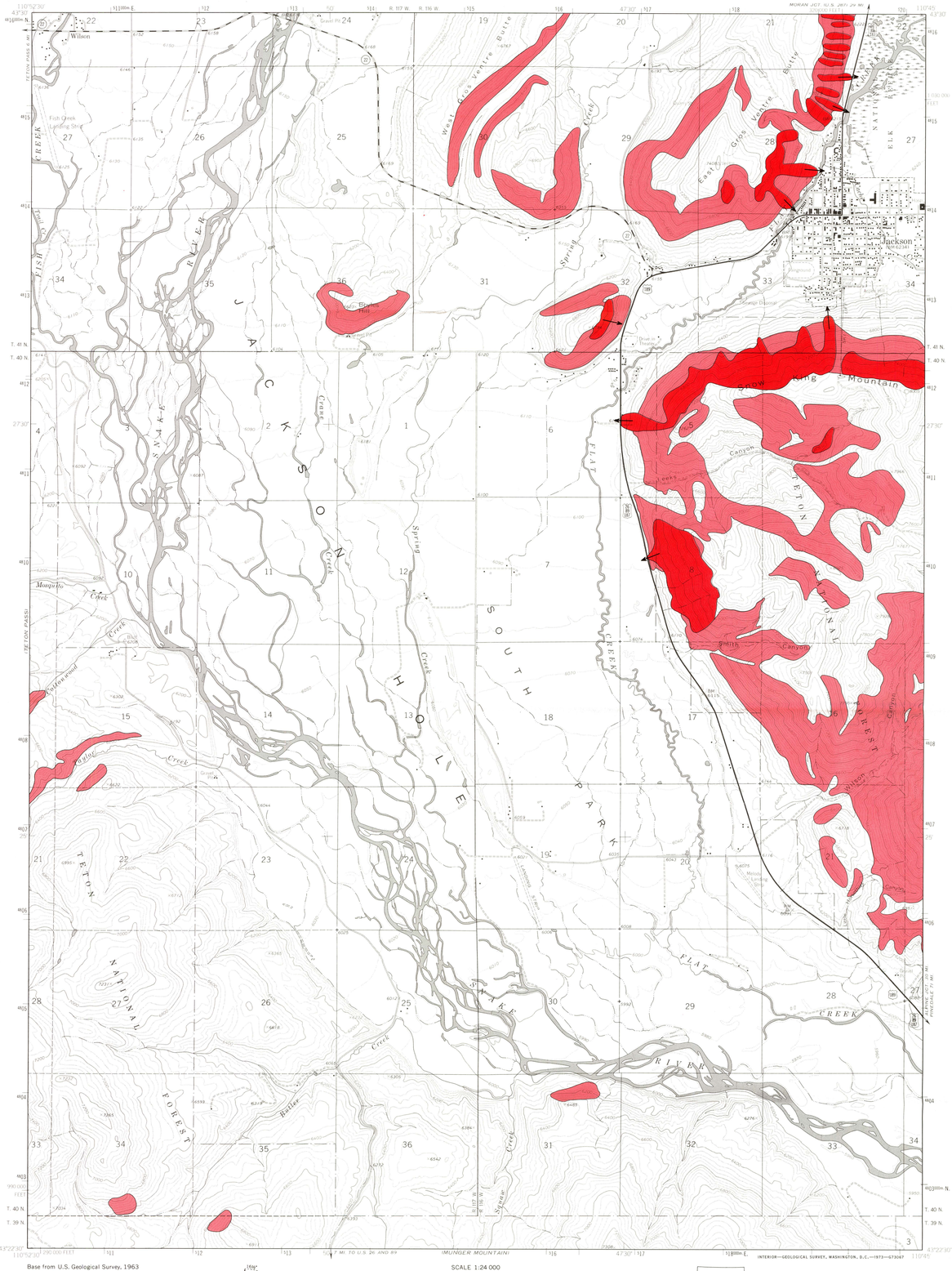
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

FOLIO OF THE
JACKSON QUADRANGLE, WYOMING
MAP I-769-D



Base from U.S. Geological Survey, 1963
10,000-foot grid based on Wyoming coordinate system, west zone
1000-meter Universal Transverse Mercator grid, zone 12

