Michigan Invasive Plant Council

Michigan Plant Invasiveness Assessment System (MPIAS June 2008)

Genus, Species, Species subset

Scientific Name:	Lonicera maackii		
Synonyms:			
Common Names(s):	Amur Honeysuckle		
Plant Type:	☐ **Annual**	☐ **Biennial**	☒ **Perennial**

The information within this MPIAS assessment is specific to the plant listed and does not imply that cultivars, varieties, other species subsets and hybrids exhibit the same behavior or scoring.

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USDA/APHIS – Federal Noxious Weed List	http://www.aphis.usda.gov/ppq/permits/fnwsbycat-e.PDF
Michigan Department of Agriculture – Noxious, Prohibited, and Restricted Plants	http://www.michigan.gov/mda/0,1607,7-125-1569_16993-11250--,00.html

Federal and Michigan Noxious, Prohibited, or Restricted Plants

Is this species listed on the federal or Michigan noxious, prohibited, or restricted plant lists?	☐ **YES**	☒ **NO**
If **YES** then do not proceed with assessment but indicate its federal and/or Michigan Department of Agriculture status on the front of the response form		
If **NO** then go to Section I		

Section I: Biological Character

Biological characteristics: Reproductive Ability and Dispersal. Reproductive characteristics and dispersal ability strongly relate to the potential of a plant to become invasive. The results of this section will be used by MIPC to calculate a rank of Potential Invasiveness in Section VII. *Check those that apply to this plant and note any other weedy or invasive traits this plant possesses in the space for comments below:*

I – A Reproductive Ability

Reproductive ability identifies a plant's invasive tendency in Michigan as high (H), medium (M), low (L), insignificant (I) or none (N) based on seed and vegetative reproductive characteristics.

Plant Type:	☐ **Annual**	☐ **Biennial**	☒ **Perennial**

I – A1. Reproduction by Seed

If the plant is sterile or unable to complete a reproductive cycle in Michigan, skip the following questions and enter an N in the Seed Subrank at the end of this section.

☒	Reproduces readily by seed.
☒	When it produces seed, produces over 1,000 seeds per square meter
☒	Reproduces at least once per year
☐	Can germinate in a wide range of conditions
☐	Seeds remain viable in the soil for 2 years or more.

Seed rating:	1 box marked = I 2 boxes marked = L 3 boxes marked =M 4 - 5 boxes marked = H

Seed Subrank

Enter the Seed Subrank in the appropriate blank at the end of Section I – A.	**Rank**
I – A1. Reproduction by Seed:	**M**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

16. Reproductive Characteristics:High significance

Comments: Lonicera maackii is capable of sexual and asexual reproduction with dual reproductive modes maintained in both forest and open area habitats (Luken and Mattimiro, 1991). The species also produces abundant annual seed crops as reproduction is primarily by seed

although greenwood and hardwood cuttings have been used extensively in commerical propagation (Batcher and Stiles, 2000). It maintains resprouting potential following biomass removal in both forests and open sites and sprouting ability does not appear to decline with age as in other shrub species (Luken, 1988). The plant produces numerous red berries that ripen in autumn and are bird- and in some cases mammal-dispersed. The species has been observed to expand its leaves earlier in the spring and retains its leaves later in the fall than native shrubs and trees (Hutchinson and Vankat, 1997), which has been shown to increase carbon gain in other invasive Lonicera taxa. Although the species has a high potential for long-term persistence in native forests once established as a result of annual stem release from the shrub base (Luken, 1988), root sprouts do not usually occur and new areas must be colinized by seedlings (seed banking capability is poor) (Luken and Goessling, 1995). Mean seedling densities in northern Kentucky were up to 328 per square meter, especially at forest edges (more light) (Luken and Goessling, 1995). Estimates of annual fruit production for Amur honeysuckle and European fly honeysuckle in southwestern Ohio ranged from 0 to 1.2 million berries per plant, and approximately 400 million berries per ha (Ingold and Craycraft, 1983). Seed banking capability is poor for this species and most new stems produced by forest grown shrubs die during the first year of stem life (Luken, 1988). (www.natureserve.org)

In a greenhouse experiment, L. maackii seeds collected in November began to germinate in just 18 days and continued to germinate three months from planting. Light promoted but was not necessary for germination; germination rates at the end of 88 days ranged from 50% in dark to 80% in light (Luken and Goessling 1995). (Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract for Lonicera maackii (Rupr.) Maxim (Amur honeysuckle), Lonicera morrowii A. Gray (Morrow's honeysuckle), Lonicera tatarica L. (Tatarian honeysuckle), Lonicera x bella Zabel (Bell's honeysuckle): the bush honeysuckles. The Nature Conservancy, Arlington, Virginia. unpaginated. http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

Estimates of annual fruit production for Amur honeysuckle and European fly honeysuckle in southwestern Ohio ranged from 0 to 1.2 million berries per plant, and approximately 400 million berries ha-1 [80].

There is some evidence for shrub age and size as determinants of reproductive ability. According to Sharp and Belcher [150], Amur honeysuckle plants begin flowering in the 3rd or 4th year, after which flowers appear on stems 2 years old and older. Deering and Vankat [33] compared reproductive state with shrub age and height within an Amur honeysuckle population in southwestern Ohio. Established shrubs took 3-8 years to reach reproductive age. At age 3 only 5.7% of individuals were reproductive, while >50% were reproductive by age 5. All shrubs ≥8.2 feet (2.5 m) tall were reproductive, while none <3.3 feet (1 m) tall were reproductive.

Site characteristics may also affect seed production. Amur honeysuckle flowering and fruiting were significantly (p=0.001 and p=0.03, respectively) correlated with light availability in southern Vermont [139].

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. According to Luken and Mattimiro [105], seeds of Amur honeysuckle are "not long-lived in the soil." Hidayati and others [74] concluded that neither winter honeysuckle, Amur honeysuckle, or Morrow's honeysuckle have the potential to form persistent seed banks.

Bush honeysuckle germination requirements are variable between species.

Stratification requirements for Amur honeysuckle seed germination are unclear. According to Luken and Goessling [103], seeds are released in a nondormant condition, and germinate easily in warm, moist conditions. According to Hidayati and others [74], Amur honeysuckle seeds require a period of either warm- or cold stratification. Nevertheless, they are dispersed in fall and may germinate in fall or spring [74,103]. According to Hidayati and others [74], if seeds mature early enough and are subjected to a sufficiently long warm stratification period prior to onset of cold winter temperatures, they may germinate in fall. Late-maturing seeds are cold-stratified over winter, and will germinate in early spring when warm temperatures induce embryo growth.

Light seems to enhance Amur honeysuckle seed germination, but it is not obligatory. In a laboratory experiment, Amur honeysuckle germination was significantly ($p<0.01$) higher in light (35 µmol m-2 s-1, 14/10 hour light/dark photoperiod) than in dark (light excluded). Nevertheless, after 88 days, mean cumulative germination ranged from 53.7% to 81.3% in light, and from 31.3% to 55.0% in dark [103]. Hidayati and others [74] found that Amur honeysuckle seeds were not inhibited by burial under 2 inches (5 cm) of leaf litter or 2.8 inches (7 cm) of soil in a greenhouse.

Amur honeysuckle performs best on moist, well-drained sites, but is adaptable to "poor" soils, compacted soils, various soil pHs, restricted root zones, drought and salt spray [17]. According to Vogel [185] the lower pH limit for Amur honeysuckle is 5.0. It escapes to calcareous slopes in north-central Texas [36], and grows in thin prairie soils over dolomite in southern Wisconsin [27]. Amur honeysuckle generally occurs in mesic habitats in Virginia [182]. According to Sharp and Belcher [150] the Amur honeysuckle cultivar 'Rem-Red' is "adapted" to deep, well-drained, fertile, sandy loam to clay loam soils, and is not "adapted" to droughty or wet soils. Lorenz and others [95] indicate that 'Rem-Red' "grows in medium-fertility, acid, clayey, loamy, and sandy soils, and tolerates somewhat poorly drained soil."

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

I – A2. Reproduction by Vegetative Means

If the plant does not reproduce vegetatively in Michigan, skip the following questions and enter an N in the Vegetative Subrank at the end of this section.

☐	Reproduces readily *in situ* by vegetative means
☐	Has spreading rhizomes that may root at nodes.
☐	Fragments easily with fragments readily becoming re-established long distances from the parent plant by natural means (if checked, rating is automatically marked as high)
☐	Other (*please discuss in comments and provide documentation)

Vegetative rating:	1 box marked = I 2 boxes marked = L 3 boxes marked =M 4 boxes marked = H

Vegetative Subrank

Enter the Vegetative Subrank in the appropriate blank at the end of	**Rank**
Section I – A Vegetative:	**N**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

16. Reproductive Characteristics:High significance

Lonicera maackii is capable of sexual and asexual reproduction with dual reproductive modes

maintained in both forest and open area habitats (Luken and Mattimiro, 1991). It maintains resprouting potential following biomass removal in both forests and open sites and sprouting ability does not appear to decline with age as in other shrub species (Luken, 1988). Although the species has a high potential for long-term persistence in native forests once established as a result of annual stem release from the shrub base (Luken, 1988), root sprouts do not usually occur and new areas must be colinized by seedlings (seed banking capability is poor) (Luken and Goessling, 1995). (www.natureserve.org)

Amur honeysuckle will sprout from adventitious buds on the root crown in response to stem damage [105,168]. Repeated cutting throughout the growing season results in continued but diminished sprouting (see Physical/mechanical control) [168]. The sprouting response of Amur honeysuckle to any particular stem damage event does not appear to diminish with stem age [105].

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

I-A3. Growth Habit

Growth Habit	**12-15' height with similar spread. Upright spreading deciduous shrub with leggy branches** **(Dirr, M. 1998. Manual of Woody Landscape Plants)**

I – B. Dispersal:

Dispersal identifies the vectors or agents of dispersal and the likelihood of long distance dispersal.

Dispersal agents	(E) Environmental Influences such as wind and water (W) Wildlife, both mammals and birds (DA) Domestic Animals, both mammals and birds (H).Human activity Dispersal distance refers to the potential for long distance dispersal.

Dispersal distance refers to the potential for long distance dispersal.

I-B1. Vector categories

Identify the vector categories and individual agents involved with the dispersal of this plant. Check all that apply	
☐ Environmental Influences (E):	☐ Wind ☐ Water ☐ Other (name)
☒ Wildlife (W):	☒ Mammals ☒ Birds ☐ Other (name)
☒ Domestic Animals (DA):	☐ Mammals ☒ Birds ☐ Other (name)
☒ Human Activity (H):	☐ New development (construction equipment) ☐ Maintenance equipment ☐ Borrow material (topsoil, gravel, stone) ☐ Recreation (ATV, boats, RV) ☒ Dumping ☒ Other (name) ornamental and conservation plantings
☐ Other (*please discuss in comments and provide documentation)	

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	Reviewed scientific publication	☐	Observational
☒	Other published material	☐	Anecdotal

Comments, supportive evidence, and explanation of documentation level:

"The birds deposit the seeds in old shrub borders, hedges, wasteland and before one knows it, Amur Honeysuckle has taken over." (Dirr, M. 1998. Manual of Woody Landscape Plants. p. 580)

12. Long-distance Dispersal Potential within Nation:High significance

Comments: The main dispersal agents are birds (Luken, 1988; Deering and Vankat, 1999), many of which are migratory and prefer the fruits. The plant produces numerous red berries that ripen in autumn and are bird- and in some cases mammal-dispersed. Hutchinson and Vankat (1998) found that greater native forest cover and connectivity of forests facilitated the spread of Lonicera maackii, whereas the abundance of agricultural land acted as a barrier to dispersal in a high impact natural forest preserve area well studied in Oxford, Ohio. This is because birds, the primary dispersal agent, are less likely to disperse seeds across large areas of agricultural land, especially where woody vegetation that serves as recruitment foci for the bird-dispersed plants is lacking. (www.natureserve.org)

Seeds of bush honeysuckles are dispersed by birds and perhaps by small mammals. L. tatarica and L. maackii fruits, which persist on the plants into the middle of the winter, are often consumed by a variety of birds (Ingold 1983; White 1992). Bird dispersal contributes to germination success

by increasing the likelihood that seed will be dropped in lighted tree fall gaps and other openings rather than in shaded settings (Hoppes 1988).

The bush honeysuckles have been promoted for decades by the US Dept of Agriculture and by commercial nurseries for their wildlife, shelterbelt, and ornamental value. Many state and private nurseries still sell them, although less widely than previously (Luken and Thieret 1996).

(Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract for Lonicera maackii (Rupr.) Maxim (Amur honeysuckle), Lonicera morrowii A. Gray (Morrow's honeysuckle), Lonicera tatarica L. (Tatarian honeysuckle), Lonicera x bella Zabel (Bell's honeysuckle): the bush honeysuckles. The Nature Conservancy, Arlington, Virginia. unpaginated. http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

Several sources indicate bush honeysuckle seeds are dispersed primarily by frugivorous birds [7,80,93,126,186]. Bartuszevige and Gorchov [12] showed that a wide variety of bird species consumed Amur honeysuckle fruit in southwestern Ohio. They also confirmed that American robins dispersed viable Amur honeysuckle seed, usually into woodlot edge and fencerow habitats. White-tailed deer may also consume and disperse viable seeds of Tatarian honeysuckle, Morrow's honeysuckle, Bell's honeysuckle, and Amur honeysuckle [180]. Barnes [7] suggests that "many, if not most" fruits fall near the parent plant.

