ENVIRONMENTAL LAW • INSTITUTE®

2014 Invasive Species Seminar Series

Species Risk Assessment Tools: Science and Policy Applications

Friday, October 3, 2014
12:00pm-2:00pm Eastern Time
(speaking will begin at 12:15)

Co-hosted by the Environmental Law Institute &
The National Invasive Species Council

This webinar is made possible by the generous support of the Turner Foundation.

To join the ELI Invasive Species Seminar Series mailing list, please email subramanian@eli.org

ENVIRONMENTAL LAW • INSTITUTE®

2014 Invasive Species Webinar Series

Species Risk Assessment Tools: Science and Policy Applications

Friday, October 3, 2014 • 12:00pm-2:00pm ET

NOW SPEAKING:

Stas Burgiel

Assistant Director for Prevention and Budgetary Coordination, National Invasive Species Council (NISC)

Stas serves as the NISC policy lead on issues related to preventing the introduction and spread of invasive species with a focus on the pathways for their movement. He coordinates a prevention committee convened jointly with the Aquatic Nuisance Species Task Force and also oversees the collation of information on NISC member agency budgets related to invasive species issues. Key areas of interest and activity include the role of trade agreements, links to climate change and multi-level stakeholder coordination.

Stas received his Ph.D. in international service from the American University and a B.A. in political science from Swarthmore College. He has worked and consulted for a range of nongovernmental, governmental and intergovernmental organizations, including the Global Invasive Species Programme, the Nature Conservancy, the UNEP/World Conservation Monitoring Centre and the New Zealand government, on invasive species and other environmental policy issues.

ENVIRONMENTAL LAW • INSTITUTE®

2014 Invasive Species Webinar Series

Species Risk Assessment Tools: Science and Policy Applications

Friday, October 3, 2014 • 12:00pm-2:00pm ET

INTRODUCING:

Anthony Koop

Ecologist and Risk Analyst, Plant Epidemiology and Risk Analysis Laboratory, Animal and Plant Health Inspection Service

Tony is a risk analyst with the Plant Epidemiology and Risk Analysis Laboratory (PERAL) of the Animal and Plant Health Inspection Service. As the team lead for the PERAL Weed Team, he coordinates most day-to-day activities of the team, including weed prioritizations, pest plant datasheets, and weed risk assessments (WRA). Over the last ten years he has prepared and reviewed several hundred WRAs, helped develop the foundation and structure of the team's processes, organized three WRA training workshops, and worked on other weed issues related to biofuels, genetically engineered plants, herbicide resistance, and international standards. He also led the development of the predictive model of the new PPQ WRA. Prior to his work on weeds, Tony prepared commodity and pest risk assessments for PERAL. Tony is a plant ecologist with bachelors, masters, and doctorate degrees in biology. He has been working on invasive plant issues for over 20 years.

Questions for the panelists? Submit via the "Questions" box

APHIS
Animal and Plant Health Inspection Service

The PPQ Weed Risk Assessment

An Introduction

Anthony L. Koop,
Leslie Newton, Barney Caton, Lisa Kohl, Larry Fowler
(USDA-APHIS)

Species Risk Assessment Tools: Science and Policy Applications
ELI / NISC Webinar
October 3, 2014

What is a Risk Assessment?

Risk Assessment: Likelihood and consequences of an event

Invasive Species RA: Evaluation of the likelihood of the entry, establishment, and spread of a pest, and its potential consequences (harm & impacts)

Decision making - Broad range of types

APHIS
Animal and Plant Health Inspection Service

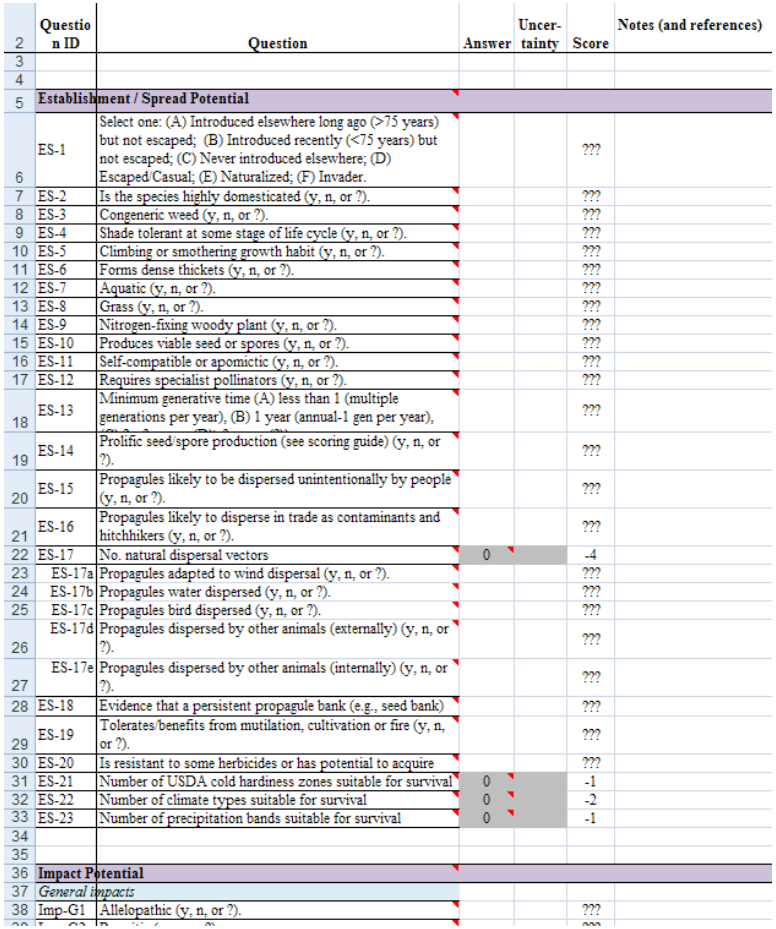
Risk Assessment in PERAL

- USDA-APHIS-Plant Protection and Quarantine (PPQ)
- Plant Epidemiology and Risk Analysis Laboratory (PERAL)
  - Conduct a variety of risk analyses
    - Pest screening & prioritization
    - Pest risk assessment
    - Pathway analyses
    - Quantitative pest modeling
    - Economic analyses
    - Commodity import analyses
    - Geospatial analyses, …

APHIS
Animal and Plant Health Inspection Service

The PPQ WRA: 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	Uncertainty	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 ?).			???	

