

Exotic Species

- More than 210 exotic plant species in the park.
- Resource managers target the most invasive species for control or removal.
- Species include (common names): dalmation toadflax, spotted knapweed, Canada thistle, ox-eye daisy, houndstongue, leafy spurge.

Yellowstone Sand Verbena (*Abronia ammophila*)

Yellowstone sand verbena occurs along the shore of Yellowstone Lake. Taxonomists debate the relationship of this population of sand verbena to other sand verbenas. It may be distinct at the subspecific level, and is certainly reproductively isolated from the closest sand verbena populations in the Bighorn Basin of Wyoming.

Sand verbenas are a member of the four o'clock family. Very few members of the family grow this far north. Little is known about the life history of Yellowstone sand verbena. It was described as an annual in the only monograph that has examined this genus in recent years, but it is a perennial. It grows close to the sand surface. Some individuals occur near warm ground, so the thermal activity in Yellowstone may be helping this species survive. The flowers are white and the foliage is sticky, and bloom from mid-June until a killing frost.

Yellowstone Sulfur Wild Buckwheat (*Eriogonum umbellatum* var. *cladophorum*)

Several varieties of sulfur buckwheat live in the park, but this variety grows along edges of thermally influenced sites from Madison Junction to the Upper Geyser Basin. It differs from the more common varieties by the densely hairy upper surface of the leaves, and by the bright yellow of its flowers.

Managing Invasive Plants

The full extent and impact of exotic plants in Yellowstone is unknown. Many grow in disturbed areas such as developments, road corridors, and thermal basins; they also are spreading into the backcountry. Several exotics, such as the common dandelion, have spread throughout the park.

Exotic plants can displace native plant species and change the nature of vegetation communities. These changes can profoundly effect the entire ecosystem. For example, exotics unpalatable to wildlife may replace preferred native plants, leading to changes in

grazing activity. In turn, this stresses plants not adapted to grazing.

Controlling all the exotic species, some well-established, is unrealistic. The park focuses control action on species posing the most serious threat or those most likely to be controlled.

The park uses Integrated Pest Management—chemical, biological, sociological, and mechanical methods—to control some of the exotic plants. The park also cooperates with adjacent state and county Weed Control Boards to share knowledge and technology related to exotic plant detection and control.

Dalmation toadflax (*Linaria dalmatica*)

- Northern portions of the park, especially around Mammoth.
- Highly invasive, replacing native plants.

Spotted knapweed (*Centaurea maculosa*)

- Along roadsides and in the vicinity of Mammoth.
- Aggressive species that, once established, forms a monoculture, which displaces native grasses on the ungulate winter and summer ranges.
- Aggressive control efforts underway to prevent a catastrophic change in park vegetation.

Canada thistle (*Cirsium arvense*)

- Throughout the park and adjacent national forests.
- Airborne seed enable it to spread widely throughout the park, invading wetlands.
- Forms dense monocultures, thus radically changing vegetation.



Dalmatian toadflax

Ox-eye daisy (*Leucanthemum vulgare*)

- Mammoth and Madison areas.
- Can become dominant in meadows, is unpalatable to elk and other wildlife.
- Control efforts have substantially curtailed infestation; monitoring and evaluation continue.

Houndstongue (*Cynoglossum officinale*)

- Primarily Mammoth and East Entrance.
- May have been introduced by contaminated hay used by both the National Park Service and concessioners in their horse operations.
- Highly invasive.
- Seeds easily attach to the coats of animals, and thus spread along animal corridors.

Leafy spurge (*Euphorbia esula*)

- Small patches in Bechler and along roadsides, so far being successfully controlled but spreading actively in Paradise Valley north of the park and outside Bechler on the Caribou-Targhee National Forest.
- Becomes a monoculture, forcing out native vegetation.
- Extremely hard to control because of deep underground stems (up to 30 feet) and dense vegetation.

Restoring Native Plants

In 1932, President Hoover added over 7,000 acres of land to Yellowstone National Park to provide low-elevation winter wildlife habitat near Gardiner, MT. The addition included 700 acres of irrigated agricultural fields.

Park managers stopped irrigating the fields and planted an exotic perennial grass, crested wheatgrass (*Agropyron cristatum*), that they hoped would tolerate the arid conditions and provide wildlife forage. It thrived for many decades, but was never suitable forage. Eventually another, more aggressive, non-native plant—an annual mustard, desert alyssum (*Alyssum desertorum*)—moved in. Alyssum germinates very early and uses up most of the soil moisture before other species even get started. It also exudes a chemical that inhibits soil bacteria needed by native plants.

Park managers are restoring native vegetation to this area, following recommendations of arid land restoration specialists. In 2008 and 2009, they fenced four pilot plots totaling 50 acres, where they are controlling non-native plants with herbicides and growing cover crops to increase soil organic matter and moisture-holding capacity and restore soil microbial communities. After two to three years, they will seed the plots with native species.

Managers expect the fencing to remain for 10 to 15 years while the native plants become established. The fencing prevents elk and other ungulates from grazing on the young plants.

Restoration of this area will proceed in multi-year phases to allow native plants to become established under natural conditions, to provide time for managers to monitor and refine their methods, and to provide winter wildlife habitat.

Some of these restoration plots are adjacent to the Old Yellowstone Trail, an unpaved road that parallels the Yellowstone River west of Gardiner, Montana.