

*This photo-essay is neither a route-description nor a guide; it is intended to raise, among skiers already familiar with the area, awareness of hazards, to suggest **not** doing something. Take accredited 24-hour avalanche and avalanche rescue classes before joining skilled partners on a ski tour.*

The Kendall Trap

Charlie Hagedorn

The “Kendall Trees” is a loosely-defined area on the West side of Kendall Peak, adjoining Commonwealth Basin at Washington’s Snoqualmie Pass. With comparatively straightforward, often trail-broken, access and a lower-hazard approach, Kendall Trees gets an increasing amount of backcountry ski traffic. In particular, the Trees are a frequent ski destination in times of higher avalanche hazard. This essay is written for those experienced backcountry skiers who might storm-ski on Kendall.

The upper slopes of Kendall Peak have been the site of two recent avalanche accidents, one with a miraculous outcome, and one tragic. Accidents often hold precious lessons that come at the highest cost.

The Trap

The tour into the Trees is, unsurprisingly, almost-entirely treed. A skintrack generally ascends from Commonwealth Basin to gain a bench of older-growth trees, then ascends those trees to the top of a “Tree Triangle”, with avalanche terrain above and to both sides. Furthermore, the most-common skin-to-ski transition point is itself easily within avalanche terrain¹. It is here that a ski tourist stands at a margin of the Trap.

On the tour to reach the top of the Tree Triangle, a skier ascends 1,800 vertical feet entirely within sheltered and treed terrain, with negligible views of nearby peaks. The snowpack has been sheltered from wind, stabilized by tree drips, protected from sunshine, and insulated from clear/cold winter nights. The terrain above the trees is alpine in character: windswept, devoid of anchors, clear

¹The prominent slide path to the south of the Tree Triangle was formed from similarly mature timber by a large avalanche in 1990.



Figure 1: The upper west slopes of Kendall Peak, from West Granite Mountain. November 18, 2017