Risk Elements in the WRA

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

Predictive model

Uncertainty Analysis

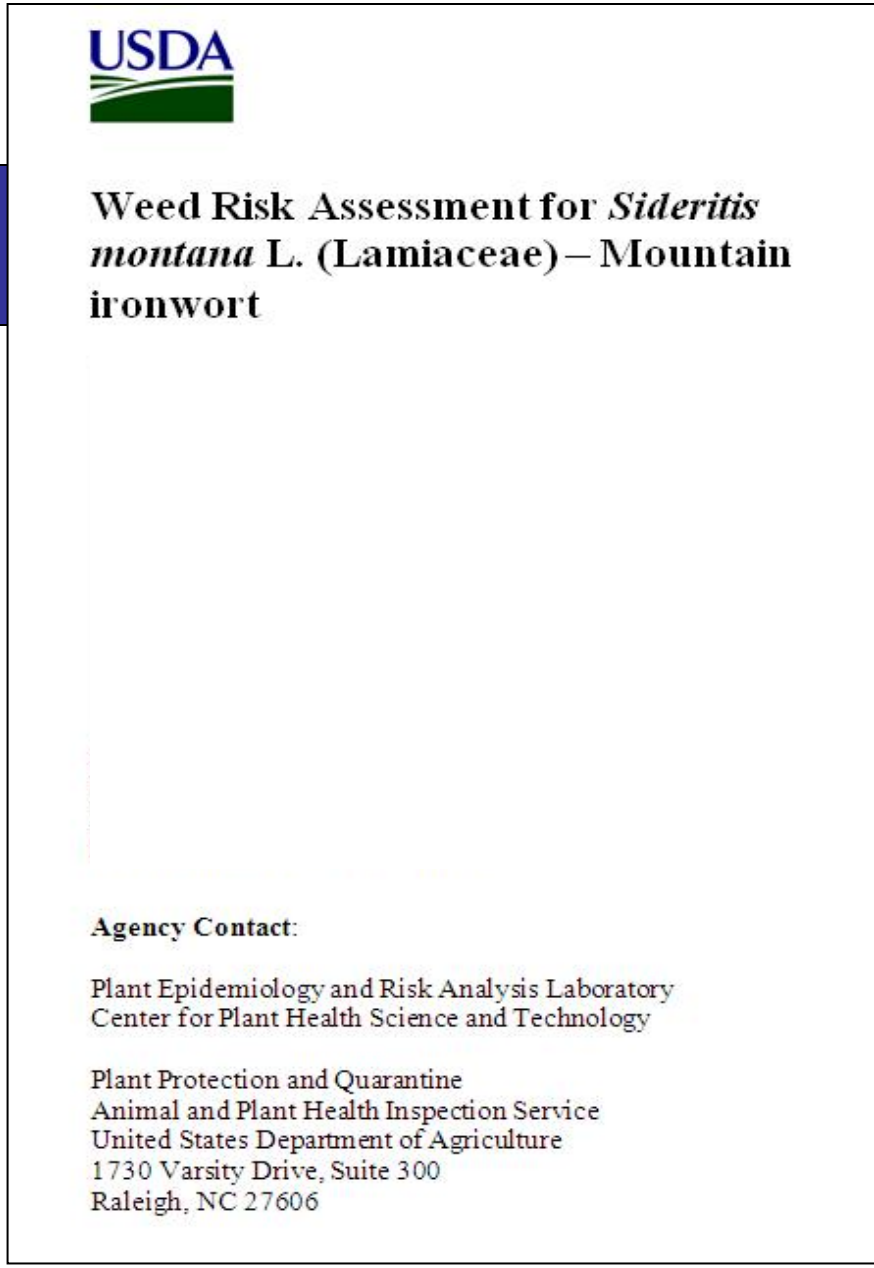
APHIS
Animal and Plant Health Inspection Service

The Final Product

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

References

Appendix: questions, answers, uncertainty, and evidence



USDA

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

Agency Contact:

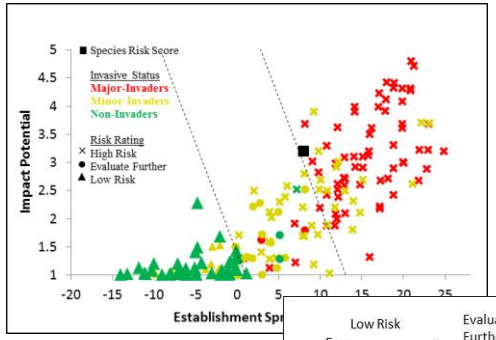
Plant Epidemiology and Risk Analysis Laboratory
Center for Plant Health Science and Technology

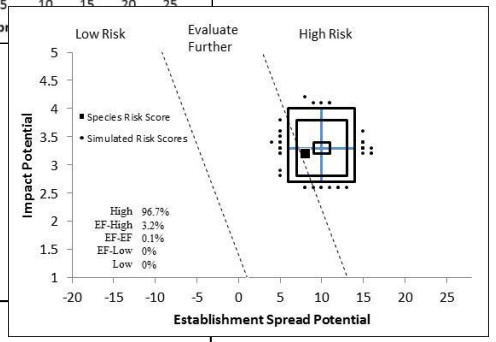
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
United States Department of Agriculture
1730 Varsity Drive, Suite 300
Raleigh, NC 27606

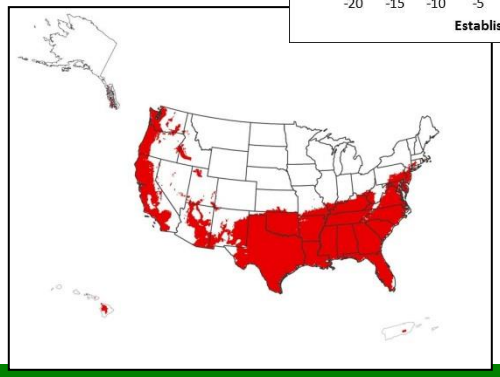
APHIS
Animal and Plant Health Inspection Service

