ECOSYSTEM MANAGEMENT AND OUR NATIONAL FORESTS--IS THERE A ROLE FOR FOREST HERBICIDES? C. K. McMahon, J. H. Miller, USDA Forest Service, Auburn, AL and D. F. Thomas, USDA Forest Service, Washington, DC.

ABSTRACT

Environmentally safe, selective herbicide treatments can be adapted to manage habitats and direct succession toward desired future conditions within the principles of Ecosystem Management (EM). Six roles for herbicide treatments in EM are suggested: create and maintain desired habitats; create mixed and unevenaged stands; restore damaged landscapes; control exotic, noxious and poisonous plants; maintain recreational areas, trails, and scenic vistas; and manage rights-of-way for multiple use. Low impact, selective herbicide treatments include tree injection, cut-stump sprays or wipes, basal sprays or wipes, directed sprays, and soil-spot sprays. Selective control can also be achieved using broadcast (aerial and ground) applications of selective herbicides. Currently less than 0.1% of National Forest lands are treated with chemical herbicides, in a typical year. The six roles and treatment methodologies are consistent with the desire of the current administration to decrease pesticide use, to use safer pesticides, and to emphasize integrated pest management programs.

INTRODUCTION

Ecosystem management is the operating philosophy of the Forest Service for stewardship of lands and resources to achieve environmentally sensitive, socially responsive, economically feasible, and scientifically sound multiple-use management of the National Forest System. Ecosystem management means using an ecological approach to achieve the multiple-use management of National Forests and Grasslands by blending the needs of people and environmental values in such a way that National Forests and Grasslands represent diverse, healthy, productive, and sustainable ecosystems.

Selective herbicide applications can be tailored to direct vegetation succession and manage habitat to support the principles of Ecosystem Management. Low impact, selective herbicide treatments include tree injection, cut-stump sprays or wipes, basal sprays or wipes, directed sprays, and soil-spot sprays. Selective control can also be achieved using broadcast (aerial and ground) applications of selective herbicides.

ROLES FOR HERBICIDES

Conceptually, we see a continued role for chemical herbicides in Ecosystem Management with a decrease in the amount of active ingredient used per acre in most situations. Keep in mind that many newer herbicide formulations coupled with low impact selective application technology now permit effective treatment with only ounces of active ingredients per acre. These six roles and treatment methodologies are consistent with the desire of the current administration to decrease pesticide use, to use safer pesticides, and to emphasize integrated pest management programs. Also, keep in mind that less than 0.1% of our National Forest System lands currently receive a herbicide treatment in any one year.

Six roles for herbicide treatments in EM are suggested:

1. Create and maintain desired habitats

Herbicides in concert with other vegetation management treatments such as prescribed fire can play a vital role in creating and managing habitat for threatened, endangered and sensitive plants and animals. Wildlife and game animal habitat can also be created and maintained with selective herbicide treatments. Additionally, on some landscapes forest livestock grazing can be enhanced with increased forage production by controlling species composition to favor more desirable plants.

- The structure of old growth stands can be mimicked to some degree in younger stands by midstory control, gap formation, and creation of standing and down coarse woody debris for the assemblage of species dependent on older forests.

- Food plants for game and non-game wildlife can be encouraged by their release from plant competition using selective herbicide treatments.

2. Create mixed and unevenaged stands

Regeneration of a variety of stand types, including both mixed conifer-hardwood, hardwood and unevenaged stands is the challenge facing Forest Service silviculturists, wildlife biologists and other resource managers. Completely new silvicultural systems will have to be developed to meet these challenges, which is underway at several Ecosystem Management research sites across the U.S. Natural regeneration will play an increasing role, which will require innovative vegetation control strategies for establishment and management through succession.

- Through selective removals by herbicides of individual and component plants early in the regeneration phase, successional development can be positively directed, releasing desired conifer and hardwood species, and other desirable components. Wood and fiber outputs can not be overlooked in Ecosystem Management and can be optimally produced using selective application technology to release crop species, either conifers or hardwoods, while maintaining desirable habitat components.

- Chemical herbaceous plant control will be needed in lieu of burning treatments in smoke sensitive zones to prepare seed beds for fire subclimax conifer species.

- Edges between adjoining stands, streamside management zones, and wildlife openings can be blended from early successional (low-stature) species, to shrubs, and to arborescent species by using selective periodic removals. These blended edges of harvest units will create a more favorable aesthetic appearance, provide more habitat options for wildlife and higher recreational values.

3. Restore damaged landscapes

A full array of natural and human induced factors have resulted and will result in extensive areas of damaged landscapes and ecosystems. Pest epidemics, wildfires, hurricanes, ice-snow storms, and widespread drought cause different patterns of perpetual disturbance to forest and range landscapes. Human induced factors such as fire exclusion and over grazing can also contribute to damage and loss. Some past harvesting practices and reforestation efforts also have resulted in undesirable monocultures, which may require restoration.

