

# New York State Ranking System for Evaluating Non-Native Plant Species for Invasiveness

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## INTRODUCTION

A ranking system designed to assess the invasive nature of non-native plant species was developed by The Nature Conservancy (TNC) in New York and the Brooklyn Botanic Garden (BBG) in 2008. Consequences to the native species and natural ecosystems of New York State are the focus of the ranking system. The system can be used to assess the invasive nature of non-native plant species that are established in natural/minimally managed areas in NYS, and also to assess the potential invasiveness of species that are new arrivals or are not yet present. The system is designed to be repeatable, based on the best available science, clearly explained and fully documented. Use of this system has made more analytic and transparent the process of creating lists of invasive species that may be prohibited from sale. Assessment results and documentation should also be useful in prioritizing control efforts, and developing early detection/rapid response species lists.

The NYS Office of Invasive Species Coordination (OISC) and Invasive Species Council (ISC) incorporated the New York State Invasive Plant Ranking System into their 2010 report, A Regulatory System for Non-native Species (NY ISC 2010). The NYS Department of Environmental Conservation is now developing statewide regulations in coordination with the NYS Department of Agriculture and Markets. In addition, results of this work have informed invasive species legislation in Nassau and Suffolk Counties.

## DEFINITIONS

For the purpose of the New York Invasive Plant Ranking System, an invasive plant species is a species that is: “1) nonnative to the ecosystem under consideration, and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health.” (Federal Executive Order 13112, signed in 1999 and adopted by the New York State Invasive Species Task Force in 2005). Further, for purposes of this Invasive Plant Ranking System, invasive plants are non-native species that have spread into native or minimally managed plant systems in New York. These plants cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems.

As defined here, "species" includes all synonyms, subspecies, varieties, forms, and cultivars of that species unless proven otherwise by a process of scientific evaluation. Non-native genotypes of a species (e.g. *Phragmites australis* ssp. *australis*) may be considered separate from the parent species on a case-by-case basis.

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/or 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.

In 2008 there were no known protocols or criteria for assessing the invasiveness of cultivars independent of the species to which they belong. Development of such a protocol was recognized as an important need. In 2011 the Scientific Review Committee established a Cultivar Committee (SRC-CC) with the charge of developing a Cultivar Assessment Protocol (CAP). The SRC-CC used as a starting point the Intraspecific Taxon Protocol developed by the University of Florida and the Florida Institute of Food and Agricultural Sciences (IF/IFAS 2008) which SRC-CC simplified and adapted for use in New York. A draft CAP was completed in September 2012 and is now under review.

## **RATIONALE**

Numerous ranking systems exist, but the authors felt that none were completely suitable for both assessing and predicting negative impacts to natural systems in New York State and regions in NYS due to differences in scale, purpose and emphasis. We created a ranking system that incorporates components from other systems, primarily the system adopted in Alaska (Carlson et al. 2008), the system developed by NatureServe (Morse et al. 2004; Randall et al. 2008), and plant characteristics used by Williams and Newfield (2002). Scores are given to a series of questions, and the overall point total determines the invasiveness category for NYS. As is the case for the Alaska system, the New York system requires clear documentation for answers to each question, but allows for species to be evaluated when some information is lacking. Outcomes from the system should generally agree with present knowledge and understanding.

## **NYS RANKING SYSTEM**

The New York System ranks species in a two stage process. First the species are ranked at the state level using a form that contains a series of questions in four broad categories:

	Section categories	Points
1	Ecological impact	40
2	Biological characteristic and dispersal ability	25
3	Ecological amplitude and distribution	25
4	Difficulty of control	10
	Total	100

Questions in categories 1, 2 and 4 primarily address inherent ecological and biological characteristics of the species, and its impacts and control feasibility, which are largely or entirely independent of geographical location within the species' introduced range. Questions in category 3 address the distribution and abundance of the species in the northeastern United States, eastern

Canada and New York State, and the similarity of climates in the species' native range to climates in New York.

