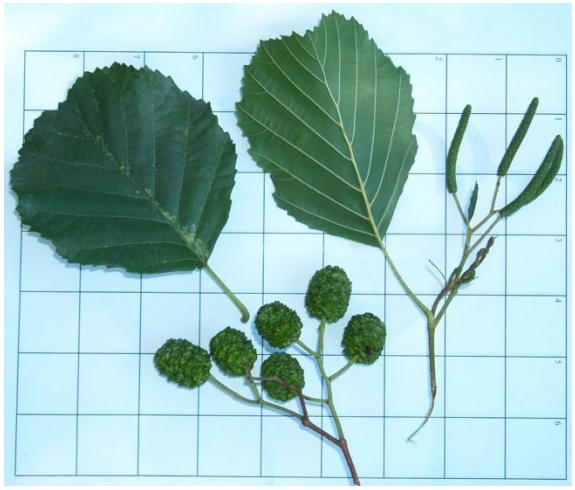
MN NWAC Risk Assessment Worksheet (04-2017)	Common Name	*Latin Name* (Full USDA Nomenclature)
	European alder, black alder, or common alder	*Alnus glutinosa* (L.) Gaertn.
Original Reviewer:	**Affiliation/Organization:**	**Original Review:**
David Hanson David Hanson	Minnesota Department of Transportation Minnesota Department of Transportation	08/22/2018 08/20/2019

Species Description:

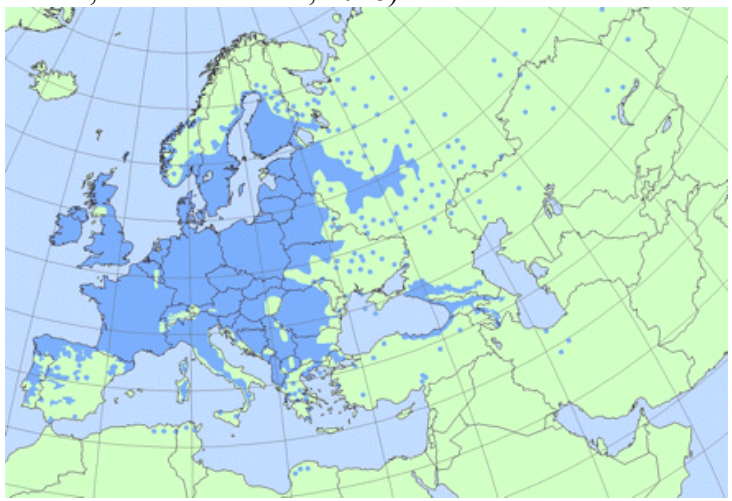
- Planted as a landscape tree or for site restorations. Indications from neighboring states and Hennepin County, MN suggest invasive potential into natural areas.
- Member of the family Betulaceae (birches). Considered a pioneer species which indicates potential to colonize disturbed sites.
- Form is typically narrow, upright, pyramidal. Potential for trees to reach 80 feet tall in native range, less in North America.
- Foliage is alternate and simple. Leaf margin is described as doubly toothed and the tip of leaf blade is rounded or notched (indented) while the base is wedge shaped. Overall leaf shape is oval to orbicular with typical measurements of 2-4 inches long by 2-3 inches wide. Dark green above, lighter below. Individual leaves have 5-6 veins either side of mid-vein.
- Flowers, while not colorful, do provide seasonal interest. Male flowers are a slender 1-1½ long catkin present through winter months. Female flowers are small, clustered near branch tips that develop into ¾ inch long woody cones. Female cones persist through winter shedding many winged nutlets
- Twigs are green when young and developing a brownish color with stalked, purplish-brown, 3-angled buds.
- Bark is initially smooth with prominent lenticels breaking into small blocks with maturity.

(Seiler et al. 2018). Maps and additional identification images in Appendix.

