CHAPTER 3. LANDSCAPE DISTURBANCES

Invasive Plant Species – Gunnison Basin

Invasive plant species have been identified as one of the great issues facing the Forest Service today (USDA Forest Service 2003). Invasive plant species are both native and non-native species that can cause economic or environmental harm, or harm to human health. Many species are also considered to be noxious weeds. The State of Colorado (Colorado Revised Statutes 35: Article 5.5, Section 35-5.5-103. (16)) defines noxious weeds as: an alien plant or parts of an alien plant that have been designated as being noxious by a local advisory board, and meets one or more of the following criteria:

(a) aggressively invades or is detrimental to economic crops or native plant communities;
(b) is poisonous to livestock;
(c) is a carrier of detrimental insects, diseases or parasites;
(d) the direct or indirect effect of the presence of this plant is detrimental to the environmentally sound management of natural or agricultural ecosystems.

Invasive plant species generally are species that have been introduced into ecosystems in which they did not evolve, and consequently, tend to have no natural enemies to limit their reproduction and expansion. They also tend to be more vigorous, taller, and more productive than native species (Mitchell 2000). As a result they can out-compete and displace native plant species, often completely taking over a site.

Invasive plant species have the potential to cause serious ecological and economic harm. Natural plant community composition can be altered, greatly reducing biodiversity and eliminating habitat and forage for wildlife and livestock. Ecosystem functions such as nutrient cycling and energy flow can be altered. Invasive plants can change soil textures by reducing soil moisture holding capacity or lowering water tables. Soils can become more unstable and surface runoff and sediment yield can be increased (Miller 2000). The presence of invasive plant species can also alter fire regimes.

Human activities that disturb native plant communities can create suitable habitat for invasive plant species. Invasive plant species can be spread or introduced into unoccupied areas by vehicles, humans, and animals along travel routes and waterways.

Invasive plant species infestations are increasing exponentially through the western United States, and this trend is also occurring within the Gunnison Basin Geographic Area. The Forest Plan Revision process must evaluate any risks to ecological sustainability and provide direction to reduce the threats of invasive species.

Known Occurrences of Invasive Plant Species

The State of Colorado, local counties (Gunnison, Hinsdale, Saguache), and the GMUG National Forest have all identified invasive plant species of concern. (Complete list is in administrative record.)

Efforts to map and monitor known infestations of invasive plant species are ongoing. Data is available through a state-wide effort to map invasive plants by the quarters of 7.5 min topographic quadrangles (State Quarter Quad Mapping 2002). Invasive species mapping on NFS lands identify more precise locations. Current inventories do not include all known infestations.

Twenty species have been inventoried on the Gunnison Basin Geographic Area. Table 1 lists these species and the affected acres for the entire Geographic Area and just the NFS lands. These acreage figures do not reflect the density of plant infestations at any given site, due to the different data sources. Infestation densities vary from less than 10 percent to 100 percent cover within the affected acres.

Table 1. Gross Acres Affected by Invasive Plant Species, Gunnison Basin Geographic Area

Species	Acres on Geographic Area	Acres on NFS
Scentless Chamomile (*Anthemis arvensis*)	17	1
Hoary cress (Whitetop) (*Cardaria draba)*	34	13
Musk thistle (*Carduus nutans L.)*	11	4
Diffuse knapweed (*Centaurea diffusa*)	6	3
Spotted knapweed (*Centaurea maculosa*)	6	5
Russian knapweed (*Centaurea repens)*	50	13
Oxeye daisy (*Chrysanthemum leucanthemum)*	148	142
Canada thistle (*Cirsium arvense)*	82	33
Bull thistle (*Cirsium vulgare)*	10	5
Field bindweed (*Convolvulus arvensis)*	10	1
Houndstongue (*Cynoglossum officinale)*	1	0
Russian olive (*Elaeagnus angustifolia)*	1	0
Leafy spurge (*Euphorbia esula)*	3	2
Dame's rocket (*Hesperis matronalis)*	4	3
Black henbane (*Hyoscyamus niger*)	60	30
Perennial pepperweed (*Lepidium latifolium)*	17	4
Dalmation toadflax – broadleaf (*Linaria dalmatica*)	3	3
Yellow toadflax (*Linaria vulgaris)*	515	503
Saltcedar (Tamarisk) (*Tamarix ramosissima)*	1	0

Figure 1 displays the current County and Forest Service inventory of invasive plant species locations in the geographic area. Figures 2 through 7 display the current inventory of invasive plant species locations in the Geographic Area from the State quarter quad inventory data (2002). Invasive plant species shown on these figures are grouped by knapweeds, thistles, ornamentals, agricultural weeds, riparian species and other noxious species. Acres of infestations associated with quarter quads that overlap NFS land are included in the NFS acres totals, above.

