3H: Revegetation of Disturbed Areas

Management Measure for Revegetation of Disturbed Areas

Reduce erosion and sedimentation by rapid revegetation of areas disturbed by harvesting operations or road construction:

(1) Revegetate disturbed areas (using seeding or planting) promptly after completion of the earth-disturbing activity. Local growing conditions will dictate the timing for establishment of vegetative cover.

(2) Use mixes of species and treatments developed and tailored for successful vegetation establishment for the region or area.

(3) Concentrate revegetation efforts initially on priority areas such as disturbed areas in SMAs or the steepest areas of disturbance (e.g., on roads, landings, or skid trails) near drainages.

Management Measure Description

Revegetating disturbed areas restabilizes the soil in these areas, reduces erosion, and helps to prevent sediment and pollutants associated with sediment (such as phosphorus and nitrogen) from entering into nearby surface waters. Vegetation controls soil erosion by dissipating the impact force of raindrops, reducing the velocity of surface runoff, trapping dry sediment and preventing it from moving farther downslope, stabilizing the soil with roots, and contributing organic matter to the soil, which increases soil infiltration rates.

Nutrient and soil losses to streams and lakes are reduced by revegetating harvested, burned, or other disturbed areas. In some cases, planting early to establish erosion protection quickly and then again later to provide more permanent protection is necessary and advisable to prevent excessive erosion.

Good ground cover is key to reducing erosion. Good ground cover is defined as living plants within 5 feet of the ground and litter or duff with a depth of 2 inches or more (Kuehn and Cobourn, 1989).

Benefits and Costs of Revegetation Practices

The effectiveness of revegetation for controlling erosion, particularly on steep slopes and road fills, depends on protecting the slope until vegetative growth can take hold and grow enough to serve as a soil stabilizer. Straw mulch and netting are common ways to protect a newly seeded and fertilized slope. Adding straw mulch can reduce erosion by one-eighth to one-half. Adding netting with mulch can reduce erosion by nearly 100 percent to negligible levels (Figure 3-43) (Bethlahmy and Kidd, 1966).

Megahan (1987) estimated that the cost of seeding with plastic netting placed over the seeded area (approximately $8,200 per acre) is almost 50 times more than the cost of dry

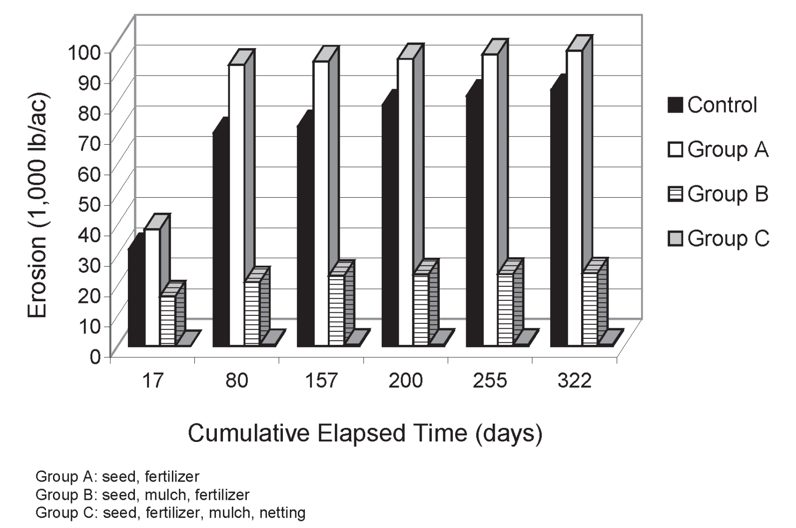

Figure 3-43. Comparison of the effectiveness of seed, fertilizer, mulch, and netting in controlling cumulative erosion from treated plots on a steep road fill in Idaho (after Bethlahmy and Kidd, 1966).

seeding alone (approximately $180 per acre). Other cost estimates related to practices for forest regeneration are presented in Tables 3-34 to 3-36. Dubensky (1991) estimated the economic effect of regeneration practices on the overall cost of a harvesting operation (Table 3-34). Lickwar (1989) compared revegetation costs for disturbed areas of various slope gradients in the Southeast (Table 3-35). Minnesota's Stewardship Incentives Program estimated the costs of reestablishing permanent vegetation with native and introduced grasses (Table 3-36).

