

Short Guide to Agencies, Programs, and Practices for **BURNED AREA REHABILITATION**



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PURPOSE

The purpose of this paper is to provide guidance to private landowners after high intensity fire has impacted their property. The paper introduces some of the relevant agencies, programs, and practices that may aid in restoring land to a properly functioning condition.

SUMMARY

The burned area rehabilitation process can be summarized in 5 steps. This document provides guidance and links to additional information about the first four steps.

1. Assess
 - Utilize available resources for technical assistance. Ideally, have a resource professional visit the property and provide a written summary of their observations and findings. (Refer to **Agencies** and **Programs**)
 - Consider having a management plan written by a consultant or resource professional that will include the next 4 steps. (Refer to **Resource Assessment**)
2. Identify
 - Goals and objectives
 - Priority areas for treatment
 - Appropriate and feasible management activities (Refer to **Practices**)
3. Plan
 - Create a plan of operations to implement practices in a logical sequence
 - E.g. roads should be closed and rehabbed after machinery has left
4. Implement
 - Remember that practices will be expensive and long-term.
 - Utilize designs and specifications appropriately to ensure the greatest possible success, while acknowledging the difficulty and variability of burned area rehabilitation.
5. Monitor
 - Evaluate practice effectiveness. Practice adaptive management if your strategies aren't working!

BACKGROUND

High severity wildfire that burns surface organic matter and kills large swaths of forest can have serious implications on soil erosion, vegetation recovery and overall ecosystem health. Losing aboveground canopy cover and surface litter causes a drastic increase in water yield within the first few years after a fire, and changes in overall site hydrology can be seen for as many as 60 – 80 years in the interior West.¹ Increased water yield may cause flash flooding, while vegetation may require many years to reestablish or, in some cases, result in a stand-type conversion that can last hundreds of years. Throughout the West, changes in climate, fuel loading, and management techniques over the past 100+ years have resulted in increased fire intensity, making these issues increasingly more relevant.

Research is on-going in this field, and as such, this document is intended to be updated with the best available science as needed.

Timeline for Practice Implementation		
When to Implement	Action or Treatment	Notes
Immediately	In-stream erosion control	Permits may be needed
Immediately	Upslope erosion control	Silt fences, contour felling, etc. where the value of downstream resources justify the expense.
Immediately	Salvage logging, mastication	Logging roads can cause more damage if built improperly so water bars and other rehab measures are crucial.
Aerially – Immediately* On roads – after machinery has left	Mulching, seeding	Mulching is cheaper and can be more effective than contour felling. Seeding should be conducted ONLY if needed.
Next planting season (either fall or spring)	Restoration plantings (trees, shrubs, herbaceous species)	May be needed to regenerate a species that has been removed from the site. Species should be carefully selected based on site suitability and soil type. Site prep and / or scarification may be required.

¹ Peterson, D. e. (2009). *Effects of Timber Harvest Post-Fire in Western North America*. USDA - FS, PNW Research Station.

AGENCIES

Natural Resources Conservation Service (NRCS) – Works with landowners on farms, ranches, and nonindustrial private forest lands to provide technical and financial assistance to address resource concerns. NRCS is closely affiliated with Soil and Water Conservation Districts (SWCD's) and often share an office. There is approximately one office per county in New Mexico.

<http://www.nm.nrcs.usda.gov/contact/>

NM State Forestry (NMSF) – Works primarily with nonindustrial private forest landowners to implement thinning projects for wildfire hazard reduction, forest health, etc. Also tasked with wildfire suppression on non-federal, non-Tribal and non-municipal lands. There are six District Offices in New Mexico, located in Bernalillo, Capitan, Cimarron, Chama, Las Vegas, and Socorro.

<http://www.emnrd.state.nm.us/FD/Contactus.htm>

National Interagency Fire Center (NIFC) – The parent of the Burned Area Emergency Rehabilitation Program (BAER), NIFC is formed from 8 federal agencies and serves to coordinate national fire planning and operations.

<http://www.nifc.gov/index.html>

Soil and Water Conservation Districts (SWCDs) – Political subdivisions of state government that provide technical and financial assistance to private landowners and public and tribal land managers for natural resource conservation work in their Districts. They rely primarily on the voluntary action and cooperation of landowners to achieve their objectives -- the restoration, preservation and responsible development of our natural resources. Boundaries for New Mexico's 47 SWCDs can be found at <http://www.nmda.nmsu.edu/apr/soil-and-water-conservation-districts/Programs>.

