A PLAN FOR THE CONTROL OF INVASIVE SPECIES ON LOS ALAMOS COUNTY OPEN SPACE

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INVASIVE SPECIES: A PROBLEM OF NATIONAL AND LOCAL SCOPE

Native plants and animals have evolved within specific ecosystems and this pattern of co-evolution keeps their populations in check. Transport of a species from one ecosystem to another, either human-aided or by natural means, can release into an ecosystem a species that has not evolved with the system. This may result in a rapid expansion of the non-native species that can lead to the loss of community function, species diversity, and wildlife habitat.

Non-native species are typically opportunists and can rapidly colonize roadsides, construction sites, tilled and uncultivated ground, areas burned by wildfire, and areas of fuel mitigation projects are prime parcels for invasion. Species adapted to environments created by human-built structures or land cultivation are well suited for a rapid expansion of their range.

Most invasive species present in North America originate from Europe or Asia. The species traveled to the New World either with a specific human purpose or as stowaways. Most alien plants, seeds hitchhiked on livestock, on clothing, or as contaminants in harvested crop seed brought to North America for farming. Other plants have been imported for their unique ornamental values for landscaping or for erosion control. (See Table 1.)

Perhaps the most bizarre reason for introduction of an animal species is that of the Common Starling: Eugene Scheiffer, a lover of the works of Shakespeare, wanted to introduce all of the birds mentioned in Shakespeare's plays into the United States. He released 120 starlings into Central Park in New York City in 1890 and 1891. Currently, it is estimated that 300 million Common Starlings live in North America.

Economic Use	**Percent of species**	
Ornamentals for landscaping	42	
Erosion control	18	
Wood	11	
Forage crops	10	
Food	8	
Other	11	
Table 1. Reasons for importation of exotic plant species		

The environmental costs of invasive species can be staggering. The inadvertent introduction of the European chestnut blight resulted in the virtual extinction of an important hardwood tree in the Eastern United States. An invasion of sea lampreys reduced populations of lake trout in the Great Lakes by more than 90 percent. Cheatgrass has accelerated the fire cycle in some western States 20-fold. The Bureau of Land Management estimates that every day as much as 4,600 acres of additional Federal public natural areas in the Western continental United States are negatively impacted by invasive plant species. Saltcedar has altered soil chemistry and impacted native plants and wildlife in riparian areas, with has resulted in decreased water yields. Nearly half of all federally listed endangered species are negatively impacted by invasives. A conservative estimate places the number of alien species that have been introduced in the United States is 5,000. About 10 percent of those species have the potential to become invasive.

Ecosystems and communities have more at stake than the potential loss of native species. Invasive species can take a heavy economic toll. Researchers at Cornell University estimate that invasive species are costing Americans approximately $137 billion every year, a number, a number up from $13 billion in 1994. By altering fire regimes, invasive species in the western United States increase the risk of fire along the wildland-urban interface.

It is estimated that non-native plants colonize about 5,000 acres a day on public lands west of the Mississippi River. Russian knapweed alone has pushed out native species on more than one million acres of federally owned lands. Unchecked, invasive species have altered ecosystems.

In 1999, Executive Order 13112 established the National Invasive Species Council to coordinate nationwide efforts to stem the spread of invasive species. One of the Council's charges is to encourage planning and action at local, tribal, State, regional, and ecosystem-based levels to achieve the goals and objectives of the National Invasive Species Management Plan. The Los Alamos County plan for control of invasive species is directly aligned with the national plan. The prevention strategies, implementation measures, and information management guidelines will permit easy exchange of information and control across jurisdictional boundaries to approach the problem on a landscape scale.

DEFINITIONS

Native species are plants and animals within the natural range that they would occupy without direct or indirect introduction and/or care by humans. They live in balanced populations with the other components of an ecosystem. They are generally adapted to the environmental conditions and processes of an ecosystem such as climate, soil characteristics, and fire regime. As a result, they are well-suited for survival within that system, are efficient users of available resources, and are adapted to the fire regime of the system. In addition, native species provide habitat and food sources for wildlife. Because they do not alter existing ecosystem balance, they are the most desirable species.

Alien species are species that are not native to an ecosystem but that are capable of living and propagating within the physical parameters of that ecosystem. Many familiar, common plants found within Los Alamos County are alien species. Some are considered weeds: dandelion, sweet clover, horseweed, and Russian thistle, for example. Other alien species welcomed for their floral displays or fruit: wild apple, California poppy, Shasta daisy, and black-eyed Susan fall into this category.

Invasive species are alien species whose introduction is likely to cause economic or environmental harm. They are non-indigenous plants or animals that have the ability to establish self-sustaining, expanding, free-living populations, and may cause economic and environmental harm to an ecosystem. They frequently invade an area, exclude other plants or animals, and can expand their populations to cover acres hundreds or thousands of acres.

Integrated Invasive Species Management is a process by which one combination of management techniques (biological, chemical, mechanical, and cultural) is applied that together will control a particular invasive species or infestation efficiently and effectively, with minimal adverse impacts to non-target organisms. An integrated approach seeks to combine two or more control actions that will interact to provide better control than any one of the actions might provide. The integrated approach is species-specific, tailored to exploit the weaknesses of a particular weed species and designed to be practical and safe.

ALIEN AND INVASIVE SPECIES IN LOS ALAMOS COUNTY

Because invasive species are capable of rapid colonization of disturbed ground, Los Alamos County is vulnerable to infestation by alien plants, making detection of the presence and monitoring the expansion of invasive species imperative. The Cerro Grande Fire and the many post-fire activities with Los Alamos County have dramatically increased the amount of disturbed land within the County. See Table 2 for a list of ground disturbing activities in the County in 2004.

Type of Disturbance	**Disturbed Acres**
Neighborhood reconstruction	61
New construction	24
Burned Area Reconstruction Project	22
Other post-fire projects	35
Fuel mitigation projects	910
Burned area	250
Total	1303

Table 2. Ground Disturbing Activities in Los Alamos County, 2004

About 20 species of invasive and potentially invasive plants are found on Los Alamos County Open Space (See table 3). Most species are found only in isolated populations. Others, notably cheatgrass, Siberian Elm, and Russian Olive, are found throughout the County. See map 1 for the known distribution of invasive species in the County.

WHY SHOULD WE BE CONCERNED?

