Minnesota Noxious Weed Risk Assessment

Developed by the Minnesota Noxious Weed Advisory Committee

Assessment information

Common name: Giant butterbur, sweet coltsfoot, Japanese sweet coltsfoot, butterbur, fuki, Japanese butterbur, giant butterfly dock, giant butterbur

Scientific name: *Petasites japonicus* (Siebold & Zucc.) Maxim.

Family name: Asteraceae

Current reviewer name and organizational affiliation: Laura Van Riper, Minnesota Department of Natural Resources
Date of current review: August 7, 2023

Species description

Photos

Photo caption: *Petasites japonicus* leaves can grow up to 32 inches wide. Photo credit: Minnesota Department of Agriculture.

Photo caption: *P. japonicus* flowering in May in St. Louis County, Minnesota. Photo credit: Minnesota Department of Agriculture.

Photo caption: *P. japonicus* plants growing in a forest understory in Maplewood, Minnesota (Ramsey County) photographed in August. Photo credit: Minnesota Department of Agriculture.

Why the plant is being assessed

- Ornamental herbaceous perennial that thrives in wet areas.
- Reproduces by root fragmentation and creeping rhizomes.
- Reports of spread into forested areas in Duluth (St. Louis County) and Maplewood (Ramsey County).

Identification, biology, and life cycle

- Quoted from Missouri Botanical Garden (2023):

  - *Petasites japonicus*, commonly known as butterbur, fuki or sweet coltsfoot, is a rhizomatous perennial that is noted for its huge basal leaves that form dense spreading clumps of foliage to 3’ tall and 5’ wide.
  - It is native to Korea, China and Japan where it is typically found growing on wet streambanks in woodland areas.
  - Long-stalked, lightly toothed, kidney-shaped, green leaves (to 16-32” wide) are tomentose beneath.
  - Fragrant, yellowish-white, daisy-like flowers in dense corymbs appear in spring before the leaves emerge on rigid scapes to 6” tall. Scapes elongate after bloom.
  - Leaf stalks (petioles) are eaten as a vegetable (fuki) in Japan.
- Minnesota has a native species called *Petasites frigidus* (common names include sweet coltsfoot, Arctic sweet coltsfoot, Arctic butterbur, palmate sweet coltsfoot, arrow-leaved sweet coltsfoot, grape-leaved sweet coltsfoot) (Minnesota Wildflowers 2023). There are three varieties of *Petasites frigidus* and none of them have the kidney shaped leaves of *Petasites japonicus*. Minnesota Wildflowers (2023) states that the leaf shape “is highly variable as per the three recognized varieties; broadly arrowhead shaped (var. *sagittatus*), those round in outline with 5 to 11 deep sinuses with the finger lobes also lobed (var. *palmatus*), and forms midway between these two with broader, shallower lobes (var. X *vitifolius*). The blades can be quite wavy and the edges range from smooth to coarsely and sharply toothed.”
- *P. japonicus* can also look similar to *Petasites hybridus* (butterfly dock, common butterbur) which is also being assessed by the Noxious Weed Advisory Committee. *Petasites hybridus* has pink to purple flowers (versus yellow-ish white for *P. japonicus*) and smaller leaves (1-2 feet across) (Clackamas Soil and Water Conservation District 2023).
- There are two subspecies of *Petasites japonicus*. *Petasites japonicus* subsp. *giganteus (*F. Schmidt ex Trautv.) Kitam. is native to Korea and Japan (Kew 2023a). *Petasites japonicus* subsp. *japonicus* has a wider range being native to China, southeast Russia, Korea, and Japan (Kew 2023b). This review covers *Petasites japonicus* and all subspecies, varieties, etc.

Current distribution

Photo caption: National level map from USDA Plants (2023) showing *P. japonicus* in Washington state, and the provinces of British Columbia and Ontario. Accessed 27 January 2023.

