



Dead Russian knapweed, San Antonio, New Mexico, June 2000

## Socorro County's Integrated Weed Management Plan for the Control and Management of Invasive/Noxious Weeds

Socorro County Noxious Weed Committee  
Socorro Soil & Water Conservation District  
Sevilleta National Wildlife Refuge

## I. Purpose of and Need for Action

Several invasive non-native plant species have infested Socorro County. They are displacing native plant species primarily in our riparian areas. In order to minimize the negative impacts of these invasive species and to prevent the establishment of other invasive, non-native species, Federal, State, and local government agencies along with private individuals have developed an Integrated Weed Management Plan (IWM). The purpose of this action is to prevent the invasion and establishment of aggressive, non-native plant species within our County and to manage the existing invasive plant populations.

Russian knapweed, Salt cedar, Perennial pepperweed, African rue, Camel thorn, Parrot feather, Yellow starthistle, Russian olive, Yellow toadflax, Siberian elm, and Tree of Heaven are the principal invasive plant targets of this IWM. The presence of these invasive species undermines efforts in our County to manage the land and promote agriculture. These non-native plants compete with native species for very limited resources, degrade native habitats and disrupt natural processes. Without organized pest control, populations of non-native plant species will continue to increase within our County.

This action is needed to protect not only Federal and State land, but also the interests of the farmers, ranchers, and other landowners. Controlling invasive plant species within Socorro County will minimize the spread of these species onto adjacent and downstream landowners where the degradation of land values, the increase in fire hazard, a reduction in crop yields, the lowering of forage values, and the poisoning of livestock will also be reduced with our control efforts.

## II. Integrated Weed Management with Herbicide

Socorro County has adopted a comprehensive invasive plant strategy known as Integrated Weed Management that combines education and

prevention with control and management. It takes advantage of a full range of treatment options such as physical, mechanical, chemical and biological. This integrated approach involves a preliminary inventory of the nature and extent of the infestations, prevention, early detection and control of new outbreaks, species and site specific treatment, monitoring and follow-up treatment, public education, and cooperation and coordination among all land owning entities.

**Physical Treatment:** this would involve hand pulling, digging, and the cut-stump treatment. Infestations of various thistles listed on the Socorro County Noxious Weed List such as Bull thistle, Musk thistle, and Yellow starthistle would be candidates for pulling and digging. Salt cedar, Russian olive, Siberian elm, and Tree of Heaven are currently being treated with the cut-stump method. This involves taking the tree out with a chainsaw and treating the stump with the herbicide Garlon (3A or 4). This method is actually physical and chemical treatment.

**Mechanical Treatment:** this would involve mowing, root plowing, and disking. The majority of species can be treated with this method; however, the Socorro County Noxious Weed Committee has several recommendations on timing of this. Mowing while the invasive plant species is in full seed is ill advised, as it will only spread the seed. Prior to flowering and seeding will stress the root reserves of these plants and aid in control. Many areas within our County are in areas where chemical treatment may not be an option or the area requires maintenance such as mowing. The goal with mechanical treatment is to coordinate the timing of mowing with all agencies and landowners and education on the importance of cleaning of all machinery before leaving the infested area.

Brand Name	Manufacturer	Active Ingredient	Chemical Family	Site of Action
Arsenal	American Cyanamid	isopropylamine salt of imazapyr (28%)	imidazolinones	acetolactate synthase inhibitor (disrupts protein synthesis)
Escort	DuPont	metsulfuron methyl (60%)	sulfonylureas	acetolactate synthase inhibitor (disrupts protein synthesis)
Garlon 4	Dow Elanco	triclopyr (61.6%)	pyridines	synthetic auxin (inhibits growth)
Garlon 3A	Dow AgroSciences	triclopyr (44.4%)	pyridines	synthetic auxin (inhibits growth)
Plateau	American Cyanamid	ammonium salt of imazapic (23.6%)	imidazolinones	acetolactate synthase inhibitor (disrupts protein synthesis)
Rodeo	Monsanto	glyphosate (53.8%)	glyphosate	EPSP synthase inhibitor (disrupts protein synthesis)
Roundup Ultra	Monsanto	glyphosate (41%)	glyphosate	EPSP synthase inhibitor (disrupts protein synthesis)
Tordon 22K	Dow Elanco	picloram (24.4%)	pyridines	synthetic auxin (inhibits growth)
Weedar 64	Rhone-Poulenc	2, 4-D dimethylamine (46.8%)	phenoxy acetic acids	synthetic auxin (inhibits growth)