The WRA's core analyses & results

- Risk potential
- Uncertainty analysis
- Geographic potential



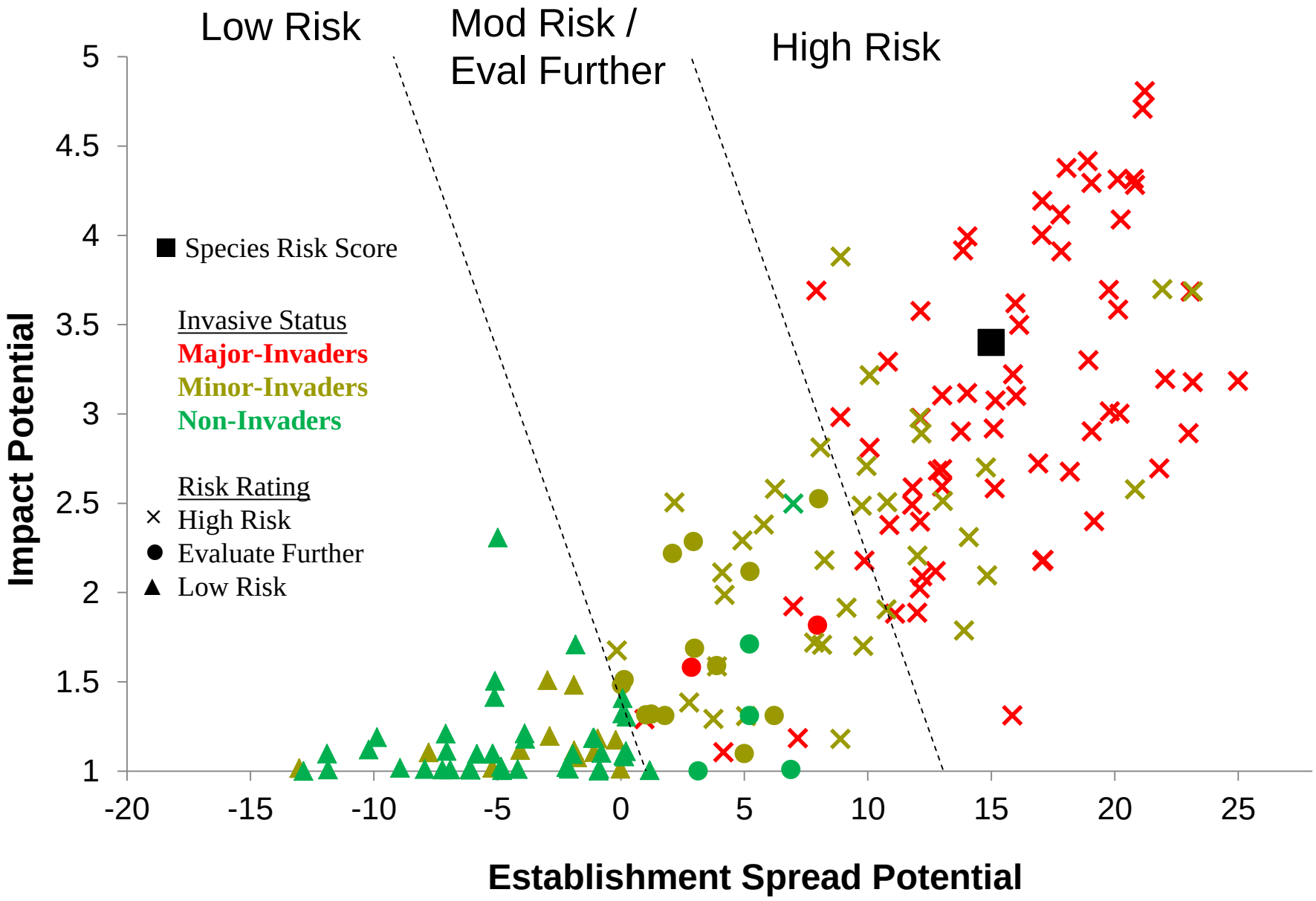




APHIS
Animal and Plant Health Inspection Service

1) Risk Potential

- Calculate risk scores for Establishment/Spread & Impact of plant species
  - Higher values indicate greater capacity
- Determine the final conclusion
  - High Risk, Low Risk, or Evaluate Further
- Species with moderate scores (EF) → secondary screening tool


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

Model Performance

(validation dataset, N=102)

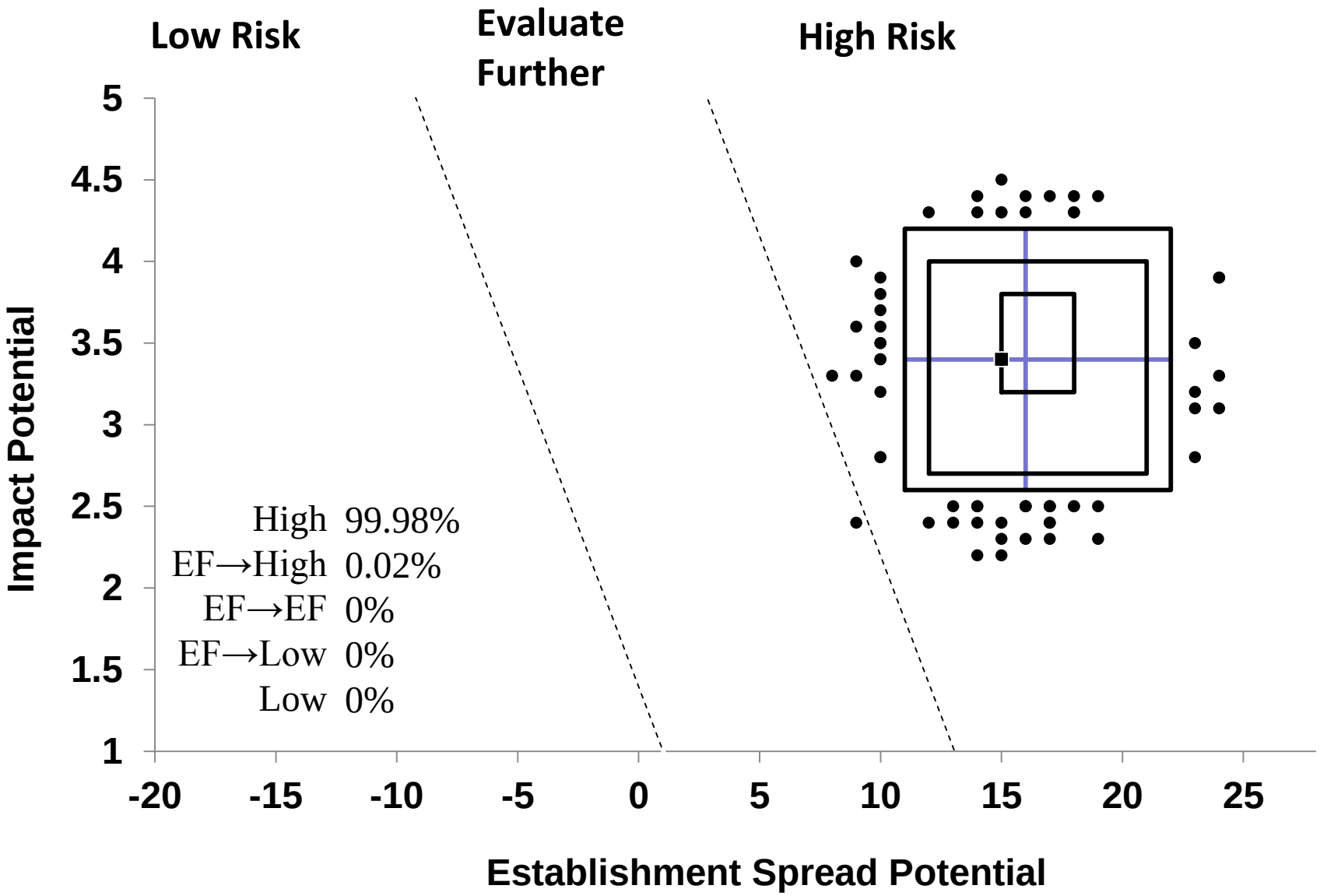
	Accuracy		Error	
Test	Maj-Invaders (True +)	Non-Invaders (True -)	Maj-Invaders (False +)	Non-Invaders (False-)
US – PPQ WRA	0.941	0.971	0.000	0.000
US - Aus WRA	0.971	0.794	0.088	0.000
Mean (8 other AUS tests)	0.936	0.715	0.164	0.022

- Overall accuracy is higher than the Australian WRA
- Non-invader and major-invader performance similar

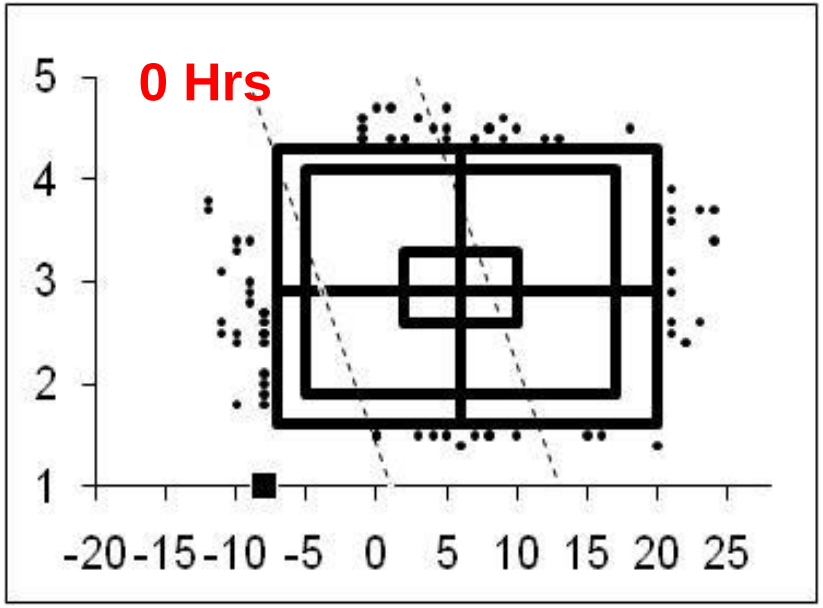
APHIS
Animal and Plant Health Inspection Service

