Minnesota Noxious Weed Risk Assessment

Developed by the Minnesota Noxious Weed Advisory Committee

Assessment information

Common name: Lesser celandine, fig buttercup

Scientific name: *Ficaria verna* Huds. (synonym *Ranunculus ficaria* L.)

Family name: Ranunculaceae

Current reviewer name and organizational affiliation: Laura Van Riper, Minnesota Department of Natural Resources
Date of current review: November 20, 2020

Species description

Photo

Photo caption: Lesser celandine plant (Richard Gardner, Bugwood.org)

Photo caption: Patch of lesser celandine plants (Richard Gardner, Bugwood.org)

Why the plant is being assessed

- Threats below are quoted from the Wisconsin Department of Natural Resources webpage on lesser celandine. The fact that it is poisonous to humans and livestock was a driving reason for the MN Noxious Weed Advisory Committee to choose to assess this plant.
- Invades forests, wetlands and riparian areas, as well as upland areas and disturbed areas such as lawns. In one Cleveland park, approximately 400 acres are dominated by this plant.
- Infestations of this plant eliminate spring ephemeral communities in woodlands, which includes sensitive native plants.
- Easily reproduces and spreads into new areas through bulbils and tubers, or seed.
- Plants are poisonous to livestock and humans.

Identification, biology, and life cycle

- Identification characteristics below are quoted from the Wisconsin Department of Natural Resources webpage on lesser celandine.
- **Leaves & stems:** Leaves are dark-green, shiny, and kidney to heart-shaped on short stalks. Leaves emerge from a basal rosette in early spring before canopy trees leaf out.
- **Flowers:** Flowers are bright butter-yellow, glossy, and usually have 8 petals (although sometimes up to 12), arranged around central disk. Numerous 1" flowers are borne singly on stalks. Flowers open in early spring, March to April.
- **Fruits & seeds:** This species does produce viable seed, up to 70 seeds per plant. After flowering, aerial vegetation dies back and entire plants can be dead by June.
- **Roots:** Above-ground whitish bulblets (bulbils) are produced on the stem axils, usually forming after flowering. Below-ground rhizomes are thick, finger-like tubers. These storage organs keep the plant alive through summer-fall when above-ground portions of the plant have senesced.
- **Similar species:** Lesser celandine resembles marsh marigold (*Caltha palustris*), but is much smaller. Marsh marigold is a native wetland plant found throughout eastern United States. Marsh marigold contains 5-9 yellow "petals" (actually sepals), while lesser celandine often contain 8 petals. Marsh marigold also does not produce tubers or bulblets (bulbils).
- **Horticultural varieties:** Lesser celandine varieties include 'Pencarn' and 'Buttered Popcorn'. Notable traits of these varieties are leaves variegated with silver markings and double flower heads. These varieties are considered equally as invasive.
- **Nomenclature confusion:** This species is unrelated to greater celandine (*Cheidonium majus*).

Current distribution

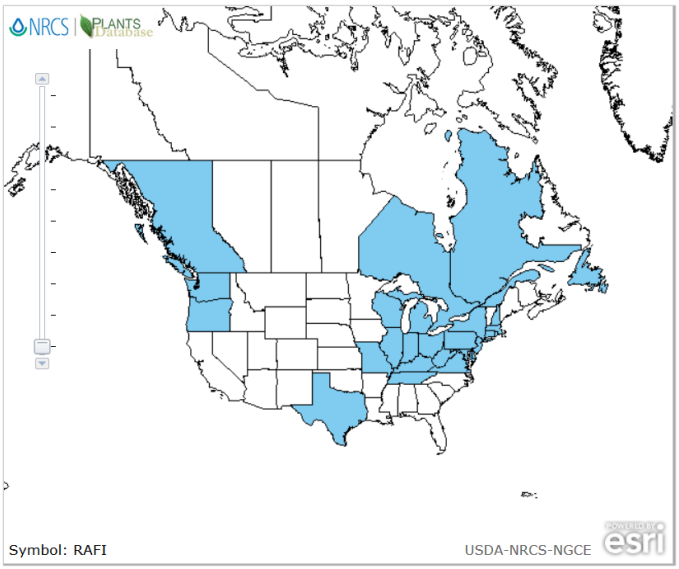

Photo caption: National level lesser celandine map from USDA Plants. Plants reported in the northeastern US, Texas, Washington, and Oregon. No reports in Minnesota. USDA Plants uses the scientific name *Ranunculus ficaria*. Map accessed January 16, 2020.

