Glacier View Meadows
Manual for Noxious Weed Management
And
Land Stewardship

Revised 2016


GVM Ecology Committee

Renee Galeano-Popp, Chair Noxious Weed Subcommittee

First Edition Dated 2007

By Judd Adams

Introduction

Noxious weeds are non-native, invasive species that have been designated as noxious by Federal and State authorities. These species can displace native plants and dominate native plant communities. They are from other continents and have arrived in this country without their original set of checks and balances. Their invasive capabilities affect biodiversity as a whole from native pollinators to local wildlife such as deer that evolved with native plants. These plants also have a significant effect on aesthetics and can detrimentally affect the quality of life we enjoy here in GVM.

These species have been studied by experts at the State and county levels. The State of Colorado rated these species according to their level of invasive capabilities and therefore their priority for management (Colorado Department of Agriculture 2016). Larimer County Weed District (LCWD) maintains a list of species pertinent to our area (LCWD 2016). All nomenclature in this manual follows Ackerfield (2015) and scientific names are included in Appendix A.

The State of Colorado defined **List A** species as those that pose the greatest threat to regional ecosystems and agricultural productivity. These species have few occurrences in the state and have been targeted for eradication. They represent the state's highest priority. The GVM area does not have any List A noxious weeds.

The State of Colorado defined **List B** species as those that are highly invasive but which are common and widespread enough that eradication from Colorado is unlikely. Local control is a goal for these species and they represent Larimer County's highest priority after List A species.

Colorado's **List C** species are invasive but are so common, abundant and widespread that their control is unlikely. Local containment is the best that can be expected. List C species represent Larimer County's lowest priority for noxious weed management and they will not engage in enforcement activities for these species.

Musk thistle, Canada thistle and Diffuse knapweed are the most common and abundant List B weeds in GVM. However, many other List B species have also shown up such as Scotch thistle, Bull thistle, Leafy spurge and Houndstongue as examples. Two other List B species are currently spreading and causing serious concern in GVM. These are Dalmatian toadflax and Hoary Alyssum.

In addition to the high priority List B species, two List C species are prevalent in GVM. These are Common mullein and cheatgrass.

GVM spends a considerable portion of its annual budget to manage noxious weeds in GVM greenbelts and along roadsides, however these are a small part of the whole subdivision. The vast majority of land affected by noxious weeds here is in the hands of property owners. For this reason, GVM offers weed management resources such as this manual to residents because it takes a partnership between us to make a difference.

GVM offers:

- Educational materials/programs
- Weed identification workshops
- Property consultations
- Treatment materials such as herbicide
- Weed treatment of greenbelts/public spaces

Prevention

Noxious weeds and other "weedy" species tend to find areas of ground disturbance to be very attractive sites to establish on. Roadsides are often the first sites to become infested but any recently disturbed, bare ground is subject to rapid weed establishment. New home construction, new waterlines and so forth are prime for weeds.

The best defense against noxious weed establishment is to reclaim these areas of bare ground with native seed. Whenever possible, topsoil should be set aside at the start of ground breaking activities and then replaced at the end of construction. This ensures that the most fertile soil will be on the top where seeds can be sown.

The GVM Ecology Committee is committed to the use of native plants whenever possible. Seed is locally available (usually as a mix) for the following native grass species:

Mountain Brome (*Bromus marginatus*)

Slender Wheatgrass (*Elymus trachycaulus*)

Streambank or Thickspike Wheatgrass (*Elymus lanceolatus*)

Idaho Fescue (*Festuca idahoensis*)

Arizona Fescue (*Festuca arizonica*)

Prairie Junegrass (*Koeleria macrantha*)

Bluebunch Wheatgrass (*Pseudoregneria spicatum*)

Bottlebrush Squirreltail (*Elymus elymoides*)

Sandberg's Bluegrass (*Poa secunda*)

Blue Grama (*Bouteloua gracilis*)

Side-oats grama (*Bouteloua curtipendula*)

Western Wheatgrass (*Pascopyrum smithii*)

Reclamation with wildflower seed is more expensive and frequently seeds are not native to our area. Ackerfield (2015) has information about whether species are native to Colorado and contains county maps that allow you to see if a species is native to Larimer County. Contact the committee if you seek advice or don't have this book.