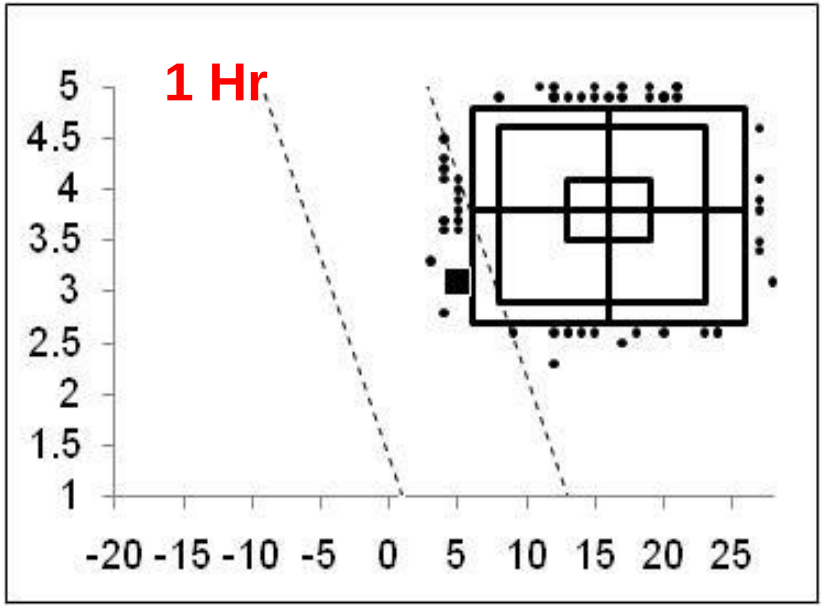
2) Uncertainty analysis

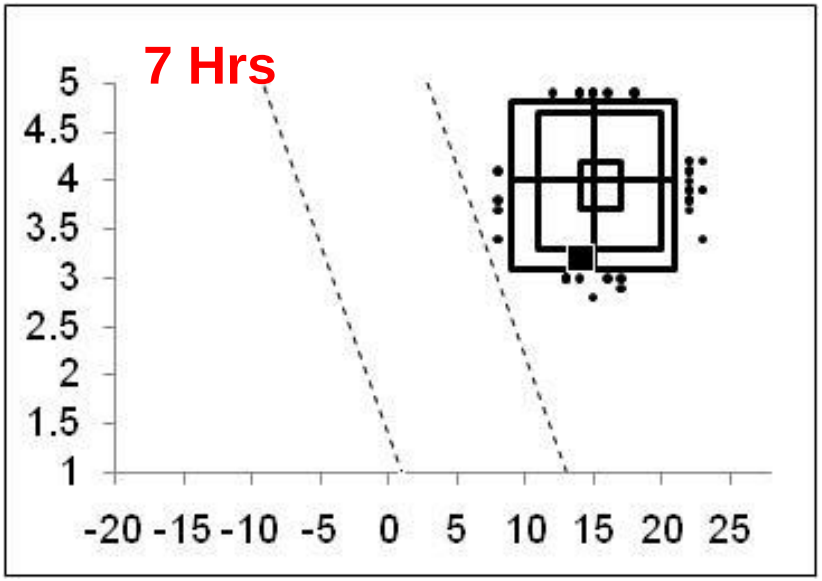
- Summarize & describe uncertainty for each risk element
- Evaluate the sensitivity of the risk scores to uncertainty using a Monte Carlo simulation
  - what would the risk score be if…
  - N = 5,000

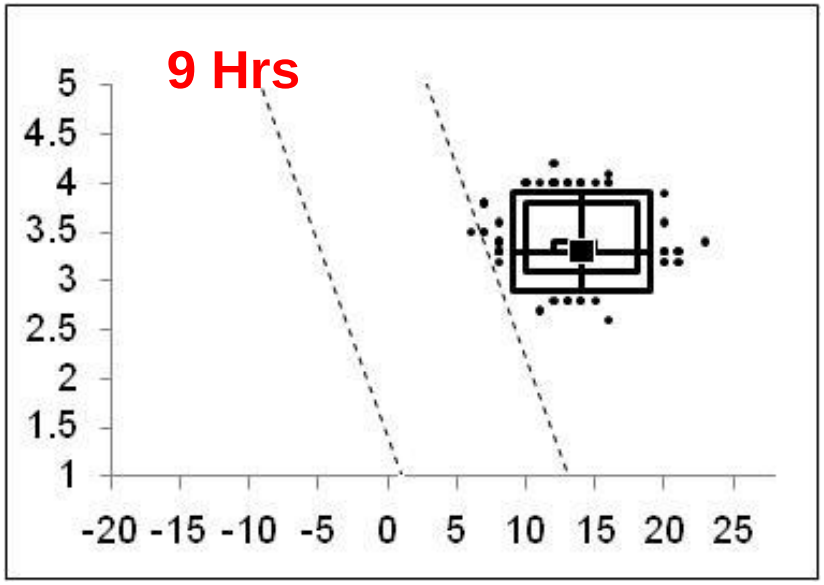

Low Risk
Evaluate Further
High Risk
Impact Potential
5
4.5
4
3.5
3
2.5
2
1.5
1
-20
-15
-10
-5
0
5
10
15
20
25
Establishment Spread Potential
High 99.98%
EF→High 0.02%
EF→EF 0%
EF→Low 0%
Low 0%