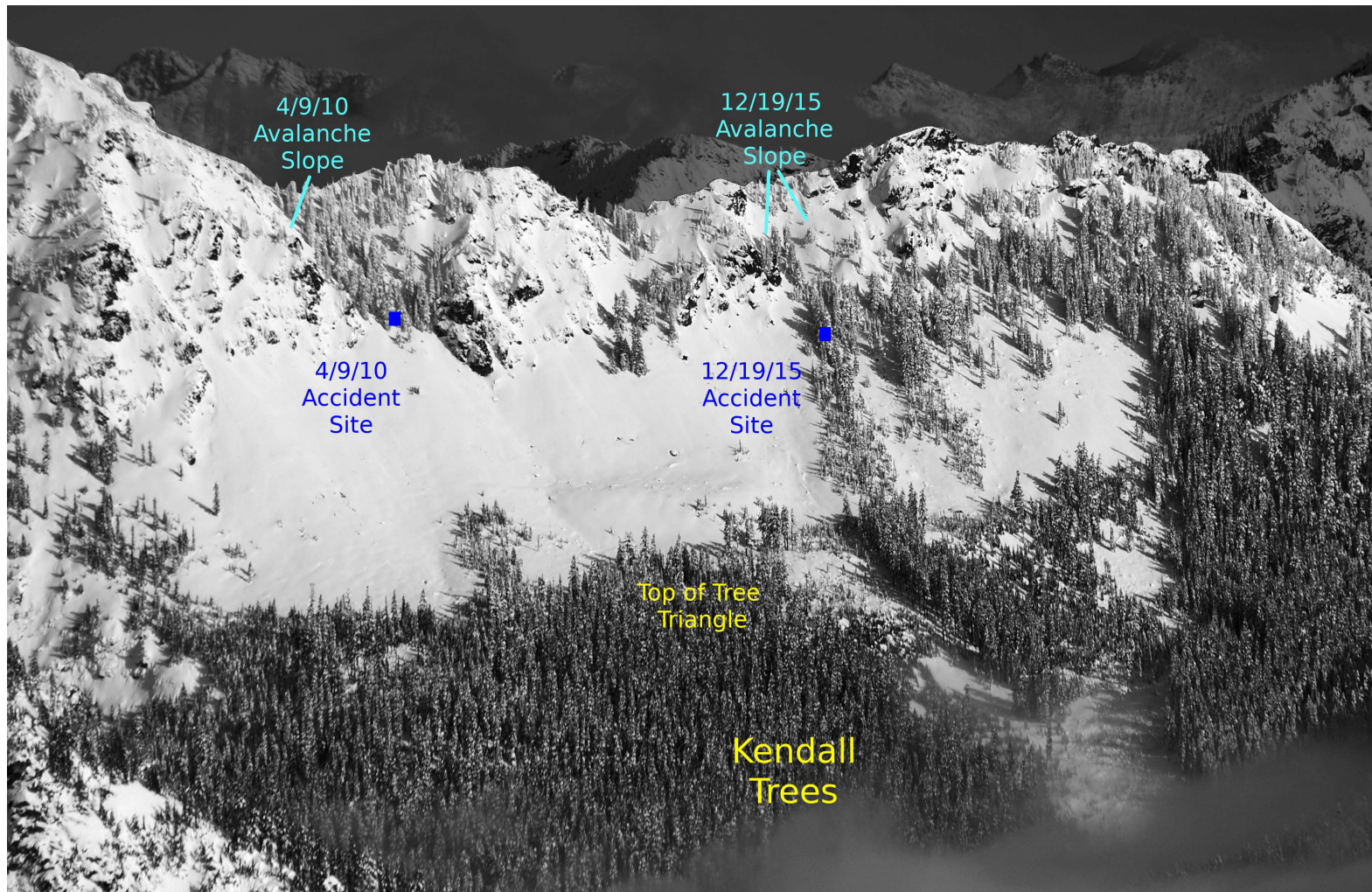


Figure 2: Upper west slopes of Kendall Peak, from West Granite Mountain. November 18, 2017, annotated.



