# INTEGRATED NOXIOUS WEED MANAGEMENT PLAN
# FOR
# TURNPIKE MINING RESOURCE
# 599 HIGHWAY 52
# ERIE, WELD COUNTY, COLORADO
# DRMS PERMIT NO. M-2004-009

Prepared by:

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# 1.0 INTRODUCTION

This Integrated Noxious Weed Management Plan has been developed to control noxious weed species within the Division of Reclamation, Mining, and Safety (DRMS) permit boundary for the Turnpike Mining Resource (Site – Figure 1). This plan identifies existing noxious weeds on the property that are comingled with other native plant species (e.g., wheat grasses). This plan contains noxious weed management practices, typically recommended by Colorado State University and other weed organization professionals. Weed management practices have been tailored to the specific weed problems identified at the Site. The weed management approach to gain control of the invasive species at the Site presented in this plan is based on the following concepts.

1) Weed control must be applied and evaluated over an extended period to be successful.
2) The basic steps of weed control include identification of weed species, locating the weed problem, development of control and prevention strategies, implementation of those strategies, and ongoing monitoring to assess the effectiveness of the efforts.
3) To prevent/minimize the infestation and spread of noxious weeds, semi-annual inspections of the permitted area will be conducted in the spring and fall of each year to evaluate site conditions at the time and monitor response to previous treatments.

Appropriate weed control actions shall be implemented whenever noxious weed species are observed on the property. This plan identifies specific treatment methods and timetables. Plans may be modified based in new invasions of weed based on the species of concern, location and extent of the infestation, and other pertinent factors. Development of this plan is in accordance with Section 3.1.10 (6) of the Mineral Rule and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials.

## 1.1 PROPERTY INFORMATION

| | |
|---|---|
| **Property Owner** | Hunt Brothers Properties |
| **Mine Operator** | Asphalt Specialties Co., Inc. (ASCI) |
| **DRMS Permit No.** | M-2004-009 |
| **Site Address** | 599 Highway 52, Erie, Weld County, Colorado |
| **Latitude / Longitude** | 40.094012° N / -105.044055° W |
| **Elevation** | ~ 4,948 feet above mean sea level (ft amsl) |
| **Permitted Acreage** | 200.40 acres |
| **Acreage Disturbed** | ~ 166.0 acres |
| **Soil Types (% of Property)** | Aquolls and Aquepts, flooded (60.4%); Aquolls and Aquents, gravelly substratum (27.8%); Ellicott-Ellicott sandy-skeletal complex, 0 to 3 percent slopes, rarely flooded (9.2%); and Loam, Nunn and Otero sandy (2.7%). |

## 1.2 WEED MANAGEMENT PRIORITIES AND GOALS

The priorities of this weed management plan are to: 1) contain current noxious weed infestations; 2) suppress and/or eliminate noxious weed species present; and 3) prevent potential invasive weed species in Weld County from infesting the Site. General descriptions of these basic weed management goals for the Site are below:

- **Elimination/Eradication:** Elimination (or eradication) is the complete removal of a weed infestation. It is the implementation of a short-term but intensive control effort to completely purge a targeted weed infestation permanently from an area (unless reintroduced). Elimination is desirable and possible for small weed patches, but not always for larger ones. (Important note: if eradication creates an open environment, a weed problem may be cured simply to create another one; therefore, it is essential to revegetate the ground to prevent another infestation).
- **Containment:** Containment prevents weed encroachment onto non-infested areas. It is the creation and enforcement of confining perimeters around the infestation. This is achieved by eradicating plants on the exterior of the infestation's designated perimeter and those along vector corridors (such as roads, streams, trails) that may help spread the infestation beyond the perimeter.
- **Suppression:** Suppression reduces weed density and area. It is the use of a wide variety of weed management techniques that reduce the density and severity of infestations within the boundaries of containment perimeters. This is done to mitigate the harm to agriculture, the environment, and other values caused by widespread and well-established populations of noxious weeds.

## 1.3 LOCAL AGENCY EVALUATION AND CONSULTATION

ASCI contacted the Weld County Public Works Department - Weed Management Division for assistance in preparing this weed management plan. A site visit to identify the types, locations, and extents of noxious weeds present at the Site was conducted with Weed Management Division Supervisor, Ms. Tina Booton, on September 8, 2022. Information regarding the identification and management strategy for noxious weeds obtained from the Weed Management Division is present throughout this plan. Below is contact information for the Weed Management Division.

**Weld County Public Works Department**
**Weed Management Division**
1111 H Street
Greeley, CO 80631
Phone: (970) 400-3770
E-mail: tbooton@weldgov.com
Website: https://www.weldgov.com/departments/public_works/weed_management

# 2.0 OVERVIEW OF TARGETED WEED SPECIES

Noxious weeds in Colorado are categorized based on the extent of infestation within the state.

- **Colorado Noxious Weeds - List A:** List A species are not well established in Colorado, are potentially a large problem to this state, and require mandatory eradication by local governing agencies. Prescribed techniques for management of List A species are hand pulling, digging, or herbicide application. Mowing, grazing, and insect bio-control are not acceptable forms of management for these species.
- **Colorado Noxious Weeds - List B:** List B species are common enough in parts of the state that eradication is not feasible, though the species are still recommended for eradication, suppression, or containment depending on distribution and densities around the state. Prevention of seed dispersal may be accomplished by mowing, hand pulling, tillage, grazing, or herbicide application.
- **Colorado Noxious Weeds - List C:** List C species are widespread and well established. Control of List B and C species is recommended, but not required by the state. However, local governing bodies may require management.

No List A weeds have been identified at the Site. Section 2.1 identifies the primary List B and C weed species of concern and provides general descriptions and information about the weeds.

## 2.1 SITE-SPECIFIC TARGETED WEED SPECIES

The following table lists noxious weeds species of concern identified at the Site which are the primary targets for management, management strategy (i.e., priority and goal), and extent of infestation (Figure 1). Copies of the Targeted Weed Fact Sheets are provided in Appendix A.

| Noxious Weed Species Identified (Scientific Name) | State List | Management Priority | Designation Goal | Infestation Density |
|---|---|---|---|---|
| Saltcedar/Tamarisk (Tamarix ramosissima) | B | 1st | Elimination / Containment & Suppression | Medium |
| Russian Olive (Elaeagnus angustifoilia) | B | 1st | Elimination / Containment & Suppression | Medium |
| Canada Thistle (Cirsium arvense) | B | 1st | Containment & Suppression | Medium |
| Musk Thistle (Carduus nutans) | B | 1st | Containment & Suppression | Medium |
| Diffuse Knapweed (Centaurea diffusa) | B | 1st | Containment & Suppression | Light |
| Chicory (Cichorium intybus) | C | 2nd | Suppression | Light |

- **Saltcedar/Tamarisk (Tamarix ramosissima):** Saltcedar, aka tamarisk (Tamarix ramosissima), is a non-native deciduous or evergreen shrub or small tree that grows from 5 to 20 feet tall. The bark on saplings and stems is reddish-brown. The leaves are small and scale-like and the flowers are pink to white and 5-petaled. Saltcedar reproduces by seeds as well as vegetative. A mature plant can produce up to 600,000 seeds per year. Seeds are viable for up to 45 days under ideal conditions. Saltcedar buds break dormancy in February or March. Flowering occurs anytime between April and August. Ideal conditions for saltcedar seedling survival are saturated soil during the first few weeks of life, a high water table, and open sunny ground with little competition from other plants.
- **Russian Olive (Elaeagnus angustifolia):** Russian olive is a non-native deciduous shrub or small tree that can reach 10-25 feet tall. The foliage has an overall silvery appearance. The leaves are arranged alternately, 2-3 inches long and narrow with smooth margins. The upper surface is gray-green while the lower surface and leaf stalks are silvery-gray. The bark is dark reddish-brown in color and usually has 1-2-inch thorns. The twigs also have a silver-gray appearance. The flowers appear between May and June, they are yellow, bell shaped and arranged in clusters. The tree starts to produce fruit at 3 year of age. The fruit is shaped like a small olive and contain a single seed. The seeds are viable for up to 3 years. The Russian olive spreads mostly through seeds but can re-grow from injury. The Russian olive is very adaptable. The seedlings are tolerant of shade and drought conditions. It can thrive in a variety of soil types, including bare mineral substrates. They can grow between sea level and 8,000 feet.
- **Canada Thistle (Cirsium arvense):** Canada thistle (Cirsium arvense) is a non-native deep-rooted perennial that spreads by seeds and aggressive, creeping horizontal roots (rhizomes). Canada thistle can grow 2 to 5 feet in height. The leaves are oblong, spiny, bright green in color, and are only slightly hairy on the undersurface. Flowers occur in small clusters that form on the ends of branches. They are about 1 cm in diameter, tubular shaped, and vary from white to purple in color with a strong vanilla scent (female flowers). Canada thistle emerges from its root system from late April through May. It begins to flower in late spring to early summer with increase in day length. Canada thistle only produces about 1,000 to 1,500 seeds per plant. Typically, it reproduces vegetative through a creeping root system, and can quickly form dense stands. Every piece of root, from ½ to 1 inch in length, can form new plants. The key to controlling Canada thistle is to eliminate seed production and to reduce the plant's nutrient reserves in its root system through persistent, long-term management. Combining control methods for Canada thistle is imperative. The weed needs to be continually stressed, forcing it to exhaust root nutrient stores and eventually die. Of all control methods, prevention is most important. Maintain healthy pastures and rangeland and continually monitor your property for new infestations.

