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Three Invasive Plants of Potential Interest to North Carolina

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**United States Department of Agriculture (USDA)
Animal and Plant Health Inspection Service (APHIS)
Plant Protection and Quarantine (PPQ)**



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United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Plant Protection and Quarantine (PPQ)

APHIS mission: *To protect the health and value of American agriculture and natural resources.*

Development and validation of a weed screening tool for the United States.

Koop, A. L., L. Fowler, L. P. Newton, and B. P. Caton. 2012.





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Can we predict which plants will become invasive?



UGA2116025



PPQ Weed Risk Assessment Model

- Tested with 204 non-invaders, minor-invaders, and major-invaders
- 94.1% accuracy at predicting major-invaders
- 97.1% accuracy at predicting non-invaders
- No false positives or negatives



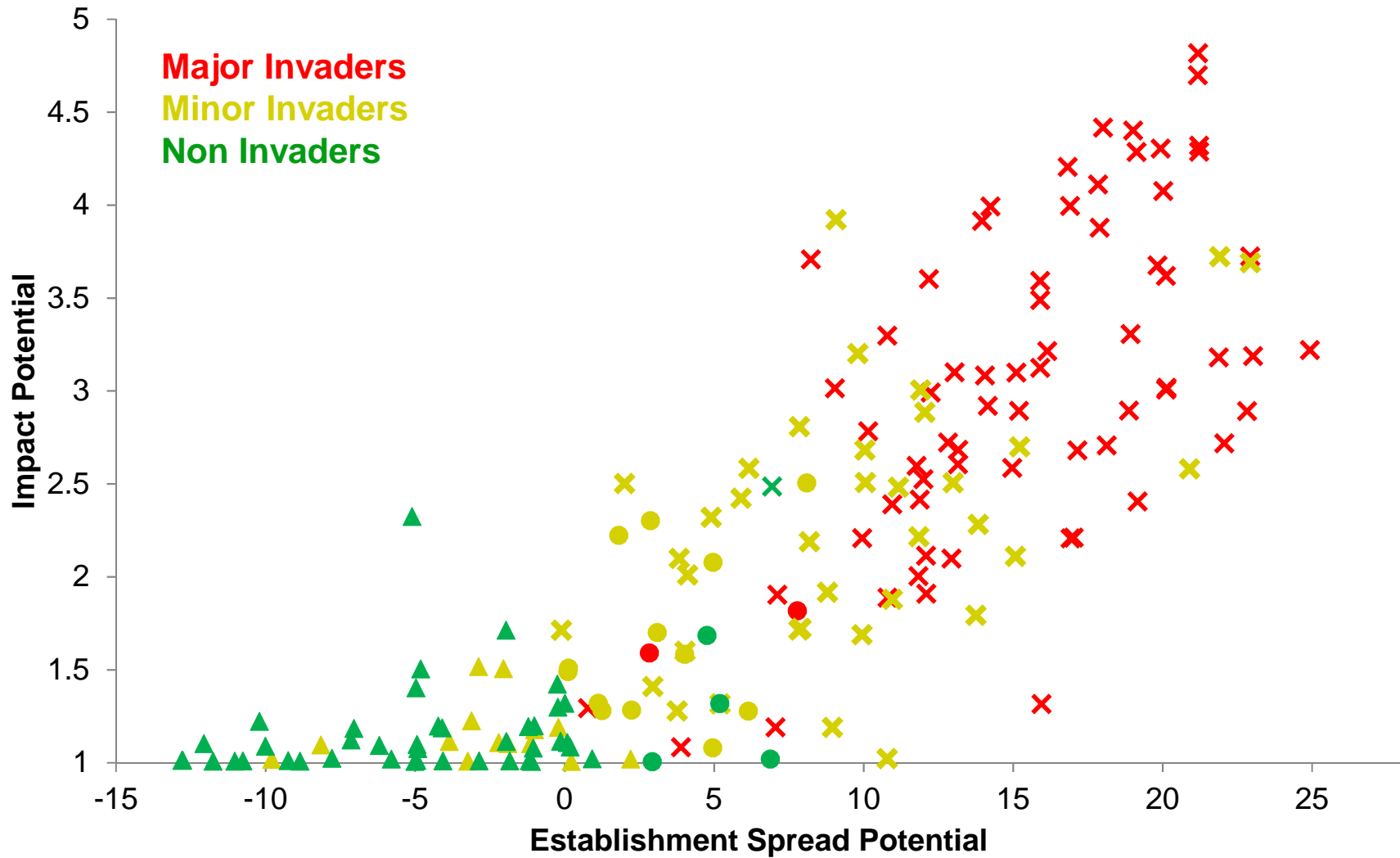
Example Questions used in the PPQ WRA

- **What is the taxon's establishment and spread status outside its native range?**
 - **Does the taxon form dense thickets, patches, or populations?**
 - **Are propagules likely to be dispersed unintentionally by human activity?**
 - **Is there evidence that a persistent (>1 year) seed bank (or other propagules) is formed?**
- Establishment and Spread**
- **Does the taxon change ecosystem processes and parameters in natural systems?**
 - **Does the taxon change species diversity in natural systems?**
- Impact**



