Exhibit D:
Weed Management

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North Metro Natural Gas Pipeline Project

Weed Management and Revegetation Plan

November 2016

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1. Introduction

Tetra Tech, Inc. was retained by Public Service Company of Colorado (PSCo), doing business as Xcel Energy, to provide a Weed Management and Revegetation Plan (Plan) for a segment of a new natural gas pipeline (the Project), located in Adams and Denver counties, Colorado. Xcel Energy proposes to install approximately 5 miles of new 24-inch natural gas pipeline from a proposed new pressure regulating facility at the Cherokee Station Power Plant to a proposed regulator station southwest of the intersection of Interstate 25 (I-25) and Interstate 70 (I-70). This Project will reinforce the natural gas system infrastructure and provide improved and reliable service to the northern metro area in both Adams and Denver counties. This Project is needed to meet the increased demand for natural gas services as a result of the recent population growth and urban development in the Denver metro area. A majority of the proposed pipeline will be either trenched or bored underneath the existing paved road. Some Project features, such as laydown areas, bore areas, and regulator station siting areas, will be located adjacent to the roadway.

When the pipeline is not located in public right-of-way (ROW), PSCo will seek a 50-foot permanent ROW and an additional 25-foot temporary construction ROW. One preferred route and several alternative segments for the pipeline are being considered for the Project (Figure 1). The final pipeline alignment will be determined as part of the permitting process, which PSCo anticipates completing by spring 2017. PSCo plans to begin construction in early summer 2017. For the purposes of this Plan, and to allow for route changes for the pipeline before construction, the preferred route and all of the alternative segments, along with a 100-foot buffer on each side of the centerline for each route and the proposed regulator station site, staging areas, and valve set sites with no buffers (depicted in Figure 1) are collectively referred to in this report as the Study Area.

The Route Selection Report (Tetra Tech 2016b) provides general Project information and documents the process used to identify and analyze alternative routes to be carried forward to the permitting phase of the Project. The purpose of this Plan is to (1) describe applicable regulations pertaining to noxious weeds in the study area, (2) present the results of preliminary assessment and documentation of vegetation and weeds in the study area, and (3) provide recommendations for successful revegetation and integrated weed management of the project ROW for the pre- and post-construction period of this project.

2. Regulatory Setting

2.1 Colorado Noxious Weed Act

The state of Colorado promulgated the Colorado Noxious Weed Act (Act) in 1990 within Title 35, Article 5.5, Parts 110 through 119, in 1990. The Act initially created three lists: A, B and

C. The state subsequently added a watch list. The most recent update to the weed lists became effective December 30, 2015 (CDOA 2015b). Noxious weeds are defined in the Act:

> *Noxious weed" means an alien plant or parts of an alien plant that have been designated by rule as being noxious or has been declared a noxious weed by a local advisory board, and meets one or more of the following criteria:*
> *(a) Aggressively invades or is detrimental to economic crops or native plant communities;*
> *(b) Is poisonous to livestock;*
> *(c) Is a carrier of detrimental insects, diseases, or parasites;*
> *(d) The direct or indirect effect of the presence of this plant is detrimental to the environmentally sound management of natural or agricultural ecosystems.*

Noxious weeds have become one of the most important issues for owners and managers of agricultural and open space lands. Weeds can cause economic losses to agriculture in both croplands and rangelands. They can also crowd out native vegetation and generally provide lower quality wildlife habitats than native vegetation.

The following basic actions will be taken by PSCo to comply with the Colorado Noxious Weed Act and are described in further detail in this management plan:

- Survey for weed infestations before and after ground-disturbing activities are undertaken.
- Use appropriate construction practices to minimize noxious weed infestations.
- Revegetate disturbed areas.
- Monitor disturbed areas.
- Treat new infestations.

2.2 Colorado Noxious Weed List

The state of Colorado has designated three types of noxious weeds that require management actions (CDOA 2015b):

- Colorado List A species are designated by the Commissioner for eradication. There are 25 List A species.
- List B weed species are species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, develops and implements state noxious weed management plans designed to stop the continued spread of these species. There are 36 List B species.
- List C weed species are species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands. The goal of such plans will not be to stop the continued spread of these species but to provide additional education, research, and

biological control resources to jurisdictions that choose to require management of List C species. There are 15 List C species.

The Watch List species are species that have been determined to pose a potential threat to the agricultural productivity and environmental values of the lands of the state. The Watch List is intended to serve advisory and educational purposes only. Its purpose is to encourage the identification and reporting of these species to the Commissioner in order to facilitate the collection of information to assist the Commissioner in determining which species should be designated as noxious weeds. There are 24 Watch List species.

The state listed noxious weed species are summarized in Table 1.

Table 1:
Colorado Noxious Weed List

List	Common Name	Scientific Name
Colorado List A	African rue	*Peganum harmala*
	Camelthorn	*Alhagi pseudalhagi*
	Common crupina	*Crupina vulgaris*
	Cypress spurge	*Euphorbia cyparissias*
	Dyer's woad	*Isatis tinctoria*
	Elongated mustard	*Brassica elongata*
	Flowering rush	*Butomus umbellatus*
	Giant reed	*Arundo donax*
	Giant salvinia	*Salvinia molesta*
	Hairy willow-herb	*Epilobium hirsutum*
	Hydrilla	*Hydrilla verticillata*
	Bohemian Knotweed	*Polygonium x bohemicum*
	Giant Knotweed	*Polygonium sachalinese*
	Japanese Knotweed	*Polygonium cuspidatum*
	Meadow knapweed	*Centaurea pratensis*
	Mediterranean sage	*Salvia aethiopis*
	Medusahead	*Taeniatherum caput-medusae*
	Myrtle spurge	*Euphorbia myrsinites*
	Orange hawkweed	*Hieracium aurantiacum*
	Parrotfeather	*Myriophyllum aquaticum*
	Purple loosestrife	*Lythrum salicaria*
	Rush skeletonweed	*Chondrilla juncea*
	Squarrose knapweed	*Centaurea virgata*
	Tansy ragwort	*Senecio jacobaea*
	Yellow starthistle	*Centaurea solstitialis*
Colorado List B	Absinth wormwood	*Artemisia absinthium*
	Black henbane	*Hyoscyamus niger*
	Bouncingbet	*Saponaria officinalis*
	Bull thistle	*Cirsium vulgare*

Table 1:
Colorado Noxious Weed List

List	Common Name	Scientific Name
	Canada thistle	*Breea arvensis* (*Cirsium arvense*)
	Chinese clematis	*Clematis orientalis*
	Corn chamomile	*Anthemis arvensis*
	Mayweed chamomile	*Anthemis cotula*
	Scentless chamomile	*Tripleurospermum perforatum*
	Chinese clematis	*Clematis orientalis*
	Common tansy	*Tanacetum vulgare*
	Common teasel	*Dipsacus fullonum*
	Corn chamomile	*Anthemis arvensis*
	Common teasel	*Dipsacus fullonum*
	Cutleaf teasel	*Dipsacus laciniatus*
	Dalmatian toadflax	*Linaria dalmatica*
	Dame's rocket	*Hesperis matronalis*
	Diffuse knapweed	*Acosta diffusa (Centaurea diffusa)*
	Eurasian watermilfoil	*Myriophyllum spicatum*
	Hoary cress	*Cardaria draba*
	Houndstongue	*Cynoglossum officinale*
	Jointed goatgrass	*Aegilops cylindrica*
	Leafy spurge	*Euphorbia esula*
	Moth mullein	*Verbascum blattaria*
	Musk thistle	*Carduus nutans*
	Oxeye daisy	*Chrysanthemum leucanthemum*
	Perennial pepperweed	*Lepidium latifolium*
	Plumeless thistle	*Carduus acanthoides*
	Russian knapweed	*Acroptilon repens*
	Russian-olive	*Elaeagnus angustifolia*
	Salt cedar	*Tamarix chinensis, T.parviflora, and T. ramosissima*
	Scentless chamomile	*Matricaria perforata*
	Scotch thistle	*Onopordum acanthium, and O. tauricum*
	Spotted knapweed	*Centaurea maculosa*
	Sulfur cinquefoil	*Potentilla recta*
	Wild caraway	*Carum carvi*
	Yellow nutsedge	*Cyperus esculentus*
	Yellow toadflax	*Linaria vulgaris*
Colorado List C	Bulbous Goatgrass	*Poa bulbosa*
	Chicory	*Cichorium intybus*
	Common burdock	*Arctium minus*
	Common mullein	*Verbascum thapsus*
	Common St. Johnswort	*Hypericum perforatum*
	Downy brome	*Bromus tectorum*
	Field bindweed	*Convolvulus arvensis*

Table 1:
Colorado Noxious Weed List

List	Common Name	Scientific Name
	Halogeton	*Halogeton glomeratus*
	Perennial sowthistle	*Sonchus arvensis*
	Poison hemlock	*Conium maculatum*
	Puncturevine	*Tribulus terrestris*
	Quackgrass	*Elymus repens*
	Redstem filaree	*Erodium cicutarium*
	Velvetleaf	*Abutilon theophrasti*
	Wild proso millet	*Panicum miliaceum*

Source: CDOA 2015a.

2.3 Adams County Noxious Weed Management Plan

Adams County established a Noxious Weed Management Plan (Adams County Plan) and a Noxious Weed Enforcement Policy in May 2008 (the Policy) which is included as Attachment 1. Under the Adams County Plan, Adams County has adopted the state weed list, and have added two noxious weeds as B-List species: Japanese knotweed (*Polygonum cuspidatum*) and common reed (*Phragmites australis*). The noxious weed control supervisor for Adams County is Mr. Chris Ness. The Adams County Plan states:

> *Cooperation from all landowners/occupants regarding timely noxious weed management will be encouraged via positive communication and education efforts. The Weed Office or its agent will continue to apply herbicides to a limited acreage of noxious weeds on private lands by landowner or tenant request, consistent with County policies. Where noxious weeds are still found, an enforcement process will be initiated to ensure control of the Weeds.*

According to the Policy, landowners in Adams County are required to manage noxious weed infestations. The policy also outlines criteria for county officials to inspect for noxious weed infestations on public and private land and identifies methods of notification to landowners if an infestation is found to occur and it requires that the notified landowner comply with the terms of the notification and the policy. If the landowner does not comply with the terms, the county may enter upon the land and undertake the management of noxious weeds. In this case, the Adams County Plan outlines a method for the county to recover costs of management.

2.4 Adams County Noxious Weed Management List

According to Adams County Weed Supervisor Chris Ness, Adams County actively pursues eradication of both List A and List B species (Chris Ness 2016). The Colorado Department of Agriculture (CDOA) maintains a list of noxious weed summary statistics and management plans for each county according to the Colorado Noxious Weed Act. The CDOA gathers data on a set of five different listed weed species each year. The data collected are used to

develop the summary for each county. The summary statistics include a list of the species reported in Adams County and county-specific management goals for each species. The summary statistics for Adams County are included as Table 2.

Table 2:
Adams County Noxious Weed Management List

Species	Scientific Name	Total # of Acres Infested in the County	Adams County Management Plan[1]	Year Field Data Was Collected
Absinth wormwood	*Artemisia absinthium*	0	Eliminate by 2018	2013
Black henbane	*Hyoscyamus niger*	0	Eliminate by 2018	2013
Bouncingbet	*Saponaria officinalis*	13	Eliminate by 2016	2011
Bull thistle	*Cirsium vulgare.*	6	Contain: Figure 16.01	2015
Canada thistle	*Cirsium arvense*	Not reported	Suppress	2015
Chamomiles	*Anthemis* spp.	4	Eliminate by 2016	2011
Chinese clematis	*Clematis orientalis*	0	Eliminate by 2018	2013
Common tansy	*Tanacetum vulgare*	0	Eliminate by 2016	2011
Common teasel	*Dipsacus fullonum*	136	Contain: Figure 21.01	2015
Cutleaf teasel	*Dipsacus laciniatus*	162	Contain: Figure 21.01	2015
Dalmatian toadflax	*Linaria dalmatica*	0	Eliminate by 2019	2014
Dames rocket	*Hesperis matronalis*	4	Contain: Figure 23.01	2010
Diffuse knapweed	*Centaurea diffusa*	1	Contain: Figure 6.01	2014
Eurasian watermilfoil	*Myriophyllum spicatum*	0	Contain: Figure 17.01	2015
Hoary cress	*Cardaria draba*	13	Contain: Figure 13.01	2014
Houndstongue	*Cynoglossum officinale*	0	Eliminate by 2018	2013
Jointed goatgrass	*Aegilops cylindrica*	20	Contain: Figure 24.01	2010/2015
Leafy spurge	*Euphorbia esula*	10	Contain: Figure 12.01	2014
Moth mullein	*Verbascum blattaria*	5	Eliminate by 2014	2010
Musk thistle	*Carduus nutans*	432	Eliminate by 2022	2015
Oxeye daisy	*Chrysanthemum leucanthemum*	0	Eliminate by 2018	2013
Perennial pepperweed	*Lepidium latifolium*	2	Contain: Figure 10.01	2014
Plumeless thistle	*Carduus acanthoides.*	0	Eliminate by 2018	2013
Russian knapweed	*Acroptilon repens*	10	Contain: Figure 14.01	2014
Russian olive	*Elaeagnus angustifolia*	78	Eliminate by 2022	2012
Salt cedar	*Tamarix parviflora*	15	Contain: Figure 4.01	2014
Scotch thistle	*Onopordum acanthium*	412	Contain: Figure 20.01	2009/2015
Spotted knapweed	*Centaurea maculosa*	0	Eliminate by 2018	2013
Sulfur cinquefoil	*Potentilla recta*	1	Eliminate by 2012	2008
Wild caraway	*Carum carvi*	Not reported	Eliminate by 2016	2011
Yellow nutsedge	*Cyperus esculentus*	0	Eliminate by 2017	2012
Yellow toadflax	*Linaria vulgaris*	7	Eliminate by 2021	2014

Source: CDOA (2016b)

1 Figure numbers refer to containment maps included in the 2015 Noxious Weed Act—Rules and Regulation Containment Figures by Counties (CDOA 2016c.)

2.5 Denver County Noxious Weed Management List

The Denver County Noxious weeds coordinator is Ms. Kelly Uhing. According to Ms. Uhing, Denver County manages noxious weeds specifically from the State Noxious Weeds List and follows the state management requirements (Kelly Uhing 2016). Ms. Uhing explained that Denver's management plan is in need of updates and offered technical expertise on the most effective management methods. As discussed in Section 2.4, the CDOA maintains a list of noxious weed summary statistics and management plans for each county according to the Noxious Weed Act. The summary statistics include a list of the species reported in Denver County and county-specific management goals for each species. Summary statistics and management plans for Denver County are included as Table 3.

Table 3:
Denver County Noxious Weed Management List

Species	Scientific Name	Total # of Acres Infested in the County	Adams County Management Plan[1]	Year Field Data Was Collected
Absinth wormwood	*Artemisia absinthium*	0	Eliminate by 2018	2013
Black henbane	*Hyoscyamus niger*	0	Eliminate by 2018	2013
Bouncingbet	*Saponaria officinalis*	31	Contain: Figure 26.01	2011
Bull thistle	*Cirsium vulgare.*	1	Eliminate by 2020	2015
Canada thistle	*Cirsium arvense*	2,500	Suppress	2015
Chamomiles**	*Anthemis spp.*	0	Eliminate by 2016	2011
Chinese clematis	*Clematis orientalis*	1	Eliminate by 2018	2013
Common tansy	*Tanacetum vulgare*	2	Eliminate by 2016	2011
Common teasel	*Dipsacus fullonum*	41	Suppress	2015
Cutleaf teasel	*Dipsacus laciniatus*	39	Suppress	2015
Dalmatian toadflax	*Linaria dalmatica*	45	Eliminate by 2021	2014
Dames rocket	*Hesperis matronalis*	4	Contain: Figure 23.03	2010
Diffuse knapweed	*Centaurea diffusa*	352	Suppress	2014
Eurasian watermilfoil	*Myriophyllum spicatum*	25	Contain: Figure 17.03	2015
Hoary cress	*Cardaria draba*	284	Suppress	2014
Houndstongue	*Cynoglossum officinale*	70	Eliminate by 2020	2013
Jointed goatgrass	*Aegilops cylindrica*	25	Contain: Figure 24.03	2010/2015
Leafy spurge	*Euphorbia esula*	257	Suppress	2014
Moth mullein	*Verbascum blattaria*	0	Eliminate by 2014	2010
Musk thistle	*Carduus nutans*	10	Suppress	2015
Oxeye daisy	*Chrysanthemum leucanthemum*	0	Eliminate by 2018	2013
Perennial pepperweed	*Lepidium latifolium*	152	Contain: Figure 10.05	2014
Plumeless thistle	*Carduus acanthoides.*	0	Eliminate by 2018	2013
Russian knapweed	*Acroptilon repens*	30	Eliminate by 2021	2014
Russian olive	*Elaeagnus angustifolia*	595	Eliminate by 2022	2012
Salt cedar	*Tamarix parviflora*	19	Eliminate by 2019	2014
Scotch thistle	*Onopordum acanthium*	16	Suppress	2009/2015

Table 3:
Denver County Noxious Weed Management List

Species	Scientific Name	Total # of Acres Infested in the County	Adams County Management Plan[1]	Year Field Data Was Collected
Spotted knapweed	*Centaurea maculosa*	0	Eliminate by 2018	2013
Sulfur cinquefoil	*Potentilla recta*	3	Eliminate by 2012	2008
Wild caraway	*Carum carvi*	0	Eliminate by 2016	2011
Yellow nutsedge	*Cyperus esculentus*	486	Suppress	2012
Yellow toadflax	*Linaria vulgaris*	69	Contain: Figure 8.03	2014

Source: CDOA (2016b)

1 Figure numbers refer to containment maps included in the 2015 Noxious Weed Act- Rules and Regulation Containment Figures by Counties. Available at: http://www.colorado.gov/agconservation/NoxiousWeedRuleFigures.pdf

3. Site Description

The pre-construction Biological Resources Report (Tetra Tech 2016a) included a desktop analysis and field observations of the existing vegetative conditions in the ROW, including identification and documentation of native and non-native species and identification and documentation of singular occurrences and large infestations of state listed noxious weeds. The assessment did not include an estimate of percent vegetative cover and did not constitute a formal noxious weed survey. The following sections include a summary of the findings of the assessment.

3.1.1 Land Use

Land use in the study area is primarily urban, including residential and major streets, parking lots and landscaping for industrial and commercial property, and some open space that has been previously disturbed by construction of roads and buildings. The ROW crosses some vacant parcels that are primarily unvegetated or dominated by non-native species.

3.1.2 Ecoregional Setting

The Study Area is completely situated in the High Plains Level III Ecoregion. The High Plains Ecoregion includes four Level IV ecoregions. The Study Area lies within the Flat to Rolling Plains (25d) Level IV ecoregion (Chapman et al. 2006). This ecoregion is characterized by flat to rolling plains with small depressional wetlands (playas) scattered throughout the landscape. Streams are intermittent; a few large perennial streams are present. Soils are generally silty or sandy. Annual precipitation is approximately 12–18 inches. Natural vegetation consists of shortgrass prairie species such as blue grama (*Bouteloua gracilis*), buffalograss (*Buchloë dactyloides*), with threadleaf sedge (*Carex filifolia*), fringed sage (*Artemisia frigida*), Junegrass (*Koeleria macrantha*), and western wheatgrass (*Pascopyrum smithii*). Riparian areas typically contain plains cottonwood (*Populus deltoides* ssp. *monilifera*), shrubs, and herbaceous species. Extensive dryland farming occurs in this

ecoregion with areas of scattered irrigated cropland. The main cash crop is winter wheat; forage crops make up the remainder of the cash crops.

