

NEW YORK TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

Scientific name: Agrilus planipennis
 Common names: Emerald Ash Borer, EAB (well-known acronym)
 Native distribution: China, Mongolia, North Korea, South Korea, Japan, Taiwan, and the Russian Far East
 Date assessed: 6/12/2013
 Assessors: E. Schwartzberg
 Reviewers: _____
 Date Approved: _____ Form version date: 3 January 2013

New York Invasiveness Rank: Very High (Relative Maximum Score >80.00)

Distribution and Invasiveness Rank (Obtain from PRISM invasiveness ranking form)		
Status of this species in each PRISM:	Current Distribution	PRISM Invasiveness Rank
1 Adirondack Park Invasive Program	Not Assessed	Not Assessed
2 Capital/Mohawk	Not Assessed	Not Assessed
3 Catskill Regional Invasive Species Partnership	Not Assessed	Not Assessed
4 Finger Lakes	Not Assessed	Not Assessed
5 Long Island Invasive Species Management Area	Not Assessed	Not Assessed
6 Lower Hudson	Not Assessed	Not Assessed
7 Saint Lawrence/Eastern Lake Ontario	Not Assessed	Not Assessed
8 Western New York	Not Assessed	Not Assessed

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	30 (30)	30
2	Biological characteristic and dispersal ability	30 (30)	27
3	Ecological amplitude and distribution	30 (30)	29
4	Difficulty of control	10 (10)	10
	Outcome score	100 (100) ^b	96 ^a
	Relative maximum score †		96.00
	New York Invasiveness Rank §	Very High (Relative Maximum Score >80.00)	

* For questions answered "unknown" do not include point value in "Total Answered Points Possible." If "Total Answered Points Possible" is less than 70.00 points, then the overall invasive rank should be listed as "Unknown."

† Calculated as 100(a/b) to two decimal places.

§ Very High >80.00; High 70.00–80.00; Moderate 50.00–69.99; Low 40.00–49.99; Insignificant <40.00

A. DISTRIBUTION (KNOWN/POTENTIAL): Summarized from individual PRISM forms

A1.1. Has this species been documented to persist without cultivation in NY? (reliable source; voucher not required)	
<input checked="" type="checkbox"/>	Yes – continue to A1.2
<input type="checkbox"/>	No – continue to A2.1; Yes <input type="checkbox"/> NA; Yes <input type="checkbox"/> USA
A1.2. In which PRISMs is it known (see inset map)?	
<input type="checkbox"/>	Adirondack Park Invasive Program
<input checked="" type="checkbox"/>	Capital/Mohawk
<input checked="" type="checkbox"/>	Catskill Regional Invasive Species Partnership
<input checked="" type="checkbox"/>	Finger Lakes
<input type="checkbox"/>	Long Island Invasive Species Management Area
<input checked="" type="checkbox"/>	Lower Hudson
<input type="checkbox"/>	Saint Lawrence/Eastern Lake Ontario



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<input checked="" type="checkbox"/>	Western New York
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Documentation:

Sources of information:

TNYISC 2013, iMapInvasives 2013.

A2.0. Is this species listed on the Federal Injurious Fish and Wildlife, Noxious Weed or PPQ Action Required list?

- Yes – the species will automatically be listed as Prohibited, no further assessment required.
 No – continue to A2.1.

A2.1. What is the likelihood that this species will occur and persist given the climate in the following PRISMs? (obtain from PRISM invasiveness ranking form)

- | | |
|-------------|--|
| Very Likely | Adirondack Park Invasive Program |
| Very Likely | Capital/Mohawk |
| Very Likely | Catskill Regional Invasive Species Partnership |
| Very Likely | Finger Lakes |
| Very Likely | Long Island Invasive Species Management Area |
| Very Likely | Lower Hudson |
| Very Likely | Saint Lawrence/Eastern Lake Ontario |
| Very Likely | Western New York |

Documentation:

Sources of information (e.g.: distribution models, literature, expert opinions):

Present in adjacent PRISMS (TNYISC 2013, iMapInvasives 2013).

If the species does not occur and is not likely to occur with any of the PRISMs, then stop here as there is no need to assess the species.

