CHAPTER 3. LANDSCAPE DISTURBANCES

Invasive Plant Species – San Juans

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 San Juans 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, Montrose, Ouray, San Miguel), 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-two species have been inventoried on the San Juans 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 10 percent to 100 percent cover within the affected acres.

Table 1. Gross Acres Affected by Invasive Plant Species, San Juans Geographic Area

Species	Acres on Geographic Area	Acres on NFS
Mayweed Chamomile (*Anthemis cotula)*	1	0
Common burdock (*Arctium minus)*	275	65
Cheat Grass (Downy Brome) (*Bromus tectorum)*	1,800	300
Plumeless thistle (*Carduus acanthoides)*	2	2
Hoary cress (Whitetop) (*Cardaria draba)*	73	31
Musk thistle (*Carduus nutans L.)*	76	66
Diffuse knapweed (*Centaurea diffusa*)	20	15
Spotted knapweed (*Centaurea maculosa*)	14	12
Russian knapweed (*Centaurea repens)*	90	34
Oxeye daisy (*Chrysanthemum leucanthemum)*	143	129
Canada thistle (*Cirsium arvense)*	26	16
Bull thistle (*Cirsium vulgare)*	314	295
Field bindweed (*Convolvulus arvensis)*	1	0
Houndstongue (*Cynoglossum officinale)*	90	20
Russian olive (*Elaeagnus angustifolia)*	2	0
Leafy spurge (*Euphorbia esula)*	804	403
Dame's rocket (*Hesperis matronalis)*	7	5
Black henbane (*Hyoscyamus niger*)	1	1
Dalmation toadflax-broadleaf (*Linaria dalmatica*)	3	3
Yellow toadflax (*Linaria vulgaris)*	109	104
Scotch thistle((*Onopordum acanthium)*	8	4
Saltcedar (Tamarisk) (*Tamarix ramosissima)*	5	3

Figure 1 displays the current inventory of invasive plant species locations on the NFS portion of 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 in 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.

As with other Geographic Areas, the largest extents of invasive plant species occur below NFS lands. On NFS lands, concentration areas for invasive plant species are in the Big Cimarron/Owl Creek Pass and in and around the Beaver Park areas.

Both yellow toadflax and oxeye daisy are found at higher elevations in the upper San Miguel watersheds, most commonly in aspen intermixed with meadows. Both of these species were originally introduced as ornamentals on private land. Leafy spurge is found in a concentrated area south and southwest of Ridgeway. Canada thistle, musk thistle and bull thistle are all found in the Big Cimarron road corridor near the Big Cimarron campground and north of the Forest boundary. Canada thistle and musk thistle are also found in the Beaver Park area. Canada thistle is also established on Sunshine Mesa. Cheat grass is shown to occupy the most acreage both off and on the NFS in the San Juans Geographic Area. Concentrations are mapped in lower elevations east and southeast of Montrose.

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. As mentioned above, not all parts of the San Juans 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 7 are likely located along roads or trails within that shaded area.

Figure 1. Forest Service Inventory of Invasive Plant Species, San Juans Geographic Area