The Gunnison Basin Geographic Area has the most extensive inventory of invasive plant species when compared to other geographic areas on the GMUG. However; the acreages affected by invasive plant species are less than all other Geographic Areas.

The largest extents of invasive plant species occur below NFS lands. On NFS lands, concentration areas for invasive plant species are associated with most of the major road corridors in the following areas: Alpine Plateau, Los Pinos-Cebolla Creek, Gunnison County Road 27, Willow Creek, Doyleville Cutoff, Pitkin, Taylor Canyon, Forest access roads off State Highway 135, Slate River, Kebler Pass, Ohio Creek, Rainbow Lake, Red Creek and Soap Creek.

Yellow toadflax is the species of biggest concern in this Geographic Area. Populations are localized in and around Crested Butte and along roads to the north and west. This species prefers areas of aspen intermixed with meadows. This species was originally introduced into the area as an ornamental on private lands. Two other ornamental species are also a growing concern in this Geographic Area: oxeye daisy and scentless chamomile. Oxeye daisy is moving onto the Forest near private land in Taylor Canyon, near Ohio City and in Soap Creek. This species is commonly found in association with the aspen cover type. The Soap Creek watershed has been identified as a weed management area by Gunnison County because of oxeye daisy infestations. Scentless chamomile currently only occurs on much smaller areas, but this species also occurs in association with private land around Crested Butte, Kebler Pass and Taylor Canyon.

Canada thistle is scattered throughout the Geographic Area, with areas of concentration occurring in Soap Creek, Red Creek, along Rainbow Lake road, Kebler Pass, north of Crested Butte, along Alpine Plateau Road and Willow Creek. This species can be found in almost any cover type, but is most common in grass/forb and aspen cover types.

Black henbane is found almost exclusively in the Gunnison Basin Geographic Area of the GMUG. Concentration is found along the Doyleville cutoff between State Highway 114 and US Highway 50. A few populations have been found on the Forest southeast of this route.

The majority of inventoried infestations shown on Figure 1 occur along roads. Roads are one of the major pathways upon which invasive plant species are transported; however, roads also serve as the primary survey routes. Additional concentrations shown on Figure 1 are within specific project areas (i.e., Last Chance timber sale). As mentioned above, not all parts of the Gunnison Basin Geographic Area have been inventoried for invasive plant species.

Roads are also the primary survey routes for inventories included in the State's quarter quad inventory. Infestations indicated by a shaded quarter quad on Figures 2 through Figure 7 are likely located along roads or trails within that shaded area.

