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The PPQ Weed Risk Assessment

Introduction and Overview

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Who am I?

United States Department of Agriculture (USDA)

- Animal and Plant Health Inspection Service (APHIS)
  - Plant Protection and Quarantine (PPQ)
    - Plant Epidemiology and Risk Analysis Lab (PERAL)

» Tony Koop (Plant ecologist, risk analyst)

» Team Leader for WRA

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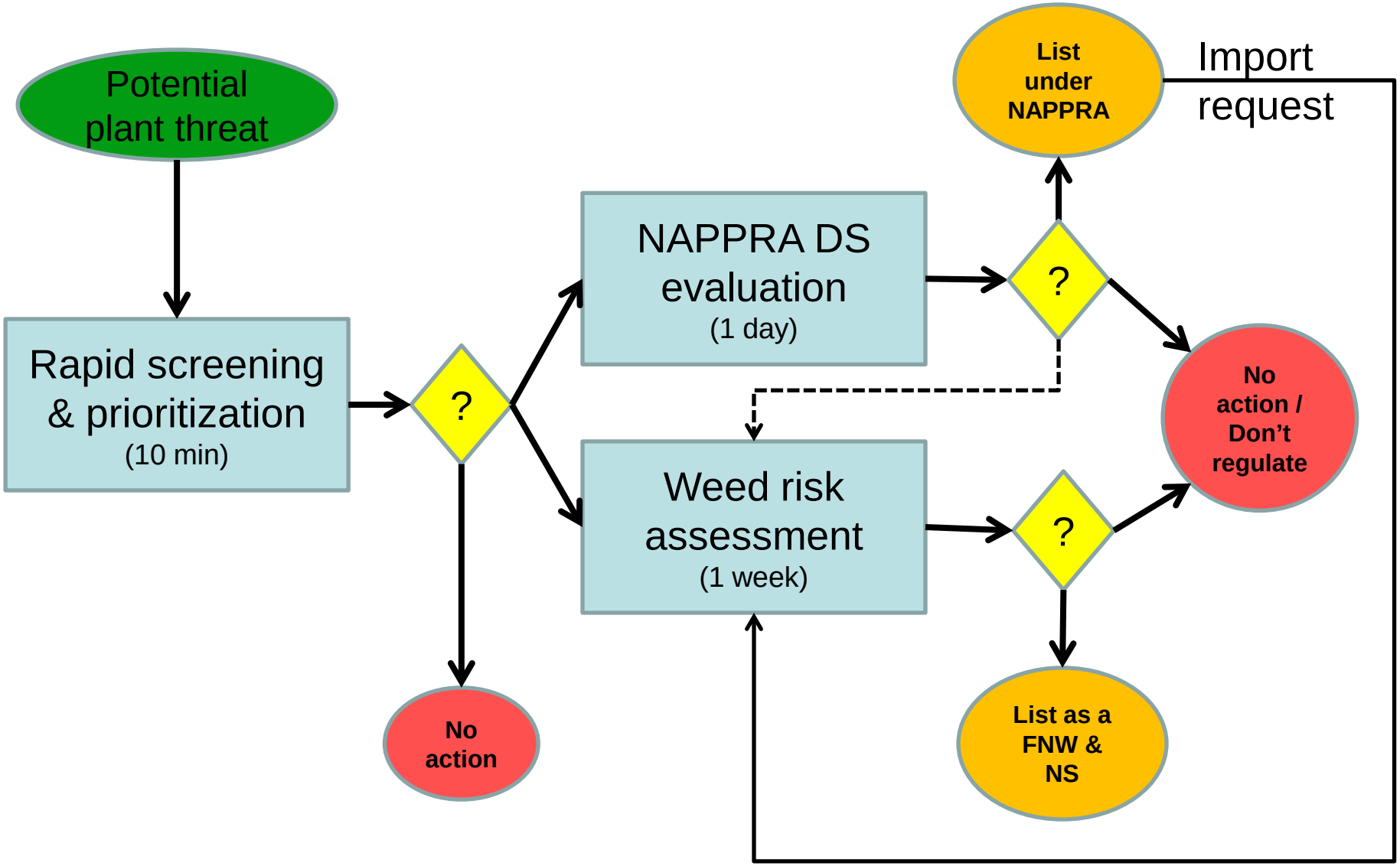
APHIS regulates weeds

- Federal Noxious Weeds – Species that can not be imported into or moved through the U.S.
- NAPPRA Plants – Not Authorized Pending Pest Risk Analysis.
- Weed Seeds – Species that either have no tolerance or some tolerance in vegetable and agricultural seed

PPQ Weed & Invasive Plant Evaluation



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What is Weed Risk Assessment?

WRA: An evaluation of the probability of the entry, establishment, and spread of a plant, and its potential consequences (harm & impacts)

Decision making

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Style of the assessment

- Mostly Yes/No questions; a few multiple choice
- Record uncertainty: negligible, low, moderate, high, max
- Evidence, supporting documents, and reasoning are recorded for each