Uncertainty over time



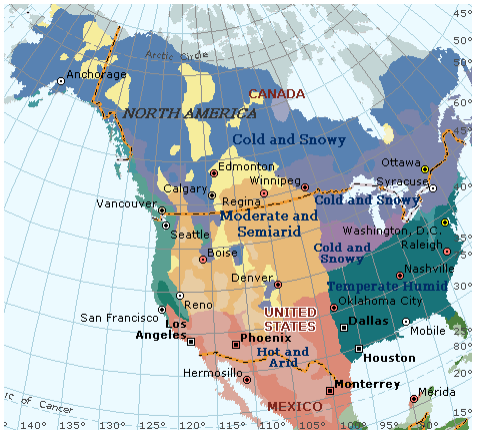


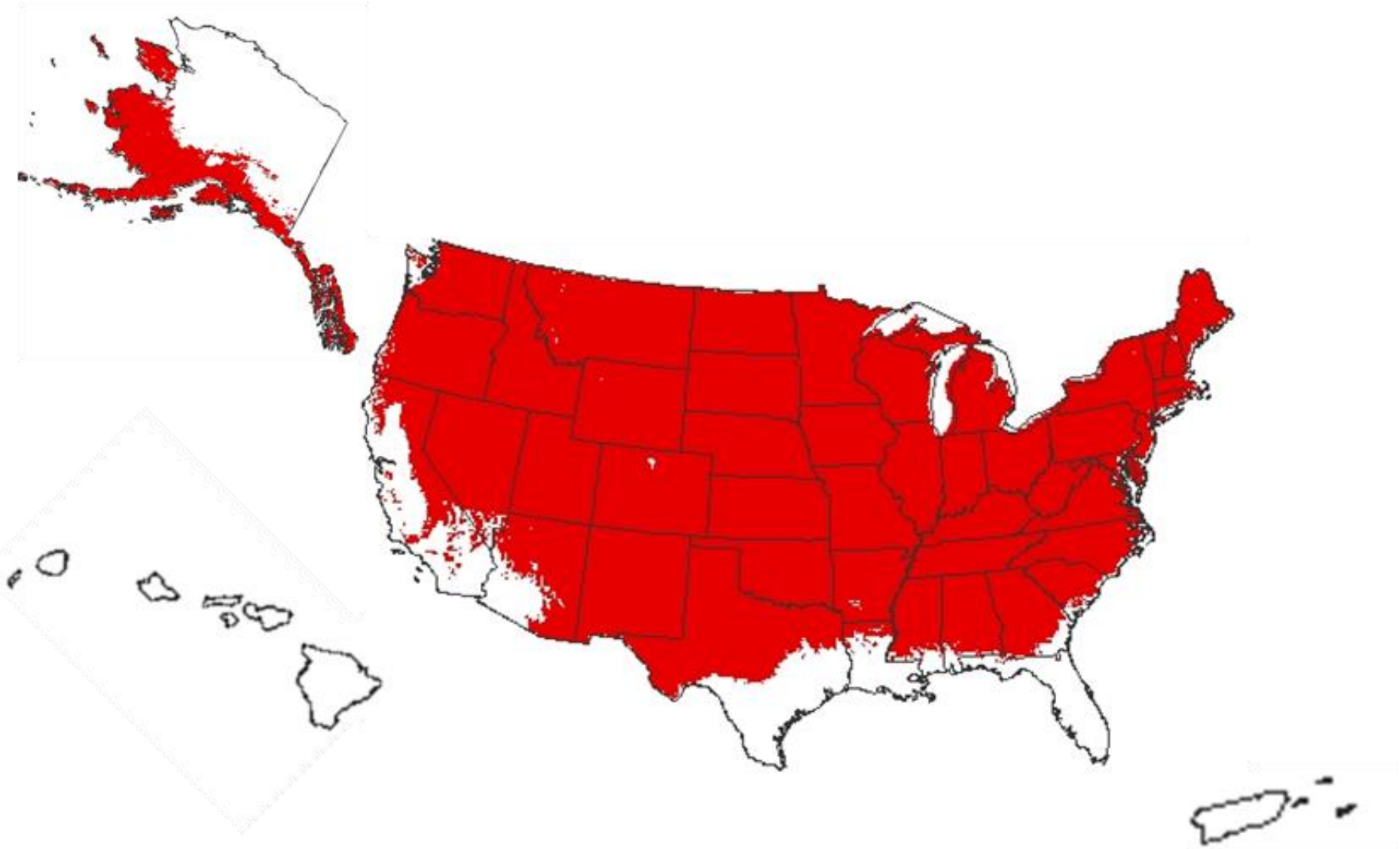




3) Geographic potential

- 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

APHIS
Animal and Plant Health Inspection Service

Validating the climate matching model

	Mean Performance Measures for Blind Tests		
Model	Predicted Prevalence	Sensitivity	Critical Success Index
PPQ model	0.670	0.956	0.264
MaxEnt	0.448	0.852	0.257
Climex	0.538	0.920	0.249

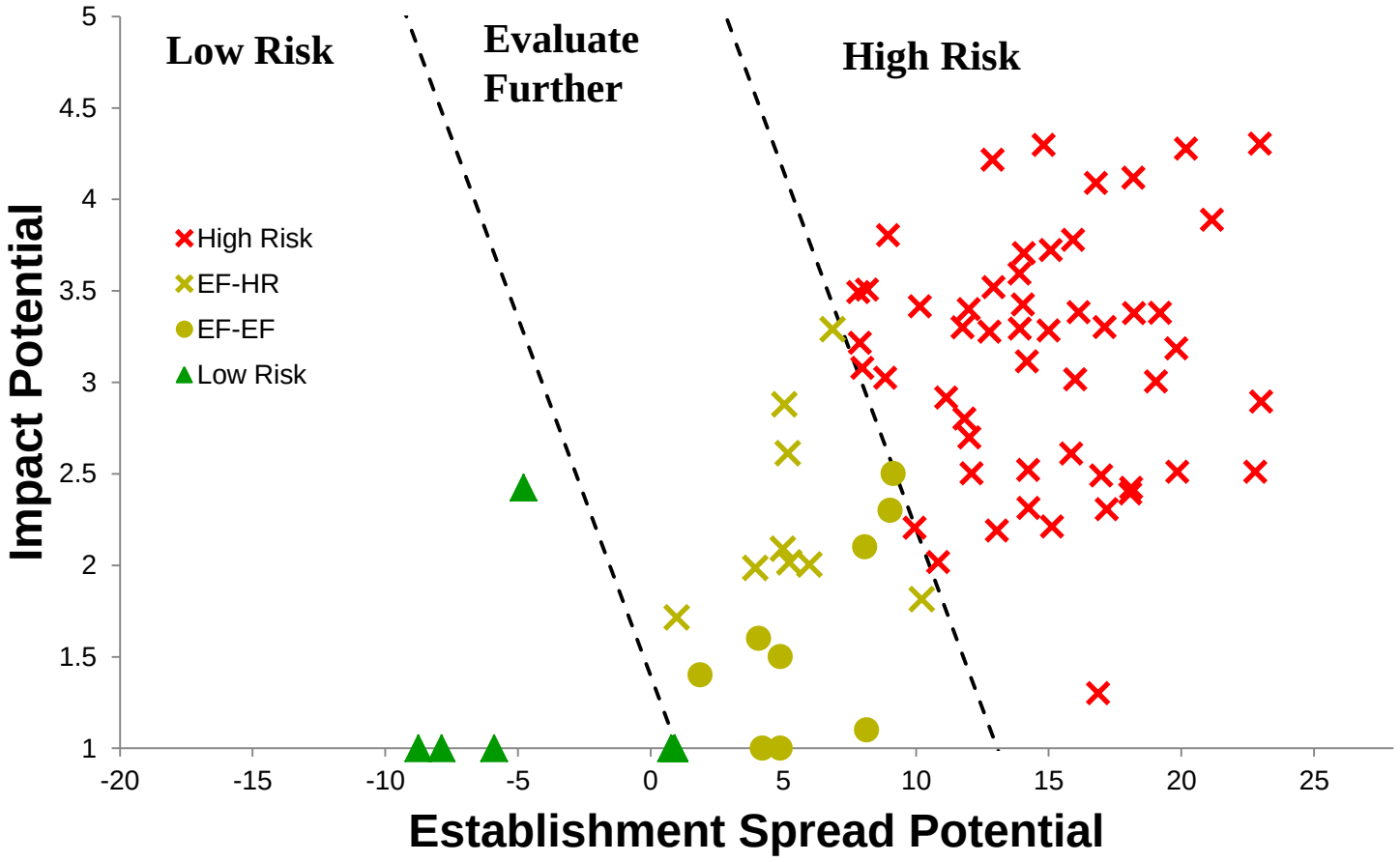
- The PPQ model predicts a wider area as climatically suitable
- Other performance measures similar

