
Slope Limitations for Tractor Operations, BMP 13.02

Objectives

- 1) To reduce gully and sheet erosion and the associated sediment production, and to minimize soil displacement, by restricting where tractors can operate on slopes where corrective measures for proper drainage are both easily installed and effective.

Site Description

This site is located in Unit 5B in the Moccasin Creek drainage on the Missoula Ranger District of Lolo NF, in Sections 3 and 10, Township 11N, Range 18W. LSI classification is a combination of 30MA and 30QC.

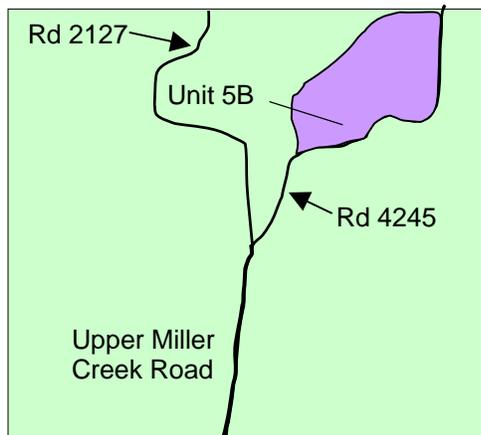


Figure 1

Narrative

The monitoring site is a 25-acre tractor harvest unit with slopes ranging from 10 to 35 percent, averaging 25 percent. Harvest was done in late November and early December of 2000. A layer of snow from 10 to 12 inches deep was present during harvest.

The slope of a timber unit plays a significant role in determining the type of logging practice to be used on a site. Tractor logging is only permitted on slopes of 35 percent or less (photos 1&2). Slopes greater than 35 percent should be tractor logged only on a case-by-case basis after a review by the soil scientist and where erosion and soil impacts can be controlled.



Photo 1



Photo 2

A stream channel is not present in or near Unit 5B, minimizing the concern for water quality. During harvest a layer of litter was left on the ground, along with a significant snow layer. The litter layer decreases the rate and amount of sediment produced on site.

Slope also affects the rate of erosion. As slope increases, the potential for erosion increases. In a study done by McGreer 1981, as slope increased from 15 to 45 percent, there was also an increase in erosion. At a 15-percent gradient, ash with litter was measured at 0.28 tons/acre. At 45 percent, ash with litter was 0.30, an increase of 0.02 tons/acre.

Observations and Measurements

Specifying that timber can only be tractor-harvested if the slope is 35 percent or less, greatly reduces the risk of sediment production. The logs on the site were skidded to two landings. The landings were located adjacent to Road 4245 (photo 3). No signs of erosion, such as ruts or gullies, were present. Soil displacement was minimized, with no sign of soil movement off site. Drainage structures were not needed due to the winter harvest method. During periods of overland flows, natural drainage features will be sufficient to direct runoff and filter sediment off site.

The snow depth was helpful in providing protection for the soil. Snow reduces the amount of direct contact between the machinery and the soil, reducing erosion.

Vegetation had established in the spring as a result of the harvest practices.



Photo 3

Effectiveness

A combination of factors made this practice effective. Determining what ground could be logged by tractor was the first step in minimizing erosion and sediment production. The unit design fit the topography and soil type. Logging in late fall and early winter, also had a positive effect on the success of the practice.

The 10 to 12-inch layer of snow along with the litter layer left on-site increased overall soil protection effectiveness. According to McGreer (1981, p 9), leaving a remnant litter layer on volcanic-ash topsoil will reduce first-year erosion on skid trails by 72 percent on a 15-percent slope. On 45 percent slopes, erosion will be reduced by 84 percent on skid trails.

Re-vegetation of Surface Disturbed Areas, BMP 13.04

Objectives

- 1) To minimize soil erosion from roads by re-vegetating the cutslope, fillslope and travelway.

Site Description

This revegetation BMP application is located in the LaValle Creek Drainage on Road 19205. The site begins at the junction of Butler Creek Road 9962 and Road 19205 and continues into an obliterated road section. It is on Missoula Ranger District of the Lolo NF. LSI classification is 15JB

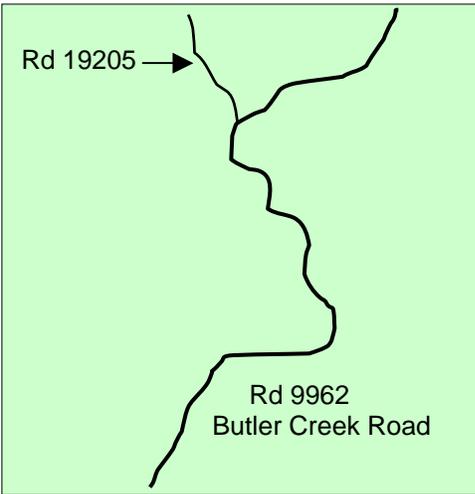


Figure 1

Narrative

Road 19205 was used as the main access for tractor harvest units 17, 18 and 18a on the Northside Timber Sale. New access road construction increases erosion and sediment potential.

In 1972, Megahan and Kidd found that 84 percent of the total sediment produced by a road within six years of construction, occurred the first year after construction. Therefore, mitigation to control erosion must be implemented as soon as possible.

As a mitigation measure under the timber sale contract, the beginning of Road 19205 was re-vegetated to prevent soil erosion and sediment. The travelway fill and cutslopes were scarified and seeded to minimize the potential for erosion and stabilize the soils. By re-vegetating the impacted surface, erosion control and water infiltration will increase.