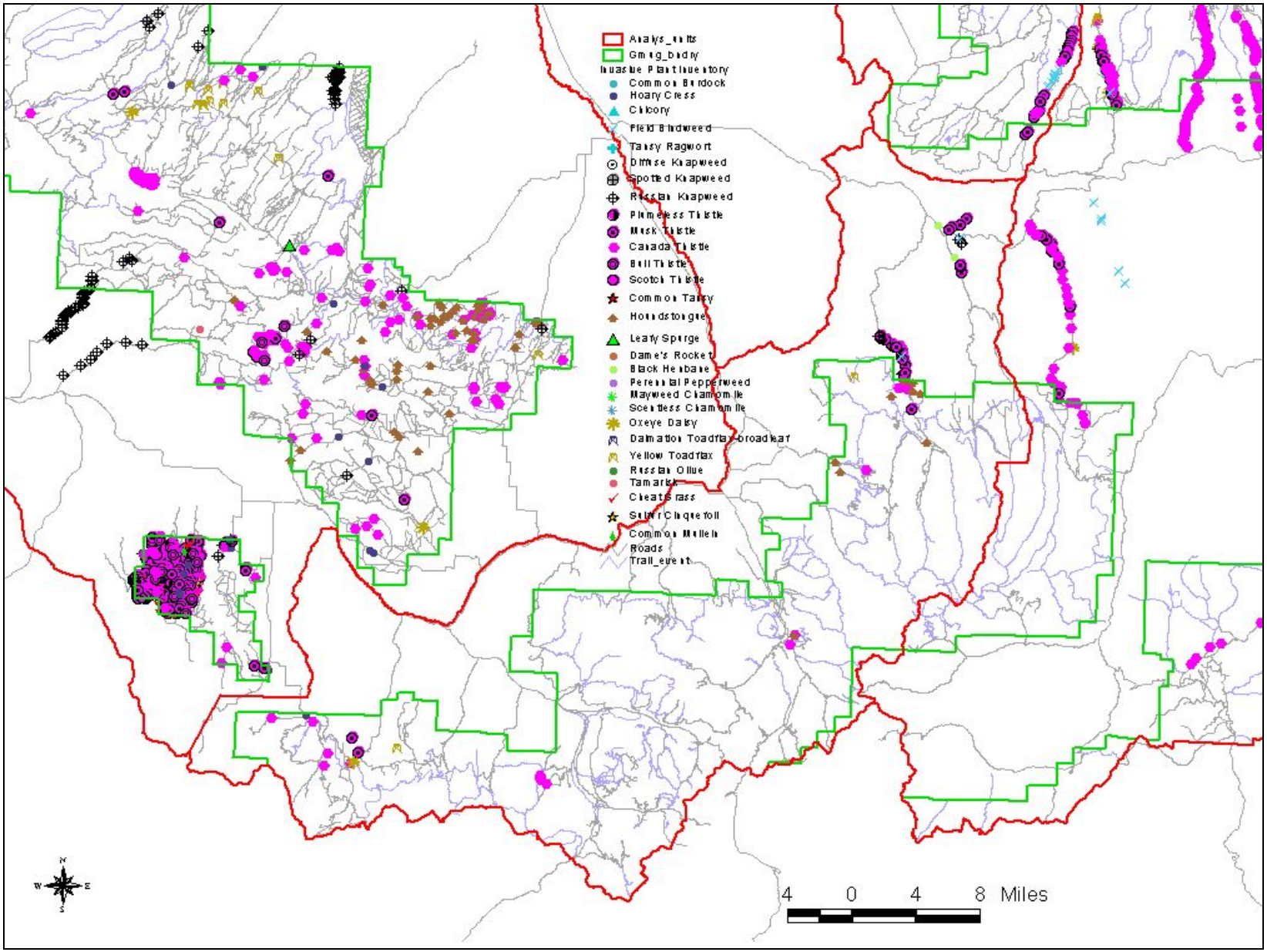


Figure 2. Knapweed Species

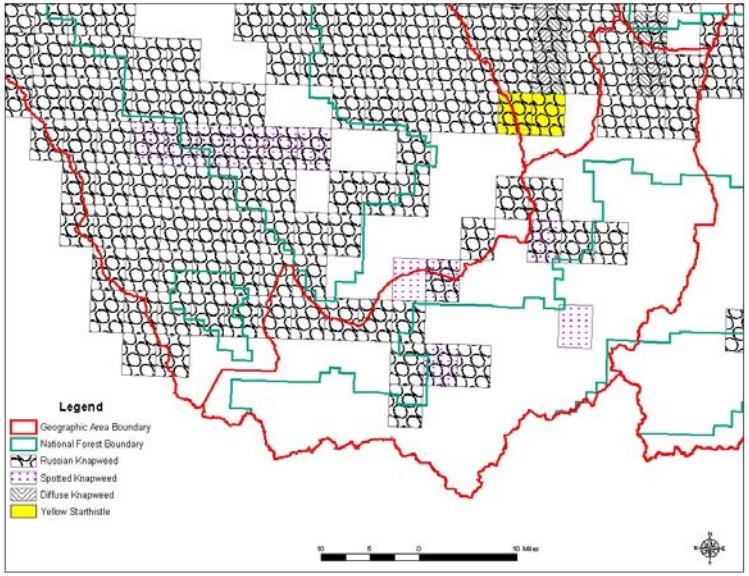


Figure 3. Thistle Species

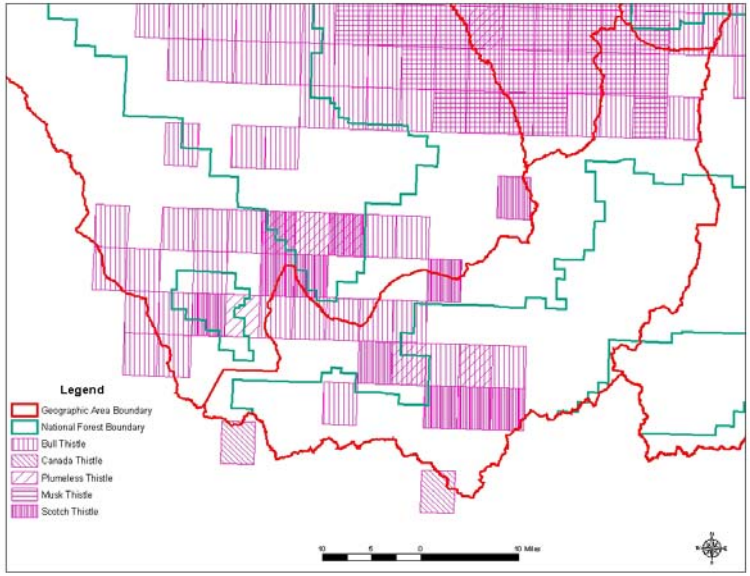


Figure 4. Ornamental Species

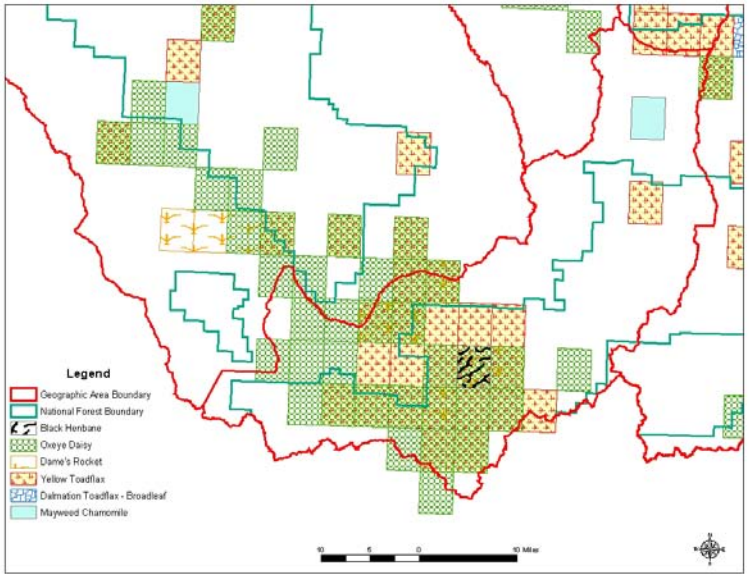


Figure 5. Agricultural Species

