

Ski Hill Avalanche Fatality

1 snowmobiler caught, partially buried and killed
Lionhead area near West Yellowstone, MT
Custer-Gallatin National Forest – February 6, 2022

SYNOPSIS

On February 6, 2022, one snowmobiler in a group of four was caught and killed in a small avalanche on Ski Hill at the south end of Lionhead Ridge. He was on a 45-degree wind-loaded slope when it released and partially buried him against a tree. The slide was 4"-11" deep, 75 feet wide and ran 300 vertical feet on a layer of near-surface facets. The avalanche was not witnessed and the victim was buried an estimated 15-25 minutes before he was uncovered. The shallow, steep slide partially buried the rider with his head a foot under the snow and resuscitation efforts were not successful. The group was familiar with the area and had rescue gear. The avalanche is classified SS-AMu-R1-D2-O.

GPS coordinates and elevation:

Crown: N 44.705770, W -111.298948; elev 8,125 '

Victim: N 44.7058434, W -111.297497; elev 7,941'

Toe: N 44.705990, W -111.296883; elev 7,850'

Video: <https://youtu.be/82sYGJKGjSc>

Pictures: pages 6-9

AVALANCHE

On February 6 a group of 4 men from Iowa were riding in Lionhead. They had ridden in the area for the last 12-15 winters. They all had a beacon, shovel and probe, and 3 of the 4 had airbag packs, including the victim. They all had taken avalanche awareness classes multiple times and read the GNFAAC avalanche forecast that morning. The site of the avalanche is locally referred to as "Ski Hill", a common slope for snowmobilers to ride ever since a large avalanche cleared trees from the bottom of the path in March 2012. The party knew this was avalanche terrain and had seen the slope slide before.

Bradie (30 years old), the victim, was an expert rider who spent 3 winters in the area. No one witnessed the avalanche, but his brother believes he was sidehilling across the slope, which he had done earlier. Two of the 4 were on top of the slope and out of view. His brother rode up the hill from the bottom of Denny Creek when he saw avalanche debris and Bradie's flipped sled. Further upslope he spotted orange fabric from a deflated airbag against a tree. He made his way over on sled and foot. It is undetermined if Bradie deployed the airbag or if the zipper opened and spilled the fabric out of the pack. The bright color signaled his location. The brother estimates 10-15 minutes passed from when the avalanche was triggered to when he saw it. It took him another 5-10 minutes to reach and uncover his brother. Bradie had his back pressed against a tree, head helmeted and slightly uphill, but buried under a foot of debris. He was not breathing, although his brother heard a few gasps after digging him out.

RESCUE

After Bradie was uncovered the other two members arrived and began resuscitation efforts (CPR). They called a friend in the valley who alerted 911 at 4:44 PM. The friend quickly headed to the scene. At 4:51 PM. Gallatin County Sheriff Search and Rescue (GCSSAR) paged rescuers to respond. At some point the party removed Bradie's chest protector to perform more effective CPR.

About 6 GCSSAR members arrived at approximately 5:40 PM. after determining the scene was safe from secondary avalanches. They continued CPR until the automated external defibrillator (AED) arrived. The unit's pads were placed on Bradie's chest, but the AED did not detect electrical activity and voiced, "Shock not advised. Continue CPR." The AED was powered off and on again with the same results. Since over an hour had passed since the avalanche and CPR was unsuccessful, resuscitation efforts were stopped at 5:58 PM.

GCSSAR evacuated Bradie in a toboggan to the trailhead. The coroner's investigation concluded he "died of asphyxiation after being buried in avalanche debris."

WEATHER

Seasonal snowfall and precipitation data through the end of January, 2022, are from the Madison Plateau SNOTEL site at 7,750', 12 miles ESE of the accident site. Snowfall and precipitation data for the month of February, 2022, are from the Black Bear SNOTEL site at 8,170', 15 miles SE of the accident (Madison Plateau SNOTEL data, which better reflects conditions at the accident site, is unavailable for this time period). Wind data is from the Lionhead Ridge weather station at 9,400', 1.6 miles NW of the accident.

The month preceding the accident had little snowfall, with only 14" of snow falling between January 8 and February 6, equal to 1.0" snow water equivalent (SWE). Five inches (0.3" SWE) fell on January 31 and February 1 and an additional three inches (0.2" SWE) fell during the 48 hours prior to the accident (Figure 1).