Figure 3: Kendall's west slopes from Alpental. November 19, 2017

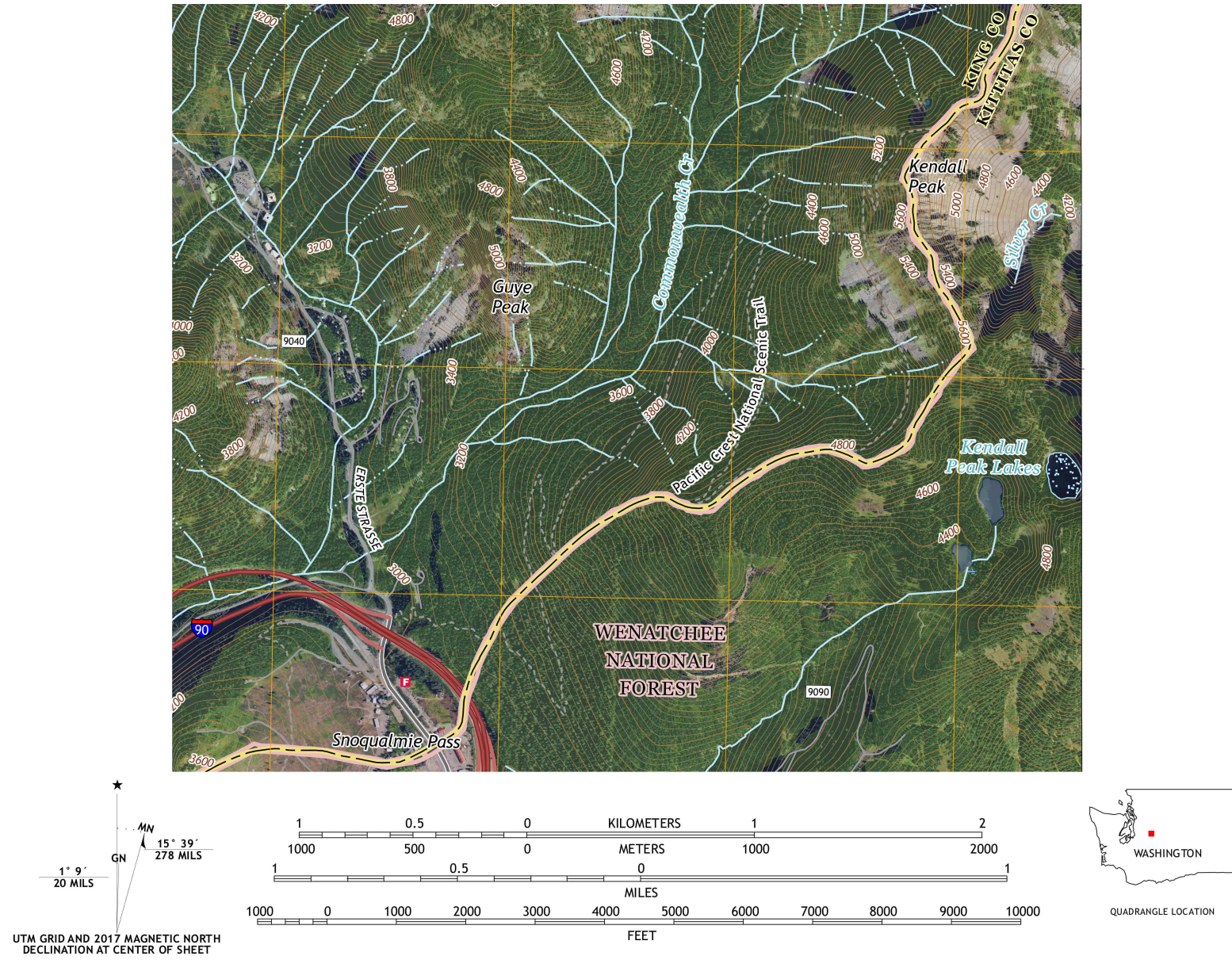


Figure 4: Map of Kendall Peak and Commonwealth Basin, in relation to Interstate 90 at Snoqualmie Pass (Map data: USGS [1])

to the sky, crenulated, and steeper. To leave the denser protection of the trees is to step into entirely new terrain, with a potentially radically-different snowpack.

The first steps out of the depths of the forest are generally low-risk; this is precisely what makes Kendall's west slopes a concern for the experienced and thoughtful skier. Both the most-hazardous and most-subtle terrain features are smoothly connected to less-hazardous terrain both below and to the South. The Trap draws skiers in with incremental increases in risk, rewards them with the skiing potential they seek, and can strike before increased risk is fully perceived.

Specific concerns

Wind Wind is perhaps the most important difference between Kendall's treed and alpine terrain. Windslab can build from both cross-loading and from the action of wind flowing directly over the summit ridgeline. The ridgeline gullies become more-deeply inset at higher elevations, creating pockets for localized windslab formation. Both the 2010 and 2015 accident's avalanche start zones are subtle or hidden entirely when viewed from below. The day of the 2015 accident, ski parties reached the ridge through several of the ridgeline gullies; windslab was reported only in the one which slid.

Assessment of windloading above the Trees must be deliberate and cautious; skiers may not feel windslab before it is a proximate hazard.

Slope angle The open slopes of Kendall smoothly increase in steepness. At the top of the Tree Triangle, the open slopes are less than twenty-five degrees. Within ~100m of travel, the slope has passed through thirty degrees. After 200m, the slope angle is firmly above thirty-five, and exceeds forty-five degrees in places near the ridgeline. What can initially feel like a conservative step into open terrain can become, "well, that lap was fun and stable, and the adjoining slope looks even more fun...." Without climbing on rock, there are unlikely to be any low-exposure routes to gain the ridgetop.

Furthermore, lower-angle slopes are connected to steeper terrain above. In some conditions, instability triggered on lower-angle slopes can propagate upward to produce a slide.

Skier Density A decade ago, one could ski the Trees and be pleasantly surprised to find another party. In 2017, more-constricted areas *above* Commonwealth Basin become moguled on a storm day.

Where once a party could lap more-protected terrain all day and cross only their own tracks, the most-heavily used slopes are now sometimes tracked by mid-morning. The search for fresh tracks pushes to the margins of their intended terrain for the day, and sometimes beyond.



Figure 5: Kendall's west slopes from the north shoulder of Silver Peak. March 19, 2017. The more-southerly facets of the ridgeline that can wind-load and cross-load are more prominent in this photo.

