



**NEW MEXICO
FORESTRY DIVISION**

POST-FIRE STABILIZATION

A guide for New Mexico landowners



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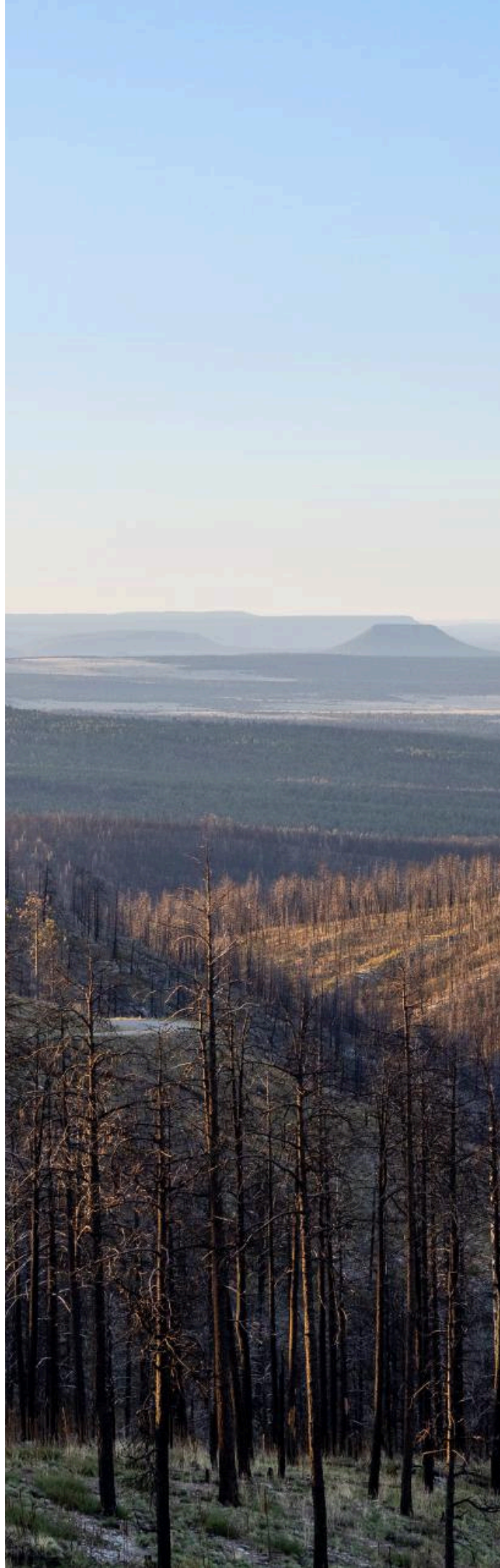
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New Mexico Forestry Division
1220 S St. Francis Drive, Santa Fe, NM 87505
emnrd.nm.gov/sfd

Cover photo: Log erosion barriers in the Salt-South Fork burned area. Ethan Seavey/New Mexico Forestry Division.
Right: Hermit's Peak-Calf Canyon burned area. Courtesy Jen Judge/New Mexico Magazine.





Large-scale, high severity wildfire is becoming increasingly common across New Mexico.

Wildfires alter soil and vegetation, increasing the risk of flooding and landslides. Burned areas reduce the land's ability to absorb rainfall – fire-hardened soil sheds water quickly, accelerating runoff and increasing the likelihood of flash flooding and debris flows. These heightened risks persist until vegetation recovers, either through natural regeneration or with the assistance of landowners, communities and natural resource management professionals.

This guide provides information on common post-fire land stabilization practices for landowners seeking assistance through the New Mexico Forestry Division (NMFD/Division). For more information on our Post-Fire Coordination Program, including active assistance programs and general recovery resources, visit emnrd.nm.gov/sfd/post-wildfire-coordination.

Post-fire stabilization needs vary significantly between properties, and not all practices listed in this guide will be appropriate for every site. Burn severity, slope, soil conditions, access limitations, and watershed context all influence what is effective and safe. Landowners are encouraged to consult with qualified natural resource professionals for site-specific recommendations. **For landowners participating in NMFD Post-Fire Assistance Programs, Division staff will determine which practices can be implemented based on field conditions, safety considerations, and available program resources.**

Burned trees can fall without warning during wind or rain events. Cutting, removing, or relocating burned trees can be hazardous. The Division recommends seeking professional assistance from a certified arborist prior to beginning work. Landowners conducting the work themselves should only do so with proper training and personal protective equipment.