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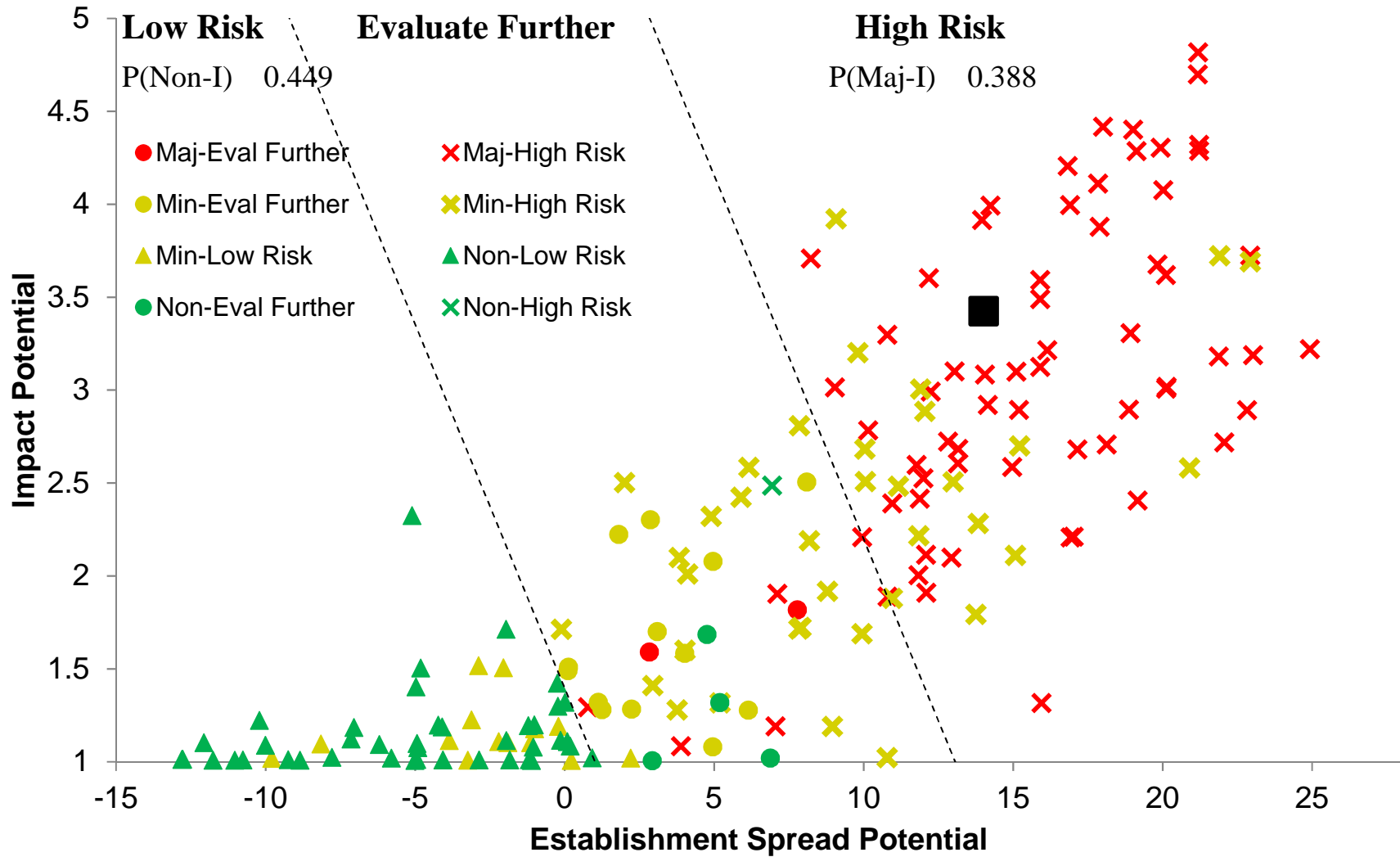
Risk Space





