

# Committee on Resources

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Field Hearing:

Crisis on the National Forests:

Containing the Threat of Wildland Fire to the Environment and Communities

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Invasive Noxious Weeds And Their Relationship To Wildfires And Forest Management Activities

The mission of The Arboretum at Flagstaff focuses on the conservation of plants and plant communities native to the Colorado Plateau and the wise stewardship of our natural environment.

One of The Arboretum's primary concerns relative to wildfires and forest management is the issue of noxious, invasive weeds, which are spreading rapidly throughout the west. Invasive weeds tend to move into sites where the soil has been disturbed. Both fires and forest management activities often result in disturbed soils. Where invasive weeds spread into native habitats, native plant populations continue to be reduced. The Colorado Plateau region includes many unique habitats as well as many rare, threatened, and endangered plant species. In fact, about 15% of the native plant species of the Colorado Plateau is globally rare, whereas the average in other regions of the country is about 10%. The continuing spread of noxious, invasive weeds jeopardizes the survival of rare native plants and reduces overall plant biodiversity.

The spread of noxious, invasive weeds also impacts plant communities and ecosystem functions. As invasive weeds take the place of native plants, plant communities and associated habitat functions are altered and wildlife habitat and biodiversity is reduced. Ecosystem functions are being impacted through changes to a variety of components including hydrology, chemistry, and fire behavior, and the overall values of our natural resources are diminishing.

The rapid expansion of invasive, noxious weed populations is costing the United States economy billions of dollars annually in lost production, abandonment of farms, eradication and control, and habitat restoration.

The Arboretum at Flagstaff encourages the Subcommittee on Forests and Forest Health to consider the significant impacts of invasive, exotic species on native plants, plant communities, and ecosystem functions. The spread of invasive weeds tends to increase in response to activities that disturb the soil and native plants. The Arboretum strongly recommends best management practices that minimize the spread of invasive species be required as a part of all forest management activities and that sufficient funding be provided for follow-up monitoring and control of invasive, exotic species that do arise subsequent to forest management activities.

Many questions remain regarding mechanisms weed species use to out-compete native plants, how they take advantage of disturbance activities, and how best to control and eradicate them. The Arboretum at Flagstaff also strongly recommends that funding be provided to incorporate research on these questions into forest management activities. Concurrent research will maximize the benefits of forest health restoration programs.

## Invasive, Noxious Weed Characteristics Relevant to Forest Management Activities

The ability of particular plant species to rapidly invade new areas once introduced is based on several characteristics that provide competitive advantages under certain environmental conditions. Those that become dominant by eliminating other species, may be toxic, poisonous, or parasitic, and that significantly reduce the desirable functions of the habitat are generally considered invasive, noxious weeds.

Many exotic plant species grow and spread aggressively following various types of disturbances to forests and rangeland habitats. Some of these species, once established, have been observed to spread from disturbed sites into undisturbed sites.

Particularly in disturbed sites, invasive species may out-compete native species, becoming dominant or even becoming a monoculture. The most troublesome are those that persist as dominants for years or decades, alter plant communities and ecosystem functions, are toxic or poisonous.

Many invasive species are heavy seed producers. Several species are capable of producing up to 50,000 seeds or more per plant. Seeds may persist in the soil for a few years to 35 years or more. An individual dalmatian toadflax can produce up to 500,000 seeds, which may remain viable in the soil for 10 years. Other invasive species spread aggressively through extensive and rapid root growth. These plants can quickly produce new shoots from root buds when disturbed by mowing, burning, or hand-pulling.

The dominance of invasive, noxious weeds degrade ecosystems in several ways:

Some noxious species alter soil chemistry, inhibiting the growth and germination of other species.

Noxious species may interfere with natural nutrient and water cycles, creating secondary impacts to other plants and the ecosystem.

Some invasive species alter the fire cycle and the characteristics of fires within an ecosystem.