PROGRAMS

NOTE: Landowners should be aware that funding opportunities under government assistance programs are competitive and limited in regard to what they can cover, how much is available, and who is eligible to receive funding. However, agencies offer technical assistance through a number of different programs. Particular focus should be given to the application of appropriate practices in the proper sequence to restore a burned area.

Emergency Watershed Protection (EWP) Program – The purpose of this USDA-NRCS program is to undertake emergency measures to slow down runoff and prevent soil erosion to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural

occurrence is causing or has caused a sudden impairment of the watershed. Within a few days of an incident, a team from the NRCS Albuquerque State Office will assess the potential impacts and apply for funding.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/ewp>

Burned Area Emergency Response (BAER) Program – The purpose of this interagency program is to mitigate the potential for catastrophic damage to life, property, water quality, and deteriorated ecosystems after high severity wildfire. BAER objectives are to:

1. Determine if an emergency condition exists after the fire.
2. Alleviate emergency conditions to help stabilize soil; control water, sediment and debris movement; prevent impairment of ecosystems; mitigate significant threats to health, safety, life property and downstream values at risk.
3. Monitor the implementation and effectiveness of emergency treatments.

BAER funds are only applied on federal lands of the member agencies in the NIFC. BAER is “first aid” – immediate stabilization that often begins before a fire is fully contained. BAER does not seek to replace what is damaged by fire, but to reduce further damage due to the land being temporarily exposed in a fragile condition. The BAER Catalog contains a wealth of information (including specifications) on how to implement rehabilitation projects in three areas – Upslope, in-stream, and on roads. http://www.nifc.gov/programs/programs_main.html

Environmental Quality Incentive Program (EQIP) – The purpose of this USDA-NRCS program is to provide financial and technical assistance to farmers, ranchers, and nonindustrial private forest landowners who face threats to soil, water, air, and related natural resources on their land. Persons engaged in livestock or agricultural production and owners of non-industrial private forestland are eligible for the program. Eligible land includes cropland, rangeland, pastureland, private non-industrial forestland, and other farm or ranch lands. Applications for EQIP may be turned in to your local NRCS Field Office at any time, but are batched, ranked, and awarded once per fiscal year. <http://www.nm.nrcs.usda.gov/programs/eqip.html>

Conservation Seedling Program – The purpose is to provide low-cost, high-quality tree and shrub seedlings to private landowners for conservation purposes such as reforestation, erosion control, windbreaks, or Christmas tree plantations. There are two distribution periods every year (spring and fall).

<http://www.emnrd.state.nm.us/FD/treepublic/Default.htm>

Technical Assistance – NMSF, NRCS, and other government agencies (federal, state, tribal, local) will provide some level of technical assistance for free. Various environmental consulting firms and individuals are also available in the private sector. You may search for certified [Technical Service Providers](#) through the NRCS, or contact a State Forestry District for a list of consultants. In any case, a site visit and

assessment will typically be required to provide specific guidance, but in some cases general advice may be provided without a trip to the property. This document is an example of non-site-specific technical assistance, and a wealth of basic information can be found at any of the websites listed under TREATMENT.

TREATMENT

This is not a comprehensive list of potential treatment or management options for the private landowner, but can be used as a starting point. The practices are listed in approximately the sequence that they would be implemented to avoid ancillary damage to other resources. However, the landowner goals and objectives, economic feasibility, and available resources will ultimately determine a schedule of operations. This schedule would be a basic list of management activities with planned implementation dates. Agency staff or consultants can help landowners plan out appropriate management activities and implementation schedule.

Specifications and guidance documents for most of these practices can be found online at the following websites:

- 1) [NRCS-NM Field Office Tech Guide](#) (NRCS)
- 2) [Burned Area Emergency Rehabilitation Catalog](#) (BAER)
- 3) [AZ Wildfire Recovery Tips](#) (AZ)
- 4) [All About Watersheds – NM Wildfire Information](#) (AAW)
- 5) [Colorado State Forest Service – Post-Fire Rehabilitation](#) (CSFS)
- 6) [Montana's EWP Specifications](#) (MT)

Resource Assessment

A natural resource professional will visit the property and conduct an inventory or walk-through to gather information on current conditions. Follow-up contact to obtain maps, soils data, and additional information may also take place. Soil information can be found at www.websoilsurvey.com. Soil information is available if the property is in an area that has been part of a soil resource assessment.

If a large scale, long-term plan is needed or desired, the assessment will be a first step in writing a Forest Management or Stewardship Plan.