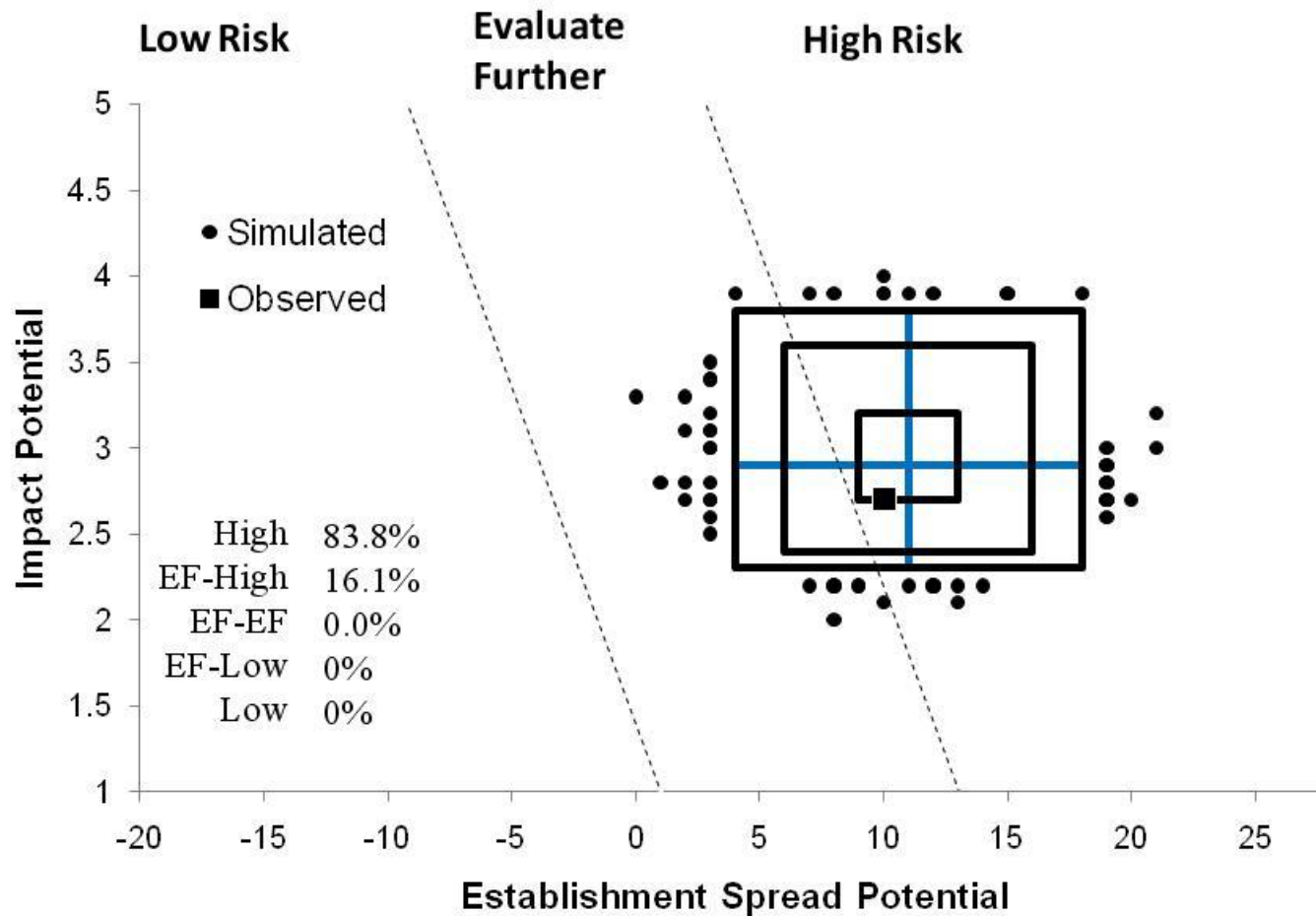
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Risk Space