Identification

GVM offers books that can help landowners with identification of noxious weeds. These are all located at the main office on the ecology shelves. The LCWD has a free booklet entitled "*Weed Management Reference Guide*" (LCWD undated) as well as separate pamphlets on the identification of local thistles and knapweeds. GVM tries to keep these in stock but you can also visit the LCWD office on 2649 East Mulberry if we are out or you seek more information.

The book *Weeds of the West* (Burrill et. al 1996) is also available in the main office. It offers excellent photographs and descriptions of many plants. While we recommend this book, a point of clarification is in order. *Weeds of the West* includes many more species than those that concern us at GVM and many more than are designated as noxious weeds. This book includes "weedy" plants that come in after disturbance but unlike noxious species, they don't spread to undisturbed areas. The book has a significant number of plants that affect the productivity of lands used for grazing livestock. The latter includes native plants that are poisonous to domestic animals.

The best way to have the noxious weeds on your property identified for you is to request a one-on-one consultation with one of the GVM experts. Feel free to contact the main office for a list of names and contact information.

Noxious Weed Treatment Guidance

Remember, noxious weed management is not about removing plants. It is about managing root systems and seed banks. In some cases roots go down to a depth of 3-4 feet and seeds for some species are viable in the soil for 20 to 30 years. Persistence will pay off in the end. It is not a one shot deal.

If you have a very dense and large occurrence of noxious weeds, removing and killing them is going to leave bare areas that will rapidly be re-invaded by unwanted species. Seeding in behind your treatments is highly recommended in these cases.

While this manual is written mainly with an eye to landowner treatments, there are many cases where noxious weed infestations are too large for practical application by individuals. In all cases where noxious weeds exceed a landowner's capabilities or desires, there are contract

sprayers that will come help manage your property for a charge. GVM's main office maintains a list.

Canada thistle **(List B)**

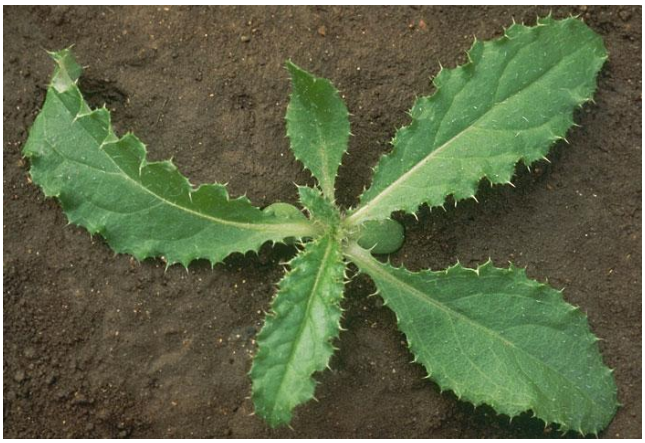
After its introduction to North America in the 1600s, the rapid spread of Canada thistle led to the enactment of control legislation as early as 1795 in Vermont and 1831 in New York. Since that time it has spread throughout most of Canada and the United States, north of the 35th parallel, where it is considered one of the most tenacious and economically important agricultural weeds (Zouhar, 2001a).

Canada thistle is a long-lived perennial that reproduces by roots which is how it produces large dense patches. The goal of Canada thistle treatment is to starve the extensive root system. It will take several to many years but it will work with persistence. Although Canada thistle has low seed viability, the methods below will ensure that no flowers will be produced and no seed set.

- Mow or clip plants as often as possible during the growing season
- Leave at least 9 leaves per stem (cut at a height of 8 inches or more to achieve)
- Bag and dispose of all clippings in order to minimize fire fuels. Dispose of in the GVM compactor
- If possible, apply herbicide in early October

Zouhar (2001) suggests that mowing or clipping of Canada thistle must be repeated every 7-28 days for at least 4 years to have an impact.