References:

Chemical Fact Sheets of imazapyr and picloram, on the web at [pmep.cce.cornell.edu/profiles](http://pmep.cce.cornell.edu/profiles)

The e-Pesticide Manual, The British Crop Protection Council, on the web at [www.bcpc.org/epesticide/manual/page\\_q2.html](http://www.bcpc.org/epesticide/manual/page_q2.html)

Pesticide Information Profiles, EXTOTOXNET, on the web at [ace.orst.edu/cgi-bin/mfs/01/pips](http://ace.orst.edu/cgi-bin/mfs/01/pips)

Herbicide Labels and Material Safety Data Sheets

Brand Name	Description	Invasive Species Controlled	Resistant Weeds
Arsenal	nonselective, systemic herbicide, absorbed by foliage and roots and rapidly translocated, for pre- and post-emergence control of annual and perennial grasses, sedges, broadleaf weeds, and woody plants	pepperweed, bull thistle, camelthorn, yellow starthistle, Russian knapweed, elm, Russian olive, Salt cedar, others	kochia
Escort	selective, systemic herbicide, absorbed by foliage and roots and rapidly translocated, for pre- and post-emergence control of annual and perennial broadleaf plants	perennial pepperweed, bull thistle, elm, others	kochia, Russian thistle
Garlon 4	selective, systemic herbicide, rapidly absorbed by foliage and roots and translocated throughout the plant, for control of broadleaf weeds and woody plants	bull thistle, elm, Salt cedar, tree of heaven, others	yellow starthistle
Garlon 3A	selective, systemic herbicide, rapidly absorbed by foliage and roots and translocated throughout the plant, for control of broadleaf weeds and woody plants	Canada thistle, elm, field bindweed, kudzu	Yellow starthistle
Plateau	nonselective, systemic herbicide, absorbed by foliage and rapidly translocated, for pre- and post-emergence control of annual and perennial grasses, sedges, broadleaf weeds, and woody plants	bull thistle, Russian knapweed, perennial pepperweed, yellow starthistle, others	
Rodeo	nonselective, systemic herbicide, absorbed by foliage and rapidly translocated, for post-emergence control of annual and perennial grasses, sedges, broadleaf weeds, and woody plants	Russian knapweed, perennial pepperweed, yellow starthistle, elm, Russian olive, Salt cedar, others	
Roundup Ultra	nonselective, systemic herbicide, absorbed by foliage and rapidly translocated, for post-emergence control of annual and perennial grasses, sedges, broadleaf weeds, and woody plants	knapweeds, yellow starthistle, elm, Russian olive, Salt cedar, others	
Tordon 22K	selective, systemic herbicide, for post-emergence control of broadleaf weeds and woody plants	Russian knapweed, camelthorn, yellow starthistle, bull thistle, yellow toadflax, others	yellow starthistle
Weedar 64	Selective, systemic herbicide, absorbed by roots and/or foliage, for post-emergence control of annual and perennial broadleaf weeds, also aquatic broadleaf weeds	bull thistle, milfoil, others	Musk and Canada thistles

Brand Name	Recommended Application Rate	Aquatic Label	Surfactant
Arsenal	2-3 pints/acre – pepperweeds 3-4 pints/acre – bull thistle, camelthorn, yellow starthistle 4-6 pints/acre – Russian knapweed, elm, Russian olive, Salt cedar	no	Nonionic, seed or vegetable oils, silicone-based, or fertilizer/surfactant blends
Escort	1 ounce/acre – perennial pepperweed 1-3 ounces/acre – bull thistle, elm	no	nonionic, for post-emergent vegetation
Garlon 4	1-4 quarts/acre – broadleaf weeds 4-8 quarts/acre – woody species ( up to 100% conc. for cut stumps)	no	recommended for best results when spraying
Garlon 3A	½ - 1 gallon/acre – woody species 1/3 - 1 ½ gallons/acre – broadleaf weeds 3-4 pints/acre – field bindweed, Canada thistle	no	nonionic, agricultural surfactant
Plateau	8-12 ounces/acre – Russian knapweed, perennial pepperweed, yellow starthistle, bull thistle	no	methylated seed oils or vegetable oils, nonionic, silicon-based, or fertilizer/surfactant blends
Rodeo	4.5 - 7.5 pints/acre – Russian knapweed, perennial pepperweed, yellow starthistle 3-7.5 pints/acre – elm, Russian olive 6-7.5 pints/acre – Salt cedar (up to 100% conc. for cut stumps)	yes	nonionic
Roundup Ultra	2 quarts/acre – yellow starthistle 4 quarts/acre – knapweeds 2-5 quarts/acre – elm, Russian olive, Salt cedar	no	not recommended
Tordon 22K	0.5 pint/acre – bull thistle 1-2 pints/acre – yellow starthistle 2-3 quarts/acre – Russian knapweed 3-4 quarts/acre – yellow toadflax	no	not recommended
Weedar 64	0.6 - 2 quarts/acre – perennial pepperweed 1-3 quarts/acre – “general weed control” 2-3 quarts/acre – woody species	no	not recommended