- Purpose: To get a comprehensive inventory and assessment of current and desired future conditions and provide management recommendations and prescriptions
- Management Plan Outlines:
 - i. NMSF – template or outline – <http://www.emnrd.state.nm.us/FD/ForestMgt/ForestStewardship.htm>
 - ii. NRCS Conservation Activity Plan – Practice 106 – [FOTG](#) – Section III

Practices

Hazardous Tree Felling – BAER

- Purpose: To safely drop hazard trees that are next to roads, structures, fences, gates, etc. and create a safe working environment for rehab activities.

Waterbars on Hand Lines and Dozer Lines – NMSF Guidelines

- Purpose: To control erosion from firelines (including hand lines and dozer lines) created during fire suppression activities.
- Reference: Forest Fireline Rehabilitation on State and Private Lands (Appendix to NMSF Fire Policy). [Contact NMSF District.](#)

Maximum Interval Distance between Waterbars		Construct water bars at a 30 – 35 degree angle (not perpendicular) to the suppression lines. Aim the water flow toward non-burned areas to the extent possible. On steeper slopes, alternate the side to which the waterbars drain. Insure that waterbars have open outlets to avoid restricting flows. Do not angle a waterbar directly into an existing stream course. Where possible, construct waterbars where rocks, vegetations, or debris are below the outlet to dissipate water.
% Grade	Distance* (ft)	
0 -4.9	150	
5.0-9.9	130	
10.0-14.9	75	
15.0-24.9	50	
25.0-40	25	
*Measured on/along road slope. More specific data dependent on aspect, parent material, and slope location found in Forest Practice Guidelines.		

Soil Scarification / Mulching / Seeding² / Invasives – BAER / NRCS / CSFS / MT

- Purposes: To restore native plant communities and control erosion.
- Recommended Methods: Scarify soil to create improved seed bed where hydrophobic soils, which will repel water, have been created. (Consult the Soil Quality Information Sheet on [Hydrophobicity.](#))
- Seed mix should contain less than 0.6 % weed content and no noxious weeds.



² Peppin, D., Fulé, P., Sieg, C.H., Beyers, J., Hunter, M., 2010. Post-wildfire seeding in forests of the western United States: An evidence-based review. For. Ecol. Manage. 260, 573-586.

- Always wash equipment before entering and departing to avoid spreading invasive/noxious weed seed.
- Supplemental Practices: Mulching (NRCS 484 or *MT*) to protect seed.
- For more information on noxious weed management, see <http://www.nmda.nmsu.edu/apr/noxious-weed-information/> or contact NM Department of Agriculture's Weed Specialist

Salvage Logging – NMSF / CSFS / MT

- Purpose: To accomplish a reduction of merchantable standing dead material and prevent future high fuel loads when the burned trees fall.
- Recommended Methods: Consider a “goods for services” agreement with the logger if the wood product is low-value. Request a harvest plan and permit from NMSF.
- References: Consult the CSFS brochures about management and treatment of burned vegetation. Consult the MT website on salvaging merchantable trees.



Forest Stand Improvement or Thinning – NRCS 666 / CSFS

- Purpose: To remove dead or dying residual trees in order to address the resource concerns of increased future fire hazard when trees fall and increased rates of soil erosion.
- Recommended Methods: Mastication to create an enhanced microclimate for seeds; fall trees on contour (see LEB specs, below) to control erosion.
- Supplemental Practices: Forest Trails and Landings (NRCS 655) should be considered to build safe roads with lower erosion potential. See specs on “waterbars” above. To minimize soil disturbance consider establishing designated skid trails if logged.
- Defensible Space (where a structure exists)
 - Purpose: Typically implemented around structures and access roads where wildfire presents a significant hazard. Zone 1 is 0-30 feet minimum (more depending on slope and plant type) where residual plants are lean, green, clean and well spaced. Zone 2 is from 30-100 feet and where heavy thinning should occur. Zone 3 is from 100 feet to property boundary and where continued thinning should occur. Information on defensible space can be found at www.firewise.org.

Log Erosion Barriers / Contour Felling – BAER / MT

- Purpose: To control water movement, capture sediment, increase infiltration, and create a seedbed on slopes with highest burn severity.
- General Specs: Logs must be anchored, in full contact with the soil, laid in an alternate “brick-lay” pattern to ensure they do not move downslope

and create a greater hazard. Could be implemented in conjunction with forest stand improvement activities such as mastication of standing dead.

- NOTE: This practice is very time-consuming and expensive to implement properly and should be carefully considered. Recent fire rehab action supported by BAER Teams in NM has excluded LEBs in favor of hydro-mulching.