Amur honeysuckle has been cultivated as an ornamental in North America [106,131,150], and as of 1996, was still commercially available [106].

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

I – B2. Dispersal Distance

☐	Little potential for long-distance dispersal (1 km in a single dispersal event)
☒	Great potential for long-distance dispersal

Please use this scale and your answers from Section I – B above to calculate a: Dispersal Subrank

Dispersal Subrank	I One or two vector categories; Little potential for long-distance dispersal L Three or four vector categories; Little potential for long-distance dispersal M One or two vector categories; Great potential for long-distance dispersal H Three or four vector categories; Great potential for long-distance dispersal

Dispersal Subrank

Section I B. Dispersal Subrank:	**H**

Biological Character Subrank

Biological Character Subrank	**Rank**
Section I A. Reproductive Ability: Reproduction by Seed	**H**
Section I A. Reproductive Ability: Reproduction by Vegetative Means	**N**
Section I B. Dispersal:	**H**

Section II: Impact

Impact: Impact identifies the plant's ecological, aesthetic, economic influence on each of the respective natural, managed, and/or constructed system. Questions on impact are tailored to the individual characteristics and composition of the system. Impact is classified as high (H), medium (M), low (L), or insignificant (I).

II - A. Natural Systems

Impacts on native species and natural systems: Terrestrial and Aquatic. *Where possible, assess the cumulative (e.g., over a period of several decades) impact of the plant on the natural areas and other wildlands where it typically occurs. Impacts will be re-assessed as more is learned and as the plant moves into new areas.*

II - A1. Ability to invade natural systems

Choose one answer that best describes the ability of this plant to invade natural systems.	
☐	Not known to spread into natural systems in the absence of disturbance (e.g. plant may persist from former cultivation) **(0 points)**
☐	Establishes only in areas where major disturbance has occurred in the last 20 years (e.g., post-hurricane sites, highway corridors) **(3 points)**
☐	Often establishes in mid-late-successional natural areas where minor disturbances may occur (e.g. tree falls, hiking trails, streambank erosion), but no major disturbance within the last 20-75 years **(7 points)**
☒	Often establishes in intact or otherwise healthy natural systems with no major disturbance for at least 75 years **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

"In the southern states, the species has escaped and the red fruits will be present into February and March. Shows amazing shade tolerance and exists as an under story plant in some woodlands. Truly a noxious weed." (Dirr 1998)

9. Diversity of Habitats or Ecological Systems Invaded in Nation:High/Moderate significance

Comments: Lonicera maackii establishes in most forest habitats and often becomes abundant along forest edges, where seedling establishment is greater (Luken and Goessling, 1995) and in forests with some canopy disturbance (Hutchinson and Vankat, 1997; Zheng et al., 2004). In Ohio and Kentucky, forest grown populations were significantly older than open area grown populations (Luken and Mattimiro, 1991). Slightly disturbed and/or young secondary forests with less tree canopy cover have proven more invasible than less disturbed forests (Hutchinson and Vankat, 1997). Amur honeysuckle commonly grows on sites with some type of canopy cover (open forests, flood plain forests, periodically disturbed floodplains, riparian habitats and scrub communities). In North America, it is found in both open and wooded habitats (Munger, 2005). (www.natureserve.org)14. Inherent Ability to Invade Conservation Areas and Other Native Species Habitats:High significance

Comments: This species is listed as an "invasive plant of major concern" in Czarapata (2005).

Hutchinson and Vankat (1998) found that greater native forest cover and connectivity of forests facilitated the spread of Lonicera maackii, whereas the abundance of agricultural land acted as a barrier to dispersal in a high impact natural forest preserve area well studied in Oxford, Ohio. This is because birds, the primary dispersal agent, are less likely to disperse seeds across large areas of agricultural land, especially where woody vegetation that serves as recruitment foci for the bird-dispersed plants is lacking. Slightly disturbed and/or young secondary forests with less tree canopy cover have proven more invasible than less disturbed forests (Hutchinson and Vankat, 1997). Light appears to be important in the invasibility of forests as suggested by the inverse relationships of L. maackii cover to canopy cover and shade tolerance index in stands in Ohio (Hutchinson and Vankat, 1997). Late successional forests are more resistant to invasion than younger forests, presumably due to less light reaching the forest floor. Overall the species has a high potential for long-term persistence in native forest areas, as evidenced by over 40 years of rapid growth in Ohio and Kentucky natural forest preserves. The ability to establish seedlings in forest edges and interiors, coupled with continuous activity of adventitious buds on the bases of parent plants (Luken, 1988), provides a potent combination for long-term site occupation despite the poor seed banking capability (Luken and Goessling, 1995). Deering and Vankat (1999) reported that initial populations can result from a single individual shrub (the species is self-compatible) and remain small for the first several years but then begin to experience exponential growth when populations become larger from radial growth producing radical increases in basal shrub area. (www.natureserve.org)

Bush honeysuckle seedling establishment appears most successful where litter cover and herbaceous competition are sparse [126,185]. Luken [100] found that after clipping established Amur honeysuckle plants in forested and pasture habitats, Amur honeysuckle seedlings established in forested plots at approximately twice the rate of those in pastures. In pasture plots, grasses and forbs were relatively undisturbed, and probably continued suppression of Amur honeysuckle seedlings.

However, the relationship between canopy cover and bush honeysuckle seedling establishment and growth is not straightforward. According to a review by Nyboer [126], bush honeysuckles commonly establish under tall shrubs or trees that serve as perch areas for seed-dispersing birds. As discussed above, canopy shading may also suppress strong herbaceous competition and permit greater bush honeysuckle seedling establishment. However, too much shading may result in reduced seedling establishment and growth [98]. Luken and Goessling [103] studied Amur honeysuckle seedling establishment in forest patches dominated by sugar maple, white ash, and American elm in northern Kentucky. Seedling densities were greatest near the edges of forest patches and declined steadily toward their interior. While they were unable to establish a firm causal link between light levels and seedling densities, light levels and seedling densities were significantly positively correlated ($p<0.05$; $r = 0.88$) along transects from forest edge to interior.

According to Luken (personal observation cited in [104]) and Luken and others [98], in its native range, Amur honeysuckle commonly grows on sites with some type of canopy cover (open forests, flood plain forests, periodically disturbed floodplains, riparian habitats and scrub communities). In North America, it is found in both open and wooded habitats [99,131]. In southern Wisconsin, Cochrane [27] described Amur honeysuckle occurrence as mostly in partially shaded fencerows, weedy thickets, and brushy groves, and less frequently in woods [27]. In north-central Texas Amur honeysuckle escapes to "forest margins" [36], in Michigan it is found in "woods (upland and swampy), thickets, banks, fencerows, and often near a landscaped source" [186], and in southwestern Ohio it is mentioned as occurring in pastures and woodlands [18]. Hutchinson and Vankat [79] examined Amur honeysuckle distribution in southwestern Ohio along northerly and westerly transects, emanating from a supposed central population source from which invasive populations have subsequently dispersed. Their results suggest Amur honeysuckle population spread is closely linked to forest cover and forest connectivity across the landscape. They propose that large expanses of agricultural land act as a barrier to dispersal, perhaps due to habitat constraints on frugivorous birds that disperse seeds. Medley [112] found that Amur honeysuckle density was significantly ($p = 0.001$) correlated with proximity to the edge of a 13 acre (5.2 ha) mature deciduous forest stand in southwestern Ohio. However, Amur

honeysuckle stem basal area was also significantly (p<0.05) correlated with proximity to stream channels, with some of the largest individuals located near the center of the stand along streambanks.

Bush honeysuckles are likely to occur across a variety of successional habitats within their North American range [152]. Luken and McKnight [101] suggest that Amur honeysuckle can dominate habitats ranging from recently disturbed areas to mature forest.

Vankat and Snyder [179] examined floristics of a chronosequence of nearby stands corresponding to old-field/deciduous-forest succession in southwestern Ohio. Amur honeysuckle was present, but not common, in a 10-year-old goldenrod (Solidago spp.)- and fescue (Festuca spp.)-dominated old field, and in an approximately 50-year-old goldenrod-dominated old field with a sparse white ash-black cherry tree stratum. Amur honeysuckle was codominant in the understory (3.3 to 9.8 feet (1-3 m) tall) with sugar maple, and codominant in the ground layer (<3.3 feet (1 m)) with jewelweed (Impatiens capensis), in an approximately 90-year-old sugar maple-slippery elm forest. Vankat and Snyder [179] concede that conclusions about successional status of Amur honeysuckle, based on the above data, are limited by the study design. Nevertheless, Amur honeysuckle was common in a young closed-canopy forest stand, sparse in 2 old fields with some woody plant composition but no closed canopy, and absent from a 2-year-old abandoned agricultural field and an old-growth American beech-sugar maple forest.

Once established, the ability of bush honeysuckles to persist and spread within various successional habitats is less clear. Hutchinson and Vankat [78] assert that late successional forests dominated by shade-tolerant tree species such as sugar maple and American beech are more resistant to Amur honeysuckle invasion, probably due to low light levels near the forest floor. Luken [101] suggested forest patches having complete canopy closure can resist Amur honeysuckle invasion, but if canopy gaps are created, Amur honeysuckle can establish and persist.

Research has also provided some insight into why certain habitats may be more or less susceptible to bush honeysuckle invasion and its impacts. Hutchinson and Vankat [78] assert that late-successional forests dominated by shade tolerant tree species such as sugar maple and American beech are more resistant to Amur honeysuckle invasion, probably due to low light levels near the forest floor. They investigated impacts of Amur honeysuckle invasion in the interior of hardwood forest stands in southwestern Ohio. They found that Amur honeysuckle cover was inversely related to tree basal area (r2=0.151, p< 0.0001) and tree canopy cover (r2=0.292, p<0.0001). Amur honeysuckle cover commonly exceeded 50% only in stands with basal area <30 m2/ha, and was rarely <50% when tree canopy cover was <85%.

Evidence from southwestern Ohio indicates that the severity of bush honeysuckle invasion may be related to proximity to established source populations and time since invasion. Hutchinson and Vankat [78] investigated impacts of Amur honeysuckle invasion in hardwood forest stands near Oxford, in southwestern Ohio. Amur honeysuckle cover was positively related to estimated time since invasion (r2=0.172, p<0.0001) and was >50% only in stands invaded ≥12 years. Collier and others [29] compared native vegetation growing under Amur honeysuckle crowns with plants growing outside Amur honeysuckle influence, also in hardwood forest stands near Oxford, Ohio. Species richness for all taxa, as well as species richness and density of tree seedlings, was significantly (p<0.0001) lower in forests where Amur honeysuckle had been present for ≥16 years, compared with forests where Amur honeysuckle was present ≤ 10 years. Hutchinson and Vankat [78] also found that Amur honeysuckle cover was also inversely related to distance from Oxford (r2=0.133, p<0.0006). Stands with >50% cover were mostly ≤3.1 miles (5 km) from Oxford. Amur honeysuckle was planted in Oxford in the 1960s and these populations were considered the primary source for invasion in the study area

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

II - A2. Impact on Ecosystem Processes

Plants that alter processes such as fire occurrence or frequency, erosion, and sedimentation rates, hydrological regimes, or nutrient regimes often have the greatest long-term impacts on ecosystems. Some invaders can completely transform natural systems so that they can no longer support native species.

Choose one answer that best describes the impact of this plant on ecological processes:	
☐	Not known impact on ecosystem processes **(0 points)**
☐	Influences ecosystem processes (e.g., has perceivable but mild influence on soil nutrient availability) **(5 points)**
☒	Significant alteration in ecosystem processes (e.g., increases sedimentation rates along coastlines, reducing open water areas that are important for waterfowl) **(10 points)**
☐	Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the plant reduces water level from open water or wetland systems through rapid transpiration, making these areas more fire prone and unable to support native wetland species; or plant fixes nitrogen in the soil making soil unlikely to support certain native plants) **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

Not a known allelopath. (USDA Plants Database; http://plants.usda.gov)

1. Impact on Ecosystem Processes and System-wide Parameters:Low significance

Comments: Suppression of advance regeneration of native tree seedlings is reported by Woods (1993) in Vermont and Massachusetts for the related species, Lonicera tatarica, which would potentially lead to changes in canopy composition or even failure of canopy tree replacement resulting in conversion of forests to more open canopies and shrublands. (www.natureserve.org)

There are suggestions that bush honeysuckles could alter successional trajectories in ways that favor their persistence. Collier and others [29] hypothesized that Amur honeysuckle invasion may alter patterns of forest succession in southwestern Ohio. If development of a dense Amur honeysuckle shrub layer suppresses establishment of shade-tolerant tree seedlings, recruitment of mid- and late successional tree species may be inhibited. Hypothetically then, as older canopy trees die, closed-canopy forests could change to open-canopy woodlands or even Amur honeysuckle-dominated shrublands. Luken [100] demonstrated that Amur honeysuckle dominance in the shrub layer of northern Kentucky hardwood forests can suppress advance regeneration of overstory species.