Figure 1. Inventory of Invasive Plant Species, Gunnison Basin Geographic Area

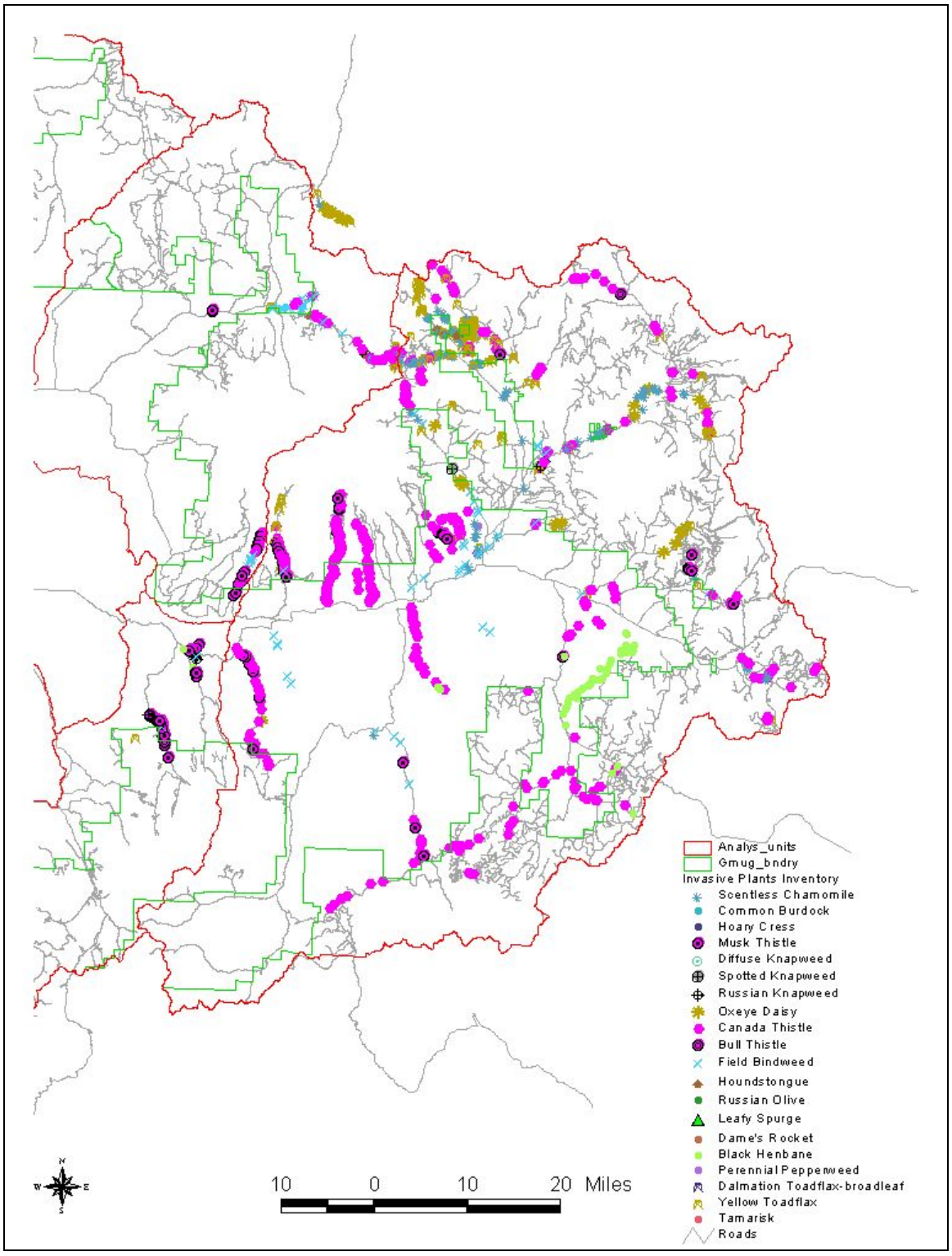


Figure 2. Knapweed Species

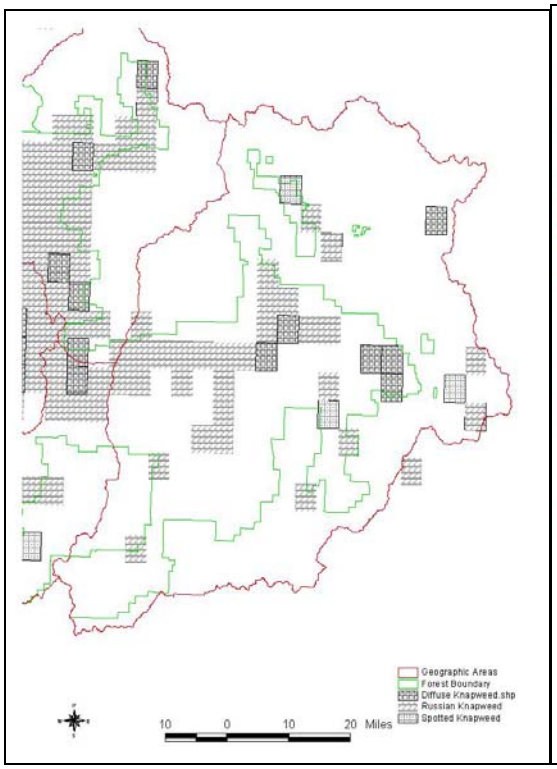


Figure 3. Thistle Species

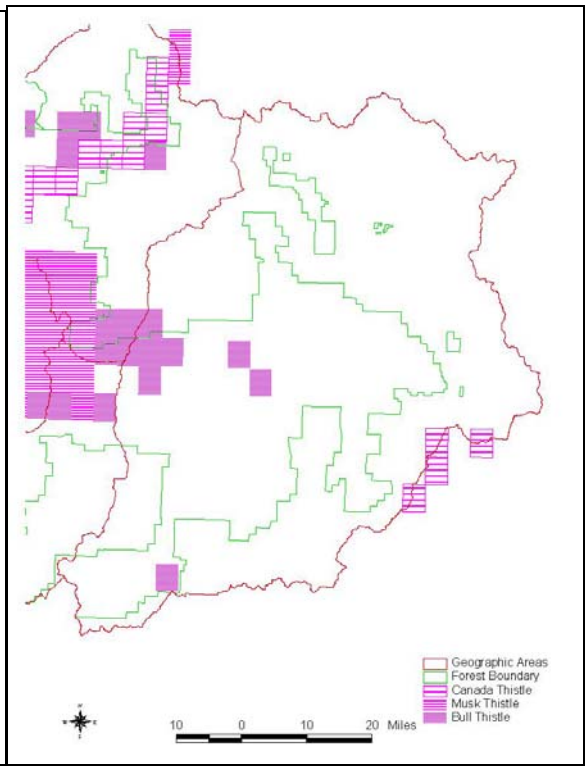


Figure 4. Ornamental Species

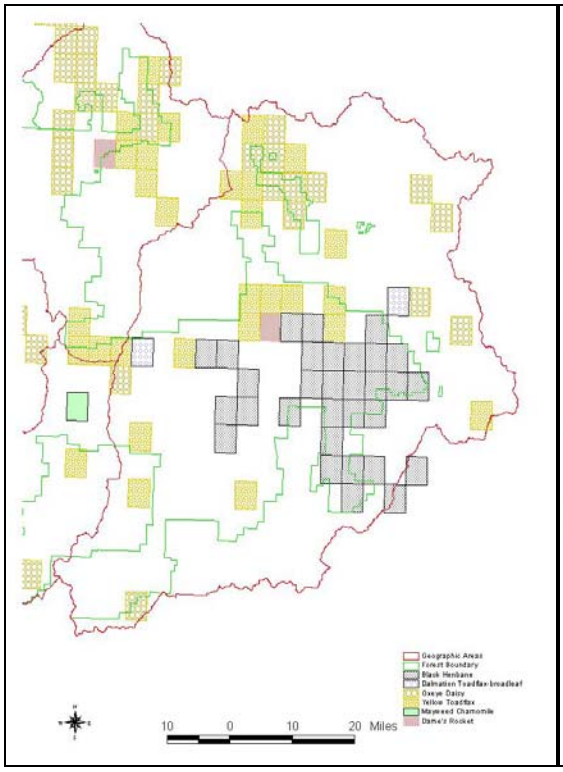


Figure 5. Agricultural Species

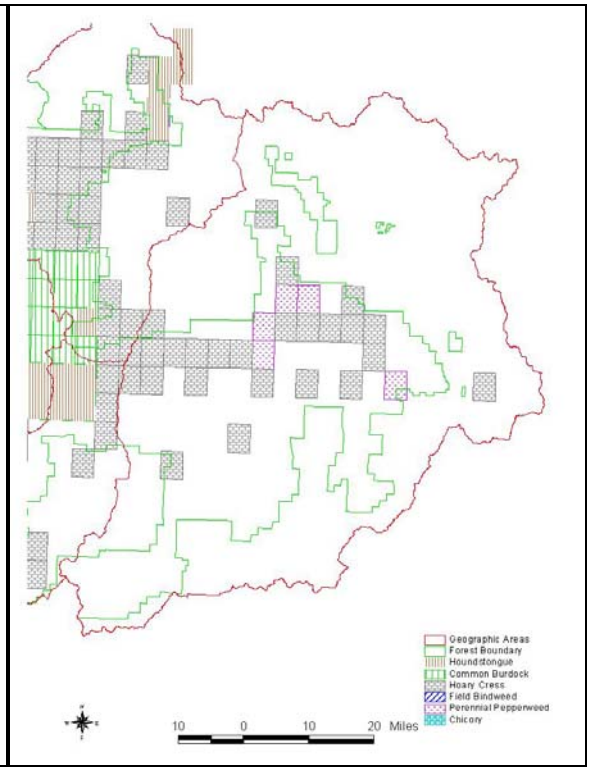
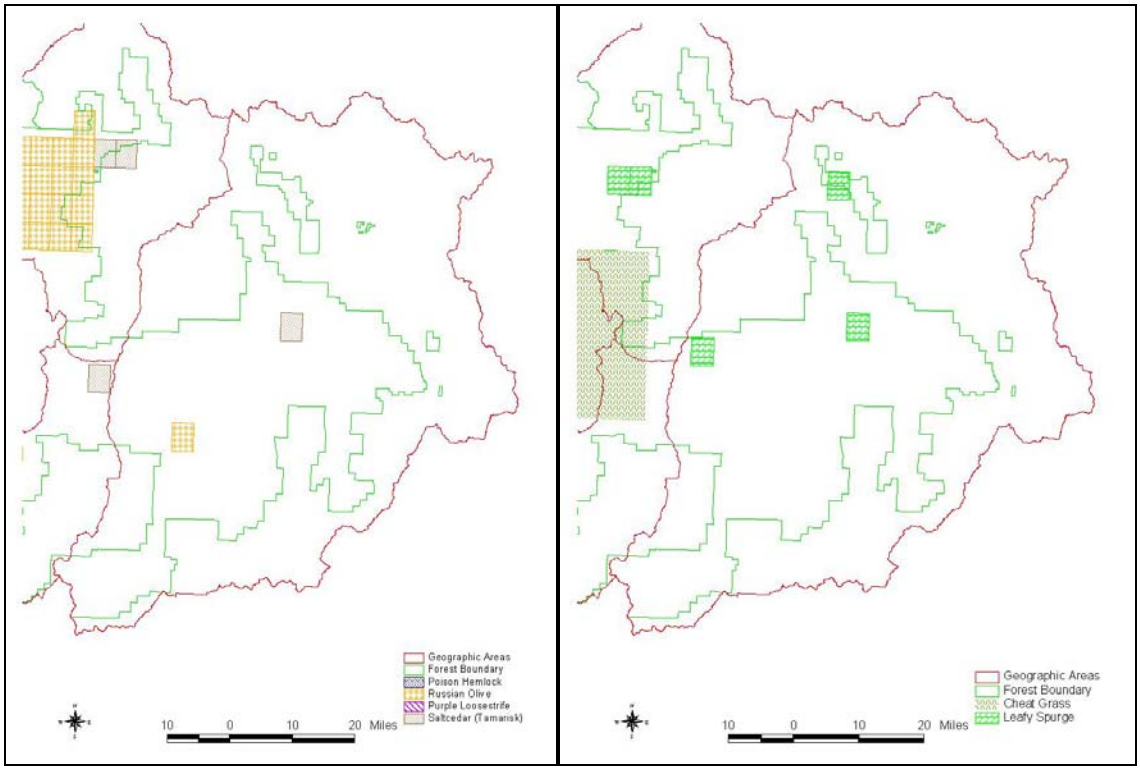


Figure 6. Riparian Species **Figure 7.** Other Noxious Species



Invasibility Risk

Areas where vegetative cover is disturbed and bare soil becomes exposed are most susceptible to noxious weed invasions. Land areas can be disturbed as a result of human land uses/management (i.e., roads, trails, ditches, agriculture, livestock grazing, timber harvest, prescribed burning, and land clearance) or natural disturbances (i.e., wildfires, wildlife concentration areas).

Physical factors of a site, such as available moisture, sunlight and warm temperatures (Stohlgren as cited in Regan et al. 2003), also influence the potential for invasive species to become established. Most invasive plant species require large amounts of sunlight, warm temperatures and relatively long growing seasons. In arid western environments like the Uncompahgre Plateau, riparian and wetland areas are susceptible because of the available water.

