

## Chapter 9. Weed Management after Fire

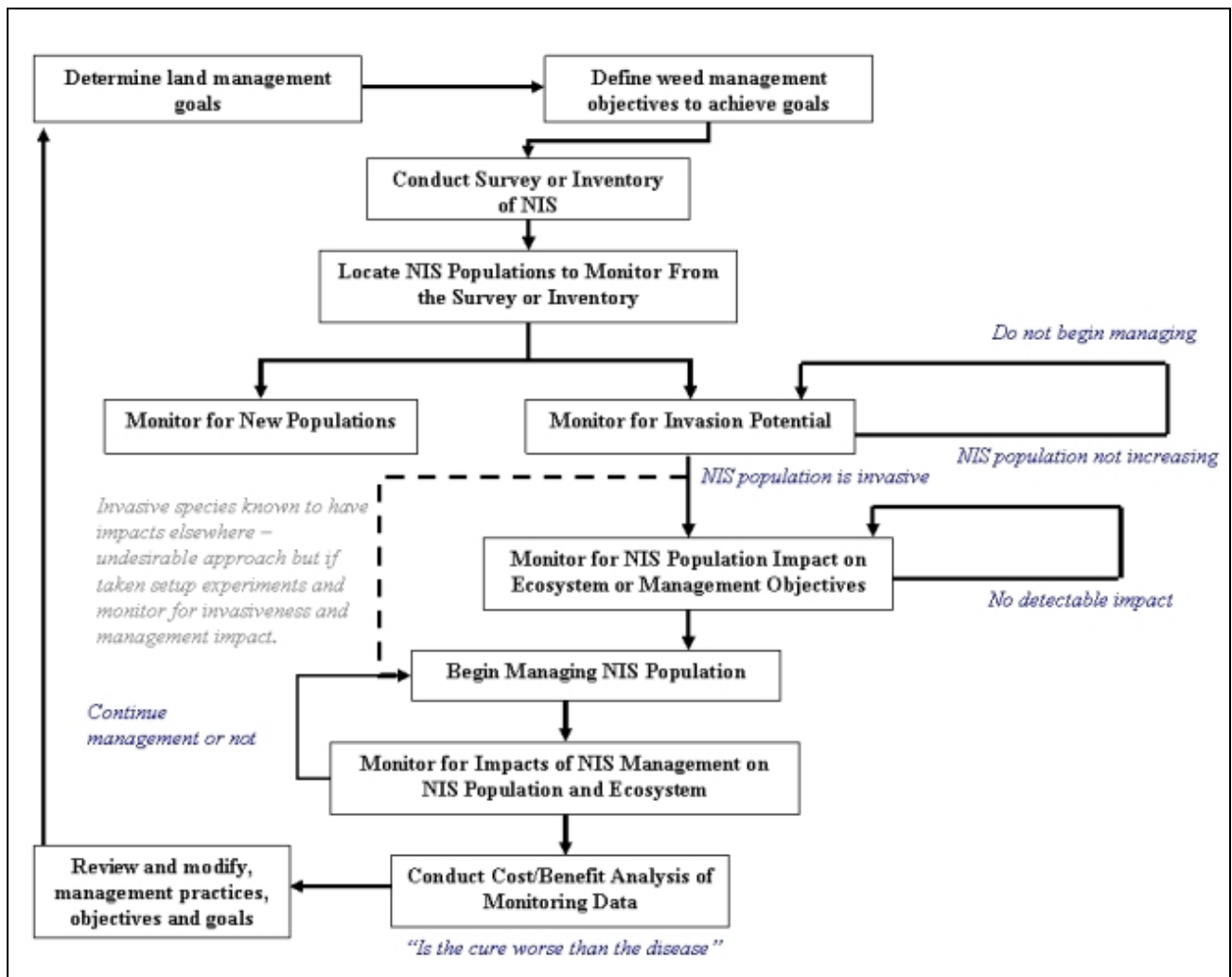
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*Excerpted and adapted from Goodwin, K., R. Sheley, and J. Clark. 2002. Integrated Noxious Weed Management After Wildfires. Montana State University Extension Service: Bozeman, MT. Pub. EB-160.*

### INTRODUCTION

Severe fires can substantially affect the environment, compromising wildlife habitat, livestock grazing, watershed stability, and water quality. Fires expose ground surfaces, reduce shade, and create a flush of soil nutrients—conditions that favor the establishment of noxious weeds. While many native and desirable plants survive fires, their ability to reestablish, thrive, and reseed

is reduced by the presence of weeds that aggressively compete for water, light, and soil nutrients. After a fire, it is important to immediately develop a weed management plan for the burned and adjacent areas. The key is to enhance the reestablishment of desirable plants and healthy plant communities. The flowchart below outlines some steps toward this goal.



### REVEGETATION OR NATURAL RECOVERY?

It is a good idea to determine soon after a fire whether revegetation is needed to speed recovery of a competitive plant community, or whether desirable plants in the burned area will recover naturally. Two factors must be taken into account: the severity of the burn and the proportion of weeds to desirable plants on the land before it burned. In general, more severe burns and higher pre-burn weed populations increase the necessity of revegetation. Or, another way to look at it: Consider revegetating an area if the desired plant cover is 20 to 30%, depending on degree of disturbance. **Table 1** offers broad guidelines.

Other factors to consider in a revegetation decision are slope (where soil needs to be stabilized quickly), proximity to drainages

(vegetation in drainages helps reduce erosion and filter sedimentation from post-burn runoff), and management objectives (for example, erosion control, reforestation, weed suppression, or native plants).