Table 3-34. Economic Effect of Implementation of Proposed Management Measures on Road Construction and Maintenance (Dubensky, 1991)[a]

Management Practice	Increased Cost
Fiber for road and landing construction/maintenance	$5.00/ton
Ripping, shaping, and seeding log decks	$214/deck
Seeding firelines or rough logging roads	$24/100 ft
Construction and seeding of water bars	$15 each
Construction of rolling dips on roads	$24 each

All costs updated to 1998 dollars
[a] Public comment information provided by the American Paper Institute and the National Forest Products Association.

Table 3-35. Cost Estimates (and Cost as a Percent of Gross Revenues) for Seed, Fertilizer, and Mulch (1987 Dollars) (Lickwar, 1989)

Practice Component	Steep Sites[a]		Moderate Sites[b]		Flat Sites[c]	
Seed, fertilizer, and mulch	$19,950	(3.41%)	$18,438	(2.72%)	$17,590	(1.36%)

Note: All costs updated to 1998 dollars.
[a] Based on a 1,148-acre forest and gross harvest revenues of $399,685. Slopes average over 9 percent.
[b] Based on a 1,104-acre forest and gross harvest revenues of $473,182. Slopes ranged from 4 percent to 8 percent.
[c] Based on a 1,832-acre forest and gross harvest revenues of $899,491. Slopes ranged from 0 percent to 3 percent.

Table 3-36. Estimated Costs for Revegetation (1991 Costs) (Minnesota DNR, 1991)

Practice	Total Cost[a]
Establishment of permanent vegetative cover (includes seedbed preparation, fertilizer, chemicals and application, seed, and seeding as prescribed in the plan)	
Introduced grasses	$96/acre
Native grasses	$176/acre

Note: All costs updated to 1998 dollars.
[a] The costs shown represent the total cost of the practice. Calculations were made by dividing the maximum Federal cost share by 0.75 to obtain the total cost.

Best Management Practices

◆ *Use mixtures of seeds adapted to the site, and avoid the use of invasive species. Choose annuals to allow natural revegetation of native understory plants, and select species that have adequate soil-binding properties.*

The selection of appropriate grasses and legumes is important for vegetation establishment. Grasses vary as to climatic adaptability, soil chemistry, and plant growth characteristics. USDA Natural Resources Conservation Service technical guides at the statewide level are excellent sources of information about seeding mixtures and planting prescriptions. The U.S. Forest Service, state foresters, and county extension agents can also provide helpful suggestions.

Using native species is both important and practical, and plenty of hardy native species are usually available. Nonnative species can outcompete and eliminate native vegetation, and the use of nonnative species often results in increased maintenance activities and expense.

Seeding rates (e.g., pounds per 1,000 square feet) are generally recommended for individual seed varieties and seed mixtures. Following such recommendations usually provides adequate cover and soil protection, whereas overseeding can create seedling overcrowding and subsequent failure.

◆ *On steep slopes, use native woody plants planted in rows, cordons, or wattles.*

These species may be established more effectively than grass and are preferable for binding soils.

◆ *Seed as soon as practicable after soil disturbance, preferably before rain, to increase the chance of successful vegetation establishment.*

Timing depends on the species to be planted and the schedule of operations, which determines when protection is needed.

◆ *Mulch as needed to hold seed, retard rainfall impact, and preserve soil moisture.*

Critical, first-year mulch applications provide the necessary ground cover to curb erosion and aid plant establishment. Various materials, including straw, bark, and wood chips, can be used to temporarily stabilize fill slopes and other disturbed areas and to improve conditions for germination immediately after construction. In most cases, mulching is done together with seeding and planting to establish stable banks. Both the type and the

