

Miller Mountain Avalanche Fatality

1 motorized snow biker caught, partially buried and killed
Sheep Creek drainage, Cooke City, MT
Custer Gallatin National Forest – February 19, 2022

SYNOPSIS

On February 19, 2022, three snowmobilers and two snow bikers were in Sheep Creek on the south face of Miller Mountain north of Cooke City. The two snow bikers were high on the slope when one stopped on a small ridge while the other climbed higher and triggered a large avalanche. The avalanche carried him down through a gully and over a cliff where he was partially buried near the toe of the debris. His arm and airbag were visible and his head was 1 foot under the surface. Resuscitation efforts were unsuccessful. The avalanche was 800 feet wide, averaged 2 feet deep (estimated) and ran 1,200 vertical feet. The avalanche likely broke on facets and depth hoar at the bottom of the snowpack in an area that was thinly covered and recently wind-loaded. The debris was up to 15 feet deep. The avalanche is classified SS-AMu-R3-D3-O.

GPS coordinates and elevation:

Crown: N 45.044713, W -109.981783; elev 10,000'

Victim: N 45.03811, W -109.98067; elev 8,870'

*victim was 25 feet from the toe of the debris

Video: <https://youtu.be/qC7geA4kgyg>

Pictures: pages 5-10

AVALANCHE

A group of five men from Bismarck, ND arrived in Cooke City on Friday, February 18. The next day they rode in the Sheep Creek drainage north of Cooke City. Three of the five were very familiar with the area having made 10-15 trips each, while this was victim Nathaniel Wolfe's (age 34) third trip. Each person had a beacon, shovel, probe and avalanche airbag. They all follow the GNFA's posts on social media and at least one of them had read the avalanche forecast that morning.

The day was mostly clear and windy and the three snowmobilers and two snow bikers rode up the south side of Sheep Creek to the head of the drainage, playing along the way. They saw no signs of instability. Later in the afternoon they began climbing and boondocking along the north side of the valley on their way back to town.

Near 5 p.m. the two snow bikers, Loren (48) and Nathaniel, climbed up the south side of Miller Mountain, threading their way through trees and gullies to treeline. Loren stopped on a sharp ridge as Nathaniel climbed up further to "a spot where we would normally not go", according to Bodie (48),

another member of the group. Nathaniel triggered the avalanche and Loren saw a “bunch of snow come by me; I couldn’t get him on the radio.” Loren alerted the others over his radio.

Bodie and his son, Junior (14), were down valley and did not see the avalanche. They turned around and rode back to the area looking for avalanche debris. The lower slopes of the area are characterized by many trees and gullies that made it difficult to quickly identify the runout zone. Jason (40) was up valley with a separate group of riders when he got the radio call about the avalanche. Because the avalanche was funneled down a narrow gully and over a small cliff (a waterfall in the summer) the debris was only 75-100 feet wide but up to 15 feet deep in spots.

RESCUE

Everyone converged at the toe of the debris where Nathaniel was found with his arm sticking out of the snow, his Pieps airbag deployed. His head was buried 1-foot under the surface, and they estimated it took “15 minutes tops” to dig him out from the time of the radio alert. His helmet was ripped off and his partners speculated his chin strap may not have been buckled. After Nathaniel was uncovered they started CPR. Bodie and Junior rode to Cooke City and alerted Park County SAR at 5:44 p.m. Bodie rode back to the scene with SAR, arriving at 6:04 p.m. They tried three times to resuscitate him using an automated external defibrillator (AED) but were unsuccessful. SAR left the accident site at 6:17 p.m. and evacuated the victim back to town. The Park County coroner concluded that Nathaniel died of asphyxiation due to the avalanche.

WEATHER

Seasonal snowfall and precipitation data are from the Fisher Creek SNOTEL site at 9,100’, 2.4 miles NE of the accident site. Wind data are from the Lulu Pass weather station at 10,020’, 2.5 miles NNE of the accident location.

The mountains near Cooke City received relatively little snowfall in January through the beginning of February. From February 14- 19 the Fisher Creek SNOTEL received 1-3” of snow per day, totaling 13” of snow and 1.1” of snow water equivalent (SWE) over six days (Figure 1).

