

NAME OF SPECIES: <i>Lonicera X bella</i> Zabel (1)	
Synonyms: <i>Lonicera xbella</i> f. <i>albida</i> (Zabel) Rehder (3)	
Common Name: Bell's honeysuckle, showy bush honeysuckle, white-bell honeysuckle. (1) (5)	
A. CURRENT STATUS AND DISTRIBUTION	
I. In Wisconsin?	1. YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
	2. <u>Abundance</u> : 235 recorded occurrences from across WI (1). The species is vastly under-reported however.
	3. <u>Geographic Range</u> : Reported from 49 counties in WI, though anecdotal evidence suggests it is found in all WI counties. (1)
	4. <u>Habitat Invaded</u> : Bell's honeysuckle and common buckthorn (<i>Rhamnus cathartica</i>) were the dominant shrub species in an oak (<i>Q. x palaeolithicola</i>) -dominated forest in southern Wisconsin. Bell's honeysuckle is present, but not common, in southeastern Wisconsin shrub-carr communities, which are wet-ground plant communities dominated by tall shrubs other than alder (<i>Alnus</i> spp.), with an understory intermediate between meadow and lowland forest. Bell's honeysuckle has been noted in all of the 30 terrestrial plant communities located within the University of Wisconsin Madison Arboretum. A wide range of sites may support Bell's honeysuckle populations in Wisconsin, including roadsides, fencerows, pastures or fields, railroad rights-of-way, lake, river, or stream banks, and wooded areas, particularly within openings or edges of woods (5). Woodlands are most affected, and are particularly vulnerable if the habitat is already disturbed (8). Disturbed Areas <input checked="" type="checkbox"/> Undisturbed Areas <input checked="" type="checkbox"/>
	5. <u>Historical Status and Rate of Spread in Wisconsin</u> : First reported from WI in 1923, now probably found in every county in WI - however due to under-reporting the full extent of its spread is not well known. (1)
	6. <u>Proportion of potential range occupied</u> : In North America the hybrid <i>L. x bella</i> is the most aggressive of all the bush honeysuckles, and possibly due to its hybrid vigor it is able to colonize a wide range of habitats. (8) (7)
II. Invasive in Similar Climate Zones	1. YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
	<u>Where (include trends)</u> : In North America, <i>L. morrowii</i> , <i>L. tatarica</i> , and their hybrid <i>L. x bella</i> occupy a wide range of sites. They are most often found on forest edges and in forest interiors but are also found in lacustrine (lakeside) and riparian habitats and in a variety of waste places such as abandoned agricultural land and road and railroad rights-of-way (4). <i>L.x bella</i> is present locally in the same range as <i>L. morrowii</i> , which is naturalized in a broad band from Minnesota to Arkansas east to Maine and South Carolina; disjunct populations are present in Wyoming and Colorado (7). Bell's honeysuckle is found in habitats similar to those where Tatarian honeysuckle and Morrow's honeysuckle occur in Michigan (5). It occurs in mesic sugar maple- and red maple-dominated forests in Vermont and Massachusetts (5).
III. Invasive in Similar Habitat Types	1. Upland <input checked="" type="checkbox"/> Wetland <input checked="" type="checkbox"/> Dune <input type="checkbox"/> Prairie <input checked="" type="checkbox"/> Aquatic <input type="checkbox"/> Forest <input checked="" type="checkbox"/> Grassland <input checked="" type="checkbox"/> Bog <input checked="" type="checkbox"/> Fen <input checked="" type="checkbox"/> Swamp <input type="checkbox"/> Marsh <input checked="" type="checkbox"/> Lake <input type="checkbox"/> Stream <input type="checkbox"/> Other: <i>L. x bella</i> can occupy dry