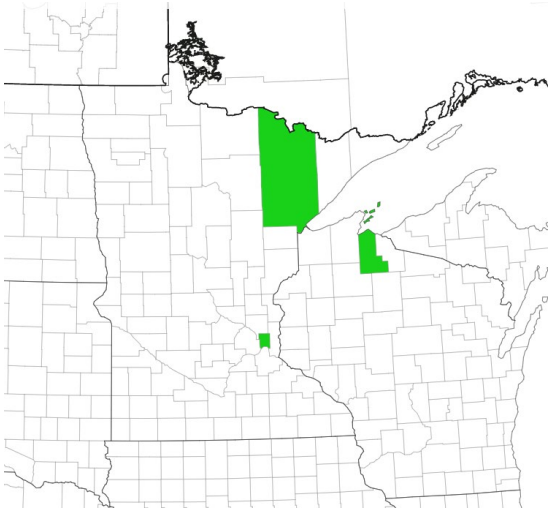

Photo caption: State level map from EDDMapS (2023). Accessed 27 January 2023.
In Minnesota, there is one report of *P. japonicus* in Ramsey County and two reports in St. Louis County. There is one report from Ashland County in Wisconsin.

Current regulation

P. japonicus is not regulated in Minnesota. No information was found indicating that it is regulated in the United States. The Wisconsin Department of Natural Resources has completed a literature review of *P. japonicus* and will finalize it and present its recommendations to the Wisconsin Invasive Species Council for an update to their NR40 regulations. *P. japonicus* could be recommended to be regulated a Prohibited Invasive Species in Wisconsin, but it is not officially regulated in Wisconsin at this time (J. Granberg personal communication 2023).

Risk assessment

Box 1:

Is the plant species or genotype non-native?

Answer: Yes
Outcome: Go to Box 3.
P. japonicus is native to Korea, China, and Japan (Missouri Botanical Garden 2023). There are two subspecies of *Petasites japonicus*. *Petasites japonicus* subsp. *giganteus (*F.Schmidt ex Trautv.) Kitam. is native to Korea and Japan (Kew 2023a). *Petasites japonicus* subsp. *japonicus* has a wider range being native to China, southeast Russia, Korea, and Japan (Kew 2023b). Deguchi and Koyoma (2020) use slightly different nomenclature relating to the authority (*Petasites japonicus*. subsp. *giganteus* (G.Nicholson) Kitam.).

Hind and Kay (2006) give this history: “Suggestions from the literature, and available nursery catalogues, indicate that *Petasites japonicus* has been a regularly used vegetable in Japan for many centuries; the type subspecies is often cultivated throughout the country for its petioles and inflorescences. The much larger subspecies is more of a novelty, and has the same uses as a vegetable, although it is often used as a parasol or umbrella. The giant subspecies appears to have been brought into cultivation outside Japan in the late 1890s. Its introduction into Europe may well have been via the Yokohama Nursery through Croux et fils of Aulnay (Seine).” They also note that the subspecies *gigantus* was first recorded at the Royal Botanic Gardens, Kew, in 1899 and the first herbarium material there was documented 1900. They note that it is “now relatively widely cultivated,

primarily as an architectural plant, in both Europe and the USA. In Europe apparently only the male plant has become naturalized."

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.
Missouri Botanical Garden (2023) notes that it "spreads aggressively by rhizomes if not grown in containers or otherwise restrained by barriers."

The City of Portland (2015) posted an article on *P. japonicus* warning that it is spreading in sensitive natural areas and is hard to remove. They note that "more established populations are difficult to control and common herbicide treatments don't seem to be effective." The City of Portland (2016) lists it as a "watch" species.

The Clackamas Soil and Water Conservation District (2023) in Oregon includes *P. japonicus* in their "Weed Wise" webpages and notes that it "is often planted as an ornamental, but if the plant roots are not contained, its underground stems allow it to spread rapidly, especially in moist streamside areas. The large leaves can shade out other plants, leaving bare ground, which can lead to erosion problems."

The Washington State Noxious Weed Control Board (2023) lists *P. japonicus* as being on its "monitor list".

There are patches in Wisconsin that are being mapped and/or managed. At the 2022 Upper Midwest Invasive Species Conference Shackleford et al. (2022) present on the "Recent Discovery and Treatments of Invasive Butterfly Docks (*Petasites hybridus* and *P. japonicus*) in Wisconsin." They noted that *Petasites japonicus* has been found in Mellen, Wisconsin and Milwaukee, Wisconsin. The Wisconsin Department of Natural Resources has completed a literature review of *Petasites japonicus* and will finalize it and present its recommendations to the Wisconsin Invasive Species Council for an update to their NR40 regulations. *P. japonicus* could be recommended to be regulated a Prohibited Invasive Species in Wisconsin, but it is not officially regulated in Wisconsin at this time (J. Granberg personal communication 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

P. japonicus populations have been documented in St. Louis and Ramsey counties in Minnesota (EDDMapS 2023). Missouri Botanical Garden (2023) lists its plant hardiness zones as zones 5-9. The known locations in Minnesota are in zone 4 so the plant may be more hardy than thought. Other websites (such as Ferri Seeds 2023 and Tripplebrook Farm 2023) list the hardiness zones as 4-9.