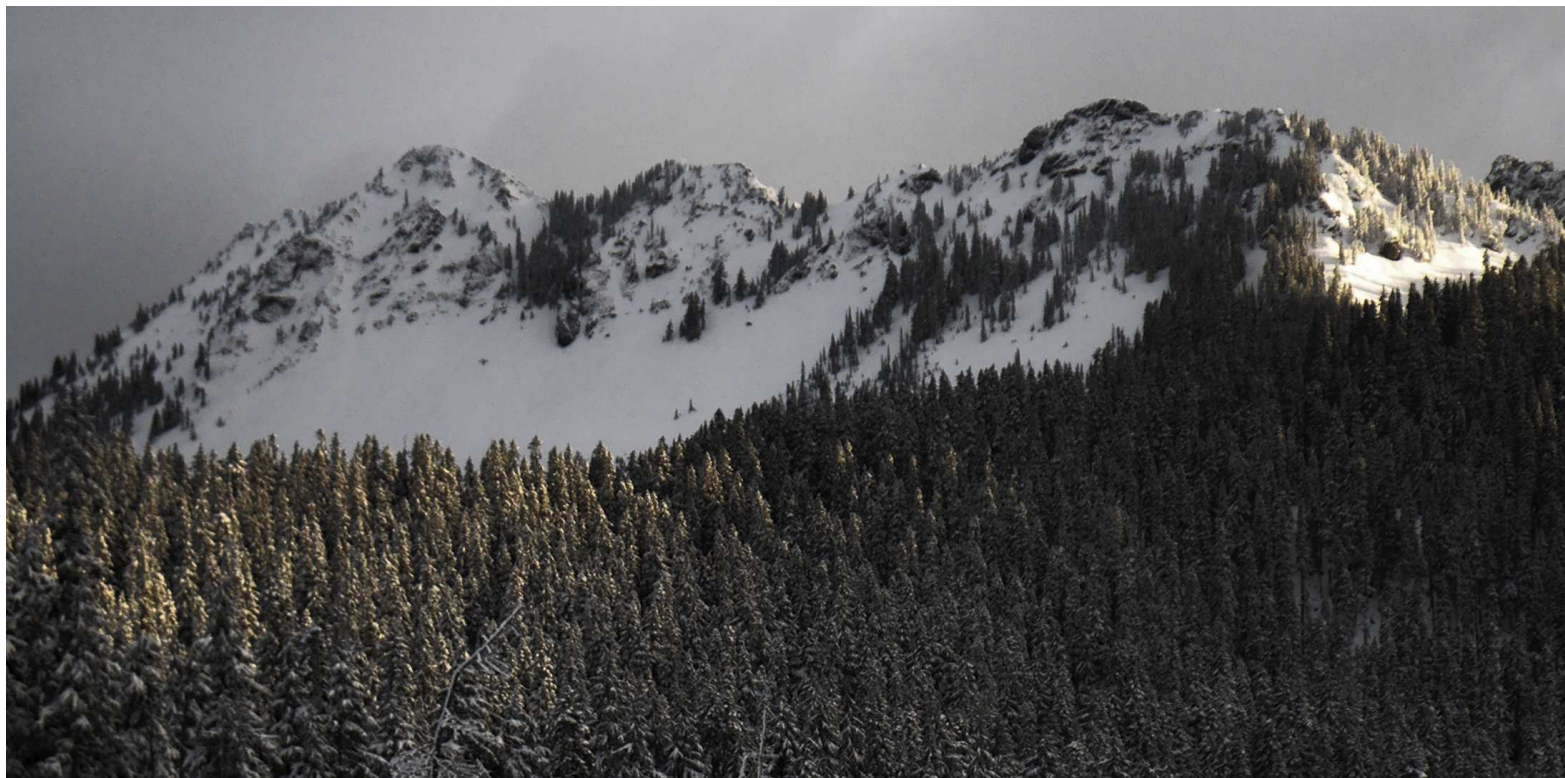


Figure 6: Kendall's upper west slopes from the top of Kendall Stump. February 8, 2011.

The increased number of skiers also offers social proof and volunteer stability testers – “if they can get up there without triggering a slide, I bet we can too!” Risk-accepting or skilled skiers can put skintracks into more-hazardous terrain, lowering substantially the barrier to entry.

Finally, increased skier density increases the likelihood that one party may trigger a slide and hit another. This may have happened in the 12/19/15 accident. In the 4/9/10 accident, the party had bifurcated, and the upper half of the group hit the lower half. Slides from Kendall’s ridgeline routinely reach the top of the Tree Triangle. The existing historic slide path shows that avalanches can reach far further.

It is no longer enough to consider our own relationship to avalanche terrain – we must consider people who may be *below* or *above* us, and adjust our movement accordingly. We cannot control their choices, but we can control our own.

Accidents

Below are summaries of two recent accidents on Kendall’s west slopes. The full NWAC accident reports [2] are worthy of careful reading and reflection.

April 9, 2010

Summary: At the tail end of a storm, with High hazard rating, a group of four snow professionals ascended to the top of the Tree Triangle, then headed directly uphill into the gully feature above. The group successfully gained the ridgeline. At the saddle, the group split. Two opted to descend, and two opted to travel northwest, onto the S-facing slope above the saddle.

