Minnesota Noxious Weed Risk Assessment

Developed by the Minnesota Noxious Weed Advisory Committee

Assessment Information

Common Name: Canada Thistle; other common names include creeping thistle, field thistle, perennial thistle, corn thistle, Californian thistle, Canadian thistle, lettuce from hell thistle, cursed thistle, green thistle, hard thistle, prickly thistle, setose thistle, small-flowered thistle, waxy thistle, and stinger-needles.

Scientific Name: *Cirsium arvense* (L.) Scop. (Synonyms – *Breea arvensis* (L.) Less., *Breea incana* (S.G. Gmel.) W.A. Weber, ined., *Carduus arvensis* (L.) Robson, *Cirsium arvense* (L.) Scop. var. *argenteum* (Vest) Fiori, *Cirsium arvense* (L.) Scop. var. *horridum* Wimm. & Grab., *Cirsium arvense* (L.) Scop. var. *integrifolium* Wimm. & Grab., *Cirsium arvense* (L.) Scop. var. *mite* Wimm. & Grab., *Cirsium arvense* (L.) Scop. var. *vestitum* Wimm. & Grab., *Cirsium incanum* (S.G. Gmel.) Fisch. ex M. Bieb., *Cirsium setosum* (Willd.) Besser ex M. Bieb., *Serratula arvensis* L.); *Cirsium arvense* var. *arvense*, *Cirsium arvense* var. *horridum, Cirsium arvense* var. *incanum*, *Cirsium arvense* var. *integrifolium*, and *Cirsium arvense* var. *vestitum*, and are variously recognized as valid varieties (Moore 1975).

Family Name: Asteraceae – Aster, Daisy, Composite, or Sunflower Family

Current Reviewer: James Calkins, Minnesota Nursery and Landscape Association (MNLA) with assistance from Laura Van Riper, Minnesota Department of Natural Resources
Date of Current Review: August 7, 2024

Previous Reviewer: Roger Becker, University of Minnesota Department of Agronomy and Plant Genetics
Date of Previous Review: August 16, 2013

Species Description

Photographs

Canada thistle (*Cirsium arvense*) infestation. Photo Credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Canada thistle (*Cirsium arvense*) flowers. Photo Credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.


Canada thistle (*Cirsium arvense*) seed heads. Photo Credit: James Calkins.

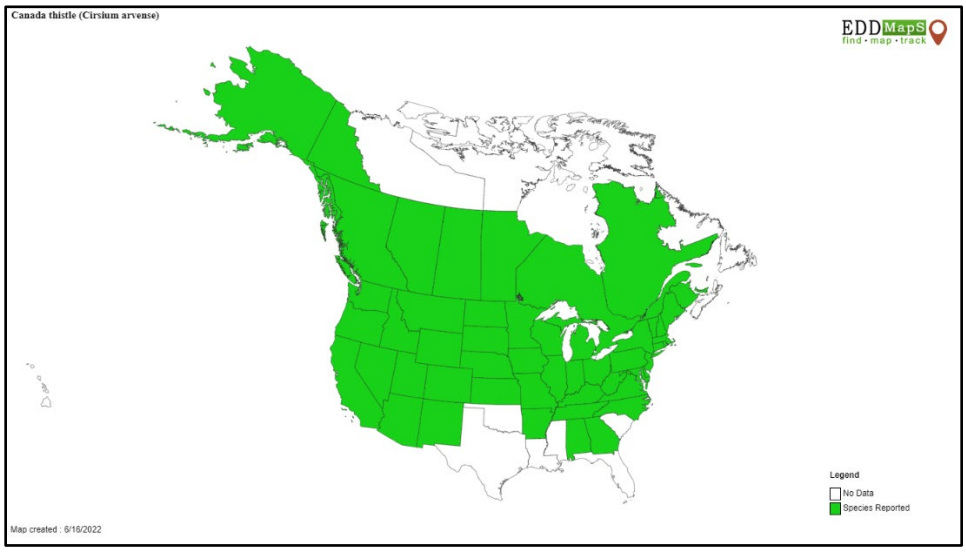
Why the Plant is Being Assessed

- Canada thistle has historically been considered a serious noxious weed and has been listed as a noxious weed in Minnesota since 1872 and was the first species to be listed as a noxious weed in the state.
- The Minnesota Noxious Weed Law requires that all listed species be reviewed every three years to determine if their regulatory status should remain the same or be changed based on new information; as part of this triennial review process, the risk assessment for Canada thistle was last updated formally in 2013 and it was decided that the risk assessment should be updated during the 202-2022 review cycle and this review was extended into 2024.