A2.2. What is the current distribution of the species in each PRISM? (obtain rank from PRISM invasiveness ranking forms)

Adirondack Park Invasive Program	Distribution
Capital/Mohawk	Not Present
Catskill Regional Invasive Species Partnership	Restricted
Finger Lakes	Restricted
Long Island Invasive Species Management Area	Restricted
Lower Hudson	Not Present
Saint Lawrence/Eastern Lake Ontario	Common
Western New York	Not Present
	Common

Documentation:

Sources of information:

TNYISC 2013, iMapInvasives 2013.

A2.3. Describe the potential or known suitable habitats within New York. Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

- | | | |
|---|---|---|
| <p>Aquatic Habitats</p> <p><input type="checkbox"/> Salt/brackish waters</p> <p><input type="checkbox"/> Freshwater tidal</p> <p><input type="checkbox"/> Rivers/streams</p> <p><input type="checkbox"/> Natural lakes and ponds</p> <p><input type="checkbox"/> Vernal pools</p> <p><input type="checkbox"/> Reservoirs/impoundments*</p> | <p>Wetland Habitats</p> <p><input type="checkbox"/> Salt/brackish marshes</p> <p><input type="checkbox"/> Freshwater marshes</p> <p><input type="checkbox"/> Peatlands</p> <p><input type="checkbox"/> Shrub swamps</p> <p><input type="checkbox"/> Forested wetlands/riparian</p> <p><input type="checkbox"/> Ditches*</p> <p><input type="checkbox"/> Beaches and/or coastal dunes</p> | <p>Upland Habitats</p> <p><input checked="" type="checkbox"/> Cultivated*</p> <p><input checked="" type="checkbox"/> Grasslands/old fields</p> <p><input checked="" type="checkbox"/> Shrublands</p> <p><input checked="" type="checkbox"/> Forests/woodlands</p> <p><input type="checkbox"/> Alpine</p> <p><input checked="" type="checkbox"/> Roadsides*</p> |
|---|---|---|

Other potential or known suitable habitats within New York:

Urban areas

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Documentation:
Sources of information:
GISD 2013.

B. INVASIVENESS RANKING

1. ECOLOGICAL IMPACT

1.1. Impact on Ecosystem Processes and System-wide Parameters (e.g., energy cycle, nutrient and mineral dynamics, light availability, or fire regime).

- A. No perceivable impact on ecosystem processes based on research studies or the absence of impact if a species is widespread and/or has been present in the northeast for > 50 years. 0
- B. Influences ecosystem processes to a minor degree 3
- C. Significant alteration of ecosystem processes 7
- D. Major, possibly irreversible, alteration or disruption of ecosystem processes 10
- U. Unknown

Score

Documentation:

Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)

Causes widespread mortality of ash trees and can result in altered canopy composition, effecting light availability, community composition, plant defense chemistry, and nutrient cycling.

Sources of information:

Gandhi and Herms 2010a.

1.2. Impact on Terrestrial Community Composition (species specific)

- A. No perceived impact; causes no apparent change in native populations 0
- B. Influences community composition (e.g., reduces the number of individuals in one or more native species in the community) 3
- C. Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community) 7
- D. Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community) 10
- U. Unknown

Score

Documentation:

Identify type of impact or alteration:

As of 2004, 15 million trees were dead or dying as a result of emerald ash borer (Poland and McCullough 2006). This beetle will cause major alterations in community structure by through death of ash trees (Poland and McCullough 2006, Gandhi and Herms 2010b).

Sources of information:

Poland and McCullough 2006, Gandhi and Herms 2010b.

1.3. Impact on other species or species groups (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades).

- A. Negligible perceived impact – no host damage 0
- B. Minor impact – limited host damage (aesthetics or restricts commercial trade) 3
- C. Moderate impact - extensive damage – kills host in 2-5 years (prohibits commercial trade) 7
- D. Severe impact on other species or species groups – kills or predisposed host within 2 years (prohibits commercial trade) 10
- U. Unknown

Score

Documentation:

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Identify type of impact or alteration: (control methods and time-term required)
 Severe impact on ash trees. Kills host within 2-4 years.
 Sources of information:
 NYSDEC 2013a.

Total Possible	30
Section One Total	30

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode and rate of reproduction (population dynamic - fecundity)

- A. No reproduction (does not complete life cycle) 0
- B. Limited reproduction (minimal population expansion - able to complete only 1 life cycle) 3
- C. Moderate reproduction (mod. population expansion - able to complete 2 or 3 life cycles) 5
- D. Abundant and/or asexual reproduction (high population expansion – able to complete more than 3 lifecycles) 8
- U. Unknown (life cycle information is not available)

Score 5

Documentation:

Describe key reproductive characteristics:
 Sexual reproduction with a 1-2 year life cycle. Females lay 60-90 eggs in their lifetime (USDA-APHIS 2011).
 Sources of information:
 USDA-APHIS 2011.

