Minnesota Noxious Weed Risk Assessment

Developed by the Minnesota Noxious Weed Advisory Committee

Assessment information

Common name: Common butterbur, butterfly dock, pestilence wort

Scientific name: *Petasites hybridus* (L.) G. Gaertn., B. Mey. & Scherb.

Family name: Asteraceae

Current reviewer name and organizational affiliation: Emilie Justen, Minnesota Department of Agriculture
Date of current review: August 8, 2023

Species description

Photos

Photo caption: *Petasites hybridus* plant in flower.
Image credit: William M. Ciesla, Forest Health Management International, Bugwood.org.

Photo caption: Close up of flower.
Image credit: Steve Garske, Invasive Species Coordinator, Great Lakes Indian Fish and Wildlife Commission.

Photo caption: *Petasites hybridus* infestation along roadway near Marquette, Michigan.
Image credit: Steve Garske, Invasive Species Coordinator, Great Lakes Indian Fish and Wildlife Commission.

Photo caption: *Petasites hybridus* infestation near Superior, Wisconsin.
Image credit: Steve Garske, Invasive Species Coordinator, Great Lakes Indian Fish and Wildlife Commission.

Photo caption: Leaves of *Petasites hybridus* are large and heart shaped.
Image credit: Steve Garske, Invasive Species Coordinator, Great Lakes Indian Fish and Wildlife Commission.

Why the plant is being assessed

- *Petasites hybridus* is regulated in Wisconsin as a Prohibited invasive species.
- A few metro counties in Minnesota have reported *Petasites hybridus* populations.
- At the 2022 Upper Midwest Invasive Species Conference, land managers in Wisconsin gave a presentation on their management efforts on *Petasites* species in Wisconsin (Shackleford et al. 2022).

Identification, biology, and life cycle

- Perennial forb
- Huge leaves up to 3 feet across and 3-4 feet tall that shade out native species
- Reproduces by root fragmentation and creeping rhizomes
- Resembles rhubarb
- Flower stalks with tiny pink to white flowers; plants are dioecious
- Seeds attached to feathery pappi
- Source: Wisconsin Department of Natural Resources (2023)