Within Los Alamos County, invasive species pose more of a threat than reducing ecological health. Invasive species can:

- **Increase the threat of wildfire**. Many invasives are highly flammable and can alter fire regimes. Fire frequency in areas of cheatgrass invasion increase ten-fold.
- **Increase soil erosion**. Native plants often have extensive root systems that hold soil in place. Sites with invasive species have more bare soil and less organic litter. In areas infested with spotted knapweed, sediment transport increased 200 percent.
- **Decrease in productivity of soil**. Invasive species rob nutrients from soil and many species produce herbicide agents that inhibit the growth of other plants.
- **Decrease wildlife habitat**. Invasives offer sparse nutrition, little material for nesting, and little cover.
- **Reduce water quantity and quality**. Some invasives take up large quantities of water, reducing flows in canyons.
- **Degrade riparian areas.** Replacement of native species with invasives along stream channels eliminates habitat of native species, dramatically reduces stream flow, and allows the encroachment of fire-prone plants.

Invasive Plants in Los Alamos County

Common Name	Scientific Name	Confirmed in LAC	Class
Bull thistle	*Cirsium vulgare*	Y	B
Canada Thistle	*Cirsium arvense*	N	A
Cheatgrass	*Bromus tectorum*	Y	C
Common mullein	*Verbascum thapsus*	Y	C
Common Purslane	*Portulaca oleracea*	Y	B
Dalmatian toadflax	*Linaria dalmatica*	Y	A
Diffuse Knapweed	*Centaurea diffusa*	N	A
Field bindweed	*Convolvulus arvensis*	Y	C
Flixweed, Herb sophia	*Descurainia sophia*	Y	C
Jointed goatgrass	*Aegilops cylindrica*	Y	C
Musk Thistle	*Carduus nutans*	Y	A
Russian knapweed	*Acroptilon repens*	Y	B
Russian olive	*Elaeagnus angustifolia*	Y	C
Russian thistle	*Salsola tragus*	Y	C
Siberian Elm	*Ulmus pumila*	Y	C
Skeletonleaf Bursage	*Ambrosia tomentosa*	Y	B
Spotted Knapweed	*Centaurea biebersteinii*	Y	A
Saltcedar	*Tamarix ramosissima*	Y	A
Yellow Toadflax	*Linaria vulgaris*	Y	A

Class A: High priority given to efforts to prevent new infestations and eliminating existing infestations

Class B: Plants limited to particular areas, with management priority given to containing species within current area

Class C: Plants that are widespread and require long-term management

Table 3. Invasive Species in Los Alamos County

INVASIVE SPECIES MANAGEMENT PLAN

GUIDING PRINCIPLES
(Adapted from the National Invasive Species Management Plan)

1. **Take action now.** Los Alamos County is relatively free of invasive species populations. By aggressively implementing a management plan, problems caused by non-native species should never reach epidemic proportions.

2. **Work smart, be adaptive.** Ecosystems are constantly changing to due variations in climate, fire, and human influences. Management objectives and implementation must adapt to changing conditions. By monitoring ecosystem health, we can adjust to match current conditions.

3. **Find balance.** Too often management decisions are determined by extreme points of view. Land management must find a balance that considers all aspects of ecosystem health from native species to water quality to erosion control.

4. **Work across jurisdictional boundaries.** Successful land management must be on the ecosystem or landscape scale. Working in concert with other land management agencies is of primary importance.

INTEGRATED INVASIVE SPECIES MANAGEMENT STRATEGIES

1. Establish and record management goals and invasive species management objectives.

2. Identify invasive species that are likely to expand their populations and assign priorities to these species based on the severity of their impact and the difficulty of control.

3. Give priority to mechanical or biological treatments of infestations, but consider all methods for controlling high priority species and infestations, or otherwise reducing their impact.

4. Monitor the results of management actions and evaluate the results in light of the management goals.

5. Modify and improve control priorities, methods and plans according to the information gained through monitoring, and start the cycle again.

Management Objective Definitions

Eradicate means completely eliminating all weed plants, including live roots, rhizomes and seeds. Eradicating a weed species on a management area is very difficult unless it is present in small numbers.

Control means to reduce the abundance of a weed species, typically as measured or estimated in terms of canopy cover or plant density.

Contain means confining an infestation so it does not expand, but does not usually mean reducing the current infestation.

INVASIVE SPECIES MANAGEMENT OBJECTIVES

Goal 1: Prevent invasion of invasive species.

Strategy 1. Maintain a list of invasive species present in or around Los Alamos County Open Space.

- The County Open Space Specialist will develop and maintain a list of invasive species know to occur on Los Alamos County open space, on private lands within the County, or on adjacent lands managed by the USDA Forest Service, the Department of Energy, Los Alamos National Laboratory, and San Ildefonso Pueblo.

Strategy 2. Promote the use of locally native species.

- With the State Cooperative Extension Agency, the open space specialist will develop a voluntary program to encourage use of native landscape plants. The program will include of list of plants that should not be used for landscaping and suggest alternative to undesirable species.
- Produce a simple brochure that targets landscaping businesses to discourage the use of potentially invasive species.

Strategy 3. Promote a public awareness of problems caused by non-native invasive species.

- Inform citizens about invasive species through public forums, mailings, and the media.

Strategy 4. Prevent the spread of invasive species from private land

- When potentially threatening populations of invasive species are discovered on private land adjacent to County open space, the open space specialist will inform landowners about the potential threat to public lands through written communication. This will not imply any enforcement power nor any commitment from Los Alamos County to provide treatment for the population.

Goal 2. Develop the capability for early detection and quick response.

Strategy 1. Implement a community-based invasive species monitoring system.

- The County Open Space Specialist will develop a community-based system for the discovery, documentation, and mapping of invasive species. Volunteers will be recruited to watch for invasive species whenever they use County open space. The locations of invasive populations will be recorded with GPS receivers. Data on invasive populations will be uploaded to a web site and stored in the LAC GIS.
    - At an annual workshop, volunteers will be trained to identify invasive species Instructions on operation hand-held GPS receivers will be given. Instructions on uploading coordinates, species, population size, and other data will be presented.
    - A PDF invasive species manual will be available on the County web site.
    - Data on invasive species will be maintained as part of the County GIS and updates will be displayed on the County web site.

Strategy 2. Guidelines for control of invasive populations are in place.

- The species-specific management objectives section of this document establishes procedures of the eradication or the prevention of spread of invasive species. The accepted guidelines with permit a response within an effective time frame.

Strategy 3. County staff are trained to respond to control invasive species.

- The County open space specialist, along with other staff in the Parks Division, will be state-certified in the safe storage, handling, and application of approved herbicides. Staff will maintain certifications in weed management.

Goal 3. Control or management invasive species populations with a balanced approach.