- **Musk Thistle (Carduus nutans):** Musk thistle (Carduus nutans) is a non-native biennial forb that reproduces solely by seed. A biennial is a plant that completes its lifecycle within two years. During the first year of growth, musk thistle appears as a rosette in spring or fall. During the second year in mid to late spring – the stem bolts, flowers, sets seed, and the plant dies. A prolific seed producer, musk thistle can produce up to 20,000 seeds per plant. Therefore, the key to managing this plant is to prevent seed production.
- **Diffuse Knapweed (Centaurea diffusa):** Diffuse knapweed (Centaurea diffusa) is a non-native biennial forb that reproduces solely by seed. A biennial is a plant that completes its lifecycle within two years. During the first year of growth, diffuse knapweed appears as a rosette in spring or fall. During the second year in mid to late spring – the stem bolts, flowers, sets seed, and the plant dies. Once the plant dries up, it breaks off at ground level and becomes a tumbleweed which disperses the still viable seeds over long distances. A prolific seed producer, diffuse knapweed can produce up to 18,000 seeds per plant. Therefore, the key to managing this plant is to prevent seed production. Diffuse knapweed can grow 1 to 3 feet tall, and is diffusely branched above ground. This gives the plant a ball-shaped appearance and tumble-weed mobility when broken off. Leaves are small, and are reduced in size near the flowering heads. Flowers are mostly white, sometimes purple, urn-shaped, and are located on each branch tip. Bracts that enclose the flowerheads are divided like the teeth of a comb, and are tipped with a distinct slender spine. Upon drying, the bracts become rough, rendering them injurious to the touch. Flowers bloom July through August. Seed set usually occurs by mid-August. The key to effective control of Diffuse knapweed is to prevent the plant from flowering and going to seed. An integrated weed management approach dealing with Diffuse knapweed is highly recommended. There are many options of mechanical, chemical, and biological controls, available.
- **Chicory (Cichorium intybus):** Chicory (Cichorium intybus L.) is a perennial forb in the Asteraceae family, also known as coffeeweed, French endive, and succory, not to be confused with curly endive (Cichorium endivia L.) (iNaturalist 2019). Mature plants can be four feet tall. Oblanceolate basal leaves range in size from 5 to 35 cm long and are persistent (SEINet 2019). Their margins are highly variable, sometimes dentate or denticulate like dandelion leaves, sometimes pinnatifid (Plants of the World Online 2019). The rigid ascending stems have stiff short hairs. Branches are widely apart. Stems are hollow, have milky sap and linear ribs (University of Wisconsin- Madison 2019). Its stem leaves are sessile, rigid, oblong to lanceolate, usually with smooth margins, and are narrower than the basal leaves; short stiff hairs are on both surfaces and leaf margins. The base of leaves clasp the stem. Chicory has a very robust, long taproot and rootlets. It has been in Colorado since at least 1872 when Townshend Stith Brandegee collected a specimen in Fremont County (SEINet 2019). In Colorado its either under-reported or rare. It is ruderal, inhabiting roadsides and disturbed areas at elevations below 8,000 feet.

# 3.0 MANAGEMENT OPTIONS FOR TARGETED WEED SPECIES

Management of weed species can vary from species to species. The following sections provide a summary of effective control methods and timing for implementation to treat each targeted noxious weed species present at the Site.

## 3.1 CONTROL METHODS

Integrated management is a program of noxious weed control that properly implements a variety of coordinated control methods which greatly improves the success rate for weed control. There are no cure-alls for noxious weeds – no single tool will work every time in every situation. The solution is integrated management, which combines, or integrates, different tools to provide more effective weed control than any single tool could produce. The stress and damage caused by one tool weakens the target, making it more susceptible to damage caused by other tools. Types of control methods include:

- **Cultural** – Introducing and promoting competitive species (i.e., competitive grasses, planted cottonwood cuttings, etc.) have proven to be effective at reducing the chances of re-invasion. Information is available from the local Colorado State University (CSU) Extension office or Natural Resources Conservation Service office for proper seed mix recommendations.
- **Mechanical** – Mechanical controls include mowing, cutting, pulling, clipping, fire, grazing, tillage, grubbing.
- **Chemical/Herbicides** – A variety of herbicide options exist that will control noxious weeds. The active ingredient will vary based on the specific noxious weed species. Information about herbicides can be found on the Crop Data Management Systems, Inc. website (www.cdms.net) and specific specimen labels are available for viewing online. Whichever herbicide you choose to use, remember to read the herbicide label before using the product and follow all directions and precautions. Always read, understand, and follow label directions. The herbicide label is the LAW!

  Landowners should provide consent for use of chemicals/herbicides prior to application. All contracted professional herbicide applicators must be fully licensed by the Colorado Department of Agriculture.
- **Biological** – Not all sites are suitable for biological control. The use of insects will also require some maintenance and considerations for their lifecycle and behavior. Insects can be obtained at no charge from the Colorado Department of Agriculture - Palisade Insectary. Please call (970) 464-7916, e-mail: insectary@state.co.us, or go to www.palisadeinsectray.com for more information.

## 3.2 LIST B WEED SPECIES – CONTROL METHODS REQUIRED

### 3.2.1 Saltcedar/Tamarisk

**Cultural** – After managing saltcedar infestations, other vegetation must be established to prevent re-invasion. Competitive grasses and planted cottonwood cuttings have proven to be effective at reducing the chances of re-invasion.

**Mechanical** – A bulldozer or prescribed fire can be used to open large stands of saltcedar. These methods must be followed up with an herbicide treatment of the subsequent sprouts when they are 1 to 2 meters tall.

**Chemical/Herbicides** – For large stands of saltcedar that would essentially be monotypic, foliar applications of the herbicide Arsenal, Habitat or Arsenal plus Roundup are effective. Late summer/early fall are optimum treatment times. This is recommended for areas that have little to no desirable shrubs and trees.

**Biological** – There is no recommended Biological control currently.

### 3.2.2 Russian Olive

**Cultural** – After managing Russian olive infestations, other vegetation must be established to prevent re-invasion. Competitive grasses and planted cottonwood cuttings have proven to be effective at reducing the chances of re-invasion.

**Mechanical** – In areas where woody native plants are present and their continued existence is desired, or for large stands of Russian olive it may be necessary to cut and treat the stumps with an herbicide. This is referred to as the cut-stump treatment. Cuts should be made within 2 inches of the grounds surface, immediately followed by an herbicide application to the cut stems. The girdling method involves making shallow, overlapping cuts into the bark around the trunk base. Use a hatchet or chainsaw to make these cuts. Then lightly spray the entire cut surface with herbicide.

**Chemical/Herbicides** – For large stands of Russian olive that would essentially be monotypic, foliar applications of herbicides are effective. Late summer/early fall are optimum treatment times using this method. This is recommended for areas that have little to no desirable shrubs and trees.

**Biological** – There is no recommended Biological control currently.

### 3.2.3 Canada Thistle

**Cultural** – Establishment of selected, aggressive grasses can be an effective cultural control of Canada thistle. Good grazing management will stimulate grass growth and keep pastures healthy. Healthy pastures may be more resistant to Canada thistle invasion. Bare spots caused by overgrazing are prime habitat for weed infestations.

**Mechanical** – Canada thistle is not well controlled by mechanical methods. Do not dig or hand-pull. These techniques will increase your infestation density. Canada thistle will form new sprouts at each point where its root system is broken.

Mowing can be effective to stress the plants and inhibit flowering. Intensive mowing is best done on a monthly basis throughout the growing season. Once the plants have reached 12 inches in height, commence mowing. Mow the plants down to 2 to 4 inches in height. If the plants have bloomed, flower/seed heads can be removed with clippers. Be sure to bag and properly dispose of the flower heads because cut-off flower heads can still develop viable seeds. Combining mowing with herbicides will further enhance control of this weed.

**Chemical/Herbicides** – Canada thistle is best controlled with herbicides and herbicide applications are best done twice per year. For Canada thistle control, spraying is most effective if done in the fall (September to early October) before the first killing frost as the plants prepare for winter dormancy. Spring spraying should be done around the time when flower buds appear on the plants (June). An appropriate surfactant mixed with the herbicide (refer to the label) will aid with the absorption of the herbicide into the plant and you will achieve better control results.

As this species is often found in wet areas, it may restrict the use of certain herbicides. An aquatic-safe approved herbicide is a great quality to have in an herbicide when applying near any kind of riparian areas (near a stream or river) or drainages. Care must be taken to avoid spraying herbicides near water unless they are specifically labeled for aquatic use. An aquatic-approved herbicide is required when applications will be made over water or encounter surface water. Combining mowing with herbicides will further enhance control of this weed.

**Biological** –The primary biocontrol agent currently in use against Canada thistle is the stem-gall forming fly (Urophora cardui) and is effective on large infestations and when combined with other control methods. This agent is not effective in killing the plant but may weaken the plant, making it more susceptible to other stresses.

### 3.2.4 Musk Thistle

**Cultural** – Establishment of selected, aggressive grasses can be an effective cultural control of musk thistle.

**Mechanical** – Musk thistle can be controlled by several mechanical methods: cutting, pulling, mowing, and clipping. Mechanical control (e.g., mowing) is best done once or twice in the spring to early summer as the plants bolt, but before the plants flower (roughly April through early June).

Grubbing or digging out rosettes, cutting flower stems, and hand-pulling can be effective as well. Rosettes can be cut out of the ground with a sharp shovel. Be sure to cut below the root crown level (about 1 inch below the soil surface). Be sure to sever the root completely to kill the plant. Digging out the plants is most effective during the rosette stage, but if the plants have already bloomed when you cut or pull them, remove the flower/seed heads with clippers and be sure to

bag and properly dispose of the flower heads. Cut-off flower heads can still develop viable seeds. The remaining plant should be cut off below the soil surface to keep it from blooming again.

**Chemical/Herbicides** – Herbicide applications to control musk thistle are best done twice per year: once in the spring (late March through May) before plants have bolted and again in the fall as the plants prepare for winter dormancy (late September or early October) before the first killing frost. Herbicide applications will be most effective during these plants' rosette stage. Plants that have bolted are not very susceptible to herbicides (this will be a waste of money and time). Also, if the plant is in bloom when it is sprayed, the seeds can still mature and disperse. An appropriate surfactant mixed with the herbicide (refer to the label) will aid with the absorption of the herbicide into the plant and you will achieve better control results. Remember: only spray rosettes that have not bolted.

