INDIANA

NON-NATIVE PLANT INVASIVENESS RANKING FORM

DRAFT ASSESSMENT FOR INVASIVE PLANTS NOT IN TRADE

Form originally created for use in New York; Indiana Form version date: November 1, 2010

Scientific name:	*Ficaria verna (previously Ranunculus ficaria)* USDA Plants Code: RAFI
Common names:	Fig buttercup, lesser celandine
Native distribution:	Europe, west Asia
Date assessed:	Oct. 25, 2019
Assessors:	Brenda Howard
Reviewers:	Will Drews, Dawn Slack, Ellen Jacquart
Date Approved:	IPAC approved 09 Dec 2019

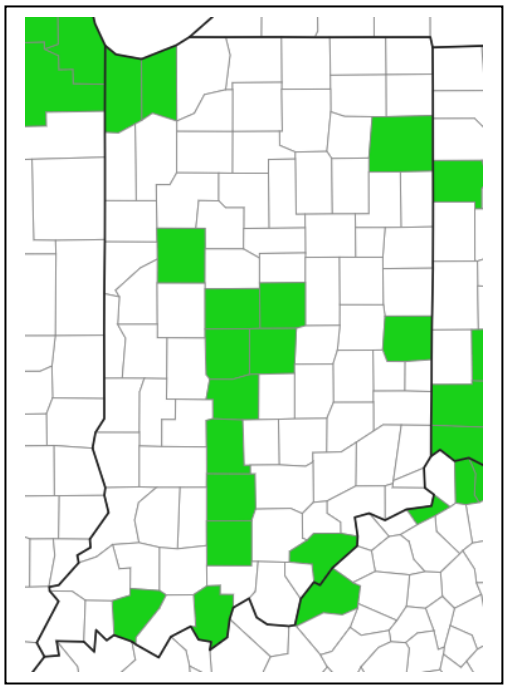
Indiana Invasiveness Rank:

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (30)	21
2	Biological characteristic and dispersal ability	25 (25)	23
3	Ecological amplitude and distribution	25 (25)	23
4	Difficulty of control	10 (7)	6
	Outcome score	100 (87)[b]	73 [a]
	Relative maximum score †	82.76	
	Indiana Invasiveness Rank §	Very High	

* For questions answered "unknown" do not include point value in "Total Answered Points Possible." If "Total Answered Points Possible" is less than 70.00 points, then the overall invasive rank should be listed as "Unknown."
†Calculated as 100(a/b) to two decimal places.
§Very High >80.00; High 70.00−80.00; Moderate 50.00−69.99; Low 40.00−49.99; Insignificant <40.00

A. DISTRIBUTION (KNOWN/POTENTIAL):

A1 Has this species been documented to persist without cultivation in IN? (reliable source; voucher not required)	
☒	**Yes – continue to A2.2**
☐	No – continue to A2.1
A2What is the likelihood that this species will occur and persist outside of cultivation given the climate in Indiana? (obtain from occurrence data in other states with similar climates)	
☒	Likely – continue to A3
☐	Not likely – stop here. There is no need to assess the species



Documentation:
EDDMapS. 2019. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed November 12, 2019.

A3 Describe the potential or known suitable habitats within Indiana (underlined). Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

Aquatic Habitats	Wetland Habitats	Upland Habitats
Rivers/streams	Marshes	Forest
Natural lakes and ponds	Fens	Savannas
Reservoirs/impoundments*	Bogs	Barrens
	Shrub swamps	Prairies
	Forested wetlands/riparian	Cultivated*
	Beaches/dunes	Old Fields*
	Ditches*	Roadsides*

In its introduced range it should be expected primarily in disturbed or undisturbed, moist, deciduous forests and as a weed in lawns and horticultural plantings. Lesser celandine is also expected to occur in urban areas including drainage areas and ditch banks.

Axtell et al 2010
EDDMapS 2019.