On February 6, winds at Lionhead Ridge were 5-10 mph out of the northwest with gusts up to 30 mph. Over the previous week, winds were out of the west and northwest with periods of sustained 20 mph and gusts up to 40 mph (Figure 2). At the time of the accident the temperature at Lionhead Ridge was 20 F.

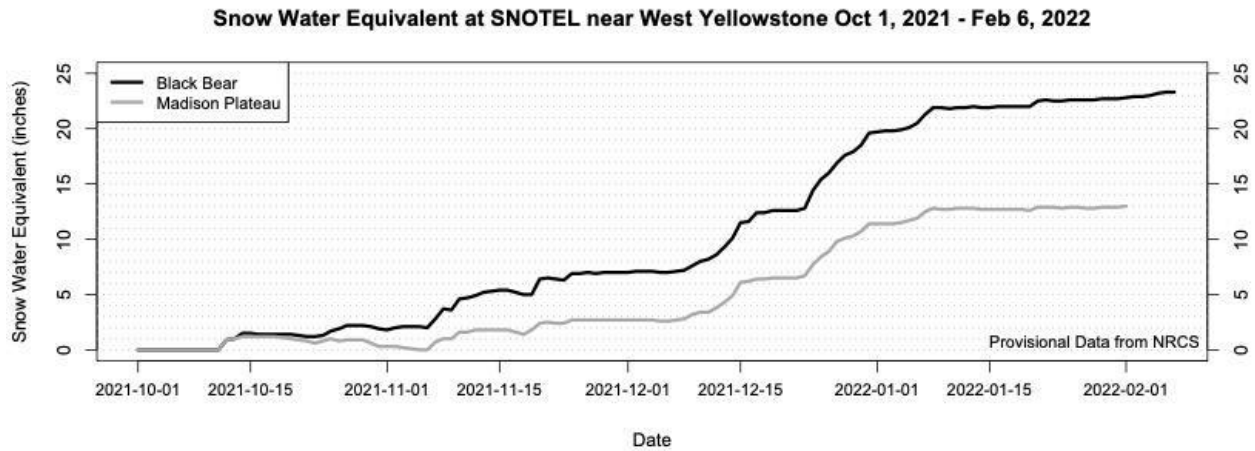


Figure 1. Snow water equivalent (daily values at midnight) at Black Bear and Madison Plateau SNOTEL sites from October 1, 2021 to Feb 6, 2022.

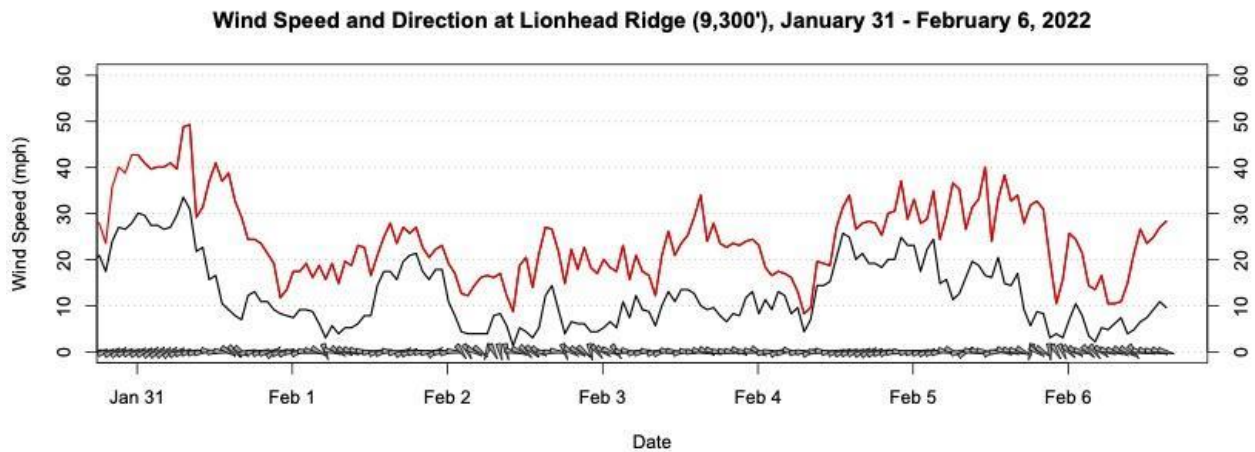


Figure 2. Wind speed and direction (hourly) from Lionhead Ridge from January 31 to the time of the accident on February 6, 2022. Wind direction is displayed as arrows along the bottom of the graph, and shows a generally west-northwest wind direction for the week prior to the accident.