Other potential impacts of bush honeysuckle invasion include changes in herbivory pressure on native plants, allelopathy, and altered ecosystem processes. Trisel [168] found herbivory on Amur honeysuckle leaves was substantially less than for many native trees and shrubs in southwestern Ohio. This indicates that, as bush honeysuckles become increasingly dominant within a habitat, native species may encounter a corresponding increase in herbivory, which may contribute to their displacement. Laboratory and greenhouse experiments also indicate Amur honeysuckle may have allelopathic effects on herbs and woody seedlings, but more research is needed to distinguish between resource competition and allelopathy in the field [125,168]. There are also suggestions that bush honeysuckle invasion could have ecosystem level effects. According to Luken and Thieret [97], 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.

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

II - A3. Impact on Natural Community Structure

Choose one answer that best describes this plant's impact on community structure:	
☐	No impact, establishes in an existing layer without influencing its structure **(0 points)**
☐	Influences structure in one layer (e.g., changes the density of a layer) **(3 points)**
☒	Significant impact on at least one layer (e.g., creation of a new layer, elimination of an existing layer) **(7 points)**
☐	Major alteration of structure (e.g., covers canopy, eradicating most or all layers below) **(10 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

Shows amazing shade tolerance and exists as an under story plant in some woodlands. (Dirr 1998)

2. Impact on Ecological Community Structure:High/Moderate significance

Comments: Lonicera maackii has become abundant in forests and exhibits significant canopy disturbance. Canopy disturbance facilitates invasion into deciduous forests in southwestern Ohio and tree regeneration becomes inhibited and tree seedling abundance declines (Hutchinson and Vankat, 1997). Over the past three decades in Ohio and neighboring states, dense thickets have replaced relatively open understories that apparently had no abundant native shrubs indicating L. maackii has been an addition rather than a replacement in these forests, filling an open niche (Collier et al., 2002). The species can form a dense shrub layer (Batcher and Stiles, 2002; Nyboer, 1992; Williams, 2001). Most control measures (many outlined in Munger, 2005) require several years for any measure of success. (www.natureserve.org

II – A4. Impact on Natural Community Composition

Choose one answer that best describes this plant's impact on community composition:	
☐	No impact, causes no known changes in native populations **(0 points)**
☐	Influences community composition (e.g., reduces the number of individuals in one or more native populations by reducing recruitment) **(3 points)**
☒	Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community) **(7 points)**
☐	Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or changing the community composition towards species exotic to the natural community) **(10 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

3. Impact on Ecological Community Composition:High significance

Comments: Over the past three decades in Ohio and neighboring states, dense thickets have replaced relatively open understories that apparently had no abundant native shrubs indicating L. maackii has been an addition rather than a replacement in these forests, filling an open niche (Collier et al., 2002). Collier et al. (2002) confirmed what was previously anecdotally supported; that species richness and abundance below crowns of L. maackii was lowered in its presence. Because L. maackii dramatically increases in both density and cover following colonization, the effects at the scale of single shrubs should become increasingly apparent at the scale of forest stands. Where this species becomes established in the understory of forests, it has a negative impact on tree seedlings and herbs (Hutchinson and Vankat, 1997; 1998), presumably due to reduced light under Lonicera maackii canopies as this species is light limited. It also suppresses spring emphemerals and forest regeneration (Batcher and Stiles, 2002; Nyboer, 1992; Williams, 2001).

5. Conservation Significance of the Communities and Native Species Threatened:High/Moderate significance

Comments: Collier et al. (2002) demonstrated that Lonicera maackii appears detrimental to 98% of uncommon forest plant taxa leading to the potential to cause local extinctions of plant populations.

(www.natureserve.org)

Amur honeysuckle has been the target of eradication efforts in north-central Kentucky and south-central Ohio because it "dominates nature reserves to the exclusion of endemic species" [105].

A variety of impacts has been ascribed to bush honeysuckle invasion. Most impacts are associated with their competitive dominance, potentially resulting in displacement of native species. Collier and others [29] compared native vegetation growing under Amur honeysuckle crowns with plants growing outside Amur honeysuckle influence in hardwood forest stands near Oxford, in southwestern Ohio. For all species combined, mean species richness was 53% lower, and mean cover 63% lower, in plots beneath Amur honeysuckle crowns. According to Luken and McKnight [101], dense Amur honeysuckle thickets in forest and open sites are "associated with a near complete absence of ground cover species." One study in a northern Kentucky hardwood forest described a monospecific Amur honeysuckle shrub layer with nearly 100% canopy

coverage, mean maximum subcanopy light levels of 1% of full sun, and a sparse ground layer flora composed mainly of suppressed Amur honeysuckle seedlings and saplings [96].

It is likely that interference from dense bush honeysuckle populations can suppress advance regeneration of native tree seedlings. Yost and others [200] studied vegetation of an urban woodland in New York containing abundant Amur honeysuckle. Their survey revealed a significant negative correlation ($r=-0.21$, $p<0.05$) between tree seedling density and Amur honeysuckle cover. Collier and others [29] compared native vegetation growing under Amur honeysuckle crowns with plants growing outside Amur honeysuckle influence, in hardwood forest stands near Oxford, in southwestern Ohio. For tree seedlings (≤1 m tall), mean species richness was 41% lower and mean density was 68% lower in plots beneath Amur honeysuckle crowns. Every tree species had lower seedling abundance beneath Amur honeysuckle crowns. Hutchinson and Vankat [78] investigated impacts of Amur honeysuckle invasion in southwestern Ohio hardwood forests. They found tree seedling density to be inversely related to Amur honeysuckle cover ($r2 = 0.118$, $p < 0.001$). When Amur honeysuckle cover was ≥15%, seedling densities were nearly always <0.5 m-2, but when Amur honeysuckle cover was <15%, seedling densities varied greatly. Tree seedling species richness was also inversely related to Amur honeysuckle cover ($r2 = 0.152$, $p<0.0001$). When Amur honeysuckle cover was >50%, the number of species was usually ≤8, but when Amur honeysuckle cover was <50%, richness was highly variable, ranging from 0 to 15 species. Luken [100] studied the response of woody seedlings to removal of dominant Amur honeysuckle shrubs in a northern Kentucky hardwood forest. Following 4 years of repeated clipping of established Amur honeysuckle plants, plus removal of Amur honeysuckle seedlings in the last 2 years of the study, seedling density and frequency of woody seedlings other than Amur honeysuckle were significantly ($p<0.01$) greater than in plots where Amur honeysuckle was not controlled.

There is also evidence that invasive bush honeysuckles can negatively impact native herbs. Collier and others [29] compared native vegetation growing under Amur honeysuckle crowns with plants growing outside Amur honeysuckle influence, in hardwood forest stands near Oxford, in southwestern Ohio. Eighty-six percent of herb species had lower abundance beneath Amur honeysuckle crowns. Hutchinson and Vankat [78] found herbaceous cover was inversely related to Amur honeysuckle cover ($r2=0.494$, $p<0.0001$) in southwestern Ohio hardwood forests.

Gould and Gorchov [57] examined the effect of Amur honeysuckle presence on survival to reproductive age, and fecundity, of 3 native forest understory annual forbs. These were stickywilly (Galium aparine), an early-season shade-intolerant , pale touch-me-not (Impatiens pallida), a mid-season semishade-tolerant, and Canadian clearweed (Pilea pumila), a late-season shade-tolerant. Forbs were outplanted into treatment plots where Amur honeysuckle was either a) present, b) removed, or c) previously absent. Resident herb and seedling competitors were removed from all treatment plots at 6-10 day intervals throughout the experiment, and large mammalian herbivores were excluded. Survival of stickywilly and pale touch-me-not was significantly greater ($p<0.05$) in removal plots than in present plots at 1 of 2 sites. Fecundity of all 3 species (# seeds per surviving individual) was significantly greater ($p<0.05$) in removal plots than in present plots at both sites. Fecundity of pale touch-me-not and Canadian clearweed was also significantly greater ($p<0.05$) in absent plots than in present plots (absent plots were only feasible at 1 site). Survival of the shade-tolerant species Canadian clearweed was not affected by Amur honeysuckle presence, but fecundity was reduced. While speculative, this may be interpreted as a relatively less severe impact of Amur honeysuckle invasion on shade tolerant herb-layer species, compared with more shade intolerant species.

Miller and Gorchov [119] studied the effects of Amur honeysuckle presence on growth, reproduction and survival of 3 native forest understory perennial forbs over 5 growing seasons. Species studied included narrowleaf wild leek (Allium burdickii), a spring ephemeral, and the full-season species rue anemone (Thalictrum thalictroides) and downy yellow violet (Viola pubescens var. pubescens). They found Amur honeysuckle presence generally reduced growth and reproduction of target species, but not their survival. These effects appeared cumulative, often manifesting only after several years of treatment. They surmised the lack of treatment effect on forb survival may indicate perennial herbs are less impacted by Amur honeysuckle presence than

are some annual forest understory forbs [57] and tree seedlings [55], although exclusion of browsing mammals may also have contributed to sustained survival in this experiment. They also caution that despite no demonstrable impact on survival in this study, reductions in growth and reproduction of individual perennial herbs by invasive shrubs, such as was demonstrated here with Amur honeysuckle, will likely reduce population sizes over time.

These results could be viewed within the context that Amur honeysuckle is simply filling a functional niche often filled by native shrubs, and is not really impacting native plant diversity in any novel way. Miller and Gorchov [119] and Gould and Gorchov [57] considered the possibility that native shrubs may also suppress herb-layer vegetation, although native shrubs were described as "very sparse" at these sites. In contrast, Amur honeysuckle density at one site was 0.7 shrubs m-2. Collier and others [29] asserted that native shrubs are generally uncommon in southwestern Ohio forests, citing Braun (1916, 1950) and Vankat (personal observation). Assuming their assertion is correct, observed negative impacts of Amur honeysuckle on native flora in otherwise shrub depauperate forests may be altering species composition and understory structure in ways that diverge from historic conditions. More research is needed that examines the comparative effects of bush honeysuckles vs. native shrubs in suppressing herbs and woody seedlings within various eastern North American forest types.

Some evidence indicates that where native shrubs and invasive bush honeysuckles co-occur, bush honeysuckles may be stronger competitors. Medley [112] studied distribution of Amur honeysuckle in a 13 acre (5.2 ha) sugar maple- and white ash-dominated deciduous forest in southwestern Ohio. Amur honeysuckle was the most important woody understory species, based on its mean density (3361 individuals ha-1), frequency (95% of sample points), and basal area (1.89 m2 ha-1). Instances of high species richness (>10 spp. per plot) of native woody plants and high basal areas (>1 m2 ha-1) of the most common native shrubs northern spicebush and blackhaw corresponded with Amur honeysuckle basal areas <4 m2 ha-1. When Amur honeysuckle basal areas were >5 m2 ha-1, woody plant species diversity and basal areas of common native shrubs were generally lower (≤ 10 spp. per plot, and <1 m2 ha-1, respectively).

Collier and others [29] compared native vegetation growing under Amur honeysuckle crowns with plants growing outside Amur honeysuckle influence, also in hardwood forest stands near Oxford, Ohio. Species richness for all taxa, as well as species richness and density of tree seedlings, was significantly ($p<0.0001$) lower in forests where Amur honeysuckle had been present for ≥16 years, compared with forests where Amur honeysuckle was present ≤ 10 years.