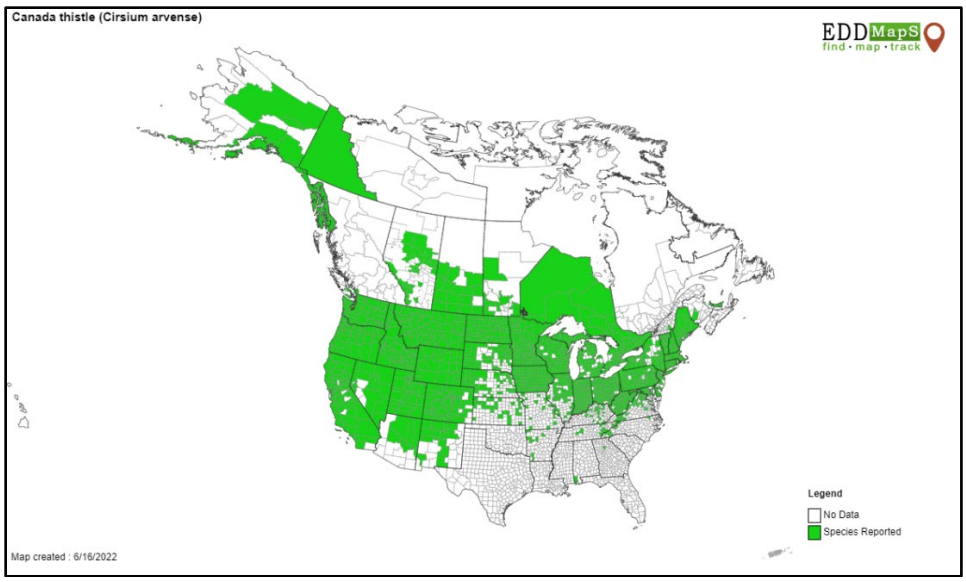
Identification, Biology, and Life Cycle

- Canada thistle is a non-native, herbaceous perennial with an upright, branching habit and an extensive suckering root system that produces clonal colonies that can have hundreds or thousands of stems; plants are typically 1-5 feet tall.
- Stems are hollow, grooved and sparsely hairy to smooth.
- Leaves are dark green and waxy, 2–6 inches long, alternate, stalkless and clasping the stem at the base, oblong and irregularly lobed with sharp spines along the edges; the upper surfaces of the leaves are hairless while the lower surfaces are pale green and smooth to hairy.
- Plants are typically dioecious (individual plants male and female) but up to 26% of male plants can produce both male and female flowers (Nuzzo 1997).
- Flower color is variable from lavender to rose-purple or pink and sometimes white and flowers are borne in compact heads with 1-5 heads/flowering shoot; insect pollinated.
- Given its adaptive nature, *Cirsium arvense* is considered one of the worst invasive weeds world-wide and is common on disturbed sites along roadsides, abandoned fields, croplands, and pastures on a variety of soils including deep, well-aerated, mesic soils to relatively dry habitats including sand dunes and sandy fields, and along the edges of wet habitats including stream banks, lakeshores, cleared swamps, muskegs, and ditches (Moore 1975, Nuzzo 1997, Zouhar 2021).

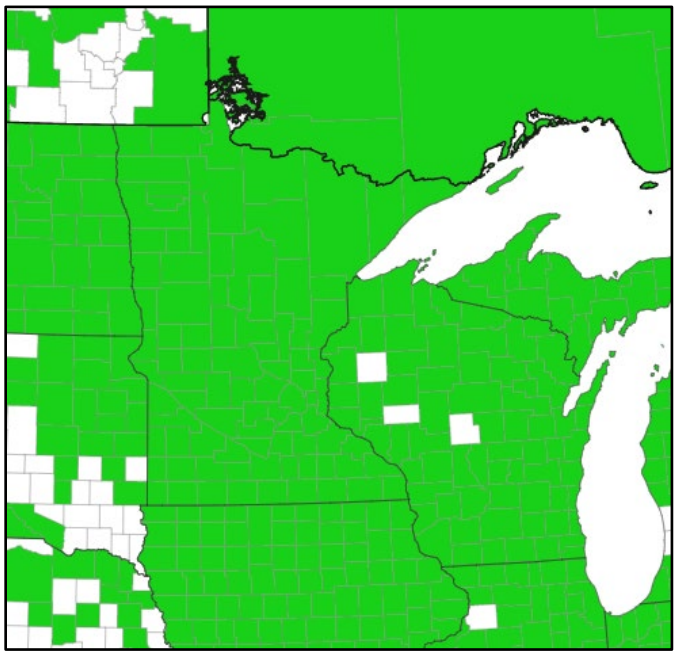
Current Distribution



Reported distribution of Canada thistle (*Cirsium arvense*) in the United States and Canada at the state and province level – EDDMapS, August 10, 2023. At the time if this assessment, Canada thistle has been reported in every state in the U.S.A except Florida, Hawaii, Louisiana, Mississippi, Oklahoma, South Carolina, and Texas, and every Canadian province except Newfoundland and Labrador, Northwest Territories, Nova Scotia, and Nunavut (EDDMapS 2022). The EDDMapS distribution map matches the distribution from the USDA NRCS PLANTS Database with a couple of exceptions. In the USDA map Georgia (U.S.A.) is shown as not having Canada thistle. In the USDA map the Northwest Territories and Nova Scotia (Canada) are shown has having Canada thistle (USDA NRCS 2022; see Appendix for the PLANTS Database distribution map).



Reported distribution of Canada thistle (*Cirsium arvense*) in the United States and Canada at the county level – EDDMapS, August 10, 2023; Canada thistle (*Cirsium arvense*) – EDDMapS Distribution – EDDMapS (EDDMapS 2022).


Reported distribution of Canada thistle (*Cirsium arvense*) in Minnesota and Wisconsin at the county level – EDDMapS, August 10, 2023; Canada thistle (*Cirsium arvense*) – EDDMapS Distribution – EDDMapS (EDDMapS 2022); at the time of this assessment, Canada thistle has been reported in all 87 of the counties in Minnesota (31,149 reports statewide, the most of any state or Canadian province except Colorado/50,039 reports) and all but three of the 72 counties in Wisconsin (Barron County, Eau Claire County, and Wood County; the author is, however, aware that Canada thistle is present in these three Wisconsin counties; 5,725 reports statewide). Canada thistle is also widespread in the other states that border Minnesota – Iowa (reported in all 99 counties; 336 reports statewide), North Dakota (reported in all 53 counties; 19,298 reports statewide, and the sixth highest state or province based on the total number of individual EDDMapS reports), and South Dakota (reported in 27 of 66 counties; 10,435 reports statewide). The other states that round out the top 10 states

based on reporting include Oregon (third with 24,402 reports), Wyoming (fourth with 26,145 reports), Idaho (fifth with 22,261 reports), Montana (seventh with 19,065 reports), Utah (eighth with 13,553 reports), Washington (ninth with 5857 reports), and California (tenth with 2778 reports). As was the case for the state distribution data, there are differences in the county data based on the EDDMapS and USDA PLANTS Database data; Canada thistle is present in every county in Minnesota based on EDDMapS reporting while it has not been reported for 13 counties according to the USDA PLANTS Database (see the PLANTS Database distribution map in the Appendix).

Current Regulation

- Canada thistle is currently regulated as a Prohibited-Control Noxious Weed in Minnesota [Prohibited-Control Noxious Weeds are plants that are established throughout Minnesota or regions of the state, must be controlled to prevent the spread, maturation, and dispersal of any propagating parts (in the case of Canada thistle, seeds and root pieces) with the goal of reducing established populations and preventing reproduction and spread, and may not be propagated, sold, or transported in the state] and was the first species to be listed as a noxious weed in Minnesota in 1872 (Minnesota Noxious Weed List | Minnesota Department of Agriculture).
- Canada thistle is also regulated as a Prohibited Noxious Weed Seed in Minnesota under the Minnesota Seed Law (Minnesota Statutes 21.85, Subd. 15) and may not be present in agricultural, vegetable, flower, tree, and shrub seeds sold in Minnesota; Prohibited and Restricted Weed Seeds Minnesota).
- Canada thistle is also regulated in Alaska (Prohibited; Alaska Plant Materials Center | Division of Agriculture), Connecticut (Invasive, Prohibited; Invasive Plant List | Connecticut Invasive Plant Working Group (uconn.edu)), Missouri (Noxious Weed), New York (Prohibited; DEC Prohibited and Regulated Invasive Plants (ny.gov)), and Wisconsin (Restricted; Canada thistle Wisconsin DNR).
- Canada thistle is not on the Federal Noxious Weed List (USDA APHIS | Federal Noxious Weeds) or the list of seeds covered under the Federal Seed Act. Canada thistle seed is variously regulated by 48 states including Minnesota as reported above (Arkansas and New York excluded) (All States Noxious-weed Seed List (usda.gov)). Canada thistle seed is also on the North American Invasive Species Management Association's NAISMA Weed Prohibited Weed List for Weed Free Forage, Weed Free Gravel, Weed Free Mulch, and Weed Free Compost standards (NAISMA 2024).