SNOWPACK

The avalanche occurred at 8,125’ elevation on an east aspect (90 degrees) on a slope locally referred to as “Ski Hill” at the south end of Lionhead Ridge, located west of West Yellowstone, MT. The slope angle was measured 36 degrees at the crown and 45 degrees at the steepest point along the path. The avalanche broke 4”-11” deep, ran 275’ vertical and 75’ wide. The runout angle (toe of debris to crown) was measured to be 28 degrees. The avalanche is classified SS-AMu-R1-D2-O.

The avalanche broke on a weak layer of “fist” hardness near-surface facets (1-2 mm size) that had a few surface hoar crystals mixed in. The slab was 4”-11” deep and consisted of snow that fell over the

previous two weeks (F to 1F hardness). The snowpit was dug the morning after the avalanche on February 7 (Figure 3).

A warm and dry fall of 2021 led to below average snow depth. In early December there was less than a foot of snow on the ground near the accident site. This shallow snowpack was a mixture of melt-freeze crusts and weak faceted snow. Snowfall started in earnest on December 8 with 7-8 ft falling in a series of storms through the remainder of December with 8.8" of SWE. The GNFAAC began issuing daily avalanche advisories on December 10, with the danger shifting between MODERATE and CONSIDERABLE through the rest of December. The first week of January, 2022 brought a little over a foot of snowfall equal to 1.4" SWE and CONSIDERABLE danger. The remainder of January was dry, with only a few inches of snowfall. The avalanche danger dropped to LOW on January 14 and remained at LOW through the rest of January and early February. Only two large avalanches (one mid-December and one in early January) were reported in the Lionhead Area through the entire 2021-'22 season prior to the accident.

On January 18, a layer of near-surface facets and surface hoar was preserved under a dusting of new snow. Over the remainder of January clear skies and cool temperatures metamorphosed the few inches of new snow into a thicker layer of near-surface facets. The avalanche broke on this layer. Light snowfall and wind-loading during the two weeks prior to the accident built a thin slab above these weak layers.

On the day of the accident, February 6, the Gallatin National Forest Avalanche Center rated the avalanche danger for the Lionhead Area as LOW. The avalanche forecast stated:

Near West Yellowstone, Big Sky, and in the Bridger Range avalanches are unlikely or will be small. These areas got 5-10" of snow earlier this week which was drifted into slabs that might remain unstable in isolated areas. The last couple days wind was moderate to strong, but had minimal snow left to blow into drifts, and today wind has decreased to light with a few moderate gusts. Recently formed drifts have become generally stable. If you travel in steep terrain stay alert for areas of isolated instability, and carefully evaluate the snowpack for wind-loading and buried weak layers. Large avalanches are unlikely and the avalanche danger is LOW near West Yellowstone, Big Sky and the Bridger Range.

[GNFAAC Avalanche Forecast for Sun Feb 6, 2022](#)

It is likely that the victim triggered the avalanche as he sidehilled across the slope. There were other, older, snowmobile tracks on the slope that avalanched. The slope was steep and the rider initiated a fracture in the weak layer of facets that propagated across the slope creating a shallow, but ultimately fatal avalanche.

Ski Hill Fatality
Henry Mtns
MT
 Elevation: **8125 ft**
 Aspect: **90°**
 Specifics: Pit is adjacent to avalanche: crown; Snowmobile tracks on slope

Doug Chabot-Admin
02/07/2022 - 10:30am
 Co-ord: **44.70577N, -111.29895W**
 Slope Angle: **36°**
 Wind Loading: **previous**

Stability:
 Air Temperature: **-7°C**
 Sky Cover: **CLR**
 Precipitation: **NO**
 Wind: **Calm**

HS:110 Layer Notes:
 85-84cm: **decomposing**
 84-82cm: **Fx at 82cm**
 84-82cm: **Problematic layer**