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

II - A5. Conservation Significance of the Natural Systems and Native Species Threatened

Many invaders occur primarily in disturbed, low quality habitats that are dominated by other invasive plants. Invasive plants have a greater impact if they (a) *directly or indirectly threaten native species or communities that are considered rare or vulnerable (e.g., Federally listed or ranked* G1-G3 by The Nature Conservancy and Natural Heritage Network) *or* (b) *threaten outstanding, high quality occurrences of common community types.*

Indicate below the natural communities (Michigan Natural Features Inventory, 1986) in which the plant has become invasive, and then list any rare species that are or are likely to become threatened by this plant. (Note: * indicates a state rank of S1-S3; ** indicates global rank of G1-G3 and state rank of S1-S3)

Natural Communities Affected

Wetland		
Marsh:	☐ **Submergent marsh** ☐ **Emergent marsh** ☐ **Great Lakes marsh*** ☐ **Northern wet meadow** ☐ **Southern wet meadow***	☐ **Inland salt marsh **** ☐ **Intermittent wetland **** ☐ **Coastal plain marsh **** ☐ **Interdunal marsh ****
Prairie:	☐**Lakeplain wet prairie **** ☐**Lakeplain wet-mesic prairie ****	☐**Wet prairie **** ☐ **Wet-mesic prairie ****
Fen:	☐ **Prairie fen ** ☐**Northern fen **	☐**Patterned fen ** ☐ **Poor fen ****
Bog:	☐**Bog**	☐ **Muskeg **
Forest:	☐ **Poor conifer swamp** ☐ **Rich conifer swamp *** ☐ **Relict conifer swamp ****	☐ **Hardwood-conifer swamp ** ☐**Southern swamp *** ☐ **Southern floodplain forest ****
Shrub:	☐ **Northern shrub thicket** ☐ **Southern shrub-carr**	☐ **Inundated shrub swamp **
Forest/marsh:	☐ **Wooded dune and swale complex ****	

Upland:		
Forest:	☐ Mesic southern forest (southern hardwood) ** ☐ Dry-mesic northern forest (pine-hardwood)* ☐ Dry-mesic southern forest (oak-hardwood) * ☐ Dry northern forest (pine) *	☐ Dry southern forest (oak forest) * ☐ Boreal forest * ☐ Mesic northern forest (northern hardwood and hemlock-hardwood) *
Savanna:	☐ Lakeplain oak openings ** ☐ Bur oak plains ** ☐ Oak openings ** ☐ Oak barrens **	☐ Pine barrens ** ☐ Great lakes barrens ** ☐ Northern bald (krummholz ridgetop) **
Prairie:	☐ Mesic prairie ** ☐ Hillside prairie ** ☐ Mesic sand prairie **	☐ Woodland prairie ** ☐ Dry sand prairie **
Primary:	☐ Open dunes ** ☐ Sand gravel beach ** ☐ Cobble beach * ☐ Bedrock beach * ☐ Alvar ** ☐ Bedrock glade **	☐ Dry non-acid cliff * ☐ Moist non-acid cliff * ☐ Dry acid cliff * ☐ Moist acid cliff * ☐ Sinkhole **

Native Species affected:	**4. Impact on Individual Native Plant or Animal Species:High significance** **Comments: Gould and Gorchov (2000) demonstrated that the presence of L. maackii shrubs reduced fecundity of Galium aparine, Impatiens pallida and Pilea pumila in undisturbed deciduous forest stands and reduced survial of G. aparine and I. pallida only in more anthropogenically disturbed stands; leading to the assumption that L. maackii most negatively impacts the survival of shade-intolerant or early season annuals. Leaves of L. maackii also have negative effects on Fraxinus americana germination and Acer saccharum seedling growth (Trisel and Gorchov, 1995 cited in Gould and Gorchov, 2000). Schmidt and Whelan (1999) found exotic L. maackii enhanced nest predation (by large mammals) in American robins (which, despite this, increased their usage of L. maackii following its establishment), through a combination of lower nest height, absence of sharp thorns, and a branch of architecture that may facilitate predation movement. Similar higher predation was also found in the same study for wood thrushes than the pooled native species in the**

	area. Miller and Gorchov (2004) studied the effects of Amur honeysuckle presence on growth, reproduction and survival of 3 native forest understory perennial forbs over 5 growing seasons. Species studied included narrowleaf wild leek (Allium burdickii), a spring ephemeral, and the full-season species rue anemone (Thalictrum thalictroides) and downy yellow violet (Viola pubescens var. pubescens). They found Amur honeysuckle presence generally reduced growth and reproduction of target species, but not their survival. (www.natureserve.org) Schmidt and Whelan (1999) studied nest predation on American robins and wood thrushes for 6 years in a 200 ha woodland fragment near Chicago. They found that robin nests in L. maackii and another non-native, invasive shrub, Rhamnus cathartica, experienced higher predation rates than nests in similar native shrubs (Crataegus, Viburnum) and in native trees. (Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract for Lonicera maackii (Rupr.) Maxim (Amur honeysuckle), Lonicera morrowii A. Gray (Morrow's honeysuckle), Lonicera tatarica L. (Tatarian honeysuckle), Lonicera x bella Zabel (Bell's honeysuckle): the bush honeysuckles. The Nature Conservancy, Arlington, Virginia. unpaginated. http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)
Global Heritage Status Rank:	GNR (unranked)
National Heritage Status Rank (U.S.):	NNA (not applicable)
National Heritage Status Rank (Canada):	NNA (not applicable)
Michigan Rank:	SNA (not applicable) Additional information from the Floristic Quality Assessment (Herman et al. 2001): Considered an adventive species:
Michigan wetland category:	
Physiognomy:	
Wetness coefficient:	
Other information:	Amur honeysuckle commonly grows on sites with some type of canopy cover (open forests, flood plain forests, periodically disturbed floodplains, riparian habitats and scrub communities). In North America, it is found in both open and wooded habitats (Munger, 2005). (www.natureserve.org) Luken [99], Luken and Goessling [103], and Luken and Mattimiro [105] studied Amur honeysuckle populations in northern Kentucky growing along roadsides (open-grown) and within forest stands variously dominated by black locust (Robinia pseudoacacia), American elm (Ulmus americana), slippery elm (U.

	rubra), sugar maple (Acer saccharum), hackberry (Celtis occidentalis), and white ash (Fraxinus americana). Gould and Gorchov [57], Miller and Gorchov [119], and Swanson and Vankat [163] described Amur honeysuckle as the dominant shrub species growing in the understory of 3 southwestern Ohio hardwood forests. Important overstory species in these forests were a) shagbark hickory (Carya ovata), shellbark hickory (C. laciniosa), elms (Ulmus spp.), and northern red oak (Quercus rubra), b) northern red oak, elms, sugar maple, and American beech (Fagus grandifolia), and c) oaks (Quercus spp.), sugar maple, and hickories (Carya spp.). Amur honeysuckle was also mentioned as occurring in another southwestern Ohio forest dominated by sugar maple along with subdominants American beech, black cherry (Prunus serotina), bitternut hickory (C. cordiformis), yellow-poplar (Liriodendron tulipifera), and ash (Fraxinus spp.) [168] (Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

Conservation Significance

Based on this information, choose one answer that best describes the overall conservation significance of native species or communities affected by this plant:	
☐	Found only in human-disturbed habitats and not known to impact any vulnerable or high quality native species or communities (**0 points**)
☐	Usually inhabits common, unthreatened habitats and rarely impacts vulnerable or high quality species or communities **(3 points)**
☐	Known to occasionally threaten vulnerable or high quality species or communities **(7 points)**
☒	Known to often inhabit one or more vulnerable or high quality communities and/or often threatens rare native species **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: See references in previous sections			

Impact Subrank: Section II: Natural Systems

Total Points from questions II – A1 to II – A5	54
Natural Systems Impact Subrank:	H
Determine a Subrank using this scale: **0 – 12 points = I; 13 – 28 = L; 29 – 45 = M; 46 – 65 = H**	H

II - B. Production/Managed Forests, Christmas Tree Plantations

Definition: Forests managed for wood and fiber production and/or wildlife or other values such as pine plantations, aspen, northern hardwoods, and Christmas tree plantations.

Desirable or Weed Plant

Is the plant in question:		
An intended crop or desirable plant	☐ **YES**	☒ **NO**
Considered a weed plant	☒ **YES**	☐ **NO**
If the answer is yes to crop/desirable plant than proceed to section II-C. If the plant is identified as a weed plant continue		

Extensiveness

How extensive is this plant?	
☐	It is not known to occur **(0 points)**
☐	Scattered individuals or present in small isolated patches **(3 points)**
☒	Establishes along forest edges or in areas disturbed by forest management activities- i.e. roads, landings, clearing or skid trails **(7 points)**
☐	Ubiquitous throughout, spreading or dominant in the understory (**15 points**)

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: See previously listed references			

Production Impact

Is it impacting production?	
☐	No impact to tree regeneration **(0 points)**
☐	Regeneration somewhat impacted **(5 points)**
☒	Regeneration moderately impacted **(7 points)**
☐	Tree regeneration is not occurring because of this plant. **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: **See previously listed references**			

Production/Management Stages

At what production/management stages does this plant have a negative impact? Check all that apply:			
☐	None (0 points)	☒	Sapling stage (10 points)
☐	Planting (5 points)	☐	Pole stage or mature stand (15 points)
☒	Seedling establishment (5 points)		

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	Reviewed scientific publication	☐	Observational
☒	Other published material	☐	Anecdotal

Comments, supportive evidence, and explanation of documentation level:

Forest regeneration following disturbance can be severely impeded by these species. The group is widely considered an aggressive, highly successful weedy complex (Barnes 1974; Luken and Thieret 1996; Woods 1993 and others). In a survey of Ohio forests, tree seedling density, tree seedling species richness, and herb cover were all inversely related to L. maackii cover, and tree regeneration appeared to have been inhibited (Hutchingson 1997). (Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract for Lonicera maackii (Rupr.) Maxim (Amur honeysuckle), Lonicera morrowii A. Gray (Morrow's honeysuckle), Lonicera tatarica L. (Tatarian honeysuckle), Lonicera x bella Zabel (Bell's honeysuckle): the bush honeysuckles. The Nature Conservancy, Arlington, Virginia. unpaginated. http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

Luken [100] demonstrated that Amur honeysuckle dominance in the shrub layer of northern Kentucky hardwood forests can suppress advance regeneration of overstory species.

It is likely that interference from dense bush honeysuckle populations can suppress advance regeneration of native tree seedlings. Yost and others [200] studied vegetation of an urban woodland in New York containing abundant Amur honeysuckle. Their survey revealed a significant negative correlation ($r=-0.21$, $p<0.05$) between tree seedling density and Amur honeysuckle cover. Collier and others [29] compared native vegetation growing under Amur honeysuckle crowns with plants growing outside Amur honeysuckle influence, in hardwood forest stands near Oxford, in southwestern Ohio. For tree seedlings (≤1 m tall), mean species richness was 41% lower and mean density was 68% lower in plots beneath Amur honeysuckle crowns. Every tree species had lower seedling abundance beneath Amur honeysuckle crowns. Hutchinson and Vankat [78] investigated impacts of Amur honeysuckle invasion in southwestern Ohio hardwood forests. They found tree seedling density to be inversely related to Amur honeysuckle cover ($r2 = 0.118$, $p < 0.001$). When Amur honeysuckle cover was ≥15%, seedling densities were nearly always <0.5 m-2, but when Amur honeysuckle cover was <15%, seedling densities varied greatly. Tree seedling species richness was also inversely related to Amur honeysuckle cover ($r2 = 0.152$, $p<0.0001$). When Amur honeysuckle cover was >50%, the number of species was usually ≤8, but when Amur honeysuckle cover was <50%, richness was highly variable, ranging from 0 to 15 species. Luken [100] studied the response of woody seedlings to removal of dominant Amur honeysuckle shrubs in a northern Kentucky hardwood forest. Following 4 years of repeated clipping of established Amur honeysuckle plants, plus removal of Amur honeysuckle seedlings in the last 2 years of the study, seedling density and frequency of woody seedlings other than Amur honeysuckle were significantly ($p<0.01$) greater than in plots where Amur honeysuckle was not controlled.

Even if seedlings of shade tolerant tree species can establish, interference from dense bush honeysuckle populations may still impact recruitment into mid-story or subcanopy status. Medley [112] studied distribution of Amur honeysuckle in a 13 acre (5.2 ha) sugar maple- and white ash-

dominated deciduous forest in southwestern Ohio. Amur honeysuckle was the most important woody understory species, based on its mean density (3,361 individuals ha-1), frequency (95% of sample points), and basal area (1.89 m2 ha-1). There was a significant (p<0.05) negative relationship between Amur honeysuckle and sugar maple sapling densities (>1 m tall; <10 cm dbh).

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

The following information will not be scored in the assessment however it is useful in determining MIPC Plan of Action.

Silvicultural Treatments

What silvicultural treatments associated with the crop species may influence the presence of this plant. Check all that apply:	
☐	Natural regeneration
☒	Site prep
☐	Planting
☒	Selection cut
☒	Thinning
☒	Clear cut
☐	Whole tree
☐	Shortwood

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: See previously listed references			

Introduction sources

Introduction sources. Check all that apply:	
☒	Corridors (roads, utility, trails, streams, and rivers)
☐	Seed mixes-re-vegetation practices
☐	Seed bank
☐	Equipment- logging, recreational, road building (skidders, harvesters, ATV's, road graders)
☐	Borrow material (gravel, sand, topsoil)
☒	Wildlife (mammals, birds)
☐	People (recreational user, cars, boats)
☒	Unauthorized dumping
☒	Plants on adjacent sites

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

Impact Subrank: Section II-B. Production/Managed Forests, Christmas Tree Plantations

Add total points		29
Rating:	**≤ 5 = Insignificant (I)** **>5 ≤ 13 = Low (L)** **>13 ≤ 34 = Medium (M)** **>34 = High (H)**	
Production/Managed Forests, Christmas Tree Plantations Subrank:		M

II-C. Impacts on Managed Landscapes within Suburban and Urban Ecosystems

Definition: Public and private areas within suburban and urban communities managed for green belts, linear parks, parks, and other recreational uses as well as urban forests and open space integrated throughout residential and commercial centers. Commercial centers include retail centers, corporate campuses and industrial areas. These areas are typically managed with various degrees of input by individual property owners, public agencies and/or commercial contractors and include unmanaged peripheral areas.