B. INVASIVENESS RANKING
Questions apply to areas similar in climate and habitats to Indiana unless specified otherwise.

1. ECOLOGICAL IMPACT

1.1. Impact on Natural Ecosystem Processes and System-Wide Parameters (e.g. fire regime, geomorphological changes (erosion, sedimentation rates), hydrologic regime, nutrient and mineral dynamics, light availability, salinity, pH)

A.	No perceivable impact on ecosystem processes based on research studies, or the absence of impact information if a species is widespread (>10 occurrences in minimally managed areas), has been well-studied (>10 reports/publications), and has been present in the northeast for >100 years.	0
B.	Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability)	3
C.	Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl)	7
D.	Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology and/or hydrology, affects fire frequency, alters soil pH, or fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species)	10
U.	Unknown	

Score U

Documentation:

1.2. Impact on Natural Community Structure

A.	No perceived impact; establishes in an existing layer without influencing its structure	0
B.	Influences structure in one layer (e.g., changes the density of one layer)	3
C.	Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer)	7
D.	Major alteration of structure (e.g., covers canopy, eradicating most or all layers below)	10

U. Unknown

Score 7

Documentation:

As this species occupies more of the forest floor, dense carpet-like colonies likely prevent established native species from completing their life cycle.

Axtell et al 2010

1.3. Impact on Natural Community Composition

A.	No perceived impact; causes no apparent change in native populations	0
B.	Influences community composition (e.g., reduces the number of individuals in one or more native species in the community)	3
C.	Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community)	7
D.	Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community)	10
U.	Unknown	

Score 7

Documentation:

Interestingly, we found that Ranunculus ficaria had lasting effects beyond its brief growing season. Hohman (2005) similarly found reduced diversity associated with presence of R. ficaria for species other than ephemeral species, though the results were correlational rather than experimental in nature.

Cipollini, K.A. and Schradin, K.D. (2011). Guilty in the court of public opinion: Testing presumptive impacts and allelopathic potential of *Ranunculus ficaria*. *American Midland Naturalist* 166**:** 63-74.

Extracts of R. ficaria also had weak but significant effects on germination and growth, confirming earlier work using a similar approach (Cipollini, Titus, and Wagner 2012, Cipollini and Flint 2013) and in the field (Cipollini and Schradin 2011).

Cipollini K, Titus K, Wagner C (2012) Allelopathic effects of invasive species (Alliaria petiolata, Lonicera maackii, Ranunculus ficaria) in the midwestern United States. Allelopathy J 29: 63–75

1.4. Impact on other species or species groups (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades. Examples include reduction in nesting/foraging sites; reduction in habitat connectivity; injurious components such as spines, thorns, burrs, toxins; suppresses soil/sediment microflora; interferes with native pollinators and/or pollination of a native species; hybridizes with a native species; hosts a non-native disease which impacts a native species)

A.	Negligible perceived impact	0
B.	Minor impact	3
C.	Moderate impact	7
D.	Severe impact on other species or species groups	10

U. Unknown

Score 7

Documentation:
Identify type of impact or alteration: Impacts germination and growth of multiple native plant species as well as has an intermediate effect on mycorrhizal inoculation of native plants.

Sources of information:
Cipollini and Bohrer 2016

Total Possible 30
Section One Total 21

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode and rate of reproduction

A. No reproduction by seeds or vegetative propagules (i.e. plant sterile with no sexual or asexual reproduction). 0
B. Limited reproduction (fewer than 10 viable seeds per plant AND no vegetative reproduction; if viability is not known, then maximum seed production is less than 100 seeds per plant and no vegetative reproduction) 1
C. Moderate reproduction (fewer than 100 viable seeds per plant - if viability is not known, then maximum seed production is less than 1000 seeds per plant - OR limited successful vegetative spread documented) 2
D. Abundant reproduction with vegetative asexual spread documented as one of the plants prime reproductive means OR more than 100 viable seeds per plant (if viability is not known, then maximum seed production reported to be greater than 1000 seeds per plant.) 4
U. Unknown

Score 4

Documentation:
Describe key reproductive characteristics (including seeds per plant):

Ficaria verna spreads primarily by abundant tubers and bulblets, each of which can grow into a new plant once separated from the parent plant. The prolific tubers may be unearthed and scattered by the digging activities of some animals, including humans trying to pull weeds. The tubers also can spread by rain or even flooding events.

