Colchuck Peak Fatalities
February 19, 2023

Report by Matt Primomo, Katie Warren, Dallas Glass and Dennis D'Amico

Incident Summary

On February 19th, a group of six climbers attempted the Northeast Couloir route on Colchuck Peak. At approximately 1:15pm, while ascending, the lead climber triggered a slab avalanche that caught and carried four members of the team approximately 1,000 vertical feet. All four climbers suffered traumatic injuries during the event, three perished. The remaining teammates attempted to evacuate all individuals but were unsuccessful. The Chelan County Sheriff's Office was notified of the accident Monday morning, February 20th. Mountain rescue teams met the remaining survivors at Colchuck Lake and assisted the injured party member to the trailhead.

On Friday February 24th, a helicopter rescue team located and removed one of the deceased individuals. Ongoing avalanche hazard and inclement weather continued to delay recovery efforts. As of late March 2023, the two remaining deceased climbers are assumed to be buried by additional snowfall and subsequent avalanches near the base of the couloir.

Occurrence Time and Date: Approx 1:15 pm on February 19, 2023.
Time First Reported to SAR: Approx 8:30 am on February 20, 2023.
Recovery/Rescue Time: Recovery efforts ongoing.
Lat/Lon: Approx. 47.47885, -120.84439
Location: Northeast Couloir, Colchuck Peak, Stuart Range, Okanogan-Wenatchee N.F. Chelan, Co, Washington.
Number in Party: 6
Number Caught: 4
Number Partially Buried, Critical or Not-critical: 0
Number Completely Buried: 0
Duration of Burial: N/A
Number Injured: 1
Number Killed: 3

Avalanche Type: Slab (unknown if hard slab or soft slab)
Trigger: AFu
Size: D1.5
Start Zone Aspect: N-NE-E
Start Zone Angle: Est. 45 degrees
Start Zone Elevation: Approx: 8,200ft

Height of Crown Face and Width of Fracture: Unknown
Vertical Fall: Approx 1,000ft.

Slab, Weak Layer and Bed Surface Characteristics: Unknown
Avalanche involved a terrain trap: Yes. Steep, confined terrain with rock walls, outcroppings, and constrictions.
Number of people that crossed start zone before avalanche: None
Avalanche occurred during: Ascent

Location of group in relation to start zone during avalanche: All six group members were in the couloir. Four climbers were higher on the route. Two members were below a large rock and somewhat protected from overhead hazard.

Avalanche Safety Gear Carried: None
Avalanche Training: None
Experience at Activity: The climbers had varying degrees of experience, from novice to intermediate, and one had advanced experience. Members in the group had climbed peaks such as Denali, Mount Adams, and Mount Whitney.

Signs of Instability Noted by Group: Blowing snow

Extent of Injuries or Cause of Death:

- Climber 1: Severely injured but conscious and ambulatory. He later succumbed to traumatic injuries. M.E. cause of death: Trauma, including a back injury.
- Climber 2: Reported to have obvious head trauma. (medical examiner's report pending)
- Climber 3: Unknown cause of death, likely trauma. (medical examiner's report pending)
- Climber 4: Reported two injured knees and an ankle injury.

NWAC Forecast Zone: East Central Zone
Avalanche Danger Rating (Above, Near or Below Tree-line):
The forecasted avalanche danger was Moderate near and above tree-line, and Low below-treeline at the time of the accident, with increasing danger during the day (Appendix A).

Terrain
Colchuck Peak (8705ft) is part of the Stuart Range, a sub range of the Cascade Mountains. It sits approximately 15-20 miles east of the Cascade Crest. Other peaks in the area are typically 8000-8500ft tall and exposed to strong alpine winds. Many mountains in the region are classic alpine climbing objectives during the summer months. However, deep wintertime snow, harsh weather, and long approaches make them difficult to access for much of the year.
The Colchuck Lake area is a NNE facing alpine basin ringed by large rock massifs. Extremely steep cliffs and sharp ridges rise roughly 2000 vertical feet from just above the lake to the peaks' summits. Several very steep couloirs and alpine passes are the only breaks in the towering walls.
One of these chutes, the Northeast Couloir on Colchuck Peak, rises approximately 1500 vertical feet from the Colchuck Glacier to the ridgeline near the summit (Image 1). The couloir often has a narrow ice choke in the lower third. Steep snow with perennial snowfields make up the middle section. The upper part of the route is very steep, often reported as challenging and hard to protect mixed climbing (rock, ice, and snow). Large cornices frequently form along the ridge at the top of the climb. The couloir is full of exposed rocks, short cliffs, and narrow chokes. Slope angles frequently range from 40 to 50 degrees or more for nearly the entire length of the route (Image 2).

Avalanche
Due to the high consequence nature of the terrain, ensuing stormy weather, limited visibility, and ongoing avalanche danger, very few specifics are known about the avalanche. However, GPX tracks and interviews with the survivors provide some insights.
The avalanche occurred high within the NE Couloir at around 8200ft. This N to E facing terrain often contains slope angles near or above 45 degrees. Given the confined nature of the chute, it would typically only be

capable of producing relatively small avalanches (D1-2 in size). This corresponds with the description given by the group and the lack of initial burials. Based on this information and statements by the party, the avalanche was likely a D1.5 in size.
Given the extremely steep, sustained nature of the terrain, debris from the slide descended at least 1000 vertical feet to near the base of the couloir where slope steepness eases.

Snowpack
Similar to the avalanche characteristics, conditions limited direct snowpack information gathering at the accident site. Using data from regional weather stations and direct observations near Colchuck Lake we can make some statements about the area's snowpack.
Due to its position east of the Cascade crest, the Stuart Range often experiences colder temperatures, less precipitation, and shallower snowpacks than other mountainous areas of western Washington. At the time of the accident, snow depths near Colchuck Lake (5570ft) were around 150 to 200cm (~5-7ft) deep. Based on regional weather stations, this is near the seasonal average for mid-February.
The high nature of the peaks in the Stuart Range make them particularly susceptible to alpine winds. Observations from around the East Central forecast zone indicated wind transported snow and wind slab formation in the days leading up to February 19th. Observations near Colchuck Lake 2 days following the accident also showed wind drifted snow, even at these lower elevations.
At the time of the avalanche, several centimeters of new snow sat over a melt-freeze crust buried on February 13th. An additional 40-50cm (~1.5ft) of snow fell near Colchuck Lake beginning February 19th through the 22nd. .