Current distribution

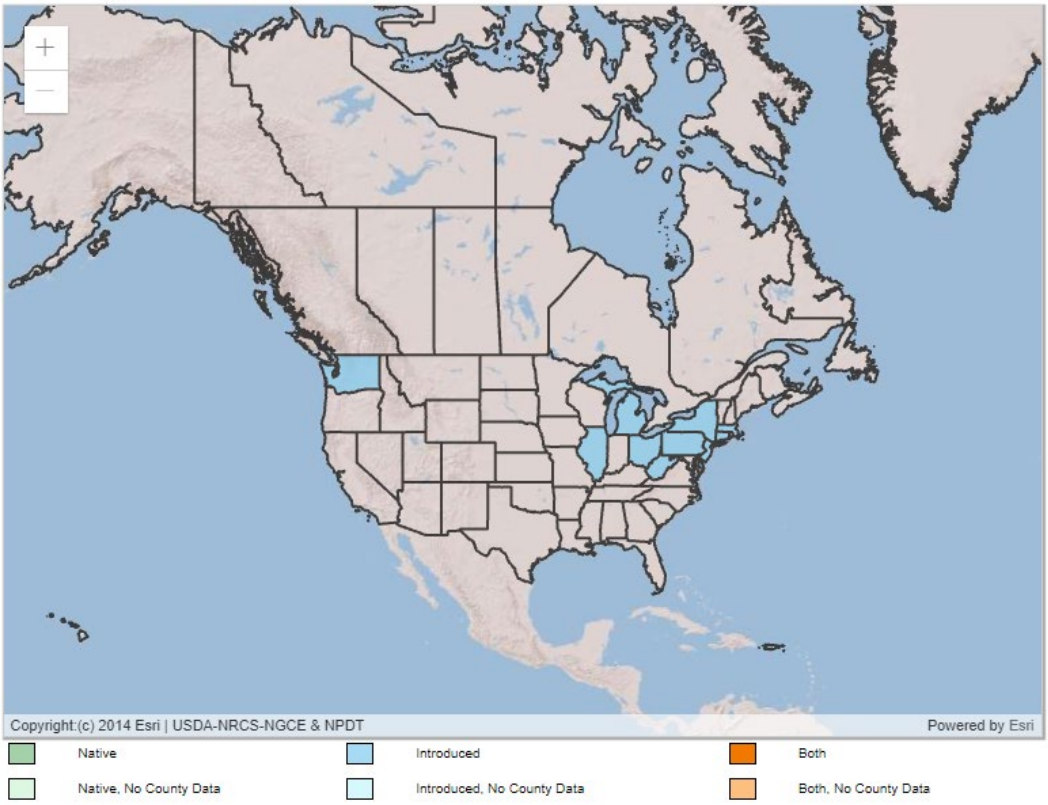

Photo caption: National level map from USDA Plants (2023). Accessed 3/6/2023.
Description of where the plant is found in the United States: Introduced in Washington, Illinois, Michigan, Ohio, West Virginia, Pennsylvania, Delaware, New York, New Jersey, Massachusetts.