The crowdsourcing site, iNaturalist (2023) has 10 reports of *P. japonicus* as of June 5, 2023. iNaturalist reports include planted specimens, while reports in EDDMapS are generally limited to plants that were not purposefully planted. None of the 10 iNaturalist reports were considered "research grade" as of June 5, 2023. They either were lacking additional people agreeing with the identification or were marked as cultivated/planted. Emilie Justen of the Minnesota Department of Agriculture followed up with iNaturalist report 154821929, which is in Hennepin county and was initially not marked as cultivated (personal communication 2023). In visiting the site, she met with the landowners and found out that the original plant had grown to 100-200 square feet in three years. The owners had also dug up and moved the plants to new areas on their property.

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.

Hind and Kay (2006) in the United Kingdom, note that "a search of nursery catalogues and web sites suggests that only one cultivar is readily available and it is usually cited as '*Petasites giganteus* 'Nishiki-buki'', a cultivar with patchy variegated leaves, which often revert. The subspecies and cultivars are both available from a number of specialist nurseries." The Chicago Botanic Garden (2023) references variegated Japanese butterbur *Petasites japonicus* 'Variegatus'. There is no indication that the cultivars differ in reproductive properties.

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

Answer: Yes.
Outcome: Go to Question 7C.
Hind and Kay (2006) note: "Propagation by dividing the rhizome is by far the easiest method; sections of rhizome can be transplanted or potted up into a rich compost and kept moist."

Tsuyuzaki (1989) studied revegetation of Japanese mountains after volcanic deposits. He found that *Polygonum sachalinense* (giant knotweed) and *Petasites japonicus* var. *giganteus* were large contributors to vegetative cover. He noted that "The excavation of those perennial plants demonstrated that they were derived not only from the seeds but also vegetatively from the old stumps buried in the former topsoil by extending their rhizomes up to the present ground surface."

The City of Portland (2015) found that it "spreads mostly through underground stems, and sometimes through seeds. It seems to be spreading in Portland through yard waste dumping, plant trading and when the underground stems break apart and float down streams. Gardeners sometimes plant Japanese butterbur in containers to check its spread, but this plant is an escape artist! It's been known to spread in spite of containment."

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.
Hind and Kay (2006) note that the subspecies *gigantus* is "now relatively widely cultivated, primarily as an architectural plant, in both Europe and the USA. In Europe apparently only the male plant has become naturalized." Since the plants that have become naturalized in Europe are only male plants, it implies that the asexual propagules are effectively spreading.

The City of Portland (2015) found that it "spreads mostly through underground stems, and sometimes through seeds. It seems to be spreading in Portland through yard waste dumping, plant trading and when the underground stems break apart and float down streams. Gardeners sometimes plant Japanese butterbur in containers to check its spread, but this plant is an escape artist! It's been known to spread in spite of containment."

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: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
The author was not able to find information on the number of seeds per plant.

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.***
The author was not able to find information on the seed/seedling vigor or length of time seeds remain viable in the seed bank.

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.***

Hind and Kay (2006) describe the subspecies giganteus as dioecious (male and female reproductive parts are on separate plants) or subdioecious (most, but not all of the plants are dioecious). For sexual reproduction in dioecious plants, both male and female plants are needed.

Sakai et al. (2008) studied the "function of morphologically hermaphroditic, but functionally sterile, florets in female inflorescences of *Petasites japonicus* (Sieb. & Zucc.) Maxim." They concluded "that the hermaphrodite florets in female inflorescences enhance female reproductive success through prolonged duration of pollinator stay." They state: "Individual inflorescences containing many flower-head clusters attract pollinators to both male and female inflorescences. Each male flower head consists of morphologically hermaphroditic, but functionally male, florets. These florets have stigmas, but do not develop to achenes. Each female flower head consists of many female florets and a few morphologically hermaphroditic, but functionally sterile, florets. The hermaphrodite florets in these heads have stigmas and anthers, and are similar in appearance to the hermaphrodite florets in the male flower heads. However, the hermaphrodite florets in female heads do not develop to achenes and do not produce pollen (anthers are empty)."