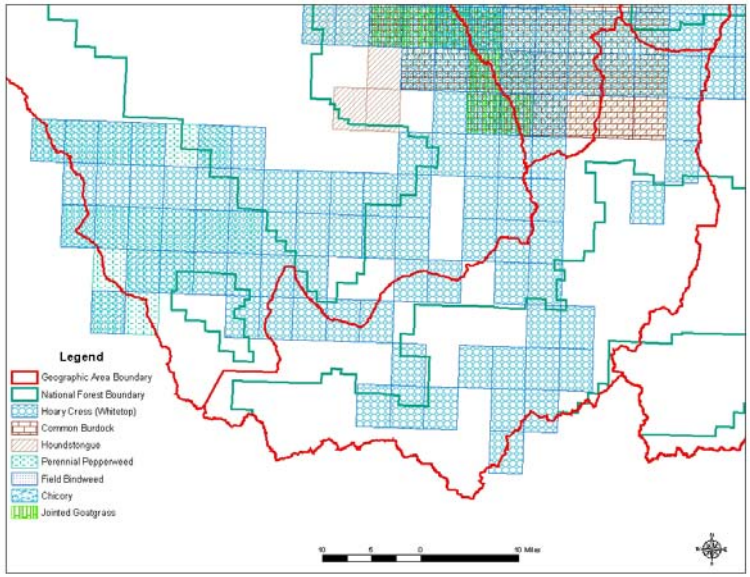


Figure 6. Riparian Species

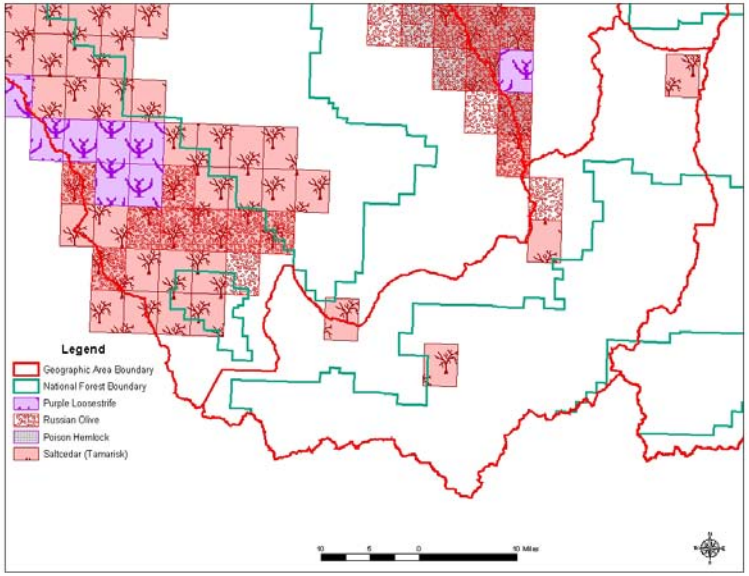
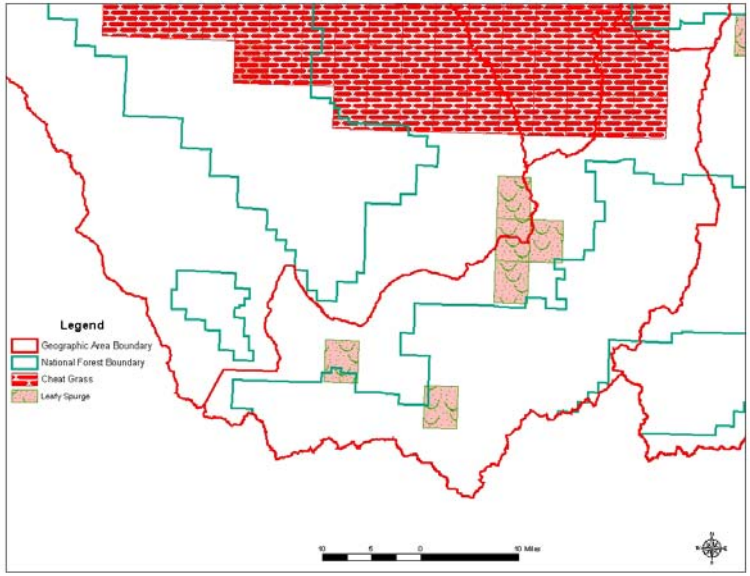


Figure 7. Other Noxious Species



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.

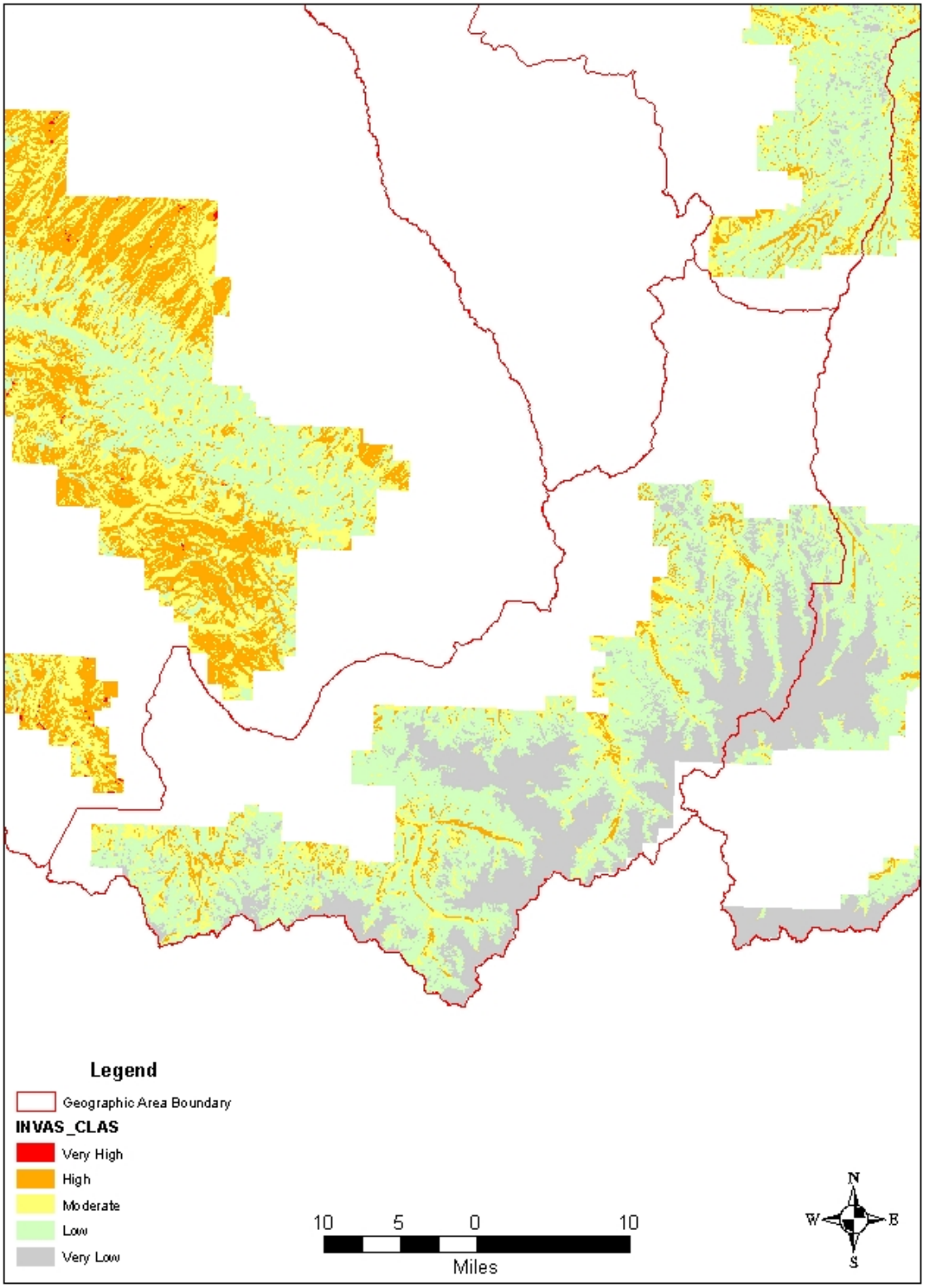
A GIS based modeling effort was used to identify those areas that have the highest risk for invasive plant species. Slope, aspect, elevation and canopy cover were used to assign invasibility risk. For example; areas of highest risk are below 8,500 feet in elevation, in areas with canopy closure less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