3.1.3 Vegetation

Three basic cover types were observed during the field review: shortgrass prairie, palustrine emergent wetlands, and disturbed/developed lands. These cover types, and common plant species observed within them, are described below.

3.1.4 Shortgrass Prairie

Shortgrass prairie would be the dominant native ecosystem type in the Study Area under natural conditions. Shortgrass prairie species were observed in isolated low-quality patches, often interspersed with or surrounded by listed and non-listed weeds. No areas of high-quality unfragmented shortgrass prairie were observed. Typical shortgrass prairie species observed during the field review included buffalograss (*Buchloë dactyloides)*, blue grama (*Bouteloua gracilis)*, western wheatgrass (*Pascopyrum smithii*) and sideoats grama (*Bouteloua curtipendula*). Rabbitbrush (*Ericameria nauseosa*), a perennial shrub, was also observed in areas with shortgrass prairie vegetation.

3.1.5 Palustrine Emergent Wetlands

Several potential palustrine emergent (PEM) wetlands, as defined by the U.S. Fish and Wildlife Service Classification of Wetlands and Deepwater Habitats of the United States (Cowardin 1979), were identified in the Biological Report (Tetra Tech 2016a). These wetland resources may be avoided through relocating the ROW or horizontal directional drilling techniques if practicable.

These wetlands are located in roadside ditches or stormwater conveyances or detention ponds and may be located adjacent to storm water inlets/outlets or in isolated occurrences. Wetlands in the Study Area contained broad-leaved cattail (*Typha latifiolia*), barnyardgrass (*Echinochloa crus-galli*), pink smartweed (*Polygonum pensylvanicum*), and softstem bulrush (Schoenoplectus tabernaemontani). The C-List Noxious weed common mullein (*Verbascum thapsus*), was noted in or around many of the observed wetlands.

3.1.6 Disturbed/Developed

Disturbed/developed lands were the most common land use in the Study Area. Disturbed or developed areas include residential, commercial, and industrial settings with limited greenways. Weeds are often a dominant component in the vegetation of disturbed areas.

The disturbed/developed land is the dominant land cover for all segments of the preferred and alternative routes. Typical species in disturbed/developed areas include field bindweed (*Convolvulus arvensis,* C-List), downy brome (B*romus tectorum,* C-List), kochia (*Bassia sieversiana, not listed*), alfalfa (*Medicago sativa, not listed*), and puncturevine (*Tribulus terrestris, C-List*). Several non-native grasses, planted originally for grazing, are also

common, including smooth brome (*Bromopsis inermis*), crested wheatgrass (*Agropyron cristatum* ssp. *desertorum*), and intermediate wheatgrass (*Thinopyrum intermedium*).

3.1.7 Field Reconnaissance Weed Identification

A field reconnaissance was conducted in October 2016 (Tetra Tech 2016). During the survey, no Colorado List A or B species were identified in the Study Area (Table 4). Four List C noxious weeds were identified. No large infestations of noxious weeds were identified. Kochia was observed throughout the Study Area, sometimes forming dense monotypic stands in disturbed areas. Kochia is obviously a non-native with invasive tendencies, but is no longer on the CDOA weed list. No dense infestations of noxious weeds were observed in the study area. Downy brome (List C) was prevalent in some disturbed vacant areas.

Table 4:
Weed Species Observed in the Study Area

State Weed List (A, B, or C)	Common Name	Scientific Name
List A Weeds	None observed.	—
List B Weeds	None observed.	—
List C Weeds	Common Mullein	*Verbascum thapsus*
	Field bindweed	*Convolvulus arvensis*
	Downy brome (cheatgrass)	*Bromus tectorum (*syn. *Anisantha tectorum)*
	Puncturevine	*Tribulus terrestris*
Not listed	Kochia (ironweed)	*Kochia scoparia (*syn. *Bassia sieversiana)*

4. Weed Management Guidelines

The following guidelines were developed to limit the extent of effects and potential for dispersal and establishment of noxious weeds. The guidelines should be implemented as part of construction and maintenance activities associated with the Project.

4.1 Pre-Construction Survey Goals and Protocol

Most of the Project consists of constructing a 24-inch-diameter natural gas pipeline. The pipeline will be buried underground. The Project is not anticipated to require crossings of surface water features such as streams or lakes. Construction of the pipeline route would involve open trenching. In some places, horizontal directional drilling (boring) will be used to avoid sensitive resources or other existing infrastructure. The goals of a pre-construction survey would be to identify and map the presence of state- and county-listed noxious weeds, delineate the extent of infestations, and identify potential noxious weed sources adjacent to the study area. The survey would be limited to vegetated areas that would be disturbed during construction. Survey methods could be completed using a pedestrian survey and/or an unmanned aerial vehicle (UAV), as described below.

4.1.1 Biologist Pedestrian Survey

Survey protocol would involve use of a Trimble GeoXT Global Positioning System (GPS) receiver with accuracy of 1 to 5 meters to map the locations of weed infestations along the pipeline route before, during, and after construction. The survey would be conducted by a biologist with experience in mapping Colorado-listed noxious weeds. First, a “windshield survey” would be completed to identify locations where noxious weeds may exist from a car. Following the windshield survey, a biologist would walk on foot in areas where weeds have potential to occur. Data would be collected in two ways: in situations where fewer than 25 stems of a given species were observed in an area, only point data would be recorded with the GPS unit. In situations where more than 25 stems of a given species are documented to be present in an area, a polygon would be mapped with the GPS and the acreage for that species should be derived.

4.1.2 Unmanned Aerial Vehicle Survey

Survey protocol would involve the use of an unmanned aerial vehicle (UAV) by a licensed UAV operator. The UAV would record georeferenced data, including aerial imagery of the entire Study Area before, during, and after construction. Following the survey, data would be analyzed by a biologist qualified to identify noxious weeds and great-plains vegetation. The biologist would identify and document areas where noxious weeds exist for management. Data collected during the UAV survey could be used for other data collection needs for the Project, including for revegetation documentation, as discussed in Sections 4.4 and 5.2. Use of UAVs should comply with all Federal Aviation Administration (FAA) regulations.

4.2 Pre-/Post-Disturbance Weed Treatment

Attachment 2 provides species-specific biology and general control methods for common noxious weeds that have been or may be observed in the study area. Actual control methods would be selected by the individuals conducting the treatments based on the species to be controlled, the location of the infestations (for example, near a riparian area), and their experience with the types of treatments that are most effective in the local area.

4.3 Construction Practices

Bare ground represents an open ecological niche that allows for the establishment of undesirable species, such as noxious weeds. It is important to limit both the size of disturbance footprints and the duration of disturbance associated with construction activities to the extent possible to minimize opportunities for noxious weed invasion.

Clearing or blading should only occur in the minimum area needed for safe and efficient construction. Construction activities should avoid areas where noxious weeds are established to the extent possible.

All heavy equipment used during construction should be washed prior to use in the site area to ensure that weed seed from a different region is not transported into the Study Area.

Washing of equipment within the Study Area is not recommended. On-site washing of equipment increases the chance of weed seed dispersal by drainage of water across and potentially offsite. Instead, accumulations of mud should be knocked off equipment. This method promotes containment of weed seeds on the work site, where weeds can be monitored and treated, if necessary.

4.4 Post-Construction Monitoring

The post-construction pipeline route using the pedestrian or UAV survey method should be monitored for noxious weeds during the first growing season following the construction process. The goal of monitoring will be to detect any infestations as soon as possible while they are still small and to make recommendations for effective treatment. Monitoring should take place for at least one growing season following construction. A weed monitoring report should be written at the end of this first full growing season after construction completion to help collect results and refocus strategy for any further weed control that may be necessary. This report may be shared with the Adams and Denver County weed management programs to ensure proper coordination of weed control efforts.

4.5 Weed Control

A number of management strategies are available for control of noxious weeds. The methods described in this weed management plan include mechanical, biological, chemical, and cultural control methods. Mechanical methods typically include means such as hand-pulling, digging, and mowing. Biological controls may include application of select insects into an infestation, and grazing by livestock. Chemical control methods typically rely on selective and non-selective herbicides. The type of herbicides would vary depending on the weed species to be controlled. Cultural control methods include establishment of competitive vegetation. Selection of a control method or combination of methods should consider the life history of the species, the extent of infestation, and potential environmental effects from the treatment.

Attempts to eradicate noxious weeds will likely be unsuccessful if the initial disturbance that allowed the species to become established is still occurring in the area. Treatments will also be unsuccessful if other locally established populations of noxious weeds are not controlled. Attempts to control noxious species may also be unsuccessful if there is not an active revegetation program or if there are not viable populations of native species to recolonize the area. Treatment of one noxious species may open up new habitat for other noxious species if native species are not reestablished. For these reasons, successful, complete, and timely implementation of the revegetation program will be a critical element to successful management of noxious weeds within the Study Area and adjacent lands.

Any treatments to noxious weeds should be carefully documented at the time of the treatment. Detailed notes should be collected to map areas sprayed, log spray dates, and document time and money spent on the weed management program. Species-specific control methods for noxious weeds identified in the initial site reconnaissance are provided as Attachment 2 to this document.

5. Revegetation

The purpose of revegetation should include the re-establishment of existing soil contours to the extent possible and to reestablish vegetation that is removed during construction. By reestablishing vegetation, the potential for soil erosion will be reduced and wildlife habitats will be repaired/re-created.

Disturbed areas should be recontoured and revegetated as soon as practical, using approved seed mixtures and techniques. Disturbance areas would be re-seeded using approved, certified weed-free seed. Other materials used as part of revegetation, such as hay mulch, manure, or fill material, should also come from certified weed-free sources to the extent practical. Additional details on revegetation are provided in the following subsections.

5.1 Principles for Successful Revegetation

The following principles should be applied to all sites where revegetation would be undertaken:

- Minimize disturbed areas. The larger the disturbed area, the more effort is required to reclaim, monitor, and maintain it. More disturbance means a greater area is primed for noxious weed invasion.
- Salvage and stabilize existing topsoil to use in revegetation. Plant reestablishment can be difficult without the use of expensive soil amendments if topsoil has not been salvaged.
- Use plant species that can be established and survive in the reclaimed environment. Native plant species currently established on site are often the best plant choices, although the availability of seed or nursery stock can be challenging.
- Control noxious weeds and other undesirable species. These plants can out-compete the desired species if not properly controlled, especially if they are already established on site.
- Monitor the site. Monitoring is needed to determine whether reclamation has been successful. Monitoring can identify noxious weed invasions or the need for additional reclamation activities.
- Maintain the site. Maintenance is simply acting on any problems or concerns noted during monitoring. For example, controlling weeds, maintaining erosion control structures, planting additional container stock, or applying more native seed could be maintenance activities.

5.2 Pre-Construction Vegetation Survey

The sole purpose of a pre-construction vegetation survey would be to establish a baseline understanding of species diversity and percent ground cover in areas likely to be disturbed by pipeline construction or other ancillary infrastructure. The results of the survey will allow for the creation of legitimate revegetation goals at the conclusion of the Project in terms of the reestablishment of disturbed areas with appropriate species diversity, abundance, and

ground cover percentage. The pre-construction vegetation survey would only include vegetated areas that would be disturbed by construction. Survey protocol would involve capturing digital photography of the pipeline route, recording dominant species present, and documenting an estimate of percent cover. The pre-construction vegetation survey would be completed by a biologist qualified to identify Great Plains flora through a pedestrian survey or through the use of UAVs. Any use of UAVs should follow all FAA regulations.

An average goal for revegetation is 80 percent ground cover on all disturbed areas within 2 years after the end of construction. This figure may have to be adjusted after an evaluation of data from the pre-construction vegetation survey. If the survey identifies any situations that are preventing attainment of the cover goal, such as weed infestations or poor plant vigor and survival, corrective actions would be developed and implemented.

5.3 Conservation of Topsoil

Some areas that would be disturbed by this Project may not currently have topsoil in place (e.g., around the perimeter of existing parking areas and road shoulders); other areas may. In those areas where topsoil would otherwise be lost, it should be stripped and stockpiled for reclamation. If the topsoil stockpiles would not be replaced within 6 months, a cover crop of upland grasses should be planted on the stockpiled soils for stabilization purposes.

In those areas where the pre-construction topsoil contour is at its optimal final contour, construction crews should minimize the amount of disturbance. Examples of these areas include portions of the Study Area that should be returned to native vegetation after construction. Of particular concern is mixing of topsoil with subsoil through unnecessary grading or other soil disturbance.

5.4 Best Management Practices

Best management practices (BMPs) have been developed for use during grading and construction to minimize erosion. These BMPs would be implemented and maintained to the extent that they are applicable during the reclamation phase of the Project. The BMPs include:

- Exposed soil surfaces should be stabilized to reduce flow velocities.
- Streams and ditches in or adjacent to the pipeline route should be protected through the use of silt fences and hay bales. The silt fence would be staked and placed on the downgradient side of the hay bales.
- Following completion of construction, exposed areas would be stabilized and revegetated and the silt fencing removed.
- Soil erosion control measures (rip-rap stones, silt fence, or hay bales, etc.) should be inspected after each rain event for damage from washouts or siltation and corrective measures implemented to ensure adequate function is maintained.
- Sediment traps and basins should be cleaned and sediment should be removed from silt fences, stone outlet structures, and hay bales as necessary when material accumulates.

- Soil stockpiles should be placed in well-drained areas with adequate temporary soil erosion and sediment control measures at least 50 feet from wetlands and watercourses.
- Following completion of work, compacted soils should be loosened and leveled by scarifying, harrowing, disking, or other approved methods.
- All disturbed areas should be re-graded and, where appropriate, re-seeded with approved native vegetation to provide proper drainage, stabilize soils, and reduce erosion. During dry weather conditions, water should be sprayed over construction traffic ways to minimize creation of dust.

5.5 Soil Preparation

Disturbed soil should be re-contoured as close as possible to pre-construction contours. Where topsoil has been removed and stockpiled, it should be redistributed over the re-contoured subsoil. Areas that have been compacted by repeated equipment traffic should be ripped to allow water penetration and successful plant regrowth. If suitable topsoil is not available, or if it is poor quality, additional topsoil or other soil amendments may need to be brought on to the site. BMPs, as specified in Section 4.4, would be maintained or reinstalled as needed to ensure they remain functional through the reclamation phase of the Project.

5.6 Plant Material Selection

This Project lies within the High Plains Level III ecoregion and, therefore, grasses, forbs, and shrubs adapted to shortgrass prairie environments are recommended for the revegetation efforts. Grasses are likely to make up a significant proportion of the overall plant material for the revegetation process. Grasses should preferably be drill seeded, but they may be broadcast-seeded as necessary. Two recommended reclamation seed mixture for high plains/shortgrass prairie environments is provided in Table 5. The High Plains Shortgrass Prairie seed mix should be used for non-wetland environments. The High Plains Wetland Mix should be used in wetland environments. These seed mixes were adapted from a high plains/shortgrass prairie seed mix suggested by Pawnee Butte Seed (Pawnee Butte Seed 2016) and using the reference *Plants for Western Land Reclamation* (DeAguero 1994). All seed should be certified weed free. This list may need to be adjusted after an evaluation of data from the pre-construction vegetation survey. If the survey identifies any situations that are preventing attainment of the cover goal, such as weed infestations or poor plant vigor and survival, corrective actions would be developed and implemented.

Table 5:
Recommended Seed Mix for Project Revegetation in the High Plains/Shortgrass Prairie Environment

Seed Mix	Common Name	Scientific Name	Percent of Mix[1]
High Plains Shortgrass Prairie	Blue grama (W)	*Chondrosum gracile*	15
	Buffalograss(W)	*Buchloë dactyloides*	10
	Canada wildrye (C)	*Elymus canadensis*	15
	Sideoats grama(W)	*Bouteloua curtipendula*	15

Table 5:
Recommended Seed Mix for Project Revegetation in the High Plains/Shortgrass Prairie Environment

Seed Mix	Common Name	Scientific Name	Percent of Mix[1]
	Western wheatgrass(C)	*Pascopyrum smithii*	20
	Sand dropseed(W)	*Sporobolus cryptandrus*	15
	Alfalfa	*Medicago sativa*	10
High Plains Wetland	Creeping bentgrass	*Agrostis stolonifera*	15
	Common three square	*Schoenoplectus pungens*	25
	Creeping spikerush	*Eleocharris palustris*	15
	Softstem bulrush	*Schoenoplectus tabernaemontani*	15
	Prairie cordgrass	*Spartina pectinata*	15
	Nebraska sedge	*Carex nebrascensis*	15

1 Application rates would be determined following verification of seed purity and germination rates as published by the selected seed supplier.

The grass species in the High Plains Shortgrass Prairie Seed Mix were all observed in the Study Area during site reconnaissance and are native to the Study Area. The species in the High Plains Wetland seed mix are included as suggested species because of their status as native wetland species. All of the species listed in Table 5 are likely to be commercially available from seed supply companies in northeastern Colorado.

If tree removal and replacement is required for construction, the location, number, and species of each tree being removed should be recorded. Russian olive (*Eleagnus angustifolia*) trees are B List noxious weeds in Colorado and should be removed if practicable and replaced with a different species at PSCo or landowner's discretion. If sod replacement is required for construction, sod should be obtained from a local distribution company and planted during the growing season. Areas where trees or sod are replaced should be part of post-construction monitoring to ensure proper regrowth.

5.7 Planting Seed

The preferred seed planting times are spring and fall. Actual seeding dates will depend on soil conditions. Planting should not occur when equipment would significantly compact or otherwise disturb the soil because of excessive soil moisture. Although spring and fall are the recommended times for seeding, it is important to establish a desirable vegetation cover as soon as possible after construction is complete to prevent establishment and spread of noxious weeds. In such instances, seed may be planted in the summer months.

Drill seeding is the recommended seeding method. Any seed drill used should be fitted with seed boxes that can accommodate the chosen species. A good fit is particularly important for fluffy or irregular seed shapes, or when a wide variety of seed sizes are included in the seed mix. To the extent possible, drill seeding should be along the contour.

Broadcast seeding may also be used, although the seeding rate would need to be doubled to account for seed loss and poorer soil-seed contact. Broadcast seeding may be accomplished with hand-held or vehicle-mounted equipment. Any site where broadcast seeding is used should be dragged or raked to improve contact between seed and soil.

Various types of mulch may be used to improve retention of soil moisture and plant establishment, especially where seed is broadcast. Certified weed-free straw is the preferred mulch material. Hydro-mulching may also be appropriate on steeper cut-and-fill slopes. The need for mulch should be determined during reclamation based on slope, soil moisture availability, and other site conditions.

