

(SNOW MANAGEMENT)
AT A SKI AREA USING MACHINE AND BLOWING SNOW EFFECTS AS TOOLS

David H. Hendrickson ¹

ABSTRACT

The topic relates specifically to practices we have been using at our ski area in order to:

1. reduce the effects of wind blown snow and "blowing snow" ie. rapid cornice buildup and,
2. the changing of drift patterns by mechanical means.

Namely, moving snow with a groomer machine on ridge tops to reduce the buildup of cornices on the lee side of the ridge and maintenance of a road system on top of the ridges to assist in the grooming of main trail runs below the ridges to the base area. What this accomplishes is to grade/push snow buildup from the top of the ridge into the prevailing wind thus changing the angle of the up wind slope. What is achieved is to redirect the wind drifting to create an eddy current in order to deposit the snow on top of the ridge rather than over the lee side. This further reduces cornice buildup as you can then drive downhill from the maintained road and groom from the road directly in the fall-line.

1. Snow Safety Director, Alpenglw Ski Area, Anchorage, Alaska
907/428-1208 (Ski Area), 907/428-3090 (Ski Patrol), 907/276-7962 (FAX)

SNOW MANAGEMENT Ski Area - ALPENGLow

Situated approximately twelve miles from Anchorage off the Ship Creek Drainage in Chugach Mountains, the area was established in 1947 by the then Corps of Engineers U.S. Army as a recreation site for both civilian and military personnel use. Subsequently a local group who had been trying different plans for a ski area formed a ski club and associated with the military for use of their hill. In the years since then, the ski club leased land from the Territory of Alaska, the Bureau of Land Management, and the State of Alaska for an operation which today is within the boundaries of Chugach State Park, and includes two chairlifts, a "T" Bar Poma Lift and a pony cable tow for beginners, as well as the military with a lighted double chairlift and Poma on the lower mountain ridge.

The predominant ridges run WSW to ENE - with most of the runs to lower base area on the westerly to northwesterly side of the main ridges, with the exception of a series of back bowls, face, and saddle runs which face north, NNW and WSW back out the Rendezvous Valley Run. Elevations range from 2,500 ft. at Base Area to 4,100 ft. at the highest peak with the longer of the chair lifts (#2) terminating at approximately 3,900 ft elevation. The T-Bar at approximately 3,650 ft and chair #1 at approximately 3,300 ft along the predominant ridge tops. Access to the ridge tops is by a round about route with a machine downhill past the base of the lifts to the military lower ridge, thence a climb back up easterly to ridge, thence ENE up the ridge past the top of Chair #1 - the T-Bar and finally to top of Chair Two via the ridge - where, as the season progresses, we work from the ridge road as we establish it, down the specific runs. Thus, we groom as well as maintain the road for the climbing access. After a short while on some specific runs, the ridge top can be gained simply by driving up the groomed slope to shorten the climbing distance down and around by the road. What we are learning is that by constructing this ridge road out of snow and moving the snow as it accumulates (before too much cornice is formed) we can 'doze the snow off the road/ridge top lee edge into the prevailing wind and not only fill in low spots along the ridge but actually change the angle of the windward slope, further reducing cornice build up by creating an eddy current pretty much on top of the ridge (usually in the road). We are able to then sculpt the snow adding to the windward side of the ridge road, in essence creating an artificial high angle snow fence. The advantage found in doing this with a machine allows us to reduce the cornice build up in our most hazardous areas thus also reducing the amount of avalanche mitigation that may be required after some of the heavy storms with the high winds preceding or during the storm. It also allows us to groom downhill on the lee side of the would be cornice by removing most of the material and pushing it across the ridge-top road into the prevailing wind and reducing the angle of the leeward slope at the top of the ridge. The general slope angle in the area on most runs is 26° - 28° with some above 36° and ground cover on top of ridges is nothing more than high altitude scree rock or moss and heather with minimal anchoring. Winds of an average will range from 20 - 30 m.p.h., gusts to 50+, above 100 at times and snow transport as much as a 12 - 20 ft cornice horizontal build up in an overnight storm.