Lesser celandine (Ranunculaceae) is a perennial weed with tuberous root. Tubers are the most important means of reproduction and dispersion of this weed.

Its ephemeral growth habit and vegetative reproduction make lesser celandine an increasingly problematic weed.

Axtell et al 2010
Sources of information:

2.2. Innate potential for long-distance dispersal (e.g. bird dispersal, sticks to animal hair, buoyant fruits, pappus for wind-dispersal)

A. Does not occur (no long-distance dispersal mechanisms) 0
B. Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations) 1
C. Moderate opportunities for long-distance dispersal (adaptations exist for long-distance dispersal, but studies report that 95% of seeds land within 100 meters of the parent plant) 2
D. Numerous opportunities for long-distance dispersal (adaptations exist for long-distance dispersal and evidence that many seeds disperse greater than 100 meters from the parent plant) 4

U. Unknown

Score 4

Documentation:
Identify dispersal mechanisms:

Bulbils are believed to be spread after being accidentally unearthed and carried by animals; they may also be transported by water, which would likely increase colonization of riverbanks (Swearingen 2005). Multiple examples of lesser celandine moving miles downstream and establishing new populations along Jackson Creek and Clear Creek in Monroe County (Jacquart personal observation)

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contaminated compost, land and vegetation management equipment such as mowers and excavators, etc.)

A.	Does not occur	0
B.	Low (human dispersal to new areas occurs almost exclusively by direct means and is infrequent or inefficient)	1
C.	Moderate (human dispersal to new areas occurs by direct and indirect means to a moderate extent)	2
D.	High (opportunities for human dispersal to new areas by direct and indirect means are numerous, frequent, and successful)	3
U.	Unknown	

Score 3

Documentation:

Mowing turf is a disruptive operation that may promote the spread of aerial bulbils in these systems (Reisch and Scheitler 2009) Lesser celandine dominates several ditches in the headwaters of Jackson Creek in Bloomington and ditch cleaning results in the movement of bulbils and establishment of new populations where that fill is used (Jacquart personal observation). Add info on perennial exchange (Ellen J.)

2.4. Characteristics that increase competitive advantage, such as shade tolerance, ability to grow on infertile soils, perennial habit, fast growth, nitrogen fixation, allelopathy, etc.

A.	Possesses no characteristics that increase competitive advantage	0
B.	Possesses one characteristic that increases competitive advantage	3
C.	Possesses two or more characteristics that increase competitive advantage	6
U.	Unknown	

Score 6

Documentation:

A high colonizing capacity has been associated with a short generation time (i.e., emergence to seed set), viability of bulbils, and effective dispersal.

Axtell et al 2010

…demonstrated that bulbils of R. ficaria species showed the highest germination rate relative to other forest-floor species studied (Verheven and Hermy 2004).

Shade tolerant (Taylor and Markham 1978)

2.5. Growth vigor

A. Does not form thickets or have a climbing or smothering growth habit 0
B. Has climbing or smothering growth habit, forms a dense layer above shorter vegetation, forms dense thickets, or forms a dense floating mat in aquatic systems where it smothers other vegetation or organisms 2
U. Unknown

Score 2

Documentation:

Forms dense mats that exclude native species (Hammerschlag et al. no date).