**Biological** – Biological controls are available for musk thistle control. The seed head weevil (*Rhinocyllus conicus*) and the crown weevil (*Trichosirocalus horridus*) insects are effective on large infestations. When used together, these insects provide fair to good control. Expect to wait at least 3 to 5 years for the insects to establish significant populations and achieve optimum management results. Insects can be obtained at no charge from the Colorado Department of Agriculture. However, the Department of Agriculture discontinued distribution of the seed head weevil (*Rhinocyllus conicus*) this insect since it was released in Colorado in the 1970s is now found almost everywhere in the state. The musk thistle crown weevil (*Trichosirocalus horridus*) is currently established in many areas around the state but is still being distributed.

### 3.2.5 Diffuse Knapweed

**Cultural** – Establishment of selected grasses can be an effective cultural control of diffuse knapweed. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bare ground is prime habitat for weed invasions.

**Mechanical** – Any mechanical or physical method that severs the root below the soil surface will kill diffuse knapweed. Mowing or chopping is most effective when diffuse knapweed plants are at full-bloom. Be sure to properly dispose of the flowering cut plants, since seeds can mature and become viable after the plant has been cut down.

**Chemical/Herbicides** – Herbicides are available. Pending the chemical selected, applications are best done twice per year: once in the spring (late March through May) and again in the (late September or early October).

**Biological** – The seedhead weevil (Larinus minutus) and the root weevil fly (Cyphocleonus achates) provide fair to good control when used in combination with each other. Expect to wait at least 3 to 5 years for the insects to establish and achieve optimum results. This is an option for large infestations. To obtain the insects, contact the Colorado Department of Agriculture, 970-464-7916.

## 3.3 LIST C WEED SPECIES – CONTROL METHODS NOT REQUIRED

### 3.3.1 Chicory

**Cultural** – Since chicory is sensitive to competition from grasses, maintain or drill seed bluebunch wheatgrass (Pseudoroegneria spicata) and Sandberg bluegrass (Poa secunda) with vesicular-arbuscular mycorrhizae; these are drought tolerant natives that are highly competitive against chicory but require mycorrhizae. Native shrubs with competitive robust root biomass is another option. It is ruderal so minimize soil disturbance, especially near infestations. For cultivated sites, select native plants with blue flowers instead of chicory: Scutellaria brittonii, Gentiana parryi, Mertensia lanceolata, Penstemon glaber, Eritrichium aretoides, or Aconitum columbianum. Be cautious when purchasing seed as chicory may be in mixes. Use seed pillows to disperse seeds.

**Mechanical** – Mechanical methods are best for residential areas, small infestations or soils where the entire taproot can be removed. Mowing is not recommended; it leaves roots behind, stimulates flower production, disperses seeds, and expands the size of the infested area. Chopping the inflorescence just below the root crown and bagging the biomass may reduce vigor with consecutively treatment; effectiveness is dependent on cultivare type. Collect, bag, and dispose of or destroy flowers; seeds can mature and germinate if left. Subsoiling must be deeper than 10 inches; use a subsoiler. Fall prescribed fire may kill seeds if hot enough; chicory sets seed through the growing season so timing is important. Fire is unlikely to affect its deep taproot. The effects to chicory from prescribed fire is not tested.

**Chemical/Herbicides** – Herbicide recommendations to control chicory in pastures and rangeland are found at: https://goo.gl/. TvWnv9. Rates are approximate and based on equipment with an output of 30 gal/acre. Follow the label for exact rates.

**Biological** – Chicory provides high quality forage for goats, sheep and cattle. It is sensitive to grazing; fall is best for control (Alemseged et al. 2003, Barry 1998, Li and Kemp 2005, Li et al. 2003). Properly managed grazing can improve vigor of desired species and indirectly reduce chicory. Currently there are no biological control agents for chicory authorized in Colorado. For biocontrol information, visit the Colorado Department of Agriculture's Palisade Insectary website at: www.colorado.gov/ag/biocontrol.

# 4.0 SITE-SPECIFIC INTEGRATED WEED MANGEMENT PLAN

ASCI will implement mechanical controls (e.g., mowing, physical extraction, etc.) to manage priority targeted weed species present at the Site beginning in 2023. This is to prevent seed production/spreading of weeds and allow for further cultural establishment of the native plant species and competitive grasses already present at the Site. Mowing will be conducted two (2) times per year. The first mowing will occur in the spring to early summer as the plants bolt, but before the plants flower (roughly April through early June). The second mowing will occur in the fall as the plants prepare for winter dormancy (late September or early October). Extraction of Saltcedar/Tamarisk and Russian Olive species will be conducted during these periods as well.

Due to the adjacent Town of Erie Water Treatment Plant, Boulder Creek, and private properties, which include ranching and animal grazing use, the application of spray herbicides poses a significant risk to these sensitive receptors (Figure 1). Factors outside the control of a licensed commercial spraying applicator (e.g., sustained wind speeds or gusts greater than 10 miles per hour [mph] during application causing drift, herbicide runoff, etc.) could result in the contamination of waters and/or private property. To avoid possible adverse impacts from herbicides, ASCI will begin to implement chemical/herbicide controls the season prior to seeding. Chemical/herbicide controls implemented will consist of full application and/or spot treatment of weeds, as appropriate. The actual chemical(s)/herbicide(s) used will be selected by the licensed commercial spraying applicator; however, general chemical/herbicide selection sheets are presented in Appendix B. Overall weed management at the Site will be monitored during semi-annual inspections (prior to and after seeding) to evaluate the effectiveness of previous activities conducted and for the strategies being implemented. Changes to control methods and/or implementation schedule will be made, as necessary.

# 5.0 BASIC WEED MANAGEMENT GUIDELINES

Noxious weed management is not a one-time effort. To obtain your desired level of management, you will need to perform control measures for several years. Work will include observation, control application, observation of controls effectiveness and eradication of the weed population. Work at small infestations and the perimeters of larger infestations first. This will help keep infestations from spreading outward and will help to control new outbreaks. By confining the weeds into areas, they will be more manageable. Keep records of the controls you use and the results. This will provide analysis of the weed control progress and make any needed modifications to the specific weed control program.

## 5.1 BASIC CULTURAL CONTROL GUIDELINES

The most effective method of control for noxious weeds is to prevent their establishment through proper land management. Maintain healthy pastures and rangeland and continually monitor your property for new infestations. New infestations are much more easily controlled than established infestations.

Disturbed soil and bare ground are prime habitats for weed invasions. A healthy native plant community will help keep noxious weeds under control by providing competition. Grass seeding takes place in the fall with follow up over seeding the spring as required to establish a healthy stand of vegetation. You can either broadcast seed or use a seed drill to plant it (depending on the area). Riparian areas may require other revegetation efforts.

## 5.2 BASIC MECHANICAL CONTROL GUIDELEINES

Clean the mowing equipment to remove seeds and vegetative plant parts with a pressure washer before and after mowing operations. This is especially important if mowing flowering plants. To limit spreading of weeds, do not clean equipment in un-infested areas, near roadways, or streams.

Some flowering plants and their cut-off flower heads can still develop viable seeds. If the plants have already bloomed when you cut or pull them, it is important to properly dispose of them. Put them in a garbage bag, make sure bags are securely closed, and send them to a landfill.

Generally, it is okay to mow one week after spraying. Mowing should not be done immediately following applications to allow the sprayed plants time to absorb the herbicide into their systems

## 5.3 BASIC CHEMICAL CONTROL GUIDELINES

The first rule of herbicide use is to read the label before using the product and follow all directions and precautions. The label is the law. Seek assistance before purchasing or using an herbicide if not sure of the use or purpose of the product. Chemicals are powerful tools that should be used judiciously. Follow all instructions (application rates, proper safety equipment, appropriate weather conditions, etc.) as directed on the herbicide's label. Safety precaution may safety glasses, rubber gloves, long-sleeved shirts, long pants, high-top shoes, and socks are common sense precautions which all applicators should take. An additional precaution includes the use a respirator to protect sensitive mucus membranes in nose and throat. Follow proper clean-up and disposal procedures for the equipment and containers. All directions for use are dictated on the herbicide’s label.

Care must be taken to avoid spraying herbicides near water unless they are specifically labeled for aquatic use. An aquatic-approved herbicide is required when applications will be made over water or encounter surface water. An aquatic-safe herbicide is a great quality to have in an herbicide when applying near any kind of stream or river (riparian areas) or drainages.

Broadleaf selective herbicides (such as 2,4-D) can either be applied by spot spraying individual plants or by a continuous spray over an entire area. A non-selective herbicide (such as glyphosate) should only be used if spot spraying. Avoid using soil-active herbicides (such as dicamba) near windbreak plants or other desirable woody vegetation. Plant injury or death can occur. Also, do not allow any herbicide to drift onto desirable vegetation for the same reasons. From time to time, if possible, alternate the herbicide (active ingredient) applied to the noxious weed infestation. This will help to prevent the weeds from developing chemical resistance.

For the first few years, spray twice per year: once in the spring and once in the fall. When you have achieved a more acceptable level of control, you can change to spraying only once in the fall. If it becomes economically unfeasible for you to spray twice a year, you may choose to only spray in the fall. From time to time, if possible, alternate the herbicide (active ingredient) you use. This will help to prevent the weeds from developing chemical resistance.

When using a foliar spray, be sure to get good spray coverage of the plants. All the leaves should have herbicide contact. The sprayed plants should be obviously wet, but not dripping with herbicide. If a surfactant is indicated the herbicide label, it should be mixed as directed with the herbicide. Surfactants help herbicides do their job by reducing the surface tension of liquids between two liquids or a solid leaf. You may also choose to use an herbicide tracer dye so that you can easily see the areas you have treated. Calibrate the sprayer to the recommended application rate and keep records of the work performed.

### 5.3.1 SPRAY DRIFT MANAGEMENT

Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment and weather-related factors determine the potential for spray drift. The applicator and grower are responsible for considering all these factors when making decisions. The following drift management requirements must be followed to avoid off-target drift movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications, public health uses, or to applications using dry formulations.

1. The distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
2. Nozzles must always point backwards parallel with the airstream and never be pointed downwards more than 45 degrees.

**AERIAL DRIFT REDUCTION INFORMATION**

**INFORMATION ON DROPLET SIZE**

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see “Wind”, “Temperature and Humidity”, and “Temperature Inversions”).