APHIS
Animal and Plant Health Inspection Service

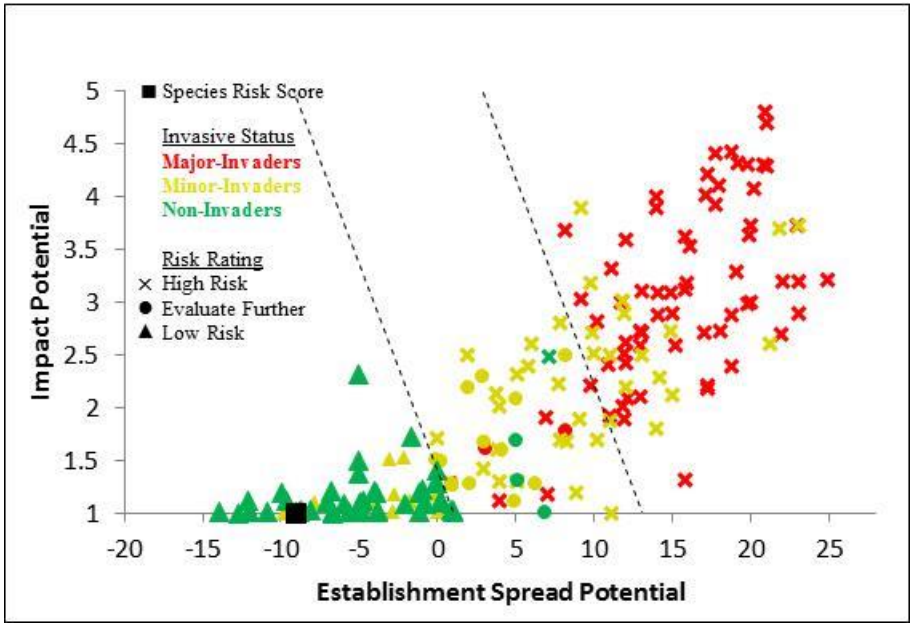
Other potential "risk elements" for WRA

- Extent of U.S. cultivation
- Feasibility of control
- Extent of current and potential range
- Biomass/biofuels
- GE species

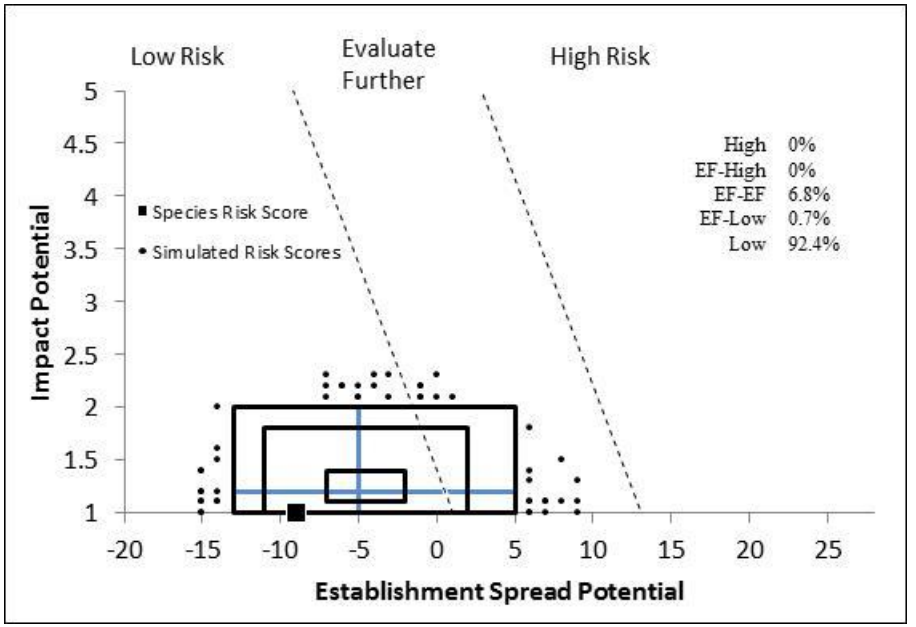
84 Species Assessed with the New Model



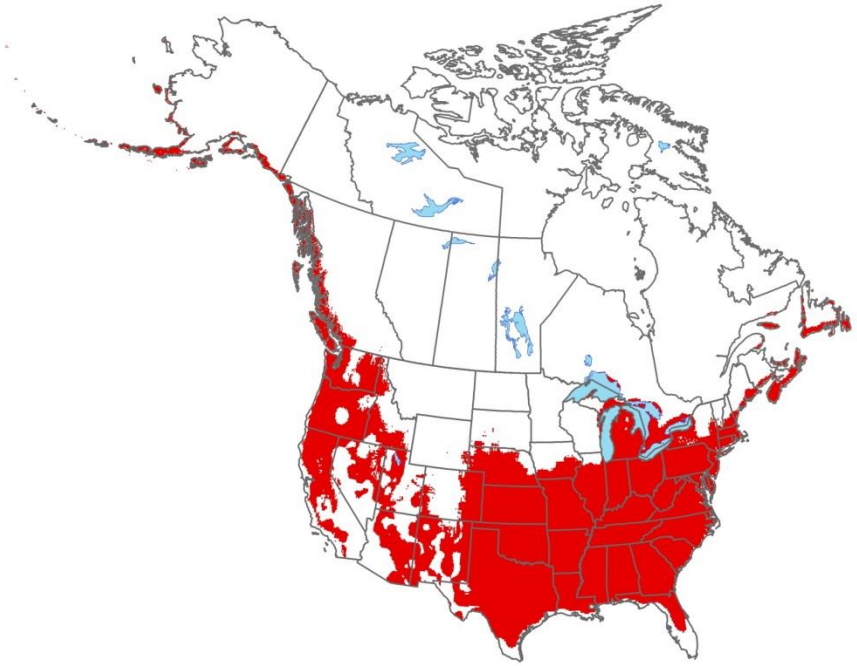
Anubias barteri



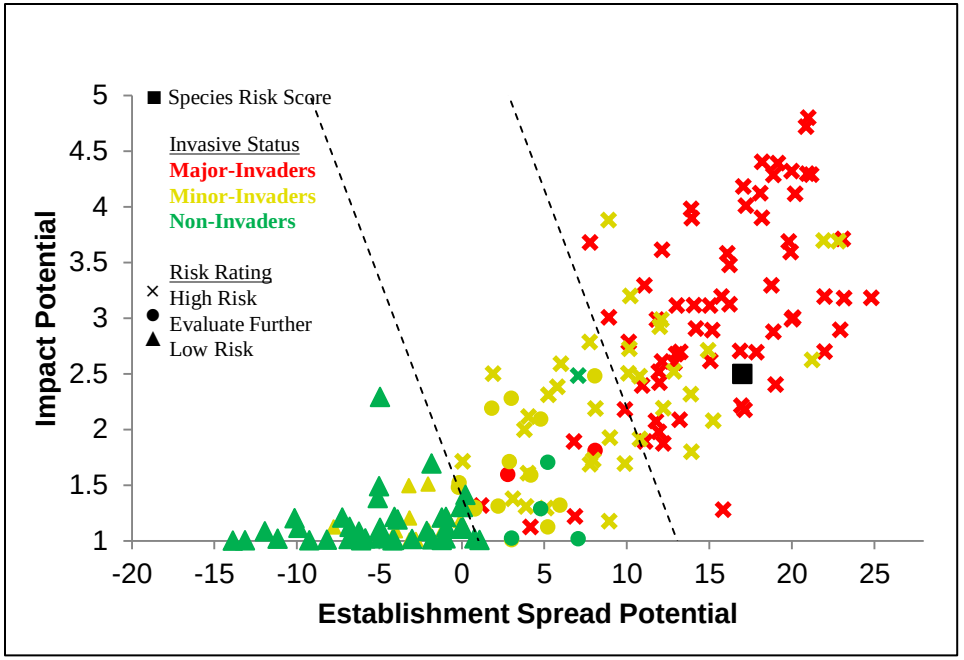
- Aquatic ornamental
- Tropical aroid
- No evidence of impact or invasiveness elsewhere.