The use of fertilizer before, during, or after planting and seeding is not recommended, except in cases where little or no topsoil is available as a planting medium. The use of fertilizer tends to favor growth and spread of non-native plant species and noxious weeds over native species. The native plant species recommended for use in reclamation are adapted to natural levels of soil nutrients. Even when topsoil is sparse or lacking, the preferred action should be to import topsoil, rather than trying to amend the soil on site with fertilizers.

Irrigation would generally not be used on sites that are seeded. The native plant species selected for use on this Project are adapted to the natural precipitation regime of northeastern Colorado. In the event of a prolonged drought, PSCo may consider the use of supplemental irrigation to aid plant establishment and survival in seeded areas. The source of irrigation water is yet to be determined.

6. Implementation Schedule

This Plan provides an integrated approach to the control of noxious weeds and revegetation of newly disturbed areas for the Project. The recommended weed management and revegetation implementation schedule is provided in Table 6. It is important to understand that weed management should continue throughout the construction process and beyond to obtain the very best results possible. Revegetation should be accomplished as soon after completion of construction as possible and should be monitored for success.

Table 6:
Weed Management and Revegetation Implementation Schedule

Task	Timing
Pre-Construction Weed Survey and Mapping	During the growing season prior to construction.
Top Soil Stockpiling	Stockpile topsoil in areas that would only be temporarily disturbed during construction.
Cover Crop on Topsoil Stockpile	Not necessary assuming rapid replacement of topsoil over trenched areas/disturbed areas.
Recontouring and Replacement of Topsoil	As soon as possible following completion of construction.

Table 6:
Weed Management and Revegetation Implementation Schedule

Task	Timing
Drill and Broadcast Seeding	As soon as possible following completion of construction, recontouring, and topsoil replacement.
Post-Construction Vegetation Survey	The first growing season following completion of construction.
Revegetation Monitoring	The first growing season following completion of construction.

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North Metro Natural Gas Pipeline Project

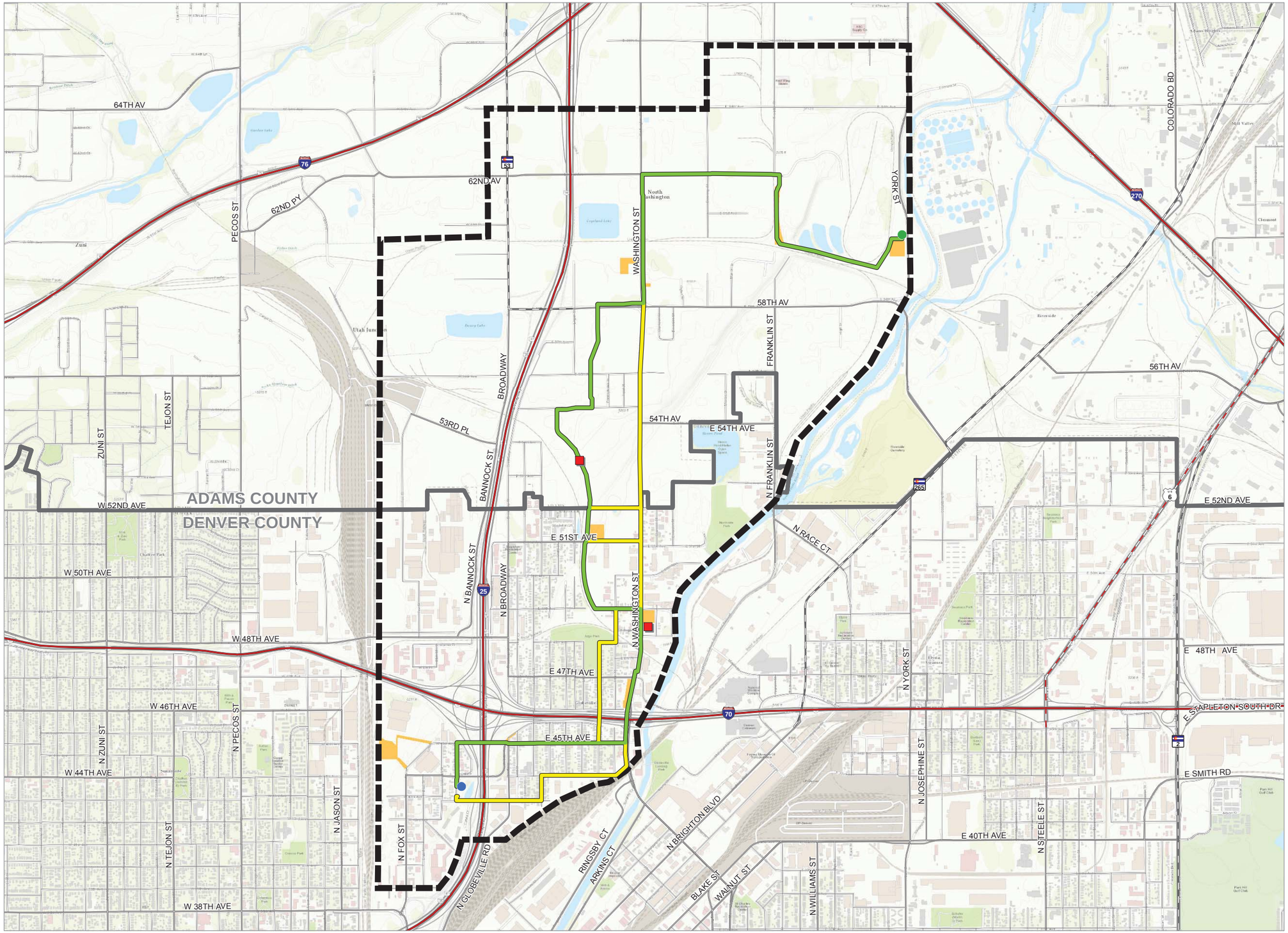


Figure 1
Project Layout

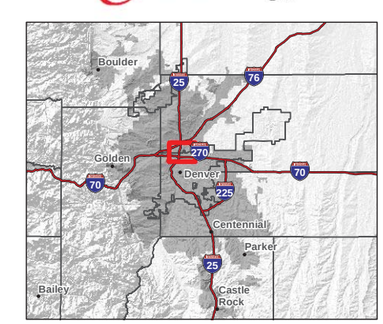
Legend

- Facility 958
- Regulator Station 179
- Alternative Valve Set Site
- Preferred Route
- Alternative Route Segment
- Proposed Staging Area
- Project Boundary

Transportation

- Interstate
- U.S.
- State
- Rail

Xcel Energy



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Last modified: 11/28/2016

Attachment 1:
Adams County Noxious Weed Plan and Enforcement Policy

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STATE OF COLORADO)
COUNTY OF ADAMS)

At a regular meeting of the Board of County Commissioners for Adams County, Colorado, held at the Administration Building in Brighton, Colorado on the 5th day of May, 2008 there were present:

Alice J. Nichol _____ Chairman
Larry W. Pace_____Commissioner
W.R. Fischer _____ Commissioner
Hal B. Warren_____ County Attorney
Kristen Hood, Deputy_____ Clerk of the Board

when the following proceedings, among others were held and done, to-wit:

RESOLUTION ADOPTING REVISIONS TO THE ADAMS COUNTY NOXIOUS WEED MANAGEMENT PLAN

WHEREAS, the Board of County Commissioners, County of Adams, State of Colorado, is a local governing body responsible for implementation of the Colorado Noxious Weed Act; and,

WHEREAS, the Colorado Noxious Weed Act, C.R.S. § 35-5.5-107(4)(a) et seq., provides that the management plan shall be reviewed at regular intervals but not less often that once every three years by the local advisory board; and,

WHEREAS, a revised plan was developed by the Department of Parks and Community Resources and the Adams County Weed Advisory Board consistent with the Act; and,

WHEREAS, the Adams County Noxious Weed Management Plan is amended to revise sections that are in conflict with current law; and,

WHEREAS, the Board of County Commissioners have the authority to approve, modify, or reject any amendments made to the weed management plan,

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners of the County of Adams, State of Colorado, that the Adams County Noxious Weed Management Plan be amended as follows.

1. Appendix A will include Colorado State List A, B, and C noxious weeds, and specific management objectives.

2. Appendix B will include the Adams County Enforcement Policy.

3. Adams County Noxious Weed "B" List species include: Japanese Knotweed, *Polygonum cuspidatum* and Common Reed, *Phragmites australis*. All previous Adams County designated noxious weeds, and their management objectives have been assimilated by new state weed laws.

Upon motion duly made and seconded the foregoing resolution was adopted by the following vote:

Nichol_____ Aye
Pace_____ Aye
Fischer_____ Aye
Commissioners

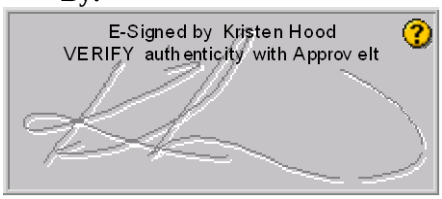
STATE OF COLORADO)
County of Adams)

I, Karen Long, County Clerk and ex-officio Clerk of the Board of County Commissioners in and for the County and State aforesaid do hereby certify that the annexed and foregoing Order is truly copied from the Records of the Proceedings of the Board of County Commissioners for said Adams County, now in my office.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County, at Brighton, Colorado this 5th day of May, A.D. 2008.

County Clerk and ex-officio Clerk of the Board of County Commissioners
Karen Long:

By:



Deputy

Adams County Noxious Weed Management Plan

Revised March 2008

Adams County Noxious Weed Management Plan

Table of Contents

Adams County

2008 Noxious Weed Management Plan

I. Introduction

A. Purpose of This Plan

The purpose of this Adams County Noxious Weed Management Plan is to provide guidelines for effectively managing designated noxious weeds, which constitute a present threat to the natural resources of lands in unincorporated Adams County. This plan implements the mandates of the Colorado Noxious Weed Act (also referred to herein as the Act) and 8CCR1206-2, revisions to the Act (also referred to herein as part of the Act). Specific management practices, directed by the Act are integrated in the County plan. Educational outreach, preventive measures, and good stewardship components are also included. It is this plan's intent to incorporate those options that are the least environmentally damaging, yet practical, timely, and economically feasible.

B. Enactment Authority

The Colorado Noxious Weed Act (C.R.S. §35-5.5-101, *et seq.)* was signed into state law in 1990, amended in 1996 and revised in 2003. The Act states that certain noxious weeds pose a threat to the natural resources of Colorado. It also states that it is the duty of all persons to use integrated methods to manage noxious weeds if the same are likely to be materially damaging to the land of neighboring landowners. It further directs that the Board of County Commissioners of each county in the state shall adopt a Noxious Weed Management Plan for all unincorporated land within the county.

The Act directs the Board of County Commissioners to appoint a local advisory board, whose power and duties are threefold:

1. Develop recommended management criteria and integrated weed management plans for managing designated noxious weeds;
2. Declare noxious weeds and any state noxious weeds designated by rule to be subject to integrated management; and
3. Recommend to the Board of County Commissioners that certain landowners be required to submit integrated weed management plans for managing designated noxious weeds on their properties.

The jurisdictional area of the Adams County Board of Commissioners is all of the unincorporated lands within the County. This plan shall be referred to as the Adams County Noxious Weed Management Plan, or the County Management Plan (CMP). It was developed by the Adams County Weed Advisory Board (also referred to herein as County Advisory Board).

C. Jurisdiction and Scope of Plan

This plan shall apply to all subject lands within Adams County. It does not preclude the County from entering into intergovernmental agreements with other governmental entities towards managing noxious weeds under the Colorado Noxious Weed Act. The Adams County Weed Office (reffered to herein as the Weed Office) is aware that the Federal Noxious Weed Act (1974), as amended by Section 15 (management

of Undesirable plants on Federal Lands (1990)), directs federal agencies to have an office or person trained to coordinate a noxious weed management program, to adequately fund the program, to implement cooperative agreements and to conduct integrated weed management. It also directs that such agencies manage on Federal lands those designated noxious weeds on Federal lands within the county.

The Weed Office recognizes that a Memorandum of Agreement regarding noxious weed management was signed in Colorado in 1996 among 13 federal and state agencies with land management and natural resource protection responsibilities.

D. Definitions

The following definitions shall apply to terms used in this plan:

1. **"Act":** the Colorado Noxious Weed Act, Article 5.5 of Title 35, C.R.S. § 35-5.5-101, *et seq.*, as amended.

2. **"CMP":** the Adams County Noxious Weed Management Plan, and as further defined under "Management Plan" below.

3. **"County":** the unincorporated areas of the County of Adams (Adams County) which are owned and managed by Adams County.

4. **"County Advisory Board":** the individuals appointed by the Board of County Commissioners, Adams County, to serve on the Adams County Weed Advisory Board and advise the County on matters of management of noxious weeds.

5. **"IMP":** an individual noxious weed management plan, as further defined under "Management Plan" below.

6. **"Infestation":** to have overrun or inhabit, so as to be harmful or bothersome.

7. "**Integrated Management":** the planning and implementation of a coordinated program utilizing a variety of methods for managing noxious weeds, the purpose of which is to achieve desirable plant communities. Such methods may include but are not limited to education, preventive measures, good stewardship, and the following techniques:

(a) **"Biological management":** which means the use of an organism to disrupt the growth of noxious weeds.

(b) **"Chemical management":** which means the use of herbicides or plant growth regulators to disrupt the growth of noxious weeds.

(c) **"Cultural management":** which means methodologies or management practices that favor the growth of desirable plants over noxious weeds, including maintaining an optimum fertility and plant moisture status in an area, planting at optimum density and spatial arrangement in an area and planting species most suited to an area.

(d) " **Mechanical management":** which means methodologies or management practices that physically disrupt plant growth, including tilling, mowing, burning, flooding, mulching, hand-pulling, hoeing and grazing.

8. "Landowner": any owner of record of federal, tribal, state, county, municipal or private land.

9. "Local advisory board": The Adams County Noxious Weed Management Advisory Board are those individuals appointed by the Adams County Board of Commissioners to advise on matters of noxious weed management.

10. "Local governing body": The Adams County Board of Commissions.

11. "Local Noxious Weed": any plant of local importance which has been declared a noxious weed by the Commissioners.

12. "Management": any activity that prevents a plant from establishing, reproducing, or dispersing itself.

13. "Management objective": means the specific, desired result of integrated management efforts and includes:

(a) "Eradication": which means reducing the reproductive success of a noxious weed species or specified noxious weed population in largely un-infested regions to zero and permanently eliminating the species or population within a specified period of time. Once all specified weed populations are eliminated or prevented from reproducing, intensive efforts continue until the existing seed bank is exhausted.

(b) "Containment": which means maintaining an intensively managed buffer zone that separates infested regions, where suppression activities prevail, from largely un-infested regions, where eradication activities prevail.

(c) "Suppression": which means reducing the vigor of noxious weed populations within an infested region, decreasing the propensity of noxious weed species to spread to surrounding lands, and mitigating the negative effects of noxious weed populations on infested lands. Suppression efforts may employ a wide variety of integrated management techniques.

(d) "Restoration": which means the removal of noxious weed species and reestablishment of desirable plant communities on lands of significant environmental or agricultural value in order to help restore or maintain said value.

14. "Management Plan": a noxious weed management plan developed by any person, or the Local Advisory Board, using integrated management. The "County Management Plan" (CMP, or this plan) shall refer to the integrated management plan adopted by the County Advisory Board for the subject lands. An "Individual Management Plan" (IMP) shall refer to an integrated management plan for a specific property or group of properties as submitted by a landowner(s), and approved by the County Advisory Board, or its designated agent.

15. "Noxious Weed": an alien plant or parts of an alien plant that has been designated by rule as being noxious or has been declared a noxious weed by the Colorado Agriculture Commissioner, or Adams County Board of Commissioners, and meets one or more of the following additional criteria:

(a) Aggressively invades or is detrimental to economic crops or native plant communities;

(b) Is poisonous to livestock;

(c) Is a carrier of detrimental insects, diseases, or parasites;

The direct or indirect effect of the presence of this plant is detrimental to the environmentally sound management of natural or agricultural ecosystems.

16. "Person" or "Occupant": an individual, partnership, corporation, association, or federal, state, or local government or agency owning, occupying, or controlling any land, easement, or right-of-way, including but not limited to any city, county, state, or federally owned and controlled highway, drainage, or irrigation ditch, spoil bank, borrow pit, gas and oil pipeline, high voltage electrical transmission line, or right-of-way for a canal or lateral.

17. "Weed Supervisor": the agent or employee designated by the Board of County Commissioners to carry out the Noxious Weed Management Plan for Adams County.

II. Designation of Noxious Weeds

A. State-Listed Noxious Weeds

State noxious weed list and rules and regulations under the Act are developed by the Commissioner of the Colorado Department of Agriculture (CDA). The most recent changes made to the Act pertain to the classification of noxious weeds into one of several categories. The categories include the A, B, and C Lists. List A: "Rare noxious weed species that are subject to eradication wherever detected statewide in order to protect neighboring lands and the state as a whole". The Weed Office will monitor and comply with any amendments to the rules and regulations. Any weeds designated by the Colorado Noxious Weed Act for eradication containment, or suppression are automatically included in the Adams County Weed Management Plan. The Act is subject to continuous revision and the Adams County Weed Plan will be updated no less than every three years. See Appendix B for the Rules Pertaining to the Administration and Enforcement of the Colorado Noxious Weed Act.