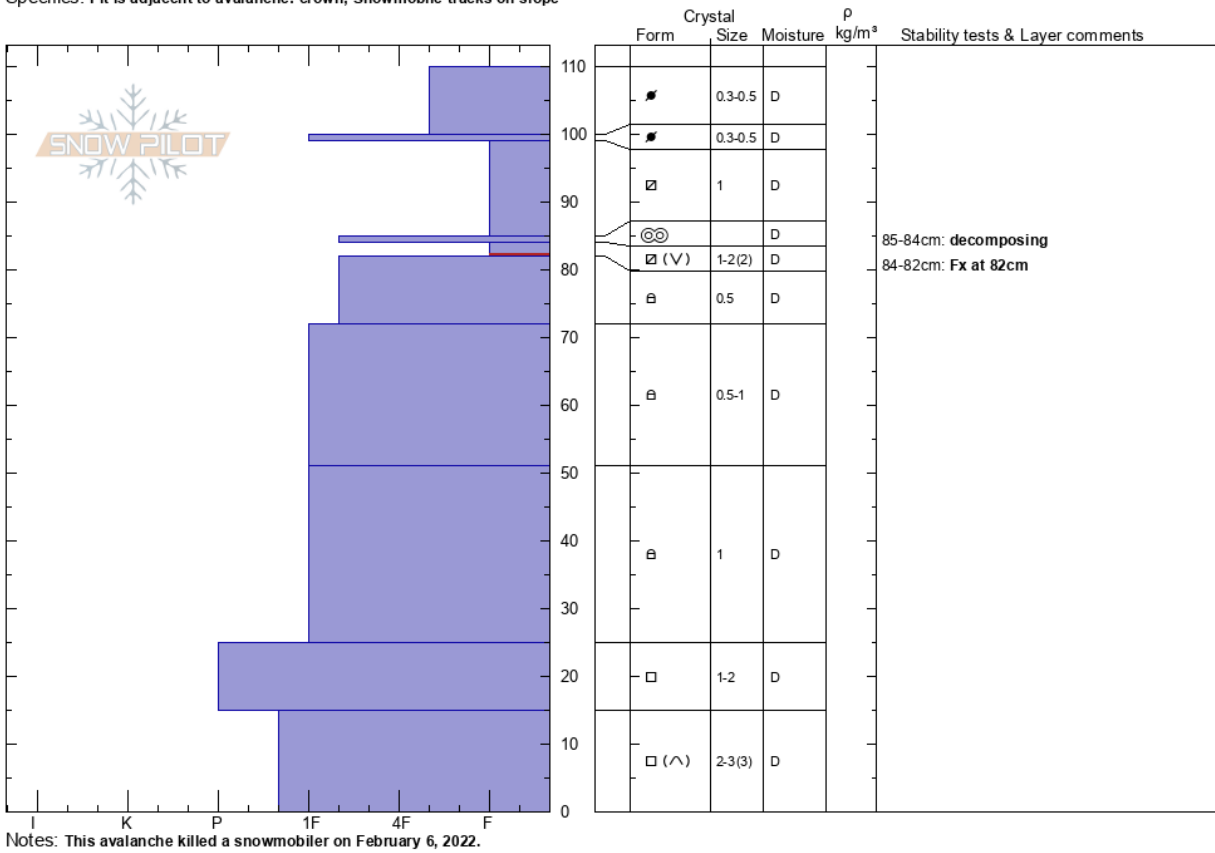


Figure 3. Snowpit profile from the crown of the avalanche. Observed by GNFAC forecasters on 2/7/22.

INVESTIGATION

Doug Chabot of the GNFAC obtained details of the accident during the recovery efforts and through interviews with party members on February 6 and 7.

Any questions should be directed to:

Doug Chabot

Director

Gallatin National Forest Avalanche Center

406-587-6984

Douglas.Chabot@usda.gov

Avalanche Overview



1. Avalanche size: 75' wide by 275' vertical.



2. The avalanche path and crown are to the right. The victim's location is marked with an X.



3. Looking up the slope. The victim was to the left of where the 2 people are standing.



4. Investigating the weak layer in the snowpit.



5. The crown of the avalanche was 75 feet wide.



6. The victim was found at the tree with the pack next to it.



7. The victim was dug up where the pack is. His back was against the tree, head uphill.