	Question ID	Question	Answer	Uncer-tainty	Score	Notes (and references)
3						
4						
5	**Establishment / Spread Potential**					
6	ES-1	Select one: (A) Introduced elsewhere long ago (>75 years) but not escaped; (B) Introduced recently (<75 years) but not escaped; (C) Never introduced elsewhere; (D) Escaped/Casual; (E) Naturalized; (F) Invader.			???	
7	ES-2	Is the species highly domesticated (y, n, or ?).			???	
8	ES-3	Congeneric weed (y, n, or ?).			???	
9	ES-4	Shade tolerant at some stage of life cycle (y, n, or ?).			???	
10	ES-5	Climbing or smothering growth habit (y, n, or ?).			???	
11	ES-6	Forms dense thickets (y, n, or ?).			???	
12	ES-7	Aquatic (y, n, or ?).			???	
13	ES-8	Grass (y, n, or ?).			???	
14	ES-9	Nitrogen-fixing woody plant (y, n, or ?).			???	
15	ES-10	Produces viable seed or spores (y, n, or ?).			???	
16	ES-11	Self-compatible or apomictic (y, n, or ?).			???	
17	ES-12	Requires specialist pollinators (y, n, or ?).			???	
18	ES-13	Minimum generative time (A) less than 1 (multiple generations per year), (B) 1 year (annual-1 gen per year),			???	
19	ES-14	Prolific seed/spore production (see scoring guide) (y, n, or ?).			???	
20	ES-15	Propagules likely to be dispersed unintentionally by people (y, n, or ?).			???	
21	ES-16	Propagules likely to disperse in trade as contaminants and hitchhikers (y, n, or ?).			???	
22	ES-17	No. natural dispersal vectors	0		-4	
23	ES-17a	Propagules adapted to wind dispersal (y, n, or ?).			???	
24	ES-17b	Propagules water dispersed (y, n, or ?).			???	
25	ES-17c	Propagules bird dispersed (y, n, or ?).			???	
26	ES-17d	Propagules dispersed by other animals (externally) (y, n, or ?).			???	
27	ES-17e	Propagules dispersed by other animals (internally) (y, n, or ?).			???	
28	ES-18	Evidence that a persistent propagule bank (e.g., seed bank)			???	
29	ES-19	Tolerates/benefits from mutilation, cultivation or fire (y, n, or ?).			???	
30	ES-20	Is resistant to some herbicides or has potential to acquire			???	
31	ES-21	Number of USDA cold hardiness zones suitable for survival	0		-1	
32	ES-22	Number of climate types suitable for survival	0		-2	
33	ES-23	Number of precipitation bands suitable for survival	0		-1	
34						
35						
36	**Impact Potential**					
37	*General impacts*					
38	Imp-G1	Allelopathic (y, n, or ?).			???	

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Risk Elements in the WRA

- Establishment / Spread Potential (23)
- Impact Potential (18)
- Geographic Potential (36)
- Entry Potential (14)

Predictive model

Uncertainty Analysis

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The Final Product

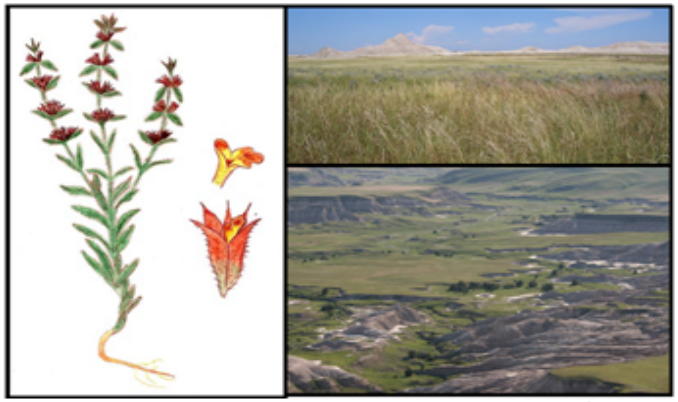
3 - 4 page summary
- Background/Initiation
- Risk element summary
- Data and figures
- Discussion/Conclusion

References

Excerpt of the questions, answers, uncertainty, and evidence

USDA

Weed Risk Assessment for *Sideritis montana* L. (Lamiaceae) – Mountain ironwort



Left: A drawing of *Sideritis montana* (source: http://www.agroatlas.ru/en). Right: The habitat and landscape in which *S. montana* occurs in the United States. The upper photograph is of Oglala National grassland in northwestern Nebraska (source: Brian Kell, http://en.wikipedia.org/). The bottom photograph is the grassland ecosystem of Conata Basin, South Dakota (source: http://www.nature.org/).

Agency Contact:

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Center for Plant Health Science and Technology

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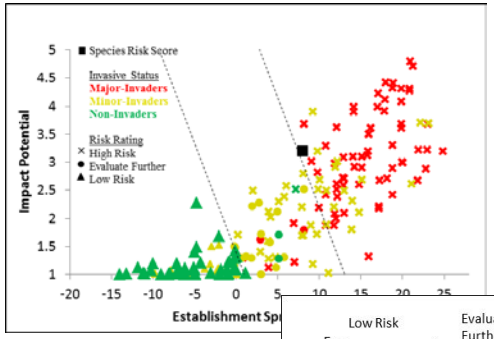
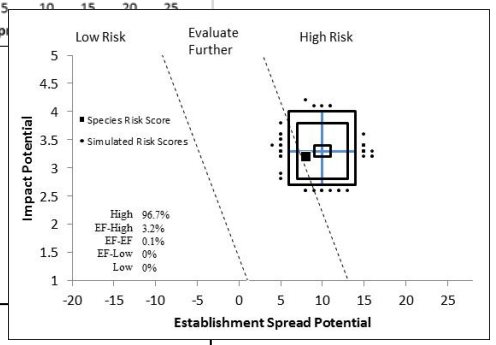
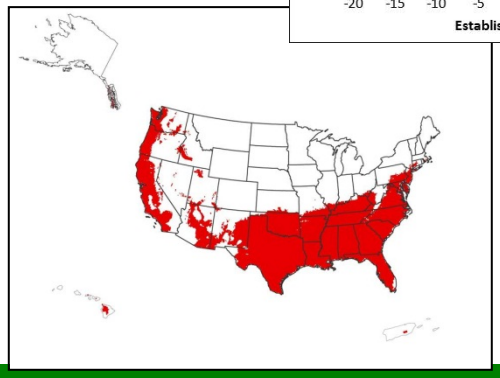
The WRA's core analyses & results