David Schimpf (personal communication 2023) was asked if he knew if both male and female plants were found in Minnesota. He shared this feedback: "My inspection of *P. japonicus* in Duluth, the only one I've seen, found that it was strictly male. No seeds were seen later in the season. Vegetative spread has been very vigorous. The *P. hybridus* material that Jeffrey Flory collected in Duluth was also male-only. I did not get close enough to it later in the season to judge seed formation. It's on the other side of the stream, my view of it obscured by vegetation."

Michael Goodnature (personal communication 2023) shared his experience managing *P. japonicus* in Ramsey county, Minnesota. He "found *Petasites japonicus* in Battle Creek Park on the upper bank of battle creek a few seasons back. We did not dig any of it up, but all plants leaves were treated with rodeo at the time. Last season I checked the spot, and I did not see any return growth. At the time of discovery, it was just the plant and there was no visible seed."

Steve Garske (personal communication 2023a) examined a photo of a *P. japonicus* inflorescence from Mellen, Wisconsin. Those flowerheads seem to indicate a female plant, but it is not confirmed. Steve Garske (personal communication 2023b) visited the *P. japonicus* patch just outside Copper Falls State Park in Mellen, Wisconsin on June 15. He noted that the old flower stalks had withered and collapsed. He pulled apart several of the old dry flowerheads and it looked like none of the seeds developed. He said it looks to be a functionally female clone.

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.*** The City of Portland (2015) found that it "spreads mostly through underground stems, and sometimes through seeds. It seems to be spreading in Portland through yard waste dumping, plant trading and when the underground stems break apart and float down streams. Gardeners sometimes plant Japanese butterbur in containers to check its spread, but this plant is an escape artist! It's been known to spread in spite of containment."

Tsuyuzaki (1989) studied revegetation of Japanese mountains after volcanic deposits and found that spread by seeds was one way that *P. japonicus* plants colonized an area.

Steve Garske (personal communication 2023a), in Wisconsin, has not seen small satellite patches of young plants that appear to have started from seed, indicating that most spread they are seeing is likely from vegetative parts.

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. japonicus* hybridizing with Minnesota native plant *Petasites frigidus*. There is a record of *Petasites* × *sachalinensis* Toman, which is a hybrid between *Petasites japonicus* subsp. *giganteus* and *P. tatewakianus* Kitam. (Hind and Kay 2006).

Question 7I: Are there 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.
The Missouri Botanical Garden (2023) says that *P. japonicus* has no serious insect or disease problems and that slugs may feed on plants.

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.
No evidence was found for it being toxic. The subspecies *giganteus* is grown as a vegetable in eastern Asia (Deguchi and Koyama 2020). Many articles that reference *P. japonicus* are studying its medicinal value. Han et al. (2021) state that *Petasites japonicus* "has been cultivated for hundreds of years in Eastern Asia and is used for dietary and medicinal purposes. Previous reports have shown that owing to its biological activities, *Petasites japonicus* exhibits wide-ranging beneficial therapeutic effects including anticancer, antiallergy, anti-inflammatory, and antioxidative activities".

Hind and Kay (2006) note: "In China the rhizomes of subsp. *japonicus* are used medicinally for detoxification, but in Japan the only other part of the plant that is regularly used is the petiole. Typically, petioles are boiled in water for a short time (blanched) and then cooled rapidly in cold water; this softens the petiole and allows the epidermis to be removed, after which the petioles can be cooked properly. It can be eaten as a green vegetable by cooking in salted water, and even preserved in salt."

Kisielius et al. (2020) found that the related species *Petasites hybridus* can exude toxic pyrrolizidine alkaloids into water and that there could be human health impacts if people drank untreated water from water sources

surrounded by *Petasites hybridus*. No data was found on this occurring or if *Petasites japonicus* exudes the same toxic pyrrolizidine alkaloids or same quantities as *Petasites hybridus*, nor were there any examples of water sources becoming unusable due to *Petasites japonicus*.

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.
No information was found indicating that there is an impact to crops.

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

Answer: Yes.
Outcome: Go to Box 9.
Deguchi and Koyama (2020) found that *Petasites japonicus* subsp. *giganteus* has "a high capacity for acclimation to different light environments" when studied in forests in Japan.