**CONTROLLING DROPLET SIZE**

- **Volume** – Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure** – Do not exceed the nozzle manufacturer’s recommended pressures. For many nozzle types lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles** – Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation** – Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended

practice. Significant deflection from horizontal will reduce droplet size and increase drift potential.

- **Nozzle Type** – Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.
- **Boom Length** – For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.
- **Application Height** – Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

**SWATH ADJUSTMENT**

When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller drops, etc.).

**WIND**

Drift potential is lowest between wind speeds of 2 –10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. Do not apply by air when wind speed is greater than 8 mph. **Do not apply by ground when wind speed is greater than 10 mph.**

*Note: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.*

**TEMPERATURE AND HUMIDITY**

When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry. Do not apply when air temperatures exceed 90°F.

**TEMPERATURE INVERSIONS**

Do not make applications during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no

wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

### SENSITIVE AREAS

The pesticide may only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

### CLEANING SPRAY EQUIPMENT

All mixing equipment and air spray equipment should be thoroughly cleaned before and after mixing and applying. Do not contaminate water by cleaning of equipment or disposal of rinsate.

## 5.4 BASIC BIOLOGICAL CONTROL GUIDELINES

Biological controls are a good option for larger infestations. Expect to wait a few years for the insects to establish and achieve optimum results. Once established, biological controls tend to persist and provide control for many years.

Not all sites are suitable for biological control. Biocontrol agents are affected by the environment and climatic/cultural conditions may inhibit their efficacy. The use of these insects will also require some maintenance and considerations for their lifecycle and behavior. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture.

# FIGURES


## Legend

- Permit Boundary
- Primary Areas of Concern

SCALE (approx.)

0 325 650 feet

N W E S

**ASPHALT SPECIALTIES CO., INC.**

**INTEGRATED NOXIOUS WEED MANAGEMENT PLAN MAP**

**599 Highway 52**
**Erie, Weld County, Colorado**

DATE: 10/28/2022

# APPENDIX A
# TARGETED WEED SPECIES – FACT SHEETS

Saltcedar

*Tamarix spp.*

Colorado Department of Agriculture

305 Interlocken Pkwy
Broomfield, CO 80021

(303) 869-9030
weeds@state.co.us

# Saltcedar Identification and Management

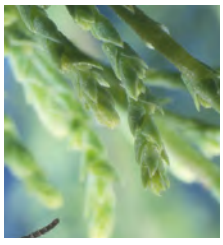
## Identification and Impacts

Saltcedar, or tamarisk (*Tamarix spp.*), is a non-native deciduous evergreen shrub or small tree that grows from 5 to 20 feet tall. The bark on saplings and stems is reddish-brown. The leaves are small, scale-like and bluish-green in color. Tiny pink to white flowers have five petals and grow on slender racemes. Saltcedar reproduces by seeds as well as vegetatively. A mature plant can produce up to 600,000 seeds per year. Seeds are viable for up to 45 days under ideal conditions. Saltcedar buds break dormancy in February or March. Flowering occurs anytime between April and August. Ideal conditions for saltcedar seedling survival are saturated soil during the first few weeks of life, a high water table, and open sunny ground with little competition from other plants.

Saltcedar was introduced from central Asia, northern Africa, and southern Europe for ornamental purposes and for stream bank stabilization. It is now widespread in the United States. Saltcedar crowds out native stands of riparian and wetland vegetation. Saltcedar increases salinity of surface soil, rendering the soil inhospitable to native plant species. Saltcedar can be found along floodplains, riverbanks, streambanks, marshes, and irrigation ditches. It's heavy use of water has contributed to the intensity of the drought.

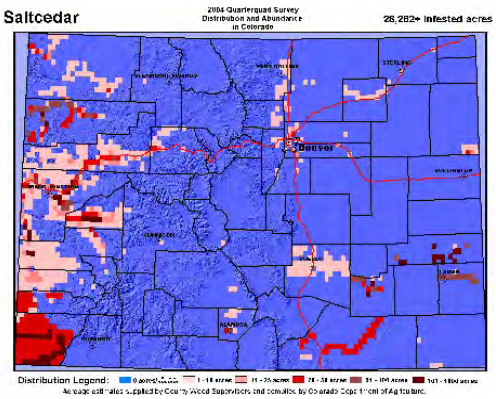
The most effective method of control for saltcedar is to prevent its establishment through proper land management. Monitor susceptible areas for new infestations. An integrated weed management approach has proven to be an effective control when dealing with saltcedar. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Saltcedar is designated as a "List B" species on the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information, please visit www.colorado.gov/ag/csd and click on the Noxious Weed Program link. Or call the State Weed Coordinator of the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.



### Key ID Points

1. Saltcedar is a tall shrub or small tree that has white to pink flowers in clusters called racimes.
2. Leaves are small and scaly.




Plant and flower photos © Kelly Uhing. Leaf photo © USDA Aphis PPQ. Infestation photo above, © Steve Dewey, Invasive.org. Tamarisk branch © Stevens County, WA Noxious Weed Control Board

Updated on:
07/2015

Management Recomendations

**CULTURAL**
After a saltcedar infestation is managed, revegetation is necessary in order to protect the soil resource and reduce the threat of reinvasion. Seeded grasses, willow stakes, and cottonwood cuttings can reduce the chances of saltcedar reinvading managed sites.

**BIOLOGICAL**
The saltcedar leaf beetle (*Diorhabda elongata*) larvae and adults feed on foliage. This causes stem dieback and potential death of the plant if defoliation is consistent. The leaf beetle should be available for limited distribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture, 970-464-7916.

**MECHANICAL**
A bulldozer or prescribed fire can be used to open up large stands of saltcedar. These methods must be followed up with a herbicide treatment of the resprouts when they are 1 to 2 meters tall. Chainsaws, or loppers for smaller plants, are effective for cut-stump treatments to smaller infestations or in environmentally-sensitive management areas.

***Integrated Weed Management:***

*Select the appropriate control method based on the size of the area and other environmental or cultural considerations. Re-seed controlled areas with desirable species to protect the soil resource and to prevent or slow saltcedar reinvasion. Follow up control efforts the same growing season and for several years afterwards.*

# Saltcedar

**HERBICIDES:** The following are recommendations for herbicides that can be applied to range and pasturelands. Rates are approximate and based on hand-held equipment with an output of 30 gallons per acre. Always read, understand, and follow the label directions. **The herbicide label is the LAW!**

| Herbicide | Rate | Application Timing |
|---|---|---|
| Triclopyr (Garlon 4, Remedy) | 20-30% solution in basal bark oil. The herbicide Pathfinder comes pre-mixed in oil and does not require dilution. | Cut-Stump Treatment: Apply to the cambial layer of the tree immediately after the cut-stump treatment and to roots above soil surface. (Summer to fall) Basal Bark Treatment: Spray till wet but not dripping; the roots above soil surface, root collar, and lower trunk to a height of 12-15 inches above ground (Summer to fall) |
| Glyphosate* (Rodeo - approved aquatic label) | Undiluted (100% solution) or 50% solution in basil bark oil | Cut-Stump Treatment: Apply to the cambial layer of the tree immediately after the cut-stump treatment and to roots above soil surface. Diluted solutions requires regular agitation. (Summer to fall) |
| Triclopyr (Garlon 4, Remedy) + Aminopyralid (Milestone) | 3 qts. Garlon 4/acre + 7 oz. Milestone/acre + 0.25% v/v non-ionic surfactant | Broadcast foliar treatment: Apply when plants are growing rapidly. (May to September) |
| Note: *These products are non-selective and will kill any vegetation contacted. | | |
| Additional herbicide recommendations for other species can be found at: **goo.gl/TvWnv9** | | |

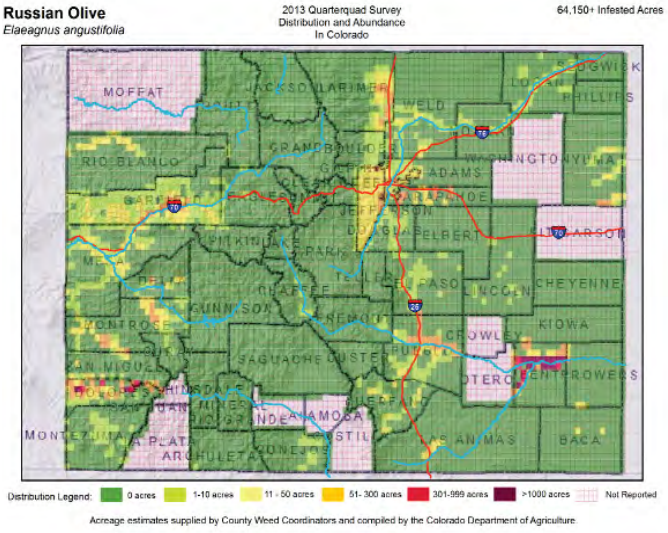
# Russian Olive Identification and Management

List B

Russian olive (*Elaeagnus angustifolia*) is a perennial tree or shrub that is native in Europe and Asia. The plant has olive-shaped fruits, silver color at first then becoming yellow-red when mature. Russian olive can reproduce by seed or root suckers. Seeds are readily spread by birds and can remain viable for up to 3 years. Spring moisture and slightly alkaline soil tend to favor seedling growth. The plant's extensive root system sprouts root suckers frequently. The tree can reach up to 30 feet in height with branches that have 1 to 2 inch thorns. Leaves are 2 to 3 inches long, alternate, narrow, and have simple blades with smooth edges. The leaf's lower surface is silvery white, while the upper surface is light green in color. Flowers are 4 small sepals in light yellow clusters, fragrant, and appear May through June. Fruits mature from September to November. Russian olive twigs are flexible, reddish, and have surfaces coated with gray and scaly pubescence, becoming smooth.

Once thought to be a beneficial windbreak tree, it since has been deemed detrimental to the environment. Russian olive can grow in a variety of soil and moisture conditions, but prefers open, moist, riparian zones. It is shade tolerant and can be found along streams, floodplains, fields and open areas up to approximately 8,000 feet in elevation. Russian-olive can outcompete native plants, interfere with natural plant succession and nutrient cycling, and tax water reserves. Because Russian olive is capable of fixing nitrogen in its roots, it can grow on bare, mineral substrates and dominate riparian vegetation. Although Russian olive provides a plentiful source of edible fruits for birds, ecologists have found that bird species richness is actually higher in riparian areas dominated by native vegetation.