The week prior to the avalanche wind direction varied from northwest to west to southwest. Average wind speeds were 10-20 mph with gusts of 20-30 mph. On February 19, wind at Lulu Pass was out of the southwest, and from 2 p.m. to 6 p.m. average speeds increased to 15-30 mph with gusts of 40-60 mph (Figure 2).

Temperatures ranged from single digits to low 30s F over the week prior to the accident. On February 19, temperature reached 30 F at Fisher Creek and 19 F at Lulu Pass. At the time of the accident the temperature was 26 F at Fisher Creek and 18 F at Lulu Pass.

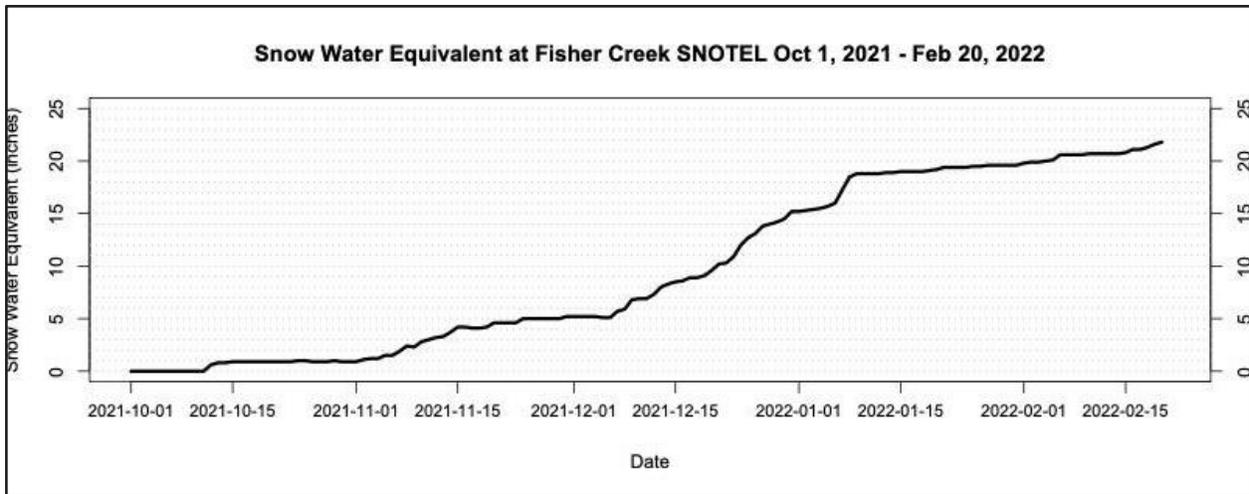


Figure 1. Snow water equivalent (start of day values at midnight) at Fisher Creek SNOTEL sites from October 1, 2021 to February 20, 2022.

