AVALANCHE ACTIVITY ON US HIGHWAY 12

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1. Location

US route 12 is a federal highway that runs through Idaho from Lewiston on the Washington border to Lolo Pass, on the border with Montana. In Idaho highway 12 serves as the primary road for local traffic between Lewiston and Missoula, MT and as an alternate for I-90. From Lowell Id, to the Idaho-Montana border at Lolo Pass, the road follows the Lochsa River through seventy seven miles of remote, mountainous terrain in the Clearwater National Forest. Also known as the Lewis and Clark Scenic byway, it is the closest paved highway to the route taken by the explorers through this country in the early 1800's.

2. Historical Background

The US Army Expedition of Merriwether Lewis and William Clark relied on local experts when they travelled through this area in 1805 and 1806. Their native guides of Nez Perce and Shoshoni tribes used ancient trails which had been established on the ridgetops between the buffalo hunting country of western Montana, and salmon fishing rivers in central Idaho. These ridgetop trails, later known as the Lolo Historic Trail, avoided the heavy undergrowth and downed timber along the Lochsa river, but were very steep and often closed by snow in all but July and August.

In the 1930's the Civilian Conservation Corps expanded the Lolo Historic Trail for motorized travel, and it became known as the Lolo Motorway. This narrow gravel road was the travel route between the small logging towns of the upper Clearwater (Orofino, Kamiah, and Kooskia) and Missoula, but remained difficult to travel most of the year due to the lasting snows at the higher elevations. The section of Highway 12 between Lolo Pass and Lowell, Idaho was finished in 1962 bringing the main travel corridor down from the historic location at the ridgetops, to the river bottom.

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Fig. 1. US 12 as it runs through Idaho

Fig. 2. Historic Lolo Trail, route of Lewis and Clark in 1805, 1806 (blue), US 12 established in 1962 (yellow)
In Other Headlines

Idaho Daily Statesman
December 24-25, 1964

Avalanches close Galena Pass (near Ketchum, Idaho)
Avalanche traps 10 at a mine Fairfield Idaho
Rain on record snowfall in McCall, Idaho causes flooding

Heavy rains close Brundage Mtn, Bogus Basin ski areas
Avalanches close Snoqualmie Pass
Avalanches on Loveland Pass encase one car and sweep off another

3. Activity history

The lower elevation of the new Highway 12 corridor made winter maintenance possible; however the new travel corridor had some unanticipated characteristics. In 1964, two days before Christmas, an avalanche cycle closed the road and avalanche debris trapped 48 people in the canyon for two days. The weather preceding the cycle was very cold with record snow accumulations followed by what is commonly known as a "Pineapple Express" -- a warm, wet system tracking in from Hawaii. The storm that produced this avalanche cycle on Highway 12 also caused major flooding in California, Nevada, Oregon, and Idaho.

In subsequent years, avalanche activity was relatively minor, primarily small bank releases and a semi-annual small avalanche near Lolo Pass.

Fig. 3. A portion of New York Times coverage of the 1964 avalanche cycle on US 12 and related weather events in the western US.

2010 International Snow Science Workshop
known to the maintenance crew as ‘Old Faithful’. Maintenance foremen and crews made informal assessments of the weather and snowpack conditions, and were able to anticipate and appropriately respond to activity on the small, frequent bank slides and ‘Old Faithful’, but no formal avalanche forecasting program existed for this road. This informal system seemed adequate for over forty years, until another large avalanche cycle affected Highway 12 in February 2008.

On January 31, 2008 a large snowstorm arrived in the Clearwater and Bitterroot Mountains. Maintenance crews on Highway 12 were unable to keep the road clear due to the high precipitation rate, and the decision was made to close the road. During the process of closing and sweeping the 77 miles of roadway between the closure gates, the first of four large avalanches blocked the road, trapping eleven tractor-trailer rigs. The consensus among the truck drivers was that since a good turn-around spot was a number of miles behind them, they’d spend the night there near the avalanche and be ready to get on their way in the morning when the maintenance crews pushed the road open. Maintenance workers stuck on the far side of the avalanche debris suggested to some of the truck drivers that their rigs were parked in a poor spot and that they should back the rigs around the corner to a better location. For some reason, the trucks remained parked where they were through the night. Snowfall continued and several more avalanches released into the roadway. Two of the trucks were bumped by avalanche debris during the night, and one of the drivers chose to spend the night in a different truck back down the road. In the morning he returned to his truck, took some photos of the avalanche debris there, and got back inside. It continued to snow. A short time later another release from this path pushed his loaded tractor-trailer into the Lochsa River. The driver reported that the truck rolled 1 ¼ times ending up on its side. He kicked out a window and pulled some snow into the cab, and was able to escape uninjured.

