

EXPLANATION

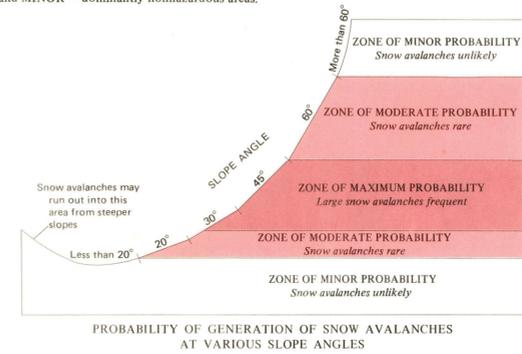
The Henrys Lake quadrangle is about 10 miles west of West Yellowstone, Mont., the western entrance to Yellowstone National Park, and it shares in the tourist trade which nourishes that city.

At one time West Yellowstone had but a single tourist season — during the summer months when thousands of persons passed through on their way into or out of the Park. But with the advent of the snowmobile, the city has a winter recreational season too, one in which at times hundreds of snowmobiles crowd its streets. Snowmobile enthusiasts seek their enjoyment in the surrounding mountains, and many are thus exposed to the threat of snow avalanches.

This map shows three categories of snow avalanche probability in the Henrys Lake quadrangle: MAXIMUM — areas in which snow avalanches are very common; MODERATE — areas in which they are infrequent; and MINOR — dominantly nonhazardous areas.

- ZONE OF MAXIMUM AVALANCHE PROBABILITY — Slopes between 30° and 45° on which snow avalanches are likely with most of the severe snowstorms
- ZONE OF MODERATE AVALANCHE PROBABILITY — Slopes between 20° and 30° or between 45° and 60°. Snow avalanches infrequent either because of moderate slope (20°-30°) or because of steepness which commonly does not permit snow to accumulate. If snow should accumulate on these steeper slopes, the potential avalanche hazard increases markedly
- ZONE OF MINOR AVALANCHE PROBABILITY OR NONHAZARDOUS ZONE — Slope less than 20° or more than 60°
- SNOW AVALANCHE PATH
- GENERAL AREA OF MULTIPLE SNOW AVALANCHE PATHS
- PREVAILING SURFACE WIND DIRECTION DURING SEVERE SNOWSTORMS

In some areas downed timber and debris indicate that leading edge of previous snow avalanche ran out beyond boundaries of hazard zones



Snow avalanches occur under a wide variety of conditions, and it is nearly impossible to predict exactly where and when they will happen. The great majority take place on relatively steep slopes, but they have occurred on moderate slopes as well. Although most slides occur during and immediately after a heavy snowstorm, they can be triggered by a sudden thaw, or by a drizzly rain. Despite these vagaries it is possible to distinguish three factors which influence snow avalanches — terrain, weather, and snow conditions.

**Terrain.** — Most snowslides take place on open slopes that range in steepness from 30° to 45°. Snow generally does not accumulate on steeper slopes though, locally, large snow cornices may form along the crests of these steeper slopes and then avalanche down them. Although most snowslides occur on treeless or sparsely timbered slopes, some of the largest have cut through the thickly wooded steep slopes that form the north face of the mountains southwest of Henrys Lake. There, the south and southwesterly winds that prevail during the snowstorms form accumulations of snow on the lee (north) side of the mountains deep enough to overcome the anchoring effect of the trees. Steep wooded slopes are also the sites of small snow avalanches that are dangerous to the winter traveler.

**Weather.** — The snow avalanche hazard mounts rapidly during periods of heavy snowfall and wind, mostly in winter months. The U.S. Forest Service has suggested that a snowfall of 1 inch or more an hour and a wind velocity of about 15 miles per hour create optimum conditions for snow avalanches along the lee sides of windswept ridges. On warm spring days a sudden thaw may lubricate the base of a snow mass and cause it to slide. Rain does very much the same thing — the water acts as a lubricant between the packed snow and the ground on which it rests.

**Snow conditions.** — The relations between snow conditions and snow avalanches are complex. In general, the condition of the snow determines the type of avalanche. "Slab avalanches," by far the most destructive type, consist normally of more or less tightly packed recrystallized snow which slides as a slab down either an open ground surface or across underlying older snow. The critical factors appear to be the internal cohesion of the snow and the degree of attachment to the mountainside. "Loose snow avalanches," by contrast, are relatively incoherent shapeless masses. Many of these begin when fluffy loosely packed wet snow high on a mountainside begins to slide. As the slide moves down the mountain it gathers new snow and increases in momentum until it moves onto gentler slopes and comes to rest.

In some places and under certain circumstances an avalanche's momentum will be so great that the avalanche will run across a valley floor and part way up the opposite valley wall.