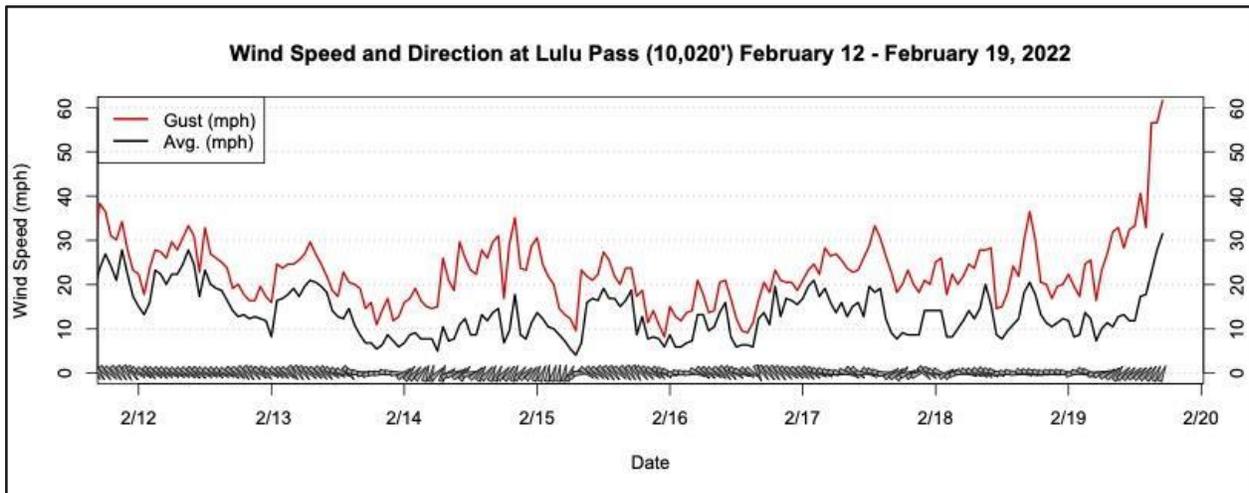


Figure 2. Wind speed and direction (hourly) from Lulu Pass from February 12 to February 19 at 6 pm. Wind direction is displayed as arrows along the bottom of the graph. There was a mix of moderate northwest, west and southwest wind for the week prior to the accident with strong southwest winds on the day of the accident (seen as a spike on the right hand side of the graph).

SNOWPACK

The avalanche occurred at 10,000 feet on a south aspect (195 degrees) on Miller Mountain in the Sheep Creek drainage north of Cooke City. The GNFAC was unable to access the crown or flanks to dig and investigate the snowpack due to deteriorating weather and increasing avalanche danger. Our assessment is based on previous snowpits and observations along with an investigation at the toe of the debris.

The avalanche broke an estimated average of 2 feet deep with the left edge of the crown being near 4 feet deep. The avalanche, measured on Google Earth, was 800 feet wide and fell 1,200 vertical feet. The

measured runout angle (toe of debris to crown) was 26 degrees, and the avalanche is classified SS-AMu-R3-D3-O.

We cannot be certain of the snowpack structure at the crown, but we can make a strong inference based on previous findings and a firsthand look at the avalanche from below. The slide likely released on a combination of facets and depth hoar near the ground. On most slopes around Cooke City there is a prominent weak layer 2 feet under the surface. The starting zone is above treeline near the east ridge leading to the summit of Miller Mountain. This slope had a thin snowpack for much of the winter from winds stripping the snow away, allowing the remaining snow to weaken and facet. In the five days prior, 11" of snow fell (0.9" SWE) with westerly wind. On the day of the accident, the wind increased from the southwest with gusts of 60 mph that loaded many slopes in the area, and 2 more inches of snow fell (0.2" SWE). Recent and ongoing wind-loading with a prominent weak layer made the steep slope primed to avalanche.

Fall of 2021 was warm and dry in the mountains near Cooke City, leading to a well-below average snowpack through the beginning of December (Figure 1). The 1-2 feet of snow that persisted in the mountains during October and November was layered with melt-freeze crusts and weak faceted snow. In mid-November brief snowfall led to a few avalanches breaking on these weak facets at the bottom of the snowpack, and we observed an unstable snow structure in the mountains near Cooke City.

Snow returned on December 6 and on December 10 we began daily avalanche forecasts. Regular, modest sized storms persisted through December resulting in spikes of CONSIDERABLE danger because of new or wind-drifted snow. On December 27 two snowmobilers were killed in an avalanche on a southwest aspect of nearby Scotch Bonnet Mountain. A large storm January 7 and 8 increased the danger to HIGH with many natural avalanches occurring. The rest of January was relatively dry and most days had a LOW avalanche danger. The first week of February had 15" of snow (0.9" of SWE) and several natural and human triggered avalanches occurred during a period of CONSIDERABLE avalanche danger. The danger dropped to MODERATE on February 8 and this rating remained on the day of the accident.

The avalanche forecast on February 19 stated:

Near Cooke City a layer of weak snow is buried 1.5-2 feet deep on many slopes which makes it possible for a person to trigger large avalanches. Since Tuesday these mountains got a foot of snow (0.9" SWE) that has been blown into deeper drifts by west-northwest wind the last few days. These drifts of recent snow alone could avalanche and be large enough to bury or injure a person, or they could break deeper and larger on a buried persistent weak layer. Yesterday a natural avalanche of wind-drifted snow occurred on Scotch Bonnet Mountain. Before riding steep slopes carefully assess the snowpack for wind-loading and buried weak layers and consider the consequences of being caught in an avalanche. Today, large avalanches are possible and avalanche danger is MODERATE.