2.2. Innate potential for long-distance dispersal (e.g. under it's own power)

- A. Does not occur (no long-distance dispersal mechanisms) 0
- B. Infrequent or inefficient long-distance dispersal (little or no flight capacity) 2
- C. Moderate capabilities for long-distance dispersal (up to 5 miles) 4
- D. High capabilities for long-distance dispersal (5 miles or greater) 6
- U. Unknown

Score 6

Documentation:

Identify dispersal mechanisms:
 Mated females fly longer distances than males or unmated females at distances up to 20 km.
 Sources of information:
 Taylor et al. 2004.

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, spread along highways, transport on cargo, contaminated firewood, compost, land and vegetation management equipment such as mowers and excavators, soil, etc.)

- A. Does not occur 0
- B. Low (human dispersal to new areas occurs almost exclusively by direct means and is infrequent or inefficient) 1
- C. Moderate (human dispersal to new areas occurs by direct and indirect means to a moderate extent) 2
- D. High (opportunities for human dispersal to new areas by direct and indirect means are numerous, frequent, and successful) 3
- U. Unknown

Score 3

Documentation:

Identify spread mechanisms:

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Mechanisms of human-assisted dispersal include nursery trade and forestry, including moving firewood.

Sources of information:

Muirhead et al. 2006, USDA-APHIS 2010a.

2.4. Potential to be spread by acts of nature (hurricanes, flooding, storms, etc.), and by other animals (mammals/birds/reptiles/insects).

- A. Does not occur 0
- B. Low (rarely occurs – 5 or more years between occurrences, requires a severe event) 1
- C. Moderate (sometimes occurs – less than every 3-5 years, requires a moderate event) 2
- D. High (commonly transported by nature and/or animals – may occur every 1-2 years) 3
- U. Unknown

Score

Documentation:

Identify spread mechanisms:

Long distance dispersal, e.g. longer distance than can be accounted for by flight distances, is likely due to human transport rather than by other animals or acts of nature.

Sources of information:

Muirhead et al. 2006.

2.5. Characteristics that increase competitive advantage such as not being palatable, no primary predator, eats many hosts, has natural or chemical defenses, fills a vacant niche, has tolerance to various extremes such as pH, temperatures, etc., is a generalist, has highly evolved defense mechanisms, has behavioral adaptations, etc.

- A. Possesses no characteristics that increase competitive advantage 0
- B. Possesses one (1) or two (2) characteristic that increases competitive advantage 2
- C. Possesses three (3) or four (4) characteristics that increase competitive advantage 4
- D. Possesses five (5) or more characteristics that increase competitive advantage 8
- U. Unknown

Score

Documentation:

Describe competitive advantages:

EAB parasitoids rare in North America (Liu et al. 2003), the beetle lives under tree bark (TNYISC 2013), and is transported easily by humans in firewood (Muirhead 2006), and is cold (Crosthwaite et al. 2011) and heat (Sobek et al. 2011) tolerant.

Sources of information:

Liu et al. 2003, Muirhead 2006, Crosthwaite et al. 2011, Sobek et al. 2011, TNYISC 2013.

2.6. Other species in the genus invasive in New York or elsewhere

- A. No 0
- B. Yes 2
- U. Unknown

Score

Documentation:

Species:

Agrilus biguttatus

Total Possible	30
Section Two Total	27

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3. ECOLOGICAL AMPLITUDE AND DISTRIBUTION

3.1. Current introduced distribution in the North America (which includes: Antigua, Barbuda, Bahamas, Barbados, Belize, Canada, Costa Rica, Cuba, Dominica, Dominican Rep., El Salvador, Granada, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, St. Kitts & Nevis, St. Lucia, St. Vincent, Grenadines, Trinidad and Tobago and the United States)

- A. Not known to be established in North America 0
- B. Established as a non-native in one country in North America. 1
- C. Established as a non-native in 2 or 3 countries in North America. 2
- D. Established as a non-native in 4 or more countries in North America. 3
- U. Unknown

Score

Documentation:

Identify countries and provinces invaded:
Quebec and Ontario, Canada, United States.
Sources of information:
TNYISC 2013, CFIA 2013.