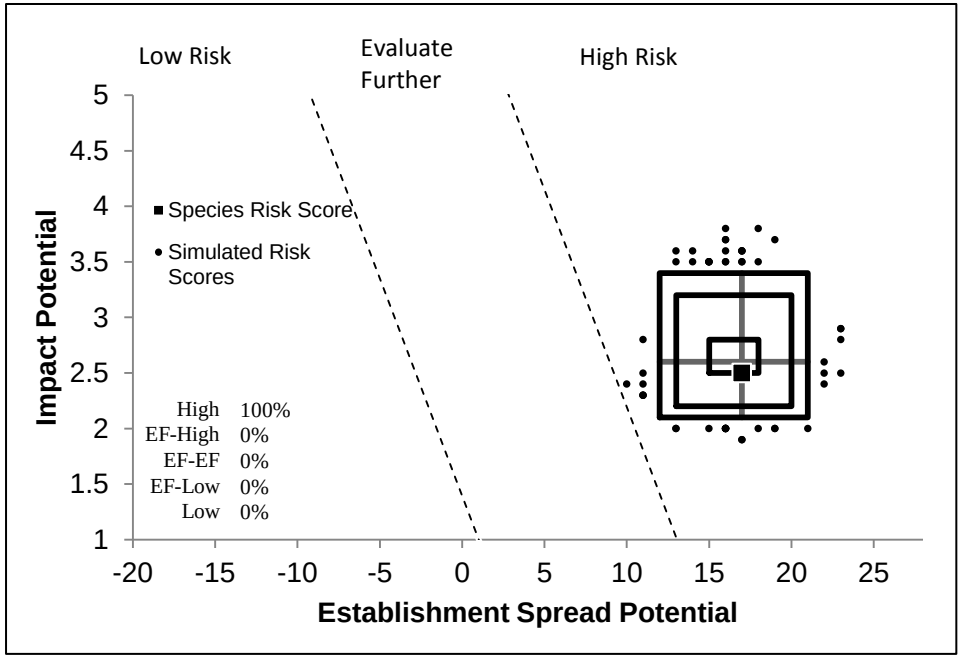


Geranium lucidum

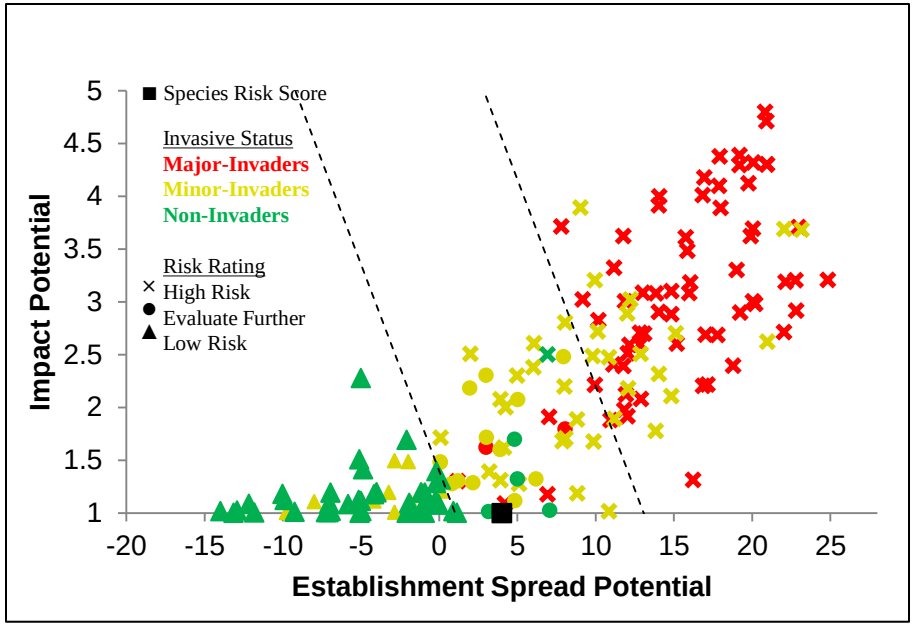


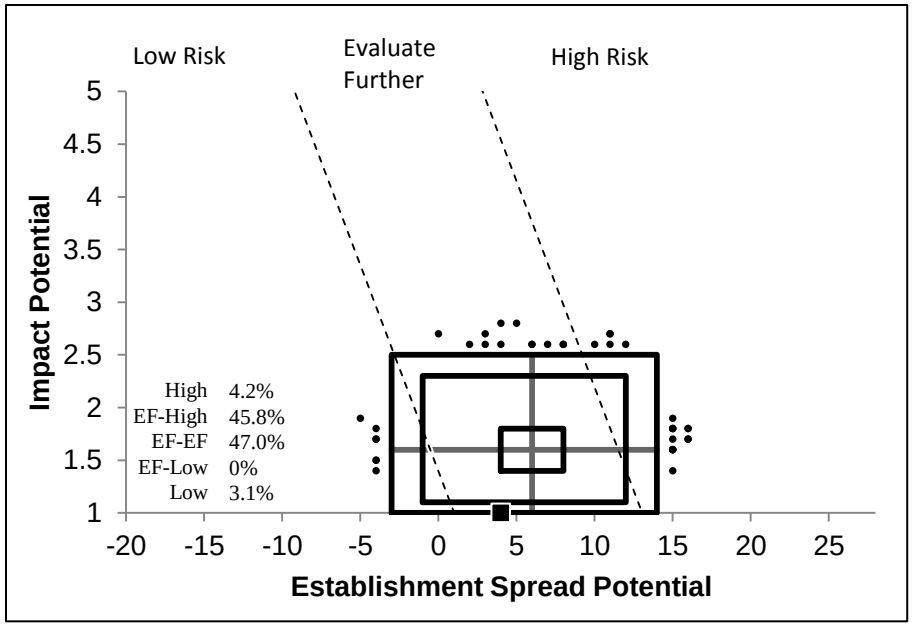
- Shade-adapted winter annual
- 1st recorded 1971 in a cow pasture
- Dominates forest understories.
- Persistent seed bank
- Spreading





Triplaris melaenodendron





- First US detection in Fl in 2010.
- First time outside of native range
- Called “novice tree”

APHIS
Animal and Plant Health Inspection Service

Working Together

Many potential weeds

What we can do for you

– Share completed WRAs
  - APHIS – FNW Program Website – WRA

– Train & mentor you [WRA-101 (Feb 24-27, 2015)]
  - WRA Guidelines

For more information or to submit requests for WRA

Tony Koop
Plant Epidemiology and Risk Analysis Laboratory
Center for Plant Health Science and Technology
USDA - APHIS – PPQ
1730 Varsity Drive, Suite 300
Raleigh, NC 27606-5202

Phone: (919) 855-7429
Email: anthony.l.koop@aphis.usda.gov

Barney Caton (PERAL Asst. Dir.) – Barney.P.Caton@aphis.usda.gov

ENVIRONMENTAL LAW • INSTITUTE®

2014 Invasive Species Webinar Series

Species Risk Assessment Tools: Science and Policy Applications

Friday, October 3, 2014 • 12:00pm-2:00pm ET

INTRODUCING:

Kerrie Kyde

Invasive Plant Ecologist, Maryland Department of Natural Resources

Kerrie Kyde is the Invasive Plant Ecologist for the Maryland Department of Natural Resources, Wildlife and Heritage Service, and a member of the Natural Heritage Program staff. She is responsible for invasive plant assessment and control in ecologically sensitive areas on 475,000 acres of state lands. She has been involved in invasive plant species work professionally and personally for 20 years. Before joining DNR, Ms. Kyde worked at the USDA biocontrol lab in Frederick on the genetics of the invasive weed Mile-a-minute and the host range and epidemiology of the Sudden Oak Death pathogen, Phytophthora ramorum.