[GNFAC Avalanche Forecast for Sat Feb 19, 2022](#)

INVESTIGATION

Doug Chabot of the GNFAC obtained details of the accident through interviews with the party and visiting the site the next day, 20 February. Brad Bolte and Katrina Haworth, Law Enforcement Officers (LEO) on the Custer Gallatin National Forest, were present during the interview. Bill Whittle of Park County SAR took Doug and Brad to the accident site.

Any questions should be directed to:

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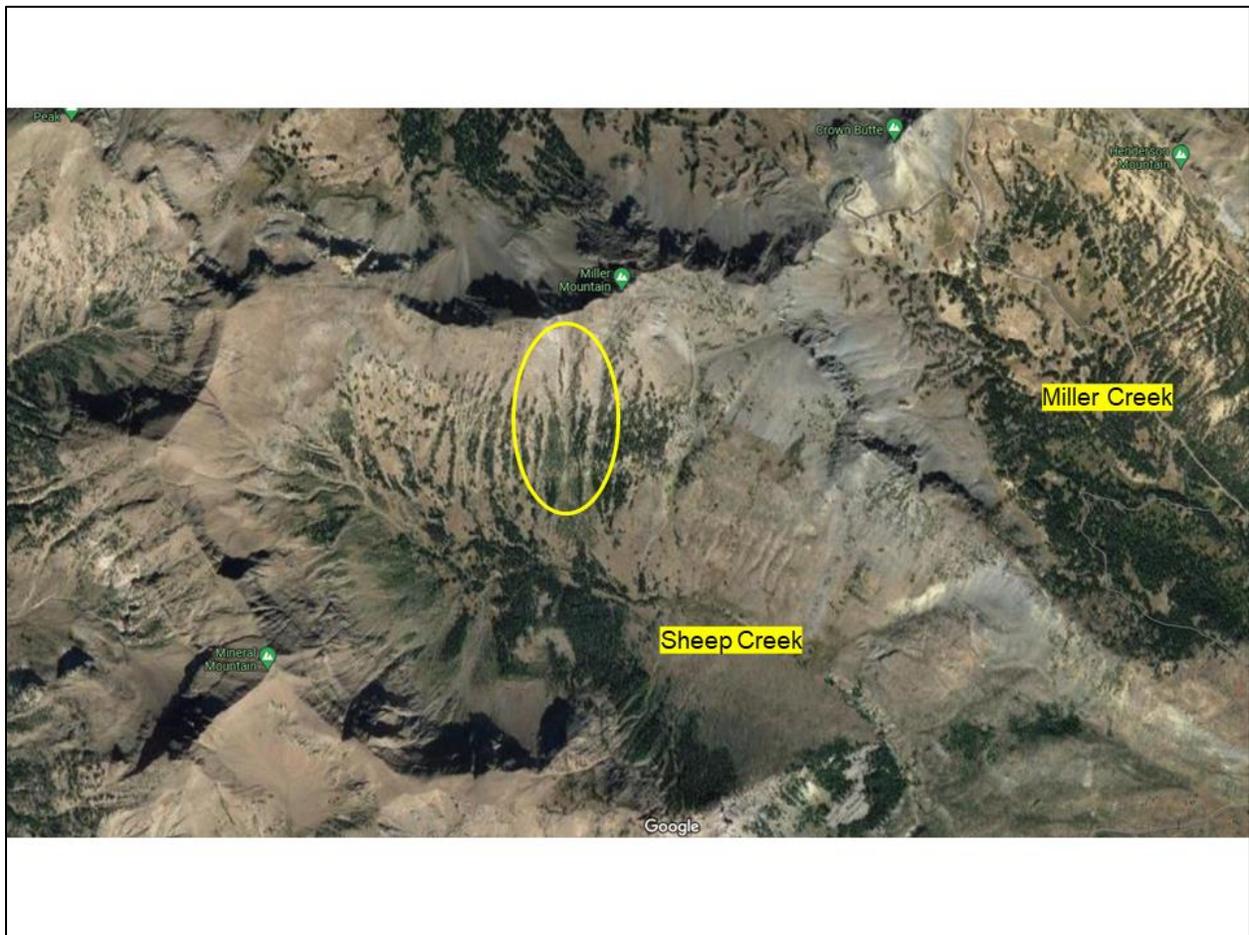


Photo 1.