Woody Residue Treatment – NRCS 384

- Purpose: To deal with slash generated through salvage logging and forest stand improvement operations; reduce fire hazard.
- Recommended Methods: Mastication (see forest stand improvement, NRCS 666) or lop and scatter. Slash may be used to create slash berms or windrows on contour, or in Rock and Brush Dams, to reduce erosion potential. They should be anchored to ensure they do not wash away and cause greater damage downstream.
- General Specs: Slash should be treated according to [NMSF forest practices](#) regulations to reduce future fire hazard concerns.



Upslope Erosion Control

- Fiber Rolls, Wattles, Silt Fences – *BAER / MT*
 - Purpose: To control erosion upslope from valuable resources.
 - Recommended Methods: Use on-site material to fill chip wattles.
- Rock and Brush Dams – *NRCS 410A*
 - Purpose: To control erosion.
 - Recommended Methods: On smaller gullies and washes, consider using Zuni bowls, one-rock dams, etc. (www.quiviracoalition.org). For larger gullies, follow specs for traditional rock and brush structures.
- Burlap bag check dams, straw mulching, jute netting, sandbag protection, silt fences, straw bale check dams, straw bale dikes – *AZ / CSFS / MT*



Restoration Plantings –

Refer to MT website “Revegetating after Wildfires” and AZ publication “Reseeding” for general information about whether or not to replant. Consult the MT guide on “Wildfire Burn Severity Classification” for

- **Tree and Shrub Site Preparation – NRCS 490**
 - Purpose: To improve planting conditions for seedlings by clearing any competing vegetation or slash. May only be needed on older rehab projects. Woody Residue Treatment may provide a similar effect, especially if mastication is used.

- **Critical Area Planting – NRCS 342**
 - Purpose: Planting seedlings, seeds, etc. of tree, shrub, or herbaceous species to prevent erosion after major disturbance through re-vegetation.
 - Recommended Methods: Implement after the major ground disturbing work is done. Consult NRCS range conservationists and/or Ecological Site Description data for suggested seed mixes.

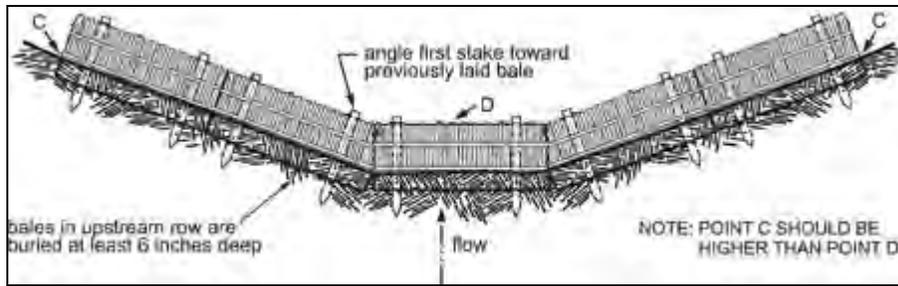
- **Range Planting – NRCS 550**
 - Purpose: To establish grass seeds for future livestock or wildlife use and to control erosion.
 - Recommended Methods: Broadcast seeding before rain has settled the ashes where fire has eliminated competing vegetation. Consult NRCS range conservationists and/or Ecological Site Description data for suggested seed mixes.

- **Tree/Shrub Establishment – NRCS 612**
 - Purpose: To reestablish tree and/or shrub species that will not regenerate naturally through seed.
 - Recommended Methods: Mimic as closely as possible the native species present when the fire occurred. Any local resource can be used. Consider the Conservation Seedling Program's one-season or bareroot stock.
 - Additional Practices: Control of herbivory by rabbits, deer, elk, etc. is likely necessary. Control of competing vegetation may also be needed for a few years. Consult Forestry Tech Note 33.



In-Stream / Channel Practices

- Checkdams, in-channel tree felling, grade stabilization structures, stream channel armoring, channel deflectors – *BAER*



- Streambank and Shoreline Protection – *NRCS 580*
- Debris Basins
 - Structure for Water Control – *NRCS 587*
 - Water and Sediment Control Basin – *NRCS 638*
- Riparian Forest Buffer – *NRCS 391*
 - Purpose: To improve stream condition by restoring the vegetated buffer around the riparian area.
 - Recommended Methods: Use this practice to protect existing species and plant additional. Establish species native to the site (e.g. cottonwoods, willows, riparian shrubs, etc.)



Road Improvement Practices

- Purpose: To close, improve, rehab, etc. the roads and culverts used and/or created during rehab activities.
 - Practices: Rolling dips, overflows, low-water stream crossings, culvert modifications, debris racks and deflectors, riser pipes, catchment basin cleanout, trail stabilization, road decommissioning.
 - Additional Practices: Forest Roads, Trails, Landings Closure – *NRCS 654*