

NAME OF SPECIES: <i>Anaplophora glabripennis</i> (Motschulsky)	
Synonyms: <i>Anaplophora nobilis</i>	
Common Name: Asian longhorned beetle, Starry sky beetle	
A. CURRENT STATUS AND DISTRIBUTION	
I. In Wisconsin?	1. YES NO X
	2. Abundance:
	3. Geographic Range:
	4. Habitat Invaded:
	5. Historical Status and Rate of Spread in Wisconsin:
	6. Proportion of potential range occupied:
II. Invasive in Similar Climate Zones	YES X NO United States: New York (1996), Illinois (1998), New Jersey (2002) Canada: Ontario (2003) Europe: Austria (2001), France (2003), Germany (2004)
III. Invasive in Similar Habitat Types	YES X NO Agricultural areas, disturbed areas natural forests, planted forests, shrub/shrublands, urban areas
IV. Habitat Affected	1. Host plants: Preferred: <i>Acer</i> , esp. <i>A. saccharum</i> , <i>Aesculus</i> , <i>Salix</i> , <i>Ulmus</i> Acceptable: <i>Betula</i> , <i>Fraxinus</i> , <i>Platanus</i> Occasional/rare: <i>Albizia</i> , <i>Celtis</i> , <i>Populus</i> , <i>Sorbus</i> Questionable in US: <i>Hibiscus</i> , <i>Malus</i> , <i>Morus</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Quercus</i> , <i>Robinia</i> , <i>Tilia</i>
	2. Conservation significance of threatened habitats: More than 650 vertebrate species and over 1800 native vascular plants are found in the state. Some of these wildlife species are popular game species, such as whitetail deer, ruffed grouse and wild turkey. Non-game wildlife species such as herptiles, which include salamanders and frogs, depend on breeding habitat in ephemeral pools that form on the forest floor. Songbirds nest in forested habitats, from fallen snags to high up in the canopy. Other species require large blocks of forest. Urban forests help with storm water run-off and the urban heat-island effect. Trees and green space affect energy usage reducing the need both for heating and air conditioning which in turn reduces pollution from burning fossil fuels. Trees increase property values by 5 to 20%
V. Native Habitat	1. Countries: China, Korea
	2. Hosts: <i>Populus</i> spp. (15 species), <i>Salix matsudana</i> , <i>Ulmus pumila</i> , <i>U. laeuig</i> , <i>Acer</i> spp. (9 species)
VI. Legal Classification	1. Quarantined species? YES X NO
	2. By what states, countries? United States: NY, NJ, IL Canada: ON Europe: Austria, France, Germany

B. ESTABLISHMENT POTENTIAL AND LIFE HISTORY TRAITS

I. Life History	1. Type of insect: Coleoptera: Cerambycidae
	2. Time to Maturity: Native and North America: 1-2 years
	3. Methods of Spread: Adult flight; adult transport on vehicles. Transportation of infested material: nursery stock, cargo, firewood, illegal dumping in landfills outside quarantine areas
II. Climate	1. Climate restrictions: China: severe damage occurs 21-43 N° latitude, 100-127° E longitude, representing four climate zones: Transitional zones between Tropical (south) Warm temperate zone (north), Warm temperate zone, Cool temperate zone, Arid temperate zone
	2. Effects of potential climate change: Estimated temperature for maximum fecundity and egg hatch is 23-24°C and eggs hatch fastest at 29°C. Warmer temperatures will allow higher hatch and survival rate and may reduce the life cycle to one year and move into more northern forests. Maximum tolerable temperature unknown.
III. Dispersal Potential	1. Invasion pathways: Natural dispersal: Adult flight: males Transportation of infested material: Nursery stock, raw timber products, cargo, firewood, illegal dumping of infested material outside of quarantine zones.
	2. Distinguishing characteristics that aid in its survival and/or inhibit its control: Under the bark for over 90% of its life cycle and tree canopy structure protects from aerial insecticide treatments and detection by natural enemies. Extremely broad host range and able to expand host range as it enters new regions and encounters new tree species.
IV. Ability to go Undetected	HIGH X MEDIUM LOW
	Signs and symptoms: Jet black beetles (1-1.5 inches long) with 20 white or yellow spots on elytra and black and white banded antenna 1.3-1.5 X the length of the body. Oviposition sites chewed into the bark, dime-sized emergence holes, sap and frass. Dieback of the upper third of a tree, followed by a large number of shoots or branches arising below the dead portions of the trunk.