A Google Earth image of the south face of Miller Mountain and surrounding drainages. The avalanche occurred in the circle.

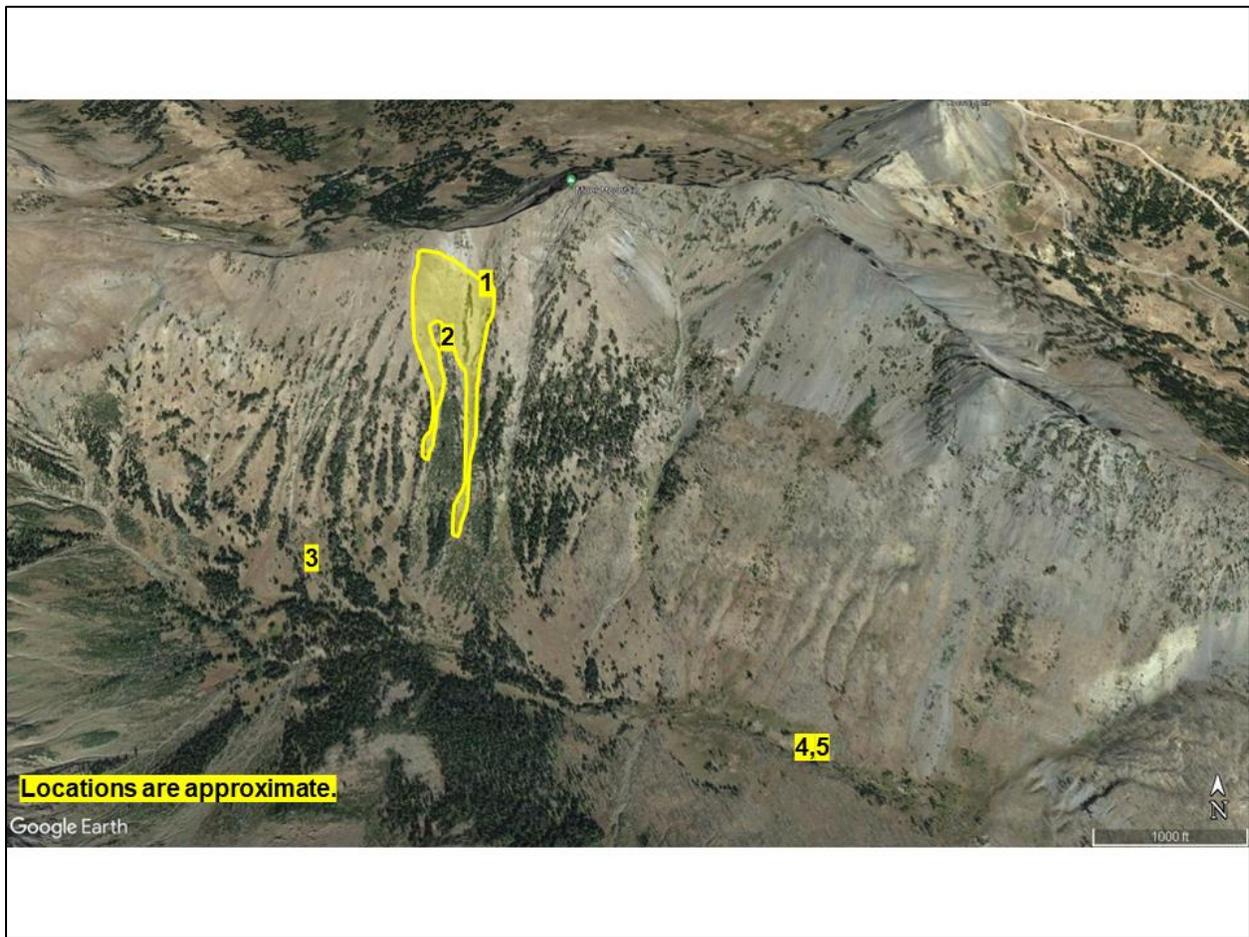


Photo 2.

A Google Earth image with the avalanche and locations of all the riders before the avalanche.

1. Nathaniel on a snow bike.
2. Loren on a snow bike.
3. Jason on a snowmobile.
4. Bodie on a snowmobile.
5. Junior on a snowmobile.