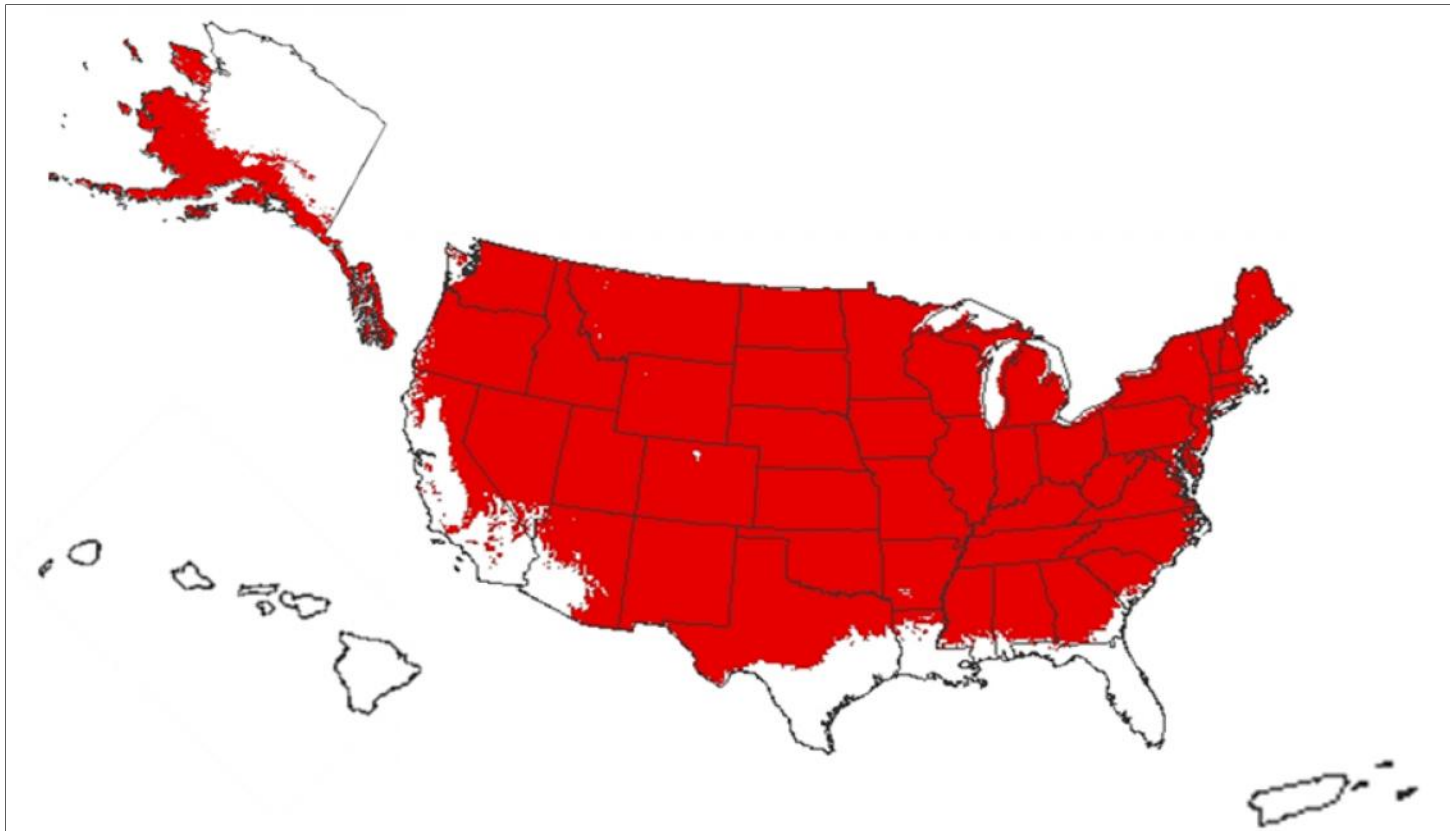
Visualization of Uncertainty





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Map of potential U.S. distribution





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Recently assessed plant species of interest to North Carolina





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Rotala rotundifolia (Buch.-Ham. ex Roxb.) Koehne



Lyn Gettys, University of Florida IFAS Extension

Robert Vidéki, Doronicum Kft., Bugwood.org



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Rotala rotundifolia

- Aquatic plant
- Naturalized and spreading in 4 counties in Florida
- Spread to Black Warrior River in Alabama (was removed)
- Produces viable seeds
- Easily spread by vegetative fragments
- Dispersed by water



5431114

U.S. Geological Survey, Bugwood.org

Rotala rotundifolia Impacts

- **In natural systems:**
 - Restricts water flow
 - Reduces light and oxygen penetration
 - Shades out native vegetation

- **In urban/suburban areas:**
 - Clogs and interferes with water drainage systems



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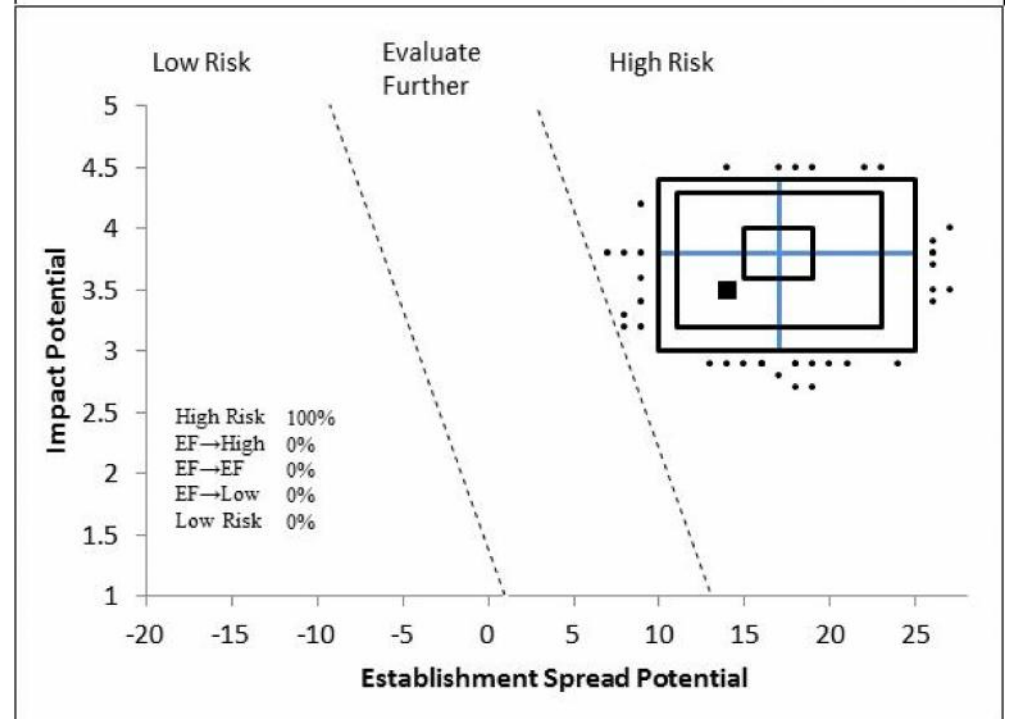
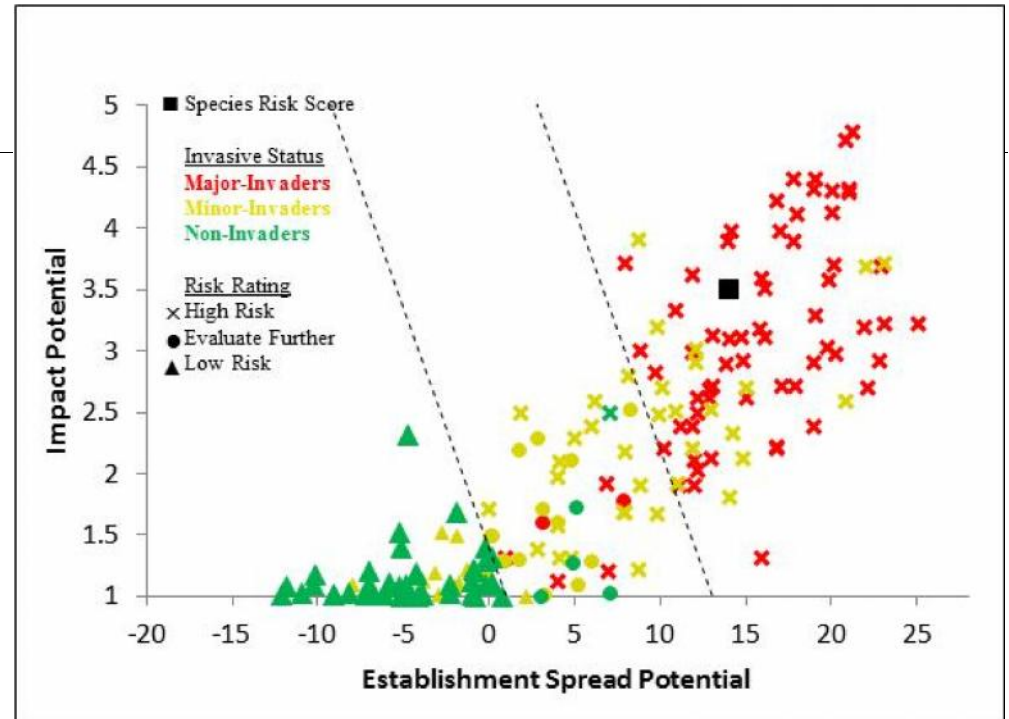
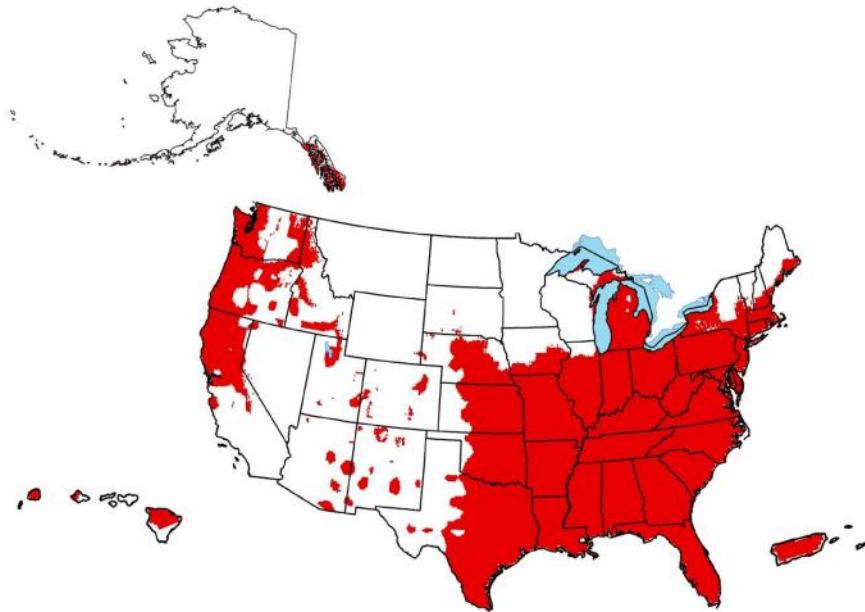