C. DAMAGE POTENTIAL

I. Competitive Ability	1. Presence of Natural Enemies: Predators: Cucujidae, Ostomidae, Cleridae, Colydiidae (<i>Dastarcus longulus</i>), and Elateridae beetles; Asilidae, Xylophagidae, and Rhagionidae flies; Phymatidae and Reduviidae bugs; predaceous thrips; carpenter ants Parasitoids: Braconidae (<i>Ontsira</i> sp.), Ichneumonidae (<i>Xylophrurus coreensis</i> , <i>Schreineria</i> sp., <i>Megarhyssa</i> sp.), Bethyidae (<i>Scleroderma guani</i>), Encyrtidae (<i>Oophagus batocerae</i> , <i>Zaommoencyrtus brachytarsus</i>), Eulophidae (<i>Aprostocetus</i> spp., <i>Euderus albitarsis</i>), Gasteruptiidae, Pteromalidae, Eupelmidae, and Eurytomidae, wasps; and Tachinidae (<i>Bullaea</i> sp. <i>Billaea irrorata</i>) and Sarcophagidae flies Entomopathogens: <i>Beauveria bassiana</i> , <i>B. brongniartii</i> , Spiders: <i>Achaearanea tepidariorum</i> (Aranae: Theridiidae) Birds: Woodpeckers
	2. Presence of Competitors: Unknown

	3. Rate of Spread: Adult flight: males may fly up to 1029 m, gravid females 1442 m/season, depending on host availability and habitat structure.
II. Environmental Effects	1. Alteration of ecosystem/community composition? YES X NO Notes: Forests are maturing, hence maple is becoming a more predominant species as a later successional tree. Wisconsin is covered by about 46% of forests. Statewide, the average urban canopy cover is 29% of the urban area, 4.7% of all forests. Hardwoods cover approximately 84% total timberland of three main forest types: Maple/Basswood: 5.3 million acres Aspen/Birch: 3.4 million acres Oak/Hickory: 2.9 million acres
	2. Alteration of ecosystem/community structure? YES X NO Notes: Removal of later successional trees will allow growth of earlier successional vegetation and coinciding communities.
	3. Alteration of ecosystem/community functions and processes? YES X NO Notes: Open canopies will increase amount of light and temperature reaching forest floor, which affects microbial activity and vegetation. Successional processes will reset
III. Socio-economic	1. Effects of Restricting Entry: Typical cerambycids infest dying or recently dead wood contribute to the natural “recycling process”, breaking down potential wood sources for other organisms and contributing to soil creation and enrichment. However, this insect attacks healthy organisms positively integrated with established ecosystems, so there would be no negative effects restricting entry.
	2. Effects on Human Health: Insect causes structural damage of trees creating hazards. Maple is a popular shade tree landscape choice for property owners.
D. PREVENTION AND CONTROL	
I. Detection Capability:	Notes: Visual inspection: ground survey, bucket trucks, tree climbers for oviposition sites, emergence holes, sap and frass. Detection/monitoring methods currently being developed include pheromones, kairomones, and bait/sentinel trees for adults, and acoustic technology for infested trees.
II. Costs of Prevention :	Notes: Quarantine enforcement, detection and monitoring, fumigation of containers, destruction of infested material.
III. Responsiveness to prevention efforts:	Notes: Public education to recognize signs and symptoms necessary for early detection and rapid response.
IV. Control tactics:	Most control methods are currently being researched. 1. Cultural: Cut and chip and/or burn infested trees; remove or chemically treat host trees within 0.5 mile radius of infested hosts; do not remove during adult emergence and flight unless bark sprayed prior to removal; irradiation of wood packing material; development of resistant hosts. 2. Biological: No biological control methods are currently being applied, however many are being investigated. Predators: Cucujidae, Ostomidae, Cleridae, Colydiidae (<i>Dastarcus longulus</i>), and Elateridae beetles; Asilidae, Xylophagidae, and Rhagionidae flies; Phymatidae and Reduviidae bugs; predaceous