3.2. Current introduced distribution in the northeastern USA (CT, DE, ME, MD, MA, NH, NJ, PA, RI, VT, VI, WV) and eastern Canada (In Canada, includes Nova Scotia, Prince Edward Island, New Brunswick, and parts of Quebec and Ontario lying south of the 47th parallel of latitude.)

- A. Not known from the northeastern US and adjacent Canada 0
- B. Established as a non-native in one northeastern USA state and/or eastern Canadian province. 1
- C. Established as a non-native in 2 or 3 northeastern USA states and/or eastern Canadian provinces. 2
- D. Established as a non-native in 4 or more northeastern USA states and/or eastern Canadian provinces, and/or categorized as a problem species (e.g., "Invasive") in 1 northeastern state or eastern Canadian province. 4
- U. Unknown

Score

Documentation:

Identify states and provinces invaded:
IL, IN, KY, MD, MI, MN, MS, NY, OH, PA, VA, WV, WI.
Sources of information:
USDA-APHIS 2010b, TNYIS 2013.

3.3. Current introduced distribution of the species in natural areas in the eight New York State PRISMs (Partnerships for Regional Invasive Species Management)

- A. Established in none of the PRISMs 0
- B. Established in 1 PRISM 1
- C. Established in 2 or 3 PRISMs 3
- D. Established in 4 or more PRISMs 5
- U. Unknown

Score

Documentation:

Describe distribution:
Present in all PRISMs except AIPPP, SLELO, and LIISMA.
Sources of information:
TNYISC 2013, iMapInvasives 2013.

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- 3.4. Distance to known occurrences in the northeastern USA and eastern Canada.
- A. No population known to be established 0
 - B. Established population in nonadjacent states/provinces 3
 - C. Established population in adjacent states/provinces 5
 - U. Unknown
- Score

Documentation:
Identify reason for selection, or evidence Established or reported in several adjacent northeastern states.
Sources of information:
TNYISC 2013.

- 3.5. Number of habitats the species may invade
- A. Not known to invade any natural habitats given at A2.3 0
 - B. Known to occur in 2 or 3 of the habitats given at A2.3, with at least 1/ 2 a natural habitat. 2
 - C. Known to occur in 4 or more of the habitats given at A2.3, with at least 3 a natural habitat. 4
 - U. Unknown
- Score

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:
Forests, shrublands, cultivated (including plantations), urban areas, grasslands, roadsides.
Sources of information:
GISD 2013, USDA-APHIS 2010b.

- 3.6. Role of human and natural disturbance in establishment
- A. Requires human disturbances to establish. 0
 - B. May occasionally establish in undisturbed areas but can readily establish in areas with natural or human disturbances. 1
 - C. Can establish independent of any known human or natural disturbances. 3
 - U. Unknown
- Score

Documentation:
Describe distribution:
Can attack healthy trees.
Sources of information:
GISD 2013.

- 3.7. Climate in native range (e.g., similar latitudinal range)
- A. Native range does not include climates similar to New York 0
 - B. Native range possibly includes climates similar to portions of New York. 3
 - C. Native range includes climates similar to those in New York 6
 - U. Unknown
- Score

Documentation:
Describe what part of the native range is similar in climate to New York:
Native range includes climate similar to NY, and beetle is established within New York State.
Sources of information:
ADAFF 2013.

Total Possible

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Section Three Total 29

4. DIFFICULTY OF CONTROL & DETECTION

4.1. Re-establishment potential

- A. No known vector for re-establishment following removal 0
- B. Re-establishment from 1 vector following removal 1
- C. Re-establishment from 2-3 vectors following removal 2
- D. Re-establishment from > 3 vectors following removal 3
- U. Unknown

Score 3

Documentation:

Describe re-establishment potential:

Transport of infested firewood, ash nursery stock, unprocessed ash logs, and other ash products.

Sources of information:

TNYISC 2013.

4.2. Status of monitoring protocols for species

- A. No known monitoring protocols exist 0
- B. Monitoring protocols are available from other countries or states 1
- C. Monitoring protocols appropriate to New York State are available 2
- U. Unknown

Score 2

Documentation:

Describe protocols:

Detailed program manual available.

Sources of information:

USDA-APHIS 2011.