1. State of Colorado A List Noxious Weeds

African rue, (Peganum harmala)
Camelthorn, (Alhaji pseudalhagi)
Common crupina, (Crupina vulgaris)
Cypress spurge, (Euphorbia cyparissias)
Dyer's woad, (Isatis tinctoria)
Giant salvinia, (Salvinia molesta)
Hydrilla, (Hydrilla verticillata)
Meadow knapweed, (Centaurea pratensis)
Mediterranen sage, (Salvia aethiopis)
Medusahead, (Taeniatherum caput-medusae)
Myrtle spurge, (Euphorbia myrsinites)
Orange hawkweed, (Hieracium aurantiacum)
Purple loosestrife, (Lythrum salicaria)
Rush Skeletonweed, (Chondrilla juncea)
Sericea lespedeza, (Lespedeza cuneata)
Squarrose knapweed, (Centaurea virgata)

Tansy ragwort, (Senecio jacobaea)
Yellow starthistle, (Centaurea solstitialis)

2. State of Colorado B List Noxious Weed Species

Absinth wormwood, (Artemisia absinthium)
Black henbane, (Hyoscyamus niger)
Bouncingbet, (Saponaria officinalis)
Bull thistle, (Cirsium vulgare)
Canada thistle, (Cirsium arvense)
Chinese clematis, (Clematis orientalis)
Common tansy, (Tanacetum vulgare)
Common teasel, (Dipsacus fullonum)
Corn chamomile, (Anthemis arvensis)
Cutleaf teasel, (Dipsacus laciniatus)
Dalmatian toadflax, broad-leaved (Linaria dalmatica)
Dalmatian toadflax, narrow-leaved (Linaria genistifolia)
Dame's rocket, (Hesperis matronalis)
Diffuse knapweed, (Centaurea diffusa)
Eurasian water milfoil, (Myriophyllum spicatum)
Hoary cress, (Cardaria draba)
Houndstongue, (Cynoglossum officinale)
Leafy spurge, (Euphorbia esula)
Mayweed chamomile, (Anhemis cotula)
Moth mullein, (Verbascum blattaria)
Musk thistle, (Carduus nutans)
Oxeye daisy, (Chrysanthemum leucanthemum)
Perennial pepperweed, (Lepidium latifolium)
Plumless thistle, (Carduus acanthoides)
Quackgrass, (Elytrigia repens)
Redstem filaree, (Erodium cicutarium)
Russian knapweed, (Acroptilon repens)
Russian-olive, (Elaeagnus angustifolia)
Salt cedar, (Tamarix chinensis, T. parviflora, and T. ramosissima)
Scentless chamomile, (Matricaria perforate)
Scotch thistle, (Onopordum acanthium)
Scotch thistle, (Onopordum tauricum)
Spotted knapweed, (Centaurea maculosa)
Spurred anoda, (Anoda cristata)
Sulfer cinquefoil, (Potentilla recta)
Venice mallow, (Hibiscus trionum)
Wild caraway, (Carum carvi)
Yellow nutsedge, (Cyperus esculentus)
Yellow toadflax, (Linaria vulgaris)

3. State of Colorado C List Noxious Weeds

Chicory (Cichorium intybus)
Common burdock (Arctium minus)
Common mullein (Verbascum thapsus)
Common St. Johnswort (Hypericum perforatum)
Downy brome (Bromus tectorum)
Field bindweed (Convolvulus arvensis)
Halogeton (Halogeton glomeratus)
Johnsongrass (Sorghum halepense)
Jointed goatgrass (Aegilops cylindrica)
Perennial sowthistle (Sonchus arvensis)
Poison hemlock (Conium maculatum)
Puncturevine (Tribulus terrestris)
Velvetleaf (Abutilon theophrasti)
Wild proso millet (Panicum miliaceum)

B. County Designations

The law defines noxious weeds as plant species that are not indigenous (native) to the state of Colorado and meet at least one of several criteria regarding their negative impacts upon crops, native plant communities, livestock, and the management of natural or agricultural systems. This definition applies to species listed by both state and local governing bodies. A local governing body may also adopt eradication, containment, or suppression standards that are more stringent than the standards adopted by the Colorado Department of Agriculture Commissioner. Any species subject to designation require a public hearing before the County Commissioners prior to being granted noxious status. All impacted landowners must be notified.

1. County Designated B List species:
   Japanese knotweed, (Polygonum cupidatum)
   Common Reed, (Phragmites australis)

III. Objectives and Goals

A. Objectives

The objectives of this CMP are to:

1. Develop and implement integrated management programs for noxious weeds on County owned open space properties, easements and Rights-of-way.
2. Continue and improve educational programs that will effectively communicate noxious weed impacts and management methods.
3. Offer to provide landowners/occupants with technical support in establishing their I.M.Ps.
4. Work with state and federal agencies towards establishing effective integrated noxious weed management programs on their properties.
5. Outline processes for enforcing control of noxious weeds on private and public properties.
6. Select control methods according to 8 CCR1206-2 for A, B and C list species and for non-listed weeds select control methods that are practical, economically reasonable and least environmentally damaging.

B. Goals

1. Educate landowners/occupants and county employees on weed awareness, prevention, identification, containment and eradication strategies consistent with state statutes.
2. Concentrate on early detection and control of new noxious weed infestations.
3. Maintain a current noxious weed infestation map.
4. Develop and coordinate with Natural Resource Analyst, integrated weed management plans for open space properties, and easements and evaluate results annually.
5. Establish contact with landowners/occupants who have noxious weed infestations.
6. Protect native ecosystems from degradation by noxious weed infestations.
7. Work pro-actively with federal, state and local agencies, to manage noxious weeds on a regional scale.
8. Monitor county right-of-ways for new invaders and to evaluate right of way maintenance needs.
9. Maintain application, records and training requirements for seasonal staff.

IV. Plan Components

A. Prevention Measures

Preventive control involves use of measures that will prevent the introduction or establishment of noxious weeds into areas not currently infested with noxious weeds. Prevention also includes the eradication of small, new infestations. These measures usually are the most practical and cost-effective means of integrated weed management.

Preventive measures that have applicability to the subject lands are: 1) using weed-free seed and mulch, 2) promoting the Colorado Weed Free Hay and Forage program, 3) prioritizing weed management areas along routes of entry and dispersal, and 4) monitoring noxious weed infestations in bordering counties.

With regard to measure number 3, the Weed Inspector and Public Works Department will control noxious weeds on County rights-of-way from May through October. Public education programs will emphasize weed infestation prevention. Sites found to have small infestations of a new, uncommon noxious weed will be given high priority for management purposes. A coordinated control effort with private landowners will be organized, where applicable. The Colorado Department of Transportation, railroad and ditch companies, and the Rocky Mountain Arsenal will be contacted. They will be encouraged to prevent noxious weed infestations, and to manage and prevent the spread of existing infestations.

B. Educational Programs

1. Education of the public is a key component of integrated weed management. Emphasis will be made on continuing and expanding educational noxious weed programs, such as the following:
2. Timely media articles concerned with noxious weed identification and management. Emphasis will be made of the alien origin of noxious weeds and the consequences of not managing them.
3. Via the media and seminars, offer the assistance of the County Weed and Cooperative Extension offices in weed management and IMP matters.
4. Conduct landowner/occupant noxious weed management seminars or talks.
5. Distribute educational brochures and field visitor's questions at local fairs and events.

6. Conduct noxious weed identification, management, and awareness seminars with county parks and public works personnel.
7. Utilize Extension Fact Sheets when possible. Prepare informational brochures on integrated noxious weed management for the public. Make herbicide labels available at public and educational events.
8. Initiate and conduct test plots on integrated noxious weed management. Hold field days addressing same.
9. Provide training for seasonal applicators.

C. Mapping

Mapping is a valuable tool in integrated weed management. As such, the Weed Inspector will establish and maintain visual maps of past and current infestations of noxious weeds on subject land. From these, a graphic representation of weed management progress and needs will be evident.

The primary goal of mapping is to record the noxious weed species present, the area infested, density of the infestation, soil types, groundwater depth, and other site factors pertinent to managing the infestation successfully.

D. Intergovernmental Agreements and Contracts

Intergovernmental Agreements (IGAs) and contracts are useful tools towards more effective noxious weed management among agencies and governments. Through cooperation, more is understood and more is done. Towards this end, the Weed Inspector will contact certain entities concerning compliance with the Act. Contracts and IGAs will be encouraged towards cooperative efforts in managing noxious weeds. Assistance will be offered towards helping each agency developing IMPs for their lands. The following organizations will be contacted:

Colorado State Department of Transportation
Colorado State Department of Parks and Recreation
Colorado Division of Wildlife
Colorado State Land Board
County municipalities
Rocky Mountain Arsenal
Any other organizations when applicable.

E. Roads

Right-of-Ways (ROW) are inspected and noxious weed infestations treated on an annual basis. Since roads are a primary source of seed spread and new invader introductions, inspections and rapid response are critical in reducing future impacts. County responsibilities are outlined in the Act. The Weed supervisor works closely with Public Works and the Colorado Department of Transportation to coordinate activities and communicate in the management of noxious weeds along county ROWs. The County maintains a contract with a private applicator for weed control along state highways.

F. Management Plan Evaluation

The goals and plan of work in this CMP will be reviewed and evaluated at the regular meetings of the County Advisory Board. Any proposed additions or changes shall be approved by the County Advisory Board and the Board before becoming final.

The full CMP shall be reviewed and amended, as needed, at least every three years (C.R.S. 35-5.5-107(4a)).

V. Enforcement

A. Noxious Weed Management on Private Properties

Cooperation from all landowners/occupants regarding timely noxious weed management will be encouraged via positive communication and education efforts. The Weed Office or its agent will continue to apply herbicides to a limited acreage of noxious weeds on private lands by landowner or tenant request, consistent with County policies. Where noxious weeds are still found, an enforcement process will be initiated to ensure control of the weeds.

The Adams County enforcement process is available for public review in Appendix A. The process is subject to change as a result of any revisions made to the Act, or from any judicial decision that affects the process.

It is desirable that the Weed Office have work priorities with regard to enforcement activities on subject lands. This is due to the size of the subject area and to the number of landowners with existing noxious weed infestations. The following list prioritizes enforcement:

Complaint properties
Enforcement regions as mapped by the Weed Office.
Lands bordering waterways (e.g. ditches, canals, rivers, creeks)

APPENDICES

APPENDIX A

ADAMS COUNTY NOXIOUS WEED ENFORCEMENT POLICY PURSUANT TO THE COLORADO NOXIOUS WEED ACT

PART 1
GENERAL PROVISIONS

Section 101. **Title**

This Policy shall be known as and be referred to as the "Adams County Noxious Weed Enforcement Policy" and
shall be effective throughout the unincorporated areas of Adams County.

Section 102. **Definitions**[1]

(1) "Act" means the Colorado Noxious Weed Act.

(2) "Integrated management" means the planning and implementation of a coordinated program utilizing a variety of methods for managing noxious weeds, the purpose of which is to achieve desirable plant communities. Such methods may include but are not limited to education, preventive measures, good stewardship, and the following techniques:

(a) "Biological management" which means the use of an organism to disrupt the growth of noxious weeds.

(b) "Chemical management" which means the use of herbicides or plant growth regulators to disrupt the growth of noxious weeds.

(c) "Cultural management" which means methodologies or management practices that favor the growth of desirable plants over noxious weeds, including maintaining an optimum fertility and plant moisture status in an

[1] C.R.S. § 35-5.5-103

area, planting at optimum density and spatial arrangement in an area, and planting species most suited to an area.

(d) "Mechanical management" which means methodologies or management practices that physically disrupt plant growth, including tilling, mowing, burning, flooding, mulching, hand-pulling, hoeing, and grazing.

(3) "Landowner" means any owner of record of state, municipal, or private land and includes an owner of any easement, right-of-way, or estate in the land.

(4) "Local advisory board" means the Adams County Weed Advisory Board and are those individuals
appointed by the local governing body to advise on matters of noxious weed management.

(5) "Local governing body" means the Adams County Board of County Commissioners.

(6) "Management" means any activity that prevents a plant from establishing, reproducing, or dispersing itself.

(7) "Management plan" means the noxious weed management plan developed by any person or the local advisory board using integrated management.

(8) "Noxious Weed" means an alien plant or parts of an alien plant that has been designated by rule as being noxious or has been declared a noxious weed by a local advisory board, and meets one or more of the following criteria:

(a) Aggressively invades or is detrimental to economic crops or native plant communities;

(b) Is poisonous to livestock;

(c) Is a carrier of detrimental insects, diseases, or parasites;

(d) The direct or indirect effect of the presence of this plant is detrimental to the environmentally sound management of natural

or agricultural ecosystems.

(9) "Noxious weed management" means the planning and implementation of an integrated program to manage noxious weed species.

(10) "Occupant" means an individual, partnership, corporation, association, or federal, state, or local government or agency thereof owning, occupying, or controlling any land, easement, or right-of-way, including any city, county, state, or federally owned and controlled highway, drainage, or irrigation ditch, spoil bank, borrow pit, gas and oil pipeline, high voltage electrical transmission line, or right-of-way for a canal or lateral.

(11) "Weed Office" means the Adams County Weed Office which is a delegate of the local governing body.

Section 103. Scope and Effect of Policy - Exceptions to Provisions[1]

(1) The provisions of this Policy relate to the general assembly's findings that noxious weeds have become a threat to the natural resources of Colorado and that an organized and coordinated effort must be made to stop the spread of noxious weeds.

(2) This Policy facilitates a coordinated effort through the local advisory board that develops and oversees plans for the control of noxious weeds.

(3) This Policy further recognizes that because the spread of noxious weeds can largely be attributed to the movement of seed and plant parts on motor vehicles and noxious weeds are becoming an increasing maintenance problem on highway right-of-ways in the state, local cooperative efforts have been undertaken to proceed with noxious weed management.

(4) This Policy is designed in accordance with the statutory provisions of Colorado Revised Statutes section 35-5.5-101 et seq., as amended and more commonly referred to as the Colorado Noxious Weed Act.

(a) The provisions of this Policy do not interpret, apply, or incorporate any provisions of the Colorado Pest Control District Act, codified at C.R.S. § 35-5-101 et seq.

PART 2
IDENTIFICATION AND INSPECTION OF NOXIOUS WEEDS

[1] C.R.S. § 35-5.5-102(1.5)

Section 201. **Methods of Identification**[1]

(1) Private and Public Lands

(a) The local governing body, through its delegates, agents, and employees, shall have the right to enter upon any premises, lands, or places whether public or private, during reasonable business hours for the purpose of inspecting for the existence of noxious weed infestations, when at least one of the following has occurred:

(i) The landowner or occupant has requested an inspection;

(ii) A neighboring landowner or occupant has reported a suspected noxious weed infestation and requested an inspection; or

(iii) An authorized agent of the local government has made a visual inspection from a public right-of-way or area and has reason to believe that a noxious weed infestation exists;

(iv) A Weed Office agent has inspected a current aerial satellite map of the property and determined there is reason to believe that a noxious weed infestation exists.

(2) Where entry onto private premises is required to investigate the existence of noxious weeds, on-site inspections may be scheduled at any reasonable time upon the landowner or occupant's consent. If after notification landowner or occupant denies access to the inspector, the inspector may seek an inspection warrant issued by a municipal, county or district court having jurisdiction over the land.

PART 3
NOTICE OF EXISTENCE OF NOXIOUS WEEDS.

Section 301. **Notice Letter (See Attachment A)**

(1) Private Lands[2]

(a) The Weed Office, acting as agent, delegate, or staff of the local governing body has the authority to notify the landowner or occupant of the presence of noxious weeds. The Notice from the Weed Office includes the following:

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[1] C.R.S. § 35-5.5-109(1)
[2] Id. at (3)

(i) the property inspection date;

(ii) the Landowner and/or Occupant of Record;

(iii) the property tax ID number and legal description of the property;

(iv) the noxious weeds to be managed;

(v) advisement to the landowner or occupant to manage the noxious weeds within ten days after receipt of notice;

(vi) the best available control methods of integrated management;

(vii) the options of notice compliance;

(viii) the consequences for non-compliance with the notice; and

(ix) an offer of weed office consultation in Management Plan Development; and

(x) notice of Landowner and/or Occupant's right to request hearing before the Local governing body; and

(xi) statement that Weed Office will seek Right of Entry from Local government body to enter property and manage identified noxious weeds unless Landowner and/or Occupant complies with notice or submits a written request for public hearing before Local governing body within ten days.

(2) Public Lands[1]

(a) The local governing body may give notice to any state board, department, or agency that administers or supervises state lands within the local governing body's jurisdiction, to manage noxious weeds on its land and naming them.

(i) Such notice shall specify the best available method(s) of integrated management and will include the same information as itemized in Section 301(1) of this Policy.

(b) Wherever possible, the local governing body shall consult with the affected state board, department, or agency in the development of a plan for the management of noxious weeds on the premises or lands.

Section 302. **Duty to Consult[1]**

Where possible, the Weed Office shall consult with the affected landowner or occupant in the development of a plan for the management of noxious weeds on the premises or lands.

Section 303. **Public and Private Lands - Landowner or Occupant Response[2]**

(1) Landowner or occupant shall respond within a reasonable time after receipt of notification, not to exceed ten (10) days, by any of the following:

(a) Complying with the terms of the notification.

(b) Acknowledging the terms of the notification and submitting an acceptable plan and schedule for the completion of the plan for compliance.

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[1] C.R.S. § 35-5.5-110(1)
[2] Id. at (4)(a); C.R.S. §35-5.5-110(2)(a)

(c) Requesting an arbitration panel to determine the final management plan. The panel shall be selected by the local governing body and shall include:

(i) A weed management specialist or weed scientist.

(ii) A landowner of similar land in the same county.

(iii) A third member chosen by agreement of the first two panel members.

The landowner or occupant is entitled to challenge any one member of the panel, and the local governing body shall name a new panel member from the same category. The decision of the arbitration panel shall be final.

(d) Requesting a public hearing before the Local governing body.

PART 4
PUBLIC HEARING
UPON LANDOWNER OR OCCUPANT'S
REQUEST- PRIVATE LANDS

Section 401. Landowner/Occupant Request for Public Hearing

(1) In the event the landowner or occupant disputes the noxious weed notice or the Weed Office's process for managing or compelling the management of the identified noxious weeds, the Landowner or Occupant is entitled to a public hearing before the Local governing body. Requests for public hearing must be made to the Weed Office in writing within ten (10) days of receipt of the noxious weed notice letter. Public hearings will be scheduled and heard within thirty (30) days of the request.

Section 402. Scheduling Public Hearings

(1) It is the Weed Office's responsibility to schedule a public hearing before the local governing body and to give notice to the landowner or occupant of the date, time, and location of the hearing. The following materials must be submitted to the local governing body prior to the hearing:

(a) Copy of Notice of Hearing letter and certified mail receipt notifying landowner or occupant of Public Hearing (must be received by property owner not less than five (5) days prior to Public Hearing date);

(b) Affidavit of Weed Office representative attesting to the following information:

(I) Weed Office inspected property and found the existence of noxious weeds;
(II) Notice of noxious weed infestation was sent via regular and certified U.S. mail to the landowner or occupant in accordance with C.R.S. §35-5.5-109(3);
(III) Landowner or occupant failed to respond and/or comply with the terms of the notice letter within a reasonable time;
(IV) Landowner or occupant submitted a timely request for public hearing;
(IV) Entry onto the landowners or occupants property is necessary to prevent the spread of the noxious weed.

Section 403. Public Hearing

(1) The Landowner or Occupant, or an attorney representing such individual or entity, will be allowed to present evidence on landowner or occupant's behalf.

(2) A member of the Weed Office will need to be present at the public hearing to present evidence as to why the Weed Office should be allowed to enter the property and eradicate the noxious weeds.

(3) The local governing body may either grant or deny the Weed Office's request for Right of Entry, or continue the matter to a subsequent date certain. (See Attachment F) Right of Entry may be granted for the limited purpose of allowing the Weed Inspector or his/her agent to enter onto private property to control the identified noxious weeds.

(4) Right of Entry may be granted upon satisfaction of the following conditions:

a. Adequate notice of the noxious weed infestation has been given to the landowner and/or tenant;
b. The landowner/tenant has not complied with the notice;
c. Management of the noxious weeds by the Weed Inspector or his/her agent is likely to prevent further noxious weed infestation.

Reasonable efforts will be made to notify landowners/occupants when a Right of Entry has been issued, and copy of the Right of Entry will be sent to the landowner/tenant via certified and regular mail.

Section 404. **Restrictions**[1]

No management of noxious weeds on private property shall occur without applying the same or greater management measures to any land or rights-of-way owned or administered by the local governing body that are adjacent to the private property.

PART 5
FAILURE TO COMPLY - PUBLIC LANDS

Section 501. **General**[2]

In the event the state board, department, or agency fails to comply with the notice to manage the identified noxious weeds or implement the plan developed by the arbitration panel, the local governing body in whose jurisdiction the infestation is located may enter upon such lands and undertake the management of such noxious weeds or cause the same to be done.