Observations and Measurements

Soil was scarified 2 to 3 inches deep and approximately 8 inches apart by a dozer equipped with ripper teeth. During the observation the grass seeded was roughly 3 to 4 inches tall on the travelway, and 3 to 5 inches tall on the cut and fillslopes (photo 1).



Photo 1

The scarified area was seeded with bluebunch wheatgrass. Bluebunch wheatgrass is a native species that establishes slower than some other non-native grasses. Overall, the project ID team felt the slower-growing native species was preferred to a faster-growing non-native species.

Observations should be repeated after the next growing season to further determine the success rate.

Effectiveness

Re-vegetating the site has so far been effective. There are no signs of erosion or displacement that cause concern. However, grass growth has been slow and covers approximately 60 percent of the site. Further monitoring is needed.

Timber Harvest Unit Design, BMP 14.02

Objectives

- 1) To make sure timber harvest unit design will minimize overland flow, maintain water quality, and minimize soil erosion, compaction and displacement, by locating and designing landings and skidding patterns to fit the terrain.

Site Description

This monitoring site is Unit 22 of the Cave Helo Timber Sale. Unit 22 is located on the westside of Road 4388, ¼ mile from the junction of Road 4388 and Cottonwood Lakes Road. It is on the Seeley Lake Ranger District of the Lolo NF. LSI classification is combination of 10UC and 73UA

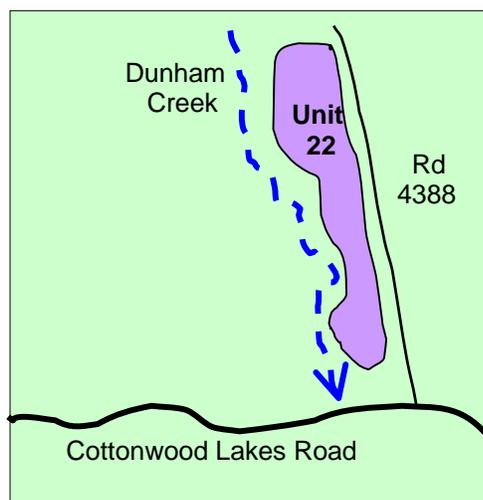


Figure 1

Narrative

Unit 22 is a 42-acre tractor harvest unit designed to maximize the use of existing roads, and allow access to skid trails and landings with minimal disturbance to the soil, stream and riparian area. Unit boundaries are aligned between Road 4388 and Dunham Creek (figure 1). The western boundary is flagged more than 50

feet from the stream. The eastern boundary is close to the road, in some places less than 50 feet.

Skid trails were located to maximize the accessibility to harvest areas while minimizing their numbers. Skid trails and landings were built far enough from Dunham Creek to satisfy Montana SMZ requirements and protect water quality. Two main landings were located in natural openings to minimize impacts, each built with two skid trails leading from them (photos 1, 2 & 3). Landing 1 is close to Cottonwood Lakes Road on the south end of the unit, and Landing 2 is in the middle of the unit (photos 4 & 5, and figure 2). Another smaller landing on the north end also provides access there (figure 2).



Photo 1

Observations and Measurements

The western boundary of the unit met SMZ qualifications, being 50 feet or more from the stream channel. Designing the unit with two main skid trails leading in either direction decreased the overall impact and still provided access to a large area.



Photo 2



Photo 3

All of the skid trails have re-established vegetation. Areas directly surrounding the log landings have also re-vegetated.

The slope of the trails is less than 5 percent, and they drain east, away from the stream. The area was seeded, and large woody debris was placed over the skid trails, providing long-term filtration and nutrient enhancement. Average slash diameter left on site is from 1 to 4 inches, with the majority ranging from 2 to 3 inches. A few large diameter logs, greater than 4 inches, are present, but comprise roughly 5 percent of the skid trails (photos 1 & 3).

There are no signs of erosion or permanent ruts from the tractor operation. The skid trails were well vegetated.

Any compaction should not persist and will diminish over time, as natural soil processes tend to slowly loosen compacted soil (Froehlich, Miles and Robbins, 1985).

Effectiveness

The design of Unit 22 is effective. A 5 percent slope drains away from the stream, and a buffer more than 50 feet wide lies between the stream and the harvest unit. Because of these two factors, sedimentation is not occurring. Skidding patterns and landings fit the terrain. The main landing was at the junction of the two main skid trails. The small landing on the north end provided a place to deck logs without building skid trails throughout the unit. Overall design of skidding patterns and landings have been effective.



Photo 4



Photo 5

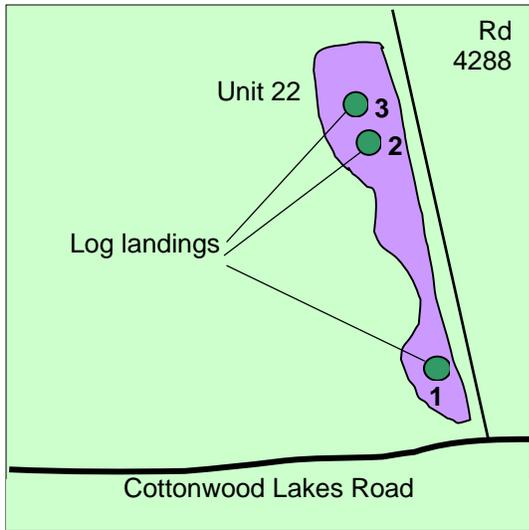


Figure 2