The key to effective control of Russian olive is preventing establishment of the trees or shrubs. If plants are already present, control options include cut-stump treatments and mechanical mowing. These treatments depend on size and location of the plant. Details on the back of this sheet can help you create a management plan compatible with your site ecology.




Russian olive is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/weeds and click on the Noxious Weed Management Program. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

© Patrick Breen, OSU

© Patrick Breen, OSU

Key ID Points

1. Leaves are silvery white.
2. Branches have 1 to 2 inch thorns.
3. Yellow-red fruits on mature plants.
4. Mature trees have shedding, reddish-brown bark.

# Russian olive

*Elaeagnus angustifolia*

List B

# Russian olive

*Elaeagnus angustifolia*

## Integrated Weed Management Recommendations

**Integrated weed management offers the most effective combination of control efforts through the "cut stump" treatment. Trees are cut down with a hatchet or chainsaw, then immediately treated with an approved herbicide on the surface of the cut stump. The most effective timing is late summer/early fall for herbicide transfer into the roots.**

© John Randall, TNC

© James Miller, USFS

© Chris Ness, Adams County

© Scott Peterson, USDA

### CULTURAL

Replace Russian olives with native trees. Prevent establishment of new trees by removing seedlings and saplings before they mature. Contact your local Natural Resources Conservation Service for recommendations of other possible trees or shrubs.

### BIOLOGICAL

Tubercularia canker is an unapproved biocontrol. However, it overwinters on infected stems and spreads via rain-splash, animals, or pruning implements to open wounds in the bark. Infected tissue becomes discolored or sunken. Entire stems may be girdled and killed, and the disease can deform or kill stressed plants over time.

### MECHANICAL

Saplings can be pulled with a weed-wrench or cut with brush-cutters. Trees can be girdled or cut with chainsaws. However, stump sprouting commonly occurs after cutting down the tree; and stump excavation without removing all parts of the roots can result in root sprouting. Treating cut-stumps with an herbicide can eliminate sprouting. Stump burning is practical when conditions support a long, hot fire and most effective in summer or early fall. Saplings are most sensitive to mechanical treatment.

### CHEMICAL

The table below includes recommendations for herbicides that can be applied to range and pasturelands. Always read, understand, and follow the label directions. The herbicide label is the LAW!

| Herbicide | Rate | Application Timing |
|---|---|---|
| Triclopyr (Garlon 4, Remedy) | 20-30% solution in basal bark oil. The herbicide Pathfinder comes pre-mixed in oil and does not require dilution. | Cut-Stump Treatment: Apply to the cambial layer of the tree immediately after the cut-stump treatment and to roots above soil surface. (Summer to fall; fall treatments showed fewer re-growth) Basal Bark Treatment: Spray till wet but not dripping; the roots above soil surface, root collar, and lower trunk to a height of 12-15 inches above ground (Late summer to fall) |
| Glyphosate* (Rodeo - approved aquatic label) | Undiluted (100% solution) or 50% solution in basil bark oil | Cut-Stump Treatment: Apply to the cambial layer of the tree immediately after the cut-stump treatment and to roots above soil surface. Diluted solutions requires regular agitation. Treat summer to fall; fall treatments showed fewer re-growth. |
| Note: *These products are non-selective and will kill any vegetation contacted. | | |
| Additional herbicide recommendations for this and other species can be found at: **goo.gl/TvWnv9** | | |

**Colorado Department of Agriculture** - Conservation Services
305 Interlocken Parkway
Broomfield, CO 80021
303-869-9030
www.colorado.gov/ag/weeds

Updated:
07/2015

# Canada Thistle Identification and Management

List B

Canada thistle (*Cirsium arvense*) is a non-native, deep-rooted perennial that spreads by seeds and aggressive creeping, horizontal roots called rhizomes. Canada thistle can grow 2 to 4 feet in height. The leaves are oblong, spiny, bright green, and slightly hairy on the undersurface. Unlike other noxious biennial thistles which have a solitary flower at the end of each stem, Canada thistle flowers occur in small clusters of 1 to 5 flowers. They are about 1 cm in diameter, tubular shaped, and vary from white to purple in color.

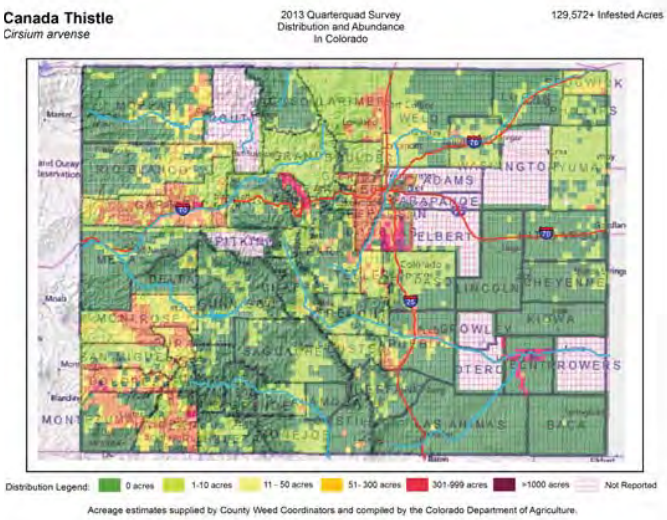
Canada thistle emerges from its root system from late April through May. It flowers in late spring and throughout the summer. It produces about 1,000 to 1,500 seeds per plant that can be wind dispersed. Seeds survive in the soil for up to 20 years. Additionally, Canada thistle reproduces vegetatively through its root system, and quickly form dense stands. Each fragmented piece of root, 0.25 inch or larger, is capable of forming new plants. The key to controlling Canada thistle is to eliminate seed production and to reduce the plant's nutrient reserves in its root system through persistent, long-term management.

Canada thistle is one of the most troublesome noxious weeds in the U.S. It can infest diverse land types, ranging from roadsides, ditch banks, riparian zones, meadows, pastures, irrigated cropland, to the most productive dryland cropland. Large infestations significantly reduce crop and cattle forage production and native plant species. It is a host plant to several agricultural pests and diseases. Canada thistle prefers moist soils, but it can be found in a variety of soil types. It has been found at elevations up to 12,000 feet.

Effective Canada thistle control requires a combination of methods. Prevention is the most important strategy. Maintain healthy pastures and rangelands, and continually monitor your property for new infestations. Established plants need to be continually stressed. Management options become limited once plants begin to produce seeds. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Canada thistle is designated as a "List B" species as described in the Colorado Noxious Weed Act. It is required to be either eliminated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/weeds and click on the Noxious Weed Program link or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, (303) 869-9030.

## 2013 Quarter Quad Survey




### Key ID Points

1. Cluster of 1-5 white to purple flowers on a stem.
2. Floral bracts are spineless.
3. Small flowers that are 1 cm in diameter.
4. Perennial, rhizomatous plant with spiny, oblong, green leaves.

Canada thistle

*Cirsium arvense*

List B

# Canada thistle

*Cirsium arvense*

## Integrated Weed Management Recommendations

**Integrated weed management is imperative for effective Canada thistle control. This weed needs to be continually stressed, forcing it to exhaust root nutrient stores, and eventually die. Mowing or grazing can be followed up with herbicide application. Avoid hand-pulling and tilling which can stimulate the growth of new plants.**

### CULTURAL

Prevention is the best control strategy. Maintain healthy pastures , riparian areas, and rangelands. Prevent bare ground caused by overgrazing, and continually monitor your property for new infestations. Establishment of select grasses can be an effective control.

### BIOLOGICAL

Cattle, goats, and sheep will graze on Canada thistle when plants are young and succulent in the spring. Follow up grazing with a fall herbicide application. Insects are available, and provide limited control. Currently, collection and distribution methods for Canada thistle rust (*Puccinia punctiformis*) are being refined. For more information on Canada thistle biocontrol, contact the Colorado Department of Agriculture - Palisade Insectary at (970) 464-7916.

### MECHANICAL

Due to Canada thistle's extensive root system, hand-pulling and tilling create root fragments and stimulate the growth of new plants. Mowing can be effective if done every 10 to 21 days throughout the growing season. Combining mowing with herbicides will further enhance Canada thistle control.

### CHEMICAL

The table below includes recommendations for herbicides that can be applied to rangeland and some pastures. Treatments may be necessary for an additional 1 to 3 years because of root nutrient stores. Always read, understand, and follow the label directions.

| Herbicide | Rate | Application Timing |
|---|---|---|
| Aminopyralid* (Milestone) | 5-7 oz. product/acre + 0.25% v/v non-ionic surfactant OR 1 teaspoon product/gal water + 0.32 oz./gal water | Apply in spring at the pre-bud growth stage until flowering and/or to fall regrowth. Can also add chlorsulfuron (Telar) at 1 oz./acre to the mix. |
| Clopyralid + Triclopyr (Prescott; Redeem; others) | 3 pints product/acre + 0.25% v/v non-ionic surfactant OR 1.25 oz. product/gal water + 0.32 oz./gal water | Apply until flowering and/or fall regrowth. |
| Aminocyclopyrachlor + chlorsulfuron (Perspective)* | 5.5 oz. product/acre + 0.25% v/v non-ionic surfactant | Apply to spring rosette to flower bud growth stage; or fall. IMPORTANT: Applications greater than 5.5 oz. product/acre exceeds the threshold for selectivity. DO NOT treat in the root zone of desirable trees and shrubs. Not for use on grazed or feed forage. |
| Note: *Product not permitted for use in the San Luis Valley. | | |
| Additional herbicide recommendations for this and other species can be found at: **goo.gl/TvWnv9** | | |

**Colorado Department of Agriculture** - Conservation Services
305 Interlocken Parkway
Broomfield, CO 80021
(303) 869-9030
www.colorado.gov/ag/weeds

Updated:
07/2015

# Musk Thistle Identification and Management

List B

© Bruce Ackley, OH State University

Musk thistle *Carduus nutans* L. is a non-native biennial forb that reproduces solely by seed. During the first year of growth, a rosette forms in spring or fall. During the second year in mid to late spring, the stem bolts, flowers, sets seed, and the plant dies.