Section 502. **Scheduling and Hearing**

The state board, department, or agency owning or occupying said public lands is afforded the same Scheduling and Hearing protections as provided to landowners or occupants of private lands under Sections 402 and 403 of this Policy.

PART 6
POST-HEARING
ASSESSMENT OF COSTS
FOR TREATMENT AND ERADICATION
OF NOXIOUS WEEDS

Section 601. **General**

If, after public hearing, the local governing body, the local advisory board, or its agents and employees provide for and/or compel the management of such noxious weeds, the local governing body is entitled to recover certain costs.

Section 602. **Private Lands - Recoverable Costs/Method of Collection**[3]

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[1] Id. at (5)(b)
[2] C.R.S. § 35-5.5-110(3)
[3] C.R.S. § 35-5.5-109(5)(a)(II)

(1) The local governing body is entitled to assess the whole cost thereof, including up to twenty (20) percent for inspection and other incidental costs in connection therewith, upon the lot or tract of land where the noxious weeds are located.

(2) Such assessment shall be a lien against each lot or tract of land until paid and shall have priority over all other liens except general taxes and prior special assessments.

(3) Such assessment may be certified to the county treasurer of the County to be collected in the same manner as provided for the collection of taxes.

(4) Any funds collected shall be deposited in the local governing body's weed fund or any similar fund.

Section 603. Landowner or Occupant Protest

(1) The Weed Office shall send a "Payment Notice/Potential Lien Assessment" letter by certified and regular mail to the landowner or occupant prior to any assessment on landowner or occupant's property. (See Attachment G)

(2) Landowner or occupant shall be given thirty (30) days from the date on the Notification Letter to respond.

(a) In the event landowner or occupant fails to respond to the letter within the prescribed thirty (30) days, the Weed Office shall assess a lien on landowner or occupant's property and may certify such lien with the Adams County Treasurer. (See Attachments H and I)

(b) If the landowner or occupant responds within the prescribed thirty (30) days and disputes the amount of the assessment, he or she is entitled to be heard before the local governing body as to his or her concerns.

Section 604. Assessment of Costs Hearing

(1) The landowner or occupant, or an attorney on his or her behalf, will be allowed to present testimony as to why the local governing body should not assess a tax lien on landowner or occupant's property for the costs outlined in the Notification of Lien letter.

(2) A member of the Weed Office will need to be present at the public hearing to provide evidence favoring the imposition of a tax lien on landowner or occupant's property.

(3) The Weed Office must show that prior to compelling the management of noxious weeds on landowner and/or occupant's property the Weed Office applied the same or greater management measures to any land or rights-of-way owned or

administered by the local governing body that are adjacent to the private property pursuant to Section 504 of this Policy.

(4) The Weed Office must show that the level of management called for in the notice or the management plan developed by the arbitration panel has been successfully achieved pursuant to Section 605 of this Policy.

(5) The local governing body may either grant or deny the lien assessment or continue the matter to a subsequent date certain.

(6) If the local governing body grants the lien assessment, the Resolution for Certification of Assessed Costs as granted by the Local Governing Body is filed with the County Treasurer's Office. (Attachments H and I)

Section 605. **Limitations**[1]

The local governing body shall not assess the cost of providing for or compelling the management of noxious weeds on private property until the level of management called for in the notice or the management plan developed by the arbitration panel has been successfully achieved.

PART 7
PUBLIC LANDS - ASSESSMENT OF COSTS

Section 701. **General**

(1) Any expenses incurred by the local governing body in the undertaking of management of noxious weeds on public lands shall be a proper charge against such state board, department, or agency which has jurisdiction over the lands.

(a) If not paid, such charge shall be submitted to the controller, who shall treat such amount as an encumbrance on the budget of the state board, department, or agency involved; or

(b) Such charge may be recovered in any court with jurisdiction over such lands.

Section 702. **Scheduling and Hearing**

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[1] Id. at (5)(c)

The state board, department, or agency owning or occupying said public lands is afforded the same Scheduling and Hearing protections as provided landowners or occupants of private lands under Sections 603 and 604 of this Policy.

PART 8
MISCELLANEOUS

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Section 801. **Additional provisions**

(1) It is the Weed Office's responsibility through reasonable efforts to determine whether the property with a suspected noxious weed infestation is occupied by an individual other than the landowner.

(a) Reasonable efforts to determine the identity of the tenant and/or occupant may include one or more of the following:

(i) mailing a copy of the notice to any dwelling on the real property,
(ii) contacting the Farm Service Agency ("FSA"),
(iii) asking the landowner for the identity of any tenant and/or occupant on the real property,

(b) any reasonable efforts taken by the Weed Office should be documented.

(c) If the Weed Office determines an individual(s) other than the landowner occupies the property, any and all applicable Notices should be sent to both landowner and occupant.

(d) If the Weed Office determines an individual(s) other than the landowner occupies the property, any and all applicable Orders approved by the local governing body should be sent to both landowner and occupant.

(2) The local governing body, through its delegates, agents, and employees, shall have the right to enter upon any premises, lands or places, whether public or private, during reasonable business hours for the purposes of ensuring compliance with any of the above requirements concerning noxious weed management and any other local requirements.[1]

(3) No agent, employee, or delegate of the local governing body shall have a civil cause of action against a landowner or occupant for personal injury or property damage incurred while on public or private land for purposes consistent with the above requirements

[1] Id. at (6)

except when such damages were willfully or deliberately caused by the landowner or occupant.[1]

(4) It shall be the duty of each local governing body and each state board, department or agency to confirm that all public roads, public highways, public rights-of-way, and any easements appurtenant thereto, under the jurisdiction of each such entity, are in compliance with the Act, and any violations of the Act shall be the financial responsibility of the appropriate local governing body or state board, department, or agency.[2]

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[1] Id. at (7)
[2] C.R.S. § 35-5.5-112

APPENDIX B

Rules Pertaining To the Administration and Enforcement of the Colorado Noxious Weed Act:

(http://198.187.128.12/colorado/lpext.dll/Infobase4/1/56169/563f6/56651?f=templates&fn=fs-main-doc.htm&q=Colorado%20Noxious%20Weed%20Act&x=Advanced&2.0#LPHit1)

8CCR1206-2

Part 1 Definitions

1.1. "Act" means the Colorado Noxious Weed Act, § § 35-5.5-101 through 119, C.R.S. (2003). *Eff 07/01/2007*

1.2. "Compliance waiver" means a written exemption granted to a local governing body or landowner by the Commissioner that releases the local governing body and/or landowner from certain obligations of eradication for a specific population of a List A or List B species. *Eff 07/01/2007*

1.3. "Division" means the Colorado Division of Wildlife. *Eff 07/01/2007*

1.4. "Elimination" means the removal or destruction of all emerged, growing plants of a population of List A or List B species designated for eradication by the Commissioner. It is the first step in achieving eradication and is succeeded by efforts to detect and destroy newly emerged plants arising from seed, reproductive propagule, or remaining root stock for the duration of the seed longevity for the particular species. *Eff 07/01/2007*

1.5. "Infested acreage" means an area of land containing a noxious weed species, defined by the actual perimeter of the infestation as delineated by the canopy cover of the plants and excluding areas not infested. *Eff 07/01/2007*

1.6. "Population" means a group of designated noxious weeds of the same species occupying a particular geographic region and capable of interbreeding. *Eff 07/01/2007*

Part 2 General Provisions

2.1. At any time, affected persons may suggest and the Commissioner may approve additional prescribed integrated management techniques not specified in these rules for the eradication, containment, or suppression of designated state noxious weeds. Such approval may be site-specific or broadly applicable. The Commissioner will publish a list on the Colorado Department of Agriculture website (http://www.ag.state.co.us/csd/weeds/Weedhome.html) of the herbicides, cultural techniques, and mechanical techniques approved for use under the specific state noxious weed management plans for List A and List B species. *Eff 07/01/2007*

2.2. As a condition for granting a compliance waiver releasing a local governing body and/or landowner from certain obligations of eradication, the Commissioner may require the local governing body and/or landowner to implement other specified management actions with respect to a specific population. *Eff 07/01/2007*

2.3. No recommendations or requirements in these rules concerning the use of herbicides are intended to contradict or supercede any other federal, state or local law regulating herbicide use. All use of herbicides to achieve any management objectives specified in these rules must comply with all applicable federal, state and local legal requirements, including but not limited to compliance with all directions for use, cautionary statements and any other requirements in the labeling of the particular herbicide product. *Eff 07/01/2007*

Part 3 List A Noxious Weed Species

3.1. List A of the Colorado noxious weed list comprises the following noxious weed species: *Eff 07/01/2007*

African rue (Peganum harmala) *Eff 07/01/2007*

Camelthorn (Alhagi pseudalhagi) *Eff 07/01/2007*

Common crupina (Crupina vulgaris) *Eff 07/01/2007*

Cypress spurge (Euphorbia cyparissias) *Eff 07/01/2007*

Dyer's woad (Isatis tinctoria) *Eff 07/01/2007*

Giant salvinia (Salvinia molesta) *Eff 07/01/2007*

Hydrilla (Hydrilla verticillata) *Eff 07/01/2007*

Meadow knapweed (Centaurea pratensis) *Eff 07/01/2007*

Mediterranean sage (Salvia aethiopis) *Eff 07/01/2007*

Medusahead (Taeniatherum caput-medusae) *Eff 07/01/2007*

Myrtle spurge (Euphorbia myrsinites) *Eff 07/01/2007*

Orange hawkweed (Hieracium aurantiacum) *Eff 07/01/2007*

Purple loosestrife (Lythrum salicaria) *Eff 07/01/2007*

Rush skeletonweed (Chondrilla juncea) *Eff 07/01/2007*

Sericea lespedeza (Lespedeza cuneata) *Eff 07/01/2007*

Squarrose knapweed (Centaurea virgata) *Eff 07/01/2007*

Tansy ragwort (Senecio jacobaea) *Eff 07/01/2007*

Yellow starthistle (Centaurea solstitialis) *Eff 07/01/2007*

3.2. All populations of List A species in Colorado are designated by the Commissioner for eradication. *Eff 07/01/2007*

3.3. It is a violation of these rules to allow any plant of any population of any List A species to produce seed or develop other reproductive propagules. *Eff 07/01/2007*

3.4. Prescribed management techniques must be applied to every population of List A noxious weeds present in Colorado to achieve the following objectives: *Eff 07/01/2007*

A. The plants of every population of List A species must be eliminated prior to seed development. *Eff 07/01/2007*

B. Once all mature plants are eliminated, appropriate efforts must be made to detect and eliminate new plants arising from seed, reproductive propagule, or root stock for the duration of the seed longevity for the particular species. *Eff 07/01/2007*

C. In order to ensure that seeds or other reproductive propagules are not produced or spread, any plant with flowers, seeds, or other reproductive propagules must be placed in sealed plastic bags and disposed of by: *Eff 07/01/2007*

1. high intensity burning in a controlled environment that completely destroys seed viability; *Eff 07/01/2007*

2. removal of plant materials to a solid waste landfill which covers refuse daily with six inches of soil or alternative material; or *Eff 07/01/2007*

3. any other method approved by the Commissioner. *Eff 07/01/2007*

3.5. Within one year of detection, any local governing body with a population of any List A species must provide to the State Weed Coordinator mapping data pertinent to each population including: *Eff 07/01/2007*

A. Species name *Eff 07/01/2007*

B. Population location(s) including distribution and abundance *Eff 07/01/2007*

C. Estimated infested acreage *Eff 07/01/2007*

3.6. State Noxious Weed Management Plans for List A Noxious Weed Species *Eff 07/01/2007*

3.6.1. African rue (Peganum harmala). In addition to the requirements set forth in this Part 3 for the management of all List A species, the following conditions also apply for African rue: *Eff 07/01/2007*

A. The prescribed integrated management techniques are limited to the use of herbicides approved by the Commissioner and digging, or other mechanical techniques approved by the Commissioner. *Eff 07/01/2007*

B. Prescribed integrated management techniques do not include the use of: (1) any biocontrol agents or; (2) any herbicides, cultural techniques, or mechanical techniques other than those approved by the Commissioner. *Eff 07/01/2007*

C. Seed longevity is unknown. *Eff 07/01/2007*

3.6.2. Camelthorn (Alhagi pseudalhagi). In addition to the requirements set forth in this Part 3 for the management of all List A species, the following conditions also apply for camelthorn: *Eff 07/01/2007*

A. The prescribed integrated management techniques are limited to the use of herbicides approved by the Commissioner and digging, or other mechanical techniques approved by the Commissioner. *Eff 07/01/2007*

B. Prescribed integrated management techniques do not include the use of: (1) any biocontrol agents or; (2) any herbicides, cultural techniques, or mechanical techniques other than those approved by the Commissioner. *Eff 07/01/2007*

C. Seed longevity is at least several years. *Eff 07/01/2007*

3.6.3. Common crupina (Crupina vulgaris). In addition to the requirements set forth in this Part 3 for the management of all List A species, the following conditions also apply for common crupina: *Eff 07/01/2007*

A. The prescribed integrated management techniques are limited to the use of herbicides approved by the Commissioner and hand-pulling, digging, or other mechanical techniques approved by the Commissioner. *Eff 07/01/2007*

B. Prescribed integrated management techniques do not include the use of: (1) any biocontrol agents or; (2) any herbicides, cultural techniques, or mechanical techniques other than those approved by the Commissioner. *Eff 07/01/2007*

C. Seed longevity is three years. *Eff 07/01/2007*

3.6.4. Cypress spurge (Euphorbia cyparissias). In addition to the requirements set forth in this Part 3 for the management of all List A species, the following conditions also apply for cypress spurge: *Eff 07/01/2007*

A. The prescribed integrated management techniques are limited to the use of herbicides approved by the Commissioner and hand-pulling, digging, or other mechanical techniques approved by the Commissioner. *Eff 07/01/2007*

B. Prescribed integrated management techniques do not include the use of: (1) any biocontrol agents or; (2) any herbicides, cultural techniques, or mechanical techniques other than those approved by the Commissioner. *Eff 07/01/2007*

Part 4 List B Noxious Weed Species

4.1. List B of the Colorado noxious weed list comprises the following noxious weed species: *Eff 07/01/2007*

Absinth wormwood (Artemisia absinthium) *Eff 07/01/2007*

Black henbane (Hyoscyamus niger) *Eff 07/01/2007*

Bouncingbet (Saponaria officinalis) *Eff 07/01/2007*

Bull thistle (Cirsium vulgare) *Eff 07/01/2007*

Canada thistle (Cirsium arvense) *Eff 07/01/2007*

Chinese clematis (Clematis orientalis) *Eff 07/01/2007*

Common tansy (Tanacetum vulgare) *Eff 07/01/2007*

Common teasel (Dipsacus fullonum) *Eff 07/01/2007*

Corn chamomile (Anthemis arvensis) *Eff 07/01/2007*

Cutleaf teasel (Dipsacus laciniatus) *Eff 07/01/2007*

Dalmatian toadflax, broad-leaved (Linaria dalmatica) *Eff 07/01/2007*

Dalmatian toadflax, narrow-leaved (Linaria genistifolia) *Eff 07/01/2007*

Dame's rocket (Hesperis matronalis) *Eff 07/01/2007*

Diffuse knapweed (Centaurea diffusa) *Eff 07/01/2007*

Eurasian watermilfoil (Myriophyllum spicatum) *Eff 07/01/2007*

Hoary cress (Cardaria draba) *Eff 07/01/2007*

Houndstongue (Cynoglossum officinale) *Eff 07/01/2007*

Leafy spurge (Euphorbia esula) *Eff 07/01/2007*

Mayweed chamomile (Anthemis cotula) *Eff 07/01/2007*

Moth mullein (Verbascum blattaria) *Eff 07/01/2007*

Musk thistle (Carduus nutans) *Eff 07/01/2007*

Oxeye daisy (Chrysanthemum leucanthemum) *Eff 07/01/2007*

Perennial pepperweed (Lepidium latifolium) *Eff 07/01/2007*

Plumeless thistle (Carduus acanthoides) *Eff 07/01/2007*

Quackgrass (Elytrigia repens) *Eff 07/01/2007*

Redstem filaree (Erodium cicutarium) *Eff 07/01/2007*

Russian knapweed (Acroptilon repens) *Eff 07/01/2007*

Russian-olive (Elaeagnus angustifolia) *Eff 07/01/2007*

Salt cedar (Tamarix chinensis, T. parviflora, and T. ramosissima) *Eff 07/01/2007*

Scentless chamomile (Matricaria perforata) *Eff 07/01/2007*

Scotch thistle (Onopordum acanthium) *Eff 07/01/2007*

Scotch thistle (Onopordum tauricum) *Eff 07/01/2007*

Spotted knapweed (Centaurea maculosa) *Eff 07/01/2007*

Spurred anoda (Anoda cristata) *Eff 07/01/2007*

Sulfur cinquefoil (Potentilla recta) *Eff 07/01/2007*

Venice mallow (Hibiscus trionum) *Eff 07/01/2007*

Wild caraway (Carum carvi) *Eff 07/01/2007*

Yellow nutsedge (Cyperus esculentus) *Eff 07/01/2007*

Yellow toadflax (Linaria vulgaris) *Eff 07/01/2007*

4.2. List B noxious weed species are species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, develops and implements state noxious weed management plans designed to stop the continued spread of these species. List B species must be managed in accordance with all the provisions of this Part 4, including any applicable state noxious weed management plans. Until a plan for a particular species is developed and implemented by rule, all persons are recommended to manage that species. *Eff 07/01/2007*

4.3. Local governing bodies and other interested parties are encouraged to make special note of the distribution and abundance of Canada thistle, Dalmatian toadflax, leafy spurge, salt cedar, spurred anoda, Venice mallow, and yellow nutsedge as the Commissioner will consult with the state noxious weed advisory committee, local governments, and other interested parties, in order to develop and implement state noxious weed management plans in 2007-2008 designed to stop the continued spread of these species. State noxious weed management plans for additional List B species will be developed in future years. *Eff 07/01/2007*

4.4. It is a violation of these rules to allow any plant of any population of a List B species designated for eradication by the Commissioner in a state noxious weed management plan (Rules 4.7.1-4.7.9) to produce seed or develop other reproductive propagules after the time specified in the plan for elimination. *Eff 07/01/2007*

4.5. Prescribed management techniques must be applied to every population of List B species designated for eradication by the Commissioner in a state noxious weed management plan (Rules 4.7.1-4.7.9) to achieve the following objectives: *Eff 07/01/2007*

A. The plants of every population of List B species designated for eradication must be eliminated prior to seed development in the year specified. *Eff 07/01/2007*

B. Any population that is discovered in areas designated for eradication subsequent to the year specified for elimination must be eliminated prior to the development of viable seed. If the population is discovered after seed development has occurred, then efforts must be made to minimize the dispersion of seed and elimination is required prior to seed development in the following year. *Eff 07/01/2007*

C. Once all plants are eliminated, appropriate efforts must be made in subsequent years to detect and eliminate new plants arising from seed, reproductive propagule, or root stock prior to seed development for the duration of the seed longevity for the particular species. *Eff 07/01/2007*

D. In order to ensure that seeds or other reproductive propagules are not produced or spread, any plant with flowers, seeds, or other reproductive propagules must be placed in sealed plastic bags and disposed of by: *Eff 07/01/2007*