4.3. Status of monitoring resources (e.g. tools, manpower, travel, traps, lures, ID keys, taxonomic specialists, etc.)

- A. No known monitoring resources are available 0
- B. Monitoring resources may be available 1
- C. Established resources are available including commercial and/ or research tools 2
- U. Unknown

Score 2

Documentation:

Identify types of control methods and time-term required:

Taxonomic visual key available (Zablotny n.d.). New traps currently being designed (Penn State News 2013. Michael Domingue, pers. correspondence). New York State quarantine in effect (TNYISC 2013, NYSDEC 2013). Detailed program manual available.

Sources of information:

Zablotny n.d., USDA-APHIS 2011, Penn State News 2013, TNYISC 2013, NYSDEC 2013b, Michael Domingue, Personal correspondence.

4.4. Level of effort required

- A. Management is not required: e.g., species does not persist without repeated human mediated action. 0
- B. Management is relatively easy and inexpensive; invasive species can be maintained at low abundance causing little or no ecological harm. (e.g., 10 or fewer person-hours of manual effort can eradicate a local infestation in 1 year.) 1
- C. Management requires a major short-term investment, and is logistically and politically challenging; eradication is difficult, but possible. (e.g., 100 or fewer person-hours/year of 2

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- manual effort, or up to 10 person-hours/ year for 2-5 years to suppress a local infestation.)
- D. Management requires a major investment and is logistically and politically difficult; eradication may be impossible. (e.g., more than 100 person-hours/ year of manual effort, or more than 10 person hours/year for more than 5 years to suppress a local infestation.) 3
- U. Unknown

Score

3

Documentation:

Describe level of effort:

Management tactics include monitoring, biological control, trapping and eradication efforts.

This is a costly, logistically, and politically difficult effort.

Sources of information:

USDA-APHIS 2011.

Total Possible

10

Section Four Total

10

Total for 4 sections Possible

100

Total for 4 sections

96

C. STATUS OF HYBRIDS:

Hybrids (crosses between different parent species) should be assessed individually and separately from the parent species wherever taxonomically possible, since their invasiveness may differ from that of the parent species. An exception should be made if the taxonomy of the species and hybrids are uncertain, and species and hybrids can not be clearly distinguished in the field. In such cases it is not feasible to distinguish species and hybrids, and they can only be assessed as a single unit.

Some hybrids of the species known to be available:

References for species assessment:

Australian Department of Agriculture, Fisheries, and Forestry (ADAFF). 2012. Climatch Mapping Tool. <<http://adl.brs.gov.au:8080/Climatch/climatch.jsp>>; [Accessed on December 20, 2012].

Canadian Food Inspection Agency (CFIA) 2013. Agrilus planipennis – Emerald Ash Borer.

<<http://www.inspection.gc.ca/plants/plant-protection/insects/emerald-ash-borer/eng/1337273882117/1337273975030>>;[Accessed on June 12, 2013].

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Gandhi, K. J., & Herms, D. A. (2010a). Direct and indirect effects of alien insect herbivores on ecological processes and interactions in forests of eastern North America. Biological Invasions, 12(2), 389-405.

Gandhi, K. J., & Herms, D. A. (2010b). North American arthropods at risk due to widespread Fraxinus mortality caused by the alien emerald ash borer. Biological Invasions, 12(6), 1839-1846.

Global Invasive Species Database (GISD). 2013. Agrilus planipennis.

<<http://www.issg.org/database/species/ecology.asp?si=722>>; [Accessed on June 12, 2013].

iMapInvasives: An Online Mapping Tool for Invasive Species Locations. 2012. <iMapInvasives.org>; [Accessed on December 20, 2012].