Desirable or weed plant

Is the plant in question:		
An intended or desirable plant:	☒ **YES**	☐ **NO**
Considered a weed plant:	☒ **YES**	☐ **NO**
If the answer is yes to desirable plant than proceed to section II-D. If the plant is identified as a weed plant continue		

Extensiveness

How extensive is this plant in suburban and urban ecosystems?	
☐	Not present **(0 points)**
☐	Present in scattered areas and isolated patches **(3 points)**
☒	Present in areas not receiving routine or regular management practices **(5 points)**
☐	Persistent throughout suburban and urban ecosystems. **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

Impact on visual appeal

Impact on visual appeal of landscape compositions:	
☐	Does not alter visual appeal **(0 points)**
☐	Visual appeal compromised during limited periods or season **(3 points)**
☒	Requires periodic attention to maintain visual appeal **(7 points)**
☐	Requires regular attention to maintain visual appeal **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

Impact on Desirable Plant Composition

Impact on Desirable Plant Composition:	
☐	No impact on surrounding desirable plants **(0 points)**
☐	Minor competition for light, water and nutrients without a direct influence on desirable plant quality **(3 points)**
☒	Competes and causes minor impacts on desirable plants' quality **(7 points)**
☐	Major influences on desirable plant quality caused by competition and changes in environmental conditions. **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: See previously listed references			

The following information will not be scored in the assessment however it is useful in determining MIPC Plan of Action .

Introduction Sources

Introduction Sources. Check all that apply:			
☐	**Seed bank**	☐	**Equipment**
☒	**Off site plants**	☐	**Topsoil/mulch/compost materials**
☒	**On site plant**	☒	**Unauthorized dumping**
☐	**Seed mixes**	☒	**Wildlife**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☒	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: See previously listed references			

Where found

Where is it found in the landscape?			
☐	**Ornamental beds**	☒	**Open space**
☒	**Boulevards and common areas**	☒	**Corridors**
☒	**Edges of landscaped areas**	☒	**Vacant land**
☒	**Woodlots**		

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

Impact Subrank: Section II-C. Managed Landscapes

Add total points		**19**
Rating:	**≤ 6 = Insignificant (I)** **>6 ≤ 9 = Low (L)** **>9 ≤ 36 = Medium (M)** **>36 = High (H)**	
Managed Landscapes within Suburban and Urban Ecosystems Subrank:		**M**

II - D. Impact on Agricultural, Horticultural and Turf Production Systems

Definition: Production areas for agronomic, horticultural, and other commodity crops. These include fields, orchards, and plantations.

Desirable or Weed

Is the plant in question:		
An intended crop:	☒ **YES**	☐ **NO**
Considered a weed plant:	☒ **YES**	☐ **NO**
If the answer is yes to crop than proceed to section III. If the plant is identified as a weed plant continue		

Ability to invade

Ability to invade agricultural, horticultural, and turf production systems:	
☐	Not known to be present **(0 points)**
☒	Present in scattered areas and isolated patches **(3 points)**
☐	Occurs on a regular basis in production systems **(7 points)**
☐	Spreads throughout production systems and beyond into adjacent areas **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

See previously listed references

Impact on production

Is it impacting plant/crop production?	
☒	No impact to production **(0 points)**
☐	Somewhat impacted **(5 points)**
☐	Moderately impacted **(7 points)**
☐	Severely impacted **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

Impact throughout production cycle

Does the plant have a negative impact throughout production cycle? Check all that apply:	
☐	Planting **(5 points)**
☐	Seedling/plant establishment **(5 points)**
☐	Crop maturation **(7 points)**
☐	Harvest **(7 points)**
☐	Processing **(10 points)**
☐	Fallow fields **(3 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☐	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

The following information will not be scored in the assessment however it is useful in determining MIPC Plan of Action .

Introduction sources

Introduction sources. Check all that apply:	
☐	Seed bank
☒	Off site plants
☒	On site plant
☐	Seed mixes
☐	Equipment
☐	Topsoil/mulch/compost materials
☒	Unauthorized dumping
☒	Domestic animals
☒	Wildlife

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☐	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

Impact Subrank: Section II-D. Agricultural, Horticultural, and Turf Production Systems

Add total points	3
Rating:	**≤ 5 = Insignificant (I)** **>5 ≤ 10 = Low (L)** **>10 ≤ 36 = Medium (M)** **>36 = High (H)**
Agricultural, Horticultural and Turf Production Systems Subrank:	I

II – E. Impact on Constructed Habitat Systems

Definition: Constructed Habitat in disturbed areas. These include woodland, prairie, and wetland construction and/or restoration.

Desired or Weed

Is the plant in question:		
A desired plant:	☐ **YES**	☒ **NO**
Considered a weed plant:	☒ **YES**	☐ **NO**
If the answer is yes to desired plant than proceed to section III. If the plant is identified as a weed plant continue		

Ability to invade

Ability to invade constructed habitats:	
☐	Not known to be present **(0 points)**
☒	Present in scattered areas and isolated patches **(3 points)**
☐	Occurs on a regular basis in habitat systems **(7 points)**
☐	Spreads throughout the habitat and beyond into adjacent areas **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: See previously listed references			

Impact on Habitat

Impact on Habitat Composition:	
☐	No impact on habitat plant composition **(0 points)**
☐	Minor competition for light, water, and nutrients without a direct influence on desirable plant compositions **(3 points)**
☒	Competes and causes minor impacts on desirable plant compositions**(7 points)**
☐	Major influences on habitat composition caused by competition and changes in environmental conditions. **(15 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: **See previously listed references**			

Impact throughout habitat

Does the plant have a negative impact throughout the habitat? Check all that apply:	
☒	Planting **(3 points)**
☒	Seedling/plant establishment **(5 points)**
☒	Habitat maturation **(10 points)**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: See previously listed references			

The following information will not be scored in the assessment however it is useful in determining MIPC Plan of Action .

Introduction sources

Introduction sources. Check all that apply:	
☐	Seed bank
☒	Off site plants
☒	On site plant
☐	Seed mixes
☐	Equipment
☐	Topsoil/mulch/compost materials
☒	Domestic animals
☒	Wildlife

Impact Subrank:: Section II-E. Constructed Habitat

Add total points		28
Rating:	**≤ 3 = Insignificant (I)** **>3 ≤ 10 = Low (L)** **> 10 ≤ 31 = Medium (M)** **>32 = High (H)**	
Constructed Habitat Subrank:		M

Section III. Distribution In Michigan And The United States

Document the known distribution of this plant. Indicate the area of origin for the species (Original Range) and the earliest documented occurrence in North America. Then, for Michigan, identify the extent of its occurance in each of four ecological regions (Albert 1995). The four ecological regions of Michigan, as pictured below, have been delineated based on broad climatic, geologic, edaphic, and vegetation patterns, and provide a more meaningful framework for assessing invasiveness than geopolitical boundaries.

Known distribution

Original Range (world wide)	**Manchuria and Korea (Dirr 1998)** **Native to central and northeastern China, Manchuria, Korea, and, less commonly, Japan. (Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract for Lonicera maackii (Rupr.) Maxim (Amur honeysuckle), Lonicera morrowii A. Gray (Morrow's honeysuckle), Lonicera tatarica L. (Tatarian honeysuckle), Lonicera x bella Zabel (Bell's honeysuckle): the bush honeysuckles. The Nature Conservancy, Arlington, Virginia. unpaginated. http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)**
Earliest possible documentation in North America	**Introduced to North America at the Dominion Arboretum in Ottawa, Canada in 1896 and the New York Botanical Garden in 1898 (Luken and Thieret 1995). (Batcher and Stiles 2000)** **It was first introduced into the U.S. in 1897/98 [74,106], and by 1931 was available from at least 8 commercial nurseries [106]. (Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)**

Regional Importance in Michigan

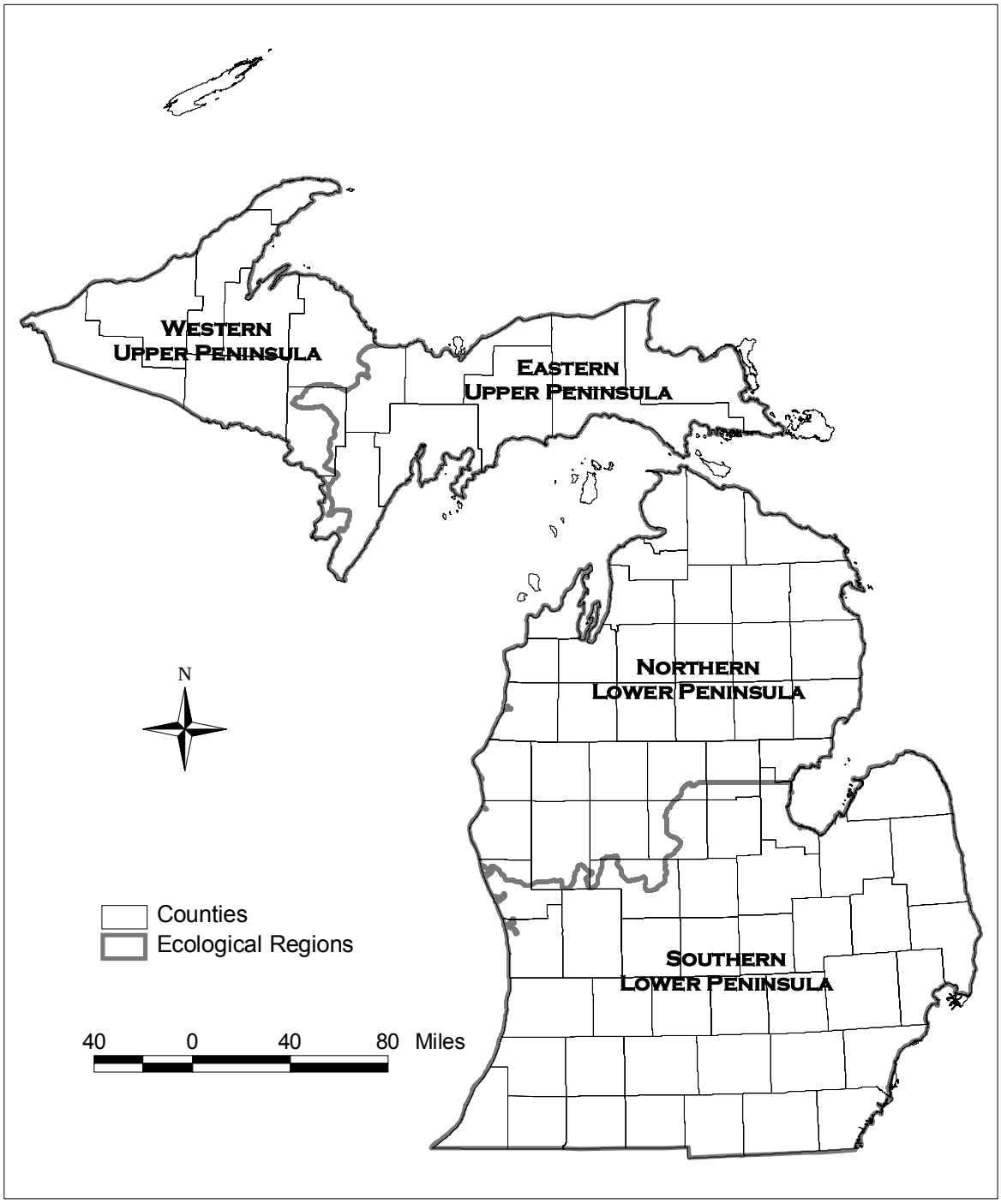
For each of the four ecological regions within Michigan, indicate the extent to which this plant has been identified as a problem.

Within each region identify whether the plant is: (see glossary for definitions).	N (naturalized) W (widespread) L (localized) I (isolated occurrences) A (absent)

For ratings of N or W, please enter the date of earliest reported occurrence in that region. Transfer the rating for each ecological region to the Distribution Subrank at the end of this section. If the date identified as a problem is unknown place (Unk) in the appropriate place.

Ecological Regions	Rating	Date
Western Upper Peninsula (WUP)	**A**	**Unk**
Eastern Upper Peninsula (EUP)	**A**	**Unk**

Northern Lower Peninsula (NLP)	**W**	**Unk**
Southern Lower Peninsula (SLP)	**W**	**Unk**



List the Michigan counties with known infestations (if there are many counties covering large areas, those areas may be identified. For example, "all counties in the Lower Peninsula" is acceptable in lieu of listing out all those counties):

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: **USDA Plants Database** **NLP: Newago, Isabella** **SLP: Ottawa, Berrien, Kalamazoo, Hillsdale, Lenawee, Washtenaw, Wayne, Macomb, Oakland, Ingham** **USDA Plants Database; http://plants.usda.gov**			

The following information is not scored in the assessment system however it is used to aid in determining the presence of this plant in surrounding states or provinces.

Problem in nearby states

Has this plant has been identified by land managers within Indiana, Illinois, Wisconsin, Ohio, and Ontario as a problem.

Please check the states/provinces and provide the appropriate documentation	
☒	Indiana
☒	Illinois
☒	Wisconsin
☒	Ohio
☒	Ontario

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: **USDA Plants Database; http://plants.usda.gov** **www.natureserve.org**			

Identify other areas in the U.S. in which it has been identified as a problem by land managers.

Some plants are not invasive everywhere they occur in the U.S., but only in certain regions or habitats. For instance, Tamarisks are severe riparian and wetland pests from California to Texas and north at least to Kansas, but while they escape occasionally in the eastern U.S., they have not been reported as a problem.