As the lower pair passed through the choke of the gully, a slide triggered by the upper pair strained the lower pair through tree trunks, injuring both, one critically. Thanks to the group’s excellent rescue response, the availability of helicopter rescue, lucky flying weather, and skilled surgeons, the critically-injured victim has recovered well.

The Trap: The group of four, composed of snow professionals, each with more than 100 days of backcountry experience, had never before skied Kendall. Relying on expertise and intuition, they selected a route based upon what they could see, gradually increasing risk exposure despite increasing evidence of unstable snow. The start zone of the April 9, 2010 slide is almost invisible from the Tree Triangle, as seen in Figure 7.

Indeed, when I took the photograph, neither I nor my partner understood from whence that volume of snow could have come. It was only when we gained Kendall’s West Ridge, and found the view shown in Figure 8, that the start zone was apparent.



Figure 7: April 9, 2010 slide, seen from the top of the Tree Triangle. Photo taken April 10, 2010.

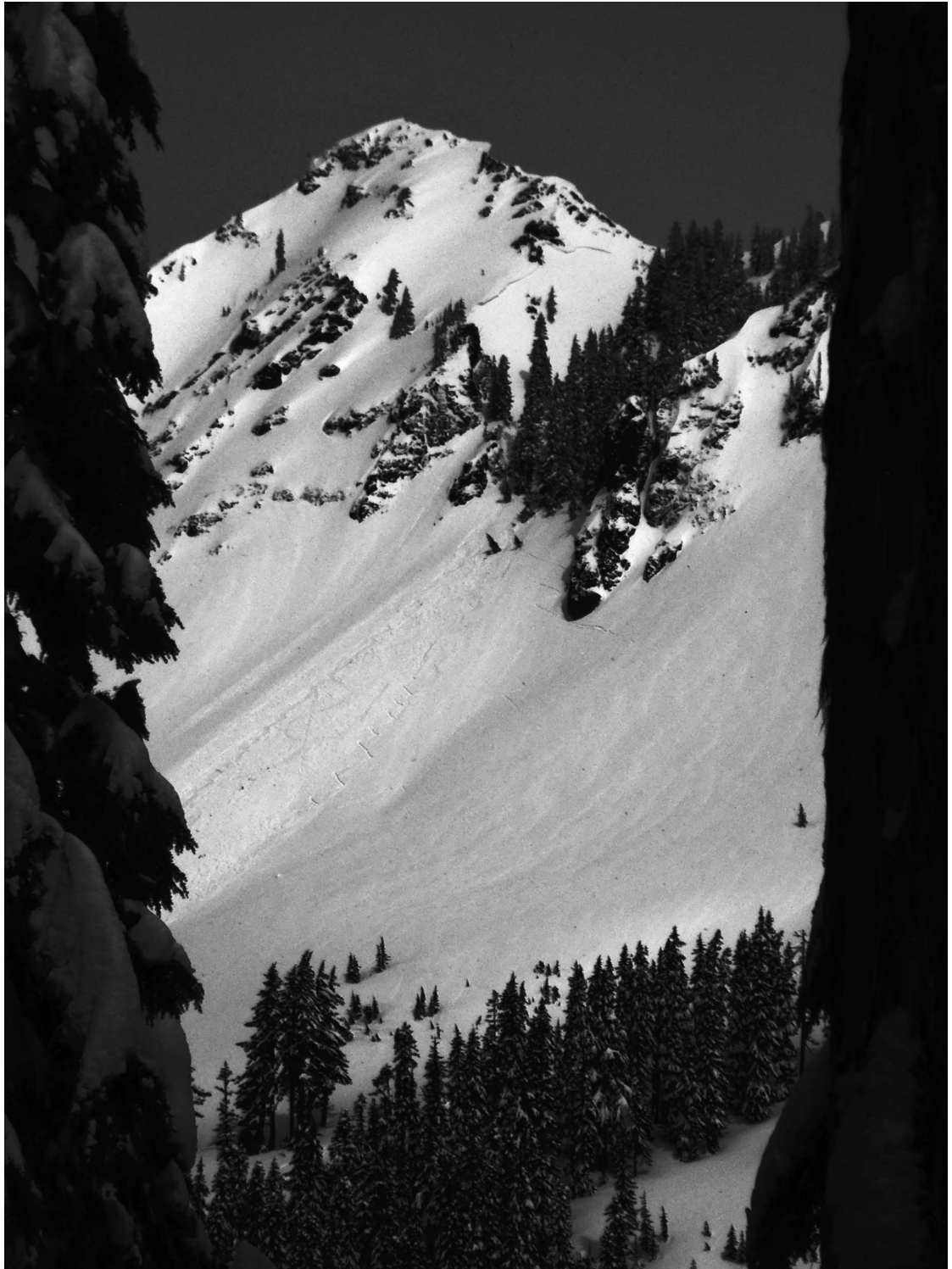


Figure 8: April 9, 2010 crown, seen from Kendall's West Ridge.