- Landscape rehabilitation will demand a full array of forest vegetation management tools including herbicides. Broadcast applications of selective herbicides may be required for extensive landscape restorations to accelerate forest canopy development to protect fragile sites, reverse or prevent invasion of exotic species, enhance aesthetics, and reclaim critical habitat.

4. Control exotic, noxious and poisonous plants

The need to suppress or eradicate non-indigenous species in some areas calls for immediate action with tools that are readily available. Selective chemical herbicide treatments are often the only effective means to meet this urgent national need.

- Because of the unrelenting aggression of exotic plants with no endemic predators, herbicides must be a part of any cost-effective integrated pest management approach. In most cases there is no substitute for herbicide's positive control of these persistent and spreading pests. Some of the most pervasive imports are purple loosestrife, knapweeds, salt cedar, and kudzu, all of which separately dominate millions of acres. Exotic pests, besides detracting from forest development and recreational uses, often represent severe threats to native plant and wildlife diversity in critical habitats.

- Poisonous plants represent continued threats to human and animal health. Poison ivy and oak in campgrounds and recreation sites place severe restriction on recreational opportunities for sensitive individuals. Poisonous plant control has been a long-term activity on National Grasslands to prevent livestock mortality and these integrated pest management programs will require herbicides to play a continuing role.

5. Maintain recreational areas, trails, and scenic vistas

Woody regrowth that hinders recreational activities or impairs vistas in high-use sites can be controlled with herbicide treatments that minimize unsightly brownout and yield long-term control. Slow-acting herbicides and selective application techniques can be used in this role. Maintenance on the expanding Forest Service trail system, which already exceeds 120,000 miles will demand low-cost innovative treatments.

- Resprouting woody species immediately adjacent to trails are typically manually cut each and every year. They could be selectively treated once after cutting with a very small amount of herbicide, eliminating the need for successive treatments. The cost savings would be dramatic and the environmental impacts negligible.

- Creation and maintenance of vistas can greatly enhance the recreational value of mountainous areas. Vistas can be effectively managed through the periodic control of the tall-growing woody component by treating cut stumps with herbicides or by using selective, non-brownout herbicide treatments.

- The beauty of highly visible forest stands and trails can be enhanced by encouraging flowering and fruiting plants through selective removals of competitors by low-impact herbicide treatments.

6. Manage rights-of-way for multiple use

There is growing recognition that rights-of-way (ROW) which were initially created to protect roads, power lines, and pipelines must be managed for more than the inanimate "road-bed, wire, and pipe." Included in ROW management for the future are management strategies to enhance "woodlands, wildlife, and people" values. Tall woody plants are undesirable under wire corridors and deep woody roots can penetrate pipes on pipeline corridors. Low growing perennials for wildlife and/or aesthetic value can be encouraged and maintained through selective control of unwanted invaders. Parallel to this low profile vegetation can be a zone of shrub species, again perpetuated by hardwood control. A parallel zone of mid-story tree species (if present in the ecosystem) can then be blended into the adjacent stands.

CONCLUDING REMARKS

Soil productivity can be safeguarded and fertility improved through low-impact removals of selected components and the encouragement of soil-forming leguminous species. Creation of coarse woody debris and snags can enrich species diversity on upland and riparian habitats. Recreational values on Forest Service lands can be greatly improved and efficiently maintained with judicious herbicide use. The selective removal of individual plants through quick and simple applications of modern forestry herbicides represents a sophisticated and safe management tool for ecosystem scale management. This wise-use low-impact approach will require a well-trained cadre of knowledgeable applicators under competent supervision and contract monitoring. Herbicide applications can and should be used as part of an integrated vegetation management approach employing other treatments such as manual cutting and prescribed fire to reach multi-resource Ecosystem Management objectives.

The six roles briefly outlined in this presentation are not a complete list of all possible roles for herbicides in Ecosystem Management. However, they serve to illustrate how this readily available silvicultural tool can be used for more than just economically driven objectives. Moreover, describing the use of selective herbicide treatments for the protection of non-commodity values may help overcome some of the myths and misperceptions that have too long surrounded the use of herbicides in forestry.

The traditional role of forestry herbicides to enhance commodity outputs will continue on many landscapes in the United States, especially in areas of mixed public and private ownerships and in the East where most of the forest lands are in the private sector. In many areas of the United States herbicide use in the private sector has not been as regulated or constrained as in the public sector. Balancing natural resource values associated with Ecosystem Management with traditional national values (i.e., private property rights), will require building new partnerships and new lines of communication between the public and private sectors. In order to maintain a viable working partnership with the private forestry sector, it would appear essential that natural resource agencies retain chemical herbicides in their vegetation management programs. In that way, the forestry community and the general public will not receive "mixed signals" about what are safe and acceptable Ecosystem Management practices.

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