Watershed Stabilization and Erosion Control

Countour Felling and Log Erosion Barriers

Felling of dead trees on steep slopes (25-60%) where the fire has increased the risk of water runoff and erosion. Felled logs are anchored to the soil horizontally on the slope by laying the logs in small trenches and/or staking the logs to the soil surface to prevent them from sliding downhill. Logs shall be placed in level lines, with the ends staggered to reduce the risk of water concentrating along the edges and adding to erosion. Individual lines of trees across the slopes are spaced according to the steepness of the slope, typically between 20 feet (for steeper slopes) to 80 feet (for gentler slopes). Logs used for contour felling should have limbs removed on the downhill side so that the log is in full contact with the soil and anchored into the slope using tree stumps, metal pins, local rock, or wooden stakes. Species used for contour logs and log erosion barriers may include all native or non-native tree species or woody materials located at a project site.

Other log erosion barrier methods, including trash racks, log mats and log step downs may be used where appropriate.

Erosion control logs in the South Fork Fire burned area. Ethan Seavey/NMFD.



Ground Roughening

Preparing soil for seeding and planting by loosening or breaking up the soil, which improves soil contact for seeds. Site preparation should occur immediately prior to planting in the spring or fall (for cool season grasses) and summer (for warm season grasses). Roughening shall always be followed by seeding and mulching.

Seeding

Planting areas with seeds of native or adapted vegetation. May be combined with mulching. In severely burned soils, seeding may also be paired with ground roughening, which can help address post-fire soil impacts such as reduced seed availability and poor water absorption. Seeding should occur in the appropriate season to maximize success and reduce grazing by wildlife.



Erosion control logs in the South Fork Fire burned area. Ethan Seavey/NMFD.

Hydromulching and Hydroseeding

Spraying a mixture of water, fiber mulch, and tackifier on burned slopes to prevent soil erosion and/or foster revegetation. Seed, fertilizer, or soil stabilizing polymers may also be applied. Hydromulch is used on severely burned or otherwise highly erosive areas with 20 percent to 60 percent slopes. Ground-applied hydromulch is limited to areas within 300 feet of roads or trails that provide equipment access.

Slash Treatment and Mulching

Applying natural mulch on areas with bare soil to reduce erosion and/or support plant growth. Provides partial ground cover on gentle slopes and may be used with planting and seeding.



*Mastication in the Jemez Mountains.
Courtesy John Formby.*

- **Chipping** produces uniform wood chips, similar to those used on playground surfaces. These chips are more consistent in size and create a more stable soil cover, reducing evaporation and providing a protective barrier against erosion.
- **Mastication** results in a larger, uneven pieces of woody material, similar to fire kindling. This method leaves behind rough material, which breaks down more slowly and provides longer-term protection against soil erosion.
- **Mulching** adds a protective layer of organic material, typically finely ground wood to cover exposed soil. This helps reduce erosion, maintain soil moisture, and protect against the elements.

Each method serves specific purposes depending on the desired outcome, such as moisture retention, erosion control, or site preparation for restoration.

Wattle or Fiber Rolls

Wattles and fiber rolls are used in high-burn severity areas where soil erosion and water quality deterioration are at risk. They reduce erosion by shortening the slope length to slow overland flow velocity. Fiber rolls trap sediment and provide a seedbed for vegetative recovery.

If water repellant soils are present, the installation of fiber rolls may break through the water repellant layer and can improve infiltration. Only wattles and fiber rolls utilizing 100% natural materials will be used.

Wattles and fiber rolls may be used in one or more of these locations:

- Areas of high and moderate burn severity
- Slopes with less than 40% of the original ground cover remaining
- Slopes between 20–40% grade
- Soils deeper than 8 inches
- Slopes with less than 25% surface rock

Erosion Control Structures

The gathering and arranging of natural materials, including rock, brush, and earth, in small gullies and rills at higher elevations where erosion risk is significant or already present.