	<p>thrips; carpenter ants</p> <p>Parasitoids: Braconidae (<i>Ontsira palliates</i>, <i>Ontsira anoplophorae</i>, <i>Ontsira</i> sp.), Ichneumonidae (<i>Xylophrurus coreensis</i>, <i>Schreineria</i> sp., <i>Megarhyssa</i> sp.), Bethyidae (<i>Scleroderma guani</i>), Encyrtidae (<i>Oophagus batocerae</i>, <i>Zaommoencyrtus brachytarsus</i>), Eulophidae (<i>Aprostocetus prolixus</i>, <i>Aprostocetus fukutai</i>, <i>Euderus albitarsis</i>), Gasteruptiidae, Pteromalidae, Eupelmidae, and Eurytomidae, wasps; and Tachinidae (<i>Bullaea</i> sp. <i>Billaea irrorata</i>) and Sarcophagidae flies</p> <p>Entomopathogens: <i>Beauveria bassiana</i>, <i>B. brongniatrii</i>, <i>Metarhizium anisopliae</i>, <i>Paecilomyces farinosus</i>, <i>Acremonium chrysogenum</i>, <i>Bacillus thuringiensis</i></p> <p>Nematodes: <i>Steinernema carpocapsae</i>, <i>S. feltiae</i>, <i>Heterorhabditis marelatus</i></p> <p>Spiders: <i>Achaearanea tepidariorum</i> (Aranae: Theridiidae)</p> <p>Birds: Woodpeckers</p> <p>3. Chemical: Soil or trunk injections with systemic insecticides (imidachlopid, thischlopid, emamectin benzoate); bark sprays (cyhalothrin, cyfluralin, permethrin, bifenthrin, deltamethrin), ethanedinitrile, container fumigations with methyl bromide</p> <p>4. Regulatory: Quarantine</p>
V. Minimum Effort:	Notes: Develop monitoring/detection technology and public outreach.
VI. Most Effective Control:	Notes: At this time, the only accepted official means of dealing with trees having any signs of ALB in the US is to cut down all infested trees, chip and burn all of the wood, and grind the stump.
VII. Cost of prevention or control vs. Cost of allowing invasion to occur:	<p>Notes: Forest products and forest-based recreation account for 12 percent of the Gross State Product and 18 percent of the jobs in Wisconsin. Sugar maple industry seriously threatened. The estimated maximum potential national urban impact is a loss of 34.9% of total canopy cover, 30.3% tree mortality (1.2 billion trees) and value loss of \$669 billion.</p> <p>The ALB has the potential to cause more damage than Dutch elm disease, chestnut blight, and gypsy moths combined, destroying millions of acres of America's treasured hardwoods, including national forests and backyard trees. The beetle has the potential to damage such industries as lumber, maple syrup, nursery, commercial fruit, and tourism accumulating over \$41 billion in losses.</p>
VIII. Non-Target Effects of Control:	Notes: Any consequences of chemical controls. Multiple chemical treatments harmful to the tree. Non-target effects of biological controls are still being studied.
IX. Efficacy of monitoring:	Notes: Approximately one-third of all infested trees detected
X. Legal and landowner issues:	Notes: Regulatory and quarantine protocols have been put in place and public awareness is required for their success.

F. REFERENCES USED:

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