Flower heads of Canada thistle



Seedling (rosette) of Canada thistle

Diagram of extensive roots of Canada thistle

Field of Canada thistle

Musk thistle **(List B)**

Musk or nodding thistle is native to western and central Europe, northwards to Scotland and extending to Sicily, central Yugoslavia, and Ukraine, western Siberia, Asia Minor, and North Africa. It has since been introduced to North and South America, Australia, and New Zealand. The earliest records of musk thistle in North America are from central Pennsylvania in 1852, followed by several records of its occurrence along the east coast in the late 1800s, apparently associated with ship ballast. Musk thistle began to appear in the Midwest around the turn of the 20th century (Zouhar 2002).

Musk thistle is a biennial which means it only lives for two years. The first year it presents itself as a rosette at ground level. The second year it bolts and sends up a flowering stalk 3 to 5 feet tall with many purple flower heads. It has weak roots but is a prolific seeder. Some researchers report that a single plant can produce an estimated 10,000-12,000 seeds which explains how this species can dominate an area and spread to new ones so easily (Zouhar 2002). Whenever it is clipped or mowed it quickly regrows new flowers. This regrowth capability is why persistent monitoring and treatment is needed throughout the season.

Musk thistle flower head with reflexed bracts

First year rosette of musk thistle

Musk thistle at start of bolting stage

Dense patch of musk thistle

The joint goals of musk thistle treatment are to a) remove or kill rosettes so they never make it to the second year or the bolting stage and b) to prevent and contain every bit of seed possible.

- Pull, dig or spray all rosettes observed throughout the growing season
- Pull, dig or spray all bolting plants prior to flowering
- Once flowering has begun, remove (clip) ALL seed heads and place in garbage bags for disposal in the GVM compactor
- Once flowering has begun, there is a high probability that herbicides will be ineffective. Remember musk thistle will die after flowering anyway
- When pulling or digging plants, the roots must be removed from the ground, because musk thistle will otherwise continue to develop flowers
- All flower heads removed from the plant must be removed from the site. Use the GVM compactor for disposal

- Place all stalks that were dug or pulled up into garbage bags in order to minimize fire fuels and ensure they will not continue to grow flower heads
- Waiting until late summer when the seeds are starting to come out of the flower heads is highly undesirable
- If any stalks (even partial stalks) are left in the ground they must be monitored for regrowth and flower buds/heads need to be removed from the site
- Please note that if you employ mowing, musk thistle will still flower just at a reduced height. Again, as long as the root is in the ground it will produce seed
- If musk thistle appears in dense patches it is wise to re-seed the site with native species

Diffuse knapweed **(List B)**

Diffuse knapweed is native to grasslands and shrub steppes of the eastern Mediterranean and western Asia. It is thought to have been introduced to North America as a contaminant in alfalfa seed from Asia Minor-Turkmenistan or in hybrid alfalfa seed from Germany. The earliest record of diffuse knapweed in North America is from an alfalfa field in Washington state in 1907 (Zouhar 2001b).

Diffuse knapweed is a biennial species that can sometimes live longer than 2 years and turn into a short-lived perennial. As do other biennials, it starts with a rosette the first year and then bolts the second year. It can get a few feet tall but it is sometimes less than 12 inches tall allowing it to blend in with surrounding plants. Spotted knapweed (*C. stoebe* ssp. *micranthos*) is very similar but with purple flowers. The two species hybridize producing plants with white and purple flowers which can be found in GVM. Both have deep, extensive roots and are prolific seeders. Some researchers believe these plants exude underground chemicals that deter other species thereby allowing diffuse and spotted knapweed to dominate areas.

The joint goals of knapweed treatment are to a) remove or kill all rosettes so they never make it any further and b) to prevent and contain every bit of its highly mobile seed as possible.

- The highest priority is to pull, dig or spray first year rosettes
- Seeds germinate throughout the growing season which means continual monitoring is needed for new rosettes
- Pull, dig or spray plants that are getting ready to bolt
- Pull, dig or spray mature plants that have already set seed this year or in previous years HOWEVER the seeds must be handled with great care. Place them into bags gently and directly, i.e. never on the ground.
- Some managers believe that mowing prior to flowering stage can prevent seed set but others are unconvinced of its effectiveness. Certainly if mowing is employed it will need to be repeated several times.