The goals are to prevent further erosion, slow down water, capture dirt and sediment, control grade and promote downstream plant growth. The following structure types may be used:

- **Rock** – Rocks that are either sourced from the site or transported from an off-site location are utilized to build structures. Larger rocks are typically used as anchors or support, while smaller rocks fill the gaps between larger ones. Rocks that have relatively flat surfaces are ideal for the foundation of certain structures, providing a stable base and an area to absorb the impact of falling water. Structures that may be utilized include, but are not limited to: One rock dam, rock mulch rundown, media luna, Zuni bowl, and baffle. More information on these structures can be found at: QuiviraCoalition.org.
- **Wood Materials** – Woody material, including brush, can be sourced from the project site to construct a variety of structures that slow flows, reduce erosion, and capture fine sediment to help rebuild gullies and channel bottoms. As sediment and plant material accumulate within these structures, they contribute to channel stability and recovery. Woodbased structures that may be utilized include, but are not limited to: wicker weirs, brush matting, brush dams, log step downs, and trash racks.



Example of Zuni bowls.
Ethan Seavey/NMFD.



Example of trash rack.
Ethan Seavey/NMFD.

- **Earthen** – Earthen grade control structures are used to either redirect or restore dispersed surface flow. Plug-and-spread structures are built in existing headcuts to reduce water velocity and the erosive force by plugging the headcut and spreading the flows to the sides. Bank sloping can reduce erosion by reshaping steep, highly erodible slopes to a more stable grade. Water bars improve road drainage by creating rolling dips, where water is collected and directed off the road.

*Example of wicker weir.
Ethan Seavey/NMFD.*



Fuels Management

Hazardous Tree Removal

Felling (cutting down) of wildfire-damaged trees that pose an immediate threat of falling onto a road, powerline, or other developed areas. Handling of resulting materials may include chipping of trees, limbs, or branches; utilizing trees for contour felling and/or log erosion barriers; or stacking of felled trees. Trees/brush shall be cut to four inches above ground level or less and may be removed by either hand crews or heavy machinery. **The Division strongly recommends seeking professional assistance from a certified arborist to complete hazardous tree work. Landowners conducting the work themselves should only do so with proper training and personal protective equipment.**



Hand thinning near Magdalena Mountains. Fred Kloeppel/NMFD.

Thinning

Removing some trees in an unburned stand to stimulate the growth of remaining trees, reduce the spread of detrimental insects and disease, and reduce the risk of uncharacteristic wildfire activity. Thinning may be conducted by hand or with heavy machinery. Handling of resulting materials may include chipping, utilization for contour logs, or stacking of felled trees.

Lop and Scatter

Hand removing the upward-extending branches from tops of felled trees to keep slash low to the ground, to increase the decomposition rate, to lower the fire hazard or as pretreatment prior to burning. Depths of ground material from lop and scatter may range from 12-24 inches.

Piling near Magdalena. Fred Kloeppel/NMFD.

Piling

Using hand crews or mechanical equipment to pile cut slash and/or downed trees. If piled by hand, low-impact vehicles, such as four-wheelers may be used to assist in treatments. Piles may be left to decompose over time, provide wildlife habitat, or create windrows to provide seedlings with protection from the elements. To reduce uncontrolled wildfire risk, piles will be considered for burning on a case-by-case basis where appropriate.



Forest Health

Prescribed Grazing

Using goat grazing for plant control to inhibit or encourage growth of specific plants by controlling the timing, intensity, duration, and area using domestic goats. Goats are always contained when inside the designated project area using a mobile fence system or similar means meant to focus grazing activity in small areas. Trees that are not marked or prescribed for removal will not be damaged and remain untouched by treatment activities.

Invasive Species Management

Invasive plants are a serious threat to the stability and function of ecosystems. Often these plants rapidly colonize burned areas, reducing native plant abundance and diversity. Treating noxious and invasive weeds prevents the serious threat these plants have on the ecosystem. Depending on the plant type and its response to fire, noxious or invasive weeds may be treated with chemical, biological, manual, mechanical, or prevention seeding. Surveying an area where the threat of noxious or invasive plants is identified is the first step. If noxious or invasive plants occur, removal of isolated populations may occur by hand. Where a robust population exists and the fire's effect has exacerbated the threat to the ecosystem, mechanical, chemical, or prevention seeding may be used.