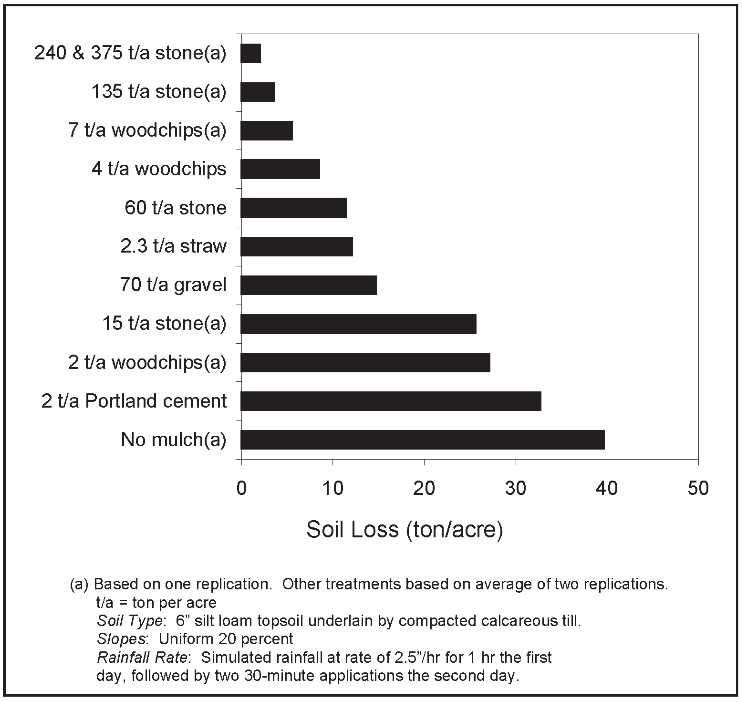

Figure 3-44. Soil losses from a 35-foot-long slope (after Hynson et al., 1972).

amount of mulch applied vary considerably between regions and depend on the extent of the erosion potential and the available materials (Hynson et al., 1982). Figure 3-44 summarizes the effectiveness of various types of mulch (including Portland cement) for reducing erosion.

◆ *Fertilize according to site-specific conditions.*

Fertilization is often necessary for successful grass establishment because road construction commonly results in the removal or burial of fertile topsoil. To determine fertilizer formulations, it is best to compare available nitrogen, phosphorus, potassium, and sulphur in the soils to be treated with the requirements of the species to be sown. It might be necessary to refertilize periodically after vegetation establishment to maintain growth and erosion control capabilities. Fertilizer and other chemical management techniques are covered in depth in section 3I of the document.

◆ *Use biosolids as an alternative to commercial fertilizers.*

Biosolids is the name given to the solid material remaining after raw sewage has been treated. Biosolids can be used for forest regeneration efforts as a viable alternative to using commercial fertilizers. Biosolids are rich in nitrogen, as well as other nutrients essential for plant growth, including phosphorus, zinc, boron, manganese, and chromium (King County, Washington, 1999). The nutrients in biosolids are mostly in an organic form, so the biosolids act like a slow-release fertilizer, releasing only 15-20 percent of their nutrients during the first year after an application (Meyers, 1998). They also have a high content of organic matter, which increases soil infiltration rates and helps improve the ability of the soil to retain water, making it available for trees during dry periods. Biosolids can increase the growth rate of trees growing on relatively infertile soils to match that of trees growing on fertile soils.

Biosolids that are applied to the forest are delivered to the forest as a semisolid product with a content of approximately 20 percent solids and 80 percent water. The biosolids can be dispersed using a device that propels them aerially over an area, or they can be applied using a high-pressure hose. From a single point, they can be spread to a 250-foot radius or more across young tree growth and to a 60-foot radius in thinned timber stands.

The application rate (in ton/acre) of biosolids can be determined based on the nitrogen content of the biosolids. Specific amounts of nitrogen can be specified for each area to be treated based on soil testing and the nutrient requirements of the species involved. In the Northwest, application rates vary from 3 dry ton/acre of biosolids for timber to 7 dry ton/acre for young plantations, which corresponds to 150 to 350 pounds of plant-available nitrogen per acre (King County, Washington, 1999).

Streams and other water bodies are protected during biosolids applications by 33-foot buffer areas that are not fertilized. States regulate the use and application of biosolids, and obtaining a permit is usually necessary before biosolids may be used.

The potential for long-term effects from metals and pathogens in biosolids has been raised as a concern, but biosolids that meet EPA and state standards pose very little environmental threat (USEPA, 1994).

- ◆ *Protect seeded areas from grazing and vehicle damage until plants are well established.*
- ◆ *Inspect all seeded areas for failures, and make necessary repairs and reseed within the planting season.*
- ◆ *During non-growing seasons, apply interim surface stabilization methods to control surface erosion.*

Possible methods include mulching (without seeding) and installation of commercially produced matting and blankets. Alternative methods for planting and seeding include hand operations, the use of a wide variety of mechanical seeders, and hydroseeding.