Weather Summary
A warm storm on February 12th began with high snow levels, up to approximately 7000ft, on the east slopes of the Cascades. This formed a crust on the surface of the snowpack. Temperatures cooled, and additional storms continued to pass through the region bringing incremental snowfall.
Between February 16th and the accident on February 19th, weather stations in the East Central zone recorded moderate to strong westerly winds (Fig 1,2). Accompanying these winds, light showers brought intermittent snow (Fig 3).
On the morning of the 19th, the party reported light snowfall which became heavier while they ascended. An incoming winter storm began to impact the area with increasingly strong west-northwest winds during the afternoon on the 19th. The winds resulted in blowing snow that likely deposited slabs on lee aspects and scoured windward slopes in the days and hours leading up to the avalanche.

Accident Summary
A group of 11 climbers from various locations, many unfamiliar with the local mountains and snowpack, met in Leavenworth, WA to attempt winter alpine climbing objectives in the Colchuck Lake basin. The team completed the roughly 8 mile snow approach on Friday, February 17th, and established a camp on the north end of the lake. On Saturday, February 18th, part of the team attempted to climb nearby Dragontail Peak, but turned around due to members of the group not feeling well. Four of the 11 teammates returned to Leavenworth that evening.
On the morning of Sunday, February 19th, 6 of the remaining 7 climbers departed to attempt the Northeast Couloir on Colchuck Peak (Fig 4). One teammate did not feel well and remained in camp.
The steep, sustained, technical route rises from the Colchuck Glacier (~7000ft) to near the summit (8705ft). The team used ice axes and crampons on their ascent. They did not deploy ropes. The party was roughly two-thirds of the way up the route when they triggered a slab avalanche around 1:15pm (Image 3).

Climber 4 reported seeing the lead climber (1) plant his ice axe just as the avalanche released. The four upper teammates (1,2,3, and 4) were all caught and carried down approximately 1000 vertical feet. A large rock outcrop sheltered the two lower climbers (5,6) from the main flow of the slide and prevented them from being caught. Uncertain of what happened to their teammates, climbers 5 and 6 ascended to see if anyone from their party remained above. They reached an elevation of approximately 8400ft around 2pm. Unable to locate the others, they began descending the route (Fig 5).

Rescue Summary

Climbers 1, 2, 3, and 4 were all on top of the debris when the avalanche came to rest. Climber 4 was alert and, despite leg injuries, able to move. He located climber 3 who was unconscious and not breathing. Climber 3 initiated CPR but resuscitation efforts were unsuccessful. Climber 2 was also unconscious and not breathing, and had sustained obvious head trauma. Climber 1 was found seriously injured, but alert and able to move.
The descending climbers (5,6) reached their two initially surviving teammates at around 5pm. The group then decided to return to camp and initiate a rescue with assistance from outside resources. Due to his injuries climber 1 could not travel to camp under his own power. He persuaded the others to continue without him and seek help. The remaining three climbers reached their tents around 8:15pm.
Climber 7, who had remained in camp all day, was sent to seek outside resources to assist in the rescue and recovery efforts. He traveled through the night, arriving at the winter parking area the next morning. He proceeded to the Chelan Co. Sheriff's Office in Leavenworth, WA notifying the authorities around 8:30am Monday, February 20th.
That same morning, Climbers 5 and 6 returned to the accident site in an attempt to rescue Climber 1. He was found at approximately 6,300ft on the moraine of the Colchuck Glacier. Unfortunately, he had succumbed to his injuries. Climbers 2 and 3 could not be located. They were buried by new snow overnight and possibly subsequent avalanches.
Twenty-two rescuers from various local and regional Mountain Rescue and SAR groups made a rapid response to the winter parking area, Bridge Creek Campground. Four from Chelan County Mountain Rescue drove in a tracked side-by-side about 4 miles up to the summer trailhead (Mountaineer Creek Trail). From there, they snowshoed to the party's base camp arriving at approximately 1:30 pm. They determined avalanche conditions were too dangerous to continue up to the three deceased climbers, and transitioned their focus toward helping escort the surviving three members back to safety. They arrived back at the Bridge Creek trailhead on the evening of February 20th.
On February 21st, very dangerous avalanche conditions, strong winds, and additional snowfall prevented recovery efforts. Chelan County Sheriff's Office and NWAC forecast staff were able to gather information from the surviving members of the party. NWAC forecasters visited the basin on Wednesday, but poor visibility limited observations to the immediate vicinity of Colchuck Lake.
Weather conditions finally eased on Friday February 24th. Chelan County Sheriff's Office, Chelan County Mountain Rescue, and Snohomish County Helicopter Rescue team continued the search for the 3 deceased individuals. They located climber 1 on the moraine under about a foot of snow and recovered his body. They also used a helicopter mounted Recco detector to search the areas near the base of the couloir. Personnel were inserted to the scene via hoist to probe likely burial locations. Unfortunately, all attempts at locating the bodies of climbers 2 and 3 were unsuccessful.
Following February 24th, elevated avalanche danger and poor weather conditions further delayed recovery efforts. The remaining 2 victims are still unaccounted for, and believed to rest in the debris cone at the bottom of the couloir. Multiple storms have impacted the region since the accident, and their bodies may be deeply buried by additional snow and avalanche debris. Recovery efforts will resume when weather and avalanche conditions permit.