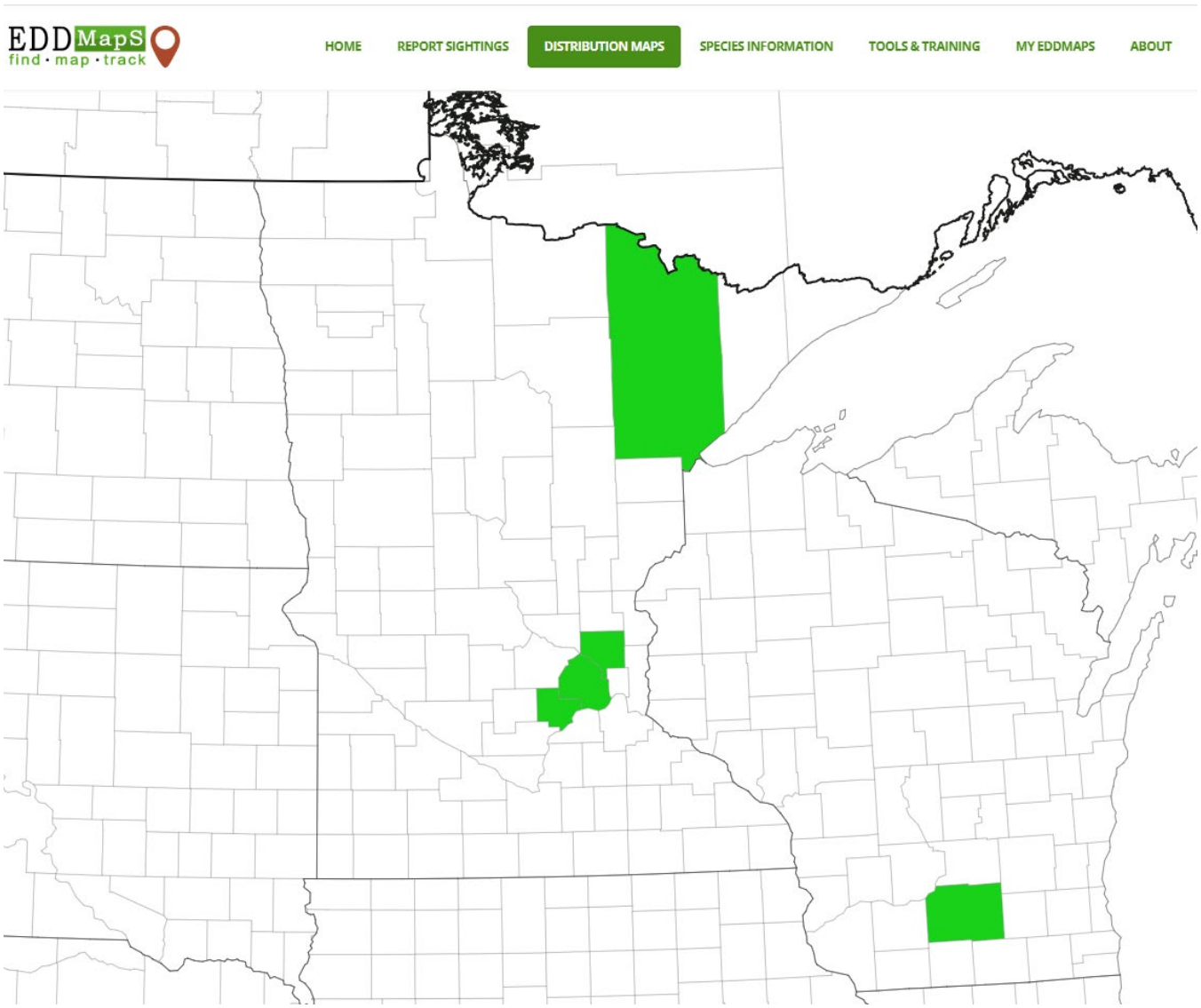

Photo caption: State level map from EDDMapS (2023). Accessed 3/6/2023.
Description of where the plant is found in Minnesota: Found in St. Louis, Carver, Hennepin, and Anoka counties. Not reported in EDDMapS but documented in: Montcalm County, MI; near Marquette, MI in Marquette County; Dane, Douglas, Fond du Lac, and Oconto Counties in Wisconsin (Shackleford 2023).

Current regulation

Not currently regulated in Minnesota. Regulated as a Prohibited Invasive Species in Wisconsin making it illegal to possess, transport, transfer or introduce in Wisconsin without a permit (Wisconsin Department of Natural Resources 2023).

Risk assessment

Box 1:

Is the plant species or genotype non-native?

Answer: Yes
Outcome: Go to Box 3
Native to Europe, Northern Iran, Algeria (MISIN 2023, Plants of the World Online 2023). It was introduced to North America for medicinal purposes (MISIN 2023).

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
Wisconsin lists this species as a Prohibited invasive species (Wisconsin Department of Natural Resources 2023). It has been reported in a few northern Michigan counties (Michigan Invasive Species 2023). Grows aggressively along streambanks to shade out native species and reproduces by root fragments and creeping rhizomes (LeClair 2011, Shackleford et al 2023It has also spread extensively around the Marquette, Michigan area (Shackleford 2023).

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
Petasites hybridus has been reported in Anoka, Carver, Hennepin, and St. Louis counties, which are USDA hardiness zone 4 (EDDMapS 2023). PFAF (2023) lists the species as hardy to USDA zones 4-8. In Carver and Hennepin counties, the reports are for plants in natural areas, likely escaped from cultivation nearby. In Anoka County, the report appears to be near a yard and it's unclear whether it escaped cultivation. A recently

confirmed report next to a Lake Superior tributary in Duluth spans both private and public lands (EDDMapS 2023).

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

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

Documented in northern Wisconsin and northern Michigan (LeClair 20211, USDA Plants 2023).

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

Did not find any information as of 4/19/23.

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

Answer: Yes

Outcome: Go to Question 7C

Reproduces by tuberous base, fleshy creeping roots, and rhizomes (LeClair 20211, UMass Extension 2023). PFAF (2023) notes that the roots “are very difficult to eradicate”.

Fenner and Thompson (2005) include *P. hybridus* in their description of plants that reproduce both clonally and sexually; clonal plants that produce seed are able to avoid inbreeding, and species that are dioecious “ensures that only outbreeding between different clones is possible”.

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

Humans move root pieces through tillage, construction, and through landscape plantings (Wisconsin Department of Natural Resources 2023). Schimpf (2023) states that “vegetative spread has been very vigorous.” Additionally, where *P. hybridus* is growing in riparian areas, there is a possibility root pieces can move downstream during flooding.

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.***

Plants are dioecious and with both male and female plants present, can produce many seedlings (LeClair 2011, MISIN 2023, PFAF 2023). However, it's likely the seeds are short lived (Karrenberg and Suter 2003).

