Burn severity, erosion potential only a few factors to consider

RESEEDING AFTER FIRE: IF, WHEN, AND HOW

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Once a wildfire is out, questions arise about whether or not a site needs revegetation.

There are many considerations, and each site represents different concerns depending upon burn severity, erosion potential, and the presence of a soil seed bank (seeds dormant in the soil) or nearby vegetation.

Burn severity

In a severe burn, 75 percent or more of the shrub or forest overstory is lost and little or no ground cover remains. Soils are exposed, and the site experiences stand replacement over time. The loss of organic matter and cover due to the fire raises the risk of erosion and limits plant regeneration because seedlings require an adequate seed bed and soil moisture for survival. These factors slow site recovery and may significantly affect wildlife habitat and livestock forage capacity.

Severe cases require post-fire site stabilization and reseeding. In contrast, light or moderate burns are less likely to kill woody plants, such as shrubs and trees, and fire-adapted grasses and forbs may regenerate quickly. These sites have a good chance for natural recovery and may need little human intervention.

Erosion potential

Soil erosion potential not only increases with burn severity but also at sites with steep terrain. Even moderate slopes (5 percent) can lose significant amounts of sediment due to runoff. Wildfire sites in Wyoming are particularly susceptible to erosion when the wildfire occurs prior to summer precipitation. In these situations, using plants for site stabilization can be important for post-fire recovery.

Seedbank and nearby vegetation sources

Plants recolonize wildfire sites by resprouting or germinating from seed either from soil seed banks or as seeds that disperse from nearby locations of undamaged vegetation. Seed dispersal from outside areas will depend on the distance to healthy vegetation, wind direction, and the species present at those sites.

Weedy species are often the first to colonize a site after a fire. Many weeds are native and not noxious; these species present no threat to the site's recovery and long-term health. Their numbers decline over time with successional change. However, if seed sources include noxious or invasive, introduced weeds, these plants may threaten forage quality and wildlife habitat. Some invasive weeds such as cheatgrass (*Bromus tectorum*) can dominate a landscape and increase the fuel load each summer. This raises the risk of future wildfires.

When can we rely on natural recovery?

Unassisted recovery of vegetation is the most cost-effective method for post-fire management where sites have limited erosion potential and a low probability of invasive weed infestation. Much of Wyoming's native vegetation is fire adapted, which results in resprouting or rapid germination. For example, at forested sites, aspen is a well-known post-fire resprouter—the trunks of existing

trees may be severely damaged, but the roots survive and will send up new shoots. A similar response is common in shrubs such as ceanothus, antelope bitterbrush, and mountain mahogany.

So, a relatively non-weedy site may recover naturally from wildfire without landowner assistance. If the sloping terrain at these sites requires erosion control, mulching or other methods, such as placement of straw wattles, silt fences, and rock berms, may be needed to reduce soil loss. Early monitoring will determine if natural recovery is occurring and erosion is minimal. Signs of recovery include new sprouts from fire-damaged trees and shrubs and germination of herbaceous species. Signs of erosion would include gullies and exposed (unburnt) rock surfaces.

But, what if a burn site covers a large area susceptible to erosion and invasive plant species? These circumstances are often unavoidable in the semi-arid West.

When is post-fire rehabilitation needed?

Introducing desirable plants to the burn site may be crucial to prevent widespread weed invasion, particularly where burns are severe. In these cases, site stabilization and reseeding are options, but each measure will have associated costs.

Reseeding costs include the price of a seed mix, equipment, and/or time for application, and the funds required to implement any erosion control and other site management measures. Benefits may outweigh costs if reseeding minimizes the presence of species such as cheatgrass and prevents the buildup of fuels caused by weed dieback that can increase future fire hazards. The reseeding of native grasses and forbs at degraded sites will also improve wildlife habitat and livestock forage.

When determining whether or not to actively restore vegetation after wildfire, consider a sliding scale of conditions that will point to either natural or assisted site recovery.

Steve Williams

This photo was taken in 2013, one year after the Arapaho Fire, North Laramie Mountains, Wyoming, and shows good aspen regeneration.

Reseeding tools and methods

Seed mix

Many native plants are available commercially, and local seed distributors will have recommendations for your area. Statewide offices of the Bureau of Land Management often have lists of desirable species for land rehabilitation (look for reclamation resources).