Commentary / Discussion / Important Points

*Terrain***:** The unforgiving terrain of the Northeast Couloir route of Colchuck Peak resulted in the loss of three lives despite the small size of the avalanche. Due to steep slope angles, extensive vertical relief, and frequent terrain traps, climbing routes are particularly susceptible to avalanche hazard. This small avalanche resulted in a long and traumatic fall through exposed rocks, short cliffs, and narrow walled chokes. These features can quickly magnify the consequences of even the smallest slide.
Travelers may comfortably navigate small wind slabs on more open and less consequential slopes. However, the terrain traps encountered on a climbing route such as the NE Couloir can make even the smallest avalanches deadly.

Equipment:

Communication Devices : The ability to communicate in an emergency with teammates and outside resources can greatly increase the speed and effectiveness of a rescue. Immediately following the avalanche, climbers 5 and 6 were unsure what happened to their teammates. As a result, they climbed higher on the route before descending to the surviving members of their party. Radios can provide quick communication between individuals to aid safe travel practices and in the event of emergencies or accidents.
Additionally, the ability to communicate with outside resources can expedite assistance. In some instances, a cell phone may be sufficient to call for help. However, in more remote wilderness environments such as Colchuck Lake, satellite communication devices may be the only practical tool to reach local authorities during an emergency.

Avalanche Rescue Gear: It is believed all three individuals died due to trauma, and therefore avalanche rescue gear would likely not have saved lives in this particular accident. However, avalanche transceivers would allow teammates and/or search and rescue members to quickly locate the victims in the event of subsequent avalanches or additional snowfall.

Personal Protective Gear: Three of the four victims caught and carried in the avalanche were not wearing helmets. The one surviving victim was wearing a helmet. While it is not certain how helmets would have influenced the result of this incident, wearing helmets can provide additional protection against traumatic brain injuries.

Multi-day Trips: There are many challenges inherent to multi-day wilderness trips especially during the winter. Typical resources, such as weather and avalanche forecasts used to assess hazard and plan may be limited or absent. Without the support of a daily avalanche forecast, it is up to the team members to evaluate weather and snowpack conditions and determine potential hazards each day. This takes a high level of training, skill, and experience.

Supporting Material

Image 1: An overview of terrain including Colchuck Peak and the NE Couloir route. Photo taken: 02/24/2023

Image 2: The NE Couloir route on Colchuck Peak in winter conditions.

Image 3: The approximate location in the NE Couloir Route where the party triggered the avalanche and came to rest. Photo taken: 02/24/2023

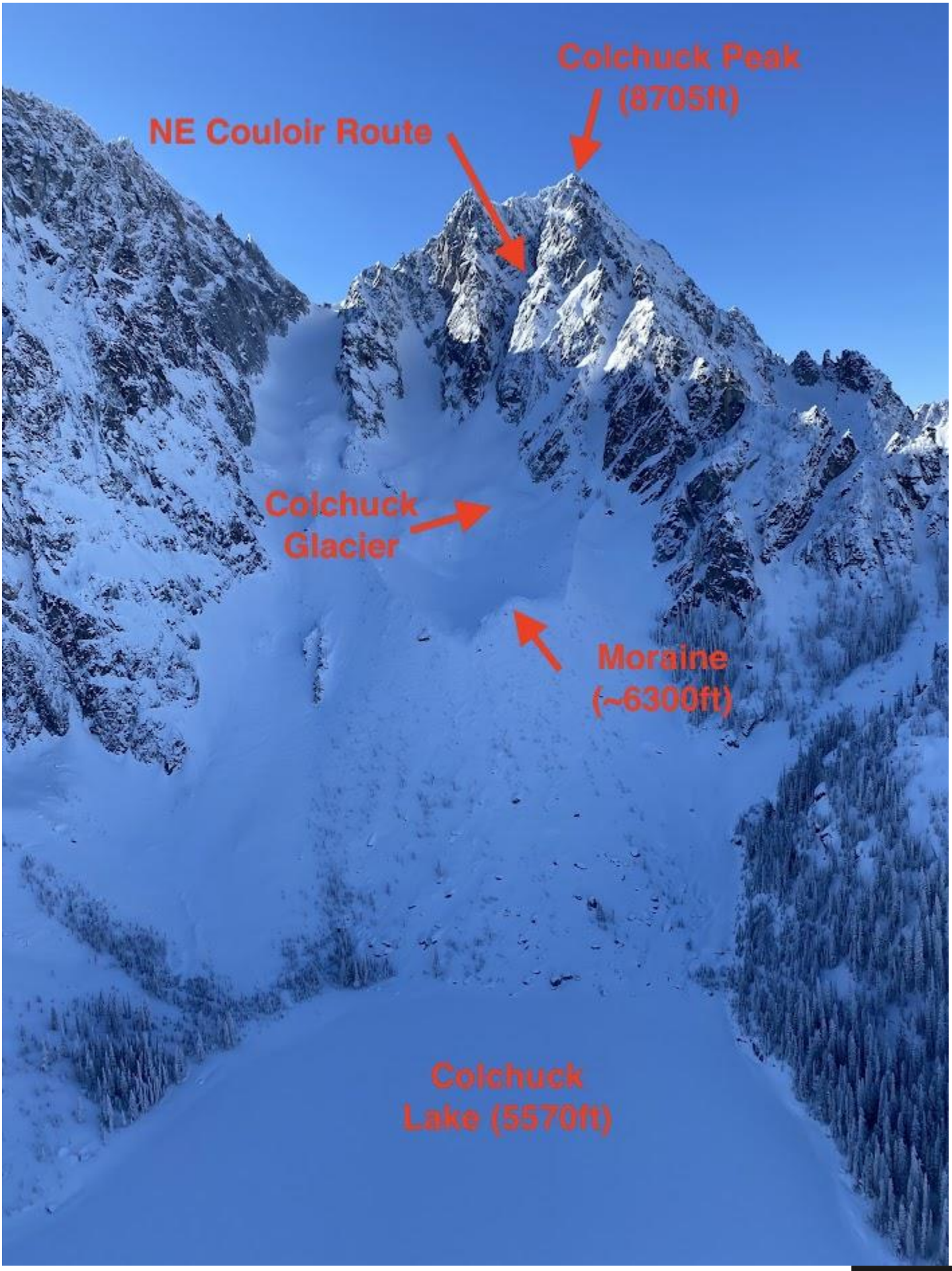
Map 1: Colchuck Lake basin, including Colchuck Peak, the NE Couloir route, and approximate camp location.