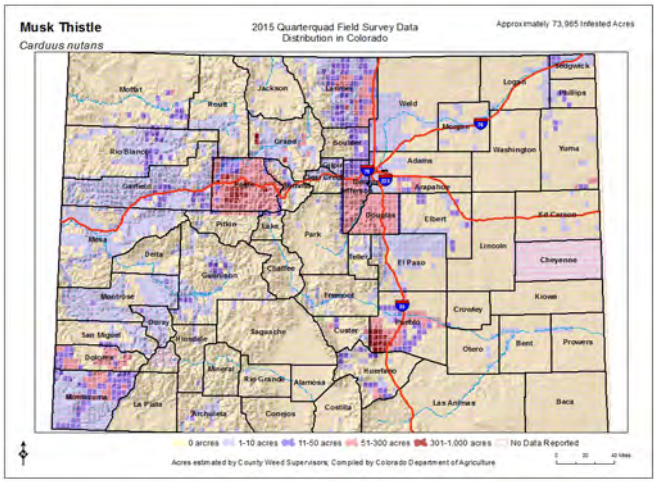
Musk thistle can grow up to 6 feet tall. The leaves have spines, are waxy, and dark green in color with a prominent light green to white midrib that can be seen from a distance. Leaves are dentately lobed; leaf bases sometimes extend down below the point of attachment. The terminal flower heads are purple, large in size (1.5 to 3 inches in diameter) and bend over as if nodding. These flower heads are made up of only disk flowers. They are surrounded by numerous, wide and stout lance-shaped, spine-tipped bracts that resemble an open pineapple. The pappus has plumose bristles that appear barbed under magnification. Musk thistle produces many flower heads. The tallest shoots flower first; lateral shoots develop in leaf axils. A robust plant may produce 100 or more flowering heads. Reproduction is usually via out-crossing through insect pollination, but self-pollination also occurs. Flowers emerge in May through September. Seeds develop shortly after flowers emerge. Flower buds can contain viable seeds from self-pollination. Seeds can mature on severed bud and flowerheads. Seeds remain viable in the soil for up to about 14 years. Seeds can germinate and emerge from spring through fall.

Musk thistle habitat is found in a variety of environments extending from shortgrass prairie to alpine. It is strongly associated with heavily disturbed sites, where over-use occurs or where site conditions are poor due to land management practices. This includes over-grazed areas, large fires, trails, ditches and roadsides. Infested livestock pasturs suffer from significantly decreased carrying capacity.

Because musk thistle reproduces solely from seed, the key for successful management is to prevent seed production. Once flowers emerge and start to produce seed, effective management options will become limited. Once sites are infested, musk thistle can form dense stands. Prevention, adjusting land management practices, a robust integrated treatment plan and restoration are critical to eliminating this species.

Musk thistle is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be eradicated; some populations may be contained or suppressed depending on state regulations. For management directions for each county, refer to the most recent Rule, or visit www.colorado.gov/ag/coweedcontacts for details.

## 2015 Quarter Quad Survey




© Chris Evans, University of IL

© Les Mehrhoff, DiscoverLife.org

### Key ID Points

1. Leaf with white midrib and leaf margins with spines.
2. Pappus with plumose barbed bristles.
3. Wide, stout lance-shaped bracts with spiny tips.

# Musk thistle

*Carduus nutans* L.

List B

# Integrated Weed Management Recommendations

Musk thistle
*Carduus nutans* L.

Effective integrated management means using a variety of eradication methods that also includes restoration, prevention of seed production and dispersal, and monitoring. Maintain robust healthy native landscapes and restore degraded sites. Avoid soil disturbance. As with most biennials, prevent seed production in the first and second year of musk thistle growth. Prevent seed from dispersing, such as on contaminated equipment. Rest sites until they are effectively restored. Change land use practices. Use methods appropriate for the site.


© Norman E. Rees, USDA Ag Research Service

## CULTURAL CONTROL METHODS

Musk thistle is not tolerant of competition and needs light to germinate seeds. Cultural methods should aim to maintain or restore a competitive assemblage of forbs, cool and warm season grasses. Implement whole site restoration of soils, plants and water regimes where stands of musk thistle exist where needed. Use locally adapted species that are ecologically appropriate for the site to improve competitiveness. Include annual as well as perennial species. Incorporate soil amendments, soil microbes and mycorrhizal fungi in restoration and land management efforts. Minimize soil compaction and disturbance, especially in wetlands and moist soil. Irrigation can increase competitive species.


© Eric Coombs, OR Dept of Agriculture

## BIOLOGICAL CONTROL METHODS

Although horses, cattle, goats and sheep may eat flower heads on a few plants, seeds pass through their digestive tracks unaltered and spread. The leaf and stalk spines can cause domestic livestock to avoid mature musk thistle. Thus, musk thistle can become an "increaser" in over-grazed systems. Properly managed grazing can improve vigor of desired species and indireclty reduce musk thistle. *Trichosirocalus horridus* is the only biological control agent available for musk thistle in Colorado. The other species, *Rhinocyllus conicus*, is not host specific and will damage native thistles, and therefore cannot be released as an agent in Colorado. For more information, visit the Colorado Department of Agriculture's Palisade Insectary website at www.colorado.gov/ag/biocontrol.


© Friends of NV Wilderness Stewardship Team

## MECHANICAL CONTROL METHODS

Methods, such as tilling, hoeing and digging, are best for infestations smaller than 0.5 acres; weigh this against other plants present, ecology and site condition. Sever roots below the soil surface during the first year before the plant stores energy, and in the second year before flower production. Mowing, chopping and deadheading stimulates more flower production; these methods require consecutive years of season-long treatments. All flowerbuds and heads must be collected, bagged, and disposed of or destroyed; seeds will mature and germinate if left on the ground. Prescribed fire that results in high soil burn severity damage roots and above ground biomass, but is not recommended due to impacts on desired plants. Fire generally favors musk thistle germination.

## CHEMICAL

NOTE: The following are recommendations for herbicides that can be applied to pastures and rangeland. Rates are approximate and based on equipment with an output of 30 gal/acre. Follow the label for exact rates. Always read, understand, and follow the label directions. The herbicide label is the LAW!

| HERBICIDE | RATE | APPLICATION TIMING |
|---|---|---|
| Aminopyralid* (Milestone) | 6 oz./acre + 0.25% v/v non-ionic surfactant | Apply in spring rosette to early bolting growth stages or in fall to rosettes. *Product not permitted for use in the San Luis Valley. |
| Chlorsulfuron** (Telar) | 1-2.6 oz. product/ acre + 0.25% v/v non-ionic surfactant | Apply in spring from rosette through very early flower growth stages. (Can prevent viable seed formation if applied no later than the first viable flowers begin to open.) **This herbicide has residual soil activity that will affect all broadleaf seedlings germinating after application has occurred. |
| Clopyralid (Transline) | 0.67-1.33 pints product/acre + 0.25% v/v non-ionic surfactant | Apply to rosettes through flower bud stage in spring, or to fall rosettes. |

**Colorado Department of Agriculture** - Conservation Services
305 Interlocken Parkway
Broomfield, CO 80021
(303) 869-9030
www.colorado.gov/ag/weeds

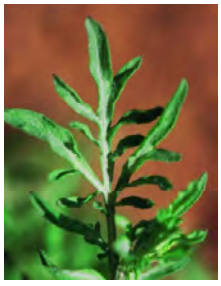
Rev. 11/16

Diffuse knapweed

Colorado Department of Agriculture

305 Interlocken Pkwy
Broomfield, CO 80021

(303) 869-9030
weeds@state.co.us



## Key ID Points

1. Floral bracts have yellow spines with teeth appearing as a comb and a distrinct terminal spinte.
2. Flowers are white or lavender.
3. Seedlings have finely divided leaves

Updated on:
07/2015

# Diffuse knapweed Identification and Management

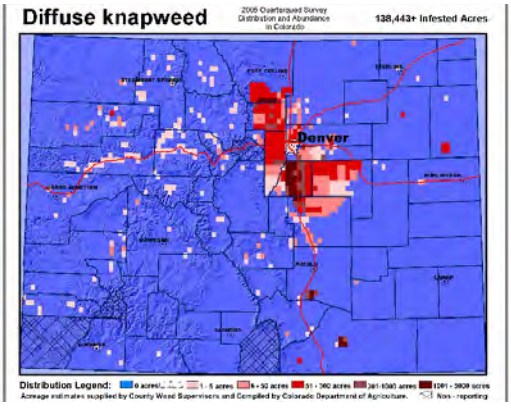
## Identification and Impacts

Diffuse knapweed *(Centaurea diffusa)* is a non-native biennial forb that reproduces solely by seed. A biennial is a plant that completes its lifecycle within two years. During the first year of growth, diffuse knapweed appears as a rosette in spring or fall. During the second year in mid to late spring – the stem bolts, flowers, sets seed, and the plant dies. Once the plant dries up, it breaks off at ground level and becomes a tumbleweed which disperses the still viable seeds over long distances. A prolific seed producer, diffuse knapweed can produce up to 18,000 seeds per plant. Therefore, the key to managing this plant is to prevent seed production. Diffuse knapweed can grow 1 to 3 feet tall, and is diffusely branched above ground. This gives the plant a ball-shaped appearance and tumble-weed mobility when broken off. Leaves are small, and are reduced in size near the flowering heads. Flowers are mostly white, sometimes purple, urn-shaped, and are located on each branch tip. Bracts that enclose the flowerheads are divided like the teeth of a comb, and are tipped with a distinct slender spine. Upon drying, the bracts become rough, rendering them injurious to the touch. Flowers bloom July through August. Seed set usually occurs by mid-August.

