



Exotic Vegetation Management

Protecting Yellowstone from the increasing threat of exotic plant invasions has become a major challenge for park management. During the last 25 years, the number of non-native plants documented in Yellowstone has increased from 85 to 212 species. Although not all of these exotic plants endanger the park's native species, many are highly invasive and can alter native plant communities and the wildlife that depends on them. Many exotic species, such as timothy and downy brome, have become so widespread that current funding levels do not permit park staff to even attempt to control them.

The full extent of exotic plants in Yellowstone's 2.2 million acres has not been determined, but the areas most vulnerable to invasion are those most frequently used by its 3 million annual visitors—along the park's 467 miles of paved roads, 900 miles of backcountry trails, 2,650 miles of rivers, 12 frontcountry developed areas, and 302 backcountry campsites. The park also has 291 miles of backcountry boundary shared with other public and private entities that pose a special management concern, recognizing that non-native plants easily move across jurisdictional boundaries. While the long-term impacts of these invasive plants



remain to be seen, changes have already occurred in the Yellowstone landscape as populations expand and new species arrive.

In 2006, more than 70 park staff and 111 volunteers worked in a coordinated effort to manage this threat. The park has adopted an Integrated Pest Management (IPM) approach with regard to exotic vegetation, emphasizing prevention, education, early detection, eradication, control, and monitoring. While 60% of the park's efforts have gone towards halting the spread of 20 highly invasive species, 40% of the efforts have gone into prevention, education, and early detection surveys. These efforts are funded with \$100,000 of park funds diverted from other program areas and \$150,000 of project-related monies, most of which is associated with Federal Highways construction projects. Although this represents a significant effort and amount of money, under current funding and levels of effort we will not be successful in eradicating several of the high priority species and will continue to fall behind as new species are discovered and as species escape containment, threatening the park's backcountry.

In 2006, staff surveyed 3,000 acres for 47 high-priority species and treated 40 species on 1,072 acres. Most of these populations were located along roads and in developed areas. Even with dedicated, continuous annual pressure, highly invasive species continue to survive in low-density populations. These populations annually disperse seeds that remain viable in the soil for 10 to 50 years. Some targeted species continue to move into the backcountry,

MOST OF THE PARK'S CONTAINMENT EFFORTS ARE DIRECTED AT THE FOLLOWING 15 SPECIES:

- 190 acres of spotted knapweed (*Centaurea maculosa*)
- 182 acres of yellow hawkweed (*Hieracium pratense*)
- 126 acres of woolly mullein (*Verbascum thapsus*)*
- 107 acres of orange hawkweed (*Hieracium aurantiacum*)
- 58 acres of St. John's wort (*Hypericum perforatum*)
- 50 acres of ox-eye daisy (*Chrysanthemum leucanthemum*)
- 49 acres of houndstoung (*Cynoglossum officinale*)
- 33 acres of hoary cress (*Cardaria draba*)
- 12 acres of musk thistle (*Carduus nutans*)
- 7 acres of dalmation toadflax (*Linaria dalmatica*)*
- <1 acre of leafy spurge (*Euphorbia esula*)
- <1 acre of sulphur cinquefoil (*Potentilla recta*)
- <1 acre of plumeless thistle (*Carduus acanthoides*)
- <1 acre of common tansy (*Tanacetum vulgare*)
- <1 acre of tall buttercup (*Ranunculus acris*)

*Species only treated where initial invasion is occurring, while other areas of the park with large established populations are not being treated.



Jennifer Whipple, park botanist, teaching employees to identify exotic plants.



Park employees perform roadside non-native plant control.



Above: Volunteers from an Atlanta church group help with manual control. Right: Park staff spraying road-side exotic vegetation.



Monitoring exotic populations.



Controlling non-native plants in Yellowstone's back-country is timestaking, expensive, and logistically difficult.

where survey, control, and containment costs increase dramatically.

Early detection surveys and eradication efforts focus on new invaders, which have included dyers woad (*Isatis tinctoria*), plumeless thistle (*Carduus acanthoides*), diffuse knapweed (*Centaurea diffusa*), Russian knapweed (*Centaurea repens*), sulfur cinquefoil (*Potentilla recta*), scotch thistle (*Onopordum ananthium*), leafy spurge (*Euphorbia esula*), tall buttercup (*Ranunculus acris*), and common tansy (*Tanacetum vulgare*).

It is estimated that the park needs to monitor an additional 7,000 acres of high-risk areas, for a total of 10,000 acres surveyed annually. To support this increased level of effort and effectively manage high priority invasive plants, the park needs an annual program operating budget of about \$450,000. This funding would cover the necessary equipment, supplies, and staff—7 seasonal and 3.55 permanent FTEs. It would enable us to expand current IPM efforts to include annual early detection surveys in areas not currently being routinely monitored, such as backcountry trails, campsites, boundaries, and utility corridors; high-risk stream corridors; fishing trails; high-risk game trails and wildlife use areas. In addition, one-time funding is needed for capital improvements and initial research totaling \$500,000. This would pay for needed vehicles, radios, computer and GPS equipment, safety equipment, heated equipment/chemical storage and herbicide mixing buildings, water quality monitoring, ecological risk assessment, environmental assessment, restoration/revegetation efforts, and development of a long-term monitoring program.