Map 2: The NE Couloir route showing the approximate location the party triggered the avalanche and where the victims came to rest.

Figures 1-3: Weather Station Plots

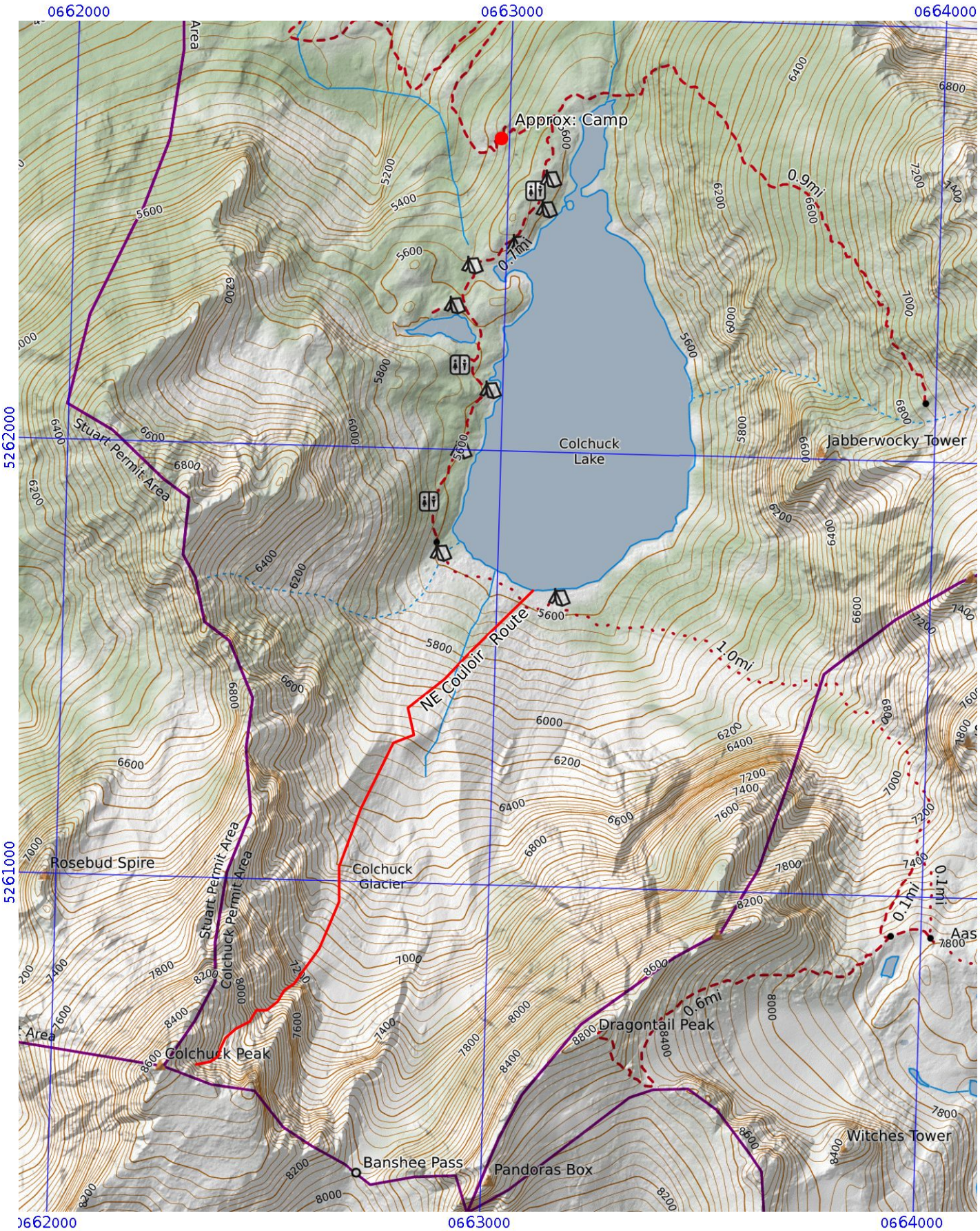
NWAC Avalanche Forecast valid 2/19/2023

USFS Avalanche Accident Short Form (Names Withheld)


Colchuck Peak
(8705ft)
NE Couloir Route
Colchuck
Glacier
Moraine
(~6300ft)
Colchuck
Lake (5570ft)


NE Couloir Route


Colchuck Peak
Avalanche Incident
NE Couloir
2-19-2023
Approximate location of climbing team when they triggered the avalanche
Approximate location where the 4 victims caught in the avalanche came to rest.