2.6. Germination/Regeneration

A. Requires open soil or water and disturbance for seed germination, or regeneration from vegetative propagules. 0
B. Can germinate/regenerate in vegetated areas but in a narrow range or in special conditions 2
C. Can germinate/regenerate in existing vegetation in a wide range of conditions 3
U. Unknown (No studies have been completed)

Score 3

Documentation:
Describe germination requirements:
The bulbils can establish in undisturbed riparian forest and in dense turfgrass (Jacquart personal observation 2019)

2.7. Other species in the genus invasive in Indiana or elsewhere

A. No 0
B. Yes 3
U. Unknown

Score 0

Documentation:

If the current nomenclature is used (Ficaria verna) there is no other species in the genus in the US. If the old nomenclature is used (Ranunculus ficaria) there are invasive members of the genus (*Ranunculus repens)*

Total Possible 25
Section Two Total 23

3. ECOLOGICAL AMPLITUDE AND DISTRIBUTION

3.1. Density of stands in natural areas in the northeastern USA and eastern Canada (use same definition as Gleason & Cronquist which is: “The part of the United States covered extends

from the Atlantic Ocean west to the western boundaries of Minnesota, Iowa, northern Missouri, and southern Illinois, south to the southern boundaries of Virginia, Kentucky, and Illinois, and south to the Missouri River in Missouri. In Canada the area covered includes Nova Scotia, Prince Edward Island, New Brunswick, and parts of Quebec and Ontario lying south of the 47th parallel of latitude")

A.	No large stands (no areas greater than 1/4 acre or 1000 square meters)	0
B.	Large dense stands present in areas with numerous invasive species already present or disturbed landscapes	2
C.	Large dense stands present in areas with few other invasive species present (i.e. ability to invade relatively pristine natural areas)	4
U.	Unknown	

Score 4

Documentation:

Most states in which lesser celandine occurs report large populations growing in dense mats along waterways to the exclusion of most other vegetation (Axtell et al. 2010). Numerous populations along creeks in Monroe County are in otherwise hig- quality forest with few to no other invasive plants (Jacquart personal observation).

3.2. Number of habitats the species may invade

A.	Not known to invade any natural habitats given at A2.2	0
B.	Known to occur in two or more of the habitats given at A2.2, with at least one a natural habitat.	1
C.	Known to occur in three or more of the habitats given at A2.2, with at least two a natural habitat.	2
D.	Known to occur in four or more of the habitats given at A2.2, with at least three a natural habitat.	4
E.	Known to occur in more than four of the habitats given at A2.2, with at least four a natural habitat.	6
U.	Unknown	

Score 6

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:

It occurs in damp meadows, shady lawns, forests, ditches, drainage ways, hedgerows, floodplains, alluvial woods, shaded turf, stream and riverbanks, pond margins, bogs, and marshes See list at A2.2 for all habitats.

Axtell et al 2010

3.3. Role of disturbance in establishment

A.	Requires anthropogenic disturbances to establish.	0
B.	May occasionally establish in undisturbed areas but can readily establish in areas with natural or anthropogenic disturbances.	2
C.	Can establish independent of any known natural or anthropogenic disturbances.	4
U.	Unknown	

Score 4

Documentation:
Identify type of disturbance:

Establishes in floodplain areas (seasonally disturbed) but can also climb into vegetation on undisturbed hillsides (Ellen Jacquart personal observation)

3.4. Climate in native range

A.	Native range does not include climates similar to Indiana	0
B.	Native range possibly includes climates similar to at least part of Indiana	1
C.	Native range includes climates like those in Indiana	3
U.	Unknown	

Score 3

Documentation:
Describe what part of the native range is similar in climate to Indiana:

Based on three climatic variables, we estimate that about 79 percent of the United States is suitable for the establishment of F. verna (Fig. 1). This predicted distribution is based on the species' known distribution elsewhere in the world and includes point-referenced localities and areas of occurrence. The map for F. verna represents the joint distribution of Plant Hardiness Zones 4-11, areas with 10-100+ inches of annual precipitation, and the following Köppen-Geiger climate classes: steppe, Mediterranean, humid subtropical, marine west coast, humid continental warm summers, humid continental cool summers, subarctic, and tundra (USDA APHIS 2015)