Questions apply to areas similar in climate and habitats to New York unless specified otherwise. Therefore, questions can be answered based on a species' behavior in areas beyond the borders of New York. Without this provision it would not be possible to assess the potential invasiveness of species that are new arrivals or are not yet present. The authors consider only the present climate in the various regions of New York. We have not attempted to incorporate possible changes in future climate that might alter the assessed invasive potential of species. Climate model projections today are still too uncertain, and too difficult to apply at local scales. Perhaps such models can be used in the future. Regardless, species assessments should always be revisited and revised as required by changing circumstances and knowledge.

Points are assigned to the answers to each question. If a species' impact, characteristics, abundance or feasibility of control are known to vary in different regions of the State, answers to questions should apply to the region(s) in which the species appears to be the most invasive (i.e. has the greatest impacts, most rapid growth, greatest abundance and distribution, etc.).

The maximum possible total score for a species, if all questions can be answered, is 100 points. A "New York Invasiveness Rank" is assigned based on the "Relative maximum score" (points accrued as a percent of the maximum possible points for questions that could be answered). For example, if the maximum possible points for the questions that could be answered are 80, and the species received an Outcome Score of 60, then the species "Relative Maximum Score" would be 60/80 or 75. If the total answered points possible are fewer than 70, an invasiveness rank cannot be assigned. For justifications of impact questions and categories see (Heffernan et al. 2001 and Warner et al. 2003).

<b>New York Invasiveness Rank</b>	<b>Relative Maximum Score</b>
Very High	> 80.00
High	70.00-80.00
Moderate	50.00-69.99
Low	40.00-49.99
Insignificant	<40.00
Not Assessable	Not persistent in NY, or not found outside of cultivation

Species that rank Very High or High are considered Invasive and are recommended candidates for regulatory action. Species that rank Moderate may not be candidates for regulation but are sufficiently problematic to justify placement on an advisory "Manage List." We recommend that these Moderate species be removed from natural areas and not used as landscape plants in parks and preserves with significant environmental value.

The second stage focuses on regions within NYS, designated as a "Partnership for Regional Invasive Species Management" (PRISM). Factors considered are (1) the current abundance and distribution of the species in the PRISM, and (2) the likelihood of the species occurring or expanding within the PRISM based on suitability of habitats and climate. A combination of the

NYS Score, distribution in the PRISM and likelihood of spread are used to assign an invasiveness rank to the species for that PRISM. Invasiveness ranks for a PRISM may be the same as or lower than the NYS rank, but cannot be higher.

The Long Island Invasive Species Management Area (LIISMA) was the first PRISM to use the ranking forms. Changes to the forms were frequent during the first years of use (2008-2009). As of this writing, the most recent NYS “form version date” is April 29, 2011 and the most recent PRISM “form version date” is April 13, 2009. Species assessed during the first months of 2008 have been updated to at least the August 22, 2008 version of the NYS form.

**PROCESS FOR SPECIES ASSESSMENT AND REVIEW ON LONG ISLAND:**

Staff of the Brooklyn Botanic Garden completed the initial plant species assessments for New York State and for LIISMA with funding provided by The Nature Conservancy. Information sources used included published literature, unpublished reports, the NYS Flora Atlas, and observations of qualified botanists, ecologists and taxonomic experts from across NYS and beyond. Assessment forms were reviewed, edited and approved by the Scientific Review Committee (SRC), which was established by the LI Invasive Species Management Area in March 2008. The SRC was composed of diverse and qualified stakeholders from 13 organizations, agencies and educational institutions. Representatives from four additional organizations and agencies participated as visiting experts on an occasional basis.