Risk Assessment

Box 1:

Is the plant species or genotype non-native?

Answer: Yes

Outcome: Go to Box 3

Although the common name Canada thistle suggests otherwise, Canada thistle is native to southeastern Europe, western Asia, and northern Africa and was introduced to North America in the 1600s (Hanson 1918, Hodgson 1968, Slotta et al. 2010).

Box 2:

Does the species pose significant human or livestock concerns or have the potential to significantly harm agricultural production?

Question 2A: Does the plant have toxic qualities that pose a significant risk to livestock, wildlife, or people?

Outcome: Decision tree does not direct to this question.

Question 2B: Does the plant cause significant financial losses associated with decreased yields, reduced quality, or increased production costs?

Outcome: Decision tree does not direct to this question.

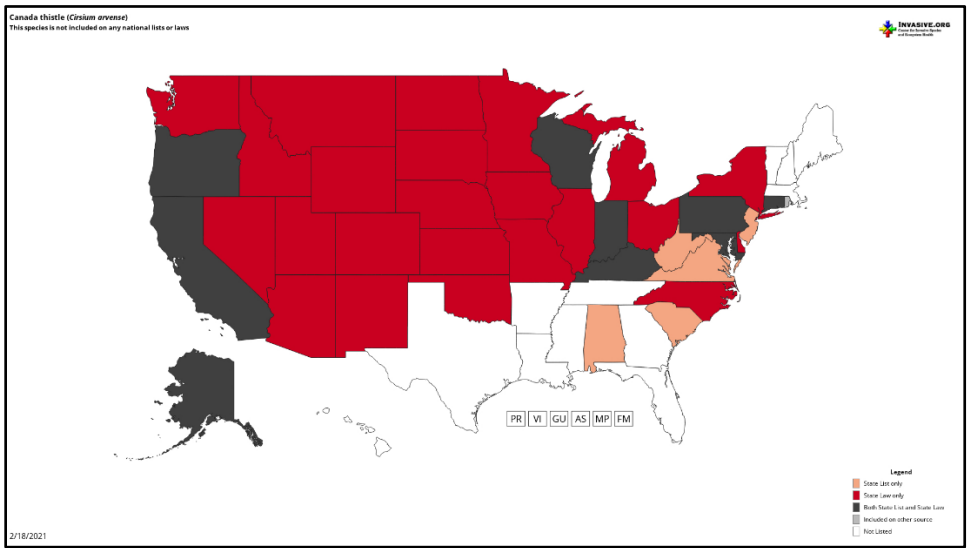
Box 3:

Is the species, or a related species, documented as being a problem elsewhere?

Answer: Yes

Outcome: Go to Box 6

Canada thistle has been documented as a problem in the northern hemisphere world-wide (Donald 1994) and is variously listed as problematic in 38 states (excluding Arkansas, Florida, Georgia, Hawaii, Louisiana, Maine, Massachusetts, Mississippi, New Hampshire, Tennessee, Texas, and Vermont) and is regulated as a noxious weed or invasive species in 33 states (EDDMapS 2022). Canada thistle is classified as a noxious weed (harmful to crops and/or natural areas) in six Canadian provinces – Ontario, Alberta, British Columbia, Saskatchewan, Manitoba, and Quebec (Nature Conservancy of Canada 2023).



States in the United States of America where Canada thistle (*Cirsium arvense*) is listed as an invasive species or regulated by law – EDDMapS, August 10, 2023; Canada thistle, Cirsium arvense Asterales: Asteraceae - EDDMapS, EDDMapS 2022.

Box 4:

Are the species' life history and growth requirements understood?

Outcome: Decision tree does not direct to this question.

Box 5:

Gather and evaluate further information

Outcome: Decision tree does not direct to this question.

Box 6:

Does the species have the capacity to establish and survive in Minnesota?

Question 6A: Is the plant, or a close relative, currently established in Minnesota?

Answer: Yes

Outcome: Go to Box 7

Canada thistle is distributed throughout most of the northern hemisphere (Donald 1994) and has been documented in every county in Minnesota (see EDDMapS map in Distribution section above) where the first specimen of Canada thistle that was cataloged at the University of Minnesota Herbarium was collected in Minneapolis in 1878. Distribution maps also show that Canada thistle is present in every state except Hawaii and six (EDDMapS data) or seven (USDA PLANTS data) southeastern states and all but four (EDDMapS data) or two Canadian provinces/territories (USDA PLANTS data (see the EDDMapS maps in the Distribution section above and the USDA PLANTS map in the Appendix).

Question 6B: Has the plant become established in areas having a climate and growing conditions similar to those found in Minnesota?

Outcome: Decision tree does not direct to this question.

Question 6C: Has the plant become established in areas having a climate and growing conditions similar to those projected to be present in Minnesota under future climate projections?

Outcome: Decision tree does not direct to this question.

Box 7:

Does the species have the potential to reproduce and spread in Minnesota?

Question 7A: Are there cultivars of the plant that are known to differ in reproductive properties from the species?

Answer: No

Outcome: Go to Question 7B

Canada thistle is considered a weed in agricultural, natural area, and landscape settings; as a result, Canada thistle is not a crop or landscape species and there are no named cultivars.

Question 7B: Does the plant reproduce by asexual/vegetative means?

Answer: Yes

Outcome: Go to Question 7C

Canada thistle produces clonal colonies via a deep (up to six meters deep; Isaacs 2016) and extensive, creeping root system that produces suckers from root buds (Moore 1975) (often reported to be rhizomatous but rhizomes are not produced). Seeds are long-lived and can remain dormant in the soil for up to 20 years but it has been suggested that only about 10% of Canada thistle is spread through seed (Isaacs 2016). Root pieces are the primary means of spread and are able to survive under tough conditions for over three months and root fragments as small as 0.25 inches long and one eight of an inch in diameter can produce a new plant (Isaacs 2016, Kimmel 2015). Vegetative reproduction via suckers produced from the extensive root system facilitates local spread and sexual reproduction (seeds) contributes (movement of root pieces can also contribute to long-distance spread) to long distance dispersal (Zouhar 2001).

CABI (2024) states that “Root fragments have the ability to survive adversity and regenerate from small pieces. Root fragments as small as 3 - 6 mm are able to produce shoots, and shoot fragments as small as 6 cm were able to produce new shoots”.