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

Plants are dioecious and unable to self-pollinate (Wisconsin Department of Natural Resources 2023).

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.***

Seeds are wind dispersed due to having feathery white bristles attached to the seeds (LeClair 2011, Renz 2023). A google search revealed that seeds are available from several online retailers such as Amazon and Etsy.

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 information was found about *P. hybridus* hybridizing with Minnesota native plant *Petasites frigidus*.

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

Author did not find evidence of natural controls or native species that prevent the spread.

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 Box 8B

High concentrations of unrefined extracts (pyrrolizidine alkaloids) cause intensive liver toxicity, lung damage, and damage to blood circulation (Kisielius et al 2020, National Institute of Health 2020). There is evidence in

Denmark that large population of *Petasites* along a stream can leach the alkaloids into both surface and ground waters, potentially contaminating drinking water (Kisielius et al 2020). [Note that the study was looking at a well and didn't explain if well was treated or if large scale treatment plants would extract toxins.]

Despite its documented toxicity, the author could not find any documented cases of toxicity in the United States.

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 Box 8C

Petasites hybridus is not a threat to row crops.

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

Answer: Yes

Outcome: Go to Box 9

Plant grows vigorously and densely, and with its very large leaves is able to shade out everything underneath it (LeClair 2011, PFAF 2023, Vermont Invasives 2019).

Additionally, its large leaves shade out native plants, leaving bare soil which can contribute to erosion problems (Vermont Invasives 2019). In Minnesota, known infestations are very small and currently do not pose a significant risk.

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.)?

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

Invades wetland and forest habitats, bogs, marshes, and other semi shaded moist areas; grows quickly and shades out native species (Vermont Invasives 2019).

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.

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: Yes

Outcome: Go to Question 9B
Potentially being sold at Minneapolis retailer Tangletown Gardens (Calkins 2023a). Though used as a medicinal plant, it is not produced in large quantities in the United States and prohibiting the species from sale or importation into Minnesota would have negligible economic effects on the retail nursery industry.

Additionally, one respondent to the Nursery Survey in 2023 said they sell *Petasites hybridus*, but said it would not cause a financial hardship if the species was regulated and not allowed to be sold.

Petasites hybridus is grown and sold as a landscape plant on a limited basis in Minnesota. In 2023, the Minnesota Nursery and Landscape Association (MNLA) reached out to wholesale nursery growers in an attempt to get an estimate of the wholesale value, and ultimately the combined monetary value (wholesale plus value-added retail) of *Petasites hybridus* to nursery growers and the Minnesota economy for inclusion in the risk assessment for this species (James Calkins 2023b, Minnesota Nursery and Landscape Association; personal communication, August 5, 2023). Although *Petasites hybridus* is grown on a limited basis and has value to some Minnesota wholesale growers and retailers, based on the information available, sales did not appear to be a significant contributor to annual nursery and garden center sales and the Minnesota economy at the time this risk assessment was completed.

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
Outcome: Go to Question 9C

Question 9C: Is the plant native to Minnesota?

Answer: No
Outcome: Go to Question 9D

Question 9D: Is a non-invasive, alternative plant material or cultivar commercially available that could serve the same purpose as the plant of concern?

Answer: Yes
Outcome: Go to Box 10
Petasites frigidus is native to Minnesota and could serve the same ornamental purpose as *P. hybridus*. It does not appear to be widely commercially cultivated. There are other popular ornamental plants with large leaves such as some hosta cultivars, rhubarb, etc. There are also other plants that bloom in May or grow along waterways (Van Riper 2023).

Suggestions from the 2023 nursery survey included native forbs, Bergenia, ajuga, wild ginger, ligularia, brunnera, and native milkweeds.

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
Verified EDDMapS (2023) reports confirm it is established in Carver, Hennepin, and Anoka counties.

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

Outcome: Decision tree does not direct to this question.

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

Outcome: Decision tree does not direct to this question.