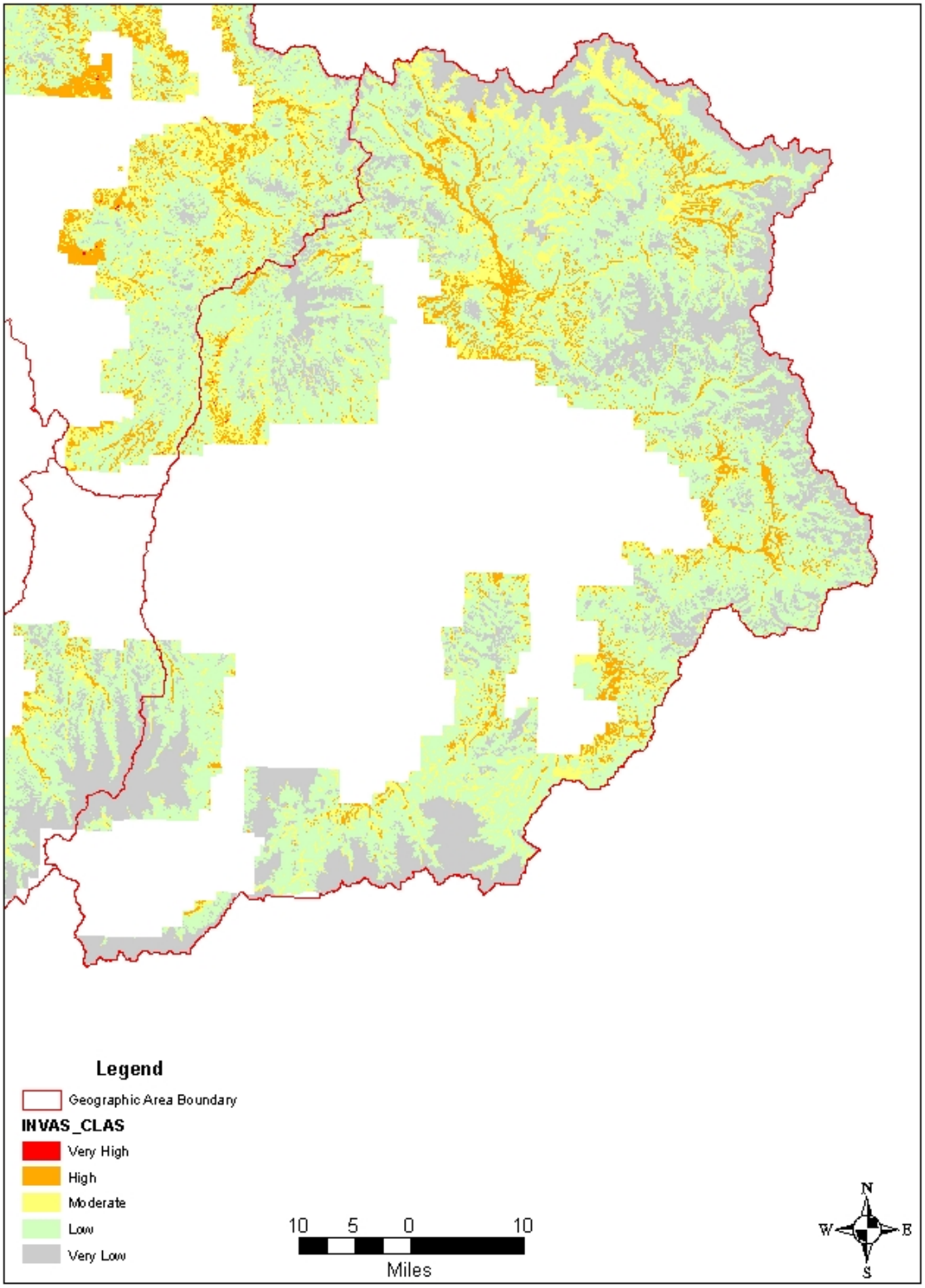
A GIS based modeling effort was used to identify those areas that have the highest risk for invasive plant species. Slope, aspect, elevation and canopy cover were used to assign invasibility risk. For example; areas of highest risk are below 8,500 feet in elevation, in areas with canopy closure less than 20 percent and in riparian or valley bottom locations. The results of this invasibility risk modeling for the Gunnison Basin are summarized in Table 2, and displayed in Figure 8.

Table 2. Acres of Invasibility Risk Ratings, NFS portion of Gunnison Basin Geographic Area

Invasibility Risk Rating	Acres	Percent	Dominant Cover Types
Very High	100	0	Bare, grass/forb
High	95,100	7	Grass/forb, sagebrush, willow
Moderate	192,500	14	Grass/forb, lodgepole pine, spruce/fir
Low	761,300	55	Lodgepole pine, spruce/fir, aspen
Very Low	340,100	24	Spruce/fir, bare, lodgepole pine

Only 21 percent of the NFS portion of this Geographic Area has moderate or high risk. These areas are in the lower elevations, along major drainages, or in more open cover types. Approximately 79 percent of the NFS portion of the Geographic Area has low or very low risk for invasive plants. These areas are higher elevations much of which is bare, above treeline, and located in Wilderness areas.