Diffuse knapweed tends to invade disturbed, overgrazed areas. Other habitats may also include rangeland, roadsides, riparian areas, and trails. It is a tough competitor on dry sites and rapidly invades and dominates disturbed areas. Once established, diffuse knapweed outcompetes and reduces the quantity of desirable native species such as perennial grasses. As a result, biodiversity and land values are reduced, and soil erosion is increased.

The key to effective control of Diffuse knapweed is to prevent the plant from flowering and going to seed. An integrated weed management approach dealing with Diffuse knapweed is highly recommended. There are many options of mechanical, chemical, and biological controls, available. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Diffuse knapweed is designated as a "List B" species on the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information, visit www.colorado.gov/ag/csd and click on the Noxious Weed Program link or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division at 303-239-4100.




Plant photo, top © Kelly Uhing. Infestation map above, Crystal Andrews. Flower photo © Cindy Roche. Rosette and leaf photos © Dale Swenarton.

*Centaurea diffusa*

Management Recomendations

**CULTURAL**
Establishment of selected grasses can be an effective cultural control of diffuse knapweed. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

**BIOLOGICAL**
The seedhead weevil (*Larinus minutus*) and the root weevil fly (*Cyphocleonus achates*) provide fair to good control when used in combination with each other. Expect to wait at least 3 to 5 years for the insects to establish and achieve optimum results. This is an option for large infestations. To obtain the insects, contact the Colorado Department of Agriculture, 970-464-7916.

**MECHANICAL**
**Any mechanical or physical method that severs the root below the soil surface will kill diffuse knapweed. Mowing or chopping is most effective when diffuse knapweed plants are at full-bloom. Be sure to properly dispose of the flowering cut plants, since seeds can mature and become viable after the plant has been cut down.**

*Integrated Weed Management:*

*Diffuse knapweed is best controlled in the rosette stage. It is imperative to prevent seed production. Do not allow diffuse knapweed flowers to appear. Management must be persistent in order to deplete the seed bank in the soil.*

# Diffuse knapweed

**HERBICIDES** : The following are recommendations for herbicides that can be applied to range and pasturelands. Always read, understand, and follow the label directions. Rates are approximate and based on equipment with an output of 30 gal/acre. Please read label for exact rates. **The herbicide label is the LAW!**

| Herbicide | Rate | Application Timing |
|---|---|---|
| Aminocyclopyrachlor + chlorsulfuron (Perspective)* | 4.75-8 oz. product/acre + 0.25% non-ionic surfactant | Pre-emergence or from seedling to mid-rosette stage. IMPORTANT: Applications greater than 5.5 oz. product/acre exceeds the threshold for selectivity. DO NOT treat in the root zone of desirable trees and shrubs. Not for use on grazed or feed forage. |
| Aminopyralid* (Milestone) | 5-7 oz./acre + 0.25% non-ionic surfactant | Spring at rosette to early bolt stage and/or in the fall to rosettes. Add 1 qt./acre 2,4-D or 3 oz. Perspective when treating in the bolting to flowering growth stages. |
| Clopyralid (Transline) | 0.67-1.33 pints/acre + 0.25% non-ionic surfactant | Apply to spring/fall rosettes before flowering stalk lengthens. Add 1 qt./acre 2,4-D when treating in the bolting to flowering growth stages. |
| Note: *Not permitted for use in the San Luis Valley. | | |
| Additional herbicide recommendations for this and other species can be found at: **goo.gl/TvWnv9** | | |

Weevil photo © J. Johnson, Univ. Idaho, bugwood.org. All other photos © Kelly Uhing.

# Chicory Identification and Management

List C

Chicory (*Cichorium intybus* L.) is a perennial forb in the Asteraceae family, also known as coffeeweed, French endive, and succory, not to be confused with curly endive (*Cichorium endivia* L.) (iNaturalist 2019).

Mature plants can be four feet tall. Oblanceolate basal leaves range in size from 5 to 35 cm long and are persistent (SEINet 2019). Their margins are highly variable, sometimes dentate or denticulate like dandelion leaves, sometimes pinnatifid (Plants of the World Online 2019). The rigid ascending stems have stiff short hairs. Branches are widely apart. Stems are hollow, have milky sap and linear ribs (University of Wisconsin-Madison 2019). Its stem leaves are sessile, rigid, oblong to lanceolate, usually with smooth margins, and are narrower than the basal leaves; short stiff hairs are on both surfaces and leaf margins. The base of leaves clasp the stem. Chicory has a very robust, long taproot and rootlets.

The peduncles leading to the flowers are very short, less than 2 mm. The inflorescence is an open panicle. The green stiff phyllaries are in two rows, each series has between five and six sepals; the outer row is reduced in size. The phyllaries are lanceolate and have glandular tipped hairs visible with a hand lens. The inflorescence has only ray flowers which are ligulate with five teeth on the edge (Jepson eFlora 2019). Flower color ranges from cornflower blue to off white. The stamens, style and bilobed stigma are usually blue. The pappus on the achene is nearly absent, consisting of minute toothed scales (Leach 1921). The achene has five ribs and since it lacks a feathery pappus architecture like many other Asteraceae plants, the seeds fall near the parent plants (Leach 1921). Chicory reproduces by seed and its longevity is at least 10 years (Priestley et al. 1985).

Chicory is often confused with blue flax (*Linum lewisii* Pursh) mainly due to their blue flower color and overlapping distributions. Being in a different plant family, upon closer inspection it becomes apparent that it lacks basal leaves, stem leaves are slender, the five petals are bi-lobed.

Chicory is native to Mediterranean areas in Europe, Africa, and Middle East. It has a long cultivation history for pharmacology dating back to ancient Egypt, Greek and Roman eras, 2000 BC. (Bahmani et al. 2015). Modern cultivation is for coffee substitution (roots) and salad (leaves). It has worldwide distribution. It has been in Colorado since at least 1872 when Townshend Stith Brandegee collected a specimen in Fremont County (SEINet 2019). In Colorado its either under-reported or rare. It is ruderal, inhabiting roadsides and disturbed areas at elevations below 8,000 feet.


© Andreas Stiller, iNaturalist

© Ron Burket, iNaturalist

### Key ID Points

1. Ligulate flowers with 5 teeth at ends
2. Blue stamens, style and bilobed stigma
3. Stiff short hairs on stems, leaves and achene
4. Persistent basal leaves resembling dandelion leaves

# Chicory

*Cichorium intybus* L.

List C

# Integrated Weed Management Recommendations

Effective integrated management means using a variety of eradication methods in the same site along with restoration, prevention of seed production and dispersal, and monitoring. Maintain robust healthy native landscapes. Restore degraded sites. Avoid soil disturbance. Prevent seed production and seed dispersal, e.g. on contaminated equipment. Rest sites until restored. Modify land use practices. Use methods appropriate for the site, including land use practices.

## Chicory
*Cichorium intybus L.*

© Weedsak, Alaska Bureau of Land Management

## CULTURAL

Since chicory is sensitive to competition from grasses, maintain or drill seed bluebunch wheatgrass (*Pseudoroegneria spicata*) and Sandberg bluegrass (*Poa secunda*) with vesicular-arbuscular mycorrhizae; these are drought tolerant natives that are highly competitive against chicory but require mycorrhizae. Native shrubs with competitive robust root biomass is another option. It is ruderal so minimize soil disturbance, especially near infestations. For cultivated sites, select native plants with blue flowers instead of chicory: *Scutellaria brittonii*, *Gentiana parryi*, *Mertensia lanceolata*, *Penstemon glaber*, *Eritrichium aretoides*, or *Aconitum columbianum*. Be cautious when purchasing seed as chicory may be in mixes. Use seed pillows to disperse seeds.

© California Department of Transportation

## MECHANICAL

Mechanical methods are best for residential areas, small infestations or soils where the entire taproot can be removed. Mowing is not recommended; it leaves roots behind, stimulates flower production, disperses seeds, and expands the size of the infested area. Chopping the inflorescence just below the root crown and bagging the biomass may reduce vigor with consecutively treatment; effectiveness is dependent on cultivare type. Collect, bag, and dispose of or destroy flowers; seeds can mature and germinate if left. Subsoiling must be deeper than 10 inches; use a subsoiler. Fall prescribed fire may kill seeds if hot enough; chicory sets seed through the growing season so timing is important. Fire is unlikely to affect its deep taproot. The effects to chicory from prescribed fire is not tested.

© EverGraze

## BIOLOGICAL

Chicory provides high quality forage for goats, sheep and cattle. It is sensitive to grazing; fall is best for control (Alemseged et al. 2003, Barry 1998, Li and Kemp 2005, Li et al. 2003). Properly managed grazing can improve vigor of desired species and indirectly reduce chicory. Currently there are no biological control agents for chicory authorized in Colorado. For biocontrol information, visit the Colorado Department of Agriculture's Palisade Insectary website at: www.colorado.gov/ag/biocontrol

© Aspen Public Radio

## CHEMICAL

NOTE: Herbicide recommendations to control chicory in pastures and rangeland are found at: https://goo.gl/TvWnv9. Rates are approximate and based on equipment with an output of 30 gal/acre. Follow the label for exact rates. Consult local turf and ornamental experts for residential settings. Always read, understand, and follow the label directions. The herbicide label is the LAW!