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- National Agricultural Pest Information System. Pest Tracker. 2013.
<<http://pest.ceris.purdue.edu/pest.php?code=INAHQJA>>; [Accessed on June 12, 2013].
- New York State Department of Environmental Conservation. 2013a. Emerald Ash Borer (EAB).
<<http://www.dec.ny.gov/animals/7253.html>>; [Accessed on June 13, 2013].
- New York State Department of Environmental Conservation. 2013b. Firewood and Invasive Insects Don't Move Firewood - You Could be Killing Our Trees!
<<http://www.dec.ny.gov/animals/28722.html>>; [Accessed on June 12, 2013].
- Penn State News. 2013. Decoys could blunt spread of ash-killing beetles.
<<http://news.psu.edu/story/263533/2013/02/12/research/decoys-could-blunt-spread-ash-killing-beetles>>; [Accessed on June 12, 2013].
- Poland, T. M., & McCullough, D. G. (2006). Emerald ash borer: invasion of the urban forest and the threat to north Americas ash resource. *Journal of Forestry*, 104(3), 118-124.
- Sobek, S., Rajamohan, A., Dillon, D., Cumming, R. C., & Sinclair, B. J. (2011). High temperature tolerance and thermal plasticity in emerald ash borer *Agrilus planipennis*. *Agricultural and Forest Entomology*, 13(3), 333-340.
- Taylor, R. A. J., L. S. Bauer, D. L. Miller, and R. A. Haack. 2004. Emerald ash borer flight potential. In: Emerald ash borer research and technology development meeting, Ed. V. Mastro and R. Reardon The New York Invasive Species Clearinghouse (TNYISC). 2013. Cornell Cooperative Extension Invasive Species Program. Emerald Ash Borer. <<http://www.nyis.info/index.php?action=eab>>; [Accessed on June 12, 2013].
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<http://www.aphis.usda.gov/import_export/plants/manuals/domestic/downloads/emerald_ash_borer_manual.pdf>; [Accessed on June 13, 2013].
- United States Department of Agriculture-Animal Plant Health Inspection Service (USDA-APHIS). 2010a. Risk Assessment of the Movement of Firewood within the United States.
<http://www.emeraldashborer.info/files/USDA_APHIS_firewood_pathway_assessment_May_2010.pdf>; [Accessed on June 13, 2013].
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<http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/background.shtml>; [Accessed on June 12, 2013].
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<<http://www.emeraldashborer.info/files/agriscrn.pdf>>; [Accessed on June 12, 2013].

Citation: The New York Terrestrial Invertebrate Invasiveness Ranking Form is an adaptation of the New York Plant Invasiveness Ranking Form. The original plant form may be cited as: Jordan, M.J., G. Moore and T.W. Weldy. 2008. Invasiveness ranking system for non-native plants of New York. Unpublished. The Nature Conservancy, Cold Spring Harbor, NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, NY.

Acknowledgments: The New York Terrestrial Invertebrate Invasiveness Ranking Form incorporates components and approaches used in several other systems, cited in the references below. Valuable contributions by members of

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the Invasive Species Council and Invasive Species Advisory Committee were incorporated in revisions of this form. Members of the Office of Invasive Species Coordination's Four-tier Team, who coordinated the effort, included representatives of the New York State Department of Environmental Conservation* (Division of Fish, Wildlife and Marine Resources, Division of Lands and Forests, Division of Water); The Nature Conservancy; New York Natural Heritage Program; New York Sea Grant; Lake Champlain Sea Grant; New York State Department of Agriculture and Markets* (Division of Plant Industry and Division of Animal Industry); Cornell University* (Department of Natural Resources and Department of Entomology); New York State Nursery and Landscape Association; New York Farm Bureau; Brooklyn Botanic Garden; Pet Industry Joint Advisory Council; Trout Unlimited; United States Department of Agriculture Animal and Plant Health Inspection Service* (Plant Protection and Quarantine and Wildlife Services); New York State Department of Transportation; State University of New York Albany and Plattsburgh; and Cary Institute of Ecosystem Studies. Those organizations listed with an asterisk comprised the Terrestrial Invertebrate Working Group.

References for ranking form:

The Analytic Hierarchy Process Prioritization Pest List for 2009. 2009. New York State Department of Agriculture, Division of Plant Industry.

Guidelines for the Import of Live Terrestrial Invertebrates. 2004. Commonwealth of Australia, Department of the Environment, Water, Heritage and the Arts.

Guidelines for Pathway-Initiated Pest Risk Assessment. 2000. United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Permits and Risk Assessment, Commodity Risk Analysis Branch, 4700 River Road, Unit 133, Riverdale, MD 20737-1236.

Jordan, M.J., G. Moore and T.W. Weldy. 2008. Invasiveness Ranking System for Non-native Plants of New York. Unpublished. The Nature Conservancy, Cold Spring Harbor, NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, New York.

Natural Resources Board Order No. IS-34-06, Invasive Species Identification, Classification and Control. 2008. Wisconsin Department of Natural Resources, Madison, Wisconsin.

List of Specimens taken to be Suitable for Live Import. 1999. Environment Protection and Biodiversity Conservation Act 1999.