Question 7C: Are the asexual propagules - vegetative parts having the capacity to develop into new plants - effectively dispersed to new areas?

Answer: Yes

Outcome: Go to Question 7I

Canada thistle is primarily moved by people with soil and equipment (Zouhar 2001). CABI (2024) discusses vegetative spread by agricultural practices. They note that “the spread of *C. arvense* via vegetative propagation after initial establishment is more important for local spread". Agricultural practices “such as ploughing and cultivation distribute fragments of stems and roots allowing the plant to become further spread”.

Question 7D: Does the plant produce large amounts of viable, cold hardy seeds? For woody species, document the average age the species produces viable seed.

Answer: Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***

Becker et al. (2008) studied Canada thistle in Minnesota across multiple sites and years and found that female Canada thistle plants averaged 829.6 achenes (seeds) per shoot. They found that of those achenes, 38% were empty, 17% shrunken, and 44% were normal.

Question 7E: For species that produce low numbers of viable seeds, do they have a high level of seed/seedling vigor or remain viable for an extended period (seed bank)?

Outcome: Decision tree does not direct to this question.

Question 7F: Is the plant self-fertile?

Answer: Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***

Nuzzo (1997) states “Although traditionally considered dioecious, up to 26% of "male" plants are actually self-fertile hermaphrodites (male and female flowers on the same plant), capable of producing seeds”.

Question 7G: Are sexual propagules – viable seeds – effectively dispersed to new areas? List and consider all vectors.

Answer: Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***

Achenes (seeds) are attached to cotton-like pappi for wind dispersal (Becker et al. 2008). Becker et al. (2008) noted “Wind influenced the direction of dispersal, but the contribution of wind to the distance of Canada thistle dispersal appears to be small and wind blown pappi tend to travel near the ground. Most achenes fell near the parent plants and the population density declined exponentially with increasing distance. Over 80% of pappi collected between 1.5 and 6.1 m from the source did not have an achene attached.”

Seeds can spread with water, by sticking to people and animals, by movement by ants, and along roadways (CABI 2024). Additionally, seeds can be contaminants in products such as hay and livestock feed that is purposefully moved (CABI 2024). While seeds from Canada thistle in field margins could spread into the crop field, the risk is generally thought to be low (CABI 2024).

Question 7H: Can the species hybridize with native species (or other introduced species) and produce viable seed and fertile offspring in the absence of human intervention?

Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
In Europe, nine hybrids between *Cirsium arvense* and other *Cirsium* species were documented. *Cirsium palustre* was one of those species and it has been introduced to North America (CABI 2024). There was also a possible hybrid between *C. arvense* and *C. hookerianum* which is native to North America (CABI 2024). No information was found indicating that *C. arvense* is hybridizing with native Minnesota thistles.

Question 7I: Do natural controls, species native to Minnesota, which have been documented to effectively prevent the spread of the species in question?

Answer: No
Outcome: Go to Box 8
No natural controls that are native to Minnesota exist. There is, however, a long history of biocontrol efforts focused on Canada thistle and biocontrol agents have been released in the United States and Canada with some success, but none have effectively prevented the spread of Canada thistle on a broad, geographical basis (McClay 2002). Interestingly, some of the biocontrol agents that have been investigated appear to have had negative impacts on native thistle species including threated species (Eckberg et al. 2017). Although *Ceutorhynchus litura* (F) (synonym – *Hadroplontus litura*), common name Canada thistle stem weevil, a member of the Curculionidae family of weevils (commonly called snout beetles or true weevils) may have the potential to provide significant reductions in Canada thistle populations in Minnesota with augmented release, the species is not yet widely accepted as host specific and widespread efforts have not been made to release *Ceutorhynchus litura* in Minnesota (Katovich and Becker 2022, personal communication).

Question 7J: Was the answer to Question 7A (Are there cultivars that differ in reproductive properties from the original species) "Yes"?

Outcome: Decision tree does not direct to this question.

Box 8:

Does the species pose significant human or livestock concerns or have the potential to significantly harm agricultural production, native ecosystems, or managed landscapes?

Question 8A: Does the plant have toxic qualities, or other detrimental qualities, that pose a significant risk to livestock, wildlife, or people?

Answer: No.
Outcome: Go to Question 8B
Overall, the plant does not pose significant toxicity risks to livestock, wildlife, or people.

The plant is prickly which could cut or irritate skin. The roots have been used medicinally to induce vomiting (Montana Natural Heritage Program 2024.) Plants for a People (2024) notes that the edible uses include raw or cooked first year roots, peeled and cooked stems, and leaves used to coagulate plant milks.

Hanson (2008) summarized threats of many plants to horses. Thistles (*Cirsium* species) were an example of species that can cause physical damage to the skin. Canada thistle was listed as being toxic to horses due to high nitrate levels. This seems to be a rare occurrence requiring the horses to eat large amounts as the University of

Minnesota "Plants Commonly Found in Established Minnesota Horse Pastures" document lists Canada thistle in the category of "non-poisonous weeds" (Martinson et al. 2009).

Jacobs et al. (2006) note: "The spiny leaves of Canada thistle make it unpalatable to most classes of livestock and therefore grazing is not commonly used to manage Canada thistle. In Australia, intensive sheep grazing reduced Canada thistle spread compared to a pasture where sheep did not graze. Observations indicate that goats will also eat Canada thistle and can prevent it from flowering."

Question 8B: Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?

Answer: Yes
Outcome: Go to Box 9
Canada thistle can reduce forage and crop yields (Moore 1975). CABI (2024) states that it affects the following agricultural crops: barley, flax, millet, oats, rye, sorghum, wheat and other cereals, rape, canola, corn, beans, peas and other vegetables, vineyards, and orchards. In pastures is reduces forage consumption because cattle avoid Canada thistle with its spines on its leaves (CABI 2024).

The University of Minnesota Extension (2024) crop production webpage has web pages on weed identification, herbicide resistance management, and herbicides. On the weed identification webpage, the following weeds are listed: Barnyard grass, large crabgrass, green foxtail, giant foxtail, yellow foxtail, wild oat, fall panicum, wild proso millet, amaranth family (waterhemp, Palmer amaranth and redroot pigweed), giant and common ragweed, common cocklebur, common lambsquarters, velvetleaf, Jerusalem artichoke, field and hedge bindweeds, yellow nutsedge, quackgrass, Canada thistle, and perennial sowthistle. The herbicide webpages discuss the modes of action of various herbicides and general types of weeds the herbicides affect. Recommendations covered a variety of weeds and specific recommendations for Canada thistle in corn or soybeans were not found. The management suggestions cover a variety of weed species.