- Dispose of all materials in bags and take them to the GVM compactor. Do not leave them in piles or strewn about.
- If your patch of diffuse or spotted knapweed is large and dense, re-seeding with native species is an important step in controlling them.

Diffuse knapweed flower

Spotted knapweed flowers

Diffuse knapweed first year rosette

Patch of Diffuse knapweed

Toadflax species **(List B)**

There are two species of toadflax in Larimer County that are introduced, invasive and included on the State of Colorado's List B. In this manual they are treated as "toadflax species". Reportedly there are hybrids between them near the Wyoming border. Both species have been used as ornamentals and it is believed that from there a variety of vectors facilitated their spread (Zouhar 2003). It is abundant in Livermore and has been spreading into GVM in recent years.

Toadflax species are deep-rooted and somewhat short lived. They reproduce both by seed and roots. Zouhar (2003) reports that some taproots have been documented at depths of 4- 10 feet.

Toadflax flowers

Toadflax leaves and flowers

Seed viability is high and accounts for most of the new occurrences. However, reproduction by roots is what accounts for the size of any one occurrence. Seed longevity is reported to be around 8 years. Toadflax is able to recover from fires and may be promoted by fire (Zouhar 2003).

Treatment of toadflax is extremely difficult and needs especially diligent and specific practices.

- Hand pulling, mowing and cutting of above ground plant parts will deter flowering and seed production. It will likely be needed throughout a season but it will not eradicate the occurrence due to deep and extensive roots
- If hand pulling, mowing and cutting are done consistently for multiple years, there is a chance that the roots will begin to decline
- Only a few herbicides have proven capable of penetrating the waxy leaves of toadflax. High concentrations of picloram have shown some promise but have not eradicated plants. Care must be taken to avoid affecting non-target species
- Preventive measures are essential. This includes care when ground disturbing machinery are in areas of toadflax. They may transport roots and seeds if best management practices are not followed.
- If you have one or the other of the toadflaxes on your property, you can manage small patches with the above recommendations or for larger occurrences you would be wise to call in a specialist

Other Noxious Weeds

Common Mullein **(List C)**

Common mullein is a non-native species that occurs throughout North America. It is considered to be common, widespread and "naturalized". Naturalized refers to the fact that it is so well established that it has become part of the American flora. Mullein is highly revered in herbology.

Most accounts indicate that mullein is restricted to areas of ground disturbance including disturbances made by small burrowing mammals. While it has proven to be persistent in some areas, it does not spread significantly beyond disturbed areas and is almost never found in undisturbed areas. Studies have also shown that mullein is somewhat ephemeral and will decline with successional processes as the land recovers from disturbance (Gucker 2008).

Mullein is a biennial that produces a rosette the first year and then bolts with a flowering stalk the following year. The leaves are wooly. Flowers are short lived only being receptive to pollination for one day. Seeds are wingless and do not travel far beyond the parent plant. Seeds are abundant and have been found to live extraordinarily long periods in the soil. Some researchers found seeds to have germinated after as long as 100 years in the soil (Gucker 2008).

Mullein is a common plant in post-fire plant communities and the presumption is that seeds were present in the soil prior to the fire. Due to the longevity of seeds in the soil combined with the widespread nature of this species, the chances of control are very low. This is why it is on List C. However, small areas may be attempted if a landowner desires. GVM highly recommends that treatment of mullein take place only after List B species have been sufficiently managed.

Treatment methods are aimed at removing first year rosettes and containing seed stalks.

- First year rosettes can be pulled, dug or sprayed
- Once a plant has bolted, all that can be done is to carefully remove the stalk such that seeds are not dropped, bag it and remove it from the site. Remember, the plant dies after it bolts.
- Prevention is critical such as mitigating ground disturbances by seeding and by washing machinery before it moves from one site to another.

Mullein rosette

Flowering mullein stalk

Remember! Not all Thistles are Bad!