- Risk potential
- Uncertainty analysis
- Geographic potential







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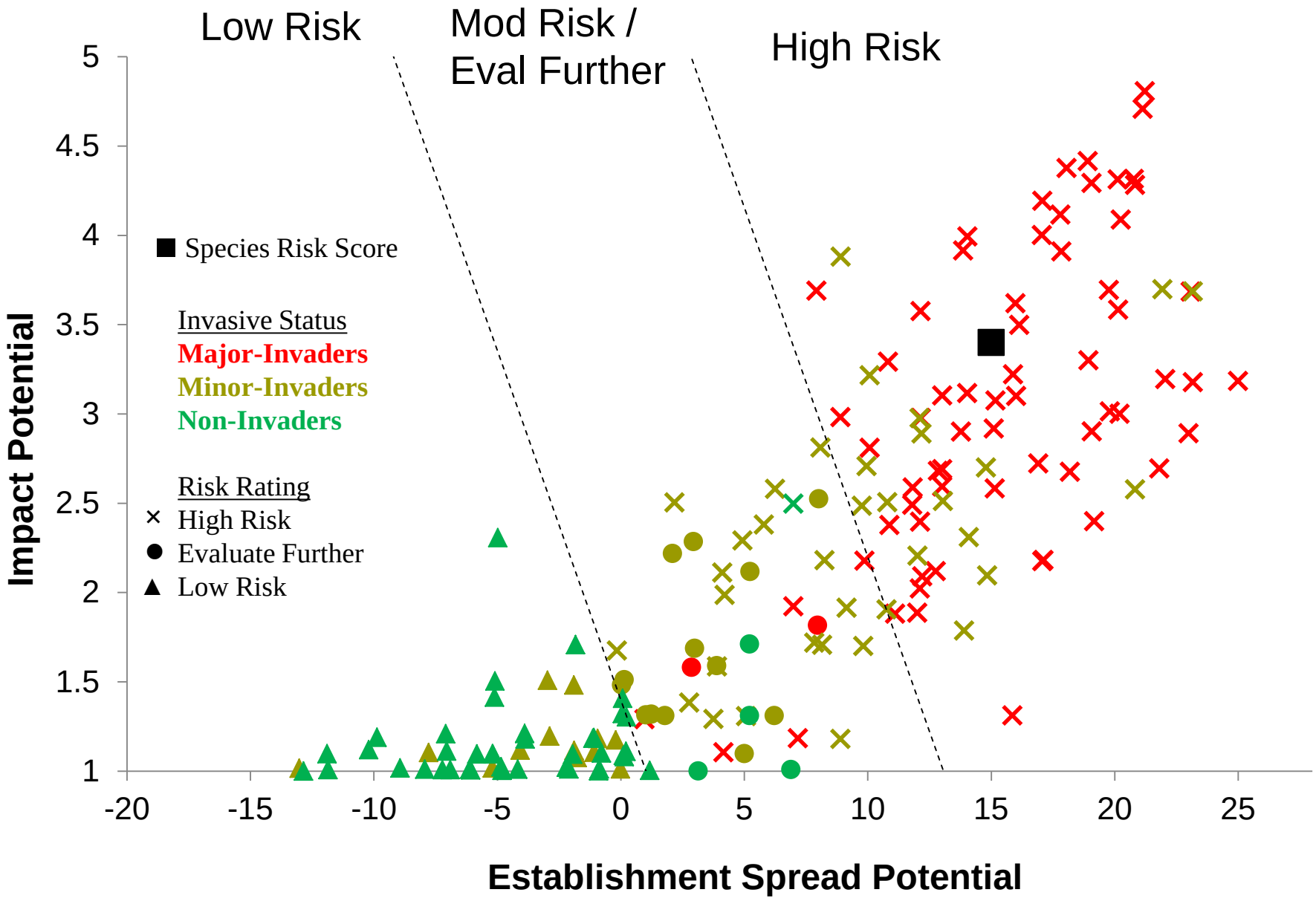
1) Risk Potential

- Calculate risk scores for Establishment/Spread & Impact of plant species
  - Higher values indicate greater capacity
- Calculate Probability(Major), P(Minor), & P(Non-Invader) with logistic-regression model
  - All 3 probabilities sum to 1
- Determine the final conclusion
  - High Risk, Low Risk, or Evaluate Further


Low Risk
Mod Risk /
Eval Further
High Risk
Species Risk Score
Invasive Status
Major-Invaders
Minor-Invaders
Non-Invaders
Risk Rating
High Risk
Evaluate Further
Low Risk
Impact Potential
Establishment Spread Potential
5
4.5
4
3.5
3
2.5
2
1.5
1
-20
-15
-10
-5
0
5
10
15
20
25