Bark Beetle Management

Trees weakened by wildfire damage, drought, or other stressors may be more susceptible to damage from insects and disease. After a major wildfire disturbance, populations of insects can begin attacking healthy trees. The following methods may be used to manage bark beetle infestation to protect unburned trees:



- **Slash management** – Bark beetles can colonize and reproduce in slash material and potentially pose a threat to residual standing trees. Slash should be managed to prevent or minimize the occurrence of bark beetles utilizing slash as refugia within 30 days of thinning activities. Some slash management practices include lop and scatter, chipping, mastication, pile and burn, removal, and solarization.
- **Repellants** – Anti-aggregation pheromones work by preventing bark beetle attacks. Anti-aggregation pheromones are not insecticides and do not kill bark beetles or other insects, and are non-toxic to birds, pets, and humans.
- **Chemical control** – Applying insecticides that are registered for controlling bark beetles on un-infested trees in late winter or early spring is an effective strategy for preventing bark beetles from attacking high value trees. A high-pressure sprayer is used to apply a solution of liquid insecticide to the tree's main trunk and branches 4 inches or larger in diameter before bark beetles become active.

Seeds for seedlings. Courtesy Josh Sloan/NMHU.



Reforestation and Revegetation

Site Preparation

In some areas, it will be important to ensure that a site has the right conditions to ensure survival of planted seedlings. Planting site preparation may include, but is not limited to:

- Brush clearing and slash treatment to ensure that seedlings have adequate access to space and sunlight, and to reduce competition with live plants that would otherwise jeopardize the success of the planting.
- Soil amendments to incorporate more organic material into the soil, aiding in nutrient availability and moisture retention. Amendments may include mulch, biochar, or other organic materials.

- The retention of snags, stumps, and nurse trees to provide protection from animal browsing and over exposure to the elements. Retention of these elements will also provide habitat for cavity nesting birds, bats, rodents, and other animals as seedlings become established.

Planting

Nursery-grown native trees and shrubs may be planted in areas with low probability of natural regeneration in both riparian and upland habitats. Trees and shrubs will be planted by hand using specialized equipment and established methods to increase long-term seedling survival.

Browsing Protection

Seedling predation by cattle, elk, deer, and other large animals contributes to high seedling mortality and reduced likelihood of planting success. Measures taken to prevent seedling mortality from browsing may include plastic or biodegradable seedling shelters or temporary exclusionary fencing.

For more about caring for and planting seedlings, visit our reforestation resources page:

emnrd.nm.gov/reforestation-resources



Browsing protection for a ponderosa seedling. Courtesy Chris Marsh/UNM.

Biomass Disposal

Burn Boxes and Air Curtain Incinerators

Excess biomass produced during project implementation that cannot be used on-site may be processed using a burn box or air curtain incinerator. Equipment will be staged at a pre-determined location with a water tender with a minimum capacity of 1,000 gallons. Any biochar or charcoal resulting from burning may either be left on the project site or otherwise disposed of.

Monitoring

Inspections

NMFD foresters, cooperators or authorized contractors will conduct inspections while project work is ongoing and following completion to confirm that treatments are installed according to project specifications and are functioning as intended. These inspections will also assess the immediate effectiveness of the practices in reducing post-fire impacts to the watershed, identify maintenance needs, and overall landscape conditions. Inspections may include field visits, photo documentation, and condition assessments as outlined in the project plan. Project sites may be visited multiple times during the implementation and post-implementation phases.

Long-Term Monitoring

Long-term monitoring will evaluate how site conditions change over time and how well treatments continue to perform through multiple seasons. Monitoring may include periodic field visits, photo documentation, aerial imagery, and condition assessments as outlined in the project plan. This effort tracks vegetation recovery, soil stability, hydrologic response, and helps determine how the landscape is progressing toward long-term recovery. NMFD will require ongoing access to the property for up to five years for monitoring, and landowners will always be notified prior to any visit.

NMFD staff meet with a landowner affected by the 2022 Hermit's Peak-Calf Canyon Fire. Ethan Seavey/NMFD



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