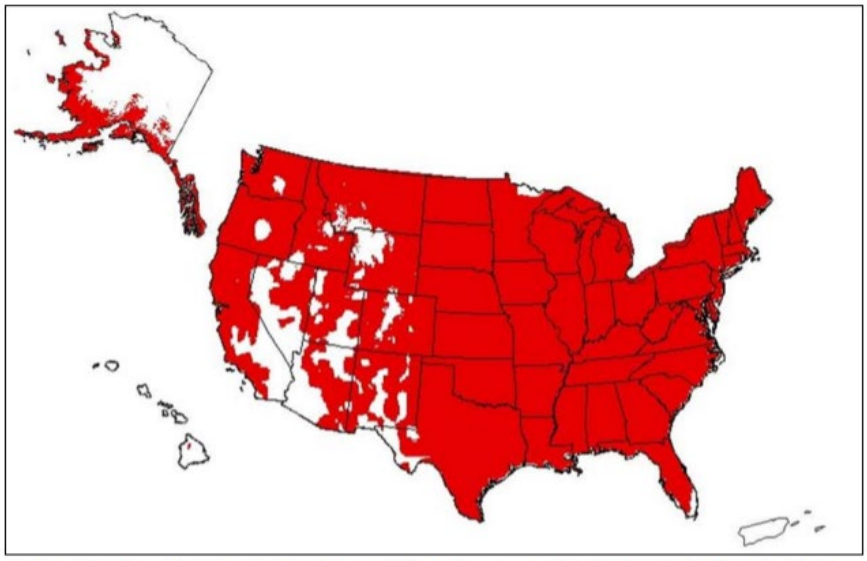


Figure 1. Predicted distribution of *Ficaria verna* in the United States. Map insets for Alaska, Hawaii, and Puerto Rico are not to scale.

3.5. Current introduced distribution in the northeastern USA and eastern Canada (see question 3.1 for definition of geographic scope)

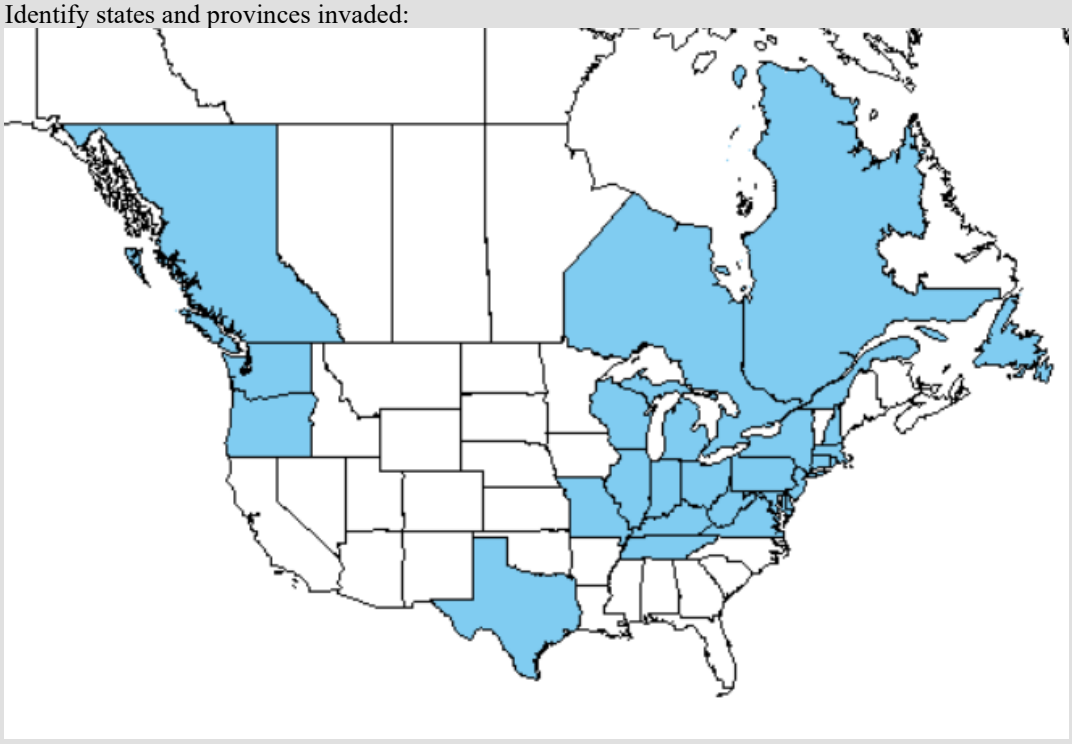
A.	Not known from the northeastern US and adjacent Canada	0
B.	Present as a non-native in one northeastern USA state and/or eastern Canadian province.	1
C.	Present as a non-native in 2 or 3 northeastern USA states and/or eastern Canadian provinces.	2
D.	Present as a non-native in 4–8 northeastern USA states and/or eastern Canadian provinces, and/or categorized as a problem weed (e.g., "Noxious" or "Invasive") in 1 northeastern state or eastern Canadian province.	3