Brand Name	Solubility (H <sub>2</sub> O, 25C)/Mobility	Persistence	Bioaccumulation
Arsenal	11.3 g/l <i>"moderate leaching potential"</i>	residual soil activity 6 months – 2 years in temperate climates	excretion half life less than one day in rats; very low potential to bioaccumulate
Escort	1.75 g/l at pH 5.4, <i>"dispersible"</i> 213 g/l at pH 9.0 <i>"higher mobility in alkaline soils than in acidic soils"</i>	half life about 30 days, up to 180 days, in soil; very dependent on soil moisture, pH, temperature	excreted mostly in unaltered form in mammals (excretion half life of about 1 day in rats); no bioaccumulation in fish
Garlon 4	0.44 g/l <i>"not strongly adsorbed to soil particles and has the potential to be mobile"</i>	half life about 46 days, up to 90 days, in soil Half life 3-14 hours in water	Excretion half life of 0.5 to 1 day in dogs and monkeys, respectively; very low bioconcentrations in aquatic organisms
Garlon 3A			
Plateau	<i>"miscible"</i>		
Rodeo	12.0 g/l, <i>"completely miscible: filed and laboratory studies show it does not leach appreciably"</i>	half life about 50 days, up to 174 days, in soil half life up to 10 weeks in pond water	insignificant potential to bioaccumulate
Roundup Ultra	12.0 g/l, <i>"completely miscible: filed and laboratory studies show it does not leach appreciably"</i>	half life about 50 days, up to 174 days, in soil half life up to 10 weeks in pond water	insignificant potential to bioaccumulate
Tordon 22K	0.42 g/l, <i>"miscible"</i> <i>"persistent and mobile...high potential to reach groundwater"</i>	half life about 90 days, up to 300 days, in soil half life 2.6 days in water	Excreted unchanged from human volunteers (excretion half life of about 1 day); low bioconcentration in aquatic organisms
Weedar 64	0.9 g/l, <i>"complete"</i> <i>"rapid degradation...prevents significant downward movement under normal conditions"</i>	half life <7 days in soil half life 1 to several weeks in oxygenated aquatic environments	excretion half life of 0.5 to 1 day in organisms; no evidence of bioaccumulation



### III. Inventory

In recent years, Socorro County has experienced a rise in non-native plant species invading natural areas and often out-competing native plant species. Within our County, these species are found along roadways, ditch banks, the Rio Grande, tributaries, in wetlands, and around upland seeps and springs. These non-native species have less value to wildlife and consume more water than native species, and their proliferation is adversely affecting wildlife habitat, nesting and feeding grounds, waterways, farm and ranch lands, and overall land quality within our County.

The hardest challenge facing the Socorro Noxious Weed Committee is determining the best management techniques for each non-native species in each particular environment. Many studies have been conducted in order to determine the best control methods for certain species. However, whether or not that will work in our soil types, growing seasons, climate, or riparian areas has yet to be determined. Active testing and monitoring is already underway in our County to determine which methods are the most effective at controlling these invasive species.

Our inventory began in March of 2000. Mapping is being done with a Trimble GPS unit. The data collected is placed in Arc info at the BLM Socorro Field Office. The data includes UTM coordinates, vegetative code, associated vegetation, associated land use, percent cover, and area covered. Hard copies of the field data sheets are also housed at the BLM office. Approximately seventy percent of the County's disturbed sites have been surveyed for the presence of noxious weeds. The remainder will be completed in the year 2001. Maps are available upon request from the Socorro Noxious Weed Committee.