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

Answer: No
Outcome: Go to Question 10F
Though consuming high concentrations can cause liver and lung damage, it is not widespread in Minnesota and is not believed to pose a serious human health threat.

Historically, extract from *Petasites hybridus* was used for spasms of the urogenital tract, gastro-intestinal tract and bile duct; it has also been studied for use as a prophylactic for hay fever and asthma (Kalin 2003). In Austria, it was historically used to treat infections, fever, colds, and flu (Vogl et al. 2013).

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: No

Outcome: Go to Question 10G

In Wisconsin and Michigan where significant infestations have been documented, it has invaded riparian areas, forest edges, and other semi-shaded moist areas. Its huge leaves shade out other plant species, reducing biodiversity. Its aggressive growth by rhizomes allows it to spread quickly and overtake large areas; because it can also spread by root fragments that break off, there is significant risk of spreading it through cultivation or disturbance of the roots and rhizomes (Wisconsin Department of Natural Resources 2023, Schimpf 2023, Shackleford et at 2023).

Distribution:

P. hybridus has limited known distribution in Minnesota. It's possible there are additional unmapped naturalized populations, though confusion with *P. japonicus* could also be a factor. Outreach on identification and encouraging reporting the species to EDDMapS would give us a better picture of the distribution.

Reproductive biology:

It reproduces both by seed that is carried by wind and water, and by rhizomes; regenerates from root fragments.

Potential for spread and re-invasion:

Prohibiting from sale would prevent more from naturalizing in the landscape. Since it is not currently widespread, the risk of reinvasion is low.

Known management tools:

The Wisconsin DNR (2023) recommends the following:

"Mechanical – due to the plants spreading rhizomes, dig or hand pull the entire plant's root system. Monitor for re-sprouts. The possibility of accidental spreading is high due to the plant's ability to reproduce via root fragments.

Chemical – Apply herbicides during the active growing season. Glyphosate or Metsulfuron can be used as a foliar spray, painted directly onto large leaves or as a spot treatment."

In places where *P. hybridus* is growing near water, use an aquatically labeled herbicide.

Photo caption: *Petasites hybridus* post treatment with aquatic glyphosate: treated plants are wilted on the left, untreated plants are on the right.
Image credit: Matthew Wallrath, Invasive Species Program Manager, Upper Sugar River Watershed Association.

Available resources:
Since current known populations are small, the amount of resources need to map and treat infestations would be small.

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
There is not enough evidence for significant toxicity or ecological harm based on the literature review.

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
Prohibiting it from sale and importation into Minnesota will keep new infestations from being introduced. The Minnesota Department of Agriculture surveyed nursery certificate holders and Minnesota Nursery Landscape Association members regarding plant species being assessed by the Noxious Weed Advisory Committee. The survey was open during June and July 2023 and there were 30 responses. For *Petasites hybridus*, only one

grower said they sell the species and also said regulating the species to prohibit it from sale would not cause economic hardship to the grower. 18/30 respondents said there should be a three year phase-out period if it is listed as a noxious weed.

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: Decision tree does not direct to this question.

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 (2023)

NWAC Listing Subcommittee

Outcome: List as Restricted
Comments: Land managers in Wisconsin and Michigan provided valuable information on effective treatments for *Petasites hybridus*. Though the extract can be toxic in large quantities, the listing subcommittee does not believe Minnesota has large enough infestations for toxicity to be an issue. There are few reports of the species naturalizing, and at least one metro report that had been planted in the landscape only a few years prior to the report.

NWAC Full Committee

Outcome: List as a Restricted Noxious Weed
Comments: The vote was 15 in favor and 2 against the recommendation.

MDA Commissioner

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

Risk Assessment Current Summary (8 August 2023)

- Though not a lot of literature exists on the invasion biology of *Petasites hybridus*, there has been good documentation of infestations and successful treatments in Wisconsin and Michigan.
- Based on the population sizes in Minnesota and insignificant economic benefits (nursery sales), this species could be a good candidate for the Restricted category to limit new introductions.

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