E. Present as a non-native in >8 northeastern USA states and/or eastern Canadian provinces. and/or categorized as a problem weed (e.g., "Noxious" or "Invasive") in 2 northeastern states or eastern Canadian provinces. 4

U. Unknown

Score 4

Documentation:
Identify states and provinces invaded:



plants.usda.gov. Accessed 7/10/2019.

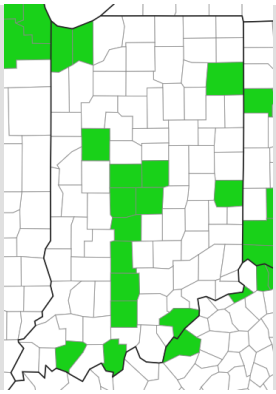
3.6. Current introduced distribution of the species in natural areas in Indiana

A. Present in no Indiana counties 0
B. Present in 1-10 Indiana counties 1
C. Present in 11-20 Indiana counties 2
D. Present in 21-50 Indiana counties 3
E. Present in more than 50 Indiana counties or on Federal noxious weed list 4
U. Unknown

Score 2

Documentation:
Describe distribution:

Sources of information:
EDDMapS. 2019. last accessed November 12, 2019.



Total Possible	25
Section Three Total	23

4. DIFFICULTY OF CONTROL

4.1. Seed banks

A.	Seeds (or vegetative propagules) remain viable in soil for less than 1 year, or does not make viable seeds or persistent propagules.	0
B.	Seeds (or vegetative propagules) remain viable in soil for at least 1 to 10 years	2
C.	Seeds (or vegetative propagules) remain viable in soil for more than 10 years	3
U.	Unknown	

Score: U

Documentation:
No information found on the seed bank for this species, or the length of viability of the bulbils.

Sources of information:

4.2. Vegetative regeneration

A.	No regrowth following removal of aboveground growth	0
B.	Regrowth from ground-level meristems	1
C.	Regrowth from extensive underground system	2
D.	Any plant part is a viable propagule	3
U.	Unknown	

Score: 2

Documentation:
Describe vegetative response:

Lesser celandine spreads primarily by vegetative means through abundant tubers and bulblets, each of which is ready to become a new plant once separated from the parent plant. The tubers of lesser celandine are prolific and may be unearthed and scattered by the digging activities of some animals, including well-meaning weed pullers, and transported during flood events(Swearingen 2005).

