform a textbook rescue. He was "Smurf blue" and not breathing when they uncovered him. They performed CPR. He regained consciousness and said "What took you guys so f***ing long?" By the next day he felt better and rode all day.*

Teaching rescue skills also provides an opportunity to teach riders other important points like exposing one person at a time. We make rescue scenarios fun. People are moving, doing something, and engaged. We practice simple beacon searches but quickly jump into complex, multi-burial scenarios to stress the importance of exposing one person at a time. Also, we have lots of one-on-one time during rescue training to discuss the importance of looking for recent avalanches or other obvious signs of instability.

First and last, we want snowmobilers thinking about avalanches. They have a lot to think about and plan for when going riding: the truck and trailer, finding ethanol free gas, adding oil, getting everyone's sled started on a cold morning, etc. When they put on a transceiver and check their partners, they are thinking about avalanches.

4.3 Storytelling

By far the most effective tool we use is storytelling. It provides a powerful means for students to retain

information (Denning 1994). In southwest Montana, we have a long list of accidents from which we can tell stories to reinforce a particular point. We try to incorporate the story of a fatality and a live recovery in every class. We often teach classes called "20/20 Hindsight" in which we review recent accidents. They can be morbid and quickly bring down the mood of a class, so it's best to include some upbeat stories as well.

The literature supports storytelling as an extremely effective teaching method. Research shows that the brain is wired to organize, keep, and retrieve information taught with a story (Eck 2006). More importantly, research shows that students can learn something from a story and then apply what they learned in actual settings (Eck 2006).

We tell stories in our daily avalanche advisories. We tell stories in our lectures, but some of the best stories come from the students. When we ask how many people have dug someone out of an avalanche during a snowmobile class in southwest Montana a lot of hands go up. We hope to change this fact, but for now it provides a powerful learning opportunity when these students share their experiences.

5. CONCLUSIONS

We hope to see class attendance steadily increase as more and more snowmobilers view avalanche training as an essential component of mountain riding. We will continue waging guerrilla warfare and keep our program relatively simple. Our curriculum will continue to stress (1) Going one at a time, (2) Carrying rescue gear, and (3) Looking for obvious signs of instability. In practice these ideas are not always easy to follow especially when snowmobiling which compresses time and gives riders so many other things to think about.

We want to make sure every rider carries gear and knows how to use it, and we'll use rescue classes to teach other important concepts. Moving safely through avalanche terrain on a snowmobile will always be a tough concept to teach and even tougher to put into practice. The most important element is recognizing avalanche terrain.

In the summer of 2013, the International Snowmobiler Manufacturers Association, the Canadian Avalanche Centre, and the USDA Forest Service National Avalanche Center developed an avalanche safety message with five points:

- **Get the Gear:** Ensure everyone has an avalanche transceiver, shovel, and probe on their person and knows how to use them.
- **Get the Training:** Take an avalanche course.
- **Get the Forecast:** Make a riding plan based on the current avalanche and weather forecast.
- **Get the Picture:** If you see recent avalanche activity, unstable snow exists. Riding on or underneath slopes is dangerous.
- **Get out of Harm's Way:** Don't go to help your stuck friend. One at a time on all avalanche slopes. Don't group up in runout zones.

These five points fit well in our current curriculum and will become an integral part of our snowmobile classes.

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