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**

☒	Other published material	☐	Anecdotal

Comments, supportive evidence, and explanation of documentation level:

States listed by one or both of USDA Plants Database and NatureServe on their maps:

MA, NY, NJ, PA, DC, DE, MD, VA, WV, NC, SC, GA, KY, TN, OH, IN, MI, WI, IL, IA, MO, AR, MS, TX, KS, NE, ND

USDA Plants Database:

Connecticut: invasive, banned

Massachesetts: prohibiteed

Vermont: class B noxious weed

In North America, this species has escaped from cultivation in at least 25 states east of the Rocky Mountains (Batcher and Stiles, 2000; Hutchinson et al., 1998; Luken and Thieret, 1996; USDA, 2006; Munger, 2005) and is considered a widespread invasive almost everywhere it occurs. (www.natureserve.org)

Amur honeysuckle is distributed in the eastern U.S. from Massachusetts west to North Dakota and south to Texas. However, there are no specific reports of occurrence in Minnesota, South Dakota, or Florida [18,36,43,54,59,83,99,100,122,171,178,186,186]. Amur honeysuckle also occurs in Idaho [135] and southern Ontario [131]. Lorenz and others [95] indicate Amur honeysuckle is climatically adapted to all but the coldest areas in this range, such as northern Maine, New Hampshire, and Vermont, the Adirondack area of New York, and southwestern portions of Michigan's Upper Peninsula (see Site Characteristics). According to Sharp and Belcher [150] the Amur honeysuckle cultivar 'Rem-Red' is "climatically adapted" from Massachusetts to South Carolina and west to Missouri. Based on a survey of herbaria in eastern North America, Trisel [168] described distribution of "naturalized" Amur honeysuckle from "New Hampshire south to Augusta, Georgia, west to Greenville, Mississippi and Tulsa, Oklahoma, north to Ames, Iowa, and Madison, Wisconsin." Rolfsmeier and others [137] reported Amur honeysuckle growing outside cultivation in Nebraska and Kansas, but indicate it may not be spreading rapidly in this area. According to Virginia Department of Conservation and Recreation [182], Amur honeysuckle occurs in the Mountain and Piedmont regions of that state.

Winter honeysuckle, Amur honeysuckle, Morrow's honeysuckle, Tatarian honeysuckle, and Bell's honeysuckle are ranked as severe threats by the Tennessee Exotic Pest Plant Council [156], and Amur honeysuckle, Morrow's honeysuckle, and Tatarian honeysuckle are ranked as severe threats by the Kentucky Exotic Pest Plant Council [85]. Morrow's honeysuckle is ranked highly invasive, Amur honeysuckle and Tatarian honeysuckle moderately invasive, and winter honeysuckle and Bell's honeysuckle occasionally invasive by the Virginia Department of Conservation and Recreation [182].

U.S. Forest Service Region 8 (Southern Region) lists winter honeysuckle, Amur honeysuckle, Morrow's honeysuckle, and Tatarian honeysuckle as category 1 weeds (exotic plant species that are known to be invasive and persistent throughout all or most of their range within the Southern Region and that can spread into and persist in native plant communities and displace native plant species and therefore pose a demonstrable threat to the integrity of the natural plant communities in the Region). The introduction of category 1 species is prohibited on National Forest System Lands [171].

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

Current trends in total range within the United States.

Choose one answer that best describes the current trend:

☐	Declining or Historical
☐	Stable
☒	Increasing
☐	Unknown

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

USDA Plants Database; http://plants.usda.gov

www.natureserve.org

Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/

13. Local Range Expansion or Change in Abundance:High significance

Comments: Over the last few decades, Lonicera maackii has become the most abundant shrub in many forests in southwestern Ohio and adjacent states (Luken and Goessling, 1995; Hutchinson and Vankat, 1997; 1998; Luken et al., 1997; Collier et al., 2002). Both Hutchinson and Vankat (1998) and Deering and Vankat (1999) reported separate average rates of migration of 0.5 km/year in separate areas of Ohio. The trend of increase has resulted in more than 25 states east of the Rocky Mountains now have substantial populations of this species with more added annually. Over the past three decades in Ohio and neighboring states, dense thickets have replaced relatively open understories that apparently had no abundant native shrubs indicating L. maackii has been an addition rather than a replacement in these forests, filling an open niche (Collier et al., 2002). (www.natureserve

Michigan Distribution Subrank: Section III Distribution In Michigan

Western Upper Peninsula (WUP)	**A**
Eastern Upper Peninsula (EUP)	**A**
Northern Lower Peninsula (NLP)	**W**
Southern Lower Peninsula (SLP)	**W**

Section IV. Control Methods

Control Methods document the availability of mechanical, chemical, biological, and fire as a resource in managing or eradicating the plant in question. Control Methods are reported as available (A), not available (NA), or under development (UD).

Control methods available

IV-A. Are Control Methods currently available for this plant?	☒ YES	☐ NO
If yes proceed to IV –B, No = NA (non available) in all the control categories.		

IV- B. Control Methods Currently Available

Mechanical: (Check all that apply)			
☒	Hand pulling	☒	Pulling using tools
☒	Mowing/Cutting	☐	Stabbing
☐	Girdling	☐	Tilling
☐	Soil Solarization	☐	Flooding
☐	Grazing	☐	Other

None marked = NA in the Control Method Subrank
≥ 1 marked = A in the Control Method Subrank
If you did not mark any methods and are aware of methods under development please include the information in the comments section below and mark UD in the Control Method Subrank

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	Reviewed scientific publication	☐	Observational
☒	Other published material	☐	Anecdotal

Comments, supportive evidence, and explanation of documentation level:

Grubbing or pulling seedlings and mature shrubs, and repeated clipping of shrubs.

Mature L. maackii shrubs growing in shaded forest settings can be eradicated by clipping once a year, during the growing season, until control is achieved (Luken and Mattimiro 1990).

(Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract: The bush honeysuckles. The Nature Conservancy. Available at http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

Cutting bush honeysuckle stems may eliminate existing plants [23,24,105,108,168] and is effective in temporarily reducing seed production [108]. However, cutting established plants usually results in sprouting [43,44,45,46,75,100,108] (see asexual regeneration). According to Luken and Mattimiro [105], single cuttings that are subsequently abandoned can produce populations from sprouts that are denser and more productive than pretreatment populations. Repeated cutting as the primary control method may be effective, especially in forested habitats, but is probably not feasible for open-grown plants (see Control above) [100,105].

The frequency, duration, and seasonality of repeated cutting treatments required for effective control are unclear. Luken [100] indicates 3+ years of treatments may be necessary in forested habitats. Luken and Mattimiro [105] suggest cutting at least annually, or more frequently if

possible. According to the Maine Natural Areas Program [108], cutting should be done in early spring and in late summer or early fall. Trisel [168] compared treatments for eradication of Amur honeysuckle in a southwestern Ohio second-growth hardwood forest. Amur honeysuckle stems were cut (3.9 inches (10 cm) above ground)) in early October. New shoots were subsequently surveyed and clipped every 2 weeks until mid-November, and again from early June to early November the following year. No immediate posttreatment sprouting was apparent in fall, but all treated shrubs exhibited regrowth by early June the following season. Sprouting continued following commencement of clipping treatments in June but diminished substantially over the course of the growing season. The percentage of shrubs with live sprouts began to decline from 100% in late July and by early November only 10% showed signs of continued regrowth. Average numbers of live stems per shrub was 3.15 before treatment, 3.1 in early June, reached a maximum of 13.8 in early July, then declined to 2.0 by early November. In a separate experiment Amur honeysuckle stems were cut (3.9 inches (10 cm) above ground) in mid-April. New shoots were subsequently surveyed and clipped every month from June until October. Final mortality in this experiment was only 7% [168].

Bush honeysuckles may be controlled by pulling and/or digging to remove entire plants [17,23,24,75,126,152]. Seedlings are often easily pulled, especially when soils are moist [17,75,108,126,152,154]. Since bush honeysuckle roots are typically shallow (see General Botanical Characteristics), small- to medium-sized plants can often be dug or pulled [17,75]. Todd [167] reported no regrowth of bush honeysuckle shrubs in northern Illinois following control by either hand pulling small individuals when soils were wet, or by cutting near ground level and "pulling" the following year. Trisel [168] achieved complete control of established Amur honeysuckle by severing all shrubs below the root crown. However, all of the root crown and as much of the root system as possible should be removed to minimize sprouting and suckering (see asexual regeneration) [43,44,45,46,126,152,168].

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

Biological Control Agents:

	Control Method Subrank
Released/available biological control agents	A
Biological control agent currently being researched Please include information in the comments section below	UD
No known biological control agents available	NA

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	Reviewed scientific publication	☐	Observational
☒	Other published material	☐	Anecdotal
Comments, supportive evidence, and explanation of documentation level: No known biological controls of Lonicera spp. (Batcher, MS and Stiles, SA. 2000. Element stewardship abstract for L. maackii, L. morrowii, L. tatarica, L. x bella: the bush honeysuckles. The Nature Conservancy). Available at http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)			

The following information will not be scored in the assessment however it is useful in determining MIPC Plan of Action.

Biological Control testing

Identify the crops/plants that the biological control agents have been tested on.		
Is the biological control agent known to have a negative impact on non-target species?	☐ YES	☐ NO
If yes, identify the impacts species:		

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	Reviewed scientific publication	☐	Observational
☐	Other published material	☐	Anecdotal
Comments, supportive evidence, and explanation of documentation level:			

Chemical herbicides

Chemical Herbicides: (Check all that apply)			
☐	Pre-emergence herbicides available	☒	Contact herbicides
☒	Post emergence herbicides available		
None marked = NA in the Control Method Subrank ≥ 1 marked = A in the Control Method Subrank			

If you did not mark any methods and are aware of methods under development please include the information in the comments section below and mark UD in the Control Method Subrank

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	Reviewed scientific publication	☐	Observational
☒	Other published material	☐	Anecdotal

Comments, supportive evidence, and explanation of documentation level:

Foliar sprays and cut stump sprays or paints. A survey of the Nature Conservancy land managers undertaken in 1998 found that most used glyphosate, and used it as a cut stump treatment to control L. maackii and/or L. tatarica. (Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract: The bush honeysuckles. The Nature Conservancy. Available at http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

After cutting, a 20% solution of glyphosate should be applied to the cut stump either by spraying the stump with a low pressure hand-held sprayer or wiping the herbicide on the stump with a sponge applicator to prevent resprouting. (Nyboer, R. 1992. Vegetation Management Guideline. Illinois Dept. of Conservation. Written for the Illinois Nature Preserves commission. http://www.inhs.uiuc.edu/chf/outreach/VMG/bhnysckl.html)

(PCA Fact Sheet: Exotic Bush Honeysuckles, Plant Conservation Alliance' s Alien Plant Working Group, www.nps.gov/plants/alien/)

Wisconsin DNR; www.dnr.state.wi.us/invasives/fact/honeysuckle_tart.htm

Foliar spray, cut stump or basal bark methods. (Southeast Exotic Pest Plant council Invasive Plant Manual; www.invasive.org/eastern/eppc/bushhoney.html)

Herbicides may be effective for controlling invasive bush honeysuckles. However, control with herbicides is temporary, as it does not change conditions that allow infestations to occur [201].Glyphosate is the most commonly mentioned chemical for use against bush honeysuckles, applied either as a foliar spray [75,154,168] or to cut stumps [43,44,45,46,67,88,154,168]. Triclopyr has also shown effectiveness [75]. Most references discuss chemical control of Amur honeysuckle, but it is likely that these methods are also effective against other bush honeysuckle species.

Sprouts and suckers may be further controlled with herbicides [43,44,45,46,75,105,126,152]. Applying herbicide to cut stumps can increase mortality [23,24,67,126,152,168] (see Chemical control methods below).

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

Fire

Fire can control the spread of invasive species into or within natural areas.

Response to fire.			
☒	**Prescribed burns***	☐	**Spot burning***
None marked = NA in the Control Method Subrank			

≥ 1 marked = A in the Control Method Subrank

If you did not mark any methods and are aware of methods under development please include the information in the comments section below and mark UD in the Control Method Subrank

*Refer to IV-C to determine whether a plant's response to fire requires consideration in planning for or using this method.

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract: The bush honeysuckles. The Nature Conservancy. Available at http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf

It appears that in many fire-adapted communities prescribed fire may be useful for controlling bush honeysuckles. Prescribed fire may be less effective for controlling particularly vigorous populations, such as those growing under full sunlight. According to Williams [194], prescribed burning has shown "some promise" for controlling bush honeysuckles growing in open habitats. But Luken [102] asserted that repeated burning to control bush honeysuckles is ineffective on open sites, due to vigorous sprouting (see Control).

As of this writing (2004) there is no information available about using prescribed fire in combination with other control methods. However, it seems likely that combinations of burning, herbicides, and physical/mechanical control methods may be useful, especially when consideration is given to the current and future desired condition of native communities on the site.

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

The following information will not be scored in the assessment however it is useful in determining MIPC Plan of Action .

Response to fire

Many invasive species have the potential to invade burned areas. Since plants respond differently to varying levels of fire intensity, it is important from a managerial standpoint to determine which plants will survive and/or invade burned areas as well as determining which invasive plants are controlled by fire.