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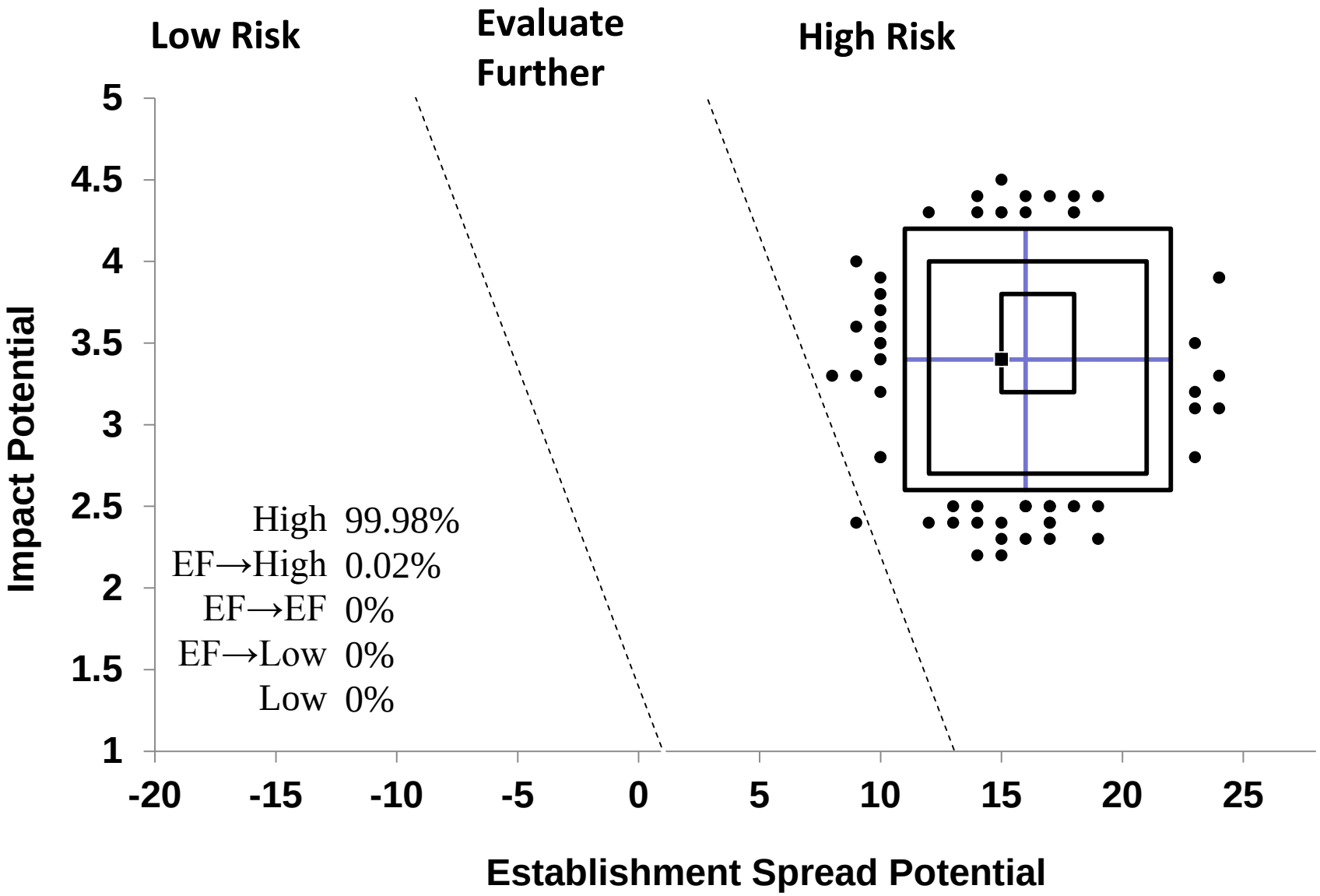
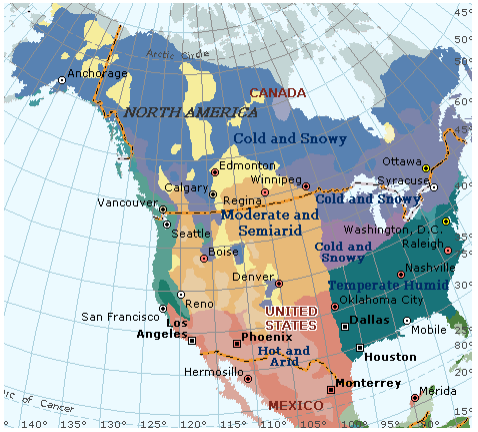
2) Uncertainty analysis