SAFETY AND SURVIVAL

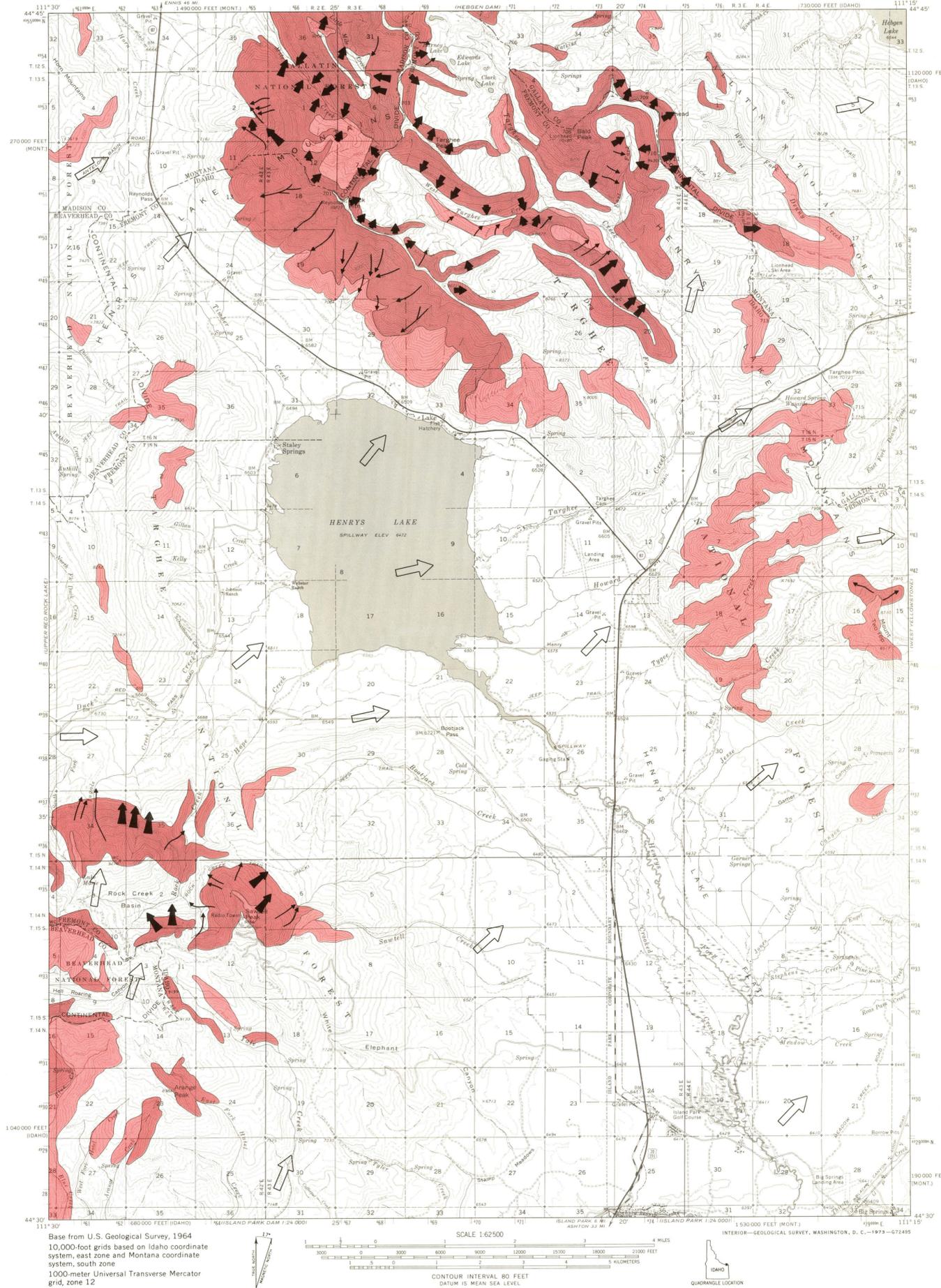
[Compiled in large part from suggestions in the following publications:  
Atwater M. M., 1968, The avalanche hunters: Philadelphia, Pa., Macrae Smith Co., 236 p.  
Gallagher, Dale, ed., 1967, The snowy torrents: U.S. Forest Service unnumbered publication, 144 p.  
LaChapelle, F. R., 1961, The ABC of avalanche safety: Denver, Colo., Colorado Outdoor Sports Corp., 47 p.  
U.S. Forest Service, 1968, Snow avalanches: U.S. Dept. Agriculture, Handb. 194, 84 p.  
U.S. Forest Service, 1970, Snow avalanche: Pamphlet issued by Rocky Mountain Regional Forest Service office, Denver Colo. 80225]

SAFETY RULES

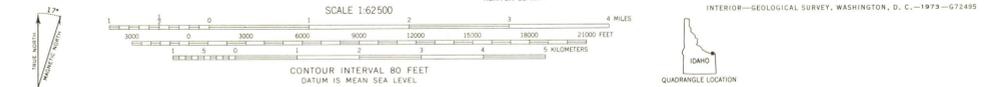
1. Never travel alone
2. Carry and use an avalanche cord.
3. Stay high near top of slopes and slightly on windward side.
4. Conduct traverse so that only one person at a time is exposed to avalanche danger.
5. Avoid avalanche chutes and steep open gullies.
6. Stay away from fracture zones in snow.
7. Do not make lunch or rest stops, camps, or bivouacs in former avalanche paths or chutes.
8. Take advantage of dense timber or rock outcrops, which are relatively safe, for lunch and rest stops. (Trees and rocks anchor snow.)
9. Stay out of hazardous areas during or immediately after heavy rainfall.
10. Beware of lee slopes and slopes beneath cornices.
11. Stay away from fast-flowing open streams and flowing springs.
12. Avoid snow cornices near edges of timber and along ridge crests.
13. Avoid all crusted wind-slabbed slopes.

AVALANCHE RESCUE

1. Make quick, careful search before going for help.
2. Mark point where victim was last seen.
3. Search directly downslope below last-seen point.
4. Send for help if there are several survivors. (Person going for help must avoid exhaustion for he may have to guide rescue party back.)
5. Make thorough search by probing with inverted ski poles, skis, or branches.
6. If victim found, free nose and mouth of snow, and then administer artificial respiration.



Base from U.S. Geological Survey, 1964  
10,000-foot grids based on Idaho coordinate system, east zone and Montana coordinate system, south zone  
1000-meter Universal Transverse Mercator grid, zone 12



MAP SHOWING SNOW AVALANCHE PROBABILITIES IN THE HENRYS LAKE QUADRANGLE, IDAHO AND MONTANA

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