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

WYOMING
QUADRANGLE LOCATION

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1973—673067

MAP SHOWING SNOWSLIDE POSSIBILITIES OF THE JACKSON QUADRANGLE, TETON COUNTY, WYOMING

By
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1973

EXPLANATION

- AREA WHERE SNOW AVALANCHES HAVE BEEN REPORTED – Such areas might or might not be safe to cross during winter, depending on local conditions. The line showing maximum downhill travel of slides is approximate because no record has been kept. In many winters there may be no slides or only small ones, but in other years when temperature and snow conditions are favorable, slides may block highways or extend into residential areas
- AREA WHERE SNOW AVALANCHES COULD OCCUR UNDER FAVORABLE CONDITIONS – (and probably have, but have not been reported). Slope is more than 50 percent
- AREA IN WHICH SNOW AVALANCHES ARE LEAST LIKELY TO OCCUR – Some could originate, however, under unusual conditions on the steeper slopes. Slope is less than 50 percent
- APPROXIMATE DOWNHILL LIMIT OF "OUTRUN" OF SNOW AVALANCHE – At point of arrow

POTENTIAL FOR SNOW AVALANCHES AND SNOWSLIDES

Snow avalanches are common in the northeast part of the Jackson quadrangle where they have caused property damage, some loss of life, and more than ordinary costs of road maintenance. They are a constant winter hazard to skiers, snowshoers, and snowmobilers. This map shows areas that are subject to avalanching and is accompanied by a discussion of how to predict future avalanches and their locations.

The reported snow avalanches and snowslides (shown in dark red on the map) are those that have been observed by Messrs. Hagen, Major, and Horn during many years of residence in the Jackson quadrangle. Many snow avalanches may have occurred in areas that are shown in light red, but they have not been reported. Although slides have not been observed in, or no information is available for, the uncolored areas, these areas are not necessarily completely safe.

The following snow avalanche specialists have reviewed the text and have contributed ideas that are incorporated in it: Ernest Hirsh, U.S. Forest Service, Jackson; John Montagne, Department of Geology, Montana State University; Mario Martinelli, Jr., Arthur Judson, and R. I. Perla, Alpine Snow and Avalanche Research Project, U.S. Forest Service; and Bruce Bryant, U.S. Geological Survey. In addition, some information in the text is from "Snow Avalanche," a leaflet printed by the U.S. Forest Service.

The distribution, frequency, and behavior of snow avalanches are complex and not readily predictable. There are two general kinds of snow avalanches: those composed of loose powdery snow (some varieties of these are called "dry" slides, "sluffs," or "powder avalanches"); and those composed of slabs and chunks of snow (some of these contain a lot of water and are called "wet" slides). The chief way to tell them apart is by the line where they break loose and start downhill. Only the slab avalanches have a distinct "fracture line" or "snow cliff."

Snow avalanches are generally considered to be snowslides that travel more than 150 feet down a slope. Loose snow avalanches are generally less destructive than wet slides and slab avalanches; however, they may smother a person who is caught in them, or they may move heavy trucks and other road equipment appreciable distances. Slab avalanches cause most fatal accidents and the greatest amount of property damage. They can consist of either hard or soft slabs and the amount of water in them can vary greatly.

The likelihood of snow avalanches in an area depends, in general, on these local variables: (*a*) steepness of slope; (*b*) direction slope faces; (*c*) ground cover; (*d*) history and composition of snow layers; (*e*) wind; (*f*) temperature.

The following text explains how these variables relate to snowslide and snow avalanche hazard.