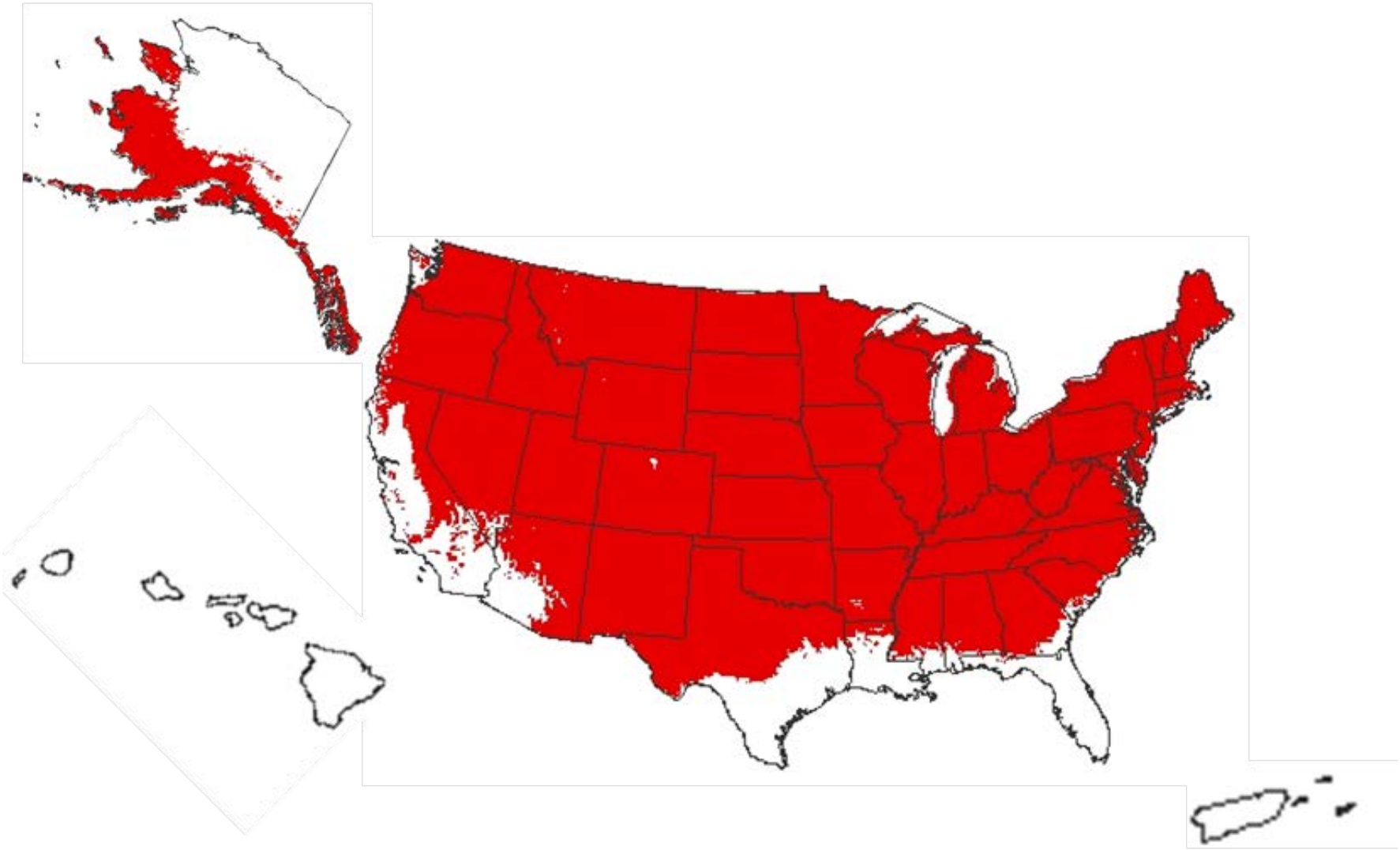
- Summarize & describe uncertainty for each risk element
- Evaluate the sensitivity of the risk scores to uncertainty using a Monte Carlo simulation
  - what would the risk score be if…
  - N = 5,000


Low Risk
Evaluate Further
High Risk
Impact Potential
5
4.5
4
3.5
3
2.5
2
1.5
1
-20
-15
-10
-5
0
5
10
15
20
25
Establishment Spread Potential
High 99.98%
EF→High 0.02%
EF→EF 0%
EF→Low 0%
Low 0%

3) Geographic potential

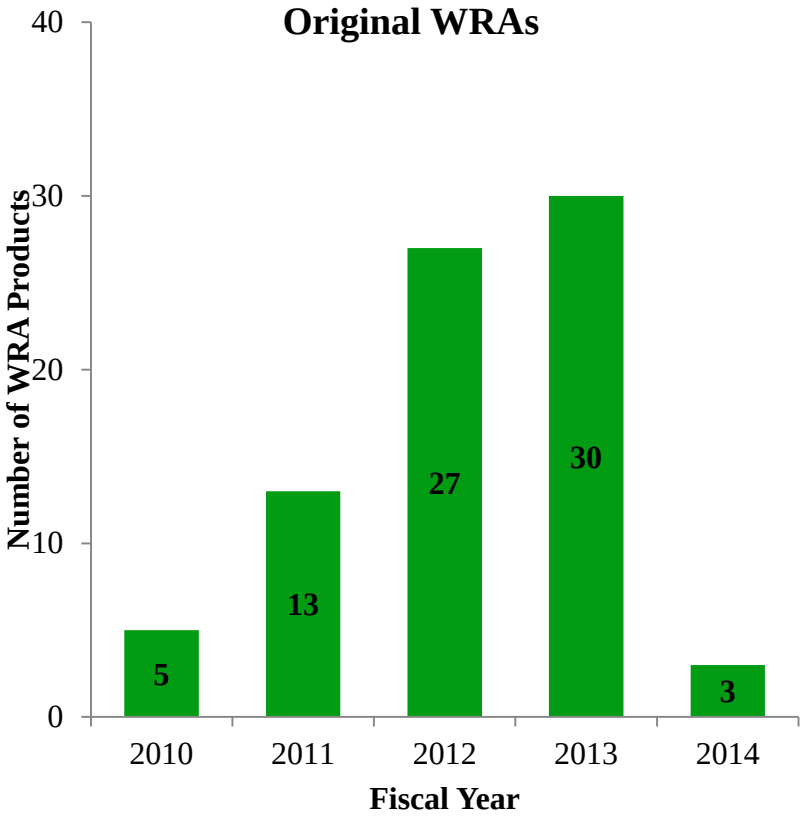
- Geo potential evaluated separately
- Simple analysis that matches on and overlays
  - Plant hardiness zones
  - Annual precipitation
  - Climate classes