Response to fire: (Check all that apply)			
☐	**well adapted to fire**	☒	**numbers decline after fire**
☒	**top killed**	☐	**numbers increase after fire**
☒	**sprouts readily from rhizomes**	☐	**seeds survive in seed bed**
☐	**killed by high intensity fires**	☒	**seeds are dispersed easily in a burned area**
☒	**killed by low intensity fires**	☐	**seed dormancy broken by fire**
☐	**the presence of this plant can contribute to increased fire potential and/or intensity**		

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

High fire tolerance. (USDA Plants Database; http://plants.usda.gov)

Although no information could be found regarding the evolutionary relationship between fire and bush honeysuckles in their native ranges, it appears that bush honeysuckles are adapted to survive fire by shielding perennating buds below the soil surface on roots and/or the root crown. Postfire sprouting has been documented [7,75,87,102,126,152]

Fire may top-kill bush honeysuckle plants, and is likely to kill seedlings and unhealthy plants [75,126,152]. However, perennating tissues on roots and root crowns are often protected from fire damage by soil.

Bush honeysuckles may establish from bird-dispersed seed after fire. Since snags, surviving trees, or tall shrubs are often present in postfire environments where bush honeysuckles are likely to found (see habitat types and plant communities) and provide perches for frugivorous birds, bush honeysuckle postfire seedling establishment may occur in this environment).

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

Control Method Subrank: Section IV: Control Method Subrank

Method	Score	Method	Score
Mechanical	A	**Chemical**	A
Biological	NA	**Fire**	A

Section V. Management Effort

Management effort identifies management potential (investment in human and financial resources) and management activity (programs being presently conducted). For most statements, no particular control methods are specified but responses should relate to the methods that are most likely to be used (refer to section IV). Management potential considers feasibility, costs, and unavoidable non-target damage. Management activity identifies current programs being employed to suppress or eradicate this plant in public and private arenas.

V-A Management Potential

Documentation must be provided. Add all points from statements which are true for this plant and record the point at the bottom of this section.

Statement	Options	Points
Despite investigation, no legally permissible and effective herbicide treatments are available and cutting or mowing alone are not sufficient to eliminate this plant.	☐ **YES** **15 points**	
This plant is difficult to control without significant damage to native species because: it is widely dispersed throughout the sites (i.e., does not occur within discrete clumps nor monocultures); it is attached to native species (e.g., vine, epiphytes or parasite); or there is a native plant which is easily mistaken for this invader.	☒ **YES** **10 points**	10
Total contractual costs of known control method per acre in first year, including access, personnel, equipment, and materials (any needed re-vegetation is not included) exceeds $2,000/acre (2002 estimated control costs are for acres with a 50% infestation).	☒ **YES** **5 points**	5
Further site restoration is necessary following plant control to reverse ecosystem impacts and to restore the original habitat-type or to prevent immediate re-colonization of the invader.	☒ **YES** **5 points**	5
Following the first year of control of this species, it would be expected that individual sites would require re-survey or re-treatment, due to recruitment from persistent seeds, spores, or vegetative structures, or by dispersal from outside the site: (choose one)	☐ **multiple times per year (15 points)** ☒ **once a year for the next 5 years; (10 points)** ☐ **one to 4 times over the next 5 years; (6 points)** ☐ **regrowth not known. (2 points)**	10
Total Points		30

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

17. General Management Difficulty:High/Moderate significance

Comments: Control is best approached in a habitat specific manner as well as based on size of the infestation. Clipping has been found to be successful (limited) in controlling this species in forests reducing mortality among forest-grown shrubs and causing declines in stem populations, but, in contrast, open grown shrub populations remained stable and stem populations continued to increase in response to clipping (Luken and Mattimiro, 1991). Both habitats experienced a decline in seedling establishment following clipping. In open areas, clipping must be accompanied with herbicides or burning following removal of adult stems. Because this species prefers slightly disturbed or undisturbed young forest habitat and open agricultural land serves as a dispersal barrier, a broad zone of unsuitable habitat surrounding a forest patch may inhibit invasion and prove an effective management strategy, but this must be weighed against the negative effects of removing a secondary vegetation zone around the forest patch that might otherwise buffer edge effects (Hutchinson and Vankat, 1998). Generally, in regions where L. maackii is present, forests should be managed to minimize tree canopy disturbance, but when this is not possible, forests should be continually monitored for plants following disturbance. In forests where L. maackii is already established, management to recue cover is recommended (Luken and Mattimiro, 1991; Hutchinson and Vankat, 1997).

18. Minimum Time Commitment:Moderate significance

Comments: Although clipping has limited control success (esp. for forest populations), this species is fully capable of regenerating most shrubs after a single clipping event so multiple clippings are necessary. A combination of clipping of adult plants with herbicide application and/or burning should follow clipping for open area populations (Luken and Mattimiro, 1991). In all cases repeated control measures are necessary (a few times a year for 2 or more years). Because seed banking capability is poor, long-term (5+ years) shrub removal experiments have been shown to be successful (Luken and Mattimiro, 1991). Repeated prescribed burning annually or biennially for several years may be necessary. Stem cutting with glyphosate herbicide application requires two cuts per year for three to five years (Batcher and Stiles, 2005; Wisconsin Department of Natural Resources, 2004).

19. Impacts of Management on Native Species:Low significance

Comments: Because this species prefers slightly disturbed or undisturbed young forest habitat and open agricultural land serves as a dispersal barrier, a broad zone of unsuitable habitat surrounding a forest patch may inhibit invasion and prove an effective management strategy, but this must be weighed against the negative effects of removing a secondary vegetation zone around the forest patch that might otherwise buffer edge effects (Hutchinson and Vankat, 1998). It is best to spray new foliage in the spring (Metsulfuron-methyl plus a surfactant is broadleaf specific) before the leaves of native shrubs and ground flora emerge (Czarapata, 2005).

(www.natureserve.org)

Restoration potential is likely to be lowest where Lonicera species occur in high densities and there is a high likelihood of continued dispersal of seeds into the restoration area. The potential for large-scale restoration of unmanaged natural areas or wildlands infested with Lonicera species is probably low. Restoration potential for managed natural areas or wildlands infested with Lonicera species is probably moderate. If attacked during the early states of colonization the potential for successful management is high.

Effective mechanical management requires a commitment to cut or pull plants at least once a year for a period of three to five years (Virginia Natural Heritage Program, no date). Because open soil can support rapid re-invasion, managers must monitor their efforts at least once per year and repeat control measures

as needed (Nybour 1992). (Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract: The bush honeysuckles. The Nature Conservancy. Available at http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

Regardless of season, it appears that a single prescribed fire is usually not sufficient to eradicate invasive bush honeysuckle populations. Because postfire sprouting is likely, subsequent prescribed burns conducted annually or biennially for several years may be necessary [75,126,152]. Solecki [154] recommends annual or biennial spring burning for 5 or more years to control bush honeysuckles.

Because bush honeysuckles are capable of sprouting and suckering (see asexual regeneration), control efforts may require sustained effort for several years [75,108].

Control methods that create soil disturbance may provide opportunities for seedling establishment of bush honeysuckles or other invasive species [154]. Luken and McKnight [101] suggest that where dense Amur honeysuckle thickets substantially reduce herb-layer coverage, removal of this shrub layer may result in erosion and/or colonization by other invasive species. If target plants have reached reproductive age, it may be necessary to subsequently remove numerous seedlings from the area [43,44,45,46] (see Regeneration Processes). Control methods that increase light levels at ground level may result in increases in bush honeysuckle seedling establishment [100]. Luken and Mattimiro [105] suggested that Amur honeysuckle seeds are not long-lived, and elimination of adult populations should be followed by control of the subsequent, if short-lived, flush of seedlings.

Eradicating established bush honeysuckle plants may be more effective in forested than open environments. An experiment in northern Kentucky examined the relative response of forest-grown vs. open-grown Amur honeysuckle plants to repeated clipping. Plants in both populations were clipped at their bases in July, and resprouts were subsequently clipped each July for the next 3 years. One year after the initial clipping there were no significant ($p \geq 0.05$) differences between populations in stem (ramet) density or shrub (genet) density as a percentage of the pretreatment populations, due to vigorous sprouting from cut stems. However, following 2 additional years of clipping, percent stem density and percent shrub density of open-grown Amur honeysuckle were significantly ($p < 0.05$) greater than for the forest-grown populations. During the 3 year treatment period, 70% of forest-grown adult plants were killed by repeated clipping, while only 10% of adult plants from pasture plots were killed. In fact, stem density of open-grown plants continued to increase throughout the treatment period, with annual clipping resulting in stem densities approaching 3 times the original level. Percent of pretreatment net primary production (NPP) was significantly ($p < 0.05$) different between forest- and open-grown populations for all 3 years. Open-grown populations maintained NPP at between 15 and 25% of pretreatment levels throughout the experiment, while NPP of forest-grown populations fell to <5% of pretreatment levels during this time [100,105]. Although speculative, it is logical that bush honeysuckle sprouting in response to other control methods (e.g. chemical, fire) might follow a similar pattern. Open-grown plants, being comparatively more productive than forest-grown plants [99], are likely able to obtain and store greater carbohydrate levels, both prior and subsequent to repeated clipping, and therefore may be more resilient under various control treatments [105].

If desired vegetation is scarce or absent, bush honeysuckle control may be of little value. Planting native species following bush honeysuckle removal can provide a desirable composition of groundcover, shrubs, and understory trees, and may also mitigate reinvasion by bush honeysuckles and other nonnative invasive plant species [23,24,67,152].

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

Management Potential Subrank: Section V-A Management Potential

Add the total points:	**Value**
< 15 = High potential for control **>=15 = Low potential for control**	30

Transfer information to the Management Effort Subrank	

V-B MANAGEMENT ACTIVITY

Given the current state of knowledge regarding control methods, are activities being employed to suppress or eradicate this plant in Michigan.	☒ **YES**	☐ **NO**
If yes please provide documentation on management efforts being used: method(s); agency(ies); location(s).		

Public Lands		**Private Lands**	
☒	Federal (F):	☒	Non-profit organizations (O):
☒	State (S):	☒	Commercial (C):
☒	Municipal (M):	☒	Individual (I)

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☐	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level: Multiple control methods in all sectors			

Management Activity Subrank: Section V-B Management Activity

Indicate whether management activities are being employed by a letter indicating the sector involved: federal (F), state (S), municipal (M), non-profit organization (O), commercial (C), individual (I).	Value
Transfer information to the Management Effort Subrank	F,S,M,O,C,I

Section V. Management Effort Subrank

	Value
Management Potential	L
Management Activity	F,S,M,O,C,I

Section VI. Value within Michigan

Value within Michigan indicates economic, aesthetic, erosion control, and wildlife habitat value. Value is designated either as high (H), low (L), or none (N) in each of the respective categories.

Does this plant have any value?	☒ **YES**	☐ **NO**
If response is **NO** then VI = N in the value subrank table If response is **YES** then go to Section VI-B		

VI-A. Factors that Indicate a Economic, Aesthetic, Erosion Control or Wildlife Habitat

Add the points from statements that are true for this plant. Please provide documentation on the size, scope, and extent of the use of the designated plant. Please provide state and federal statistics where applicable. Record the score in the table following this section.

Agriculture: Crops and Forage		
This plant constituents more than 10% of the crop on commercial farms producing and/or using this plant within the State.	☐ **YES** **5 points**	☒ **NO** **0 points**
This plant has provided a crop, forage, or seed source (e.g., forage, nectar) that has been or resulted in a source of commercial income within the state.	☐ **YES** **5 points**	☒ **NO** **0 points**
This plant has provided a crop, forage, or seed source (e.g., forage, nectar) that is used by the general public within the state	☐ **YES** **3 points**	☒ **NO** **0 points**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☒	**Observational**
☐	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

Horticulture (Fruit, Vegetable, Herbs, and Ornamentals)		
This plant constituents more than 10% of the crop produced or sold by commercial growers within the State	☐ **YES** **5 points**	☒ **NO** **0 points**
This plant has provided a crop, forage, and/or seed source that has been or resulted in a source of commercial income within the state	☒ **YES** **5 points**	☐ **NO** **0 points**
This plant has provided a crop, forage, or seed source (e.g., forage, nectar) that is used by the general public within the state	☒ **YES** **3 points**	☐ **NO** **0 points**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☒	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

Amur honeysuckle has been cultivated as an ornamental in North America [106,131,150], and as of 1996, was still commercially available [106]. (Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

The bush honeysuckles have been promoted for decades by the US Dept. of Agriculture and by commercial nurseries for their wildlife, shelterbelt, and ornamental value. Many state and private nurseries still sell them, although less widely than previously (Luken and Theiret 1996). (Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract: The bush honeysuckles. The Nature Conservancy. Available at http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

Nursery stock product. (USDA Plants Database; http://plants.usda.gov)

Turf (Sod, Golf Course, Commercial Turf (sport fields, schools, etc)		
This plant constituents more than 10% of the crop produced or sold by commercial growers within the state	☐ **YES** **5 points**	☒ **NO** **0 points**
This plant has provided turf, forage, and/or seed source that has been, or resulted in a source of commercial income within the state	☐ **YES** **5 points**	☒ **NO** **0 points**
This plant contribute significantly to recreation and leisure activities	☐ **YES** **3 points**	☒ **NO** **0 points**
This plant is used in land development (public and private property)	☐ **YES** **3 points**	☒ **NO** **0 points**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☐	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