Mercator Projection
WGS84
UTM Zone 10T

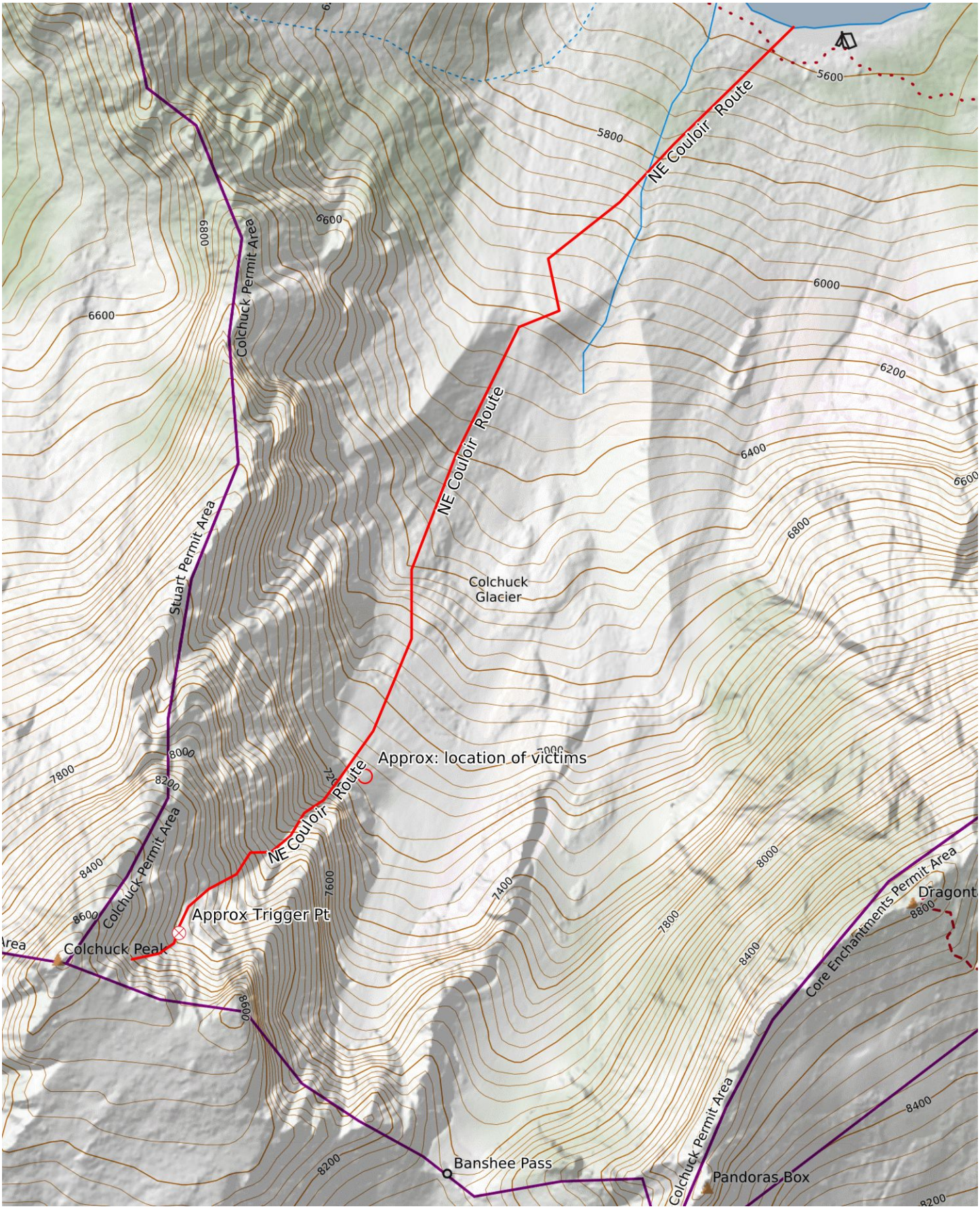
CALTOPO

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 km

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 mi

Scale **1:12000** 1 inch = 1000 feet

GN 1.6º
MN 15.0º



Mercator Projection
WGS84
UTM Zone 10T

CALTOPO

0.1 0.2 0.3 0.4 0.5 0.6 0.7 km

0.1 0.2 0.3 0.4 mi

Scale **1:6000** 1 inch = 500 feet

MN
15.0º

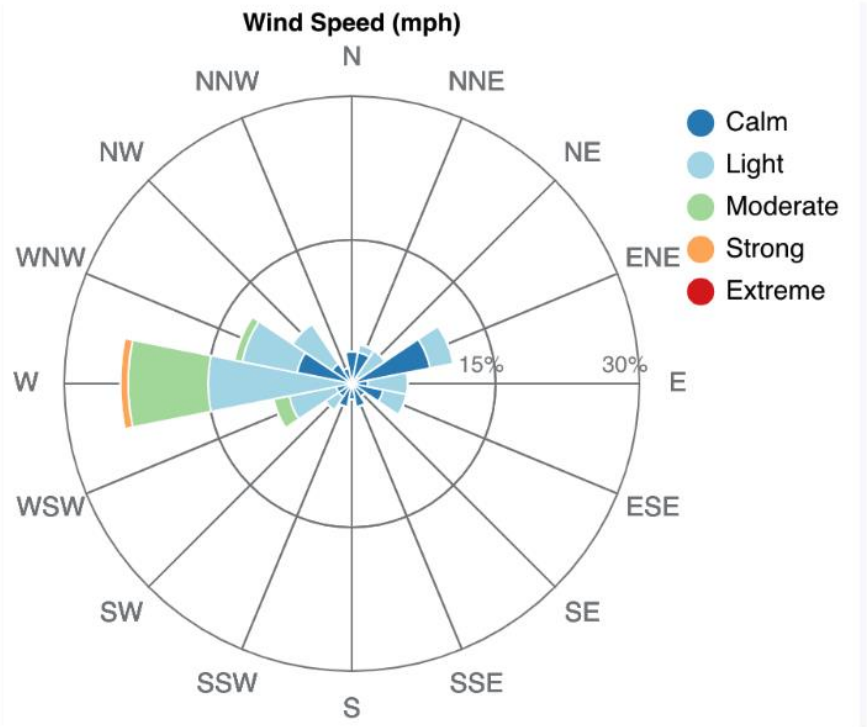


Figure 1: Wind speeds and directions at the Tumwater Canyon weather station, February 16-19, 2023. Elevation: 4180ft.