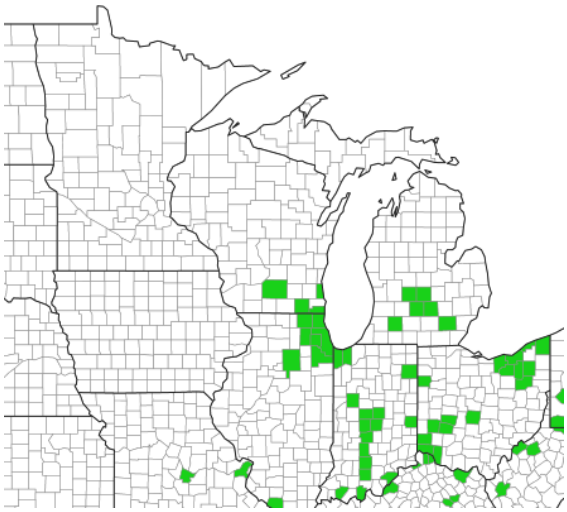

Photo caption: County level map of lesser celandine from EDDMapS from January 16, 2020. No reports in Minnesota. There are reports in four counties in southeastern Wisconsin. EDDMapS uses the scientific name *Ficaria verna*. Map accessed January 16, 2020.

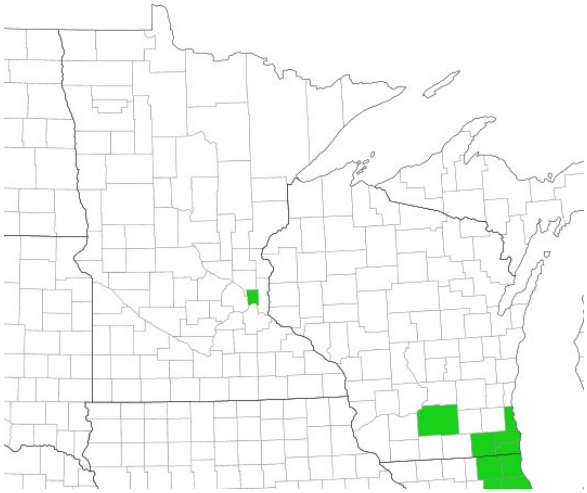

Photo caption: County level map of lesser celandine from EDDMapS from October 21, 2020 showing lesser celandine in Ramsey county Minnesota. There are reports in five counties in southeastern Wisconsin. EDDMapS uses the scientific name *Ficaria verna*. Map accessed October 21, 2020.

Current regulation

Not regulated in Minnesota. Lesser celandine is regulated as a prohibited invasive species in Wisconsin under the synonym *Ranunculus ficaria* meaning the transport, possession, transfer and introduction of the species is banned. Lesser celandine is regulated as a Class B weed in Washington under the name *Ficaria verna*. Class B noxious weeds are nonnative species whose distribution is limited to portions of Washington state. Landowners may be required to control Class B noxious weeds, depending on how widespread the species is and/or whether the species is a local priority. Lesser celandine is a class B weed in Oregon. Lesser celandine is on the Massachusetts prohibited plant list. Connecticut statute prohibits the importation, movement, sale, purchase, transplant, cultivation and distribution of lesser celandine. Lesser celandine is a prohibited invasive plant in New York.

Risk assessment

Box 1:

Is the plant species or genotype non-native?

Answer: Yes

Outcome: Go to Box 3

From the US Department of Agriculture weed risk assessment (2015): This species is native to a broad region, encompassing most of Europe (e.g., Belarus, Croatia, Germany, Ireland, Lithuania, Spain, Sweden), northern Africa (e.g., Algeria, Libya, Tunisia, and Morocco), and western Asia (Israel, Turkey, Georgia).

Box 2:

Does the plant species pose significant human or livestock concerns or has 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 plant species, or a related species, documented as being a problem elsewhere?

Answer: Yes
Outcome: Go to Box 6
Lesser celandine is regulated as a prohibited invasive species in Wisconsin under the synonym *Ranunculus ficaria* meaning the transport, possession, transfer and introduction of the species is banned. Problems documented in Wisconsin Department of Natural Resources literature review (2011).