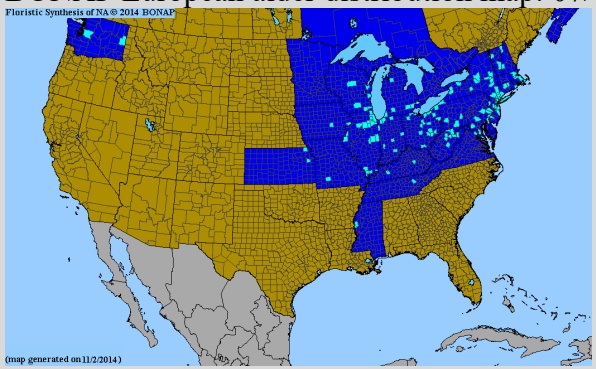




Images: typical pyramidal form, foliage with female and male catkins (summer), winter interest male catkin and female ‘cones’, bark.

Current Regulation: European alder is not currently regulated by the Minnesota Department of Agriculture.

Box	Question	Answer	Outcome
1	Is the plant species or genotype non-native?	Yes, origins in Europe, southwestern Asia, and northern Africa. (USDA, NRCS, Plants Database, 2018).  (EuForGen)	Go to box: 3
2	Does the plant species pose significant human or livestock concerns or has the potential to significantly harm agricultural production?		
	A. Does the plant have toxic qualities that pose a significant risk to livestock, wildlife, or people?	***No indication of concerns for humans, livestock or agriculture production. Research may be lacking.***	**This text is provided as additional information not directed through the decision tree process for this particular risk assessment.**
	B. Does the plant cause significant financial losses associated with decreased		

Box	Question	Answer	Outcome
	yields, reduced quality, or increased production costs?		
3	Is the plant species, or a related species, documented as being a problem elsewhere?	Yes, • Reported to be invasive in several states including IL, IN, MI, NY, PA and WI. (Lee, 2011). • Widespread in the Great Lakes by 1913, now being present in 18 states of USA: CT, DC, DE, IA, IL, IN, KS, MA, MI, MN, MO, NJ, NY, OH, PA, TN, VT, WI (Cao et. al. 2018). • European alder is on a watch list as a potential invader in Vermont including Green Mountain National Forest. (Vermont Invasives). • Michigan: "B" rating indicating "Local distribution in 1 or more of MI's ecoregions. • City of Ann Arbor Michigan, Parks and Recreation: Invasive Plants List (Swearingen and Bargeron, 2016). • Indiana: received a ranking of "High" (IISC). • Wisconsin: listed as "Restricted" (Lee and Kearns, 2011). • The Morton Arboretum does not recommend European alder due to its "Invasive Traits" (Morton Arboretum).	Go to box: 6
4	Is the plant species' life history & Growth requirements understood?		
5	Gather and evaluate further information:		
6	Does the plant species have the capacity to establish and survive in Minnesota?		

Box	Question	Answer	Outcome
	A. Is the plant, or a close relative, currently established in Minnesota?	Yes Close relatives native to Minnesota: Green alder (*A. viridis*) and speckled alder (*A. rugosa*). BONAP European alder distribution map: 07/02/2018  Navy blue: Species present and exotic in a state. Aqua blue: Species exotic and present in a county. European black alder specimens can be found on the UMN St. Paul Campus, at the Minnesota Landscape Arboretum, City of Minneapolis (Calkins pers comm. 2018, Pinkalla pers comm. 2018, Stevens pers comm. 2018). Minneapolis street tree inventory indicates: 60 of 76 European black alder planted in 2016 are surviving. 81 of 81 European black alder planted in 2017 are still surviving. (Pinkalla pers comm. 2018). Both Gary Johnson, University of Minnesota, and Craig Pinkalla, Minneapolis Park and Recreation Board, reported winter dieback caused by difficult weather patterns during late winter 2017-2018. Craig Pinkalla (pers comm. 2018), Minneapolis Park and Recreation Board, states: “They (reference to black alder) are proving to be more adaptable to a wider variety of soil conditions than anticipated.” See appendix for additional maps.	Go to box: 7