Strategy 1. Apply Integrated Invasive Species Management to combine management techniques that together will control a particular invasive species or infestation efficiently and effectively.

Strategy 2. When at all possible, eradicate, control, or contain invasive species by mechanical means (digging, pulling, or scraping).

- The first and second attempts at control of all populations of species known to respond to mechanical treatments will be by mechanical means.

Strategy 3. When necessary, use trained and qualified personnel to apply approved herbicides to eliminate populations.

- In situations where populations do not respond to two attempts at control by mechanical treatments, chemical treatments may be applied. Only populations with the following characteristics will be so treated:
    - The species is known to be difficult to control with mechanical methods
    - The population covers less than one-quarter acre
    - The species is classified as Class A or Class B

- The above restrictions will be exempted if a population of a Class A or Class B species expands by more than 25% in a single growing season.

Strategy 4. Develop and adapt species-specific management objectives and implementation procedures to prevailing conditions.

Strategy 5. The control of invasive species will be prioritized. High priority infestations include:

- Small, isolated infestations
- Patches of high priority species that are likely to spread
- Infestations along roads, trails, parking areas, and arroyos

Goal 4. Manage invasive species information in a way that fosters partnerships with regional land management agencies.

Strategy 1. Maintain an inventory of and monitor infested sites on County Open Space

- Gather and compile GIS data on invasive populations and maintain an updated map of site.
- Monitor infested sites yearly, especially in fuel reduction projects and burned areas.

Strategy 2. Engage in a free exchange of information with surrounding land management agencies.

- The County Open Space Specialist will develop and maintain contacts with the invasive species specialist with the Santa Fe National Forest, the Los Alamos Cooperative Extensive Agent, the New Mexico Division of Forest, and the resource manager of Bandelier National Monument.

CITIZEN-BASED INVASIVE SPECIES MONITORING

An effective method for developing and maintaining an inventory of invasive species on Los Alamos County open space is to utilize interested citizens. Volunteers will be recruited to watch for invasive species whenever they use County open space. The locations of invasive populations will be recorded with GPS receivers. Data on invasive populations will be uploaded to a web site and stored in the LAC GIS.

Training volunteers will help ensure the success of this program. At an annual workshop, volunteers will be trained to identify invasive species Instructions on operation hand-held GPS receivers will be given. Instructions on uploading coordinates, species, population size, and other data will be presented.

Volunteers will carry a weed kit when they are hiking the local trails. The kit will consist of an invasive species manual, a GPS receiver, and invasive species record forms. A digital camera is optional. GPS receivers will not be provided, but some are available for check out from the Volunteer Task Force.

When volunteers discover an invasive species population, the will note as accurately as possible its location. This can be a detailed description or GPS coordinates. They will note the species and estimate the number of plants or the area of the populations. If a digital camera is available, volunteers will take photographs. Information recorded in the field can be email to the open space specialist or brought to the Parks Division office.

The invasive species manual will include management goals and objectives and specific information on the identification of invasive species on Los Alamos County open space. The manual will be distributed to volunteers and will be available on the County web site.

Training for volunteers will begin the spring of 2005.

Invasive Species Record Form for Los Alamos County Open Space		
Date of observation		
Species		
General Location		
Coordinates	**Northing**	**Easting**
Estimated Number of Plants		
Estimated Area Covered		
Photographs Taken		

SPECIES SPECIFIC MANAGEMENT OBJECTIVES

Common Name: Bull thistle **Genus and Species: *Cirsium vulgare***
Family: Asteracae **Listed in New Mexico as Class B**

Priority: High

Known Locations in Los Alamos County
Western Perimeter

Possible Impacts
Reduces forage for wildlife, decreases recreational potential of land.

Management Objective: Eradication
All bull thistle populations on County open space will be eradicated within one year of detection.

Treatments
Populations of bull thistle in Los Alamos County are small and isolated. Elimination of the individual populations is possible. Because of these characteristics, the priority ranking for bull thistle is high.

Bull thistle is a biennial that reproduces solely by seed. The likelihood of new infestations will be reduced by any action to prevent the production and movement of seed. The control of bull thistle is approached by preventing the production of viable seed. This can be accomplished by:

- **Mowing:** Cut when plants are in flower bud to immediately before terminal flowerheads open to full bloom. Mow close to the ground and repeat as needed for control. Mowing alone is not an effective control measure for biennial thistles, because some seed will still be produced (but can be reduced by 99%). Bull thistle plants mowed just before seed dispersal do not produce seed or recover well. If mowed too early, bull thistle plants resprout and flower. About 4% of bull thistles cut 2 to 4 inches above the soil surface a month before flowering resprout. Early June is the best time for this treatment.

- **Digging -** Any mechanical or physical method that severs the root below the soil surface will kill bull thistle plants. If the infestation consists of a few sparse populations this can be done with little disturbance, but if larger infestations exist, areas should be re-vegetated with desirable plants to compete with bull thistle that may reinvade from seeds left in the soil. Dig the root at least two inches below ground level and remove all soil from the roots. Personal protective gear is required. To be effective, digging plants must be complete before June 15.

- **Removal of flowering head:** Pick heads that are beyond the bud stage and place in a tight container**.** Bury the container at a landfill or other site that will not be unearthed. Removal of adult bull thistle plants must be repeated annually for 4 years or more, since some plants will stay in the rosette form for up to 5 years.

- **Herbicide control should not be necessary.**

Monitoring

Monitor treated locations in late May of the following year for rosettes and bolting plants. Repeat treatment as required.

References

http://www.fs.fed.us/database/feis/plants/forb/cirvul/

BULL THISTLE

Description: Bull thistle is a biennial growing 2 to 5 feet tall. It has a short, fleshy taproot. Stems are very pubescent and have dark purple veins. The first year's leaves form a rosette. Second-year leaves are double-toothed ending in a spine; are wavy; have prickles on the surface; and are pubescent on the underside. Stem leaves are similar to rosette leaves, but they are smaller and have longer spines. Flower heads, made up of dark purple flowers, are 1.5 to 2.0 inches wide. Bracts surrounding the receptacle are narrow and spine-tipped. Seeds are topped with a papus.

Flower heads are shaped like a shaving brush. The stout spines below the flower head are characteristic.