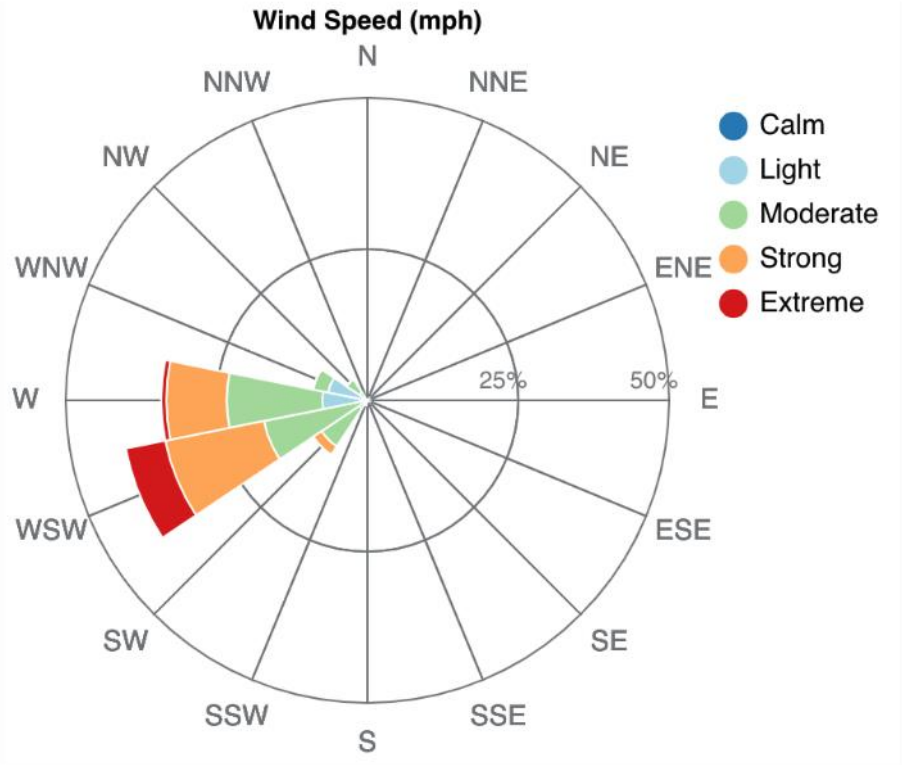


Figure 2: Wind speeds and directions at the Mission Ridge Ski Area weather station, February 16-19, 2023. Elevation: 6730ft.

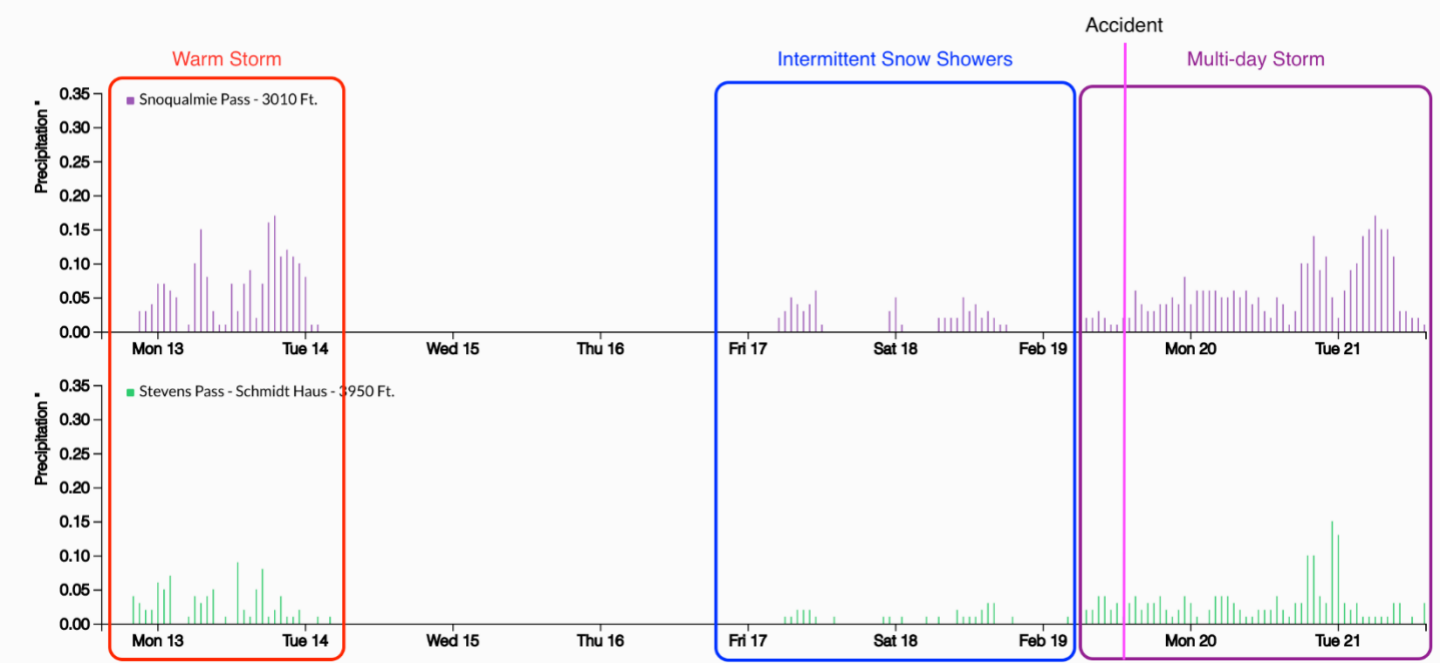


Figure 3: Hourly precipitation at Snoqualmie Pass (3010ft) and Stevens Pass (3950ft) between February 13-22, 2023. It's very likely that less precipitation likely fell at the accident site due to it's position east of the Cascade crest and the weather pattern at the time.