### IV. Target Invasive Plant Species for Eradication

A. Russian knapweed (*Acroptilon repens*)

Russian knapweed is a member of the sunflower family. It is a perennial herbaceous plant native to Eurasia. It emerges early in the spring, grows in dense colonies up to three feet tall, and produces pink to lavender cone-shaped flowers throughout the summer months and into the fall. It sets seed but primarily spreads with its distinctive black roots and it dominates its competition by exuding an allelopathic chemical that inhibits the root growth of other plant species. Our primary concern with this noxious weed is the fact that it causes chewing disease (equine nigropallidal encephalomalacia) in horses, and cattle avoid its bitter taste. The primary crop in Socorro County is alfalfa, so it is of extreme importance to keep this noxious weed from spreading into the alfalfa fields.

#### B. Camel thorn (*Alhagi pseudalhagi*)

Camel thorn is a member of the pea family. It is native to the Turanian Desert and Iranian Plateau of Asia. This aggressive and highly adaptive plant establishes in arid environments as well as moist areas such as irrigation canals. It can survive in saline soils and has been known to sprout through several inches of pavement, and foundations of houses.

Camel thorn grows to be 1.5 to 4 feet tall, with small wedge-shaped leaves and 0.25 to 1.5 inch thorns. Flowers are small, pink to maroon, and develop red seedpods. Protected by a tough coat, seeds may remain dormant for years. Camel thorn reproduces by seed and by root fragmentation and spreading rhizomes. Its taproot can penetrate down to 50 feet and widely branching roots and rhizomes spread laterally from it.

Camel thorn has been found in Socorro County on Highway 380 near mile marker 21, in a 5-acre plot just north of Bosque del Apache National Wildlife Refuge, and approximately one-acre infestation just north of the Ladd S. Gordon Waterfowl Complex, Bernardo Unit.

This plant is of extreme importance to eradicate. Under no circumstances can we allow it to progress into the Refuges. It has also been found in Albuquerque near the Alameda drain near Second Street and infests approximately 500 ft<sup>2</sup>.

C. African Rue (*Peganum harmala*)

African rue is a perennial herb indigenous to the deserts of North Africa. It can grow up to two feet tall and is equipped with a woody root system that is dark brown to black in color. Its leaves and seeds are toxic to livestock. Humans are also using it as a drug and since there is no regulatory law on this weed, law enforcement has no grounds to arrest those that use and transport it. It can also be lethal to humans. There is a large infestation of this weed on the White Sands Missile Range. It has been found and eradicated on Highway 380 near mile marker 7.

D. Yellow toadflax (*Linaria vulgaris*)

Yellow toadflax is better known as butter-n-eggs and has been widely sold due to its beautiful flowers. It is however, a competitive herbaceous perennial from Europe. Yellow toadflax emerges early in the spring and can grow up to two feet tall with roots up to three feet. This species reproduces by vegetative root buds and by small, winged seeds that can remain dormant in soil for up to ten years. The current infestation is limited to the Unit 7 drain in northern Socorro County.

E. Bull thistle (*Cirsium vulgare*)

Bull thistle is a competitive biennial thistle indigenous to Eurasia and a member of the sunflower family. Bull thistle forms a rosette of deeply lobed, prickly leaves in the first year of its life cycle, then grows two to five feet tall. It produces purple flowers in the summer of its second year. It has a shallow taproot and reproduces by seeds, which disperse

by water, animals, human activity, and sometimes wind. Most bull thistle seeds are deposited close to the parent plant. This makes this weed much easier to manage and eradicate. The current infestation in Socorro County is on the La Joya unit of the Gordon S. Ladd Refuge.

#### F. Yellow starthistle (*Centaurea stolonifera*)

Yellow starthistle is an annual member of the sunflower family and rapidly colonizes disturbed areas across the West. It has been a most devastating invader in the state of California. It is a European native and successfully establishes in dry, sunny areas such as roadsides, rangelands, agricultural fields, pastures, and waste areas. Its seeds are frequent contaminants of grass seed and hay. It also causes chewing disease in horses.

Yellow starthistle shoots reach two to three feet and branch out from the rosette, while a taproot penetrates down three feet or more. Plants allocate a majority of their resources to root growth. Deeply lobed basal leaves and small, narrow upper leaves are covered with cottony fuzz. The thistle-like flowers are yellow and encircled by 0.75-inch thorns around the base. Plants are prolific seed producers, and seeds can remain viable for more than three years. To date this weed has not been located in Socorro County, but it is a weed that we are aggressively looking for in order to prevent it taking a foothold in our County.