Table 2. Acres of Invasibility Risk Ratings, NFS portion of San Juans Geographic Area

Invasibility Risk Rating	Acres (rounded to nearest 100)	Percent	Dominant Cover Types
Very High	<100	0	Piñon-juniper
High	16,900	5	Grass-forb, aspen
Moderate	39,600	11	Aspen, spruce-fir
Low	188,700	53	Spruce-fir, aspen
Very Low	111,300	31	Bare, grass-forb

The smaller amount of acres affected by invasive plant species on the San Juans Geographic Area correlates with the invasibility risk ratings. Only 16 percent of the NFS portion of this Geographic Area has moderate or high risk. This is primarily due to the higher elevations found in this Geographic Area, much of which is bare, above treeline, and within Wilderness areas.

Figure 8. Invasibility Risk Ratings, San Juans 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 are done in close coordination with State and county weed management programs through cooperative agreements. Management efforts included prevention, detection, containment, suppression and eradication. Federal funds are diverted to counties to treat noxious weeds along roads during maintenance operations. State grant moneys have also been acquired to augmented federal dollars used to treat invasive plants species on both private and federal 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.

Key Findings

- Leafy spurge is the species of biggest concern in the San Juans Geographic Area. Note: Infested acres associated with a given quarter quad that overlaps the Forest were assigned to NFS lands.
- Cheat grass is inventoried on the most acres in the entire San Juans Geographic area, with more than 80 percent of the infestations occurring off NFS lands.
- After cheat grass, leafy spurge, bull thistle and common burdock affect the most acres in the entire Geographic Area.
- Hoary cress occurs across the largest extent of the entire Geographic Area. Yellow toadflax has the largest extent on NFS lands. Both of these species are extremely hard to control once they become established.
- Introduced ornamental species are a growing concern in the Ouray, Telluride and Mountain Village areas.
- 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.
- Because of the high elevations found in this Geographic Area, the majority of the area has low or very low risk for the establishment and spread future invasive plant species.

Trends

- Land disturbing activities (i.e., clearing and development on private land, road construction) on private lands within the Geographic Area have been increasing. These disturbances potentially increase the area suitable for invasive plant species.

- Vegetation and climatic conditions have resulted in recent fires that have burned with high intensities over large areas (i.e., West Beaver and Alta fires). These trends are expected to continue. These natural disturbances can also provide large areas of suitable habitat for invasive plants species to become established.

- 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.

- 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.

Reference

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