Stems of bull thistle have spines, but not wings formed by extended leaves

Key Characteristics:

Prickles on the upper side of the leaf
Pubescence on the upper side of the leaf
Shaving brush apperance of the flower head
Stout spines below the flower head

Lobes of the leaves of bull thistle are nearly perpendicular to the central leaf vein

Common Name: Canada thistle **Genus and Species: Cirsium arvense**
Family: Asteracae **Listed in New Mexico as Class B**

Priority: High

Known Locations in Los Alamos County
None on County Open Space, found in Santa Fe National Forest

Possible Impacts
Reduces forage for wildlife, out competes native vegetation, increases soil erosion

Management Objective: Eradication

Treatments

The management strategy for Canada thistle will be to kill established clones. Canada thistle should be removed when it is first observed. Because populations of Canada thistle in Los Alamos County are likely to be small, mechanical treatment of populations should be attempted for two growing seasons before applying herbicide treatment.

Canada thistle spreads primarily by vegetative growth of its roots. The root system can be extensive, growing horizontally as much as 20 feet in one season. Most patches spread at the rate of 3 to 6 feet per year. Horizontal roots produce numerous shoots.

Individual roots live up to two years. New root buds develop in autumn after the death of aerial shoots. Root bud development is highest under short days and moderate temperatures (autumn), and root bud elongation is greatest under long days and high temperatures (summer).

Shoots begin to emerge when the average weekly temperature is 40 degrees, usually in late April. Primary shoots grow as rosettes for 2-4 weeks, then elongate (bolt) and develop flower buds some 10 weeks after emergence.

Mowing: Mowing temporarily reduces above-ground biomass, but does not kill Canada thistle unless repeated at 7-28 day intervals for up to 4 years. Mowing twice a year, in mid-June and September may reduce or contain Canada thistle. Mowing will be the first method used to control this species.

Herbicide treatment: Canada thistle's deep, well-developed root systems make it resilient to most control methods including herbicides. However, root carbohydrate depletion is related to growth stage and is greatest when flowering occurs, but replenishment generally occurs in late summer and fall. Herbicide treatments should be applied to newly discovered populations if they are small as selective herbicides could be used to eradicate this plant and not harm many of the adjacent plants that mowing/hand pulling would potentially do.

Suitable herbicides will be applied to new growth when leaves are green (September or October). For optimal results, herbicide will be applied under warm conditions prior to the first killing frost and when soil moisture is good, or after plants have adjusted to colder weather.

Monitoring

Known site of Canada thistle should be monitoring annually. This is best during the flowering period of mid-June.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/cirsarv.pdf

CANADA THISTLE

Plant Code: **CIAR4**
Common Name: **Canada Thistle**
Scientific Name: ***Cirsium arvense***
Family: Asteraceae

Key Characteristics:

Small flower heads (0.5 inch)
Male and female flower heads on separate plants
Up to four feet tall

Description:

Canada thistle is a creeping perennial forming dense populations as a result of extensive horizontal, branching roots. Stems are up to 5 feet tall, branched at the top, ridged, and hollow. Leaves are alternate and lack petioles; margins are either wavy or lobed, both with a spine. Flower heads are usually 0.5 inch in diameter, are surrounded by spineless bracts, and have purple to lavender flowers. White flowers are not uncommon. Male and female flowers are borne on separate plants.

Mechanical treatment is ineffective as breaking up the root stock of the Canada Thistle only serves to increase the number of plants that spout from the root fragments.

Common Name: Cheatgrass, Downy Brome **Genus and Species: *Bromus tectorum***
Family: Graminae **Not listed in New Mexico, but listed in all surrounding states**

Priority: Low

Know Locations in Los Alamos County
Western Perimeter and many others

Possible Impacts
Increase fire frequency, eliminate native grasses and shrubs, extreme fire behavior

Management Objective: Control and contain
Populations of cheatgrass on the Western Perimeter Tract will be controlled by 2008.

Treatments
The objective of the management of cheatgrass in the Western Perimeter is to gradually eliminate populations of 2000 square feet or more and to contain populations within the existing areas.

Hand pulling cheatgrass plants in small infestations before seed set would effectively eliminate current seed production, but may not eliminate the infestation. The large seed bank commonly associated with cheatgrass infestations will allow plants to re-establish for several years without noticeable reductions in plant density. Hence, any pulling program must be conducted for several years, or until the seed bank has been exhausted. Also, seeds that blow into the cleared areas from adjacent uncleared areas may negate the effects of pulling. When pulling, an effort should be made to extract as much of the root as possible so that the plant cannot simply regrow and produce new seeds.

A test of the effectiveness of hand pulling should be conducted on the Western Perimeter Tract. If the test is unsuccessful after two years, herbicide treatment should be applied to any population that expands more than 50% over two years.

Combined with a monitoring program, cheatgrass eradication could be part of a school-based environmental stewardship program.

Monitoring

An initial survey of populations on the Western Perimeter should be completed in the spring of 2004. Populations larger than 2000 square feet should be monitored annually for expansion.

Monitoring of populations should be done in early May. Monitoring should include recording the size of large populations and of new populations.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/bromtec.pdf

CHEATGRASS

Plant Code: **BRTE**
Common Name: **Cheatgrass, Downy Brome**
Scientific Name: ***Bromus tectorum***
Family: Graminae

Key Characteristics:

Purplish flowerheads
Feathery, drooping flowerheads
Blooms in early spring

Description: Cheatgrass is an early growning annual that reproduces by seed. It spreads rapidly and outcompetes native grasses for late winter and early spring moisture. When it cures in early summer, it is highly flammable.

In the early spring, cheatgrass has a downy appearence

In early summer, cheatgrass dries and the brown plants are highly flammable.

Cheatgrass flowers droop from the stalk and have long, pointed awns.

Common Name: Common Mullein **Genus and Species: *Verbascum thapsus***
Family: Schorphalaceae **No listing in New Mexico**

Priority: Low

Known Locations in Los Alamos County
North Community, Western Perimeter, Upper Pueblo

Possible Impacts
Effectively competes with native plants to reduce ground cover, increase soil erosion, and alter the species composition of natural communities

Management Objective: Control
Populations of mullein will be reduced by mechanical means wherever possible.

Treatments
Mullein may produce 100,000-180,000 seeds per individual plant. Seeds have no specialized structures for long distance dispersal. The capsule splits open when mature; movement of the stalk by wind or a large animal is required to release the seeds from the parent. Seeds are dispersed as far as 11 m, although 93% of them fall within 5 m of the parent plant Seeds may remain viable for over 100 years, and viable seeds have been found in soil samples archaeologically dated from A.D. 1300.

Manual removal of plants before flowering, the establishment of a dense vegetative cover, and minimizing the availability of bare soil are probably adequate to control mullein.

Control of mullein should initially address populations of more than 10 individuals within an area of 1000 square feet. Smaller populations can be treated on an as discovered basis.