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# APPENDIX B
# GENERAL CHEMICAL/HERBICIDE SELECTION SHEETS

# Chemical Weed Matrix

March 2019

| | Canada Thistle - Creeping perennial; 6-10 inches to bud or fall | Musk Thistle; Scotch Thistle & Bull Thistle - Biennial; rosette stage or fall | Russian Knapweed - Creeping perennial; bud to early flower or fall | Diffuse Knapweed; Spotted Knapweed - Biennial or simple perennial; rosette stage or fall | Field Bindweed - Creeping perennial; at full bloom or fall | Hoary Cress; Perennial Pepperweed - Creeping perennial; bolting to bud maybe bloom | Leafy Spurge - Creeping perennial; spring true flowers or fall** | Absnith Wormwood - Perennial; 12 inches to flowering or fall | Mullein - Biennial; Rosette to pre-bud or fall | Yellow Toadflax; Dalmatian Toadflax - Creeping perennial; bud to early flowering or fall | Cheatgrass (Downy Brome) - annual; early germination, maybe spring |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tordon 22K (Picloram)- RU No trees or water; Graze- 14D wait | 1 quart/acre with NIS | 1 quart/acre with NIS | 1 quart/acre with NIS | 1 quart/acre with NIS | 1 quart/acre PLUS 2,4-D @ 1 quart/acre with NIS | NA | 1 quart/acre with NIS | 1 pint/acre with NIS | 1 - 1.5 pints /acre w/NIS | 1 quart/acre with NIS | NA |
| Milestone (aminopyralid) - Some trees; To waters edge: No irrigation; No Graze wait | 5-7 oz/acre with NIS | 3-5 oz/acre with NIS | 4 -6 oz/acre with NIS | 5-7 oz/acre with NIS | NA | NA | NA | 7 oz/acre with NIS | 7 oz/acre with NIS | NA | NA |
| Curtail (Clopyralid & 2,4-D) - Some trees; No water; Graze - 14 D wait | 2 -3 quarts/acre with NIS | 1.5-2 quarts/acre with NIS | 3 quarts/acre with NIS | 2 quarts/ acre with NIS | NA | NA | NA | 2 quarts/ acre with NIS | NA | NA | NA |
| Transline (Clopralid) - Most trees; No water; Graze - no wait. | 0.66 - 1.33 pints/acre with NIS | 0.33 - 1 pints/ acre with NIS | 1 - 1.33 pints /acre with NIS | 0.66 - 1.33 pints/acre with NIS | NA | NA | NA | NA | NA | NA | NA |
| 2,4-D - Careful trees; Maybe water = formulation; Graze - 7D wait | weak alone | 1 quart/acre with NIS | weak alone | weak alone | weak alone | 3 quarts/acre with NIS | 2 -3 quarts/acre with NIS | weak alone | 1 quart /acre w/NIS | NA | NA |
| Clarity/Banvel (Dicamba) - No trees or water; Graze - 21D wait | weak alone | 1 quart/acre with NIS | weak alone | weak alone | weak alone | | weak alone | weak alone | NA | NA | NA |
| Dicamba & 2,4-D - Graze - 7D; No water or trees; | 1 quart each/acre with NIS | | 1 quart each/acre with NIS | 1 quart each/acre with NIS | 1 quart each/acre with NIS | | 1 quart each/acre with NIS | 1 quart each/acre with NIS | NA | NA | NA |
| Glyphosate (40-50%) - Trees okay; Yes water depending on label; **Non-selective** | 2 quarts/acre | 1.5 quarts/acre | NA | 1.5 quarts/acre | 4-5 quarts/acre | 4 quarts/acre | 3.3 quarts/acre; partial control | | 2-3 quarts/ acre | 2 quarts/acre | 4-5 quarts/acre |
| Panoramic (Imazapic) - Some trees; waters edge ok; No irrigation; Graze - no wait | NA | 8 -10 oz/acre with MSO | 8 -10 oz/acre with MSO | NA | NA | 8 oz/acre with MSO | 10 oz/acre with MSO | NA | NA | 10 oz/acre with MSO | 6-8 oz/acre with NIS |
| Telar (Chlorsulfuron) - Some trees; waters edge ok; Graze - no wait | 1-2.6 oz/acre with NIS | 1 oz/acre with NIS | NA | NA | NA | 1 oz/acre with NIS | NA | NA | 1-2.6 oz/acre with NIS | Yellow: 1.25 oz/acre with NIS; Dalmatian 2 - 2.6 oz/acre with NIS | NA |
| Escort XP (Metsulfuron) - Some trees; waters edge ok; No irrigation; Graze - no wait | 1.5 to 2 oz/acre with NIS | 1 to 2 oz/acre with NIS | 1.5 to 2 oz/acre with NIS (suppression) | NA | NA | 1 to 2 oz/acre with NIS | NA | NA | 1 to 2 oz/acre with NIS | 1.5 to 2 oz/acre with NIS (suppression) | NA |
| Vista XRT (Fluroxypyr) - Some trees, some water; Graze - no wait | 4-6 oz Vista and 4-7 oz Milestone | 4-6 oz Vista and 4-7 oz Milestone | 4-6 oz Vista and 4-7 oz Milestone | 4-6 oz Vista and 4-7 oz Milestone | 6 oz Vista and 1/2 pint Tordon | 4-6 oz Vista and 3.3 oz Opensight | 23 oz /acre with MSO | NA | 6 oz Vista and 1/2 pint Tordon | NA | NA |

**Herbicide Options Around Various Water Situations** ** The label is the law. Read it for more details.

| | Outside banks of irrigation ditch | Top of ditch bank | Inside banks of Irrigation ditch | To waters edge of wetlands, rivers and lakes | To seasonally dry wetladns, marshes , bogs | In rivers | In lakes | Drainage or non-irrigation ditch banks | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Aquatic 2,4-D amine; EPA #: 34707-120 & 5905-549 & 11773-2 | Yes | Yes | Yes - do not spray water surface | Yes; up to 2 foot overspray into water allowed | Yes | Yes | Yes | Yes; except for small canals with less than 10 CFS | Max. treatments/year2 |
| Glyphosate; (Rodeo - EPA #: 62719-324) | Yes | Yes | Yes | Yes | | Yes | Yes | Yes | |
| Arsenal (EPA #: 241-346) | Yes, w/caution possible 120 day restriction | Yes, w/caution possible 120 day restriction | Yes, w/ 120 day restriction | Yes | Yes | Maybe | Yes | Yes | non-selective product that will move |
| Garlon 3A (EPA#: 62719-37); Vastlan (EPA#: 62719-687) | Yes, w/caution possible 120 day restriction | Yes, w/caution possible 120 day restriction | Yes, w/ 120 day restriction | Yes, minimize overspray | Yes | No | No | Yes | Can contaminate ground water |
| Clearcast (EPA #: 241-437) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Limited Species of Control |
| Banvel (EPA#: 66330-276) | Maybe | Maybe | No | No | No | No | No | No | Do not contaminate water |
| Milestone (EPA#: 62719-519) | Maybe | Maybe | No | Yes, take precautions to avoid drift | Yes | No | No | Yes | Do not apply directly to water |
| Telar | No | No | No | No | Yes | No | No | No | Do not apply directly to water |
| Triclopyr 3 (EPA #: 81927-13) | No | No | No | Yes, minimize overspray | Yes | No | Yes | Yes | |

# Range and Pasture Chemicals for Grasses

| Trade Name | Chemical | Trees | Water | Grazing Restrictions | Haying Restrictions | Reseeding Restrictions | Newly Seeded | Notes |
|---|---|---|---|---|---|---|---|---|
| Tordon 22K | Picloram | No | No | Dairy = 2wks | 2 weeks | 3-6 months | Well est./ 2nd root ~ 60 days | max. rate is 2 qt/acre/yr. License required. |
| Milestone | Aminopyralid | Some | edge ok | none | none if kept on property - not for sale for 18 months | 3-6 months | Well est./ 2nd root ~ 60 days | 14 days to work..max. rate is 7oz/acre/yr |
| ForeFront HL | Aminopyralid + 2,4-D | Some | edge ok | Dairy = 7 D | 7 days | 3-6 months | Well est./ 2nd root ~ 60 days | max rate is 84 oz/acre/yr |
| Opensight | Aminopyralid + metsulfuron | Careful | edge ok | none | none if kept on property - not for sale for 18 months | 3-6 months | previous growing season and fully tillered | Do not use on Timothy or other cool season grasses for hay. |
| Curtail | Clopyralid + 2,4-D | Careful | No | Dairy = 14 D | 7 days | 3-6 months | Well est./ 2nd root | max rate is 4 qts/acre/year - Do not use clippings, hay or manure for mulch for 18 months |
| Transline | Clopyralid | Ok | No | none | none | 3-6 months | Well est./ 2nd root | max rate is 1.33 pints/acre/yr - Do not use clippings, hay or manure for mulch for 18 months |
| Panormaic 2SL | Imazapic | Some | edge ok | none | none | 3-6 months | well est….5 leaf stage | shows symptons slowly; max rate = 12 oz/acre |
| Telar XP | Chlorsulfuron | Some | edge ok | none | none | 1-6 months | Well est./ 2nd root ~ 60 days | up to 3 weeks to show signs of treatment. At 1 1/3 for no restrictions. Max rate is 3 oz/acre/yr |
| Escort XP | Metsulfuron | Some | edge ok | none | none | 1-4 months | Well est...3-4 leaf stage | up to 4 weeks to show signs of treatment max rate is 1 2/3 oz/acre/yr for no restrictions. At 3 1/3 oz/acre/yr 3 day interval |
| 2,4-D | 2,4-D | Maybe | Maybe | 7 days | 30 days | 3 months | Well est./ 2nd root ~ 60 days | check for aquatic label max rate is 2 qts/acre/season |
| Clarity | Dicamba | No | No | Dairy = 21 D | 51 days | 90 days | Exceeds 3 leaf stage | also sold as Banvel max. rate is 64 oz (4 pints)/acre/yr |
| Outlaw, Weedmaster, Rangestar, Brash | Dicamba + 2,4-D | No | No | Dairy = 7 D | 37 days | 3 weeks and up | 30-60 days | max. rate is 8 pints/acre/yr |
| Glyphomax | Glyphosate (41%) | Ok | near edge | 8 wks after application | 8 wks after application | 7 days | not recommended | non-selective 7 or more days to show symptoms |
| E2 | 2,4-D, Fluroxypyr and Dicamba | No | No | Dairy - 7 D | 7 days | 3 weeks and up | Not indicated on the label | 2 pounds of 2,4-D/acre/application. Minimum 21 days between applications. Limited to 2 applications/year. Don't use on buffalograss. |
| Vista XRT | Fluroxypyr | Some | some | none | 7 days | 4 months | Not indicated on the label | Remove meat animals eating treated forage 2 days before slaughter. Maximum use 23 oz/acre |
| Esplanade 200SC | Indaziflam | yes | No | Not Allowed | Not Allowed | 8 months min. | Well established. 1-2 years | Do not use more than 10 oz/ 12 calendar months |

** Read the label. It is the law and may change from year to year.

March 19, 2019