Part 5 List C Noxious Weed Species

5.1. List C of the Colorado noxious weed list comprises the following noxious weed species: *Eff 07/01/2007*

Chicory (Cichorium intybus) *Eff 07/01/2007*

Common burdock (Arctium minus) *Eff 07/01/2007*

Common mullein (Verbascum thapsus) *Eff 07/01/2007*

Common St. Johnswort (Hypericum perforatum) *Eff 07/01/2007*

Downy brome (Bromus tectorum) *Eff 07/01/2007*

Field bindweed (Convolvulus arvensis) *Eff 07/01/2007*

Halogeton (Halogeton glomeratus) *Eff 07/01/2007*

Johnsongrass (Sorghum halepense) *Eff 07/01/2007*

Jointed goatgrass (Aegilops cylindrica) *Eff 07/01/2007*

Perennial sowthistle (Sonchus arvensis) *Eff 07/01/2007*

Poison hemlock (Conium maculatum) *Eff 07/01/2007*

Puncturevine (Tribulus terrestris) *Eff 07/01/2007*

Velvetleaf (Abutilon theophrasti) *Eff 07/01/2007*

Wild proso millet (Panicum miliaceum) *Eff 07/01/2007*

5.2. List C noxious weed species are species for which the Commissioner, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands. The goal of such plans will not be to stop the continued spread of these species but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species. *Eff 07/01/2007*

6.1. Local governing bodies and landowners with any population of any List A species or population of any List B species designated for eradication may be eligible for a compliance waiver granted by the Commissioner. *Eff 07/01/2007*

6.2. To apply for a compliance waiver, local governing bodies or landowners must submit a written petition to the State Weed Coordinator via mail (Colorado Department of Agriculture, 700 Kipling Street, Suite 4000, Lakewood, CO 80215-8000), fax (303-239-4125), or email (csdcomments@ag.state.co.us with "Attention: noxious weed petition" in the subject line). The Department will only consider a petition for waiver during the growing season of the target weed when the extent of the problem can be properly evaluated at the site for which the petition is submitted. The petition should provide specific information pertinent to the reevaluation of eradication as the appropriate management objective for a specified geographic region. *Eff 07/01/2007*

6.3. The Commissioner will evaluate petitions using the following criteria: *Eff 07/01/2007*

A. The known distribution of the weed species in the specified geographic region; *Eff 07/01/2007*

B. The feasibility of current control technologies to achieve eradication of the population; *Eff 07/01/2007*

C. The cost of carrying out eradication as part of statewide weed management plan; and *Eff 07/01/2007*

D. Any other site-specific information that establishes eradication is not feasible for a specific population in a specified geographic region. *Eff 07/01/2007*

Petitioners must address these criteria and explain specifically what conditions exist that establish that eradication is not a viable management objective. *Eff 07/01/2007*

6.4. The Commissioner will grant or deny a petition within fifteen business days of receiving it. *Eff 07/01/2007*

6.5. The Commissioner may revoke a compliance waiver at any time if the information provided in the petition was incomplete or inaccurate, or if conditions change such that eradication becomes a viable management objective. *Eff 07/01/2007*

Part 7 Statements of Basis, Specific Statutory Authority and Purpose

7.1. February 11, 2004 – Effective May 3, 2004

Statutory Authority

These permanent rules are adopted by the Commissioner of Agriculture pursuant to his authority under the Colorado Noxious Weed Act, § § 35-5.5-108 and 115, C.R.S. (2003). *Eff 07/01/2007*

Purpose

The purpose of these permanent rules is to: (1) repeal all of the existing permanent rules for the administration and enforcement of the Colorado Noxious Weed Act, § § 35-5.5-101 through 119, C.R.S. (2003), currently published at 8 C.C.R. 1203-15 (including the Statement of Basis, Purpose and Statutory Authority as well as Rules 1 through 3) and; (2) replace the current permanent rules with new permanent rules which implement the Colorado Noxious Weed Act as amended by the General Assembly in its 2003 regular session. Specifically, the purposes of these new permanent rules are to designate state noxious weeds, classify state noxious weeds into three categories (List A, B, and C), develop and implement state noxious weed management plans for List A noxious weed species, prescribe integrated management techniques to achieve eradication of List A species, and provide a process for granting compliance waivers to local governing bodies and landowners in order to develop and implement a coordinated, statewide effort to stop the spread of noxious weeds and mitigate their impacts to agriculture and the environment. *Eff 07/01/2007*

Factual and Policy Issues

The factual and policy issues encountered in the proposal of these permanent rules are as follows: *Eff 07/01/2007*

1. Several million acres of Colorado are infested with invasive non-indigenous plants that are continuing to spread to uninfested lands and increase in abundance. *Eff 07/01/2007*

2. A number of these species, designated as state noxious weeds, aggressively invade or are detrimental to economic crops or native plant communities, are poisonous to livestock, are carriers of detrimental insects, diseases, or parasites, or are detrimental, directly or indirectly, to the environmentally sound management of natural or agricultural systems. *Eff 07/01/2007*

3. Noxious weeds are a present threat to the economic and environmental value of the lands of the state of Colorado and it is a matter of statewide importance that the governing bodies of counties and municipalities manage such weeds in a coordinated manner across the state. Lack of such coordination makes weed management efforts unnecessarily costly and limits the effectiveness of public and private efforts to control such noxious weeds. *Eff 07/01/2007*

4. A broad array of public and private organizations support efforts to develop and implement a coordinated, statewide effort to stop the spread of noxious weeds. *Eff 07/01/2007*

5. Classifying designated noxious weeds into specific management categories will provide a means to focus public and private resources strategically and in a cost-effective manner. *Eff 07/01/2007*

6. By eradicating rare noxious weed species quickly (List A), these species can be prevented from establishing permanent populations in Colorado from which they will spread to harm the agricultural and environmental values of the lands of Colorado. *Eff 07/01/2007*

7. It is important that local governing bodies and affected landowners apply integrated management techniques that will achieve the specified management objectives, particularly for eradication. Some techniques are more effective than others (prescribed) and some techniques are likely to be ineffective or contribute to the spread of the weed species (not prescribed). Prescribing integrated management techniques to achieve specified management objectives will help landowners achieve management objectives such as eradication in a timely manner while limiting environmental damage, effort, and cost. *Eff 07/01/2007*

8. By stopping the spread of well-established species (List B), the values of uninfested lands for agriculture or the environment can be protected and the costs of land management to private and public landowners can be limited or reduced. *Eff 07/01/2007*

9. By educating the public about improved management for widespread species (List C), the harm associated with these species can be reduced and such efforts can be made more cost-effective for many citizens. *Eff 07/01/2007*

10. To accomplish the goals associated with List A (statewide eradication) and List B (halted spread) it is necessary to develop and implement statewide plans to coordinate appropriate actions at the private, local, state, and federal levels. Without such plans, it will be difficult to focus public and private resources strategically and in a cost-effective manner to achieve these goals. *Eff 07/01/2007*

11. In order to provide flexibility to respond to changing circumstances with respect to the distribution of weed populations, it is important to provide the state, local governing bodies, and landowners with a process to amend the requirement to eradicate a particular noxious weed. Without such a compliance waiver process, these rules may become unnecessarily burdensome. *Eff 07/01/2007*

12. The absence of rules to implement a coordinated statewide effort to manage noxious weeds results in increased management costs to public and private interests, a reduction in the effectiveness of individual efforts, and the continued loss of agricultural and environmental values to the invasion of noxious weeds. *Eff 07/01/2007*

7.2. March 4, 2005 – Effective May 2, 2005

Statutory Authority

These amendments to the rules are adopted by the Commissioner of Agriculture pursuant to his authority under the Colorado Noxious Weed Act, § § 35-5.5-108 and 115, C.R.S. (2004). *Eff 07/01/2007*

Purpose

The purposes of these amendments to the rules are to: (1) designate additional species of noxious weeds for inclusion in the current categories (Lists A, B, C) listed in Parts 3, 4 and 5 of the existing Rules; (2) reclassify some of the currently listed noxious weeds to different categories; (3) develop and implement new state noxious weed management plans for additional species listed for statewide

eradication (List A); (4) develop and implement state noxious weed management plans for selected List B species and; (5) identify priority List B species, among other possible List B species, for which the Commissioner intends to develop and implement state noxious weed management plans. *Eff 07/01/2007*

Factual Basis

The factual and policy issues encountered in the proposal of these amendments to the rules are as follows: *Eff 07/01/2007*

1. It is necessary to periodically adjust the state noxious weed list to address emerging plant pest threats as they become known to the state. *Eff 07/01/2007*

2. The current rules pertaining to the administration and enforcement of the Colorado Noxious Weed Act state that the Commissioner will develop and implement state noxious weed management plans for selected List B species. *Eff 07/01/2007*

3. State noxious weed management plans are necessary in order to coordinate appropriate actions at the private, local, state, and federal levels that will halt the continued spread of these List B species. *Eff 07/01/2007*

4. The proposed plans have been developed in consultation with the state noxious weed advisory committee, local governments, and other interested parties. *Eff 07/01/2007*

7.3. March 9, 2006 – Effective May 30, 2006

Statutory Authority

These amendments to the rules are adopted by the Commissioner of Agriculture pursuant to his authority under the Colorado Noxious Weed Act, § § 35-5.5-108 and 115, C.R.S. (2005). *Eff 07/01/2007*

Purpose

The purposes of these amendments to the rules are to: (1) develop and implement state noxious weed management plans for selected List B species and (2) identify priority List B species, among other possible List B species, for which the Commissioner intends to develop and implement state noxious weed management plans. The rule will also be moved to the Conservation Services Division section of the CCR and renumbered to 8 CCR 1206-2 to reflect a reorganization in the Colorado Department of Agriculture moving the noxious weed program to this division. *Eff 07/01/2007*

Factual Basis

The factual and policy issues encountered in the proposal of these amendments to the rules are as follows: *Eff 07/01/2007*

1. The current rules pertaining to the administration and enforcement of the Colorado Noxious Weed Act state that the Commissioner will develop and implement state noxious weed management plans for selected List B species. *Eff 07/01/2007*

2. State noxious weed management plans are necessary in order to coordinate appropriate actions at the private, local, state, and federal levels that will halt the continued spread of these List B species. *Eff 07/01/2007*

3. The proposed plans have been developed in consultation with the state noxious weed advisory committee, local governments, and other interested parties. *Eff 07/01/2007*

7.4. May 3, 2007 – Effective July 1, 2007

Statutory Authority

These amendments to the rules are adopted by the Commissioner of Agriculture pursuant to his authority under the Colorado Noxious Weed Act, § § 35-5.5-108 and 115, C.R.S. (2005). *Eff 07/01/2007*

Purpose

The purposes of these amendments to the rules are to: (1) develop and implement state noxious weed management plans for selected List B species, (2) revise existing state noxious weed management plans for selected List B species, and (3) identify priority List B species, among other possible List B species, for which the Commissioner intends to develop and implement state noxious weed management plans. *Eff 07/01/2007*

Factual Basis

The factual and policy issues encountered in the proposal of these amendments to the rules are as follows: *Eff 07/01/2007*

1. The current rules pertaining to the administration and enforcement of the Colorado Noxious Weed Act state that the Commissioner will develop and implement state noxious weed management plans for selected List B species. *Eff 07/01/2007*

Attachment 2:
Control Methods for Noxious Weeds

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Bull thistle

Colorado Dept. of Agriculture, Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

1. Leaves are prickly-hairy above and cottony below.
2. Heads cobwebby-pubescent (hairy).
3. Flowers are composite and purple in color.

Updated on: 08/08

Bull thistle Identification and Management

Identification and Impacts

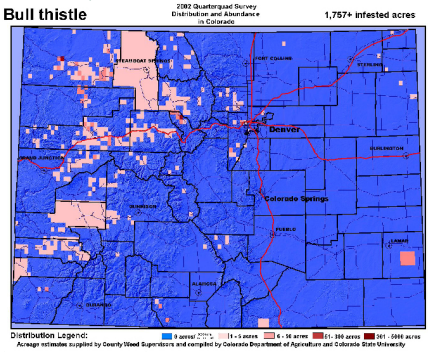
Bull thistle *(Cirsium vulgare (Savi) Tenore)* is a biennial forb that was introduced to North America as a seed contaminant and is now widespread. Gumdrop-shaped flowers are pinkish to dark purple in color and 1 ½ to 2 inches in diameter. The flower bracts are somewhat tapered and covered with spines. Seeds are capped with a circle of plume-like white hairs. Leaves are alternate. In Colorado, Bull thistles are the only species that are prickly hairy on the top and are cottony-hairy on the undersides of the leaves. In mature plants the leaves extend down, clasping the stem and are divided into segments. The plant has a short, fleshy taproot with several primary roots extending from the root crown. Seed leaves are round to spatulate, and smooth. Mature plants can produce up to 4,000 seeds per plant.

Habitats for Bull thistle include dry to moist environments. It thrives on nitrogen-rich soils, and it grows on gravelly to clay-textured soils. Bull thistle cannot withstand deep shade and is commonly seen in areas such as pastures, overgrazed rangeland, roadsides, and logged areas. Within Colorado Bull thistle infestations have been reported to occur in nearly all counties west of the continental divide, this plant has also been observed in the Upper Arkansas Watershed and in pockets on the plains. It is widespread throughout the United States and parts of Canada.

Heavy infestations can reduce livestock forage. Additionally, the presence of bull thistle in hay decreases the forage value and lowers the market price. It is an aggressive weed, but it will not withstand cultivation. Bull thistle is often a transient species, appearing in recent clear cuts or disturbed areas and becoming a dominant species for several years. It has been reported to cause hay fever in some individuals and is often confused with musk thistle.

The key to effective control of Bull thistle is maintaining healthy pastures and rangeland, guarding against disturbance or overuse, and as with most biennial limit seed production. To reduce seed production, plants with buds or flowers should be collected and immediately disposed of or destroyed. Chemical control is most effective when plants are in rosette stage, spring or early fall. Mechanical controls can be used to eliminate small patches or plants in a later growth stages. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Bull thistle 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/csd 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.



Photos © Kelly Uhing, Colorado Department of Agriculture, map above by Crystal Andrews, Colorado Department of Agriculture,

Cirsium vulgare (Savi) Tenore

Management Recommendations

Bull thistle

CULTURAL
Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing.

BIOLOGICAL
Urophora stylata, a fly predator, is used to help control this thistle. The female fly lays eggs in the seed head of the thistle. The maggot then consumes the seed in the flower. This species has overwintered in Colorado but the limited numbers will not allow for general redistribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

MECHANICAL
Because biennial thistles do not reproduce from their roots, any mechanical or physical method that severs the root below the soil surface will kill the weed. It is necessary to revegetate the site with desirable plants. Tillage, hoeing, or even hand-pulling should be successful (not on rangeland), providing it is done before the reproductive growth stages.

Integrated Weed Management:

Prevention is the most effective control with Bull thistle, maintaining healthy pastures and rangeland and continually monitor your property for new infestations.

As with most biennials, limiting seed production is another key to controlling plant populations. Chemical and mechanical options to control Bull thistle are also effective.

HERBICIDES

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

HERBICIDE	RATE	APPLICATION TIMING
Clopyralid (Transline or Stinger)	0.13 to 0.5	Apply to rosettes in spring or fall.
Clopyralid + 2,4-D (Curtail)	0.2 + 1.0 to 0.3 + 1.5	Apply to rosettes in spring or fall.
Dicamba (Banvel, Vanquish, or Clarity)	0.5 + 1.0	Apply to rosettes in spring or fall if good growing conditions exist.
2,4-D or 2,4-D + dicamba (Rangestar)	1.5 to 2.0 1.0 + 0.5	Apply to rosettes in spring.
Picloram (Tordon 22K *restricted use chemical)	0.13 to 0.25	Apply to rosettes in spring or fall.
Chlorsulfuron (Telar)	0.047 (0.75 oz ai)	Spring from bolting to bud stages; add a non-ionic surfactant
Metsulfuron (Escort XP)	0.019 (0.3 oz ai)	Spring from bolting to bud stages; add a non-ionic surfactant.

Canada thistle

Cirsium arvense

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street, Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

1. Purple flowers form in clusters of 1-5 per branch.
2. Floral bracts are spineless.
3. Small heads, vanilla scent.

Updated on: 08/08

Canada thistle Identification and Management

Canada thistle during the flowering stage. This stage typically occurs in the early summer. Seed production will follow and effective management options will then become limited.

Identification and Impacts

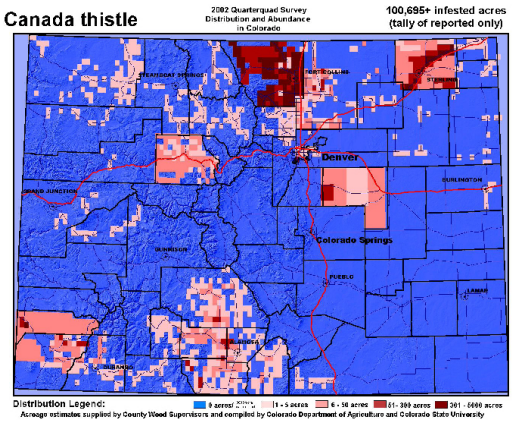
Canada thistle (*Cirsium arvense*) is a non-native deep-rooted perennial that spreads by seeds and aggressive, creeping, horizontal roots (rhizomes). Canada thistle can grow 2 to 4 feet in height. The leaves are oblong, spiny, bright green in color, and are only slightly hairy on the undersurface. Flowers 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 vegetatively through a creeping root system, and can quickly form dense stands. Every piece of root, from 1/2 to 1 inch in length, is capable of forming new plants. The key to controlling Canada thistle is to eliminate seed production and also to reduce the plant's nutrient reserves in its root system through persistent, long-term management.

Canada thistle is one of the most feared noxious weeds in the U.S. as it can infest many land types, from roadsides, ditch banks, riparian zones, pastures, irrigated cropland, to the most productive dryland cropland. Forage production is severely reduced because cattle will not graze near infestations.

The key to effective control of Canada thistle is combining control methods. These weeds need 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. 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 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, 303-239-4100.



All photos © Kelly Uhing, Infestation map above, Crystal Andrews, Colorado Department of Agriculture.

Management Recommendations

Canada thistle

CULTURAL
Establishment of selected grasses can be an effective cultural control of Canada thistle. 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.

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 but have not been effective. Insects can be obtained at no charge from the Colorado Department of Agriculture. Please call 970-464-7916 or visit www.colorado.gov/ag/csd for more information.

MECHANICAL
Due to extensive root system, hand-pulling this plant is not a viable option. Mowing can be effective if done every 10 to 21 days throughout the growing season. Combining mowing with herbicides will further enhance control of Canada thistle.

Integrated Weed Management:

Combining control methods for Canada thistle is imperative. This 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.