Seedling control will be used to control mullein. Seedlings are best pulled after a rain when the soil is loose. Plants should be pulled as soon as they are large enough to grasp but before they produce seeds. Pulling the rosettes before flowering will prevent the deposition of more seeds into the soil, although there may still be a large dormant seed reserve underground. Treated areas should be monitored the following year.

Monitoring

Monitor in late summer for expansion of known populations. Revisited treated areas in the following year to monitor effectiveness of the treatment.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/verbtha.pdf

Plant Code: **VETH**
Common Name: **Common Mullein**
Scientific Name: ***Verbascum thapsus***
Family: Scrophulariaceae

COMMON MULLEIN

Key Characteristics:

Flowers yellow or white.
Plant tall and robust
Leaves soft, fuzzy

Description: Biennials growing over 6 ft. Stems stout, covered with densely branched, woolly hairs. Stem leaves up to 1.5 ft long, elliptical to elongate, wider near the tip than the basel margins coarsely toothed. Leaves yellow-green, surfaces covered with branched, woolly hairs. Leaves of the first year very large, in a rosette at the base of the plant. Flowers in a dense, spike-like inflorescence. Petals to 1 in wide, stamens with 5 anthers . Found commonly in disturbed areas in the pinyon-juniper woodland and ponderosa pine forest.

The large, soft leaves of mullein feel like flannel. Tiny hairs give the leaves a gray cast. The plant can grow more than 6 feet tall.

Flowers of mullein are densely packed on stout flower stalks.

Common Name: Common Purslane
Family: Portulacaceae

Genus and Species: *Portulaca oleracea*
Not listed in New Mexico but locally invasive in piñon-juniper woodlands

Priority: Low

Known Locations in Los Alamos County
Overlook Park, Grand Canyon Park

Possible Impacts
Effectively competes with native plants to reduce ground cover

Management Objective: Control
Populations of common purslane will not expand beyond their present location and size.

Treatments
Common purslane is locally abundant on open space in White Rock. It is not considered an invasive species in New Mexico, but can cover large portions of natural areas and outcompete native plants.

At present, no aggressive treatment is necessary. Purslane populations should diminish as native ground cover is restored to areas disturbed by drought-induced loss of ground and canopy cover.

Restoration of natural vegetation will include areas of purslane infestation. Native grass and wildflower seed will be sowed in areas of purslane infestation. A mulch or other erosion control methods will be used to stimulate seed germination and sprouting.

If monitoring indicates that purslane populations are increasing by 25 per cent or more per year, treatment may be required. Simple hand pulling or cutting should be the only treatment necessary.

Monitoring

A sample of purslane patches should be measured and monitored for growth rate. Expansion of 25 per cent or more per year may require mechanical treatment.

COMMON PURSLANE

Plant Code: **POOL**
Common Name: **Common Purslane**
Scientific Name: ***Portulaca oleracea***
Family: Portulacaceae

Key Characteristics:

Creeping or lying on the ground
Leaves thick and fleshy, often purple

Description: A smooth, fleshy-stemmed, sprawling plant. Leaves alternate or opposite, thick and fleshy, spoon-shaped. Flowers yellow.

Common purslane forms a mat of fleshy leaves spreading from a central root. In the fall, the leaves turn purple.

Common Name: Dalmatian toadflax **Genus and Species: *Linaria dalmatica***
Yellow toadflax ***Linaria vulgaris***
Family: Schorphalaceae **Listed in New Mexico as Class A**

Priority: High

Known Locations in Los Alamos County
North Community on private land and County Open Space

Possible Impacts
Effectively competes with native plants to reduce ground cover, increase soil erosion, and alter the species composition of natural communities

Management Objective: Eradication
All populations of the genus *Linaria* on Los Alamos County Open Space will be eradicated within three years of detection.

Treatments

A toadflax plant contains up to 25 vertical, floral stems. The taproot may penetrate three feet into the soil. Horizontal roots may grow to be 10 feet long, and can develop adventitious buds that can form independent plants. The species has a tolerance to low temperatures and coarse soils.

Control of Dalmatian toadflax and yellow toadflax should focus on eliminating or greatly reducing seed production from established individuals and on reducing perennial roots. Cutting or removal of the above ground portion of toadflax plants reduces the current year growth, and can eliminate seed production, but will not no affect root reserves and is not recommended for eradication. Pulling toadflax by hand can be effective for small infestations and is recommended in the spring when the soil is moist. This can be particularly effective if the majority of the root system can be removed. Herbicide treatments can be effective, but results have been variable due to high genetic variability among these species. Revegeation is highly recommended as seeds can persist in the seedbank for 10-15 years.

Hand pulling toadflax before seed set each year can be an effective control method. Hand pulling can significantly reduce Dalmatian toadflax populations by pulling once a year as long as new seed is eliminated. This method should be repeated annually for up to ten years to completely remove a stand.

The control program should also be conducted during the month of June. This is when root carbohydrate reserves are at their lowest, which makes it more difficult for the root system to recover. Follow-up work in late June or early July is recommended to locate and remove any late-flowering plants.

Dalmatian or yellow toadflax eradication can make a useful volunteer project. Any such projects should take place in early June just before the plants flower.

Monitoring

Monitoring should be conducted in early June when toadflax plants have formed buds and are beginning to flower.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/linadal.pdf

DALAMATIAN TOADFLAX

Key Characteristics:

Leaves clasp the stem
Flowers over an inch long, blooms in May
Tall, narrow plant

Flowers appear in late May

Description: Dalmatian toadflax, a creeping perennial, grows up to 3 feet tall. It reproduces by seed and aggressive underground rootstocks, which make it difficult to control. Leaves are alternate, waxy, broad-based, and clasp the stem. The two-lipped flowers, borne in axils of upper leaves, are 0.75 to 1.5 inches long and have a characteristic spur. Flower is yellow with an orange, brearded throat-similar in shape to a snapdragon. This plant was historically used in flower gardens and can be found on open space near housing in North Community.

Stems and leaves of Dalmatian toadflax are fibrous and fleshy. The leaves are dense along the stem, and clasp the main stem.

YELLOW TOADFLAX

Plant Code: **LIVU2**
Common Name: **Yellow Toadflax**
Scientific Name: ***Linaria vulgaris***
Family: Scrophulariaceae

Key Characteristics:

Creeping perennial root system
Long, strap-like leaves
Snapdragon-like flower

Description: Yellow toadflax, a creeping perennial, grows 1 to 2 feet tall. It reproduces by seed and underground rootstocds. Stems are smooth with minimal branching. Leaves are narrow, 2.5 or more inches long, nearly opposite, strap-like, and pointed at both ends. Flowers are 1 inch long with a bearded, orange throat. Seed are produced in brown, globe-shaped capsules.