Box	Question	Answer	Outcome
	B. Has the plant become established in areas having a climate and growing conditions similar to those found in Minnesota?	• ***Yes, reports from neighboring states (Burns et al. 1990, Funk 2005, Anderson 2013).*** • ***Hardiness Zone 4, 5, 6 and 7 (Morton Arboretum).*** • ***Minnesota Department of Agriculture nursery Stock Cold Hardiness List dated 11/27/2018 lists Zone 4.*** • ***Specimens are known to be surviving in Minnesota (Calkins, Johnson, Pinkalla, and Stevens pers comm. 2019).***	**This text is provided as additional information not directed through the decision tree process for this particular risk assessment.**
7	Does the plant species have the potential to reproduce and spread in Minnesota?		
	A. Does the plant reproduce by asexual/vegetative means?	Yes, stump sprouts after cutting or death of the original stem. Layering can be a means of reproduction while root sprouting is rare (Burns et al. 1990. Funk 2005).	Go to box: 7C
	B. Are the asexual propagules effectively dispersed to new areas?		
	C. Does the plant produce large amounts of viable, cold-hardy seeds?	Yes, Seed production is documented in neighboring states – Iowa and Wisconsin (Burns et al. 1990, Funk 2005, Lee 2011). Generally heavy seed crops; however, seed production varies from year to year and can be affected by weather such as drought (Burns et al. 1990. Funk 2005).	Go to box: 7F
	D. If this species produces low numbers of viable seeds, does it have a high level of seed/seedling vigor or do the seeds remain viable for an extended period?	***According to Michael Dirr, seeds "have a low survival rate" (Dirr 1990).***	**This text is provided as additional information not directed through the decision tree process for this particular risk assessment.**
	E. Is this species self-fertile?	***No, virtually self-sterile (Burns et al. 1990. Funk 2005).*** ***However, another more recent source states self-compatible (Anderson, 2013).***	**This text is provided as additional information not directed through the decision tree process for this particular risk assessment.**

Box	Question	Answer	Outcome
	F. Are sexual propagules – viable seeds – effectively dispersed to new areas?	Yes, potentially via wind and water. However, the seeds are wingless nuts and a high percentage of dispersal remains within 65-100 feet of the parent tree. Dissemination distance can be greatly increased by crusted snow and/or flowing water (Burns et al. 1990. Funk 2005). See appendix for images of saplings in Minnesota along Minnehaha creek floodplain. Images provided by James Calkins and Dave Hanson. Craig Pinkalla (pers comm. 2018), Minneapolis Park and Recreation Board, passed along the following information; "I have not observed spread in boulevards or maintained turf areas. There is one example where invasive spread has been noted. It is very close to Minnehaha Creek where mowing or inhospitable seed bed were not limiting."	Go to box: 7G
	G. Can the species hybridize with native species (or other introduced species) and produce viable seed and fertile offspring in the absence of human intervention?	Unknown: Research is lacking on natural hybridization with North American species. Close relatives native to Minnesota: Green alder (*Alnus viridis*) and speckled alder (*A. rugosa*). Research has shown that *A. glutinosa* will hybridize with other alders such as *A. incana* in its native range (CABI, Banaev and Bazant 2007). It appears that many hybrids occur naturally. However, authors also refer to breeding programs. Hybrids have been reported for: *A. cordata* X *A. glutinosa*; *A. glutinosa* X *A. incana*; *A. glutinosa* X *A. rubra* and *A. glutinosa* X *A. orientalis* (Burns et al. 1990, Funk 2005, CABI, Banaev and Bazant 2007).	Go to box: 7H
	H. If the species is a woody (trees, shrubs, and woody vines) is the juvenile period less than or equal to 5 years for tree species or 3 years for shrubs and vines?	Yes, species is precocious – potentially flowering at the age of 2 and by the 6^{th} or 7^{th} season trees are producing large quantities of seed (Burns et al. 1990. Funk 2005).	Go to box: 8
	I. Do natural controls exist, species native to Minnesota, that are documented to		