All the truck drivers were evacuated, and the road remained closed as there were large debris piles at several other locations in the travel corridor.

As it always does, the snow eventually stopped and cleanup began. Once it was safe to work in the runout zones, heavy equipment removed the

Fig. 4. The numbers above identify the avalanche paths (highlighted in blue) by highway mileage. The first path to slide in this cycle was 133.97, effectively closing the road. The semi pushed into the river was parked at 133.79. February 2, 2008.

Fig. 5. Crews excavating the truck for removal from the Lochsa River.

Fig. 6. Heavy equipment removing avalanche debris. February 7, 2008
debris and the trucks rolled out. Several fifty year old trees were found in the dirty debris, which also contained rocks and slowed opening the road. Investigations at the ridgetop starting zones found a buried surface hoar layer at the failure plane under 4-9 feet of windblown snow on the lee side of the ridge, in addition to high precipitation rates likely causing the slides. By the time the road was cleaned up and ready to open, another large snowstorm was forecast for the area. Knowing that a deeply buried weak layer was present in the snowpack, the road was left closed through this second storm. This system was warm and wet, and caused three more large avalanches, the largest leaving 22 feet of debris on the roadway, again containing several fifty year old trees.

Fig. 7. This pile was 22’ deep on the roadway. Rocks and trees in the debris made clean up difficult. This slide occurred during the second avalanche cycle, 2008. February 14, 2008

4. ITD Avalanche Hazard Mitigation

Because the route of Highway 12 is relatively new and there are only forty years of recorded history for the avalanche terrain adjacent to the road, it is difficult to judge the return interval for major avalanche activity. Most of the slide paths are not visible from the road due to the dense forest. The dense timber in the area does provide distinct trimlines, which have been useful for identifying much of the avalanche terrain that affects the road.

The close call in February 2008 was an effective reminder that large avalanche cycles are possible on Highway 12 when weak a snowpack is subject to extreme weather events. The corridor has been re-evaluated for avalanche terrain and an atlas for the area is being developed. Sections of road under high hazard terrain have been marked so that maintenance workers can become familiar with locations of avalanche terrain which is typically veiled by heavy timber. Training classes for the maintenance workers on Highway 12 have been improved to include specific information about avalanche terrain affecting the highway, increased attention to weather trends, and the use of rescue equipment and techniques.

Avalanche Hazard on Highway 12 remains mitigated primarily through forecasting and closure, however the forecasting program has seen some changes. The remote location of this section of Highway 12 has very little for automated weather stations, so plow operators stationed at Powell record daily weather observations of temperature, water weight of precipitation, and wind. The data is then posted to a site on the Department computer network. This information is pulled up in the ITD Avalanche Forecast Office in Lowman, Idaho (300 miles from the Powell
Maintenance Shed), where avalanche forecasters review and plot the weather information. The National Weather Service now produces a daily site-specific weather forecast for the US 12 corridor, similar to that produced for Idaho State Highway 21, and Big and Little Cottonwood Canyons in Utah. Avalanche forecasters in Lowman develop a daily avalanche hazard forecast for US 12 using this daily weather history at Powell, the site-specific National Weather Service forecast, and snowpack information gathered during regular visits to US 12. Avalanche forecasters make additional trips as needed to be present for large storm cycles, and communicate with the maintenance foreman and crews through regular conference calls.

The paths outlined in the map above represent the avalanche terrain that has the highest potential to affect US 12.

Some, but not all of these paths were active in the cycles of 1964 and 2008. Most were identified from the air by historic trim lines, which are easily apparent in this densely timbered area. The road elevation (in yellow above) rises from 2100’ to 2700’. Starting zones for these paths vary in elevation from 3000’ to 5000’; paths run 800-2400’ vertical drop. Aspect varies but is largely from east through southwest.

A portion of the historic travel route, the Lolo Trail or Lolo Motorway is visible on this map (in blue), on a ridgetop north of the current highway location. The elevation of this section of historic road is 5000-7000’.