	uplands to wetlands in both open and forested ecosystems (7).
IV. Habitat Effected	<p>1. <u>Soil types favored (e.g. sand, silt, clay, or combinations thereof, pH):</u> L. x bella is found on a wide range of soils types; poor to well drained and non-calcareous to limey and it tolerates low nutrient availability (4). In WI study it was found growing over a variety of soils at the University of Wisconsin Madison Arboretum including: a) a droughty, infertile, loamy sand, b) a well- to moderately well drained, moderately fertile, silt loam, c) an imperfectly- to poorly drained silt loam, and d) a muck soil where the water table was at or near the surface in spring (5).</p> <p>2. <u>Conservation significance of threatened habitats:</u> Some of the Savanna and Barrens communities in WI under threat from this species are ranked G1- G2 and S1- S2. Some of the Upland Herbaceous communities in WI under threat from this species are ranked G2 - G3 and S1 - S3. Some of the Wetland Herbaceous communities in WI under threat from this species are ranked S1 - S3. (9).</p>
V. Native Habitat	<p>1. <u>List countries and native habitat types:</u> L x bella has arisen in cultivation and probably spontaneously in the wild as a fertile hybrid here its 2 parent species, L. morrowii and L. tatarica, occur together which is in North America (4) (5). Initial reports of Bell's honeysuckle in North America date to around the late 1800s to early 1900s (5). L. morrowii is native to Japan and found on mesic sites and acidic soils (4) (5). L. tatarica is native in Eurasia, spreading from eastern Europe to western Asia including western and central Russia, and occurs on a wide variety of soil types, including dry, relatively cool semi desert habitats (4) (5). Bell's honeysuckle is found in southern Canada and in the US from Maine west to northeastern Montana, most of the Dakotas, eastern Nebraska and northeastern Kansas, and south to North Carolina, Tennessee, and northern Missouri. There are also occurrences in Colorado, Wyoming and South Carolina. It is most widespread in New England and around the Great Lakes. (5)</p>
VI. Legal Classification	<p>1. <u>Listed by government entities?</u> Connecticut - Potentially invasive, banned; Massachusetts - Prohibited; New Hampshire - Prohibited invasive species; Vermont - Class B noxious weed (2).</p> <p>2. <u>Illegal to sell?</u> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/></p> <p>Notes: Currently illegal to sell in Connecticut, New Hampshire, Vermont; and Massachusetts in 2009 (2). However it is routinely available commercially in other states and on the internet (2). The issue of cultivars was addressed by the Mass. Dept. of Agricultural resources regarding the sales ban of some invasive species. Their findings: There are two significant challenges in determining what cultivars are not invasive: 1. There is currently no set of protocols by which to evaluate the lack of invasiveness of a particular cultivar. 2. The processes by which cultivars are identified and labeled in the marketplace is not managed sufficiently to ensure that plants that are labeled as a particular cultivar are indeed that cultivar. (10)</p>

B. ESTABLISHMENT POTENTIAL AND LIFE HISTORY TRAITS

<p>I. Life History</p>	<p>1. <u>Type of plant</u>: Annual <input type="checkbox"/> Biennial <input type="checkbox"/> Monocarpic Perennial <input type="checkbox"/> Herbaceous Perennial <input type="checkbox"/> Vine <input type="checkbox"/> Shrub <input checked="" type="checkbox"/> Tree <input type="checkbox"/></p> <p>2. <u>Time to Maturity</u>: Reproductive age for L. x bella is between 3 to 8 years of age (5).</p> <p>3. <u>Length of Seed Viability</u>: It appears the potential for bush honeysuckles to form seed banks is low, but more research is needed to confirm this assertion and to determine interspecific differences, because L. morrowii has not been found to form a persistent seed bank, however seeds of L. tatarica have been found to survive for up to 12 years. (5)</p> <p>4. <u>Methods of Reproduction</u>: Asexual <input checked="" type="checkbox"/> Sexual <input checked="" type="checkbox"/> <u>Please note abundance of propagules and other important information</u>: A study from WI on L. x bella determined that each fruit produces 5-7 seeds and a 2m tall shrub can produce 3,554 fruit in one year, so that a typical plant may produce >20,000 seeds annually (5). Research on asexual reproduction for the bush honeysuckles is sparse. One study on L. x bella found that the hybrid can both root sucker and root through layering, and that suckering and layering occurred most frequently on sites where Bell's honeysuckle seedling establishment was poorest (5).</p> <p>5. <u>Hybridization potential</u>: L. x bella can back cross with L. morrowii (7). It can also cross with other species to form other hybrids (5).</p>
<p>II. Climate</p>	<p>1. <u>Climate restrictions</u>: L.. x bella is adapted to USDA zones 4-7. (5)</p> <p>2. <u>Effects of potential climate change</u>: NA</p>
<p>III. Dispersal Potential</p>	<p>1. <u>Pathways - Please check all that apply</u>: <u>Intentional</u>: Ornamental <input checked="" type="checkbox"/> Forage/Erosion control <input checked="" type="checkbox"/> Medicine/Food: <input type="checkbox"/> Other: Bell's honeysuckle has been used for landscape and ornamental purposes in the northern U.S. (5). <u>Unintentional</u>: Bird <input checked="" type="checkbox"/> Animal <input checked="" type="checkbox"/> Vehicles/Human <input type="checkbox"/> Wind <input type="checkbox"/> Water <input type="checkbox"/> Other:</p> <p>2. <u>Distinguishing characteristics that aid in its survival and/or inhibit its control</u>: Bush honeysuckles have the advantage of longer leaf life span which is usually 4 weeks longer than native shrub species. One WI study comparing the carbon gain of L. x bella and Cornus racemosa found the L. x bella made 47% of it's carbon gain during the 4 weeks of the year when it had leaves and C. racemosa did not. (4) (5) The ability of these species to sprout from root crowns gives the plants an advantage during mechanical management (5). The dispersal of seeds by birds is prolific and extremely difficult to control (4) (5).</p>
<p>IV. Ability to go Undetected</p>	<p>1. HIGH <input type="checkbox"/> MEDIUM <input type="checkbox"/> LOW <input checked="" type="checkbox"/></p>