Box	Question	Answer	Outcome
	effectively prevent the spread of the plant in question?		
8	Does the plant species pose significant human or livestock concerns or has the potential to significantly harm agricultural production, native ecosystems, or managed landscapes?		
	A. Does the plant have toxic qualities, or other detrimental qualities, that pose a significant risk to livestock, wildlife, or people?	Health - human or livestock: Unlikely, but there is limited research concerning humans or livestock.	
	B. Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?	Agriculture or landscapes: Potential to harm is likely minimal, again, research is lacking. (Cao et. al. 2018).	
	C. Can the plant aggressively displace native species through competition (including allelopathic effects)?	Yes, "*A. glutinosa* is a moderate to serious invasive species of wet sites in parts of North America, Australia and New Zealand." (CABI). "It forms mono-specific stands that out-compete native species in as little as 10 years, blocking them from water, nutrients, and sunlight." (Anderson, 2013).	Go to box: 8E
	D. Can the plant hybridize with native species resulting in a modified gene pool and potentially negative impacts on native populations?	***Unknown hybridization potential with North American species. See Box 7G.***	**This text is provided as additional information not directed through the decision tree process for this particular risk assessment.**

Box	Question	Answer	Outcome
	E. Does the plant have the potential to change native ecosystems (adds a vegetative layer, affects ground or surface water levels, etc.)?	Yes, forms dense stands thus shading out native species, alters soil chemistry and has the potential to alter water flow on sites where it can form dense thickets. (CABI). Additionally, it appears the mechanism is alteration of soil properties through nitrogen fixation and seasonal (temporary) alteration of pH as a result of accumulated leaf litter also high in nitrogen. (Burns et al. 1990. Funk 2005) Michael Dirr states that European alder has "escaped cultivation in the U.S. and is frequently observed forming pure stands along waterways" (Dirr 1990).	Go to box: 9A
	F. Does the plant have the potential to introduce or harbor another pest or serve as an alternate host?		
9	Does the plant species have clearly defined benefits that outweigh associated negative impacts?		
	A. Is the plant currently being used or produced and/or sold in Minnesota or native to Minnesota?	Plant is not native to Minnesota. Yes, the plant is potentially available for purchase. Full extent as to the frequency that the plant is currently being used, produced or sold in Minnesota is unknown. Minneapolis Park and Recreation Board's Forestry Department sourced the plant for park and boulevard plantings from nurseries in Illinois and New York State. • Currently, Minneapolis has 209 listed in its street tree inventory with 157 of them having been planted in 2016-2017. (Pinkalla pers comm. 2018). • City of Saint Paul has 18 listed in its street tree inventory. (Coyle pers comm. 2018). • City of Rochester's inventory indicates none have been planted	Go to box: 9B

Box	Question	Answer	Outcome
		(Haberman pers comm. 2018). 2017 MN Nursery Industry Survey Results: of 26 respondents to the European alder questions • 0% currently sell the species or a named cultivar of the species. • 15.4% consider this species problematic in native ecosystems or agricultural production systems in Minnesota. • 23.1% indicated this species should be regulated as a noxious weed. • 65.4% suggested there are good alternatives available. (Minnesota Department of Agriculture 2017) Several named cultivars have been selected including 'Aurea', 'Charles Howlett', 'Imperialis', 'Laciniata', and 'Pyramidalis' (Dirr 1990). Cultivars propagated by grafting onto the species (Dirr 1990).	
	B. 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?	Plant is not native to Minnesota. No, once the tree is producing seed it could prove difficult to limit its spread, depending on surrounding habitat. Dirr (1990) states: "If used along waterways will seed in along banks and eventually cover large areas." Individual plants can be controlled via mechanical or chemical means (CABI, Cao et al. 2018).	Go to box: 9C
	C. Is the plant native to Minnesota?	No.	Go to box 9D
	D. Is a non-invasive, alternative plant material commercially available that could serve the same purpose as the plant of concern?	2017 Nursery Industry Survey Results: Of 26 respondents to the European alder questions, 65.4% suggested there are good alternatives available. (Minnesota Department of Agriculture 2017)	Go to box: 10
	E. Does the plant benefit Minnesota to a greater extent than the negative impacts identified at Box #8?	***In North America it has been grown and sold for landscape plantings, erosion control and mine spoils restoration. (Furlow, 1997)*** ***In Europe it has been studied (many research papers) and utilized in forestry (silvicultural purposes).*** ***Nitrogen fixing ability has potential benefits when used as a boulevard***	**This text is provided as additional information not directed through the decision tree process for this particular risk assessment.**