Hind and Kay (2006) are based in the United Kingdom and state: "*Petasites japonicus* subsp. *giganteus* will happily grow in boggy areas or in ordinary garden soil that does not dry out during the summer months; it can form a large patch in a few years – given plenty of room. It is an excellent plant in low areas, alongside woodland margins or in moist areas. It flowers well before the leaves, like other butterburs and the winter heliotrope, and the inflorescence loved by early feeding insects. It can grow in full sun or partial shade; in too much shade plants become a little weaker. It is rhizomatous and can spread rapidly if the soil conditions allow; pulling the leaves in summer will promote a more rapid spread since each piece of the rhizome can give rise to a new plant. It is fully lhardy (Zones 4 – 9)." They also note that in its native range it is found in cool-temperature grasslands, seaside scree vegetation, and in pioneer forests on volcanic slopes. Tsuyuzaki (1993) documented that *P. japonicus* can become abundant on Japanese mountains where the trees have been cleared for ski slopes. Tsuyuzaki (1989) found that *Petasites japonicus* var. *giganteus* was key in revegetating after volcanic deposits.

Hind and Kay (2006) also share "that *Petasites japonicus* subsp. *giganteus* often forms dominant or subdominant stands in woodlands and other vegetation types where it is often considered a pioneering species. In such situations vegetation cover beneath the plant is poor or absent. Whilst the vegetation might be affected by the dense shade of mature leaves, the absence of a springtime vegetation, when the leaves are absent, prompted investigations by some researchers (Goto et al. 2001) into the possibility that the petasites might be allelopathic. Goto et al. (2001) studied the rhizomes of the petasites and found that extracts had significant inhibitory effects on lettuce seedling growth – a common subject for quantifying allelopathic responses."

The Clackamas Soil and Water Conservation District (2023) in Oregon includes *P. japonicus* in their "Weed Wise" webpages and notes that it "is often planted as an ornamental, but if the plant roots are not contained, its underground stems allow it to spread rapidly, especially in moist streamside areas. The large leaves can shade out other plants, leaving bare ground, which can lead to erosion problems."

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

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

No information was found about *P. japonicus* hybridizing with Minnesota native plant *Petasites frigidus*. There is a record of *Petasites* × *sachalinensis* Toman, which is a hybrid between *Petasites japonicus* subsp. *giganteus* and *P. tatewakianus* Kitam. (Hind and Kay 2006).

Question 8E: Does the plant have the potential to change native ecosystems (adds a vegetative layer, affects ground or surface water levels, etc.)?

Answer: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
The Clackamas Soil and Water Conservation District (2023) in Oregon includes *P. japonicus* in their "Weed Wise" webpages and notes that it "is often planted as an ornamental, but if the plant roots are not contained, its underground stems allow it to spread rapidly, especially in moist streamside areas. The large leaves can shade out other plants, leaving bare ground, which can lead to erosion problems."

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 indicating that this is an issue.

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.
The plant has likely been used and planted in Minnesota as populations in Minnesota and other states likely came from ornamental plantings. It is unknown how widely used it is in Minnesota. Did not find evidence it is being produced in Minnesota. As with many things, it is possible to order plants and seeds from online sellers. *P. japonicus* is native to Korea, China, and Japan (Missouri Botanical Garden 2023).

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 *P. japonicus*, 28 respondents said they did not sell it and 2 said they did sell it. The two that said yes were asked "If it is determined that this species should be regulated as a noxious weed and not allowed to be sold in Minnesota, it would create a financial hardship for my/our business." They both answered "no" it would not create hardship.

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 sweet coltsfoot (*Petasites japonicus*) to nursery growers and the Minnesota economy for inclusion in the risk assessment for this species (James Calkins, Minnesota Nursery and Landscape Association; personal communication, August 5, 2023). Although sweet coltsfoot 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.

The plant is an introduced species and there are no management plans to easily prevent or control it. The City of Portland (2015) notes that it "Gardeners sometimes plant Japanese butterbur in containers to check its spread, but this plant is an escape artist! It's been known to spread in spite of containment."

Question 9C: Is the plant native to Minnesota?

Answer: No.

Outcome: Go to Question 9D.

P. japonicus is native to Korea, China, and Japan (Missouri Botanical Garden 2023).

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. japonicus*. 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.

In the 2023 Minnesota Department of Agriculture survey of nursery certificate holders and Minnesota Nursery Landscape Association members, there were alternative species suggested, including the following species: *Anemone canadensis* (Canada anemone), *Calla paulstrus* (wild calla), *Caltha palustris* (marsh marigold), *Rosa arkansana* (prairie wild rose), and *Packera aurea* (golden ragwort). One survey respondent noted that the variegated cultivar of *P. japonicus* is unique in that it is a large leaf variegated plant for damp shade that deer and rabbits don't eat. A second respondent noted that the *P. japonicus* foliage is unique for Minnesota's climate.