Forestry (Wood, Pulp, Christmas Trees)		
This plant constituents more than 10% of the crop produced, managed, or sold by commercial forest/Christmas tree operations within the state	☐ **YES** **5 points**	☒ **NO** **0 points**
This plant has provided timber, pulp, plantations, seedlings/transplants, and/or seed orchards that has been or resulted in a source of commercial income for public and private forestry	☐ **YES** **5 points**	☒ **NO** **0 points**
This plant has value added wildlife and environmental benefits during production cycles within forest operations	☐ **YES** **5 points**	☒ **NO** **0 points**
This plant has provided timber, plantations, seed orchard, or recreational uses by non-commercial property owners within the state	☐ **YES** **3 points**	☒ **NO** **0 points**

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☐	**Other published material**	☒	**Anecdotal**
Comments, supportive evidence, and explanation of documentation level:			

Landscape (Public and Private)		
This plant is currently sold in national or regional retail stores, Michigan garden centers, horticultural distribution centers or by landscape contractors	☒ YES 5 points	☐ NO 0 points
This plant is used in residential and commercial landscapes	☒ YES 5 points	☐ NO 0 points
This plant is use in public landscapes	☒ YES 5 points	☐ NO 0 points

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	Reviewed scientific publication	☐	Observational
☒	Other published material	☐	Anecdotal

Comments, supportive evidence, and explanation of documentation level:

'Rem Red' is a Soil Conservation Service, USDA introduction that grows 8'-12'. It is a seed-produced cultivar. (Dirr 1998)

The bush honeysuckles have been promoted for decades by the US Dept of Agriculture and by commercial nurseries for their wildlife, shelterbelt, and ornamental value. Many state and private nurseries still sell them, although less widely than previously (Luken and Thieret 1996). (Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract for Lonicera maackii (Rupr.) Maxim (Amur honeysuckle), Lonicera morrowii A. Gray (Morrow's honeysuckle), Lonicera tatarica L. (Tatarian honeysuckle), Lonicera x bella Zabel (Bell's honeysuckle): the bush honeysuckles. The Nature Conservancy, Arlington, Virginia. unpaginated. http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

Beginning in the 1960s, USDA Soil Conservation Service developed and distributed the Amur honeysuckle cultivar 'Rem-Red' for use as an ornamental shrub, promoted as valuable for wildlife and as useful for soil conservation and as a windbreak, border, hedge, or screen [95,150]. Amur honeysuckle, along with Tatarian honeysuckle and Morrow's honeysuckle, is among species recommended for use in strip mine site reclamation [77,185].

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

Erosion: Soil and Water Erosion		
This plant has been and/or is currently used in erosion control practices such as soil erosion, storm water management, phyto-remediation, bank stabilization, etc.	☒ YES 5 points	☐ NO 0 points
This plant is specified and used by federal and state agencies in erosion control practices	☐ YES 5 points	☒ NO 0 points
This plant is specified and used by private contractors in erosion control and/or habitat restoration	☐ YES 5 points	☒ NO 0 points
This plant provides value added benefits in wildlife conservation	☒ YES 3 points	☐ NO 0 points

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

'Rem Red' is a Soil Conservation Service, USDA introduction that grows 8'-12'. It is a seed-produced cultivar. (Dirr 1998)

The bush honeysuckles have been promoted for decades by the US Dept of Agriculture and by commercial nurseries for their wildlife, shelterbelt, and ornamental value. Many state and private nurseries still sell them, although less widely than previously (Luken and Thieret 1996). (Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract for Lonicera maackii (Rupr.) Maxim (Amur honeysuckle), Lonicera morrowii A. Gray (Morrow's honeysuckle), Lonicera tatarica L. (Tatarian honeysuckle), Lonicera x bella Zabel (Bell's honeysuckle): the bush honeysuckles. The Nature Conservancy, Arlington, Virginia. unpaginated. http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

Beginning in the 1960s, USDA Soil Conservation Service developed and distributed the Amur honeysuckle cultivar 'Rem-Red' for use as an ornamental shrub, promoted as valuable for wildlife and as useful for soil conservation and as a windbreak, border, hedge, or screen [95,150]. Amur honeysuckle, along with Tatarian honeysuckle and Morrow's honeysuckle, is among species recommended for use in strip mine site reclamation [77,185].

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Wildlife: Food and Shelter		
This plant is currently used in wildlife management	☐ YES 5 points	☒ NO 0 points
This plant is specified or used by wildlife organizations in habitat restoration or feed plot establishment	☐ YES 5 points	☒ NO 0 points
This plant is specified and used by federal and state agencies in providing shelter and/or feed sources on public lands	☒ YES 5 points	☐ NO 0 points
This plant provides value added benefits in soil and water conservation	☒ YES 3 points	☐ NO 0 points

Level of Documentation

Place a check next to the most accurate category and briefly explain			
☐	**Reviewed scientific publication**	☐	**Observational**
☒	**Other published material**	☐	**Anecdotal**

Comments, supportive evidence, and explanation of documentation level:

It appears that if other food is present, birds will pass over Amur honeysuckle. (Dirr 1998)

The exotic bush honeysuckles may provide an important source of winter food for birds in areas where it is abundant and few other shrubs survive (Whelan and Dilger 1992). Despite their low fat content and extreme bitterness, L. maackii fruits, which persist into the middle of the winter in Ohio, are consumed by a variety of birds (Ingold 1983). In a study undertaken in southwestern Ohio, deer mice were found to be the major small mammal consumers of L. maackii fruits (Williams et al 1992). (Batcher and Stiles 2000)

The bush honeysuckles have been promoted for decades by the US Dept of Agriculture and by commercial nurseries for their wildlife, shelterbelt, and ornamental value. Many state and private nurseries still sell them, although less widely than previously (Luken and Thieret 1996).

(Batcher, M.S. and S.A. Stiles. 2000. Element stewardship abstract for Lonicera maackii (Rupr.) Maxim (Amur honeysuckle), Lonicera morrowii A. Gray (Morrow's honeysuckle), Lonicera tatarica L. (Tatarian honeysuckle), Lonicera x bella Zabel (Bell's honeysuckle): the bush honeysuckles. The Nature Conservancy, Arlington, Virginia. unpaginated. http://tncweeds.ucdavis.edu/esadocs/documnts/loni_sp.pdf)

Although it appears bush honeysuckles are typically planted for other purposes, they may provide some value for wildlife and are occasionally planted for this use. According to Sharp and Belcher [150], Tatarian honeysuckle has been planted for summer wildlife food in the eastern U.S., and Luken and Thieret [106] state Amur honeysuckle has been planted in the eastern U.S. for wildlife habitat "improvement."

White-tailed deer browse bush honeysuckle twigs and foliage [150]. Vellend [180] confirmed the presence of Tatarian honeysuckle, Morrow's honeysuckle, Bell's honeysuckle, and Amur honeysuckle seeds in white-tailed deer scat in central New York, but it is unclear if fruits were eaten purposely or inadvertently. Bush honeysuckle fruits are borne in leaf axils, so white-tailed deer that are browsing on leaves and twigs are also likely to ingest fruits in season. While Velland [180] did not specify which plant parts are selected by deer, he inferred that leaves and twigs are purposely browsed, and it is obvious that fruits are at least not avoided.

Tatarian honeysuckle is browsed by eastern cottontail [64,150]. Small mammals eat fallen bush

honeysuckle fruit in late winter and early spring [150]. Deer mice extract and consume Amur honeysuckle seeds from intact fruits. However, it is speculated that relative presence or absence of Amur honeysuckle has little effect on small mammal forage habitat quality, and conversely, small mammal seed predation probably has little influence on Amur honeysuckle fecundity [195].

Bush honeysuckle fruits are eaten at least occasionally by songbirds, and avian frugivory is thought to be an important bush honeysuckle seed dispersal mechanism. Amur honeysuckle fruits are eaten at least occasionally by songbirds, especially in winter. . .

Bush honeysuckles probably provide some cover for wildlife. Amur honeysuckle provides nesting sites and protection for songbirds from late spring to late fall, and cover for rabbits [150]. Tatarian honeysuckle provides year-round cover for birds and small mammals [95].

However, indirect effects of bush honeysuckle invasion on wildlife may be difficult to predict. Schmidt and Whelan [141] examined the effect of Amur honeysuckle invasion on nest predation of American robins in northern Illinois deciduous woodlands. 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 (Crataegus 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 (see Seasonal Development) and sturdy branches. In fact, American robins significantly ($r2=0.912$, $p<0.01$) increased their use of Amur honeysuckle over the 6-year study period. Wood thrush also nested in Amur honeysuckle, although use was apparently limited by competition from American robins.

Beginning in the 1960s, USDA Soil Conservation Service developed and distributed the Amur honeysuckle cultivar 'Rem-Red' for use as an ornamental shrub, promoted as valuable for wildlife and as useful for soil conservation and as a windbreak, border, hedge, or screen [95,150]. Amur honeysuckle, along with Tatarian honeysuckle and Morrow's honeysuckle, is among species recommended for use in strip mine site reclamation [77,185].

(Munger, Gregory T. 2005. Lonicera spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/)

Value Within Michigan Subrank: Section VI: Value within Michigan

Please total the points for each area and place them in the appropriate column.

Subrank	**Agriculture**	**Horticulture**	**Turf**	**Forestry**	**Landscape**	**Erosion Control**	**Wildlife Habitat**
	Crop and Forage	**Fruit, Vegetable, Ornamentals**	**Sod, Golf Course, Commercial Turf**	**Wood, Pulp, Christmas Trees**	**Public and Private**	**Soil and Water**	**Food and Shelter**
Points	0	8	0	0	15	8	8
Rating	**0=N <5= L >8 =H**	**0=N <5= L >8 =H**	**0=N <5= L >10 =H**	**0=N <5= L >8 =H**	**0=N <5= L >10 =H**	**0=N <5= L >8 =H**	**0=N <5= L >8 =H**

Section VII. Invasiveness Rank, MIPC Plan of Action, and Plant Summary Report

Section VII is for use by MIPC. The Invasive Plant Assessment Committee will use the information provided in Sections I-VI to establish an Invasiveness Rank (based on Potential Invasiveness and Impact for each systems within the four ecological regions), a MIPC Plan of Action, and a Plant Summary Report.

Potential Invasiveness

Potential Invasiveness is a based on biological characteristics that may predispose a plant to invasive behavior. Reproductive Ability (Seed and Vegetative) + Dispersal = Potential Invasiveness.

Determine a Reproductive Ability value for this plant using the table below and the scores from the Seed and Vegetative reproduction sections on Biological Character

Reproductive Ability

Table of Reproductive Ability Values

		Vegetative Reproduction			
		H	M	L	I
Seed Reproduction	H	H	H	H	H
	M	H	M	M	L
	L	H	M	L	L
	I	H	I	I	I

	Value
Enter the Reproductive Ability Value for this plant:	H

Use the Reproductive Ability Value and the Dispersal rating from Section 1. to determine the Potential Invasiveness Value for this plant from the table below.

Potential Invasiveness

Table of Potential Invasiveness Values

		Dispersal			
		H	M	L	I
Reproductive Ability	H	H	H	M	M
	M	H	M	M	L
	L	M	M	L	L
	I	I	I	I	I

	Value
Enter the Potential Invasiveness Value for this plant:	H

Invasiveness Rank is a function of Potential Invasiveness and Impact. Impact is the expression of potential invasiveness under a given set of environmental conditions within a system (Natural System, Forest Production, Constructed Habitats, Ag/Hort/Turf Production, and Urban and Suburban Landscapes). Impact may vary among or within ecological regions. A plant's impact may occur over a broad set of environmental conditions (temperature, light, water) or be limited by one or more factors specific to a system or ecological region.

Table of Invasiveness Rank

		Impact			
		H	M	L	I
Potential Invasiveness	H	H	H	M	M
	M	H	M	M	L
	L	M	M	L	L
	I	I	I	I	I

Invasiveness Rank

Determine the Invasiveness rank for each system:	Value
Natural System	H
Forest Production	H
Ag/Hort/Turf Production	I
Constructed Habitats	M
Urban and Suburban Landscapes	M

Regional Importance

Distribution establishes the regional importance of a plant's impact on Michigan's natural, production, managed, and constructed systems. Use Invasiveness rank for each system and the Regional Impact rating for each ecological region from Section III. to determine regional importance. Regional importance is recorded as: high (H); medium (M); and low (L); and Insignificant (I)

Conversion table for determining Regional Importance

		Regional Impact			
		N	W	L	I
Invasiveness Rank	H	H	H	M	I
	M	H	M	M	I
	L	M	M	L	I
	I	I	I	I	I

Regional Importance

Regional Importance in five system types in each of four ecological regions.

Record the Invasiveness Rank for each system within each ecological region below.		System Type				
		Natural	Constructed Habitats	Managed Forests	Suburban/ Urban	Ag/Hort/ Turf
Ecological Region	WUP	I	I	I	I	I
	EUP	I	I	I	I	I
	NLP	H	M	M	M	I
	SLP	H	M	M	M	I

This information will aid in assessing and determining the overall MIPC Plan of Action.

MIPC Plan of Action

MIPC Plan of Action is based on the information obtained through this assessment. The Plan of Action is develop by the MIPC Invasive Plant Assessment Committee for review and endorsement of the MIPC Board of Directors. The Plan of Action outlines recommendation that may include one or all of the following: Education; Suppression; Restoration; and Elimination.

References

References	

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