Box	Question	Answer	Outcome
		tree and when planted on low fertility sites; this benefit is not limited to European alder as speckled alder, and other species of alder also fix nitrogen, but speckled alder isn't a suitable alternative as a boulevard or shade tree. ***Of benefit to nesting birds, seed-eating birds, and small mammals (Morton Arboretum).*** ***A potential biomass species (Bogdan et al. 2009).*** ***"There is little or no evidence to support that Alnus glutinosa has significant socio-economic impacts in the Great Lakes.*** ***Current research on the beneficial effects of Alnus glutinosa in the Great Lakes is inadequate to support proper assessment."*** ***(Cao et al. 2018)***	
10	Should the plant species be enforced as a noxious weed to prevent introduction &/or dispersal; designate as prohibited or restricted?		
	A. Is the plant currently established in Minnesota?	Yes, believed to be limited. Mostly intentional plantings within the Twin Cities Metropolitan area. See responses in Box 9A and Box 7F.	Go to box: 10B
	B. Does the plant pose a serious human health threat?	No, although research is lacking on that question (Cao et al. 2018).	Go to box: 10C
	C. Can the plant be reliably eradicated (entire plant) or controlled (top growth only to prevent pollen dispersal and seed production as appropriate) on a statewide basis using existing practices and available resources?	Yes, typical methods include girdling of stems or cut stem treatments including application of herbicide glyphosate. Second treatments may be necessary to control resprouts. (CABI, Cao et al. 2018). Based on response in Box 9A - it is surmised that the use of this plant has been limited; therefore, its escape into Minnesota at this time is likely limited.	List European Black Alder as a Restricted Noxious Weed.

Box	Question	Answer	Outcome
		However, European black alders use in Minneapolis has been near habitat suitable for invasion. Further study of the species expansion (invasion) along Minnehaha Creek in Minneapolis will take place this fall 2019. This investigation will assist future listing decisions and until that investigation is complete it is proposed to place European black alder on the list as a Restricted Noxious Weed to prevent further use.	
11	Should the plant species be allowed in Minnesota via a species-specific management plan; designate as specially regulated?		

2018

Review Entity	Comments	Outcome
NWAC Listing Subcommittee	The path through the risk assessment came to the conclusion of listing as Prohibited: Eradicate species. At this time, it is not widely planted as a landscape tree. However, its current extent in Minnesota is not well understood. Specifically, the City of Minneapolis has planted European black alder in the past and there is evidence of its escape into surrounding areas. 07/11/18	Place the assessment on hold to allow for further species distribution information to be gathered. Much discussion centered on placing a potentially heavy burden on the City of Minneapolis if the plant was listed as Prohibited: Eradicate.
NWAC Full Committee	On 12/19/18, discussed and deferred to 2019 awaiting additional information on distribution in Minnesota.	Additional information is needed.

2019

Review Entity	Comments	Outcome
NWAC Listing Subcommittee	Based on response in Box 9A - it is surmised that the use of this plant has been limited; therefore, its escape into Minnesota at this time is likely limited. Restricted noxious weed is likely an appropriate designation at this time. Recommend that European black alder is re-evaluated in three years to see if information at that time supports moving it to Prohibited Eradicate.	Restricted
NWAC Full Committee	Vote on 12/03/19 was 14:1 for Restricted.	Restricted
MDA Commissioner	Commissioner order signed on 01/15/20 and effective 01/17/20.	Restricted

Risk Assessment Current Summary (*Current Year – 08-20-2019*):

- European black alder is being sold and planted in Minnesota.
- Initial information indicates European black alder has the potential to be invasive in Minnesota.
- As more information is learned about impacts and distribution of European black alder it may appropriate to move it to a Prohibited Noxious Weed category.