Common Name: Diffuse Knapweed **Genus and Species: *Centaurea diffusa***
Family: Asteraceae **Listed in New Mexico as Class A**

Priority: High

Known Locations in Los Alamos
None on Los Alamos County Open Space, found on Santa Fe National Forest

Possible Impacts
Reduction in native riparian vegetation

Management Objective: Eradication
All populations of diffuse knapweed will be eliminated within one years of detection

Treatments
Aggressive monitoring and quick response to detected populations will control the spread of this species in Los Alamos County. Hand pulling will be the preferred treatment. Revegetation of treated areas will be initiated immediately after treatment.

Certain species can act as vegetative suppressants to diffuse knapweed. Crested wheatgrass (*Agropryon cristatum*) showed high rates of suppression due to the lack of soil moisture available to diffuse knapweed seedlings.

Biological control: If expanding populations of diffuse knapweed are found, the first treatment technique should be hand removal of diffuse knapweed followed by seeding of crested wheatgrass. Continuous monitoring would be required to control the crested wheatgrass. Once the knapweed is eradicated, the crested wheatgrass should be replaced with native grasses.

Ineffective treatment with crested wheatgrass will require herbicide treatment of diffuse knapweed populations.

Monitoring

Continued monitoring for diffuse knapweed should take place during all invasive species surveys. The flowering period for the species is July and August.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/centdif.pdf

DIFFUSE KNAPWEED

Plant Code: **CEDI3**
Common Name: **Diffuse Knapweed**
Scientific Name: ***Centaurea diffusa***
Family: Asteraceae

Listed in New Mexico By: New Mexico State, Santa Fe National Forest
Class A

Key Characteristics:

Flower bracts have a distinct terminal spine
Flowers white to light rose; blooms in July
Diffuse branches
Lower leaves pinnately divided

Description: Diffuse knapweed is a many-branched annual or short-lived simple perennial ranging in height from 1 to 2 feet at maturity. Basal leaves are finely divided; stem leaves are entire and smaller than basal leaves. Flower color ranges from white to rose to purple. Characteristic floral bracts are yellowish green with a light brown, comblike margin. These bracts are tipped with a distinct terminal spine.

Diffuse Knapweed can be one of the most aggressive invasive plants in the area. One reason is its method of seed dispersal: once the seeds are mature, the stem breaks at the base and the plant tumbles across the ground. The species also produces a secondary compound that inhibits the growth of other plants nearby.

Common Name: Field Bindweed **Genus and Species: *Convolvulus arvensis***
Family: Convolvulaceae **Listed in New Mexico as Class C**

Priority: Low

Known Locations in Los Alamos County
Ubiquitous in Los Alamos County; on open space, found on Western Perimeter Tract

Possible Impacts
Reduction of effectiveness of restoration efforts.

Management Objective: Control
All populations of field bindweed on Los Alamos County Open Space greater than 2000 square feet will receive herbicide treatment to suppress growth and expansion of populations.

Treatments
Field bindweed extends a taproot deep into the soil and then forms lateral roots. Roots spread as much as 10 feet from a plant, and have been found at depths of 20 feet.

The deep, penetrating, resilient roots of field bindweed give it the distinction of being classified as the "12th worst weed in the world." Field bindweed resists all management methods and an integrated, long-term management plan is needed for control. Successful methods include mechanical, cultural and herbicidal methods.

Field bindweed is usually confined to landscaped areas and along roadways. Herbicide treatment should be used on all infestations spreading onto County Open Space. Populations exceeding 2000 square feet should be eliminated as soon as they are detected.

Monitoring

Monitor for the presence of field bindweed in June and July.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/convarv.pdf

FIELD BINDWEED

Plant Code: **COAR4**
Common Name: **Field Bindweed**
Scientific Name: ***Convolvulus arvensis***
Family: Convolvulaceae

Listed in New Mexico By: New Mexico State, Santa Fe National Forest
Class C

Key Characteristics:

Prostrate, creeping, perennial
Trumpet-shaped flowers
Alternate, arrowhead-shaped leaves

Description: Field bindweed is a creeping perennial often forming dense mats. It reproduces by seed and a root system that penetrates to a depth of 10 feet with extensive lateral branching. Stems are prostrate or climbing. Leaves are alternate and arrowhead-shaped, with basal lobes that are blunt. Flowers are white to pinkish, brone in leaf axils, and trumpet-shaped with two small bracts below the flower. Seeds are hard, triangular, and borne in a four-seeded capsule. Seeds remain viable in the soil for up to 50 years.

Common Name: Jointed goatgrass **Genus and Species: *Aegilops cylindrica***
Family: Graminae **Listed in New Mexico as Class C**

Priority: Low

Known Locations in Los Alamos County
Pajarito Canyon below Sherwood Boulevard

Possible Impacts
Increase in fire danger, reduction of stream flows

Management Objective: Control
Populations of jointed goatgrass will not expand beyond their known boundaries.

Treatment

Dense stands of jointed goatgrass can be treated mechanically if they expand more than 25 percent in area over two years and if they pose a fire threat to adjacent areas.

Mowing jointed goatgrass just before the seeds mature in July is the most effective treatment and will be employed on expanding populations.

Monitoring

Known populations should be monitored in early June for expansion.

Reference

http://w3.uwyo.edu/~chrisbo/

JOINTED GOATGRASS

Plant Code: **AECY**
Common Name: **Jointed Goatgrass**
Scientific Name: ***Aegilops cylindrica***
Family: Graminae

Key Characteristics:

Hairs on the leaf blade and sheath
Jointed, segmented fruiting structure (spike)

Description: A winter annual grass reaching heights of 15 to 30 inches. Plants produce one to many erect stems (tillers). Leaves have evenly spaced, fine hairs along the leaf edge and down the sheath opening. Auricles are short and hairy with a short, membranous ligule. The flowering protion (spike) is slender with a series of stacked joints. The uppermost segments have a characteristic awn. These joints (spikelets) contain 1 to 3 viable seeds. At maturity the joints separate. Jointed goatgrass is closley related to wheat, so they can interbreed. Interbreeding makes this weed difficult to distinguish from wheat until spikes appear.

Common Name: Musk thistle **Genus and Species: *Carduus nutans***
Family: Asteracae **Listed in New Mexico as Class B**

Priority: High

Known Locations in Los Alamos County
Along East Road

Possible Impacts

Displacement of native species

Management Objective: Eradication
All populations of musk thistle will be eliminated within one year of detection.