Lesser celandine is regulated as a Class B weed in Washington under the name *Ficaria verna*. Class B noxious weeds are nonnative species whose distribution is limited to portions of Washington state. Landowners may be required to control Class B noxious weeds, depending on how widespread the species is and/or whether the species is a local priority. Problems documented in the Washington state noxious weed control board written findings document (2013). Massachusetts, Connecticut, New York, and Oregon also regulate lesser celandine.

The Wisconsin DNR (2020) webpage notes that lesser celandine is extremely invasive in northern Ohio. In one Cleveland park, approximately 400 acres are dominated by this plant.

The US Department of Agriculture (USDA) weed risk assessment (2015) notes that lesser celandine is naturalized outside of its native range in Australia, Japan, and New Zealand. They also note that in the US, the first specimen was collected in Pennsylvania in 1867. As of 2015, lesser celandine was naturalized in 26 eastern states, Oregon, Washington, and several provinces in Canada.

Box 4:

Are the plant species' life history & 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 plant species have the capacity to establish and survive in Minnesota?

Question 6A: Is the plant, or a close relative, currently established in Minnesota?
Answer: No
Outcome: Go to Question 6B

In early 2020 there were no records of lesser celandine in Minnesota. In October of 2020, lesser celandine reports from one site in St. Paul were imported from iNaturalist to EDDMapS. The lesser celandine reports are in a wooded area in Swede Hollow Park. Based on photographs, a Minnesota Department of Natural Resources botanist concurred with the reporter that the plants are lesser celandine. By October the plants were fully senesced and so herbarium samples have not been collected and the identification has not been fully confirmed with specimens. While lesser celandine is likely present at one site in Minnesota, it is too early to say that the species is established throughout Minnesota.

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

Answer: Yes

Outcome: Go to Box 7

Lesser celandine is found in Wisconsin. Lesser celandine is hardy in plant hardiness zones 4-8 (Missouri Botanical Garden 2020). Much of Minnesota is zone 4. It is found in forests, wetlands, riparian areas, upland areas and disturbed areas such as lawns (Wisconsin Department of Natural Resources 2020) which are habitats also found in Minnesota. The USDA weed risk assessment (2015, Figure 1) predicts the distribution of lesser celandine to include almost all of Minnesota except for a small portion of northern Minnesota, although they note that the suitable area in the US is likely overestimated due to their model parameters.

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 plant 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

There are cultivars of lesser celandine, but no information was found documenting a difference in reproductive potential from the species. The Washington state noxious weed control board (2013) cite this list of cultivars from Brickell and Cathey (2004):

- f. albus: has pale yellow flowers fading to white and dark bronze marked leaves
- f. aurantiacus: syn. 'Cupreus', has silvery leaves with a bronze central mark, deep coppery orange flowers that are darker on the underside
- 'Bowles Double': has double flowers with green centers, turning pale yellow
- 'Brazen Hussy': has glossy, deep brown leaves and shining, golden yellow flowers with a bronze underside. Its seedlings often have bronze leaves.
- 'Collarette': leaves have bronze central bands and double yellow flowers with anemone-form centers.
- 'Double Bronze' has double yellow flowers with bronze undersides.
- 'Double Mud': syn. 'Double Cream', has double cream flowers with gray-tinted undersides.
- 'Salmon's White': has pale green leaves with bronze marks and cream flowers that are tinted blue-purple on its undersides.

The Washington state noxious weed control board (2013) also lists the following cultivars, but does not provide a description of their traits: 'Brambling', 'Coffee Cream', 'Crashaw Cream', 'Dusky Maiden', 'Flore-pleno', 'Limelight', 'Ragamuffin', 'Randall's White', and 'Yaffle'.

There are five subspecies of lesser celandine that have been found in the United States (Post et al. 2009, Axtell et al. 2010). These are *Ranuculus ficaria* subspecies *bulbifier, calthifolius, chrysocephalus, ficaria*, and *ficariaformis*. Subspecies *ficaria* and *calthifolius* are diploid (2n=16), while subspecies *bulbifer*, *ficariiformis*, and *chrysocephalus* are tetraploid (2n=32) (Post et al. 2009). The reviewer was unable to find a list explaining which subspecies the various cultivars were derived from.