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Rotala rotundifolia

PPQ WRA Result: **High Risk**

Probability Major Invader = 78.1
Probability Minor Invader = 21.1
Probability Non Invader = 0.8





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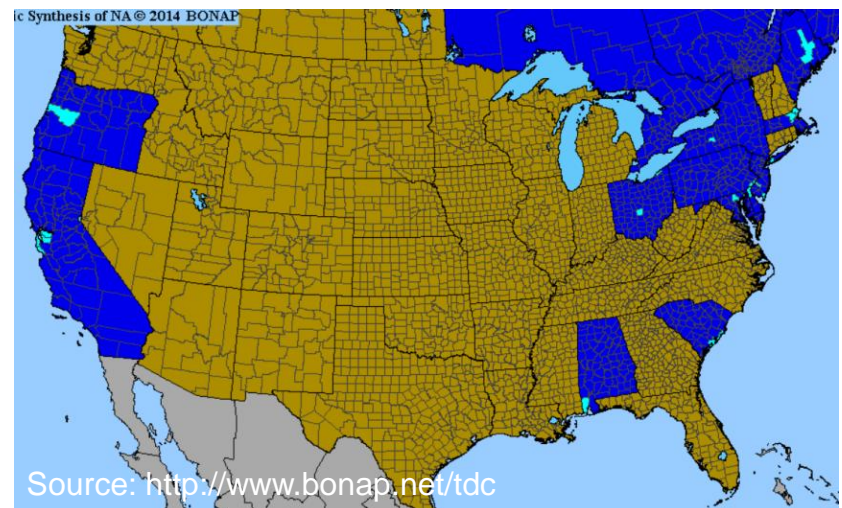
Rotala rotundifolia management



Lyn Gettys, University of Florida IFAS Extension

Mercurialis annua L.

- Annual mercury (Euphorbiaceae)
- Erect annual herb
- Often referred to as a species complex (*M. annua* s.l.) with wide range of sexual systems and ploidy levels
- Native to Africa, Asia, and Europe
- Very limited U.S. distribution (small number counties in 13 states)



Mercurialis annua

Establishment/Spread Risk Element

- Naturalized in New Zealand, Australia, and Mexico, Canada, U.S.
- *M. annua* var. *ambigua* spreading quickly in central California (5 counties)
- Prolific seed production
- Persistent seed bank
- Dense populations
- Monoecious forms self-fertile
- Seeds spread by ants, water, birds, people (e.g., landscaping activities/nursery operations)
- Some populations have herbicide resistance

