

Roads Enhance Exotic Plant Invasions

Montana Native Plant Society
Conservation Committee

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The Montana Native Plant Society has a vital interest in the ongoing process of revising forest management and travel plans in Montana's nine national forests because these plans guide management of nonnative invasive plants, a significant issue from the perspective of native plant conservation. Forest Service Chief Dale Bosworth has identified the spread of noxious weeds as one of the "four great issues facing forest lands." Bosworth's predecessor, Mike Dombeck, wrote in the FS publication *Stemming the Invasive Tide: Forest Service Strategy for Noxious and Nonnative Plant Management*: "The problem of noxious weeds and nonnative invasive species threatens every aspect of ecosystem health and productivity, in forests and on rangelands, on public and on private lands. The increasingly devastating effects include reducing biological diversity, impacting threatened and endangered species and wildlife habitat, modifying vegetative seral stages, changing fire and nutrient cycles, and degrading soil structure."

These negative ecological impacts result in major economic losses. By displacing native vegetation, weeds can reduce grazing capacities on rangeland by 65% to 90% from original productivity. It is estimated that spotted knapweed alone costs Montana ranchers \$11 million each year; total losses from weeds amount to \$100 million annually. Dense weed infestations affect wildlife by reducing forage, altering thermal and escape cover, and changing water flow and availability. Areas dominated by leafy spurge received three times less use by deer and four times less use by bison than similar uninfested areas. Dense knapweed infestations reduced elk use by 50% to 90%. As a result, game animal populations decline¹². Soil erosion and sedimentation affect not only rangeland but also streams and fisheries. Fish populations and fishing quality decline. Degraded fish and wildlife habitat also diminishes expenditures by recreationists, an important source of income in Montana.

Roads provide good habitat for many invasive exotic weeds. Roadside habitat often lacks closed vegetation and usually receives more light and water^{10, 13, 18}. Diane Larson⁶ documented the distribution of invasive plants in two national parks on the Northern Great Plains and found that exotic weeds were more common along roadways than in less disturbed native habitat. Surveys conducted along roads in Glacier National Park's fescue grasslands demonstrated higher densities of invasive exotic plants along roads compared to the native prairies¹⁵. Invasive weeds were more common closer to roads than in relatively undisturbed grasslands in northern California³. Roadsides have also been shown to harbor high concentrations of invasive exotics in Utah desert grasslands² and Australian pastures⁹.

The effect of roads on exotic plant invasions will depend on the character of the surrounding vegetation because weeds are more likely to invade grasslands, shrublands and pine savannah than closed forest. In western Montana exotic weed infestations occur in undisturbed

vegetation primarily in the steppe and ponderosa pine zones¹. Weed infestations at higher, moister sites are usually associated with intensive disturbance. Similar results were reported for habitats in the Northern Rocky Mountains between Glacier and Grand Teton national parks¹⁷. Weed infestations were also most common in grasslands and sagebrush steppe in Yellowstone National Park¹¹.

Roadsides often provide weed source populations that invade surrounding native grassland and shrubland communities. The number of invasive exotics declined with distance from roads into adjacent grasslands in Glacier National Park¹⁵ and Yellowstone National Park¹¹. Weedy exotics spread beyond roadside disturbances into adjacent grasslands on the Northern Great Plains⁶. The abundance of an invasive exotic grass declined with increasing distance from road margins into native California grasslands⁵. Results of all these studies suggest that weeds invade native plant communities from primary colonization points along road margins.

Although few exotic weeds are capable of invading closed forest in Montana, roads provide corridors for weed movement through forests. Researchers at Montana State University found that a single vehicle driven through a knapweed infested site can acquire up to 2,000 seeds and disperse them for more than ten miles¹⁴. Studies in Australia have also shown that vehicles can carry large numbers of weed seeds⁸. The increase of exotics in Glacier Park during the past century is associated with a similar increase in vehicle traffic⁷. Laurie Parendes and Julia Jones¹⁰ found that roads through Oregon coniferous forests facilitate movement of invasive exotics in three ways. First, roads provide corridors for movement of seeds by vehicles. Second, they create a high-light habitat appropriate for weed growth in an otherwise shady environment. Finally, roadsides also contain seed banks that may spark future episodes of invasion. Exotics were prominent along roads through Wisconsin hardwood forests¹⁶. Douglas Wilcox mapped infestations of purple loosestrife along a major east-west highway in New York state, and he concluded that roads act as corridors for this exotic by providing disturbed, wet habitat¹⁹.

Several studies have found that soils brought in for road construction may provide better habitat for weeds than native soil. Exotics were more common in the fine-textured soil used to build road grades on the mountains of Hawaii compared to the adjacent coarse-textured, native volcanic soils¹⁸. Fine-textured materials imported to build roads through Florida shrublands also supported higher concentrations of invasive exotics than the native sandy soils⁴. Imported gravel and road fill may also contain weed seeds, especially since many gravel pits are dominated by weedy species. Improved roads provide better habitat for weeds than unimproved roads², probably because building surfaced roads involves higher levels of disturbance and the introduction of non-native materials.

Susan Harrison and Jonathan Gelbard³ studied how roads affected weed invasions in California grasslands. They showed that roadless areas were important refuges for native plant species and communities. They concluded that limiting travel on existing roads was important but not constructing new roads was a more effective strategy for protecting native diversity. This is because, once constructed, roads continue to facilitate weed invasions for a long time. Logging

roads in Massachusetts were found to provide habitat for invasive weeds for at least 14 years following timber harvest¹³.

The Montana Native Plant Society encourages the Forest Service to limit road building as much as possible in order to protect biological diversity, sustain the economic values of weed-free land and maintain recreational opportunities for everyone. Similarly, MNPS urges the Forest Service to curtail off-road vehicle use and prevent the unauthorized creation of *de facto* roads by off-road vehicles. If new roads must be built we suggest avoiding the building of roads in lower-elevation grasslands, shrublands and pine savannah. Roads constructed through forest should be as narrow as possible to limit the amount of sunlight reaching the ground. We also advise not bringing in foreign road materials, especially from sources in proximity to weed infestations. Native plant cover should be restored or retained along the edges of roads being built or maintained. MNPS also urges the Forest Service to close or remove existing roads whenever possible. Again, roads that traverse or access low-elevation grasslands or open forest should be given priority.

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