Please remember that all thistles are not bad. We have a native thistle here that should not be removed or sprayed with herbicide. The native Prairie thistle has white flowers and blue-green foliage. While Scotch thistle also has a blue green type of foliage, it is (so far) rarely seen and has purple flowers. When in doubt, help is a phone call or email away.

Cirsium canescens is common in our area

Pulling Tips

The object here is to get the root of the target plant. Rosettes are very difficult to grab on to and may be better treated with herbicide or a shovel. Pulling can strain the back, especially the arms and shoulders. Pulling is not recommended for plants with deep root systems such as Canada thistle, dalmation toadflax and leafy spurge. Guidelines for Canada thistle are included in this manual. If you have toadflax or leafy spurge, please ask for assistance.

- It is best to wear gloves although sometimes a bare hand can get a better grip.
- The best time to pull is when the ground is moist or wet from rain.
- A weed digger is most useful
- Pull from as close to the ground as possible
- Pull straight up rather than at an angle
- Place all of your pulled plants and clippings in a bag and dispose

- If you can't get the root by pulling you can use a shovel, weed digger, spray herbicide or cut the plant off at ground level with clippers. If you clip the plant and leave the root it will likely re-sprout and need further management.

Herbicide Tips

- GVM will provide you with a small amount of general herbicide and a prayer for your use if you ask for it at the main office.
- Ensure you have your target species correctly identified
- Follow all safety precautions to protect yourself. This includes long pants, long sleeves, gloves and eye protection. Some people also cover their nose and mouth with a scarf.
- Heed warnings about using herbicides at or near water sources such as seeps, springs, streams, ponds and your own well.
- Prohibit pets from rolling or passing through areas that have been sprayed.
- You do not need to douse a plant. It is often better to let the plant live for a while and transfer the herbicide to the roots. Use your herbicide sparingly.
- Repeat spraying as needed, e.g. 2-3 weeks keeping an eye on how the previously sprayed plants look. Are they hindered?

Cooperation

Lastly, cooperation with your neighbors will often play a large role in the success or failure of managing noxious weeds on your property. Chances are you and your neighbor are sharing weeds. Your weeds may be contaminating their lot and vice versa. Sometimes it is an entire block of properties that share the same weeds.

Coordinating with your neighbors is the key. Ask your neighbors if they will join you in your efforts to control these plants. Without their aid, your efforts may be diluted significantly.

References

Ackerfield, J. 2015. Flora of Colorado. Botanical Research Institute of Texas.

Burill, L., S. Dewey, D. Cudney, B. Nelson, R. Lee, R. Parker 1996. Weeds of the West, 5th Edition. Edited by T. Whitson. University of Wyoming Press.

Colorado Department of Agriculture, 2016. Colorado Department of Agriculture website. https://www.colorado.gov/pacific/agconservation/noxious-weed-species

Gucker, Corey L. 2008. *Verbascum thapsus*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2016, May 9]

LCWD, 2016. Larimer County Weed District website. http://www.larimer.org/weeds/

LCWD, Undated. Weed Management Reference Guide, Larimer County, Colorado 5th Edition. Larimer County Department of Natural Resources

Zouhar, Kris 2001a. *Cirsium arvense*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2016, April 18]

Zouhar, Kris. 2001b. *Centaurea diffusa*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2016, April 18].

Zouhar, Kris. 2002. *Carduus nutans*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2016, April 18].

Zouhar, Kris. 2003. *Linaria* spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2016, May 9].

Appendix A

Scientific Names of plants referenced in this manual (in alphabetical order by common name)

Bull thistle	*Cirsium vulgare*
Cheatgrass	*Bouteloua tectorum*
Common mullein	*Verbascum thapsus*
Diffuse knapweed	*Centaurea diffusa*
Hoary alyssum	*Berteroa incana*
Houndstongue	*Cynoglossum officinale*
Leafy spurge	*Euphorbia esula*
Musk thistle	*Carduus nutans*
Scotch thistle	*Onopordum acanthium*
Spotted knapweed	*Centaurea stoebe ssp. micranthos*
Toadflax	*Linaria* spp.