Treatment

In northern New Mexico, musk thistle is usually confined to disturbed areas along roadside, in construction areas, and in burned areas. Only a few small populations have been identified in Los Alamos County. These populations should be mechanically treated in late June, just before the flower heads go to seed.

Because musk thistle is found in small and scattered populations, all known occurrences should be eradicated in June to permit positive identification.

Treatment methods are the same as with bull thistle.

Monitoring

Musk thistle populations should be identified as quickly as possible. Monitoring for new populations is easiest in June when the flower heads provide easy identification. All treated musk thistle populations should be monitored the following June to ensure the effectiveness of treatment.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/cardnut.pdf

MUSK THISTLE

Plant Code: **CANU4**
Common Name: **Musk Thistle**
Scientific Name: ***Carduus nutans***
Family: Asteracae

Listed in New Mexico By: New Mexico State, Santa Fe National Forest
Class B

Key Characteristics:

Rosette of basal leaves up to 3 to 4 feet in diameter.
Large, "powder puff" flower head that droops or nods.
Lack of small hairs on the leaves
Up to eight feet tall
Leaves often extend down the stalk as wings

Description: Musk thistle is a biennial plant that can act as an annual. It has a thick taproot. The plant is capable of growing up to 8 ft tall. Rosette leaves are dark green with a light green midrib, spiny margin, and deep lobes. Stem leaves extend beyond the stem, moving down and give the appearance of a winged stem. Flower heads-made up of deep rose, violet, purple, or white flowers- are 1.5 to 3.0 inches in diameter and borne on stem tips, which often nod. These flower heads are subtended by broad-based bracts that have a short spine at the tip. Seed has a papus to aid in dispersal.

Common Name: Russian knapweed **Genus and Species: *Acroptilon repens***
Family: Asteracae **Listed in New Mexico as Class B**

Priority: High

Known Locations in Los Alamos County
Along 33rd Street, in White Rock

Possible Impacts
Decrease in native vegetation

Management Objective: Eradication
All populations of Russian knapweed will be eradicated within three years of detection.

Treatment

The roots of *Acroptilon repens* can extend more than 20 feet below the soil surface with 10 feet of growth occurring the first year. The roots are easily recognizable by their black or dark brown color and presence of small alternately arranged, scale leaves which support buds in their axils. These buds develop into adventitious shoots, enabling the plant to spread rapidly, and form dense colonies.

The most effective method of control for Russian knapweed is to prevent its establishment through proper land management. The healthier the natural community, the less susceptible it will be to Russian knapweed invasion. Areas near infestations will be given priority for restoration projects.

Pulling, cutting, and discing can be used to control and reduce an infestation, but used alone will not permanently eliminate a stand of Russian knapweed. Aggressive monitoring, followed by a combination of mechanical, herbicide, and biological control, is needed to remove an infestation.

The first treatment of a small population of Russian knapweed will be by mechanical means. The plant will be pulled, then the soil disced or otherwise broken. The site will be monitored the following year and if mechanical treatment was not successful, herbicide treatment will be required.

While small infestations can be effectively eradicated by nonherbicidal methods, herbicides are the most effective and cost efficient method to manage this plant. Several selective herbicides will give 2-3 yrs of near 100% control, while not harming many native species (mostly grasses)

Monitoring

Areas should be monitored three times a year (spring, summer, and fall) and all plants should be destroyed immediately. Since Russian knapweed is so persistent, it is important to kill all of the plants in the targeted area.

Treated area will be monitored for two years to ensure the effectiveness of treatment. This should be done in mid-May.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/acrorep.pdf

RUSSIAN KNAPWEED

Plant Code: **ACRE3**
Common Name: **Russian Knapweed**
Scientific Name: ***Acroptilon repens***
Family: Asteraceae

Listed in New Mexico By: New Mexico State, Santa Fe National Forest
Class: B

Key Characteristics:

Perennial with deep-penetrating, black roots (to 25 feet deep).
Spidery lavender flowers bloom in July
Upper leaves linear, lower leaves may be lobed
Branches thick, tightly packed

Description: Creeping perennial forming dense colonies as a result of buds from its black, spreading roots. It can reach a height of 4 feet. Lower leaves range from entire to lobed. Upper leaves are smaller, entire, and attached directly to the stem.
Cone-shaped, pink to lavender flower heads are borne at the end of leafy branches. Floral bracts are smooth, and papery with a rounded or pointed margin.

Common Name: Russian Olive **Genus and Species: Elaeagnus angustifolia**
Family: Elaeagnaceae **Listed in New Mexico as Class B**

Priority: High

Known Locations in Los Alamos County
Ubiquitous in Los Alamos County

Possible Impacts
Reduction in native riparian vegetation, reduction in flow in stream channels, reduction in wildlife habitat

Management Objective: Contain
Populations of Russian Olive will be eliminated within 100 feet of stream channels and the populations will be contained within their detected boundaries.

Treatments

Large mature stands of Russian Olive are nearly impossible to eradicate, so the early detection and rapid response to treat newly detected populations is important. Small patches can be adequately controlled using a variety of control methods. All control techniques used to manage Russian Olive are labor-intensive and expensive, especially in the first year. Mowing, cutting, burning, excavation, spraying, girdling, and bulldozing have all been used to varying degrees of success. Successful long-term control requires that all sites to be continually monitored.

Seedlings and sprouts of Russian Olive can easily be hand-pulled when the soil is moist. Saplings with a trunk diameter less than 3.5 inches can be pulled sufficiently with a weed wrench. Pulling or digging out larger plants is both extremely labor-intensive and not recommended, since it can leave behind root fragments that can resprout. Monitoring parties should hand pull small trees as they can.

Once it becomes firmly established, the most effective control method is the cut-stump herbicide treatment. This method is highly effective. An easier but effective treatment is the basal bark application. This method applies a 6 to 12 inch band of herbicide around the circumference of the trunk approximately one foot above ground. The width of the sprayed band depends on the size of the plant. Ester formulations are usually best for basal bark treatments, as esters can pass most readily through the bark. Esters can be highly volatile, however, so basal bark treatments should be performed only on calm, cool days. During summer, treatment is best carried out in the mornings, which tend to be cooler.

Cut-stump treatment or basal bark treatment should be applied to all mature individuals growing within 100 feet of major canyon, arroyos, or first-order drainages from Pueblo, Los Alamos, and Rendija Canyons. A prioritization plan should be developed to rank drainage areas for treatment. Since Russian Olive is an active and effective colonizer of disturbed ground, priority should be given to burned and fuel mitigation project areas near Pueblo and Rendija drainages.