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 gallons per acre. Please read label for exact rates. **The herbicide label is the LAW!**

HERBICIDE	RATE	APPLICATION TIMING
Aminopyralid (Milestone)	5-7 ounces/acre or 1 teaspoon/gal water	Apply in spring at the pre-bud growth stage and/or to fall regrowth. Add non-ionic surfactant 0.32oz/gal water or 1 qt/100 gal water.
Chlorsulfuron (Telar DF)	1-3 ounces/acre or 0.50 grams/1 gal water	Apply in spring during bud to bloom stage and/or to fall regrowth. Add non-ionic surfactant 0.32oz/gal water or 1 qt/100 gal water.
Clopyralid + 2,4-D (Redeem R&P)	3 pints/acre or 1.25 oz/gal water	Apply from rosette to bud stage when all plants have emerged. Add non-ionic surfactant @ 0.32oz/gal water or 1 qt/100 gal water. (Spring or Fall)
Picloram (Tordon 22K *This is a Restricted Use Pesticide*)	1 qt/acre or 1.0 oz/gal water	Spring - early bud stage and/or fall regrowth. DO NOT apply near or under trees or where soils have rapid permeability or where water level is high. Add a non-ionic surfactant @ 0.32oz/gal water or 1 qt/100 gal water.

Colorado State University

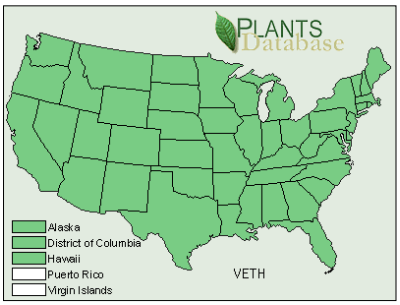
COLORADO DEPARTMENT OF AGRICULTURE

Common Mullein *Verbascum thapsus* L.

Common Names: big taper, common mullein, flannel mullein, flannel plant, great mullein, mullein, velvet dock, velvet plant, woolly mullein

Native Origin: Asia and Europe

Description: An erect biannual herb in the figwort family (*Scrophulariaceae*) growing 5 to 10 feet in height. In the first year it produces a low vegetative rosette up to 24 inches in diameter, remains thought the winter, then produces a stout flowering stem in the succeeding growing season. The stem is densely woolly with branched hairs. Leaves are alternate, oblong-obovate to obovate-lanceolate, blue-grey green, woolly and 4-16 inches long including the petiole. Leaves become progressively smaller up the flowering stem. Flowers are sessile (attached to stem), borne in long terminal spikes, bright yellow, 5 fused petals, and 1 inch in diameter. Plants die after flowering. Fruits are wooly oval capsules that split open when mature releasing 100,000 to 180,000 seeds from the parent plant. Seeds are dispersed by wind and animals, and may remain viable in the soil for over 100 years. It reproduces solely by seed. The root system is comprised of a deep taproot and fibrous roots.



Habitat: Common mullein occurs in areas with an average annual precipitation of 20-60 inches and a 140-day growing season. It is usually abundant on well-drained soils with pH 6.5 to 7.8. It prefers dry sandy soils but can grow in chalk and limestone. It can be found in neglected meadows, forest openings, pastures, fence rows, roadsides, and industrial areas.

Distribution: This species is reported from states shaded on Plants Database map. It is reported invasive in AZ, CA, CO, CT, HI, ID, IL, MO, NJ, NV, OH, OR, PA, SD, TN, VA, WA, WI, WV, and WY.

Ecological Impacts: Once established it grows quickly to form a dense ground cover. It can overtake and displace native species. At the high densities, it appears to prevent establishment of native herbs and grasses following fires or other disturbances.

Control and Management:

- **Manual**- Hand pull before seed set, bag and dispose of plants to prevent spread
- **Chemical**- It can be effectively controlled using any of several readily available general use herbicides such as glyphosate or triclopyr. For some sites, applications can be made during the early spring when most other non-target vegetation is dormant. Follow label and state requirements.
- **Biological control**- Two insects that have possible biological control implications for common mullein are European curculionid weevil (*Gymnaetron tetrum*) and mullein moth (*Cucullia verbasci*).

References: www.forestimages.org, http://plants.usda.gov, www.nps.gov/plants/alien/list/a.htm, www.nps.gov/plants/alien/fact/veth1.htm, www.ppws.vt.edu/scott/weed_id/vesth.htm
http://tncweeds.ucdavis.edu/esadocs/documnts/verbtha.html.
http://www.colostate.edu/Depts/SoilCrop/extension/CEPEP/profiles/common%20mullein.pdf
http://akweeds.uaa.alaska.edu/pdfs/species_bios_pdfs/Species_bios_VETH.pdf

Diffuse knapweed

Centaurea diffusa

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Diffuse knapweed Identification and Management

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

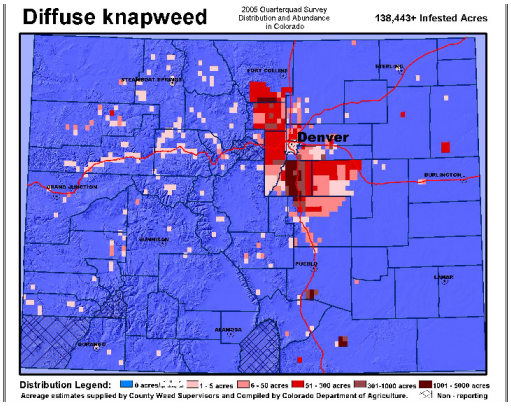
Identification and Impacts

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.



Updated on: 08/08

Management Recomendations

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. 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.

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
Aminopyralid (Milestone)	5-7 ounces/acre or 1 teaspoon/gal water	Spring at rosette to early bolt stage and/or in the fall to rosettes. Add non-ionic surfactant @ 0.32oz/gal water or 1 qt/100 gal water.
2,4-D Amine	1 qt./acre or 1 oz/gal water	Apply to spring/fall rosettes - before flowering stalk lengthens. DO NOT apply when outside temperatures will exceed 85 degrees. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water.
Clopyralid + Triclopyr (Redeem R&P)	1.5-2 pints/acre or 0.75 oz/gal water	Apply from rosette to early bolt stage of growth and/or in the fall to rosettes. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water.
Picloram (Tordon 22K *this is a Restricted Use Pesticide*)	1-2 pts/acre or 0.75 oz/gal water	Apply to spring rosettes through mid-bolt and in fall to rosettes. DO NOT apply near trees/ shrubs/high water table.

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

Field bindweed

Convulvulus arvensis

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Field bindweed Identification and Management

Key ID Points

1. Leaves are shaped like arrowheads.
2. Flowers are funnel-shaped, white to pink, and have two small bracts one inch below the flower base.

Identification and Impacts

Field bindweed (*Convolvulus arvensis*) is a non-native deep-rooted perennial that reproduces from seed and creeping, horizontal roots (rhizomes). Field bindweed stems are prostrate (grows low to the ground) and twining, and grow up to 6 feet long. Leaves are distinguishable by their arrowhead shape. The flowers are bell or trumpet-shaped, white to pink in color, and are about 1 inch long. Field bindweed seeds can remain viable in the soil for up to 40 years.

Field bindweed emerges from its root system in the spring. Flowering occurs from June to September and until the first fall frost. The number of seeds produced per plant ranges from 25 to 300 and seed production is variable depending on environmental conditions. Field bindweed is an extremely difficult noxious weed to control because, in part, of its taproot that may go 20 feet deep into the soil, and which repeatedly gives rise to numerous long rhizomes.

Field bindweed is a problem throughout Colorado. It is one of the most competitive perennial weeds. It is widespread in cultivated areas, pastures, lawns, gardens, roadsides, and waste areas from 4,000 to 8,000 feet in elevation.

To successfully manage field bindweed, containment and persistence in controlling existing stands are necessary in order to exhaust the root system and deplete the soil seed bank. This 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. A healthy cover of desirable perennial plants will assist in discouraging field bindweed establishment.

Field bindweed is designated as a "List C" species on the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local jursidictions managing this species.

On the back of this sheet are field bindweed management recommendations. For more information, visit www.ag.state.co.us/csd/csdhome.html. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

Management Recomendations

Field bindweed

CULTURAL
Establishment of selected grasses can be an effective cultural control of field bindweed. 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.**

Bindweed mite damage

BIOLOGICAL
The bindweed gall mite, *Aceria mahlerbae*, has proven to be effective in reducing field bindweed infestations. This is an option for large infestations. To obtain a mite release, contact the Colorado Department of Agriculture, 970-464-7916.

MECHANICAL
Cutting, mowing, or pulling has a negligible effect unless the plants are cut below the surface in the early seedling stage. Well-established populations have a large seed bank in the soil that can remain viable for over 40 years.

Integrated Weed Management:

Field bindweed requires active management once it is established because of its potential to regenerate rapidly. Even small infestations should be viewed as a serious threat and managed aggressively.

Contain and persistently control infestations in order to exhaust the root system and deplete the soil seed bank.

Maintain a healthy cover of perennial plants to discourage field bindweed establishment.

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

HERBICIDE	RATE	APPLICATION TIMING
Clarity + 2,4-D Amine	1 qt./acre or 1 oz/gal water	Just after full-bloom and/or fall. DO NOT apply near or under trees/shrubs or where soils have rapid permeability. DO NOT apply when outside temperatures will exceed 85 degrees. Add non-ionic surfactant @ 0.32oz/gal water or 1 qt/100 gal water.
Tordon 22K *this is a Restricted Use Pesticide*	1 qt./acre or 1 oz/gal water	Just after full-bloom and/or fall. DO NOT apply near or under trees/shrubs or where soils have rapid permeability. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water.
Roundup Ultra *non-selective herbicide, will kill all vegetation*	4 - 5 qts./acre or 4 - 5 oz/gal water	Apply at full-bloom and/or fall. Add non-ionic surfactant @ 0.32oz/gal water or 1qt/100 gal water. Use caution when applying near grasses or other desirable vegetation.

Conservation Services Division
Colorado Dept. of Agriculture
303-239-4100

Rangeland-Pasture Recommendations

Common Mullein and Moth Mullein Identification and Management

Common Mullein (*Verbascum thapsus)* and **Moth Mullein** (*Verbascum blattaria)* are non-native escaped ornamental biennials that have spread throughout the United States. These plants develop fibrous roots and a deep taproot. Both form a basal rosette in the first growth year and midway through the second season the plants "bolt" producing flower stalks.

Common Mullein has rosette leaves which can be over a foot long. They have smooth edges with dense silvery hairs on both sides giving the leaves a woolly appearance. The flowering stalk is usually solitary and can be over 8 feet tall. Occasionally a few upright branches occur near the top. Leaves on the flowering stem are alternate and become smaller and more pointed close to the top of the plant. The flowers are sulfur-yellow, 5 lobed and united at the base. The stalk is densely packed with flowers attached directly to the stalk. A prolific seed producer, common mullein seeds can remain viable in the soil for 35 years. Common mullein is a List C noxious weed and is frequently found in pastures, roadsides and dry disturbed sites.

Densely Haired Common Mullein Rosette

Moth Mullein Rosette Lacking Hair

Common Mullein Flower

Moth Mullein Flower – Notice The Stem

Moth Mullein leaves are dark green, are oblong tapering to a point with toothed edges, have prominent veins and lack the hairy covering. It has a shorter flowering stalk (2 to 5 feet) and supports flowers ranging from yellow to white with a purplish center. The flowers are each on a short stem and arranged in loose clusters at the top of the stalk. Moth mullein also is a prolific seed producer and the seeds remain viable for 90 years. It is a B list noxious weed and is presumably eradicated in Weld County. Its preferred habitat is similar to common mullein

Below are management recommendations for both common and moth mullein. If you have any questions or would like more information, please contact the Weld County Public Works Dept., Weed Division at (970) 304-6496 ext. 3770. Please visit our website www.weldweeds.org

Recommended management methods:

Cultural – Establishment of selected, aggressive grasses can be an effective cultural control of musk thistle. Contact your local CSU Extension office or Natural Resources Conservation Service office for seed mix recommendations.

Mechanical – Mowing or chopping is most effective when mullein plants are at the early flower stage but will have to be repeated throughout the season. Grubbing or digging the plants below the root crown level is effective in the rosette stage.

Biological –There is no recommended Biological control at this time.

Herbicides – The following are recommendations for herbicides that can be applied to range and pasturelands. Always read, understand, and follow the herbicide label directions. The herbicide label is the LAW!

Herbicide	Rate	Application Timing/Comments
Milestone	7 oz./acre or 1 oz/gal water	Spring rosette to pre-bud stage and/or fall rosette. Add non-ionic surfactant @ 0.32 oz/gal water or 1 qt/100 gal water.
Tordon 22K + 2,4 D	1 – 1.5 pints/acre + 1 qt/acre	Spring rosette to pre-bud stage and/or fall rosette. Add non-ionic surfactant @ 0.32 oz/gal water or 1 qt/100 gal water. Do not apply near or under trees or near water.
Telar XP	1 – 3 oz/acre	Apply from rosette to early bolt stage of growth. Add non-ionic surfactant @ 0.32oz/gal water or 1 qt/100 gal water.
Roundup	2-3 qts/acre Or 2-3 oz/gal water	Roundup is a non-selective herbicide – do not let spray drift to non-target species. Apply when plants are actively growing.

Weld County Public Works Dept., Weed Division at (970) 304-6496 ext. 3770. Please visit our website www.weldweeds.org.

Common Mullein Plant

Moth Mullein Plant

Musk thistle

Carduus nutans

Colorado Dept. of Agriculture, Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

1. Broad, spine-tipped bracts located under the flower
2. Flowering heads are terminal, solitary, and usually nodding
3. Grows up to 6 feet tall

Updated on: 08/08

Musk thistle Identification and Management

Identification and Impacts

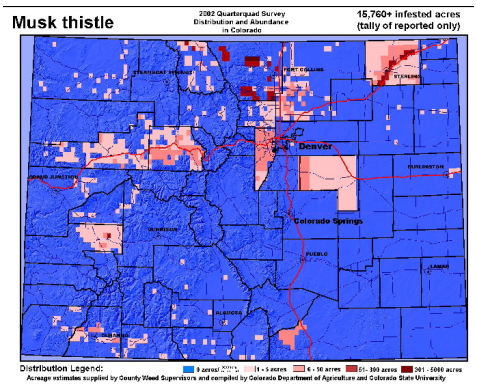
Musk thistle *(Carduus nutans)* is a non-native biennial forb that reproduces solely by seed. A biennial is a plant that completes its lifecycle within two years. During the first year of growth, musk thistle appears as a rosette in spring or fall. During the second year in mid to late spring, the stem bolts, flowers, sets seed, and the plant dies. Musk thistle produces many flower heads. The terminal, or tallest, shoots flower first, then lateral shoots develop in leaf axils. A robust plant may produce 100 or more flowering heads. A prolific seed producer, musk thistle can produce up to 20,000 seeds per plant, only one-third being viable. Because musk thistle reproduces solely from seed, the key for successful management is to prevent seed production.

Musk thistle can grow up to 6 feet tall. The leaves are spiny, waxy, and dark green in color with a light green midrib. The flowers are purple, large in size (1.5 to 3 inches in diameter), nodding, and terminal. The flowers are surrounded by numerous, lance-shaped, spine-tipped bracts. You can expect to see flowers from late May and June. Seed set usually occurs in June or July and effective management options will then become limited.

Habitats for Musk thistle include disturbed, overgrazed areas. Once a pasture is infested, the livestock carrying capacity for that area is significantly decreased. The plant may also occur on rangeland, roadsides, ditches, riparian areas, and trails.

The key to effective control of Musk thistle is to prevent the plant's seed production, Planting desirable grasses and forbs to out compete Musk thistle can also be effective. Dense Musk thistle stands can be treated by spot treatments of herbicides and by a persistent mechanical program. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Musk thistle 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/csd 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.

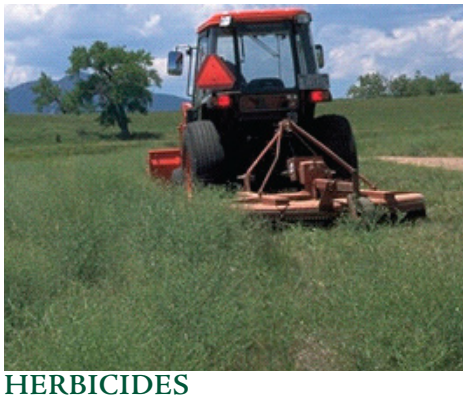


Photos © Kelly Uhing, Colorado Department of Agriculture; map above by Crystal Andrews, Colorado Department of Agriculture.

Management Recommendations

CULTURAL
Establishment of selected grasses can be an effective cultural control of Musk thistle. 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
Livestock tend to avoid grazing on musk thistle, although horses and cattle have been known to eat the flowerheads. Biological control insects, such as the seed head weevil and the crown weevil are effective on large infestations. When used together, these insects provide fair to good control. Contact the Insectary, Colorado Department of Agriculture to get complete information at 970-464-7916. Or visit www.colorado.gov/ag/csd.



MECHANICAL
Any mechanical or physical method that severs the root below the soil surface will kill Musk thistle. Mowing or chopping is most effective when Musk thistle 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:

The key to managing Musk thistle is to prevent seed production. Dense Musk thistle stands can be treated by spot use of herbicides and by a persistent mechanical program. Due to the long seed viability of musk thistle, up to 10 years, control methods may have to be repeated for many years to completely eliminate an infestation.

Musk thistle

HERBICIDES

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

HERBICIDE	RATE	APPLICATION TIMING
Picloram (Tordon 22K - *Restricted use chemical*)	1 pint/acre + 0.25% v/v non-ionic surfactant	Apply in spring to rosettes.
Aminopyralid (Milestone)	5 fl. oz./acre + 0.25% v/v non-ionic surfactant	Apply in spring rosette to early bolting growth stages or in fall to rosettes.
Metsulfuron (Escort XP)	1 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.)
Chlorsulfuron (Telar)	1 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.)

Top to bottom photos, © Norman E. Rees, USDA Agricultural Research Service; Whitney Cranshaw, Colorado State University, Bugwood.org; and Kelly Uhing, Colorado Department of Agriculture.

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

PUNCTUREVINE

Integrated Pest Management for Home Gardeners and Landscape Professionals

Puncturevine (*Tribulus terrestris*) is an aptly named summer annual found widely in California. Native to southern Europe, it can grow under a wide range of conditions, but its success is likely due to its ability to thrive in hot and dry conditions where other plants cannot. It can be a major problem in orchards, pastures, turf, and along roadsides and ditch banks. Although it is known to be toxic to sheep, its main weedy characteristic, as indicated by its common names of puncturevine or caltrop, is its spiky seedpods. (A caltrop is a metal device, used to deter passage by vehicles with pneumatic tires or the hooves of horses; it has four projecting spikes so arranged that when three of the spikes are on the ground, the fourth points upward to poke a tire or hoof.) The seeds of puncturevine are enclosed in a hard caltrop-like case that can injure livestock, people, and pets when stepped on and can even puncture bicycle tires. Another common name is "goathead."

IDENTIFICATION AND LIFE CYCLE

Puncturevine is a summer annual broadleaf weed that generally grows low to the ground forming dense mats 2 to 5 feet in diameter (Fig. 1). The stems radiate out from a central point at the taproot. The plant does not root from the stems. The hairy leaves are opposite each other and divided into four to eight pairs of leaflets that are also opposite each other. Yellow flowers up to ½ inch wide with five petals are found in the leaf axils. After the flower is pollinated, a seedpod forms that is a cluster of five flat spiny burrs containing up to five seeds. As the seedpod matures, it turns gray or tan, gets very hard and breaks apart so that the individual spikes, or burrs, can stick into passing animals and tires. These burrs disperse by adhering to tires, shoes and clothing of people, and the fur, feathers, or feet of animals.