These changes to ecosystems alter plant communities, wildlife habitat, and ecosystem functions.

Some exotics are related to native species and are able to hybridize with them, which in the long run may genetically eliminate the native species.

## Disturbance Factors that Contribute to the Spread of Noxious, Invasive Weeds

Invasive plants, both native and non-native, tend to be species adapted to disturbed site conditions. They typically grow well in soils with low organics and nutrient levels. Their seeds sprout when on or near the surface of exposed soils and many are adapted to low soil moisture levels. These conditions are often the result of activities integral to forest health management.

Fire removes organic material from the surface layer of the soil, exposing the soil and reducing moisture and nutrient levels. High intensity fires also destroy important microorganisms in the soil, which are important for plant uptake of water and nutrients. All types of fire activities have this affect including prescribed fires, slash pile burns, and uncontrolled fires. Research in northern Arizona forests have shown that the more intense the fire, the greater the number and species of exotic weeds. Many questions remain about the relationships between the timing of fires, soil types, and the successful invasion of noxious weeds. Much of the equipment used to thin or harvest trees disturbs the soil by churning up the surface layer and compacting the soil. Churning the surface exposes weed seeds to light, allowing them to sprout. Soil compaction limits plant root activities and reduces the water holding capacity of the soil.

Equipment, vehicles, people, and animals are all vectors for transporting seeds from one location to another. Of primary concern is the movement of any of these vectors from an area infested with invasive, noxious weeds into an area not yet infested. Another important consideration is disturbing a site that previously sustained activities that brought weed seeds into the area. Areas that have been heavily logged or have been grazed earlier may retain weed seeds in the soil ready to sprout following the next disturbance.

## Mitigation Measures

There are a number of Best Management Practices available to minimize the opportunities for invasive, noxious weeds to expand into new areas and to become dominant in areas in which they already occur as a result of forest health management activities.

Prevention is by far the most important measure for controlling the spread of invasive, noxious weeds. Once noxious weeds become established, their removal and even just control has proven very difficult and costly. Many infestations require multiple control efforts each year and for several years. Some species have successfully resisted control efforts for many years and research is ongoing to identify new methods. Early detection of an infestation and early and aggressive application of control methods are the most successful and by far least costly in time and expenses. The following is a brief outline of BMP methods currently

recommended.

Evaluate each area in which management activities are planned and identify the potential for weed infestations from existing stands and from potential seed bank in the soil based on previous activities in the area. Also identify ecological processes for that habitat relevant to the type of management activities planned. For example, determine the role of natural fire process for the habitat and natural forest stand densities to which the native plant communities are adapted.

Limit possible weed seed transport from infested areas to non-infested sites. Avoid activities in or adjacent to heavily infested areas or remove seed sources and propagules from site prior to conducting activities, or limit operations to non-seed producing seasons. Wash or otherwise remove all vegetation and soil from equipment before transporting to a new site.

Following activities which expose the soil, mitigate by covering the area with weed seed free mulch and/or seed the area with native species. Covering the soil will reduce the germination of weed seeds, maintain soil moisture, and minimize erosion.

Conduct regular follow-up monitoring of areas in which the soil has been disturbed to identify any new infestations of invasive, noxious weeds.

Conduct immediate and aggressive removal and control measures of new stands of invasive, noxious weeds while colonies are small and manageable. Consider that weed removal and control activities may again result in disturbed, exposed soil. In these cases, provide follow-up restoration measures, such as seeding, to restore a healthy native community to minimize the opportunities for future invasions by weeds.

Invasive noxious weeds have become a significant and costly problem throughout the forests and rangelands of the western United States. These weeds not only impact individual native plant and animal species, they also jeopardize entire ecosystems, which are the basic support system for our natural resources. Integrating weed management into the overall forest health management activities is essential to create truly healthy forests that will continue to provide both lumber products and healthy functional ecosystems on which we all depend.

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