Impact Risk Element

- **In production systems and urban/suburban areas:**
 - Weed in many crops and gardens
 - Yield loss (e.g., maize, sugarbeets)
 - *M. annua* var. *ambigua*: very invasive in CA nurseries (pots)
 - Toxic to livestock; affect quality of milk

- **In natural systems:**
 - Limited evidence of it occurring in natural systems
 - Australia: “Environmental weed”; displacing other more desirable annual herbs in a nature reserve
 - Concern in CA of possibly spreading to open, grassy habitats





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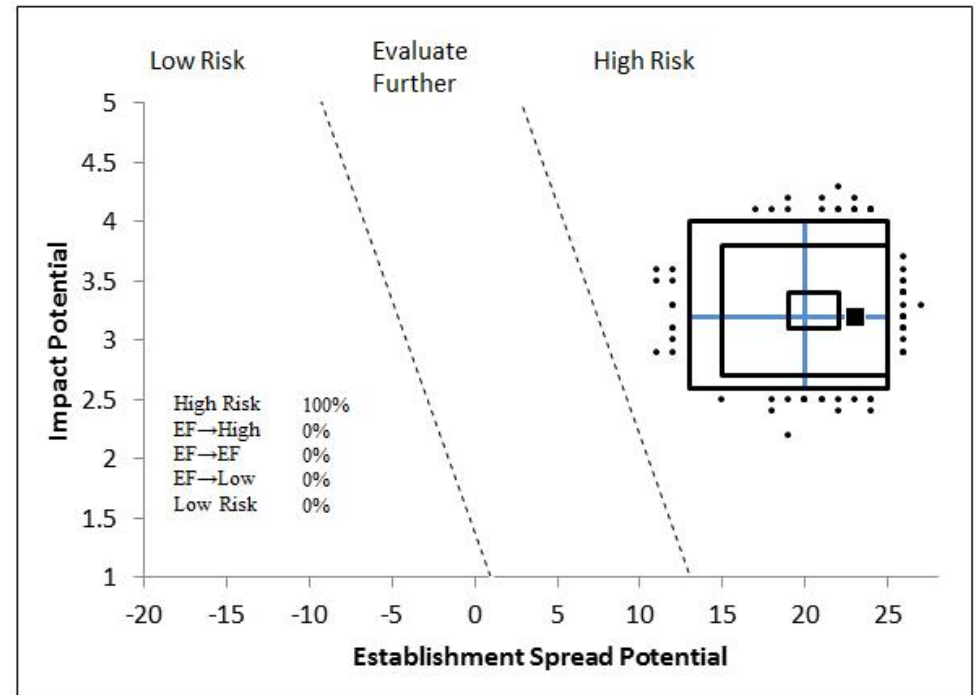
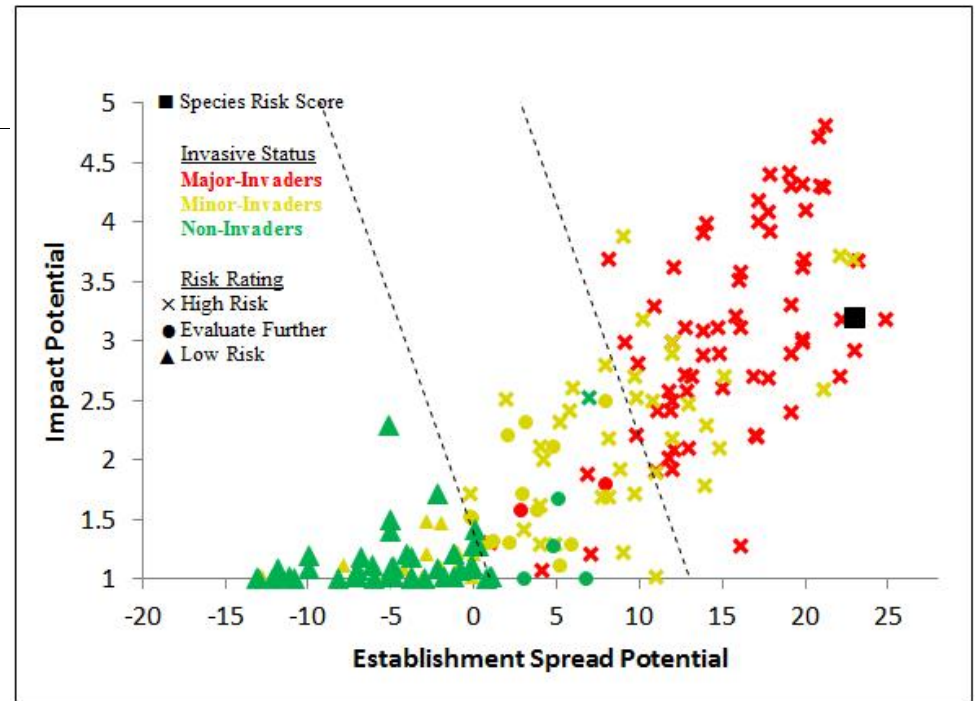
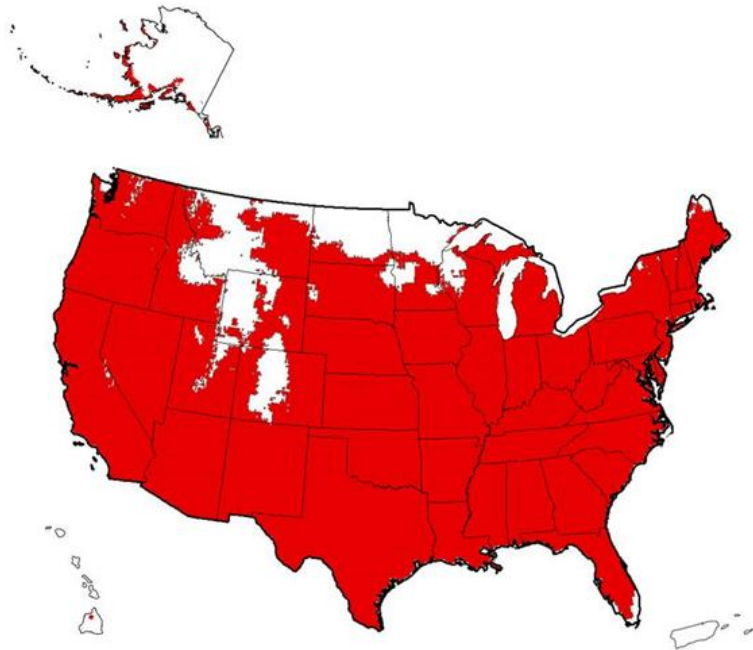
Mercurialis annua