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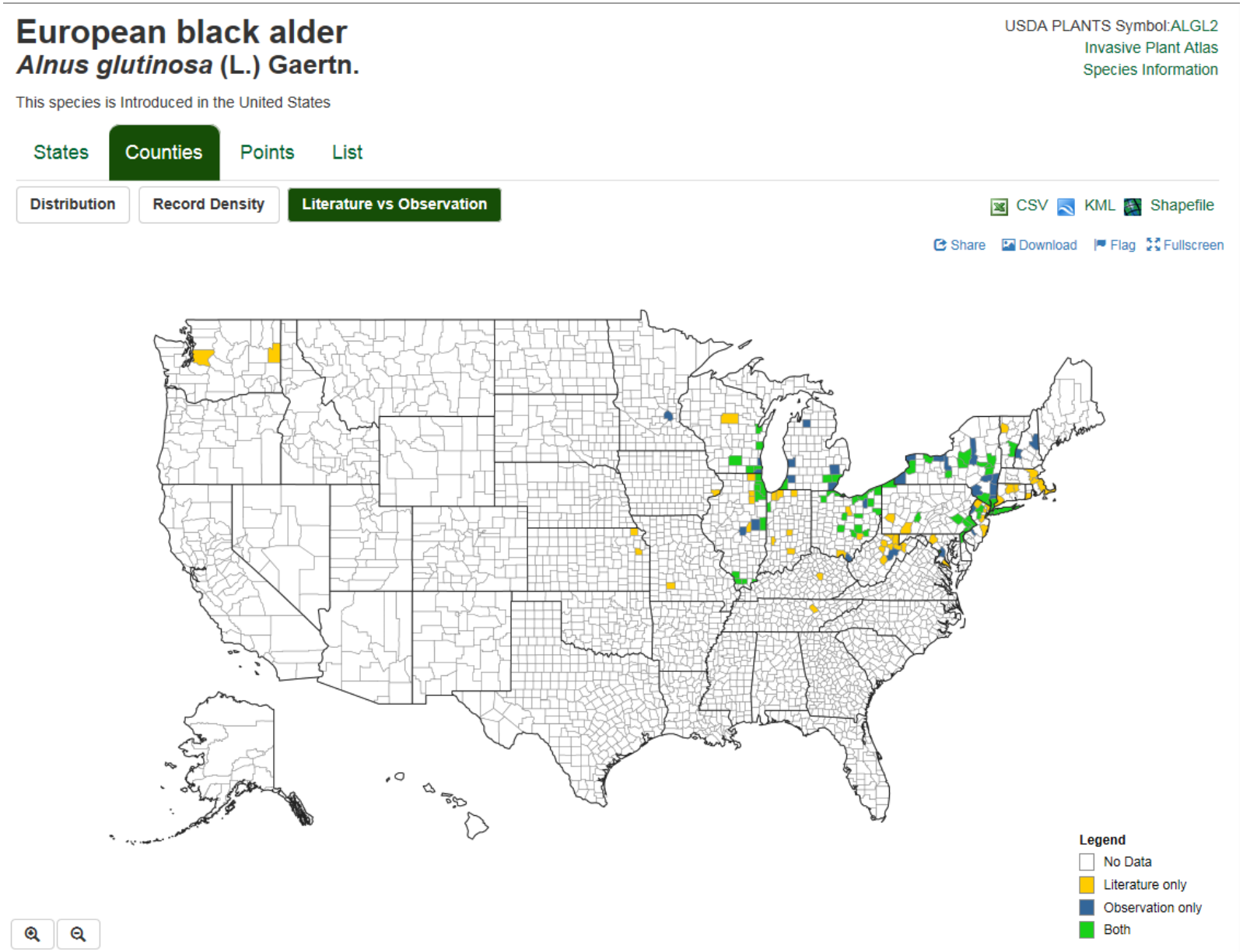
Appendix:
EddMaps reported European alder distribution map: accessed 08/19/2019