NORTHWEST AVALANCHE CENTER - HTTPS://WWW.NWAC.US/

BACKCOUNTRY AVALANCHE FORECAST

EAST SLOPES CENTRAL

ISSUED

Saturday, February 18, 2023 - 6:00PM

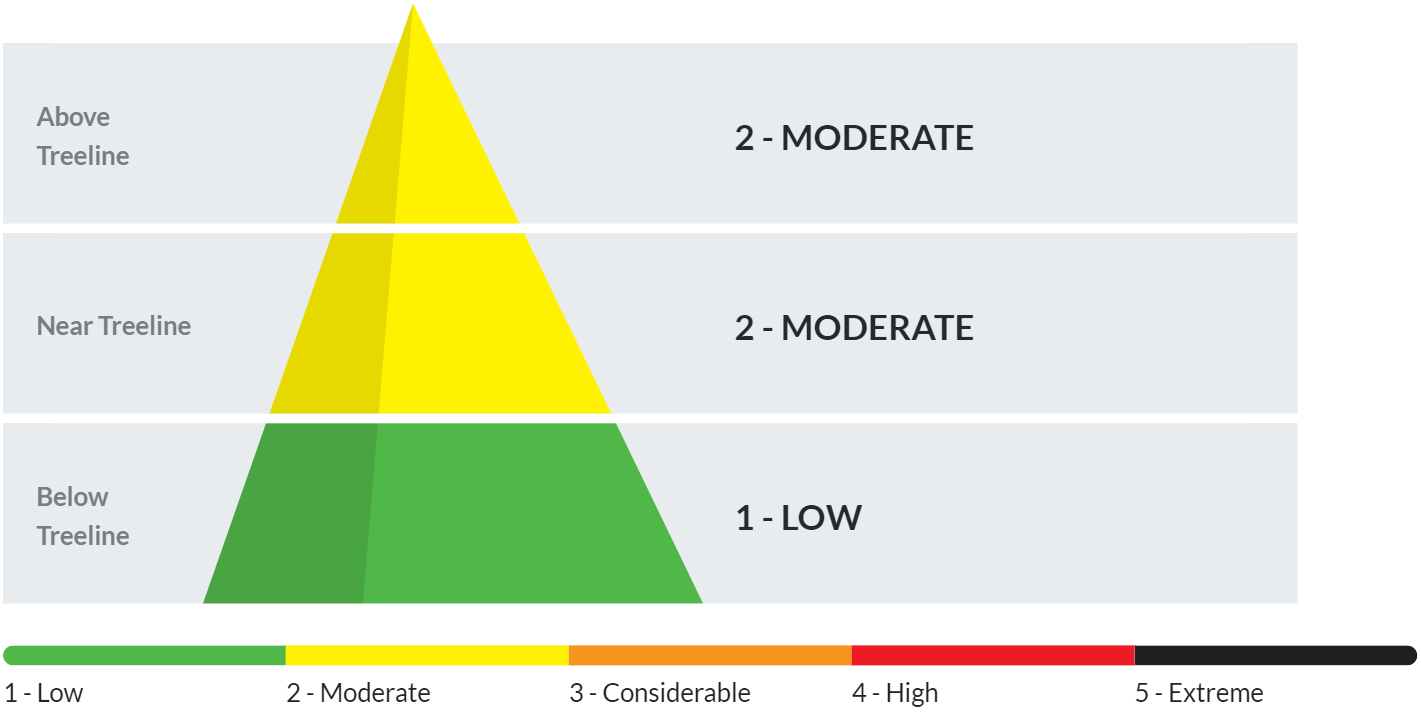
AUTHOR

Matt Primomo

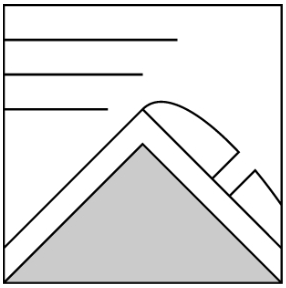
THE BOTTOM LINE

Expect increasing danger on Sunday as a multi-day storm begins to affect the area. Wind slabs should grow in size at upper elevations near the crest, and could be reactive on a recently buried weak snow or a slick crust. Take a step back in your terrain selection, identifying large steep slopes in the wind zone that hold questionable stability.

AVALANCHE DANGER

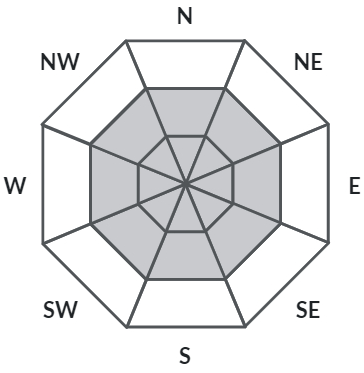


AVALANCHE PROBLEM #1

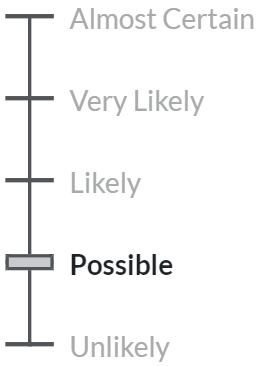


Wind Slab

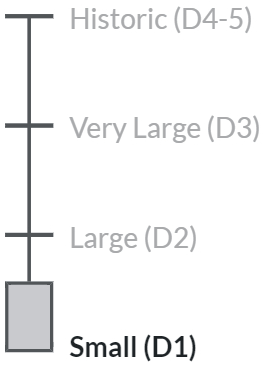
PROBLEM TYPE



ASPECT/ELEVATION



LIKELIHOOD



SIZE

Wind slabs should become larger and easier to trigger as the day progresses on Sunday. Higher elevation areas closer to the crest may see heightened danger during the second half of the day as new snow and winds build thicker slabs. You could also trigger wind slabs at mid elevations and sparsely treed slopes as well. You'll generally find lower danger below treeline, and further east in the range where less snow is available for the wind to drift it.

Look for active wind transport and increasing snowfall rates as indicators that slabs are forming. Use practical tests to check for signs of instability like shooting cracks as you gain elevation. In many areas you'll still be able to avoid the wind slab problem by steering around stiffer and textured pillows, though at higher elevations you might want to avoid entire slopes.

There is a chance that a slab could step down into deeper buried weak layers and become a large, more destructive avalanche. This problem is particularly concerning in areas near and around Stevens Pass. Although uncertainty exists, similar conditions could also linger in areas further east. With this increased uncertainty, travel with a conservative mindset and consider wider safety margins.