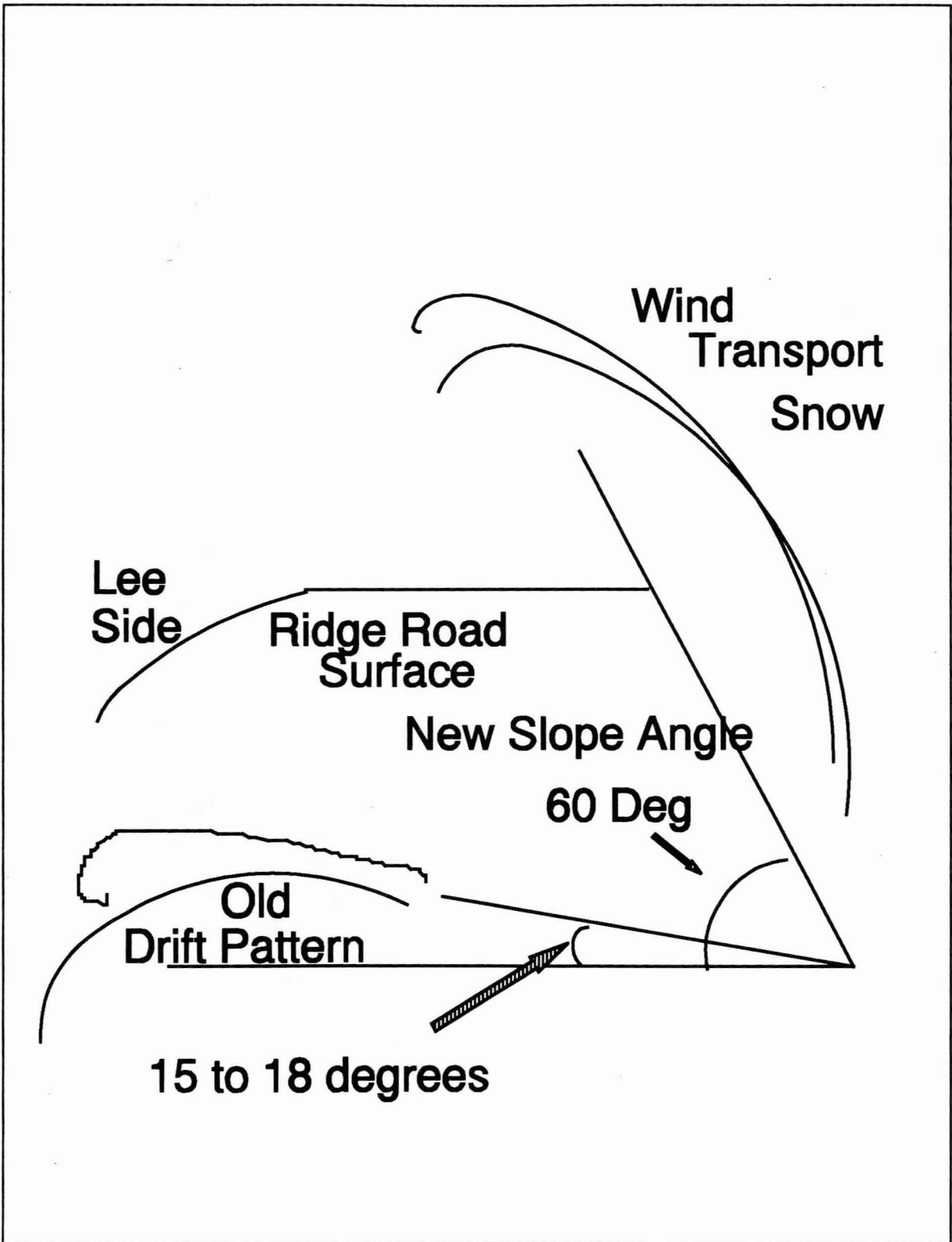


Figure 1

We are finding that the time spent in movement of snow to create a barrier against cornice build up has reduced the potential for in area avalanche hazard although many other factors still cause concern within a snow pack and some areas of the hill are not safe to attempt to operate machinery without additional expenses like cable grooming, etc. and/or early season roads for access to top of a ridge prior to a too heavy snowfall. A minimal amount of summer trails are available and most are too narrow to operate grooming equipment on until at least three or four feet of snow has accumulated, making it impossible to climb most of the runs until after some grooming from the top down (via the ridges) has been accomplished and also the creek and tributary gullies and gorges fill up with drifted snow. The establishment of the ridge road also has the advantage of (1) to create a straight pathway from lower lifts to top of mountain along the ridge without pinnacles and other obstacles in the way, thus enhancing the ski run potential by (A) adding the width of a flat ridge trail to an otherwise nearly unusable ridge for skiing if left to erode by the wind and build up in a cornice or a number of separate ones which not only are usually unskiable but present the higher risk of avalanche hazard and (B) both environmentally and economically it enhances the ski area by reducing cost of dealing with cornice removal via explosives thus reducing the cost of cleaning up debris with grooming as you are allowed to groom most of the mountain runs from top of the ridge down. (2) By constructing the roads out of snow we also prevent or minimize the environmental damage to the ridge-top terrain thus reducing erosion or the cost of repair to same.