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.

The plant is established in the sense that there are documented sites where it is surviving and spreading over time. However, there are only two small populations known to be spreading in natural areas. There are likely additional ornamental plantings in the state.

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.

P. japonicus is edible and has not been documented to pose serious human health threats. See the answer to Question 8A for more details.

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

The answer for this question was given as a “no” because there is not documented “significant” ecological or economic harm.

Distribution: *P. japonicus* has limited known distribution in Minnesota making it a potential early detection and response species. However, there are also likely many unmapped plants found in people's yards and other planted landscapes.

Reproductive biology: Reproduces both by seed and by rhizomes.

Potential for spread and re-invasion: Since it is an ornamental plant, if could be planted purposefully in new areas. It is not currently known to be widespread so risk of reinvasion after a site is managed is low.

Known management tools: The City of Portland (2015) states: "Hand-pulling is an effective way to remove small areas of Japanese butterbur from your yard, though you'll have to continue pulling sprouts for at least a few years. Mowing will not remove the plant but can keep it from spreading. More established populations are difficult to control and common herbicide treatments don't seem to be effective."

The Wisconsin DNR (2023) recommendations for managing *Petasites hybridus* would like also been effective for *P. japonicus*: "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. japonicus* is growing by water, an aquatically-labeled herbicide would need to be used.

Matthew Wallrath (personal communication 2023), of the Upper Sugar River Watershed Association in Mr. Horeb, Wisconsin gave this reply when asked about hand pulling: "it is like dandelion as far as top vs tap root. Hard to pull."

Michael Goodnature (personal communication 2023) shared his experience managing *P. japonicus* in Ramsey County, Minnesota. He "found *Petasites japonicus* in Battle Creek Park on the upper bank of battle creek a few seasons back. We did not dig any of it up, but all plants leaves were treated with rodeo at the time. Last season I checked the spot, and I did not see any return growth. At the time of discovery, it was just the plant and there was no visible seed."

Available resources: Since current known population sizes are small, it would take a small amount of resources to address current known sites.

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: No.
Outcome: Go to Question 10H.
The answer for this question was given as a "no" because there is not documented "significant" ecological or economic harm. See answers to Question 10F for more details.

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

Purposeful introduction through ornamental planting is the main introduction pathway. Prohibiting in trade would reduce the chance of future introduction and spread.

In the 2023 Minnesota Department of Agriculture survey of nursery certificate holders and Minnesota Nursery Landscape Association members, 18 of the 30 respondents said that there should be a three-year phase out period if *P. japonicus* is regulated. In the same survey, only 2 of the 30 respondents were selling *P. japonicus* and the two both noted that that regulation would not cause financial hardship.

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.***

No Special Regulation measures were identified that could be put in place which could mitigate the impact of this species within Minnesota.

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: Restricted Noxious Weed

Comments: *P. japonicus* populations are small at this point. Information from Wisconsin indicates they can spread and become bigger issues. Even without mandating control, the state could still promote managing *P. japonicus* populations. Since ornamental introduction is the main pathway, listing as Restricted could prevent new introductions. Committee agreed that it would make sense to regulate *P. japonicus* and *P. hybridus* the same way since they are so similar.

NWAC Full Committee

Outcome: List as a restricted noxious weed

Comments: The vote was 15 to 2 in favor of the recommendation.

MDA Commissioner

Outcome: List as a restricted noxious weed

Comments: No comments

Risk Assessment Current Summary (08-04-2023)

- *P. japonicus* is an ornamental plant with large leaves. It can form dense cover that can shade out plants beneath and potentially increase erosion.
- There are only a few documented sites in Minnesota with *P. japonicus* spreading into forests.
- There is limited information on the impacts of *P. japonicus*.
- Due to the limited information on *P. japonicus* impacts, it is likely not a high enough priority to add to the Prohibited Eradicate or Prohibited Control lists.
- The main introduction pathway for *P. japonicus* is through ornamental plantings. Listing *P. japonicus* as a Restricted Noxious Weed would reduce additional introductions to the state.
- The closely related species, *Petasites hybridus* is also being assessed by the Noxious Weed Advisory Committee in 2023. Since the two species are so similar in appearance and impacts, it makes sense to regulate them both in the same category or to not regulate either species.

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