

NEW YORK TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

Scientific name: Sirex noctilio; Amylostereum areolatum
 Common names: Sirex Woodwasp; Symbiotic Fungus
 Native distribution: Europe, Asia and North Africa
 Date assessed: 7/8/2013
 Assessors: D. Adams
 Reviewers: _____
 Date Approved: _____ Form version date: 3 January 2013

New York Invasiveness Rank: High (Relative Maximum Score 70.00-80.00)

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

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	30 (30)	20
2	Biological characteristic and dispersal ability	30 (30)	21
3	Ecological amplitude and distribution	30 (30)	25
4	Difficulty of control	10 (10)	9
	Outcome score	100 (100) ^b	75 ^a
	Relative maximum score [†]		75
	New York Invasiveness Rank [§]	High (Relative Maximum Score 70.00-80.00)	

* 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 checked="" 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 checked="" type="checkbox"/>	Long Island Invasive Species Management Area	
<input checked="" type="checkbox"/>	Lower Hudson	
<input checked="" type="checkbox"/>	Saint Lawrence/Eastern Lake Ontario	
<input checked="" type="checkbox"/>	Western New York	

NEW YORK TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

Documentation:

Sources of information:

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):

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)

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

Documentation:

Sources of information:

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.

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

Other potential or known suitable habitats within New York:

Forest pest species.

Documentation:

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

NEW YORK
TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

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)

Sirex woodwasp can attack living pines while native species only attack dead trees. Considered to be a secondary pest in native range.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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:

Sirex woodwasp attacks exotic and domestic pine plantations, and has caused up to 80 percent tree mortality.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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:

Identify type of impact or alteration: (control methods and time-term required)

Most of the plantations impacted have been planted with North American pine species, especially Monterey pine *P. radiata*, and loblolly pine *P. taeda*.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

NEW YORK
TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

Total Possible	30
Section One Total	20

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:

Sirex woodwasp is expected to complete one generation per year throughout most of the US. Instars vary from 6 to 12. Larval stage generally takes 10-11 months. Adults emerge about 3 weeks later. Unfertilized eggs develop into males, while fertilized eggs produce females.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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:

Woodwasp, flying insect, swarms 20-50 km.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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 2

Documentation:

Identify spread mechanisms:

Most common species of exotic woodwasp detected at US ports-of-entry associated with solid wood packing material.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

**NEW YORK
TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM**

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

2

Documentation:

Identify spread mechanisms:

Storm events may increase rate of spread.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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

4

Documentation:

Describe competitive advantages:

Attacks multiple pine species, temperate tollerant, high fecundity, swarms 20-50 km.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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

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

Score

2

Documentation:

Species:

S. juvencus, S. nitobei.

Total Possible	30
Section Two Total	21

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)

NEW YORK TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

- 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 2

Documentation:

Identify states and provinces invaded:

US and Canada.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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 2

Documentation:

Identify states and provinces invaded:

New York State, Pennsylvania and Ontario Canada.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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 5

Documentation:

Describe distribution:

From the initial Oswego County site, positive findings from subsequent surveys have been identified in Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chenango, Erie, Hamilton, Jefferson, Livingston, Madison, Monroe, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Schyler, Seneca, Steuben, St. Lawrence, Wayne, Wyoming and Yates.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

3.4. Distance to known occurrences in the northeastern USA and eastern Canada.

NEW YORK
TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

- 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 PA and Ontario.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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:

Attacks pine trees almost exclusively.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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:

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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:

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

Total Possible	30
Section Three Total	25

4. DIFFICULTY OF CONTROL & DETECTION

4.1. Re-establishment potential

NEW YORK TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

- 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

Documentation:

Describe vegetative response:

Wood packing material, fire wood and storm events,.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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

Documentation:

Describe vegetative response:

The first Sirex specimens in North America were found in traps in New York in 2005.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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

Documentation:

Identify types of control methods and time-term required:

Forest health surveys conducted on a regular basis in collaboration with state and federal agency staff.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

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 manual effort, or up to 10 person-hours/ year for 2-5 years to suppress a local infestation.) 2
- 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

Documentation:

NEW YORK TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

Identify types of control methods and time-term required:

Sirex woodwasp has been successfully managed using biological control agents. The key agent is a parasitic nematode *Deladenus siricidicola* which infects the larvae and ultimately sterilizes the adult females.

Sources of information:

USDA Sirex Woodwasp Pest Alert; USDA Sirex noctilio EA

Total Possible	10
Section Four Total	9

Total for 4 sections Possible	100
Total for 4 sections	75

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:

USDA Forest Service. 2005. Sirex Woodwasp: Pest Alert

USDA APHIS. 2007. Proposed Program for Management of the Woodwasp *Sirex noctilio*: Environmental Assessment.

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 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.

NEW YORK
TERRESTRIAL INVERTEBRATES INVASIVENESS RANKING FORM

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.