A University of Minnesota Extension (2020) Fruit and Vegetable News article discussed the difficulties of managing Canada thistle in fruit and vegetable fields. It noted that a single Canada thistle plant root can grow 18 feet deep and 20 feet in diameter and that while tillage is a frequent management strategy, it creates root fragments which can become new plants. It highlighted that management of perennial weeds can be especially challenging in organic systems.

Question 8C: Can the plant aggressively displace native species through competition (including allelopathic effects)?

Answer: Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Canada thistle can displace native species and is allelopathic (Stachion and Zimdahl 1980). Canada thistle thrives in disturbed areas such as crop fields, pastures, rangelands, and lawns (CABI 2024). Canada thistle is often seen in prairie reconstructions. While Canada thistle levels can be high early in the restoration process, if the site is left undisturbed and not treated with herbicide, the Canada thistle declines over time as other species fill in (Larson et al. 2017). There is concern that repeated herbicide treatments of Canada thistle cause disturbance and encourages Canada thistle, which makes it take longer for native species to fill in.

Question 8D: Can the plant hybridize with native species resulting in a modified gene pool and potentially negative impacts on native populations?

Outcome: Decision tree does not direct to this question.

Question 8E: Does the plant have the potential to change native ecosystems (adds a vegetative layer, affects ground or surface water levels, etc.)?
Outcome: Decision tree does not direct to this question.

Question 8F: Does the plant have the potential to introduce or harbor another pest or serve as an alternate host?
Answer: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.*** No information was found for the United States, but it has been documented as an alternate host of alfalfa mosaic virus in New Zealand and beet necrotic yellow vein virus in Russia (CABI 2024).

Box 9:
Does the species have clearly defined benefits that outweigh associated negative impacts?

Question 9A: Is the plant currently being used or produced and/or sold in Minnesota or native to Minnesota?
Answer: No.
Outcome: Go to Box 10
The plant is not being sold (it is a prohibited noxious weed in Minnesota and many other states) and is not native to Minnesota.

Question 9B: Is the plant an introduced species and can its spread be effectively and easily prevented or controlled, or its negative impacts minimized, through carefully designed and executed management practices?
Outcome: Decision tree does not direct to this question.

Question 9C: Is the plant native to Minnesota?
Outcome: Decision tree does not direct to this question.

Question 9D: Is a non-invasive, alternative plant material or cultivar commercially available that could serve the same purpose as the plant of concern?
Outcome: Decision tree does not direct to this question.

Question 9E: Does the plant benefit Minnesota to a greater extent than the negative impacts identified at Box #8?
Outcome: Decision tree does not direct to this question.

Box 10:
Should the species be regulated as Prohibited/Eradicate, Prohibited/Control, or Restricted Noxious Weed?

Question 10A: Is the plant currently established in Minnesota?

Answer: Yes.
Outcome: Go to Question 10D
See Question 6A.

Question 10B: Would prohibiting this species in trade prevent the likelihood of introduction and/or establishment?

Answer: No. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Not produced or sold by nurseries in Minnesota.

Question 10C: Does this risk assessment support this species being a top priority for statewide eradication if found in the state?

Answer: No. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
It is already established and widespread in Minnesota***.***

Question 10D: Does the plant pose a serious human health threat?

Answer: No
Outcome: Go to Question 10F
No known serious human health threat. The plant is prickly which could cut or irritate skin. The roots have been used medicinally to induce vomiting (Montana Natural Heritage Program 2024.) Plants for a People (2024) notes that the edible uses include raw or cooked first year roots, peeled and cooked stems, and leaves used to coagulate plant milks.

Question 10E: Is the health threat posed by the plant serious enough, and is the plant distribution sufficiently small enough to be manageable, and are management tools available and effective enough to justify listing as Prohibited / Eradicate species?

Outcome: Decision tree does not direct to this question.

Question 10F: Is the plant known to cause significant ecological or economic harm and can the plant be reliably eradicated (entire plant) on a statewide basis using existing practices and available resources considering the distribution, reproductive biology and potential for spread?

- *For distribution, note if the distribution is well documented, the number and acreage of known infestations and how widespread they are in the state. Note if there are infestations in border areas.*
- *For reproductive biology, note if there are reproductive biology factors that make the plant easier to control and eradication more likely (for example, long pre-reproductive period, self-incompatible pollination, short-lived seed bank).*
- *For potential for spread and re-invasion of controlled areas, note its potential to spread beyond places where it is being controlled such as deliberate planting by people, wildlife vectors, re-infestation from border states, or other factors that facilitate spread.*

- *For known management tools, note what management tools are available, potential non-target impacts, and the reasonableness of state management or mandating that landowners throughout the state use the management tools to eradicate or control existing plants*.
- *For available resources, consider the capacity of state and local personnel and availability of funding to respond to new and existing infestations*.

Answer: No

Outcome: Go to Question 10G

Although Canada thistle has historically been viewed as a significant problem in agricultural production and in natural ecosystems and can cause significant ecological or economic harm under certain conditions (conditions that can, however, be typically avoided), the species is widespread in Minnesota and eradication on a statewide basis is not currently possible using existing practices and available resources.

On a more limited basis, Canada thistle can be managed in high-quality natural communities and other sites using prescribed fire in late spring, judicious cutting or pulling, and spot applications of 2,4-D (Missouri Department of Conservation 2023). Prescribed fire can be effective in controlling Canada thistle and is a preferred treatment when timed properly. To be effective, late spring burns (between May and June) are recommended and should be used when possible while prescribed burns in early spring should be avoided as early spring burns can increase sprouting and reproduction. Pulling and hand-cutting of individual plants will eventually starve underground stems. Hand cutting and pulling can be effective for limited to moderate infestations but can be time consuming for large infestations and should be performed at least three times each season in June, August, and September. Canada thistle can also be controlled with spot applications of the amine formulation of 2,4-D (selective for broadleaved plants) as directed by the instructions on the label using a wick applicator or hand sprayer. Again, it is important to use the amine formulation of 2,4-D (rather than the ester formulation) to reduce the possibility of non-target effects caused by vapor drift.

Additional management options for sites other than high-quality natural areas include mowing plants when in full bloom (suitable for heavy infestations on large sites like old fields, ditch banks, and roadsides), prescribed burns in late spring, and treatment with the herbicide glyphosate (Missouri Department of Conservation 2023). Plants should be mowed as close to the ground as possible, and the cut flower-heads should be removed from the site to prevent seed dispersal. Repeated mowing may be needed for several years to obtain adequate control. Prescribed burns in late spring and foliar applications of a 1% to 2% solution of glyphosate in the spring when plants are 6 to 10 inches tall can also be effective. Prescribed burns in early spring and cultivation should be avoided as they can exacerbate Canada thistle infestations.