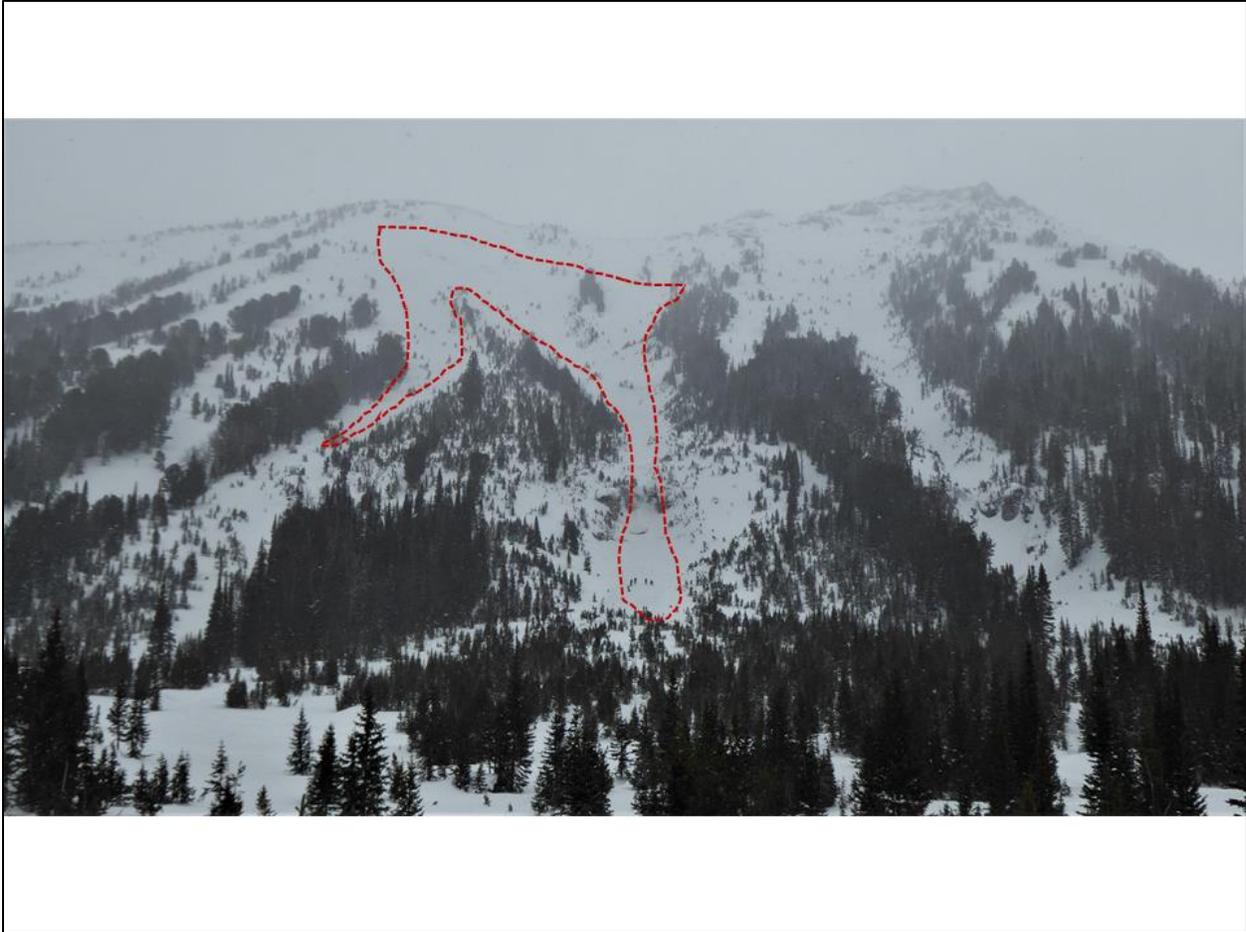


Photo 3.

The avalanche was 800 feet wide and 1,200 feet vertical. The average crown depth was estimated to be 2 feet deep. The overall size is R3 (medium, relative to the path) and a destructive potential of D3 (could bury and destroy a car). For scale, at the bottom of the avalanche is a team of people probing for the missing snow bike.