FORECAST DISCUSSION

We're in for a change, the primary things to convey are that:

1. Snow totals should begin to add up in the mountains over the next few days with strong winds, and

2. Avalanche danger is expected to increase substantially from Sunday afternoon through Tuesday.

We've been finding anywhere from 2" to 12" of recent snow over the crust that was buried on February 13th. Winds have been redistributing a substantial amount of snow at upper elevation. Both in the Salmon la Sac and eastern Highway 2 corridor, we've found the crust from the 13th to be fairly thin and breakable, with weaker snow beneath it. This structure is cause for concern going into this prolonged storm. We're likely to see avalanches break above and below this recent crust, and could see slides run on even deeper weak layers. Lower elevations hold low danger, but one can still find some nice 'corn' snow, or refrozen grains and a crust that has been freezing and thawing in the sun each day.

A crust from MLK weekend has been problematic for deeper slab releases in zones to the west. Some large and very large avalanches with wide propagation occurred from the 8 through the 13th in the Stevens Pass and Snoqualmie zones. These avalanche occurrences are worth noting if you plan to travel along the western edge of the East-Central zone. You should consider the high consequences of triggering a larger and more surprising avalanche.

WEATHER SUMMARY

Issued on 2:25 PM PST Saturday, February 18, 2023 by Robert Hahn

East Slopes Central	Saturday Night		Sunday	
	Evening	Overnight	Morning	Afternoon
5000' Temperatures (Max / Min)	28 / 23 F		32 / 24 F	
Snow Level	3500 ft	3000 ft	2000 ft	3000 ft
Ridgeline Winds	WNW 15-25 mph	WNW 15-25 mph	WNW 25-35 mph	WNW 30-40 mph
Weather Forecast	Partly cloudy. Moderate ridgeline winds.		Increasing light rain and snow. Moderate ridgeline winds become strong at times.	
Precipitation (WE): Mission Ridge	0 "		0 "	
Precipitation (WE): Salmon la Sac - Gallagher Head	0 "		LT 0.25 "	

American Avalanche Association
Forest Service National Avalanche Center
Avalanche Incident Report: Short Form

Occurrence Date :20230219 and Time: 13:15 Comments: See attached accident report

Reporting Party Name and Address: Northwest Avalanche Center

Avalanche Characteristics:

Type: Slab, unknown hardness Aspect:N- NE-E

Trigger: AFu Slope Angle: Est 45 deg

Size: Unknown Elevation: 8,200 ☐m / Xft

Sliding surface (check one): Unknown

☐ In new ☐ New/old ☐ In old ☐ Ground

Location:

State: WA County: Chelan Forest: Wenatchee National Forest

Peak, Mtn Pass, or Drainage: Colchuck Peak

Site Name:Northeast Couloir

Lat/Lon or UTM: 47.47885, -120.84439

Group	Number of People	Time recovered	Duration of burial	Depth to Face ☐m /☐ ft
Caught	4			
Partially Buried—Not critical	0			
Partially Buried--Critical	0			
Completely Buried	0			
Number of people injured:1		Number of people killed:3		

Dimensions ☐m / ☐ft	Average	Maximum
Height of Crown Face	Unknown	
Width of Fracture	Unknown	
Vertical Fall	1,000ft	Est.1,200ft

Snow	Hardness	Grain Type	Grain Size (mm)
Slab	Unknown		
Weak Layer	Unknown		
Bed Surface	Unknown		
Thickness of weak layer:	☐mm / ☐cm / ☐in		

Burial involved a terrain trap? X no ☐ yes → type:

Number of people that crossed start zone before the avalanche: Zero

Location of group in relation to start zone during avalanche: ☐ high X middle ☐ low ☐ below ☐ all ☐ unknown

Avalanche occurred during X ascent ☐ descent

Equipment Carried

1	2	3	4	5	6	
☐	☐	☐	☐	☐	☐	Transceiver
☐	☐	☐	☐	☐	☐	Shovel
☐	☐	☐	☐	☐	☐	Probe
☐	☐	☐	☐	☐	☐	Avalung
☐	☐	☐	☐	☐	☐	

Experience at Activity

1	2	3	4	5	6	
☐	☐	☐	☐	☐	X	Unknown
☐	☐	X	☐	X	☐	Novice
X	X	☐	☐	☐	☐	Intermediate
☐	☐	☐	X	☐	☐	Advanced
☐	☐	☐	☐	☐	☐	Expert

Avalanche Training

1	2	3	4	5	6	
☐	☐	☐	☐	☐	☐	Unknown
X	X	X	X	X	X	None
☐	☐	☐	☐	☐	☐	Some
☐	☐	☐	☐	☐	☐	Advanced
☐	☐	☐	☐	☐	☐	Expert

Signs of Instability Noted by Group

☐ Unknown
X None
☐ Recent avalanches
☐ Shooting cracks
☐ Collapse or whumphing
☐ Low test scores

Injuries Sustained

1	2	3	4	5	6	
☐	☐	☐	☐	X	X	None
☐	☐	☐	X	☐	☐	First Aid
☐	☐	☐	☐	☐	☐	Doctor's care
☐	☐	☐	☐	☐	☐	Hospital Stay
X	X	X	☐	☐	☐	Fatal

Extent of Injuries or Cause of Death

1	2	3	4	5	6	
☐	☐	☐	☐	☐	☐	Asphyxiation
☐	X	☐	☐	☐	☐	Head Trauma
☐	☐	☐	☐	☐	☐	Spinal Injury
☐	☐	☐	☐	☐	☐	Chest Trauma
X	☐	☐	☐	☐	☐	Skeletal Fracture
☐	☐	X	☐	☐	☐	Other: Unknown

Damage Number of Vehicles Caught: 0 Number Structures Destroyed: 0 Estimated Loss: $ N/A

Rescue Method

1	2	3	4	5	6	
☐	☐	☐	X	X	X	Self rescue
☐	☐	☐	☐	☐	☐	Transceiver
☐	☐	☐	☐	☐	☐	Spot probe
☐	☐	☐	☐	☐	☐	Probe line
☐	☐	☐	☐	☐	☐	Rescue dog
☐	☐	☐	☐	☐	☐	Voice
☐	☐	☐	☐	☐	☐	Object
☐	☐	☐	☐	☐	☐	Digging
☐	☐	X	☐	☐	☐	Other: Helicopter visual

[redacted]