C. DAMAGE POTENTIAL

<p>I. Competitive Ability</p>	<p>1. <u>Presence of Natural Enemies</u>: A non-native aphid, <i>Hyadaphis tataricae</i>, feeds on bush honeysuckles causing lowered plant vigor and may prevent flowering and fruit development. According to the USGS this insect species is still expanding its range so it may be of some control value in the future. (4) (5)</p> <p>2. <u>Competition with native species</u>: Forest regeneration following disturbance can be severely impeded by this species. In a study in New England, the <i>L. tatarica</i>-<i>L. morrowii</i>-<i>L. X bella</i> complex reduced the richness and cover of herb communities and the establishment of new seedlings. Seedlings that predate <i>L. tatarica</i> establishment were more tolerant of its presence. Annual herbs were entirely suppressed (4). Competition, especially for light, is the most commonly described means by which bush honeysuckles effect native plants (5)</p> <p>3. Rate of Spread: HIGH(1-3 yrs) <input type="checkbox"/> MEDIUM (4-6 yrs) <input type="checkbox"/> LOW (7-10 yrs) <input checked="" type="checkbox"/> Notes:</p>
<p>II. Environmental Effects</p>	<p>1. <u>Alteration of ecosystem/community composition?</u> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Notes: In a study of an invasion of bush honeysuckles in 3 sugar maple-dominated stands in Vermont, plus a red maple-dominated forest in northwestern Massachusetts, it was found that tree seedling (<1 m tall) density declined significantly ($p < 0.01$) with increasing honeysuckle cover. Average seedling density at all sites was $>5 \text{ m}^{-2}$ where honeysuckle was not present, but was $<1 \text{ m}^{-2}$ when honeysuckle cover was $>90\%$. Herb species richness and herbaceous cover both declined significantly ($p < 0.05$) with increasing honeysuckle cover. Some evidence indicates that where native shrubs and invasive bush honeysuckles co-occur, bush honeysuckles may be stronger competitors. (5)</p> <p>2. <u>Alteration of ecosystem/community structure?</u> YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/> Notes: In many U.S. forests, previously open understories are now near-impenetrable masses of <i>Lonicera tatarica</i>, or the hybrid cross of <i>L. tartarica</i> and <i>Lonicera morrowi</i>, <i>Lonicera x bella</i> (8). Where native shrubs and invasive bush honeysuckles co-occur, bush honeysuckles may be creating different nesting habitat for birds with effects on nest production (4) (5) (12). In northern Illinois, nests built in Amur honeysuckle had significantly ($p < 0.001$) higher daily nest mortality rate compared with nests built in native species. Reasons offered for increased nest predation in Amur honeysuckle included lower nest height (compared with many native shrubs and trees), absence of sharp thorns (compared with native hawthorns (<i>Crataegus</i> spp.)), and branch architecture that may facilitate predator (e.g. raccoon) movement. Unfortunately, Amur honeysuckle may provide more attractive nest sites due to its early leaf flush and sturdy branches. In fact, American robins significantly ($r^2 = 0.912$, $p < 0.01$) increased their use of Amur honeysuckle over the 6-year study period. (5)</p> <p>3. <u>Alteration of ecosystem/community functions and processes?</u> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Notes: Reduction of light availability for ground flora and</p>

	seedlings. In a studies of the effects of the understory dominance by bush honeysuckles could ultimately alter successional patterns in forests by limiting the richness, density and frequency of native ground flora and tree seedlings (4)(5)(7). There are also suggestions that bush honeysuckle invasion could have ecosystem level effects. Net primary production of dense open-grown Amur honeysuckle thickets (up to 1350 g m ⁻² yr ⁻¹ in northern Kentucky) may have large impacts on carbon and nutrient budgets of invaded sites (5)
	4. <u>Allelopathic properties?</u> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Notes: Some sources indicate that this is suspected in all the bush honeysuckles (11), but all the research to date has been on <i>L. maackii</i> (7) (14).