PPQ WRA Result: **High Risk**

Probability Major Invader = 96.1

Probability Minor Invader = 3.8

Probability Non Invader = 0.1





Mercurialis annua

Management and Regulatory Status

- Controlled in production systems (chemical, tillage, soil solarization), but no evidence of control in gardens or natural systems.
- California:
 - California Invasive Plant Council Watchlist
 - Target species for the “Invasive Plant Species Early Detection in the San Francisco Bay Area Network”
 - *M. annua* var. *ambigua* (under name *M. ambigua*, Spanish mercury): State Noxious Weed; more concern for this form compared to *M. annua* s.s. (also in CA) because spreading more quickly.
- *M. annua* s.l. being considered for listing as a Federal Noxious Weed.



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Stratiotes aloides L.



Photo by Jörg Hempel, 2011



Photo by F. MacDonald
Ontario Ministry of Natural Resources and Forestry

***Stratiotes aloides* Establishment and Spread**

- Established and spread in Trent River
- Shade tolerant
- Forms dense stands
- Produces viable seeds
- Disperse unintentionally by human activity



Photo by Ontario's Invading Species Awareness Program

Stratiotes aloides Impact

- In natural systems:
 - Alters habitat structure and species diversity
 - Reduces light and oxygen penetration
 - Shades out native vegetation

- In urban/suburban areas:
 - Serrated leaves injure swimmers
 - Hinders boating/fishing activities