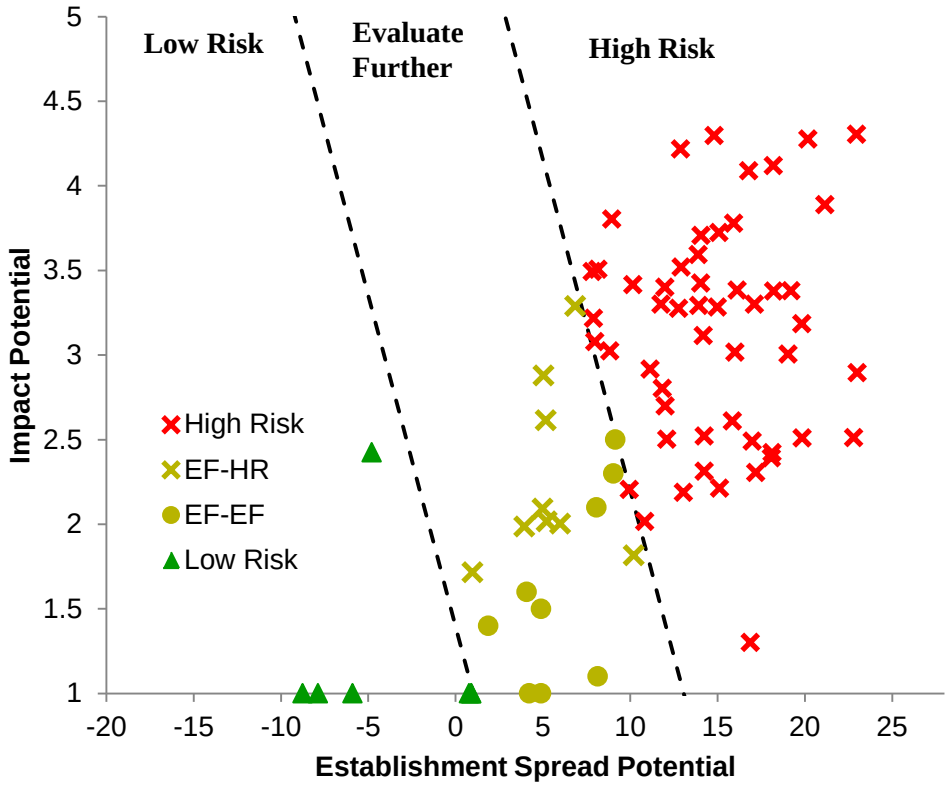




Representing areas where all three climatic variables are suitable for its survival