Figure 8. Invasibility Risk Ratings, Gunnison Basin Geographic Area



Invasive Plant Species Management

Numerous federal and State laws, as well as Forest Service policy and direction guide management of invasive species. The current Forest Plan has very limited direction related to invasive plant species. To address these limitations the Grand Mesa, Uncompahgre and Gunnison National Forests Noxious Weeds Strategy was prepared in 1994. Since 1994 additional federal and State laws and strategies have been developed. Management efforts have been modified as new direction was enacted. The revised Forest Plan needs to incorporate the latest direction concerning invasive plant species management.

Management efforts for invasive plant species in the Gunnison Basin Geographic Area are done through cooperative agreements involving Gunnison, Hinsdale and Saguache counties, Forest Service, Bureau of Land Management, National Park Service, Colorado Division of Wildlife, Colorado Department of Transportation, and local municipalities. Federal, State and local funds are combined to cover inventory and treatment efforts. On NFS lands mitigation measures designed to prevent the risk of weed introduction and/or spread are included in project designs for any ground disturbing activities, such as timber sales, utility corridors, road and trail construction and maintenance. In addition, Gunnison County has a revegetation program that requires a reclamation permit if more than 2,000 square feet will be disturbed. A bond is required if more than 10,000 square feet will be disturbed. Landowners have two years to complete revegetation and each property is inspected. This aggressive program is one reason why the Gunnison Basin Geographic Area has a smaller invasive plant problem when compared to other areas of the GMUG.

Key Findings

- Yellow toadflax is the species of biggest concern in the Gunnison Basin Geographic Area, affecting the largest area, followed by oxeye daisy. These infestations occur almost exclusively on NFS lands.
- The Soap Creek watershed has been designated as a weed management area because of the concentration of oxeye daisy.
- Canada thistle, Russian knapweed, black henbane and hoary cress account for most of the non-NFS acres affected in the Geographic Area.
- Introduced ornamental species are a growing concern in the Mount Crested Butte area.
- Current inventories do not include all known infestations. Inventories have occurred along transportation routes. Invasive plant species locations shown on maps are localized along transportation routes.
- Only 21 percent of the NFS portion of this Geographic Area has moderate or high risk while 79 percent has low or very low risk for invasive plants, mostly at higher elevations above treeline and within Wilderness areas.

Trends

- Invasive species infestations are not increasing rapidly in the Gunnison Basin Geographic Area due to aggressive efforts to treat infestations as soon as they are located.

- Land disturbing activities (i.e., clearing and development on private land, road construction) on private lands within Gunnison County have lessened the risk for invasive plant species spread due to the County reclamation program. This trend is expected to continue.

- Vegetation conditions have resulted in recent fires that have burned with high intensities over large areas (i.e., Steuben fire). This trend is expected to continue. The potential for future fire disturbances is high (see Fire Management section). If additional areas are disturbed, the potential for invasive species to infest additional areas is also high.

- Inventory work to identify invasive species infestations has been elevated as a management emphasis. Coordinated efforts with county and other local partners have been increasing to treat new infestations as they are located. Budget constraints limit what work can be accomplished.

Management Implications

- The revised Forest Plan needs to incorporate direction from local, state and national strategies to treat existing invasive plant infestations and prevent the spread or establishment of new infestations. All the ongoing coordination efforts need to be recognized in the revised Forest Plan. The revised Forest Plan also needs to put monitoring requirements in place that will track acres affected by invasive plant species, evaluate treatment success to reduce and/or eradicate invasive plant species infestations, evaluate effectiveness of standards and/or mitigation measures designed to prevent establishment or spread of invasive plant species, and track trends in acres at risk from invasive plant species.

- Projects designed to reduce fuels in wildland urban interface areas or in vegetation types that are more prone to frequent fires have also become management priorities, under the Healthy Forest Restoration Act and the regional Accelerated Watershed/Vegetation Restoration Program. Many of these projects have the potential to disturb areas, which would make them more suitable for invasive plant species. Projects must be carefully designed, implemented and monitored to ensure that fuels problems are not replaced with invasive plant species.

- Rehabilitation efforts following natural disturbances must include management efforts designed to prevent the introduction and spread of invasive plant species.

- Budget constraints for all cooperators involved in invasive species management will continue to limit the amount of work that can be done to control the spread of invasive plant species.

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