Photo 4.

The victim was found at the toe of the debris. The crown, 1,200 feet above, is marked.



Photo 5.
Custer Gallatin NF LEO Brad Bolte stands at the spot where the victim was recovered.

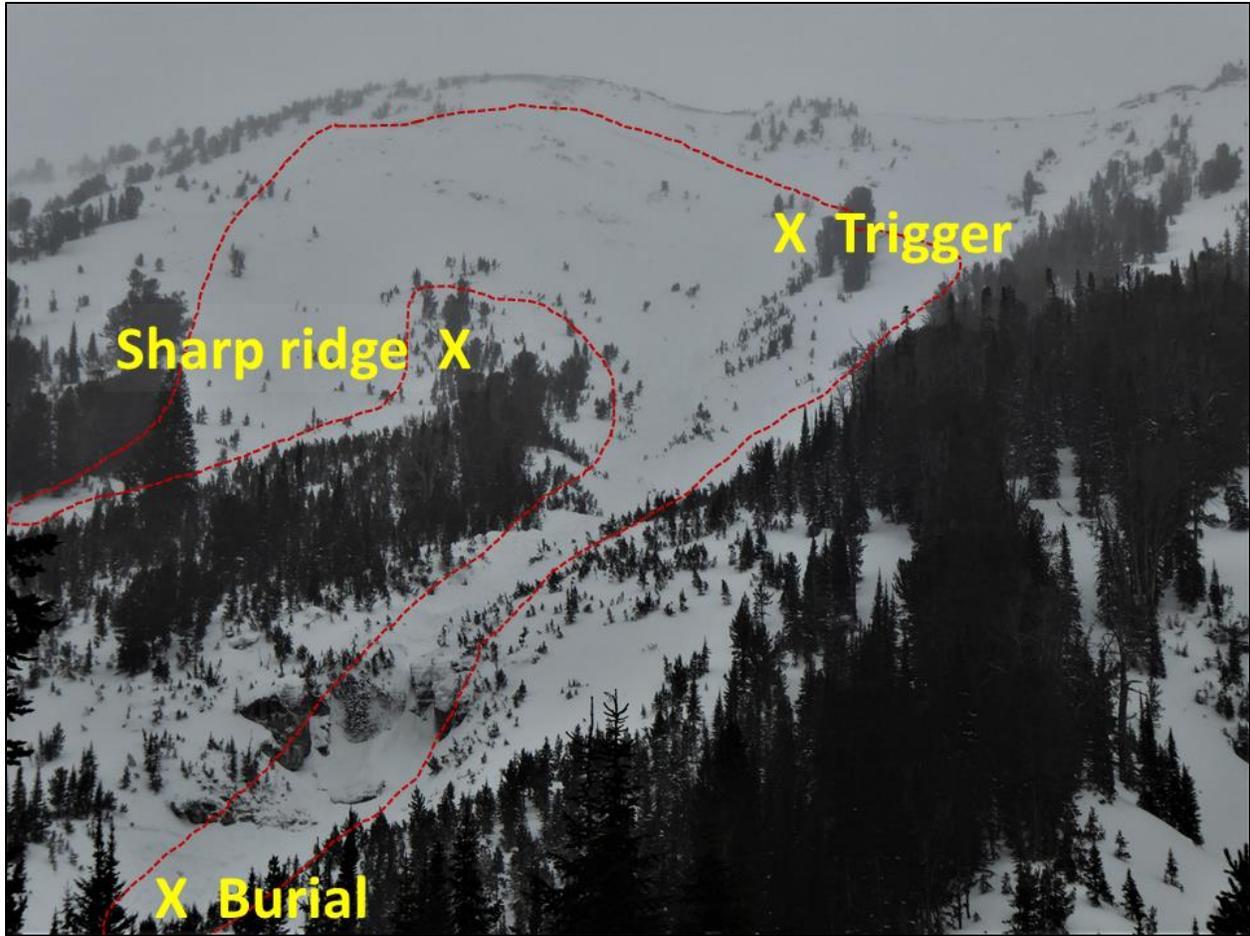


Photo 6.

This photo shows the upper part of the path with the trigger location (Nathaniel) and the spot on the ridge where Loren stopped his snow bike.