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

Answer: Yes

Outcome: Go to Question 7C

All subspecies can reproduce vegetatively through tuberous roots (Post et al. 2009). In addition to the root tubers, subspecies *bulbifer* and *ficariformis* also forms aerial bulbils in the axils of leaves (Post et al. 2009). The bulbils can start new plants.

USDA (2015) notes: "Plants produce on average 24.1 bulbils, of which only about 60- 80 percent "germinate" (Marsden-Jones 1935). One plant manager estimates that plants occur at densities of about 428 plants per square meter (Manning 2015). If all of these produce 24.1 bulbils at a 60 percent germination rate, there would be approximately 6188 bulbils produced per square meter. In another study, the maximum number of bulbils per plant that was observed was 140 (Jung et al. 2008)."

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

The tubers and bulbils are thought to mainly spread mainly by water, especially along river banks with seasonal flooding (Post et al. 2009) although animal movement may also play a role (Axtell et al. 2010). Humans can also spread the vegetative structures either purposefully through planting or accidently when soils are moved (Post et al. 2009). Reisch and Scheitler (2009) found that mowing could spread the bulbils. Kertabad et al. (2013) studied viability of tubers and found that the highest percentage of germination occurred when the tubers were stored for more than two weeks at four to eight degrees Celsius.

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.

Outcome: Go to Question 7G or Question 7E

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

USDA (2015) notes: "[T]he diploid produces large numbers which ripen and are shed by early June" (Taylor and Markham, 1978). In one study, the researcher collected an average of 73 viable achenes per plant out of 20 diploid plants, representing 63 percent of the total seeds produced (Marsden-Jones, 1935). Only 2 percent of the achenes are viable in tetraploid plants (Marsden-Jones, 1935). Assuming these fecundity rates, we would need to have at least 68 diploid plants per square meter to meet our threshold of 5000 for an herbaceous species, which is realistic based on Manning's estimate of plant density (2015)." Subspecies *ficaria* and *calthifolius* are diploid (2n=16), while subspecies *bulbifer*, *ficariiformis*, and *chrysocephalus* are tetraploid (2n=32) (Post et al. 2009). The reviewer was not able to find a list of which cultivars come from which subspecies.

Jung et al. (2017) studied *R. ficaria* subsp. *bulbifer*, which is thought to be mainly sterile, and found that it had 0-18 ripe seeds per plant. Kermack and Rauschert (2019) also studied *R. ficaria* subsp. *bulbifer* and did not observe any seeds in their study plots, but saw a few plants with seeds outside of their study area.

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)?

Answer: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
USDA (2015) noted: "Seeds with their pericarp still intact, remained intact and firm after 18 months (Taylor and Markham, 1978), suggesting that seeds may be able to persist for more than a year in the soil."

Question 7F: Is the plant self-fertile?

Answer: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
USDA (2015) answer to this question:
"Species biology suggests that plants are adapted for some self-pollination because "[i]n the second stage [of flowering] the inner stamens arch over and stand above the carpels ..., and although the anthers dehisce extrorsely, failing insect visits self-pollination takes place, and if the plant is not self-sterile a small proportion of seed is set" (p. 42 Marsden-Jones, 1935). In experiments where plants were caged to prohibit access by pollinators seed set was greatly reduced (Marsden-Jones, 1935). The author concluded that plants are completely self-sterile or produce only a small percentage of seeds that would have been possible had insects effected pollination (Marsden-Jones, 1935). Self-pollination occurs in the absence of insect visitors (Sell, 1994). Another study reports that sometimes, when flowers are emasculated, embryos still develop, indicating that seeds are produced through apomixis, but it was not confirmed whether these seeds are able to germinate (Metcalfe, 1939). Some plants are either female or male only (Marsden-Jones, 1935), and thus would need cross-pollination (Marsden-Jones, 1935). We answered yes because some plants are self-compatible, but used moderate uncertainty because cross pollination is still very important for this species (Marsden-Jones, 1935)."

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

Answer: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Similarly to the tubers and bulbils, seeds could also be spread by water, animal movement, and human movement. Jung et al. (2008) reported dispersal of the seeds by ants. USDA (2015) did not find evidence of fruits being eaten by birds or other animals.

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?

Answer: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
No evidence was found that lesser celandine hybridizes with other species.