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**Voting Members of the LIISMA Scientific Review Committee 2008—2010**

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Marilyn Jordan Ph.D. (Chair)	The Nature Conservancy, Long Island, NY
Gerry Moore Ph.D. (Vice Chair)	Brooklyn Botanic Garden
Dwight Andrews/ Ellen Talmage	Long Island Nursery & Landscape Association / NYS Flower Industry
Tim Green Ph.D.	Brookhaven National Laboratory
Jonathan Lehrer Ph.D.	Farmingdale State College (SUNY); Ornamental Horticulture
Gary Lawton	New York State Office of Parks, Recreation, Preservation
Allan Lindberg	Nassau County Department of Parks, Recreation & Museums
Jordan Raphael / M. Bilecki	Fire Island National Seashore (US National Park Service)
Andrew Senesac Ph.D. / Tamson Yeh	Cornell Cooperative Extension Suffolk Co.; Long Island Horticultural Research & Extension Center
Charles Scheer	NYS Farm Bureau
Kathy Schwager	Long Island Weed Information Management System database manager for LIISMA
Bill Titus/ Margaret Conover	Long Island Botanical Society
Polly Weigand	Suffolk County Soil and Water Conservation District

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**Visiting Experts (non-voting)**

Andrew Greller Ph.D.	Professor Emeritus in Biology, Queens College (CUNY)
Steve Young	New York Natural Heritage Program
Charles O'Neill/ Robert Kent	New York Sea Grant

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In 2011 SRC membership changed and 12 organizations, agencies and educational institutions were represented.

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**Voting Members of the LIISMA Scientific Review Committee 2011—2012**

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Marilyn Jordan Ph.D., Chair	The Nature Conservancy, Long Island, NY
Jonathan Lehrer Ph.D. (Vice-Chair)	Farmingdale State College (SUNY); Ornamental Horticulture
Steven Glenn	Brooklyn Botanic Garden
Dwight Andrews	Long Island Nursery and Landscape Association
Nora Catlin Ph.D.	Cornell Cooperative Extension, Floriculture
Allan Lindberg	Curator Natural Science (Retired); Nassau Co. Museum
Kathy Schwager	Brookhaven National Laboratory
Charles Scheer	NYS Farm Bureau
Andrew Senesac Ph.D.	Cornell Cooperative Extension; Long Island Horticultural Research & Extension Center
Bill Titus	Long Island Botanical Society
Polly Weigand	Suffolk County Soil and Water Conservation District
Steve Young	LIISMA Coordinator and NY Natural Heritage Program

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Andrew Greller Ph.D.	Professor Emeritus in Biology, Queens College (CUNY)
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SRC meetings were usually held twice a month from March 2008 through March 2010 for a total of 42 meetings and 175 species assessed. At most meetings four to six species were reviewed, revised, and either approved or postponed until essential missing information could be obtained.

In 2011—2012 seven additional meetings were held and 10 new species were assessed. Future meetings will be held on an “as needed” basis to assess new species, or to revisit previously assessed species in light of new information that could change a species’ invasiveness rank.

## **RESULTS FOR NEW YORK AND PRISMS**

All species assessments were unanimously approved by the LIISMA SRC. Of the 185 species assessed 69 were ranked invasive (High or Very High) for New York State and 64 were ranked invasive for LIISMA. In 2012 the Adirondack Park Invasive Plant Program (APIPP) began using the PRISM ranking form to assess nonnative plant species for invasiveness in their region. Of the 17 species assessed 15 were ranked invasive for NYS and 14 were ranked invasive for APIPP. Additional species will be assessed in the coming year.

## **PROCESS FOR SPECIES ASSESSMENT AND REVIEW BY NEW YORK STATE:**

NYS species assessment forms are available on the NY Invasive Species Information website (<http://www.nyis.info/index.php?action=israt>). Botanists and other experts in all PRISMs are invited to provide feedback. Forms are revised by BBG and TNC when appropriate based on new information and opinions. In the few cases where a species’ invasiveness rank would

change, the assessment will again be reviewed by the SRC. When final species forms will be submitted to the NYS Office of Invasive Species Coordination for use in statewide regulatory processes (NY ISC 2010).

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