



Removing Slash Mats

James "Scott" Groenier, Project Leader

Slash mats (figure 1) are used to help reduce impacts of rutting, soil compaction, and erosion during logging operations. Slash mats may be made by delimiters, harvesters, or skidders pulling logging slash onto skid trails. To be effective, the slash mats need to cover the ground surface and may be 6 inches deep or deeper. If slash mats are left in the woods after logging has been completed, they continue to provide soil protection, but they are unsightly, may limit plant growth, and may become a fire hazard. This tech tip discusses a few options for removing slash mats and the pros and cons of each method.

Highlights...

- During logging, slash is often spread on skid trails to reduce erosion and soil compaction.
- This tech tip discusses alternative ways of removing the slash mats after logging has been completed.



Figure 1—A typical slash mat protects soils on skid trails.



Safety and NEPA Concerns

With any alternative for slash mat removal, safety and National Environmental Policy Act (NEPA) concerns must be addressed. Timber sale NEPA documents and forest plans also should be consulted to ensure that the slash mat treatment meets the conditions of each document and is allowed.

Treatment Options

The options for slash mat removal range from burning in place to chipping and hauling it away. Well-distributed slash helps soil nutrient cycling and provides woody debris, but concentrations of slash may require treatments to meet silvicultural, fire hazard reduction, and soil resource objectives.

The cost of these options ranges from the relatively inexpensive methods of grinding the slash in place or burning it in piles, to more expensive options that involve shredding or chipping, and finally to the most expensive option of collecting and hauling the slash away. The cost of collecting and hauling slash may be offset if it is sold for biomass fuel.

The condition of the slash mats will determine the options for their use and the market price they will bring as biomass. Deep, continuous slash mats would provide more material for biomass fuel, while spotty, shallow material may be more effectively treated and left on site.

The options for slash mat treatment include:

- Scatter or burn in place
- Pile and burn
- Shred and scatter
- Chip and haul

Scatter or Burn in Place

Breaking up the slash mat with tines or a brush rake and scattering it is the simplest option.

The slash mats would be broken up by the trackhoe and the slash scattered across the ground to maintain long-term soil productivity through nutrient cycling. The trackhoe can scarify spots at the preferred spacing to promote rapid conifer regeneration.

Track-mounted machines are recommended over wheeled machines because tracks do a better job of distributing the trackhoe's weight. Wheeled machines with a brush rake may work for shallow slash mats if the ground is dry enough for wheeled machines to be used.

When slash mats are dirty and in very poor condition, burning in place with a slow, creeping fire may be the only viable method of disposal. Some concerns with this method are air quality and the possibility that the fire may escape.

Pile and Burn

The most economical method for piling slash would probably be with a trackhoe or an excavator fitted with grapples.

The mats may have to be piled and left until air quality conditions and fire danger allow them to be burned. An air curtain destructor could be used to burn slash without generating smoke and with little risk of starting a fire. The San Dimas Technology and Development Center's report "The Use of Air Curtain Destructors for Fuel Reduction and Disposal" (Zahn 2005) has more information.

Shred and Scatter

Shredding or chipping the slash mats in place usually is the next most cost effective way to remove them. Many different types of attachments can be used with different types of equipment to grind the slash mats in place. The most common combination would be a mastication head attached to a skidsteer (figure 2) or front end loader.



Figure 2—A mastication attachment on a small skidsteer.

A concern with this approach is that a lot of slash will be ground up and piled so deeply that the woody material will not decompose quickly. Also the material would be left on the skid trail rather than being scattered.

If track-mounted equipment is used, the reduced ground pressure may allow some of the shredded material to be scattered without soil compaction. Wheeled vehicles can be used, but ground conditions must be monitored to prevent soils from being rutted and compacted.

The Missoula Technology and Development Center’s “Understory Biomass Reduction Methods and Equipment Catalog” (Windell and Bradshaw 2000) has more information on this subject.

A trackhoe with a swing mulcher and thumb attachments also can be used for mastication (figure 3). The machine is track mounted, which reduces ground pressure. The thumb attachment allows slash mats to be picked up and scattered off the skidder trail before they are shredded. This approach takes longer than grinding the slash mats in place, but scatters woody biomass and speeds the decomposition of the material, producing a mulch that retains moisture for plant growth and provides a pool of plant nutrients.



Figure 3—A trackhoe with a mastication attachment used to shred material in place.

A horizontal shredder or tub grinder could be used to shred the slash mat material and blow it into the woods (figure 4), although this approach would cost more than those described so far. A trackhoe would be needed to place material onto the grinder’s feed conveyor. When the slash mat material is too dirty to be used for fuel, shredding would be recommended in areas where the shreddings can provide erosion control. Wood shreddings tend to interlock (Foltz and Dooley 2004; Groenier and Showers 2004) and are very effective as a mulch to reduce erosion on severely burned sites, areas with erosive soils, or areas of special concern. Self-feeding wood chippers (figure 5) can be used to remove slash mats, but wood chips do not provide as much erosion control as wood shreddings.



Figure 4—A horizontal shredder fed by a trackhoe can shoot shredded material into the woods for erosion control.



Figure 5—A self-feeding wood chipper attached to a tractor.

Chip and Haul

The most expensive method of removing slash mats would be to collect, grind, and haul the material for burning at a biomass cogeneration plant that produces electricity and heat. If a horizontal shredder or tub grinder is being used nearby, the material can be ground onsite economically. The slash mat material could be loaded into containers for grinding elsewhere. A log bunk could be used to haul merchantable timber or a roll-on/roll-off container (figure 6) could be used to haul shredded material.

Summary

This tech tip discussed several alternatives for slash mat removal and the advantages and disadvantages of each alternative. The alternatives can range from piling and burning to the more costly alternative of hauling shredded material for use as fuel. The condition of the slash mats will determine the options for their use and the price the material will bring.



Figure 6. A slash container roll-on/roll-off bin for collecting shredded wood.

References

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About the Author

James “Scott” Groenier, professional engineer, began working for MTDC as a project leader in 2003. Scott earned a bachelor’s degree in civil and environmental engineering from the University of Wisconsin at Madison and a master’s degree in civil engineering from Montana State University. He worked for the Wisconsin and Illinois State Departments of Transportation and with an engineering consulting firm before joining the Forest Service in 1992. He worked as the east zone structural engineer for the Eastern Region and as a civil engineer for the Ashley and Tongass National Forests before coming to MTDC.

Library Card

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During logging, slash is often spread on skid trails to reduce erosion and soil compaction. After the logging has been completed, the slash needs to be removed. This tech tip discusses options that include scattering or burning in place, piling and burning, shredding and scattering, and chipping and hauling the slash so it can be burned at a plant using biomass as fuel.

Keywords: biomass, erosion control, logging, mulch, skid trails

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<http://www.fs.fed.us/eng/t-d.php>

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