Puncturevine germinates in the spring and summer from seeds produced the previous year. Good soil moisture and warm temperatures are needed for germination, but after the plant is established it can tolerate dry soils due to its rapidly produced deep taproot. The plant may start flowering within 3 weeks of germination and flowering will continue throughout the summer. Seeds are primarily dormant in the first season, but may germinate the next spring. Seeds may remain viable in the soil for up to five years. Puncturevine plants cannot tolerate freezing temperatures.

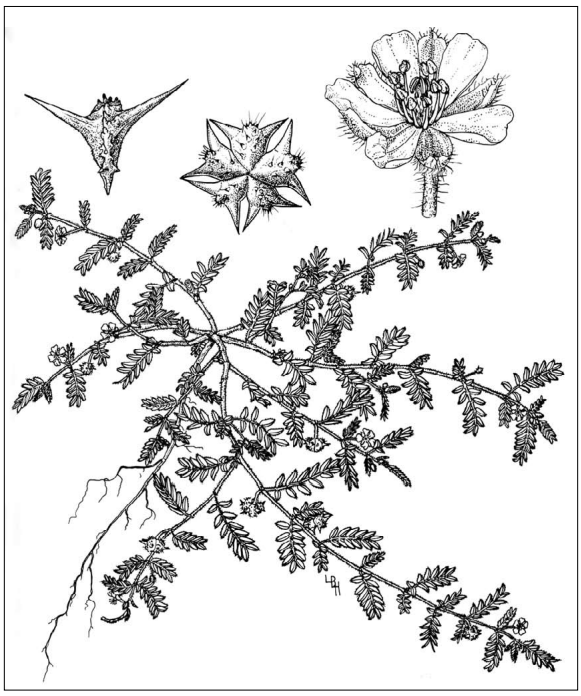


Figure 1. Puncturevine (*Tribulus terrestris*). Prostrate plant with flowers and fruits, or burrs. A. Single burr containing 2-5 seeds, B. Fruit or seedpod, C. Flower.

IMPACT

A typical puncturevine plant will produce 200 to 5,000 seeds during one growing season, depending on available soil moisture and other environmental factors. These seeds and those that did not germinate from previous seasons will contribute to the potential weed population the following year.

With its deep taproot, puncturevine competes aggressively for water and nutrients in tree and field crops and turf. Puncturevine in hay will markedly reduce the quality of the product.

When allowed to grow unchecked, puncturevine will develop into a thick mat, hiding the sharp burrs. Even under limited growth conditions, puncturevine's prolific production of the seed burrs creates dangerous conditions for livestock, people, and pets.

Grazing livestock in areas infested with puncturevine is not recommended. The sharp spines of the seed burr can injure the mouth and digestive tract or feet of animals. Puncturevine can be particularly toxic to sheep, causing sensitivity to light resulting in skin lesions and swelling of ears and lips. Severe effects include blindness, necrosis of skin, loss of lips and ears, and death in young animals. Addition-

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ally, puncturevine may contribute to nitrate poisoning in sheep and cattle. Symptoms of nitrate poisoning include labored breathing, staggering, tongue and the white of the eyes turning blue, and loss of appetite.

MANAGEMENT

Long-term control of puncturevine can be achieved by reducing the amount of seeds in the soil. This is best accomplished by removing plants before they produce seeds (i.e., before or at flowering) and continuing to do so over several years. Burrs that have dropped after removing the plant may be collected and removed by sweeping or raking the ground. Even patting the ground with a piece of carpet will help collect the burrs. Biological control from two introduced weevils is also very effective, but there may be resurgences every few years as the number of the weevils decline along with the population of the puncturevine.

The primary method of management for puncturevine in the home landscape and garden is removal of seedlings and older plants by hand or hoeing, taking care to also remove any burrs that fall off the plant. Avoid bringing puncturevine into uninfested areas on shoes and the wheels of mowers or carts.

Cultural and Mechanical Control

In most situations, puncturevine is best controlled by hand removal or by hoeing to cut the plant off at its taproot. Monitoring the area and removing the weed throughout the late spring and into the summer will greatly reduce the impact of the weed the next year. Shallow tilling (about 1 inch deep) of seedlings or small plants can be effective in larger areas. Deeper tilling is not recommended since this may bury seeds and they may be able to germinate for several years afterwards. Hand removal, hoeing, or cultivation should be initiated prior to flowering and seed production. Mowing is not an effective method of control since the plant grows low to the ground.

Mulches can be used to control common puncturevine in ornamental plantings, orchards, vineyards, vegetable crops, and gardens, if they screen out all light. To be effective, organic mulches should be at least 3 inches thick. However, puncturevine burrs that fall onto mulch surfaces can establish on the mulch surface due to the puncturevine's deep taproot. Synthetic mulches, which screen out light and provide a physical barrier to seedling development, also work well.

Aeration of compacted sites and planting competitive desirable plants can also reduce the impact of puncturevine by making the area more favorable for the growth of the desired plants and reducing resources available to the weed.

Biological Control

Two weevils, *Microlarinus lareynii* and *M. lypriformis*, native to India, France, and Italy, were introduced into the United States as biocontrol agents in 1961. *Microlarinus lareynii* is a seed weevil that deposits its eggs in the immature burr or flower bud and the larvae feed on and destroy the seeds before they pupate and emerge as adults, disperse, and start the cycle over again. Generation time is 19 to 24 days in the summer in southern California. *Microlarinus lypriformis* is a stem weevil that has a similar life cycle except that it lays its eggs in the undersides of stems, branches, and the root crown. The larvae tunnel in the pith where they feed and pupate. The adults emerge from holes chewed in the upper surfaces of the stems, branches, and crowns. Adults of both species overwinter in plant debris. Although the stem weevil is slightly more effective than the seed weevil when each is used alone, the weevils are most effective if used together and the puncturevine is moisture-stressed.

Both species of weevils are available for purchase from biological control suppliers but purchase and release is not generally recommended because weevils collected from other areas may not survive at your location. In most California counties where releases would be beneficial, county agricultural commissioners have release programs or can direct you to collection sites where you may be able to collect them yourself. Contact your county agricultural commissioner's office for more information.

Chemical Control

Chemical control is generally not necessary for the control of puncturevine in the home landscape. However, in large areas, or places where there was a heavy infestation in previous years so that it's difficult to remove by hand, hoeing, or tilling, herbicides may be used to control puncturevine.

There are few preemergent herbicides that are effective. Products containing oryzalin, benefin, or trifluralin will provide partial control of germinating seeds. These must be applied prior to germination (late winter to midspring).

After plants have emerged from the soil (postemergent), products containing 2,4-D, glyphosate, and dicamba are effective on puncturevine. The smaller or younger the plant, the better the postemergent herbicides work. Dicamba and 2,4-D will injure most broadleaf plants so it is important that they only be applied to the weeds and drift is minimized. They can be applied to lawns without injuring the desired grass. Glyphosate will kill or injure most plants so it should only be used as spot treatments or on solid stands of the weed.

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For more information contact the University of California Cooperative Extension in your county. See your telephone directory for addresses and phone numbers.

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To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

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WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down sink or toilet. Either use the pesticide according to the label or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

Virtual Field Guide
- Interactive Map of Idaho
- Noxious Weed List

Quick Links
View the Poison Hemlock (rosette) panorama with video clips and the Poison Hemlock Bloom panorama with video clips
More Poison Hemlock information in the Reference Library

Poison Hemlock *(Conium maculatum)*

View the Poison Hemlock Photo Gallery

One of the distinguishing characteristics of Poison Hemlock is the purplish spots on the stems.

Poison Hemlock is noted for its toxicity. It is a herbaceous biennial plant which grows between 1.5-2.5 m tall, with a smooth green stem, usually spotted or streaked with red or purple on the lower half of the stem. The leaves are finely divided and lacy, overall triangular in shape, up to 50 cm long and 40 cm broad. The flowers are small, white, clustered in umbels up to 10-15 cm across. The plant is often mistaken for fennel, parsley or wild carrot although the characteristic stem hairs of the wild carrots are missing. The Poison Hemlock root is fleshy, white and often unbranched and can be mistaken for parsnip. When crushed, the leaves and root emit a rank, unpleasant odour often compared to that of a mouse or parsnips.

Poison Hemlock contains the alkaloids Coniine, N-methylconiine, conhydrine, pseudoconhydrine, g-coniceïne and Atropine . The most important and toxic of these is Coniine. Coniine is a neurotoxin, which disrupts the workings of the central nervous system and is toxic to people and all classes of livestock.

Poison Hemlock has been introduced and naturalised in many other areas, including much of Asia, North America and Australia. Poison hemlock is often found on poorly drained soils, particularly near streams, ditches, and other surface water. *(From Wikipedia)*

Poison Hemlock rosette.
Photo courtesy of Ada County Weed Control.

Russian olive

Elaeagnus angustifolia

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Russian olive Identification and Management

Key ID Points

1. Leaves are silvery white with dense scales.
2. Flowers have 4 small sepals and are light yellow clusters.
3. Red-yellow fruits on mature plants.

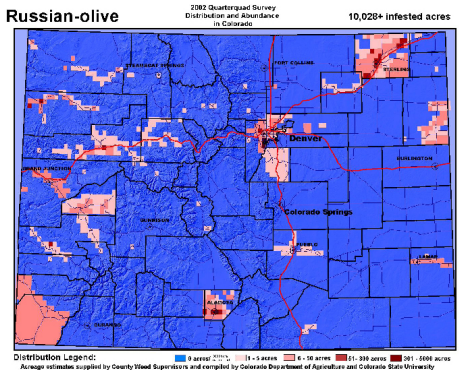
Identification and Impacts

Russian olive (*Elaeagnus angustifoilia*) 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 can remain viable for up to 3 years and are capable of germinating in a broad range of soil types. Spring moisture and slightly alkaline soil tend to favor seedling growth. The plants extensive root system, sprouts root suckers frequently. The stems can reach up to 30 feet in height with branches and trunks that have 1 to 2 inch thorns. Leaves are 2 to 3 inches long, alternate, narrow, have simple blades, and are untoothed. The lower surface is silvery white with dense scales, while the upper surface of the leaf is light green in color. Flowers are 4 small sepals in light yellow clusters, fragrant, and appear May through June. 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, fields and open areas. Russian-olive can out compete native vegetation, 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 are dependant on size and location of the plant. Details on the back of this sheet can help to 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/csd 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.



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Updated on: 08/08

Management Recommendations

CULTURAL
Cultural controls are not an option when dealing with Russian olive. Replacing with native trees is important once Russian olive has been removed. Contact your local Natural Resources Conservation Service for recommendations of other possible trees or shrubs.

BIOLOGICAL
Tubercularia canker 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. For more information, contact the Colorado Department of Agriculture's Insectary in Palisade, Colorado at 970-464-7916.

MECHANICAL
Mowing hedges with a brush type mower, followed by removal of cut material may be the most effective method for eradication. Stump sprouting commonly occurs after cutting down the tree, and excavation of the entire stump can trigger root sprouting. Burning is practical when conditions support a long hot fire and most effective in summer or early fall. Saplings are most sensitive.

Integrated Weed Management:

The most effective combination of control efforts has been cutting trees, followed by either spraying or burning the strumps. "Cut-stump" treatments that are applied during the winter months, using an approved herbicide seems effective. Trees are "cut" with a hatchet or chainsaw, then immediately treated with herbicide on the open wound.

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasture-lands. *Rates are approximate and based on 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)	Undiluted (100% solution)	Apply to the cambial layer of the tree immediately after the cut-stump treatment.
Imazapyr + Water (Habitat + Water or Arsenal + Water)	Diluted by mixing 8 to 12 fl. oz / 1 gallon of water	Apply to the cambial layer of the tree immediately after the cut-stump treatment.
Imazapyr (Habitat or Arsenal)	4 to 6 pt./Acre	Broadcast spray/spraying individual trees; low or high volume spray.

Russian olive

Scotch thistle

Colorado Dept. of Agriculture, Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Scotch thistle Identification and Management

Key ID Points

1. Flower heads cluster 2-5 and are purple to dark red in color.
2. Leaves are alternate, stalk-less and hairy underneath.

Identification and Impacts

Scotch thistle *(Onopordum acanthium or O. tauricum)* 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, Scotch thistle appears as a rosette in spring or fall. Rosettes can be 1 to 2 feet in diameter. During the second year in mid to late spring the stem bolts, flowers, sets seed, and the plant dies. A prolific seed producer, Scotch thistle can produce up to 14,000 seeds per plant.

Scotch thistle can grow up to 12 feet tall. Stems are numerous, branched, and have broad, spiny wings. The leaves of species *acanthium* are large, grayish-green, spiny, and covered with fine dense hair giving the leaf a woolly appearance. The leaves of the species *tauricum* are similar in size, but are not hairy, smooth and bright green. On both species, the leaves have a distinct mid-rib. The flowers are violet to reddish in color, numerous (70-100/plant), and are surrounded by spine-tipped bracts. The plants flower from mid-June to September.

Due to the robust, spiny nature of Scotch thistle, this plant can act as a living barbed wire fence, making areas impassible for wildlife, livestock, and people. Scotch thistle invades rangeland, overgrazed pastures, roadsides, and irrigation ditches. It also prefers high-moist soil areas adjacent to creeks and rivers.

The key to effective control of Scotch thistle is maintaining healthy pastures and rangeland, guarding against disturbance or overuse, and as with most biennials limit seed production. To reduce seed production, plants with buds or flowers should be collected and immediately disposed of or destroyed. Chemical control is most effective when plants are in rosette stage, spring or early fall. Mechanical controls can be used to eliminate small patches or plants in a later growth stage. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Scotch thistle 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/csd 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.

Photos © Map above: Crystal Andrews, Colorado Department of Agriculture; All other photos: Kelly Uhing, Colorado Department of Agriculture.

Onopordum acanthium or O. tauricum

Updated on: 08/08

Management Recommendations

Scotch thistle

CULTURAL
Establishment of selected grasses can be an effective cultural control of Scotch thistle. 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
Urophora stylata, a fly predator, is used to help control this thistle. The female fly lays eggs in the seed head of the thistle. The maggot then consumes the seed in the flower. This species has overwintered in Colorado but the limited numbers will not allow for general redistribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

MECHANICAL
Any mechanical or physical method that severs the root below the soil surface will kill Scotch thistle. Mowing or chopping is most effective when Scotch thistle 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:

Scotch thistle is best controlled in the rosette stage. For small infestations, Scotch thistle can be controlled by severing its taproot 1-2 inches below the ground. Control can be enhanced by a follow-up application of herbicides to the surviving rosettes. It is imperative to prevent seed production. Do not allow Scotch thistle flowers to appear.

HERBICIDES

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

HERBICIDE	RATE	APPLICATION TIMING
Picloram (Tordon 22K - *Restricted Use*)	1 pint/acre + 0.25-0.5% v/v non-ionic surfactant	Apply spring or fall in the rosette stage.
Aminopyralid (Milestone)	7 fl. oz./acre + 0.25-0.5% v/v non-ionic surfactant	Apply spring or fall in the rosette stage.
Metsulfuron (Cimarron X-tra)	2 oz. product/acre 0.25-0.5% v/v non-ionic surfactant	Apply rosette to early bolt stages of growth. (Spring)

WATCH OUT *for* Whitetop

by Kim Goodwin, Montana State University
& Dave Burch, Montana Dept. of Agriculture

Invasive weeds are non-native plants that invade ecosystems and replace native plants. Noxious weeds are usually invasive and designated by State law as priority plants that require control by landowners. These weeds can reduce grazing land and impact wildlife habitat. Early detection and quick response is critical to slow spread and protect weed-free areas. The purpose of this bulletin is to provide early control methods for whitetop (*Cardaria draba*). Contact your county weed coordinator or Extension agent for management of large infestations.

Whitetop (Mustard Family), a native of Eurasia, was introduced to North America in contaminated seed. Whitetop is a relatively long-lived, rhizomatous perennial forb. It has numerous white flowers with 4 petals, giving the plant a white, flat-topped appearance. Leaves are lance-shaped, alternate on the stem, and covered with soft white hairs. Mature plants can reach 2 feet tall. The roots usually occur to a depth of 30 inches, but some can reach 12 to 30 feet. The deep roots and rhizomatous nature of this plant make it difficult to control.

Habitat

Whitetop prefers open, unshaded areas. It occurs on fields, waste areas, meadows, pastures, croplands, and along roadsides. It grows well on alkaline soils that are wet in late spring. Whitetop generally grows better in moist sites or areas with at least 12 inches of annual precipitation. Whitetop invasion of arid rangelands is not common. This weed spreads vegetatively and can eliminate native vegetation. In the absence of competition, a single plant can produce more than 450 shoots and spread over an area 12 feet in diameter in a single year. With competition, a plant does not usually exceed 50 shoots per year.

Biology and spread

Whitetop reproduces by vegetative shoots and seeds. Plants emerge in early spring and flower in early summer. The plants usually set seed by mid-summer. If conditions are favorable, a second crop of seeds can be produced in the fall. A typical plant can produce 1,200 to 4,800 seeds each year. Buried seeds usually remain viable for about 3 years. Seeds are dispersed along roads, railways, and waterways. Seeds can be transported by water, wildlife, livestock, vehicles and equipment. Seeds are also dispersed to new sites in mud on boots and impure materials like mulch, forage and feed grains, crop and grass seed, top soil, and gravel.

Early control methods

Young, individual seedlings may be hand-pulled before the root system becomes extensive. Small patches with developed root systems should be treated with herbicides. Follow-up applications will be necessary to impact the root system and ensure reproduction is stopped completely.

Herbicide selection and timing should be advised by your county weed coordinator and application must follow label directions. Applications of 2,4-D alone are not very effective. Roots may rapidly sprout new growth and repeated applications are usually required. But this herbicide may be the only cost-effective choice near water. Effective herbicide treatments on sites distant from surface or ground water follow. Include surfactants to improve herbicide performance.

- Metsulfuron (Escort®) applied at a rate of 1 to 2 ounces/acre plus 2,4-D at a rate of 1 quart/acre.
- Chlorsulfuron (Telar®) applied at a rate of ½ to 1 ounce/acre plus 2,4-D at a rate of 1 quart/acre.

Photo by C. Evans

Whitetop flowers are flat-looking and clumped at the top of the stem.

Acknowledgements

This bulletin was produced with suggestions from Jim Jacobs, Connie Bollinger, Shana Wood and Susan Anderegg. Funding assistance was provided by the Montana Noxious Weed Trust Fund.

Prevent whitetop spread and colonization by locating and eradicating new plants and patches. The key to eradication is 100% control to prevent reinvasion and eliminate root reserves. Prevent invasion by using weed-free mulch, forage and feed grains, crop and grass seed, top soil, and gravel. Monitor sites for new weeds where at-risk material was used. Revegetate disturbed areas with native grasses and maintain healthy and competitive native plant communities to hinder invasion. Encourage outdoor users to clean equipment, remain on trails, and report new invasions.

MONTANA STATE UNIVERSITY EXTENSION