#### G. Malta starthistle (*Centaurea melitensis* L.)

Malta starthistle is an annual member of the sunflower family. It is an introduced species from Europe and can grow on various soil types. It is usually seen on roadsides. It has smaller seed heads than Yellow starthistle. Leaves are evenly covered with thick stiff hairs and minute resinous dots. The taproot does not penetrate the soil as deeply as

the Yellow starthistle. Seed production is highly variable. Plants can produce 1-60 or more seeds per head and 1-100 heads or more per plant. Seedlings are especially resistant to the effects of fall drought.

A forty-foot patch of this invasive weed was found in June of 2001. It was treated with herbicide by the NM State Highway & Transportation Department. The plants were then dug up and the seedpods were picked up from the ground. The plants were bagged and delivered to the BLM Fire Crew for burning. This patch of Malta starthistle will continue to be monitored and eradicated as new plants emerge.

## V. Target Invasive Plant Species for Management

### A. Parrot feather (*Myriophyllum aquaticum*)

Parrot feather is an invasive aquatic perennial native to the Amazon River in South America. A popular planting in aquaria and water gardens, it escaped cultivation and infests fresh water lakes, ponds, streams, and canals across the southern and coastal United States. The plant grows rooted in shallow areas, floats in deeper water, and can survive on wet banks. It prefers slow moving water to rapid currents.

Emergent and submersed feather-like leaves grow 0.5 to 2 inches in whorls of 4-6. Stems may protrude up to a foot above the water surface. The high tannin content of its leaves discourages grazing, and their waxy cuticle makes herbicidal control difficult.

Parrot feather infests at least one drainage ditch in the Unit A wetland area on Sevilleta NWR, at least one drainage ditch in Lemitar, the drainage ditches on Bosque del Apache, and the Low Flow Channel on Bureau of Reclamation property near a high quality wetland in the San Marcial area. Management in the past has involved raking it out

of the ditches. This method is effective, however, it is impossible to remove all of the root system and must therefore be done regularly.

## B. Perennial pepperweed (*Lepidium latifolium*)

Perennial pepperweed, commonly known as tall whitetop, is a creeping perennial herb native to Europe. It is part of the mustard family and can grow up to six feet tall. Long, perennial roots and waxy leaves make this plant difficult to control. Pepperweed is often one of the first plant species to appear in the spring; white flower clusters emerge in late spring, plants flower and fruit through most of the summer, and dormancy sets in by early autumn. Seed production is prolific, but seed viability in the field appears to be short lived, and pepperweed also spreads through its creeping root system.

Perennial pepperweed invades a wide range of habitats, preferring wet areas but also establishing successfully on roadsides, rangeland, and agricultural fields. It grows in dense, monotypic stands that can take over large swaths of land and exclude native plant species. Dead stems can persist for several years, shading out native seedlings and impeding grazing and waterfowl nesting. It is a fairly salt-tolerant weed and can mine salt ions deep in the soil profile and deposit them near the surface, making infested soils more saline. Perennial pepperweed is classified as a "Class B" invasive species in Socorro County.

Perennial pepperweed is found in many areas of New Mexico, but it is highly concentrated in the Middle Rio Grande Valley. In Socorro County, pepperweed lines ditch banks and other wet areas. If pepperweed on northern lands is not managed, seeds and root sections will wash downstream and colonize restored areas such as those on Sevilleta NWR and other lands that do not have an infestation at this

time. Pepperweed at this time is still controllable, but only if we begin managing the infestations immediately. Controlling the spread of perennial pepperweed is a top priority of this plan.

### C. Salt cedar (*Tamarix sp*)

Salt cedar is a Eurasian woody plant species that is adapted to living in the altered riparian areas of the western United States. It is an aggressive species that crowds out and replaces native cottonwood, willow, and mesquite, especially in regions of human disturbance. Salt cedar can reach over 15 feet in height, can flower throughout the growing season, and produces copious small seeds that disperse by wind and water. Seeds germinate rapidly, but seedlings grow more slowly than some native plant species and require saturated soil to establish. Mature plants are sensitive to shade.

Once established, Salt cedar transforms its environment, making it inhospitable for many natives. Salt cedar generally consumes more water than native plant species and can dry out springs, seeps, wetlands, and riparian areas. It may lower the surface water table beneath the reach of cottonwood and willow trees. It is salt-tolerant and concentrates salt in its leaves, which fall as litter and decompose, increasing surface soil salinity and consequently inhibiting colonization by native plants.

Human manipulation of the Rio Grande has created ideal conditions for the establishment and spread of Salt cedar. It is pervasive on stretches of the Rio Grande, Rio Salado, and Rio Puerco. Current Salt cedar treatment is under way. It is done under the direction of the Save Our Bosque Task Force. The cut stump method is being

employed with the use of Garlon 4 and Garlon 3A. Project manager is Doug Boykin with State Forestry.