Distribution:

- While every infestation has certainly not been documented, Canada thistle is known to be widely distributed statewide in Minnesota (present in all 87 counties) and in neighboring states.

Reproductive biology:

- Although Canada thistle is mainly dioecious, and is therefore self-incompatible (outcrossing required), the reproductive biology of Canada thistle make eradication very difficult. It is more likely to become established in disturbed areas and is not very competitive in well-managed agricultural swards and natural areas.

Potential for spread and re-invasion of controlled areas:

- Deliberate planting by people isn't a concern for Canada thistle, but reinfestation from near and distant areas and border states is certainly a possibility if site conditions are conducive and disturbance caused by tillage can create conditions that are perfect for re-invasion (Missouri Department of Conservation 2023).

Known management tools:

- Herbicides are available and can be effective, but non-target impacts can be a concern in organic production systems and in natural areas.

Available resources:.

- Given that Canada thistle is everywhere, management requires significant resources and may not be justified based on the current threat. Having effective biological controls would be helpful.

Question 10G: Is the plant known to cause significant ecological or economic harm and can the plant be reliably controlled to limit spread on a statewide basis using existing practices and available resources? Would the economic impacts or other hardships incurred in implementing control measures be reasonable considering any ongoing or potential future increase of ecological or economic harm?

- *Also consider all bullet points listed under 10F when evaluating 10G*

Answer: No
Outcome: Go to Question 10H
Although Canada thistle can be a problematic weed is some situations, the species is generally not considered to be the problem it once was and need not cause significant ecological or economic harm given the management options available and an improved understanding of its biology in agricultural and natural environments. In addition, given the widespread distribution of Canada thistle in Minnesota, effectively controlling it on a statewide basis simply may not be possible using existing practices and the available resources. In addition, controlling Canada thistle on a statewide basis does not appear to be a local or statewide priority, perhaps because it is not viewed as a significant problem that is worthy of attention.

According to Dr. Roger Becker (Extension Agronomist – Weed Management, Department of Agronomy and Plant Genetics, College of Food, Agricultural and Natural Resource Sciences, University of Minnesota), Canada thistle is everywhere in the state, including in northeastern Minnesota where it historically has not been a problem, so it is not feasible to reliably control it on a statewide basis and regulation requiring this makes no sense. This is true from a statewide perspective even though Canada thistle can be a problem if it becomes established in organic production systems. In addition, Canada thistle requires disturbance to become established, and while Canada thistle will be seen in ditches and areas that are not managed, it is no longer a problem in well-managed pasture or conventional agriculture present in densities that are problematic, nor is a persistent problem in healthy natural areas including well-managed restorations (personal communication, August 7, 2023).

Blumenthal and Jordan (2001) examined the impact of Canada thistle in the field margins on crop fields. It may not be helpful or cost efficient to control Canada thistle outside of the crop fields. They noted: "Field margin weeds may contribute to the invasion and persistence of weeds in arable fields. Experimental studies of this hypothesis, however, have been inconclusive. We examined the role of field margin weed populations with a

spatially explicit simulation model of Canada thistle population dynamics. We measured the contribution of field margin populations to weed pressure in the field across a wide range of parameter values and compared the weed control value of efforts applied to the field margin to that of similar efforts applied to the field. Under most combinations of parameter values, field margin weeds contributed little to weed pressure in the field, suggesting that controlling field margin weeds may often be of little value."

In response to concerns that were articulated when the NWAC voted previously to recommend delisting Canada thistle as a noxious weed in Minnesota in December 2013 (8 NWAC members in favor and 4 members opposed), and letters submitted to the commissioner of agriculture, the author reached out to Alan Perish (Farmers Union representative on the NWAC) who also reached out to Gary Wertish (Farmers Union President) and Trent McCorkell (Agricultural Inspector/Rice County, agricultural inspectors' representative on the NWAC, and Minnesota Association of County Agricultural Inspectors liaison) and has attempted to address the concerns that have been expressed. That counties and townships are not managing Canada thistle is a concern and is a problem that might become less common if Canada thistle were listed on a county basis; regardless, the fact that Canada thistle is not currently being managed is not an excuse as is true for any law. In addition, organic producers also remain concerned, and the Farmers Union is, once again, likely to oppose delisting Canada thistle as a noxious weed for these reasons (Alan Perish, personal communication, August 10, 2023). In a letter from the Minnesota Farmer's Union to the Minnesota Department of Agriculture on September 26, 2023 they provide this statement explaining their support for maintaining Canada thistle as a Prohibited Control Noxious Weed: "After discussions at some of our county meetings this summer and fall we wanted to formally share our strong support for maintaining the weed's status. It continues to be a threat to cropland and local ecosystems, and farmers and the state will be well-served by controlling its spread." Delisting Canada thistle was discussed during the Minnesota Association of County Agricultural Inspectors annual conference and the group is also likely to oppose delisting Canada thistle at this time. Canada thistle is not the problem it used to be, enforcement is essentially complaint driven which is problematic, and individual, county listings might be an option for consideration (Trent McCorkell, personal communication, August 10, 2023).

Land managers within the Minnesota Department of Natural Resources have also indicated that being forced to spray for Canada thistle hurts prairie restoration efforts because attempts to manage Canada thistle in these restorations often kills the native plants that were purchased and planted as part of the restoration process. In addition, while Canada thistle may sometimes show up as a result of the site disturbance caused by restoration efforts, these infestations tend to decrease in the longer-term without treatment as the new plants become established and fill in over time (Laura Van Riper, Terrestrial Invasive Species Coordinator, Minnesota Department of Natural Resources, personal communication, August 16, 2022). These concerns and the effectiveness of proper restoration practice in reducing the competitiveness of Canada thistle alone and in combination with biological controls in restoration efforts are also supported by published research (Ferrero-Serrano et al. 2008, Larson 2009, Larson et al. 2017, Larson et al. 2013).

An example of Canada thistle (*Cirsium arvense*) growing along a roadside and going to seed – in this case, adjacent to a Minnesota corn field; given the current listing of Canada thistle as a Prohibited-Control Noxious Weed under the Minnesota Noxious Weed Law, seed production and vegetative spread must be judiciously prevented to help prevent the spread of Canada thistle to new areas, but the reality is that control of Canada thistle by public and private landowners is often poor or non-existent and, although variable by location and year, enforcement often appears to be poor or lacking altogether; in the absence of enforcement, a Prohibited-Control Noxious Weed listing is ineffective (Photo Credit: James Calkins).

An example of Canada thistle (*Cirsium arvense*) growing in a wetland and going to seed – in this case, in a wetland where standing water has been limited by drought in recent years; once again, if preventing the spread of Canada thistle by seed is to have any chance of success, seed production must be judiciously prevented but is more often than not the case; in the absence of enforcement, a Prohibited/Control listing is/will be ineffective (Photo Credit: James Calkins).