Photo by F. MacDonald
Ontario Ministry of Natural Resources
and Forestry

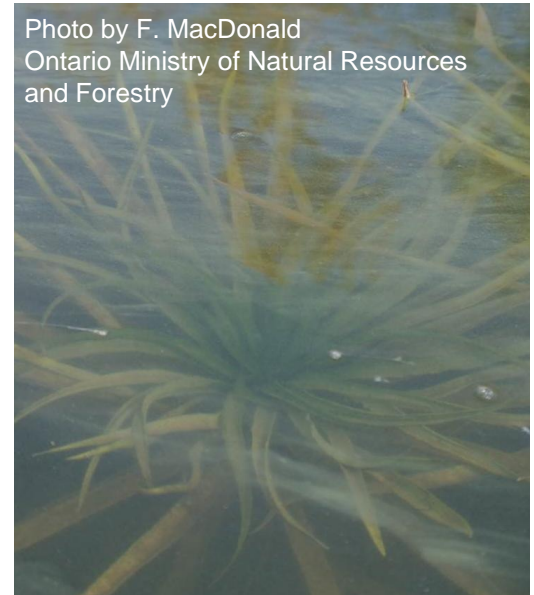


Photo by Ontario's Invading Species Awareness Program



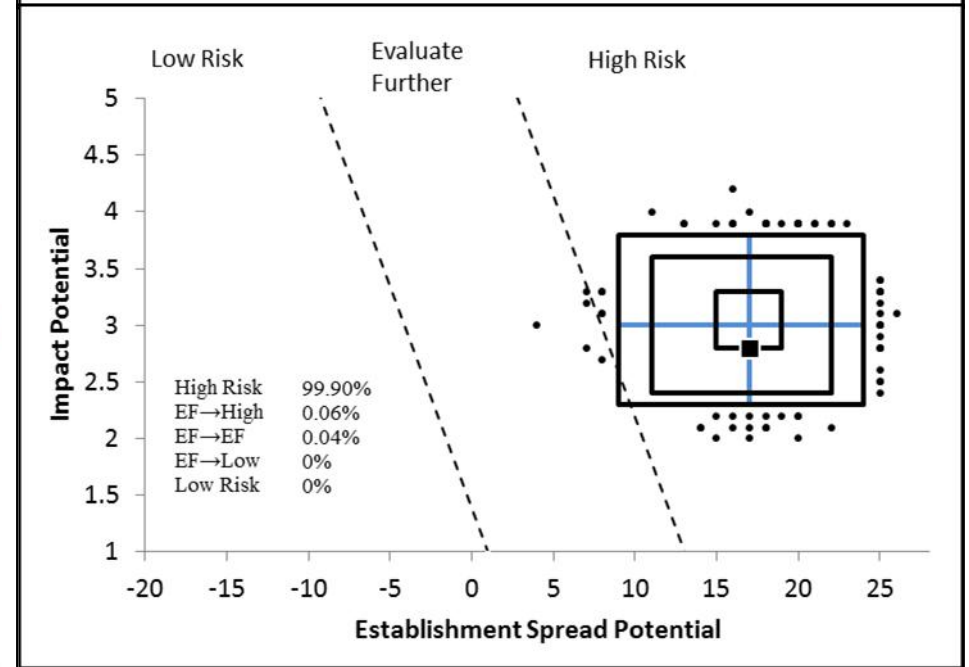
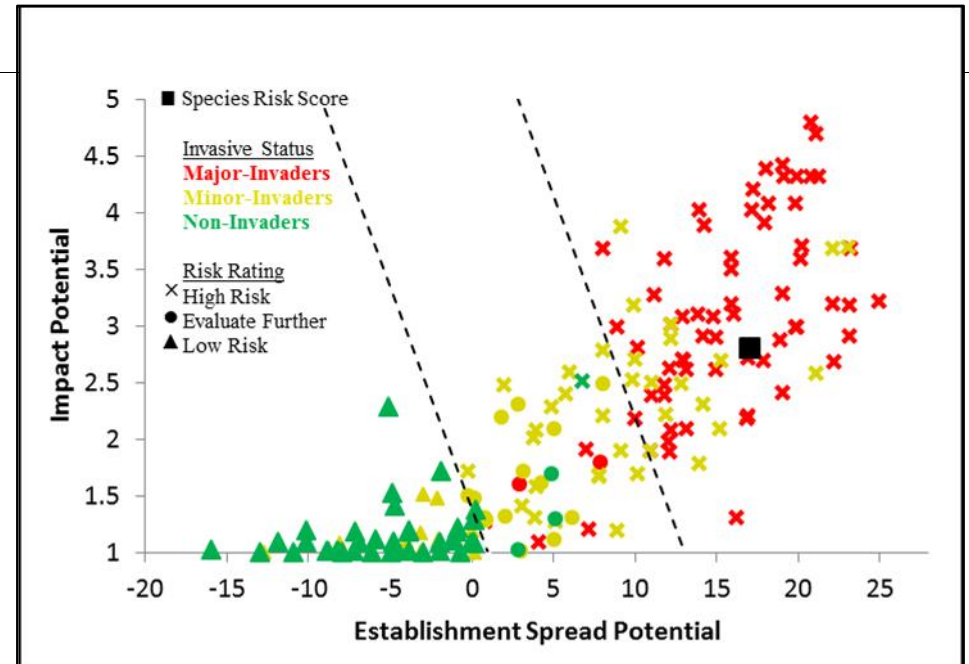
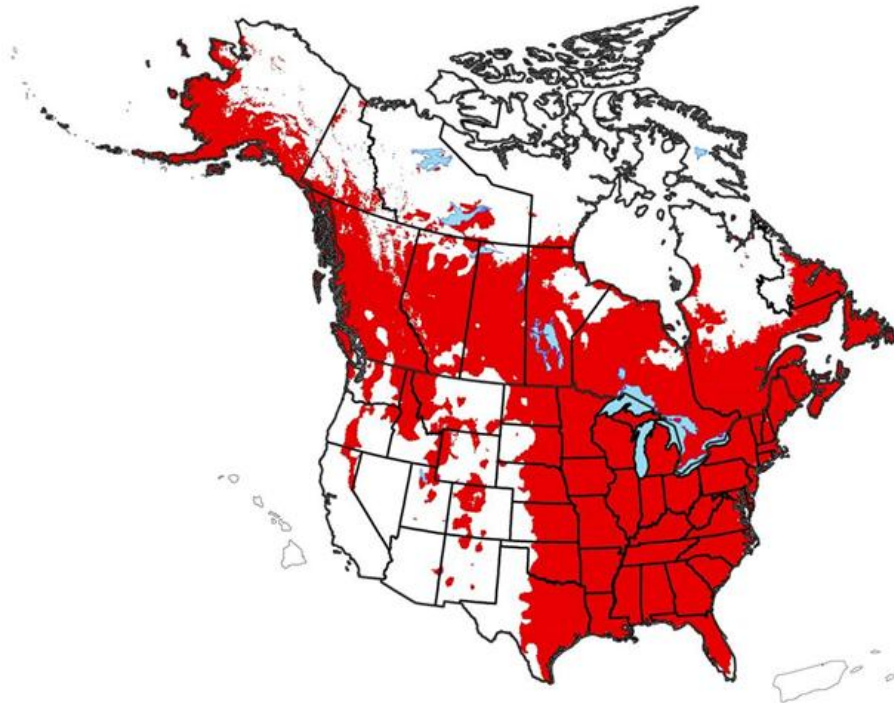
Stratiotes aloides

PPQ WRA Result: **High Risk**

Probability Major Invader = 82.6

Probability Minor Invader = 16.8

Probability Non Invader = 0.6





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Stratiotes aloides Management



Photo by Ontario's Invading Species Awareness Program



Photo by Ontario's Invading Species Awareness



We're here to help!

- Conduct routine and non-routine risk analyses
- Proactively identify and evaluate noxious weeds and pest plants of concern
- Provide WRA training and technical and resource support



Contact Tony Koop (Plant ecologist,
Team Lead):

Anthony.L.Koop@aphis.usda.gov



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Thank you!