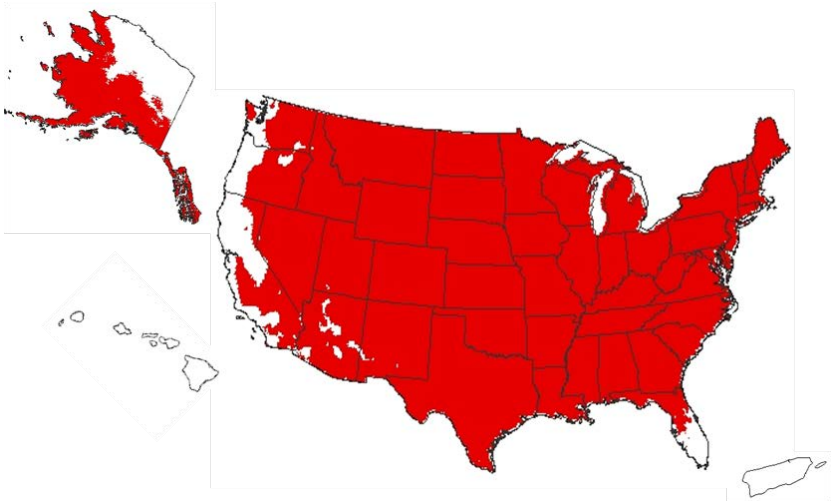
78 Species Assessed with the New Model



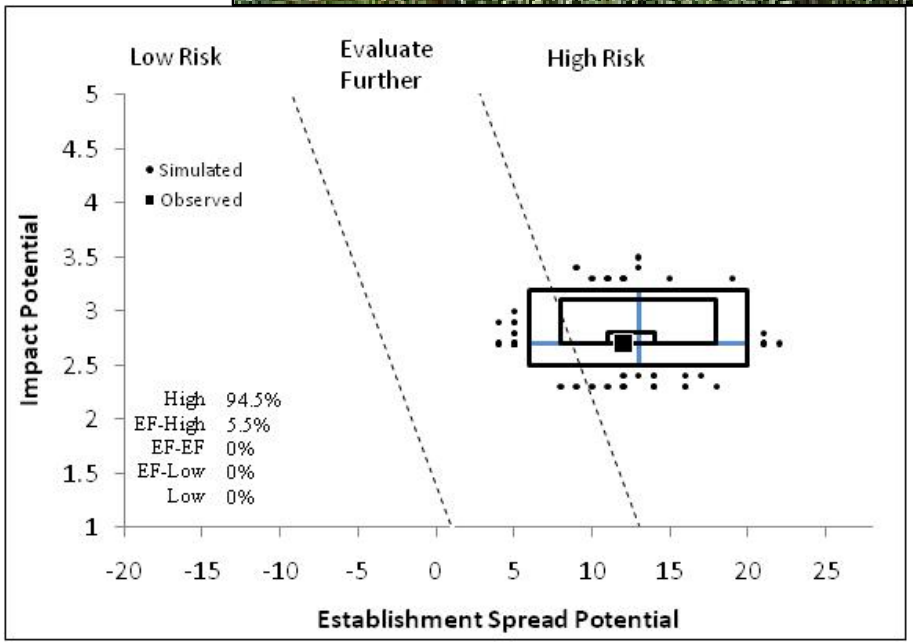


Website with links to all WRAs coming soon

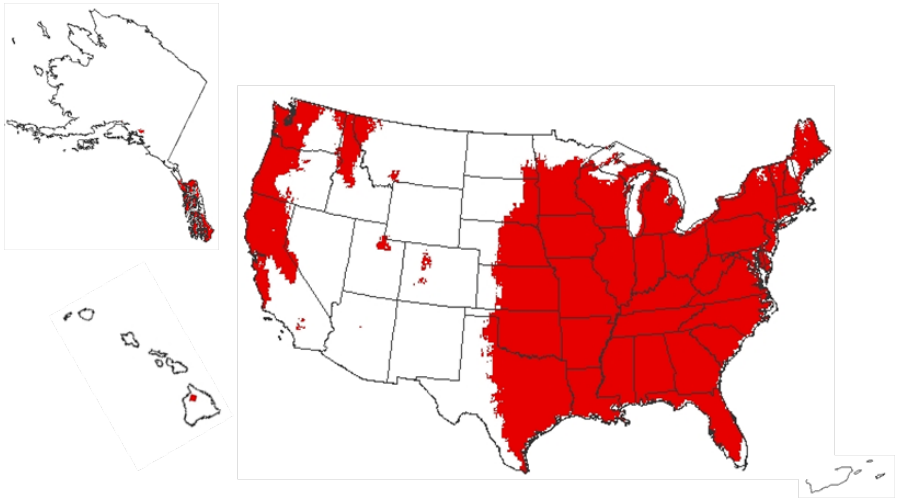
Hippophae rhamnoides



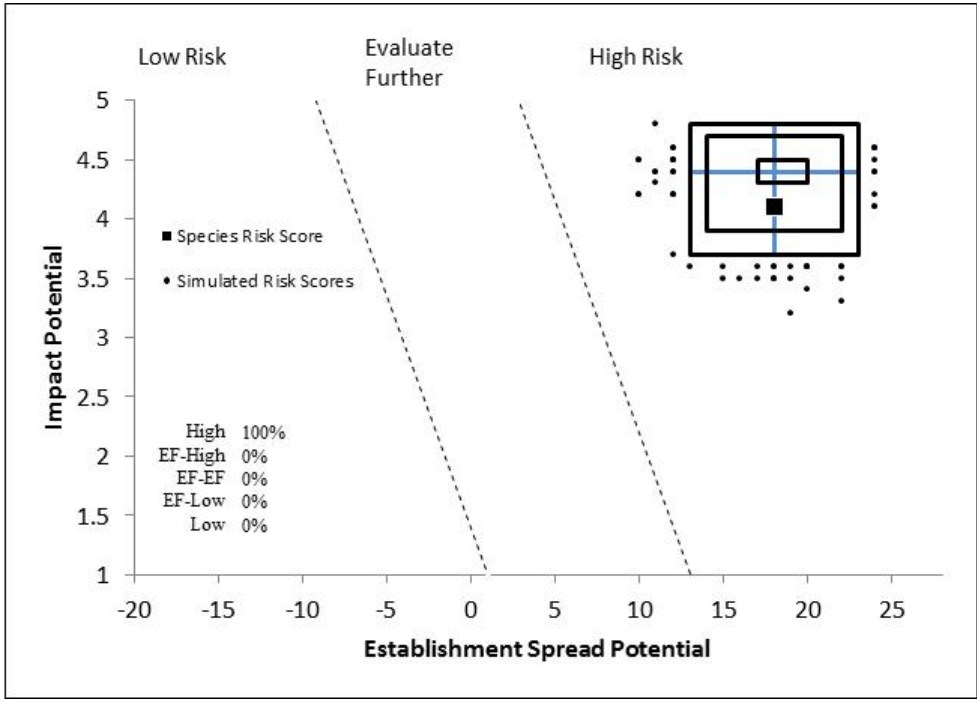
- Cultivated in the U.S., naturalized in 2 WY counties
- Become invasive in Canadian prairies
- Forms dense thickets, N-fixer, alters natural habitats, reduces access