4.3. Level of effort required

A.	Management is not required: e.g., species does not persist without repeated anthropogenic disturbance.	0

B. Management is relatively easy and inexpensive: e.g. 10 or fewer person-hours of manual effort (pulling, cutting and/or digging) can eradicate a 1 acre infestation in 1 year (infestation averages 50% cover or 1 plant/100 ft^2). 2

C. Management requires a major short-term investment: e.g. 100 or fewer person-hours/year of manual effort, or up to 10 person-hours/year using mechanical equipment (chain saws, mowers, etc.) for 2-5 years to suppress a 1-acre infestation. Eradication is difficult, but possible (infestation as above). 3

D. Management requires a major investment: e.g. more than 100 person-hours/year of manual effort, or more than 10-person hours/year using mechanical equipment, or the use of herbicide, grazing animals, fire, etc. for more than 5 years to suppress a 1-acre infestation. Eradication may be impossible (infestation as above). 4

U. Unknown

Score 4

Documentation:
Identify types of control methods and time-term required:

The perennial habit and extensive root system of lesser celandine make contact herbicides less effective than systemic herbicides.

Although lesser celandine growth decreases after coppicing (i.e., stems repeatedly cut down to near ground level) (Salisbury 1925; Taylor and Markham 1978), the short active life cycle of the plant each year prevents carbohydrate starvation from being a single-season control option. The digging of plants from small infestations may be possible but all tubers must be removed and destroyed for effective control. As the extent of the infestations increase, mechanical removal becomes less practical and more likely to inadvertently facilitate the spread of lesser celandine.

Axtell et al 2010

Total Possible	7
Section Four Total	6
Total for 4 sections Possible	87
Total for 4 sections	73

Indiana Invasiveness Rank:

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (30)	21
2	Biological characteristic and dispersal ability	25 (25)	23
3	Ecological amplitude and distribution	25 (25)	23
4	Difficulty of control	10 (7)	6
	Outcome score	100 (87)[b]	73 [a]
	Relative maximum score †	82.76	
	Indiana Invasiveness Rank §	Very High	

* For questions answered "unknown" do not include point value in "Total Answered Points Possible." If "Total Answered Points Possible" is less than 70.00 points, then the overall invasive rank should be listed as "Unknown."
†Calculated as 100(a/b) to two decimal places.
§Very High >80.00; High 70.00−80.00; Moderate 50.00−69.99; Low 40.00−49.99; Insignificant <40.00

References for species assessment:

Axtell, A., DiTommaso, A. and Post, A. (2010). Lesser celandine (Ranunculus ficaria): A threat to woodland habitats in the northern United States and southern Canada. Invasive Plant Science and Management 3: 190-196

Cipollini, K. and M.G. Bohrer. 2016. "Comparison of allelopathic effects of five invasive species on two native species." Journal of the Trorrey Botanical Society 143(4): 427-436.

Cipollini, K. and K.D. Schradin. 2011. Guilty in the Court of Public Opinion: Testing Presumptive Impacts and Allelopathic Potential of Ranunculus ficaria. The American Midland Naturalist 166(1), 63-74, (1 July 2011). https://doi.org/10.1674/0003-0031-166.1.63

Cipollini K, Titus K, Wagner C (2012) Allelopathic effects of invasive species (Alliaria petiolata, Lonicera maackii, Ranunculus ficaria) in the midwestern United States. Allelopathy J 29: 63–75

Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/

Hammerschlag, R., S. Salmons, C. Krafft, M. Paul, and J. Hatfield. No Date. Ecology and management of Ranunculus ficaria in Rock Creek Park. United States Geological Survey Patuxent Wildlife Research Center, Laurel, Maryland

Reisch, C. and S. Scheitler. 2009. Disturbance by mowing affects clonal diversity: the genetic structure of Ranunculus ficaria (Ranunculaceae) in meadows and forests. Plant Ecol. 201:699–707.

Swearingen, J. M. 2005. Lesser Celandine. Plant Conservation Alliance Alien Plant Working Group. https://www.invasive.org/weedcd/pdfs/wgw/lessercelandine.pdf Accessed: November 12, 2019.