Monitoring

Stream channels should be monitored annually for encroachment of Russian Olive. Monitoring should take place in September or October.

Control areas should be monitored twice a year to permit regular seedling and sprout treatment.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/elaeang.pdf

RUSSIAN OLIVE

Plant Code: **ELAN**
Common Name: **Russian Olive**
Scientific Name: ***Elaeagnus angustifolia***
Family: Elaeagnaceae

Listed in New Mexico By: New Mexico State, Santa Fe National Forest
Class B

Key Characteristics:

Leafstalk rounded
Old wood stems thorny
Leaves long and narrow, underside silvery
Fruit silvery

Russian Olive is common in riparian areas, but also invades any wet area.

Description: Tree to 25 ft tall. Leaves narrow, with silver dots on the underside. Flowers pale yellow, bell-shaped, strong-smelling. Fruit short-stemmed, spherical, silvery. Found along watercourses, windbreaks, and at the boundaries of housing areas.

Although the fruit is eaten by many speices of birds, they are low in nutrition.

Russian Olive has gray, narrow leaves that give the tree a smoky appearance.

Common Name: Saltcedar **Genus and Species: *Tamarix spp.***
Family: Tamaricaceae **Listed in New Mexico as Class C**

Priority: High

Known Locations in Los Alamos County
Private land, Woodland Canyon, lower Pueblo Canyon

Possible Impacts
Decrease in native vegetation, decrease in water flows, and reduction of wildlife habitat

Management Objective: Control
All populations of saltcedar on Los Alamos County Open Space will be reduced through 2007. The management objective is control of the spread of saltcedar, but if possible, the species should be eradicated within the County.

Treatment

Saltcedar poses an aggressive threat to the riparian areas in Los Alamos County, particularly Los Alamos, Pueblo, Bayo, and Rendija Canyons and their tributaries. It is commonly controlled in riparian areas and wetlands because of its potential to displace native vegetation and lower value as wildlife habitat.

Established trees are difficult to remove. For small populations like those found in Los Alamos County, the cut-stump and herbicide method is the most effective. The basal bark treatment is also an effective technique.

Saltcedar individuals and populations will be carefully mapped. Aggressive treatment will take place within one canyon per year. All saltcedars and saltcedar populations below five individuals will be treated with the cut-stump and herbicide method. If larger populations are discovered, treatment will be incremental until the population is controlled.

Monitoring

Invasive monitoring of saltcedar will produce a complete map by September 2005.

Treated areas will be monitored for two years after treatment to ensure the effectiveness of control.

Reference

http://tncweeds.ucdavis.edu/esadocs/documnts/tamaram.pdf

SALTCEDAR

Plant Code: **TARA**
Common Name: **Saltcedar, Tamarix**
Scientific Name: ***Tamarix ramosissima***
Family: Tamaricaceae

Key Characteristics:

Clusters of pink flowers at ends of branches in spring and summer
Branches delicate, wiry, drooping

Description: Small tree or shrub to 20 feet, with scale-like leaves which fall in the winter. Branches upright, spreading. Leaves blue-green. Considered a woody phreatophyte, it competes with and replaces native vegetation along water-holding areas and rivers. Found along the banks of the Rio Grande and many other drainages throughout New Mexico.

Common Name: Siberian Elm **Genus and Species: Ulmus pumila**
Family: Ulmaceae **Listed as Class C in New Mexico**

Priority: Low

Known Locations in Los Alamos County
Ubiquitous in Los Alamos County

Possible Impacts
Reduction in native riparian vegetation, reduction in flow in stream channels, reduction in wildlife habitat

Management Objective: Contain
Siberian elm populations will be prevented from expanding on Los Alamos County Open Space.

Treatments

Siberian elm is a prolific seeder that also boasts a high germination rate. It produces a deep taproot that can send up adventitious shoots when cut. Also, the tree grows quickly and provides ample shade. Thus it is a common ornamental tree in Los Alamos County and is difficult to control.

The management objective for Siberian elm is to attempt to prevent its spread to new areas.

Monitoring

Monitoring for Siberian elm should be concentrated along riparian areas.

Reference

NRCS Plant Fact Sheet, Siberian Elm

SIBERIAN ELM

Plant Code: **ULPU**
Common Name: **Siberian Elm**
Scientific Name: ***Ulnus pumila***
Family: Ulmaceae

Key Characteristics:

Oval leaves with distinct parallel veins
Deciduous trees
Spreading branches point upward
Diamond pattern on bark

Description: Tree to 25 ft tall. Leaves are small, oval, and have prominent parallel veins. The tree is often as wide as it is tall. Leaves are dropped in the fall. A prolific seeder with a high seed germination rate. Can form thickets with thousands of trees.

Siberian elm leaves have prominent parallel veins.

Common Name: Skeletonleaf bursage **Genus and Species: *Ambrosia tomentosa***
Family: Asteraceae **Not listed in New Mexico but locally invasive**

Priority: Low

Known Locations in Los Alamos County
Ubiquitous in Los Alamos County

Possible Impacts
Decrease in native vegetation

Management Objective: Contain

Treatment

Skeletonleaf bursage is state-listed throughout the West, but not in New Mexico. However, the populations in Los Alamos are expanding and the plant is now found in many locations. Most of the populations are located along roads and on disturbed ground.

Populations will be monitored for expansion into open space. If detected early, skeletonleaf bursage populations will be treated mechanically by removing the plants and discing or breaking up the soil by other means. Effective control is by herbicide treatment. Populations of one-tenth an acre or more may be treated with herbicide.

Monitoring

Monitoring for populations of skeletonleaf bursage should take place in spring. Populations located more than 25 feet from a roadway should be measured for size. Any population that expands more than 25 percent over two years should be treated.

Reference

SKELETONLEAF BURSAGE

Plant Code: **AMTO3**
Common Name: **Skeletonleaf Bursage**
Scientific Name: ***Ambrosia tomentosa***
Family: Asteraceae

Key Characteristics:

Leaves divided, smooth and green above, hairy below
Terminal flower spike with round clusters of flowers

Description: Skeletonleaf Bursage is a perennial averaging about 6 inches in height. The leaves are much divided, green above and the lower surface covered with white hairs. Flowers are inconspicuous and yellow; flowers come in terminal clusters on a single spike. The fruit is a light brown bur with conical spines. The extensive horizontal root system makes it difficult to eradicate.