#### Reseeding

If revegetation is needed, a suitable seed mix must be developed. Typically, an aggressive, quick-establishing mix of grasses and forbs will be most competitive with weeds. (Do not include forbs if broadcast treatments of broadleaf herbicides is planned.) Seed mixes should be designed to maximize the occupation of plant community niches by desirable plants and squeeze out the weeds. Typically, a competitive mix will include plant species that grow both early and late in the year and that have a variety of root systems and topgrowth. Of course, the seed mixture should be certified weed-free.

*Table 1. Determining the necessity of revegetation*

Weed Cover before Fire	Burn Severity		
	Low	Medium	High
Absent to low: up to 20% weed cover (rare to scattered weeds)  <i>High cover of desired vegetation</i>	Revegetation not necessary; ecological effects generally beneficial; regularly monitor for new weeds until plant community recovers, then monitor occasionally.	Revegetation not necessary; ecological effects generally beneficial; regularly monitor for new weeds until plant community recovers, then monitor occasionally.	Revegetation and regular weed management recommended.
Moderate: 20-80% weed cover (frequent to fairly dense weeds)  <i>Moderate cover of desired vegetation</i>	Revegetation may be necessary if desired vegetation cover is below 30%; frequent weed management recommended; high survival of most weed species.	Revegetation may be necessary if desired vegetation cover is below 30%; frequent weed management recommended; high survival of most weed species.	Revegetation and frequent weed management recommended; weed survival varies among species.*
High: 80-90% weed cover (dense weeds)  <i>Low or no cover of desired vegetation</i>	Revegetation and intense weed management recommended; high survival of most weed species.*	Revegetation and intense weed management recommended; weed survival varies among species.*	Revegetation and intense weed management recommended; weed survival varies among species.*
* Rhizomatous weeds more easily survive fires because underground stems and roots store energy and produce many shoots when topgrowth is removed. Weed survival as crowns or viable seeds after fire varies among species.			

The USDA Natural Resources Conservation Service has developed fact sheets about revegetating land after wildfires, including recommendations for seeding rates and species for different environments. Contact your local NRCS office or check visit <http://plant-materials.nrcs.usda.gov/>. Other sources of information are Extension offices, state Departments of Agriculture, county weed coordinators, state universities, and other federal land management agencies.

When burned areas are reseeded during the fall after a fire, they usually don't require seedbed preparation. Ash from the fire helps cover and retain broadcasted seeds. The wet/dry, freeze/thaw action of moisture will work the seeds into the soil while also breaking down hydrophobic soil layers. Frost heaving will break down ash crusts that form because of fall rains.

When burned areas are not seeded immediately in the fall, reseeded during the fall of the following year is often recommended. If there is no protective ash layer, a seedbed can be prepared by dragging small chains or raking the soil surface before and after broadcast seeding. If seedbed preparation is impossible, double or triple the broadcast rate recommended for drill seeding.

### Encouraging Desirable Plants

Good germination and establishment of desirable plants is the first step in successful revegetation. A good revegetation plan typically includes:

- Using plants adapted to the site
- If there is no ash layer, preparing a seedbed before and after broadcast seeding, using a no-till drill if the site is accessible
- Adding nitrogen-fixing legumes such as lupine to improve the soil structure and contribute to a healthy nitrogen cycle
- Increasing seeding rates to improve competition with weeds
- Providing a protective mulch cover, such as native-certified weed-free hay,

to protect soil and seeds from erosion, conserve moisture, and moderate soil temperatures (native hay mulch can contain seeds of native plants that will help diversify the plant community)

- Removing as many weeds as possible
- Deferring grazing until vegetation has been established, usually after two growing seasons

### Discouraging Weeds

A comprehensive integrated weed management plan will incorporate an eradication program and frequent monitoring for small patches as well as a longer-term, integrated approach to larger infestations within or adjacent to a burned area.

Eradication is most effective on newly established weed populations or those smaller than 100 square feet. Individual weeds must be removed and steadily replaced with desired plants (through natural replacement or revegetation) until all viable seeds have been depleted from the soil. Components of an eradication program might include:

- Prioritizing management efforts. Begin by locating and determining the size and density of weed patches. Low-density patches respond more quickly than high-density patches to eradication.
- Monitoring the area. Document changes in patch size and density at least once a year.
- Flagging patches, or identifying them using GPS, to make them easy to find in the spring during the vulnerable seedling/rosette stage.
- Managing with frequent follow-up, including: removing weeds by hand-pulling or digging or with herbicides; clipping, bagging, and burning seed heads; and revegetating if the desired plant cover is inadequate.

Successfully dealing with large infestations requires the use of many management methods. Containment, or managing infestation perimeters, is the goal while reducing the density of the weeds and shifting the competitive balance to the desired plants. A combi-

nation of mechanical, chemical, cultural, and biological control methods most effectively reduces the competitive vigor of the weeds.

### **Following Up**

Long-term success of burned-area management requires that managers continuously monitor and evaluate the area to adjust management practices. The goal is to encourage desirable plants and discourage weeds. Frequent monitoring of the burned site and annual evaluations of management results will determine the adequacy of the weed management plan. Plans may then be adapted according to results in the field.

Prevention and monitoring are key components of weed management plans, particularly plans for burned areas. These concepts are discussed in detail in other chapters. However, prevention practices with respect to fires in particular include:

- After a wildfire, inspect and document weed establishment at fire access roads, equipment-cleaning sites, and all disturbed staging areas. Control infestations to prevent spread into vulnerable burned areas.
- To avoid inadvertently spreading weeds from one site to another, remove mud, dirt, and plant parts from fire-fighting and restoration equipment before moving to another area.
- Straw mulch to be used for burn rehabilitation (wattles, straw bales, dams, etc.) should be certified that it is free of weed seed and reproductive plant parts.

A successful integrated weed management plan for burned areas will help the land manager prevent weed establishment, mitigate the reestablishment of noxious weeds, and establish and maintain healthy plant communities.