EFLORA's European alder distribution map: accessed 8/19/2019

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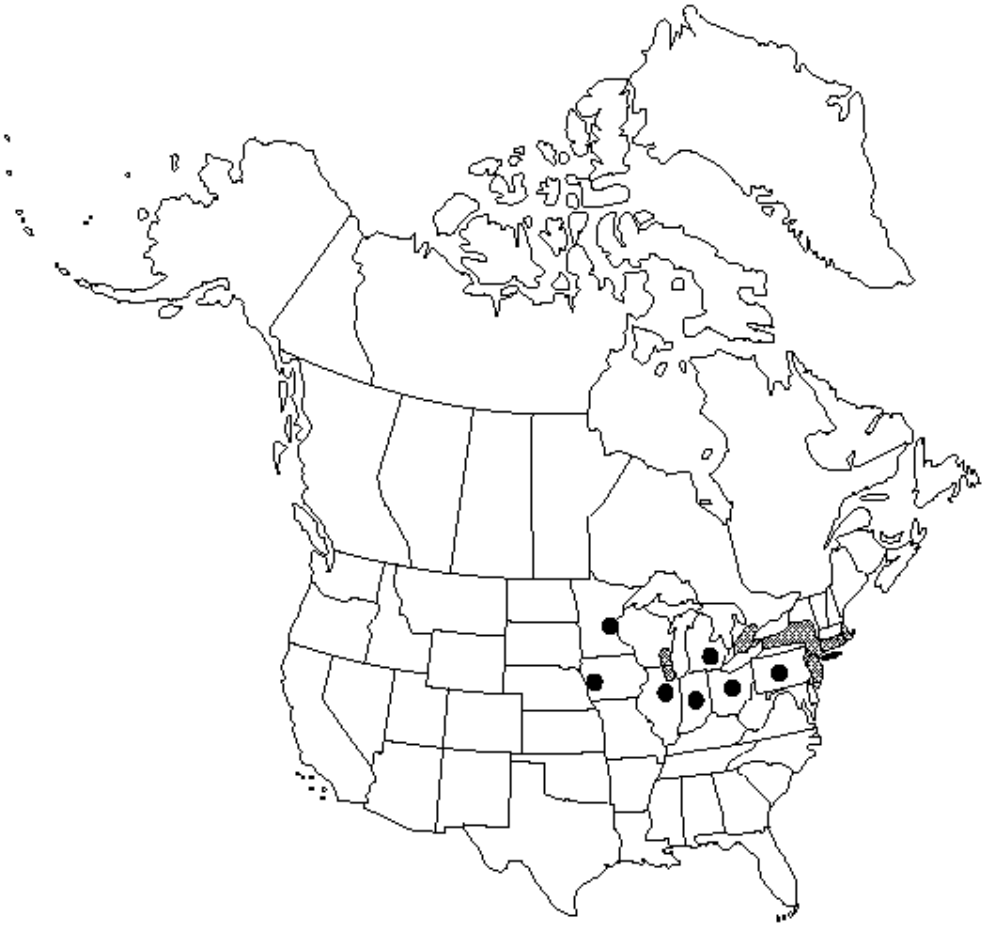
Distribution Map

Taxon: Alnus glutinosa



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Images below courtesy of James Calkins.

25-year old tree.

Sapling image, group of 3.

Sapling image 2.

Sapling image 3.

Sapling image 4.

Images below from the area of Minnehaha Parkway near 34th Avenue South in Minneapolis. Images captured August 17, 2019.

Images: Dave Hanson.

Saplings on Minnehaha Creek bank, image 1 and image 2 below.

Mature leaves and immature female cones.

Immature bark - greenish with lenticels.

Immature female cones or seed structure.

Immature male catkins.