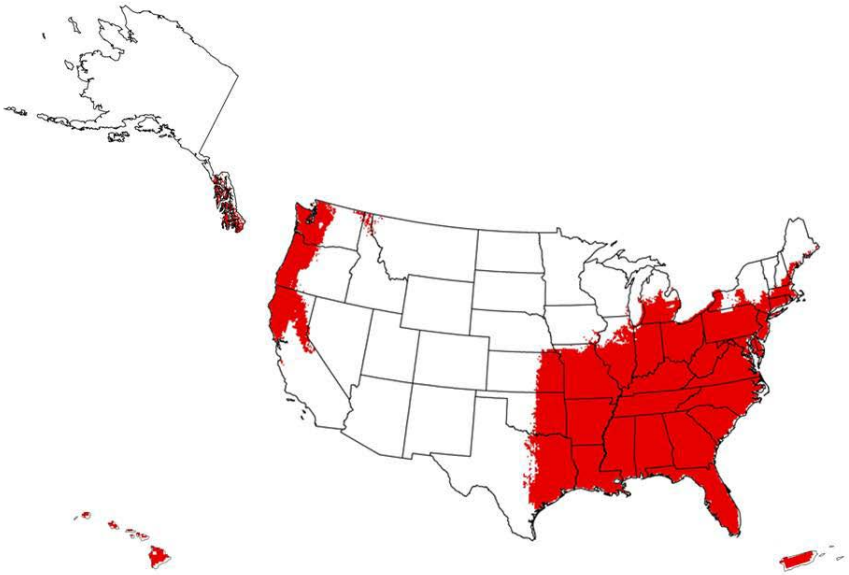
Nymphoides peltata



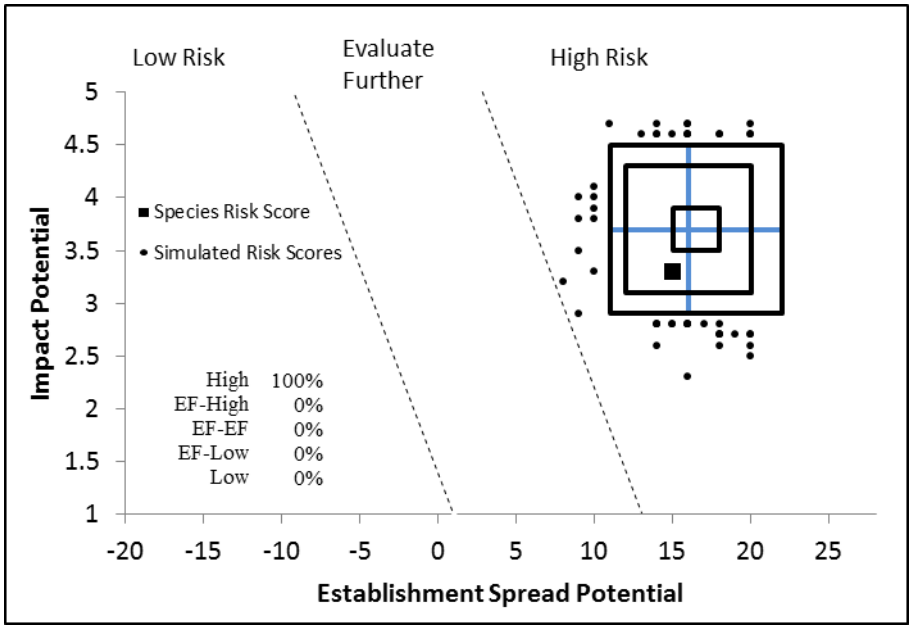
- Widely cultivated in the U.S., sporadically naturalized
- Threatens aquatic bodies, where it forms dense mats on the water surface, reducing biodiversity, changing community structure, and reduces oxygen levels in the water



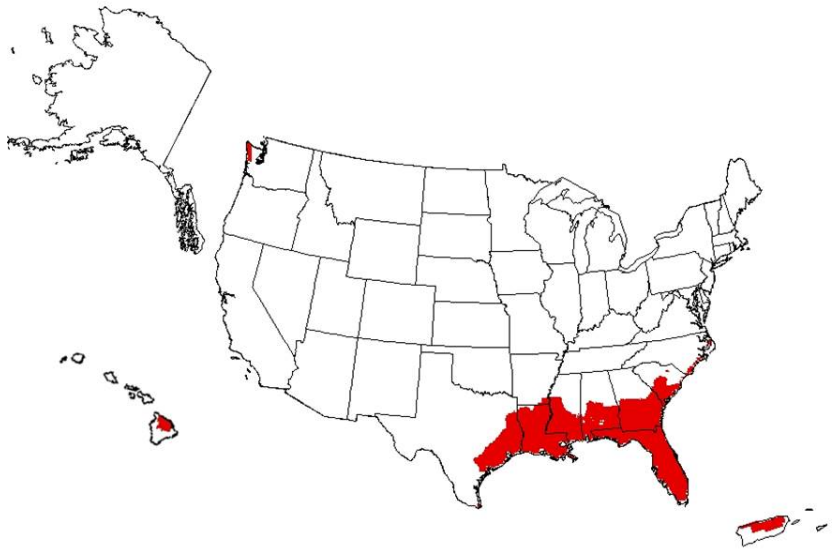
Oplismenus hirtellus subsp. *undulatifolius*



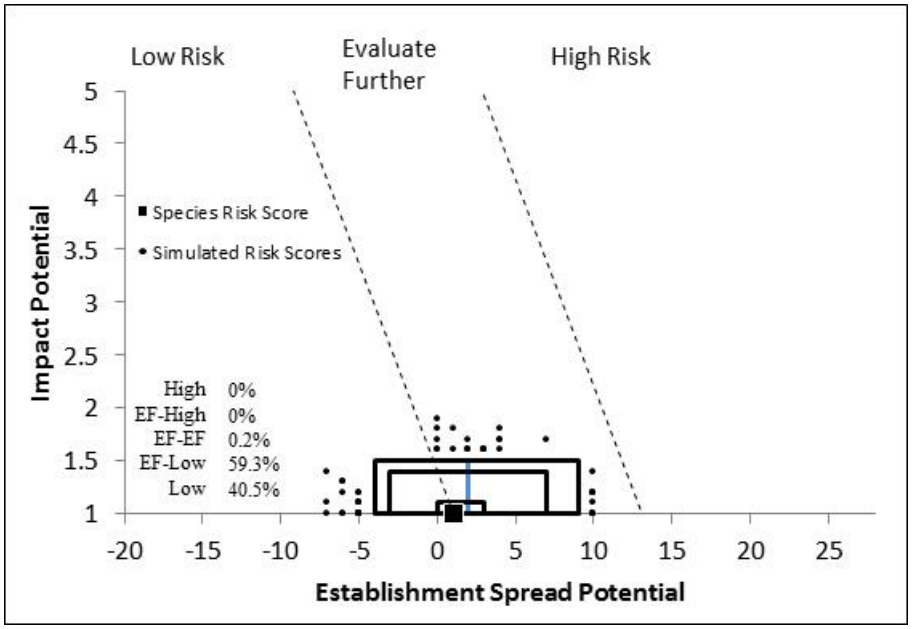
- Several subsp.: native, cult., invasive
- Become invasive MD and VA. Though not list as SNW, managed at a local level
- Heavy ground cover. Seeds readily attach to people and animals.



Leptochilus pteropus



- Aquatic ornamental
- Tropical / subtropical fern species
- No evidence of impact or invasiveness elsewhere.



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The PPQ WRA

- Provides a standardized baseline assessment of a species' weedy/invasive potential
- Risk profile may change with additional information
- Primarily designed for pre-border and recent introductions

For more information or to submit requests for WRA

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