#### D. Russian olive (*Elaeagnus angustifolia*)

Often growing in clusters in and around stands of Salt cedar, Russian olive is a fast-growing woody plant species from southern Europe and western Asia that generally invades riparian and wetland areas.

Russian olive grows to be 10 to 30 feet tall, is fortified with 1- to 2-inch thorns, and produces large numbers of olive-shaped fruits, which have wildlife value. This invasive plant shades out native species, and along with Salt cedar, it threatens native cottonwood and willow recruitment in our Bosque area. It fixes nitrogen in its roots, so it can establish on nitrogen-poor, mineral soils.

Russian olive mainly reproduces by seeds, which are dispersed by birds that eat the fruit. The seedlings are shade-tolerant. It is a nonnative that is widespread throughout New Mexico and requires long-term management and control. This tree is also being managed in the same manner as the Salt cedar.

#### E. Siberian elm (*Ulmus pumila*)

This member of the elm family is native to eastern Siberia, Manchuria, Korea, and northern China. The U.S. Department of Agriculture planted this 50-70 foot tree across the Great Plains during the Dust Bowl era of the 1930's as a hardy windbreak, because it can withstand cold winters, drought, and poor soils. It is also fast-growing, gaining more than 18 inches in a year, and has been marketed to homeowners as

an “instant” shade tree. It resembles natives American elm (*Ulmus americana*) and slippery elm (*Ulmus rubra*), but its leaves are smaller and symmetrical. It is resistant to Dutch elm disease but susceptible to attacks by the elm leaf beetle, and its brittle wood can snap during ice storms.

Siberian elm produces winged fruits and seeds early in the spring, which are dispersed primarily by wind. The seeds germinate rapidly on bare soil, and seedlings grow quickly, filling disturbed areas with a thicket of young Siberian elms. The elm grows in both dry and moist areas along roadsides and in pastures and grasslands. This tree is also being managed in the same manner as Salt cedar.

#### F. Tree of Heaven (*Ailanthus altissima*)

Tree of heaven is an invasive deciduous tree from China that, like Salt cedar, uses substantial quantities of water and crowds out native plants. A member of the tropical quassia family, tree of heaven grows quickly and may reach 80 feet in height at maturity. Tree of heaven has large alternate, compound leaves, yellow or green flowers in the spring, and papery winged fruits in the summer and fall. In addition to prolific seed production on female trees (tree of heaven is dioecious), this plant spreads through underground rhizomes that generate new shoots throughout the growing season. It is an allelopathic plant, and its flowers and other organs give off a strong nutty odor that can be offensive to people.

Tree of heaven grows in disturbed areas, both urban and rural, including fields, roadsides, fencerows, and forest edges and gaps.

This tree is also creeping into the Bosque and is being treated in the same manner as Salt cedar.

## VI. Early Detection and Prevention

The most economical and efficient means of nonnative plant control is to identify new infestations early and prevent additional species from invading our land. Therefore, all agencies will be watching for new invasive plant populations. The surveying and mapping efforts described above will also help identify new infestations in our County for priority control. The best prevention or treatment option will be selected based on land ownership, distance from water, control methods available, etc and will depend upon the weed species and the extent of the infestation. An essential component of long-term nonnative species control will be to deter the target weed or other nonnative plant species from re-invading treated areas by encouraging native plant growth in these disturbed sites.

Further preventative measures will be taken including:

- Cleaning all machinery and equipment that may have been used in an infested area prior to removing it from the site;
- Expanding the monitoring and control of nonnative plants growing upstream from the site;
- Monitoring any imported gravel or other materials that may contain seeds or regenerative vegetative material of nonnative species, and whenever possible, stipulating in contracts that purchased materials be weed seed free;
- Cooperating with neighbors to prevent the spread of invasive plants in the region;

- Public education-Spread the word, not the weed;
- Expand our coordinated efforts and cooperation to include the Farmers and Ranchers in our Cooperative Weed Management Area.

In cases where small patches of weeds have already encroached, an aggressive, 4-tiered plan will be implemented. This will include 1) delineating the infested area, 2) determining and implementing the best control methods for stopping the spread of the species and quickly eradicating it where feasible (includes follow-up treatments as necessary), 3) promoting native plant regeneration at the site, and 4) continuing to monitor the area aggressively to prevent further infestations.