Taylor, K., and B. Markham. 1978. Biological flora of the British Isles: Ranunculus ficaria L. Journal of Ecology 66(3):1011-1031.

United States Department of Agriculture Animal and Plant Health Inspection Service. 2015. "Weed Risk Assessment for Ficaria verna Huds (Ranunculaceae) – Fig buttercup" (PDF). Animal and Plant Health Inspection Service. United States Department of Agriculture. August 12, 2015.

Verheyen, K. and M. Hermy. 2004. Recruitment and growth of herb layer species with different colonizing capacities in ancient and recent forests. J. Veg. Sci. 15:125–134.

Citation: This IN ranking form may be cited as: Jacquart, E.M. and P.M.Paulone. 2011. Invasiveness ranking system for non-native plants of Indiana. Unpublished. Invasive Plant Advisory Committee (IPAC) to the Indiana Invasive Species Council, Indianapolis, IN.

Acknowledgments: The IN ranking form is an adaptation for Indiana use of the form created for New York by Jordan et al. (2009), cited below. Documentation for species assessed for New York are used for Indiana where they are applicable. The Invasive Plant Advisory Committee was created by the Indiana Invasive Species Council in October 2010, and is made up of the original members of the Indiana Invasive Plant Assessment Working Group (IPSAWG). Original members of IPSAWG included representatives of the The Nature Conservancy; Indiana Native Plant and Wildflower Society; Indiana Nursery and Landscape Association; Indiana Chapter of the American Society of Landscape Architects; Indiana Forage Council; Indiana Wildlife Federation; Indiana State Beekeepers Association; Indiana Beekeeper's Association; Department of Natural Resources; Hoosier National Forest; Indiana Academy of Science; Natural Resources Conservation Service; Indiana Department of Environmental Management;

Indiana Department of Transportation; Purdue Cooperative Extension Service; Seed Administrator, Office of the Indiana State Chemist.

References for the Indiana ranking form:

Jordan, M.J., G. Moore, and T.W. Weldy. 2009. Invasiveness ranking system for non-native plants of New York. Unpublished. The Nature Conservancy, Cold Spring Harbor, NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, NY.

References for the New York ranking form:

Carlson, Matthew L., Irina V. Lapina, Michael Shephard, Jeffery S. Conn, Roseann Densmore, Page Spencer, Jeff Heys, Julie Riley, Jamie Nielsen. 2008. Invasiveness ranking system for non-native plants of Alaska. Technical Paper R10-TPXX, USDA Forest Service, Alaska Region, Anchorage, AK XX9. Alaska Weed Ranking Project may be viewed at: http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm.

Heffernan, K.E., P.P. Coulling, J.F. Townsend, and C.J. Hutto. 2001. Ranking Invasive Exotic Plant Species in Virginia. Natural Heritage Technical Report 01-13. Virginia Dept. of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. 27 pp. plus appendices (total 149 p.).

Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. Version 1. NatureServe, Arlington, Virginia. http://www.natureserve.org/getData/plantData.jsp

Randall, J.M., L.E. Morse, N. Benton, R. Hiebert, S. Lu, and T. Killeffer. 2008. The Invasive Species Assessment Protocol: A Tool for Creating Regional and National Lists of Invasive Nonnative Plants that Negatively Impact Biodiversity. Invasive Plant Science and Management 1:36–49

Warner, Peter J., Carla C. Bossard, Matthew L. Brooks, Joseph M. DiTomaso, John A. Hall, Ann M.Howald, Douglas W. Johnson, John M. Randall, Cynthia L. Roye, Maria M. Ryan, and Alison E. Stanton. 2003. Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands. Available online at www.caleppc.org and www.swvma.org. California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 pp.

Williams, P. A., and M. Newfield. 2002. A weed risk assessment system for new conservation weeds in New Zealand. Science for Conservation 209. New Zealand Department of Conservation. 1-23 pp.