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
There are no biological control insects for lesser celandine. In its native range in Britain, there are few records of insects that feed on it, Taylor and Markham (1978) list only *Olinda ulmana* larva (Lepidoptera). There are several plant pathogens documented on lesser celandine, but none that have been noted to control populations

(Axtell et al. 2010). Axtall et al. (2010) note: "The ephemeral nature of lesser celandine reduces viable biocontrol options. The existence of many native members of the Ranunculaceae in North America, several being closely related to the target species, also reduces the chances of identifying effective host-specific biocontrol agents."

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 plant 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 – some risk but not significant
Outcome: Go Question 8B
Fresh leaves contain saponins, tannins, ascorbate (vitamin C), protoanemonin, and anemonin (Axtell et al. 2010). Protoanemonin in fresh leaves can be toxic (but not usually fatal) to livestock, but when the leaves are dry the protoanemonin volitalizes so the leaves are no longer toxic (Axtell et al. 2010).

USDA (2015) notes: "In one case, a person who was taking extracts of *F. verna* for 10 days developed acute hepatitis and required hospitalization; once she stopped taking the supplement, her condition improved (Yilmaz et al., 2015). Toxicity in the genus is due to a glycoside (Burrows and Tyrl, 2013). The genus *Ranunculus* has a long history of various medicinal uses: some species have antibacterial, antifungal and antimutagenic effects, and some cause irritations of the digestive tract (Burrows and Tyrl, 2013). Despite that, typically large quantities of material need to be consumed for any disease to manifest and in most cases only a few animals are seriously affected. Occasionally, large numbers of livestock deaths occur, as with the loss of 150 sheep in a flock of 800 after they ate *R. testiculatus* (Burrows and Tyrl, 2013)."

Question 8B: Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?
Answer: No
Outcome: Go to Question 8C
Kertabad et al. (2013) reference lesser celandine as a weed in wheat fields in Iran, but otherwise no references were found to crop issues.

Question 8C: Can the plant aggressively displace native species through competition (including allelopathic effects)?
Answer: Yes
Outcome: Go to Box 9
Lesser celandine has a short life cycle. It forms dense cover in the forest floor early in the spring which outcompetes other species and alters the structure of the understory (USDA 2015). It then senesces in late June leaving open ground that can be colonized by other non-native species (Axtell et al. 2010). USDA (2015) notes: "This species should be of particular concern to natural resource managers of bottomland or other moist sites because in such habitats *F. verna [R. ficaria]* can form extensive monocultures that cover several acres".

Masters and Emery (2015) state: *Ranunculus ficaria* is directly responsible for reducing volunteer sprout abundance and the biomass, but not necessarily diversity, in our study sites, probably through competition for space and/or light. This suggests that *R. ficaria* has some role in driving ecosystem change, and that removal of these populations will help restore some native species."

Lesser celandine has been reported as a turf and garden weed (USDA 2015).

Multiple studies have looked at lesser celandine's allelopathic effects. Cipollni and Schradin (2011) found evidence of allelopathic effects of lesser celandine on the test species *Impatiens capensis*. They noted that the soil impact of lesser celandine persisted after it had senesced. Cipollini et al. (2012) compared the allelopathic impact of lesser celandine, garlic mustard, and Amur honeysuckle. They found that in a pot experiment lesser celandine had effects intermediate to garlic mustard and Amur honeysuckle. In a field soil, Amur honeysuckle and lesser celandine had greater effects than garlic mustard. Cipollini and Flint (2013) found that leaf extracts had greater impacts than root extracts. Cipollini and Bohrer (2016) studied allelopathic impacts of five invasive species on two native species and found that Amur honeysuckle and lesser celandine had the largest effects.

Masters and Emery (2015) found that lesser celandine may have a competitive advantage in that it is able to maintain seed and bulbil production across a large range of litter depths.

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.
No evidence found for this.

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?
Outcome: Decision tree does not direct to this question.
No evidence found for this.

Box 9:

Does the plant 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
No nurseries in Minnesota are known to sell lesser celandine, but it has been found for sale online (personal communication with Jim Calkins, Minnesota Nursery and Landscape Association, March 9, 2020). A 2020 search of the University of Minnesota's Plant Information Online database found no nursery sources for lesser celandine in the United States (personal communication with David Stevenson, Minnesota Landscape Arboretum, March 17, 2020). When the USDA searched the Plant Information Online database in 2015 it found that seven cultivars were commercially available in the United States (USDA 2015). The Minnesota Nursery and

Landscape Association (MNLA) and the Minnesota Department of Agriculture sent out a survey on the plant species being assessed by the Noxious Weed Advisory Committee. The online survey was open from September 8, 2020 to October 5, 2020. Respondents were asked if they sell the species. Of the 74 people who responded to the question, none of them sold lesser celandine.