FACTORS AFFECTING SNOW AVALANCHES

STEEPNESS OF SLOPE

Snow avalanches most commonly start on slopes between 50 percent (50-ft rise in 100-ft horizontal distance) and 100 percent (100-ft rise in 100-ft horizontal distance). They become progressively less frequent on steeper slopes up to 173 percent (173-ft rise in 100-ft horizontal distance). On slopes steeper than that, the snow tends to move as it falls, so there is little buildup. If buildup does occur, however, it is extremely hazardous. Under some conditions wet snow may slide on slopes as gentle as 15 percent. Caution: a normally nonhazardous slope may be dangerous because it lies downslope from a hazardous slope. Once an avalanche starts it may travel a long distance over many kinds of terrain. Snow avalanches have been known to cross as much as one-half mile of level ground, and, locally, some may even travel uphill. Therefore, the area of snow avalanche danger includes flats and gentle slopes (some of the most significant "outrun" areas are shown by arrows on the map). The important avalanche clues lie higher up the slopes and include tree damage or absence of trees, or an avalanche chute with a large treeless snow-collection area uphill from it. Rolling of "snowballs" or "cartwheels," hollow sound on snow crusts as one walks over them, development of snow cracks, etc., are signs that slide activity could begin at any moment. Local snowslide specialists can advise on safety of routes, equipment to carry, and special rescue procedures.

DIRECTION SLOPE FACES

During deep snowfalls snow avalanches can be expected on slopes facing any direction; however, the snow avalanche potential on certain slopes may change from winter to spring. North- and east-facing slopes (those that face downwind, or leeward) are the most common sites for snow avalanches in midwinter. These slopes are slide prone because wind-deposited snow generally accumulates to greater depths there than in other areas and may solidify into poorly anchored, unstable slabs. South- and west-facing slopes (those that face upwind, or windward) are the most common sites for snow avalanches in spring and on warm sunny days. At other times they are generally safer because less snow accumulates, that which is present is more compacted, and it usually sticks to the ground surface.

GROUND COVER

Snow avalanches are most common on slopes that are bare of trees. Slopes studded with big rocks, trees, and underbrush are least likely to slide, but under exceptional conditions snowslides and snow avalanches can occur even among trees.

HISTORY AND COMPOSITION OF SNOW LAYERS

Old snow overlain by new snow. – If old snow is anchored to rocks and brush, new loose snow will slide very easily on top of the old. Such slides are frequently called "surface" avalanches. If the old snow, especially the bottom layer, is made up of loose snow crystals, however, both it and a heavy load of new snow may slide easily.

New snow. – A foot or more of new snow on slopes steeper than 50 percent is avalanche prone and these slopes should be avoided for several days after a storm. A person crossing these slopes during this interval should be alert to avoid new slides. New snow made up mostly of crystals shaped like needles or pellets forms heavier layers that lack cohesion and will generally slide easily. In contrast, the common six-sided or six-pointed platelike crystals tend to interlock and, hence, to be cohesive. Needles and pellets are stiff and unyielding and if wind and other conditions are right, they can form dangerous slab avalanches. Most snow avalanches occur during or soon after storms, especially when the new snow is loose, dry, and accumulates rapidly (at a rate of more than 1 inch per hour). During windy weather, however, even moist and dense freshly fallen snow may slide.

Wet snow. – Snow that has become wet as a result of warm weather or rain may move as "wet" slides, especially in late winter and spring. Such slides generally slide early in the day on east-facing slopes, but late in the day on south- and west-facing slopes. Some of these slides are very destructive and may occur on slopes of considerably less than 50 percent. Persistent heavy rains on cold dry snow commonly cause extensive sliding.

WIND

Any wind strong enough to move snow in exposed areas will pile it up in protected places. Depending on local snow conditions, steady wind of 15 or more miles per hour near the ground surface causes snow to pile up on the leeward side of ridge crests. Plumes of blowing snow on ridge tops are a warning signal of accumulating snow that will result in conditions favorable to new snowslides. Even a few inches of newfallen snow can be piled up by wind into dangerous accumulations on the lee sides of ridges and spurs. Wind is a significant factor in layering of snow and is the chief factor leading to development of slabs.

TEMPERATURE

Most snow remains unstable and slides easily under cold temperatures, but it generally compacts and stabilizes when the temperature rises to near freezing. Increasing temperature, however, can lead to avalanches when a snowfall starts during cold temperature and continues as the temperature steadily increases to near freezing. The avalanche occurs because the bottom layers of the new snow are not attached to underlying rock, vegetation, or old snow and, in addition, do not have the internal strength to support the overlying heavier snow. These are ideal conditions for development of the slab type of snow avalanches.

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