An example of Canada thistle (*Cirsium arvense*) growing in a highway clover leaf and going to seed; this infestation has been present and expanding for several years without any attempt at management; once again, if the spread of Canada thistle by seed is to have any chance of success, seed production as required under the Minnesota Noxious Weed Law must be judiciously prevented; in the absence of enforcement, a Prohibited/Control listing is ineffective (Photo Credit: James Calkins).

Question 10H: Would prohibiting this species in trade have any significant or measurable impact to limit or reduce the existing populations or future spread of the species in Minnesota?

Answer: Yes

Outcome: LIST THE PLANT AS A RESTRICTED NOXIOUS WEED (Yes) or Go to Question 10I (No).

Canada thistle is not grown or sold in Minnesota. Minnesota Statute 18.771, section d, states “The “restricted noxious weeds" category includes noxious weeds and their propagating parts that may not be imported, sold, or transported in the state, except as allowed by permit under section 18.82. Noxious weeds that are designated as restricted and placed on the restricted list may be plants that are widely distributed in Minnesota and for which a requirement of eradication or control would not be feasible on a statewide basis using existing practices”. Canada thistle is so widespread that it has been demonstrated that control on a statewide basis using existing practices is not happening. While there is little risk of people purposefully selling and moving Canada thistle if the species is not regulated, moving it to the Restricted Noxious Weed category would allow it to continue to be a part of the noxious weed list and the education and designation of importance that being listed carries. It would also address the issue that currently Canada thistle Prohibited Control enforcement is complaint driven (Trent McCorkell, personal communication, August 10, 2023) and not uniformly enforced across landowners. Changing Canada thistle’s status on the Noxious Weed List would not change its status on the Noxious Seed List. As a Prohibited Weed Seed, it is prohibited from being present in agricultural, vegetable, flower, tree, and shrub seeds sold in Minnesota.

Question 10I: Are there any other measures that could be put in place as Special Regulations which could mitigate the impact of the species within Minnesota?

Answer: No. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***

Canada thistle is a widely distributed plant in Minnesota and a requirement of eradication or control is not feasible on a statewide basis using existing practices. It is not sold in trade currently as it is a Prohibited Control

Noxious Weed. It is unlikely that if Canada thistle was removed from the noxious weed list that sales would begin as it is not known to have ornamental or economic value. There are no Special Regulations identified to suggest for this plant.

Removing Canada thistle from the Noxious Weed List would not change its status on the Noxious Seed List. As a Prohibited Weed Seed, it is prohibited from being present in agricultural, vegetable, flower, tree, and shrub seeds sold in Minnesota.

It is recognized that while following the risk assessment process results in Canada thistle being recommended to be listed as a Restricted Noxious Weed or removed from the noxious weed list, that there are stakeholders that are strongly in favor of maintaining Canada thistle as a Prohibited Control Noxious Weed. The Noxious Weed Advisory Committee has had extensive conversations about the length of the noxious weed list and how to prioritize outreach efforts, county agriculture inspector time, and grant dollars. Efforts that go toward Canada thistle are efforts that cannot go to newly emerging invasive species where there is a greater chance for return on investment by managing newly emerging species before they become widespread. It is unlikely that the Noxious Weed Advisory Committee will reach unanimous consensus on a recommendation.

Box 11:

The species is being proposed to be designated as a Specially Regulated Plant. What are the specific regulations proposed?

Answer: Decision tree does not direct to this question.

Final Outcomes of Risk Assessment (2024)

NWAC Listing Subcommittee

Outcome: Change the regulatory status of Canada thistle (*Cirsium arvense*) from its current status as a Prohibited-Control Noxious Weed to a Restricted Noxious Weed.

Comments: It seems the primary question from a strictly risk assessment and regulatory perspective is whether Canada thistle can or cannot be “reliably controlled to limit spread on a statewide basis using existing practices and available resources” in Minnesota? Based on the risk assessment and current practice, the answer to this question appears to be “No.” Even though Canada thistle is currently listed as a Prohibited-Control Noxious Weed under the Minnesota Noxious Weed Law, and must, therefore, be controlled on all lands within the state to prevent spread by seed or vegetative means, it appears this listing and the requirement that Canada thistle must be controlled on all lands within the state is unrealistic. This requirement is not generally enforced except on a complaint basis which is not good policy from a noxious weed management perspective on several levels.

In the absence of a commitment to more concerted and comprehensive enforcement, the current regulation is essentially meaningless relative to preventing the spread of Canada thistle because seed can across property lines, county lines, and state borders. Due to the widespread distribution of Canada thistle throughout the state of Minnesota and neighboring states, such enforcement may not be reasonable or feasible. Given that Canada thistle primarily becomes established in disturbed areas that tend to be neglected from a management perspective, is not the problem it once was in agricultural production systems. Canada thistle does not compete well in well-managed crops, pastures, and natural areas. Management of Canada thistle in natural areas often is not justified in the long-term and can impede the management of restoration activities. These factors are a strong argument that Canada thistle should no longer be regulated as a prohibited noxious weed in the state.

As documented within the risk assessment, there are concerns about the management of Canada thistle in organic production systems where herbicides cannot be used. However, cultural methods of control that employ early detection and response based on regular scouting and properly timed cutting and mowing are better suited to these smaller agricultural acreages (especially as a means of preventing the establishment of Canada thistle infestations). Furthermore, requiring the use of herbicides in the broader agricultural arena and other areas for the benefit of organic production seems inconsistent based on the basic principles of organic production and is unlikely to make much difference in the absence of consistent management of Canada thistle statewide and beyond. While there is certainly an emotional component and a historic precedence associated with the management of Canada thistle in Minnesota, Canada thistle being "everywhere" after more than 150 years of regulatory good intensions in Minnesota may be an indication that it is time to consider a different approach. Regardless of its regulatory status, Canada thistle will continue to be managed in agricultural systems and in other situations where management is justified because it makes economic and longer-term environmental sense.

Regardless of whether Canada thistle changes regulatory status or not, continued theoretical and financial support for developing biological controls for Canada thistle should be considered.

For better or worse, the state generally defers to counties relative to the management of noxious weeds, and there are inconsistencies in enforcement and conflicting perspectives regarding the wisdom and effectiveness of attempting to control Canada thistle under the current circumstances. If Canada thistle is delisted as a noxious weed on a statewide basis, individual counties have the option of regulating Canada thistle under the Minnesota Noxious Weed Law and making the decision to manage or not manage Canada thistle may be best handled at the local level.