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?

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

The plant is an introduced species. There is no evidence for easy prevention and control through particular practices.

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 plant be regulated as Prohibited/Eradicate, Prohibited/Control, or Restricted Noxious Weed?

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

Answer: No

Outcome: Go to Question 10B

See answer in Question 6A.

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

Answer: Yes

Outcome: Go to Question 10C

Trade is the main pathway by which it would enter or spread 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.

Outcome: LIST THE PLANT AS A RESTRICTED NOXIOUS WEED

While there evidence of negative impacts of this plant, the listing subcommittee recommends that there is not enough evidence to support listing it as a Prohibited Noxious Weed at this time. The most likely way the plant could enter the state is through purposeful planting. Listing as a Restricted Noxious Weed would help prevent introduction through that pathway. If lesser celandine is found in the state, the landowners, local Cooperative Weed Management Areas, and local governments could be educated about the impacts of lesser celandine and encouraged to voluntarily control the population.

Question 10D: Does the plant pose a serious human health threat?
Answer: No. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
No evidence was found that the plant poses a serious human health threat.

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 <u>eradicated</u> (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 factor 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: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Distribution: Lesser celandine is not known to be in Minnesota or in the bordering counties of adjacent states.
Reproductive biology: No factors that make it easier to control. While some subspecies don't produce seeds, others do. All subspecies reproduce vegetatively.
Potential to spread: If it is legal to sell it may be planted. Water is the main method of non-human spread.

Question 10G: Is the plant known to cause significant ecological or economic harm and can the plant be reliably <u>controlled</u> 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: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***

Management tools:

Chemical control methods include glyphosate and melsulfuron applied in late winter or early spring to minimize impacts on native species (Axtell et al. 2010). Plants may be dug up, but care must be taken to get all the tubers. Mechanical removal may be more likely to spread lesser celandine than control it (Axtell et al. 2010).

Frey and Schmit (2017) tested glyphosate applications and found that: "Treating when approximately half of the plants in the population were in flower resulted in a 95% decline in fig buttercup. Treating when the first flower in the population had emerged resulted in a 90% decline. No later phenological phases were treated. Control of fig buttercup led to an increase in cover of Japanese stiltgrass, an invasive grass."

Available resources:

There are currently no known reports, so the level of funding to control existing sites is none.

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?

Outcome: Decision tree does not direct to this question.

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?

Outcome: Decision tree does not direct to this question.

Box 11:

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

Outcome: Decision tree does not direct to this question.

Final outcomes of risk assessment (2020)

NWAC Listing Subcommittee

Outcome: List as Restricted Noxious Weed

Comments: While there is evidence of negative impacts of this plant, the listing subcommittee recommends that there is not enough evidence to support listing it as a Prohibited Noxious Weed at this time. The most likely way the plant could enter the state is through purposeful planting. Listing as a Restricted Noxious Weed would help prevent introduction through that pathway. If lesser celandine is found in the state, the landowners, local Cooperative Weed Management Areas, and local governments could be educated about the impacts of lesser celandine and encouraged to voluntarily control the population.

NWAC Full Committee

Outcome: List as a Restricted Noxious Weed

Comments: Vote was 14-1 on the recommendation to list.

MDA Commissioner

Outcome: List as a Restricted Noxious Weed
Comments: No comments

Risk Assessment Current Summary (04-26-2021)

- Lesser celandine is a small perennial plant that can form monocultures in forest understories and riparian areas. It can spread through seeds, underground tubers, and for some subspecies, aerial tubers.
- Lesser celandine has not been confirmed in Minnesota, but is present in Wisconsin and has a history of being planted as an ornamental plant.
- It is recommended that lesser celandine be regulated as a Restricted Noxious Weed with the goal of preventing introduction and spread in Minnesota.
- If lesser celandine is reported in Minnesota, control of the population should be encouraged.
- A commissioner's order to list lesser celandine as a Restricted Noxious Weed was signed on 04/26/2021. The species will be added to the Minnesota Noxious Weed List on 01/01/2023.

References

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