D. SOCIO-ECONOMIC Effects

I. Positive aspects of the species to the economy/society:	Notes: A popular landscaping plant due to the flower, fruits, smells, and low effort to grow (4). Currently available for sale by nurseries and Conservation Districts around the US. A simple Internet search for any of the bush honeysuckles brings up the websites of a number of nurseries and Conservation Districts in WA and OR that sell these species for ornamental and wildlife uses.
II. Potential socio-economic effects of restricting use:	Notes: Because of the species popularity the horticultural industry has significantly invested in developing and maintaining stocks of this plant. A proven invasive and probably not produced, nor grown by Wisconsin nurseries.
III. Direct and indirect effects :	Notes: Suppression of tree seedlings and alteration of forest regeneration would have effects on the forestry industry (4) (5). Effects on forest understory vegetation and on bird survival could have negative effects on outdoor recreation and bird watching. A study in NY found that some birds with yellow in their coloring that had been fed <i>L. morrowii</i> berries had the yellow colored feathers change to orange. This could have effects on bird social behavior (mate selection) (12).
IV. Increased cost to a sector:	Notes: The costs to the horticultural industry would be that of replacing a popular ornamental with non-invasive alternatives, developing those as nursery stocks and educating the public about them. The forestry industry would bear the costs of honeysuckle inventory, mapping, control and mapping. They would also bear the costs in terms of lowered productivity.
V. Effects on human health:	Notes: Possibly some bush honeysuckle fruits are toxic, but this is not confirmed (13).

E. CONTROL AND PREVENTION

I. Costs of Prevention (including education; please be as specific as possible):	Notes: NA
II. Responsiveness to prevention efforts:	Notes: In northern and rural parts of WI where there is a second home growth occurring, preventing the use of invasive bush honeysuckles in landscape plantings will slow the spread into surrounding forests and natural areas. This would provide land managers an opportunity to control current infestations. In

	southern WI some infestations of bush honeysuckles are well beyond the control phase.
III. Effective Control tactics:	Mechanical <input checked="" type="checkbox"/> Biological <input type="checkbox"/> Chemical <input checked="" type="checkbox"/> Times and uses: The most effective and least damaging method is the cut-stump method where honeysuckle shrubs are cut and the stumps painted with herbicide, usually in fall. This needs to be followed by monitoring and foliar spraying of seedlings. Usually for 3 or more years. Ripping out of plants is effective but labor intensive. Also, the resulting soil disturbance creates more habitat for invasives to return or move in too. Rx fire in prairies and savannas can be used, however there needs to be enough fine fuels in the understory to carry flames. In addition, fire needs to be used repeatedly to be effective in setting back the sprouting from root crowns. Quickly repeating fires may have a negative impact on native species. (4) (5).
IV. Minimum Effort:	Notes: Cutting and stump treating larger individuals along with foliar spraying of seedlings, followed by several follow-up years of surveying for seedlings is the minimum effort required to control an infestation. Depending on the size of the infestation the original treatment could be a very costly and time consuming effort (4) (5). Most control measures require several years for any measure of success (3).
V. Costs of Control:	Notes: Control cost approximately \$500-\$700 /acre in forested sites in Southern WI (15). The Ottawa National Forest in the UP of Michigan spent \$230/acre to treat a dense patch of bush honeysuckle (16).
VI. Cost of prevention or control vs. Cost of allowing invasion to occur:	Notes: NA
VII. Non-Target Effects of Control:	Notes: Depending on the time of year that herbicides are used there can be some non-target injury. Because of the early leaf-on and late leaf-off of the non-native bush honeysuckles this can be somewhat avoided. (4) (5)
VIII. Efficacy of monitoring:	Notes: Because it is easy to identify this plant, monitoring natural areas and removing it as soon as the initial plant shows up is easy. This is the most efficient and least expensive way to control bush honeysuckle spread. (4) (5)
IX. Legal and landowner issues:	Notes: This species is a widely planted and popular ornamental (4). As this species may occur on some private land, some access issues will arise and cooperation with landowners for management will be necessary (8).

F. REFERENCES USED:

- UW Herbarium
- WI DNR
- TNC
- Native Plant Conservation Alliance
- IPANE
- USDA Plants

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3	USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?22644 (17 March 2007)
4	Batcher, Michael S. and Shelly A. Stiles. 2000. Element Stewardship Abstract for <i>Lonicera maackii</i> (Rupr.) Maxim (Amur honeysuckle), <i>Lonicera morrowii</i> A. Gray (Morrow's honeysuckle), <i>Lonicera tatarica</i> L. (Tatarian honeysuckle), <i>Lonicera x bella</i> Zabel (Bell's honeysuckle), The Bush honeysuckles. The Nature Conservancy. http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf
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12	Czarapata, Elizabeth J. 2005. Invasive Plants of the Upper Midwest: An Illustrated Guide to their Identification and Control. The University of Wisconsin Press, Madison, WI.
13	Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants
14	http://www.ext.vt.edu/departments/envirohort/factsheets/shrubs/amurhon.html
15	Steve Richter, Dir of Conservation, Land Management The Nature Conservancy, Wisconsin. March 29, 2007
16	Ian Shackelford, US Forest Service, Ottawa National Forest. 11 April, 2007.
17	Ed Hasselkus, UW Emeritus Horticulture Professor. Comments on Invasive Plant Classification 2007.

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