Other sources for help in selecting a seed mix include University of Wyoming Extension, Natural Resources Conservation Service, and conservation district offices. Most seed mixes consist of grass species, but other species such as shrubs and forbs can also be purchased.

At sites where native plant diversity is still relatively high, many species will recolonize a site on their own, and a simple grass mix may be sufficient to stabilize the area and allow natural revegetation. For example, a planting might include some combination of slender, western, or thickspike wheatgrass, and bottlebrush squirreltail, Indian ricegrass, and blue grama.

Sterile varieties of fast-growing wheat species are also available (for example, Triticale and Regreen). Sterile plants are short-lived and

provide rapid ground cover, minimize openings for invasive weeds, and allow time for desirable species to germinate and grow. Due to their sterility, they will not reseed and spread in subsequent years. Sterile hybrids can be planted mid-summer to late fall as they are winter annuals that will germinate when there is adequate soil moisture and continue to grow until late spring or early summer.

If native plant diversity is low, increasing the number of site-appropriate species in a mix can improve habitat and may extend seasonal forage due to variable growing times among species. Native plants are adapted to regional climates and are more likely to tolerate drought conditions and increase the chances for planting success. A more extensive species checklist is available through the Wyoming Reclamation and Restoration Center (www.uwyo.edu/wrrc/publications/bulletins.html).

Seeding

Replanting is usually recommended in fall when seeds are naturally dispersed. Planting should occur when ground temperatures are below 50 F to ensure germination will not occur until spring. Winter temperatures break seed dormancy and lead to a flush of germination during spring thaw. Seed germination may not occur for six months or more after fall planting, and weed control measures may be required during that time to reduce competition from weeds when the planted seeds germinate.

Depending on the size and terrain of the burn site, replanting may be successfully accomplished by broadcast seeding. The simplest form is hand casting of seeds on the soil surface. For larger areas and rougher terrain, manual or mechanical broadcast equipment is available. Broadcast seeding is the least expensive technique, but seeds remain exposed on the soil surface and may be lost to rodents, birds, or blown offsite by wind.

Hydromulching generally mixes seeds with water and mulch prior to application to the soil surface. In arid environments, apply seeds first to ensure seed-to-soil contact before mulch application. This method requires specialized equipment that raise costs but provides the advantage that seeds are less likely to be dispersed offsite.

Drill seeding puts seeds below the soil surface and provides a more uniform application of the seed mix. Similar to hydromulching, drill seeding is more expensive and requires special equipment. This method works best on slopes less than 60 percent, and rangeland drills are available for rugged terrain. Many native species have small seeds or seeds with large appendages that make seed drill calibration and application difficult. The pros and cons of each method must be carefully considered to improve planting success. More information about planting depths and seeding rates is available online from the Wyoming Reclamation and Restoration Center and WRRC bulletins.

Forest recovery

Lastly, you may be interested in regrowth of trees at your site. If the site is only moderately burned, many trees will survive and recover. To determine survival rates, burned trees can be monitored the following spring to see if new growth is visible. Alternatively, where mortality is high, pines often have cones that open during fire and naturally reseed without assistance. If assistance is needed, reforestation is generally accomplished by planting seedlings and saplings. Firewise plantings are recommended near homes and other structures.

If you choose to actively revegetate a site, remember to use proper safety equipment and watch for falling trees and tree limbs in forested areas.

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Lewis flax (*Linum lewisii*)

Producer resources

If you are an agricultural producer there are several federal programs which can provide some assistance.

Environmental Quality Incentive Program (EQIP) (USDA - NRCS): For lands that are part of a private agricultural operation. This program has funds available for specific practices to address post fire concerns.

The Emergency Watershed Protection (EWP) Program (USDA - NRCS): A federal emergency recovery program which helps local communities recover after a natural disaster strikes. The program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms and other natural disasters that impair a watershed.

The Emergency Conservation Program (ECP) (USDA - Farm Service Agency): This program helps farmers and ranchers to repair damage to farmlands caused by natural disasters by giving ranchers and farmers funding and assistance to repair the damaged farmland.

Emergency Forest Restoration Program (EFRP) (USDA - Farm Service Agency): This program helps the owners of non-industrial private forests restore forest health damaged by natural disasters. The EFRP does this by authorizing payments to owners of private forests to restore disaster damaged forests.