If it is decided that the regulatory status of Canada thistle should not be changed, and it is determined that the current Prohibited-Control listing is justified and should be retained, there should, at minimum, be a concerted effort to enforce the control of Canada thistle on all lands, public and private, on a statewide basis.

As reported in the "Current Regulation" section of this risk assessment, Canada thistle seed is regulated as a Prohibited Noxious Weed Seed in Minnesota under the Minnesota Seed Law and, as has been discussed by the Noxious Weed Advisory Committee, the species regulated under the Minnesota Noxious Weed Law and the Minnesota Seed Law should be harmonized.

NWAC Full Committee

Outcome:
Comments:

MDA Commissioner

Outcome:
Comments:

Risk Assessment Current Summary (08-07-2024)

- Canada thistle has historically been considered a serious noxious weed and has been listed as a noxious weed in Minnesota since 1872 and was the first species to be listed as a noxious weed in the state.
- Canada thistle can impact crop lands and grazing lands causing economic impacts. These lands are managed to reduce the impacts of a variety of weeds.
- Canada thistle is widespread in Minnesota (found in every county) and most of the United States.

- Enforcement of Canada thistle as a Prohibited Noxious Weed is primarily complaint driven leading to low levels of management and uneven enforcement. There are cases where management of Canada thistle is counterproductive, such as in prairie reconstructions.
- As a widespread plant that is not being controlled effectively at a statewide level, the risk assessment directs toward either listing Canada thistle as a Restricted Noxious Weed or not regulating it at the state level (delisting it). Moving Canada thistle to a Restricted Noxious Weed acknowledges the widespread nature of the species while still keeping it on the noxious weed list.
- There are stakeholders that find listing Canada thistle as Prohibited Control as valuable and believe that having it listed reduces costs to farmers.
- It is unlikely that members of the Noxious Weed Advisory Committee will come to a unanimous recommendation.

Final outcomes of risk assessment (2013-2014)

NWAC Listing Subcommittee

Outcome: Restricted Noxious Weed
Comments: The general consensus of the subcommittee based on the risk assessment data and the widespread nature of Canada thistle, was to reclassify this species as a Restricted Noxious Weed.

NWAC Full Committee

Outcome: Voted 8 – 4 to recommend reclassifying Canada thistle as a Restricted Noxious Weed.
Comments: 12/18/2014. Members agree unanimously that Canada thistle is widespread and has been a large focus of weed management for over a century in MN. However, a difference in opinion arises when the discussion centers on whether or not current efforts have any impact on controlling or eradicating populations. Some members expressed concerns that the risk assessment is ignoring the fact that without the century-long battle against this plant by counties and townships, this species would be worse today.

MDA Commissioner

Outcome: The commissioner rejected NWAC's recommendation and has directed that Canada thistle remain as a Prohibited Control species to support the counties and townships opinion, in addition to comments from the Farmer's Union and MN Crop Improvement Association, that any changes would be detrimental to grazing agriculture and potentially cause confusion within the seed industry.
Comments: Reviewed 02/24/2014 -Petition letters received by the commissioner's office from four member organizations overwhelmingly disagreed with NWAC's final recommendations for Canada thistle. Counties and townships also reflected the displeasure their constituents had with the notion of reclassifying this species from an enforcement perspective. They also indicated that their constituents and citizens consider this to be one of the most important weed species statewide. The MDA also received other comments regarding the recommendations to reclassify Canada thistle that basically reflected that farmers and private landowners alike would be upset if the recommendation was approved.

Final outcomes of risk assessment (2023-2025)

NWAC Listing Subcommittee

Outcome: Restricted Noxious Weed
Comments: The general consensus of the subcommittee based on the risk assessment data and the widespread nature of Canada thistle, was to reclassify this species as a Restricted Noxious Weed.

NWAC Full Committee

Outcome: Change the category of Canada thistle from prohibited control to restricted noxious weed
Comments: The vote was 10 to 7 in favor of the recommendation. There were a wide range of viewpoints about Canada thistle. Some organizations opposed the recommendation because they said it should remain as a prohibited control noxious weed. Other organizations voted no because they said that Canada thistle should not be regulated at all.

MDA Commissioner

Outcome: The commissioner did not accept the Noxious Weed Advisory Committee recommendation. Canada thistle will remain a prohibited control noxious weed.
Comments: In support of farming organizations and the counties and townships that opposed changing Canada thistle to a restricted noxious weed, the commissioner decided the plant would remain a prohibited control noxious weed. Counties and townships are weed law enforcement partners, and it was important to consider their opinions.

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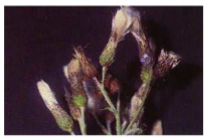
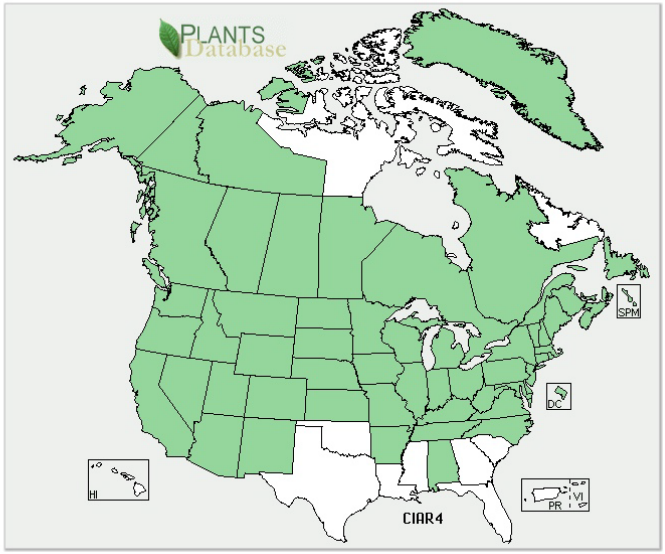
Appendix

Cirsium arvense (L.) Scop.
Canada thistle



General Information	
Symbol:	CIAR4
Group:	Dicot
Family:	Asteraceae
Duration:	Perennial
Growth Habit:	Forb/herb
Native Status:	CAN I GL I SPM I L48 I AK I
Data Source and Documentation	



View Native Status

Present Absent/Unreported

See U.S. county distributions (when available) by clicking on the map or the linked states below:

USA (AK, AL, AR, AZ, CA, CO, CT, DC, DE, IA, ID, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OR, PA, RI, SD, TN, UT, VA, VT, WA, WI, WV, WY), **CAN** (AB, BC, MB, NB, NF, NS, NT, ON, PE, QC, SK, YT), **DEN** (GL), **FRA** (SPM)

Distribution of Canada Thistle (*Cirsium arvense*) in the United States and Canada – PLANTS Database; United States Department of Agriculture, Natural Resources Conservation Service. USDA Plants Database (Accessed August 10, 2023).