December 19, 2015

Summary: December 19 was the first deep Saturday of skiing in the 15/16 season. NWAC forecast likely windslab at and above treeline on all aspects but SW and S, with storm slab possible at all elevations on all aspects, assigning a Considerable rating above treeline and Moderate below.

A full gamut, from old-timers to novices, of skiers followed the well-broken skintrack into Kendall. Stability was generally good, and the skiing excellent. Skiers travelled all over the area, except Kendall's east aspect. At the end of the day, a solo skier did not return home. Several days of storm followed, making organized search increasingly difficult and hazardous.

After an extensive and protracted search effort, involving more than 3000 searcher-hours in the field (52 40-hour weeks is 2080 hours), on June 4, 168 days after his disappearance, the skier's remains were found, skins on skis, high on the west slopes of Kendall. The skier's position, physical trauma, and distribution of gear were consistent with an avalanche accident.

Following the June recovery, reports coalesced to make clear that two other parties had triggered slides in locations immediately above the accident site. Following those avalanches, hangfire remained above the crowns, leaving open the possibility of a later spontaneous slide or a slide triggered by the solo skier as the proximate cause of the accident.

The Trap: Interviews with several ski parties skiing Kendall on December 19 2015 all described an initially-conservative approach, followed by incremental increases in risk acceptance as the excellent skiing and apparent lack of instability lured parties into more-exposed terrain. The snow in the trees and on sheltered slopes was excellent, unconsolidated, and right-side-up. Skiers visited several of the upper gullies, describing negligible instability *except* in the one gully that slid. In the one gully that slid, at least one party described upside-down and slabby snow.

Whether or not the solo skier was struck by a slide triggered by another party, that it was even possible should be notable for everyone skiing high-traffic areas in Washington. For many years, skiers have placed skintracks ascending within Kendall's avalanche terrain; this is no longer as safe as it once was. For skiers high on a slope, it is no longer straightforward to assume that nobody is below. Possible skiers above and below must now become part of our terrain assessment and management.

Coda

There are many Kendall Traps to be found in the mountain environment. The Trap is highlighted here as a specific example of terrain where a safer approach, gradual but significant increases in hazard, appealing ski terrain, and increased skier density can combine to enhance risk for skilled backcountry travelers.



Figure 9: Looking up the slide path, late afternoon December 19, 2015. One of the crowns is slightly visible near the ridgeline of the central gully feature. Ski tracks are more prominent on open slopes to looker's-right, as is an ascending skintrack at center.

Skiers looking for protected storm skiing in the Kendall area may find somewhat less-hazardous, but shorter, descents along Kendall's treed west ridge. Thorough route-finding, terrain, and avalanche hazard assessment remain essential. Slabs form in the trees, too. If a slide is initiated, trees amplify potential consequence. Trees themselves are not without consequence, even without avalanches; until the 12/19/15 accident site was found, the missing skier was presumed to have been trapped in a tree well [3].

Thank you

This work would not have been possible without the Northwest Avalanche Center's investigation, expertise, and documentation, the accident report and presentations from those involved in the 4/9/10 accident, emails/photos/conversations from those present on 12/19/15, public and private comments from the TAY community and others (Erik Turner, Toni Smith, freeski, and Lowell Skoog), the overwhelming effort by the Washington Search and Rescue (Seattle Mountain Rescue and affiliates, King County SAR, King County Sheriff, SPART, King County Sheriff Air Support, and more) community to save the victim of the 4/9/10 accident and return the victim of the 12/19/15 home. There are more thanks to come for all of you.

Thank *you* for reading. This was written for you.

References

- [1] USGS Snoqualmie Pass Quadrangle, 2017: <https://prd-tnm.s3.amazonaws.com/StagedProducts/Maps/USTopo/1/26027/8404549.pdf>
- [2] NWAC Accident Reports Page: <https://www.nwac.us/accidents/accident-reports/>
- [3] Tree Well and Snow Immersion Suffocation: <https://www.deepsnowsafety.org/>
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