Ms. Kyde was a founding member of the Maryland Invasive Species Council, and is chair of the Maryland Invasive Plant Advisory Committee charged with implementing Maryland's new Invasive Plant Law. She was the founding president of the Mid-Atlantic Invasive Plant Council, and is currently a member of DNR's Invasive Species Matrix Team, which advises Secretary Gill on invasive species science and policy.

Ms. Kyde holds a MS in Environmental Biology from Hood College.

Questions for the panelists? Submit via the "Questions" box

Putting Prevention First:

Maryland's IPAC at Work

Kerrie L. Kyde
Invasive Plant Ecologist
MD Natural Heritage Program,
Dept. of Natural Resources

MARYLAND DEPARTMENT OF NATURAL RESOURCES

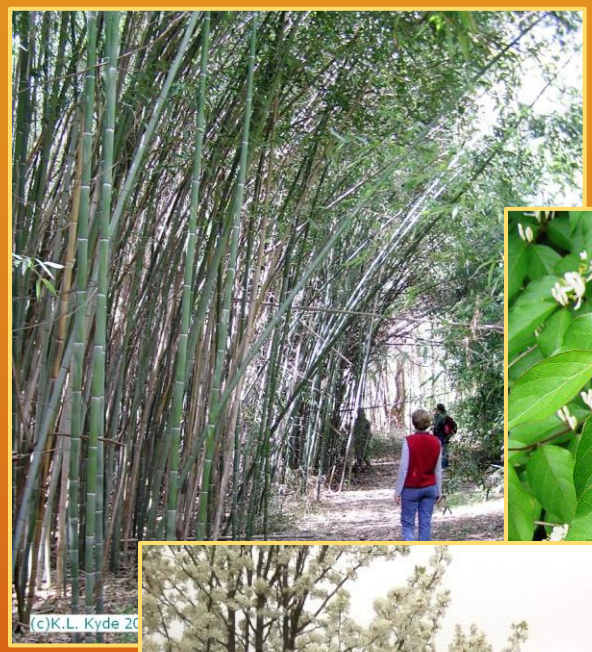
MARYLAND Smart, Green & Growing

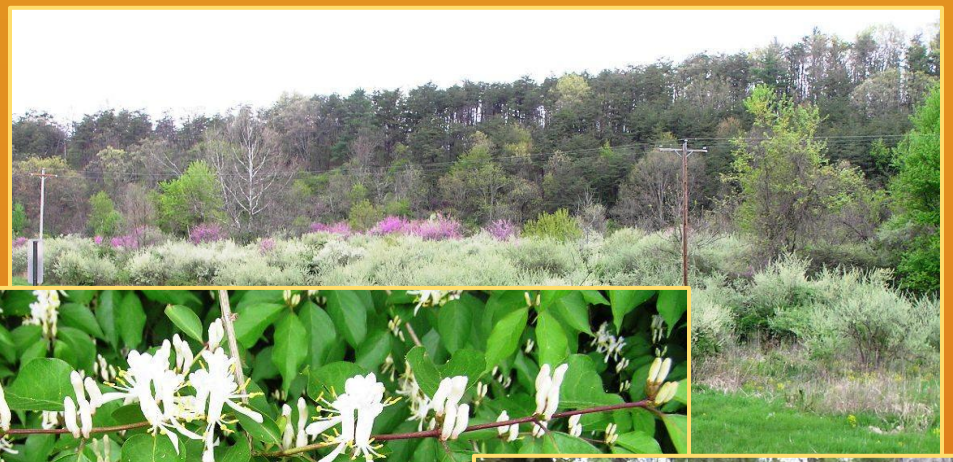
Talk Outline

- Need
- Motivation
- Legislation
- Implementation

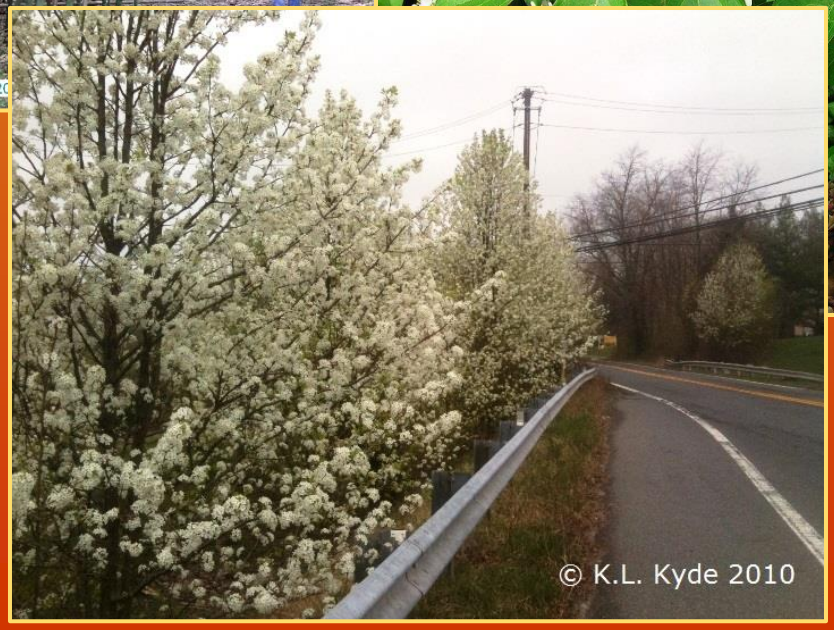
MARYLAND DEPARTMENT OF NATURAL RESOURCES

MARYLAND Smart, Green & Growing


(c)K.L. Kyde 20




© K.


© K.L. Kyde 2010


© K.L. Kyde 2013

DEPARTMENT OF NATURAL RESOURCES POLICY

SUBJECT: RESTRICTION ON PLANTING EXOTIC INVASIVE PLANTS

POLICY NUMBER: 2010:10

EFFECTIVE DATE: October 1, 2010

APPROVED:

DATE: September 29, 2010

I. Purpose

A. The purpose of this policy is

1. To eliminate the introduction and Department of Natural Res
2. To reduce the

and sale

programs
to this policy
unsuitable for use on
This list will be reviewed
removed as additional scientific information

2010 Maryland Code AGRICULTURE
TITLE 9 - REGULATION AND SUPERVISION OF SEEDS, TURF GRASS, SOD, POTATOES, GINSENG AND NOXIOUS WEEDS
Subtitle 4 - Weed Control
§9-401.Noxious plants.

(a) Declaration of certain species as noxious.- The existence of growth of certain species of plants is declared to be noxious.

(b) Enumeration.- The following plants are considered to be noxious weeds in the State:

(1) Thistles belonging to the asteraceae or compositae family, including **Canada, musk, nodding, plumeless, and bull thistle;**

(2) **Johnson grass (sorghum halepense)** or hybrids that contain Johnson grass as a parent; and

(3**) Shatter cane and wild cane (sorghum bicolor).**

MARYLAND DEPARTMENT OF NATURAL RESOURCES

MARYLAND Smart, Green & Growing

H.B. 1360

- Named 45 species as invasive
- Banned sales or use in commercial landscape planting unless plants were labeled
- Required permanently affixed labels, supplied by MDA, reading

"INVASIVE PLANT SPECIES – HARMFUL TO THE ENVIRONMENT"

MARYLAND DEPARTMENT OF NATURAL RESOURCES

MARYLAND Smart, Green & Growing

HOUSE BILL 831

Jake Robinson – our secret weapon!

MARYLAND DEPARTMENT OF NATURAL RESOURCES

MARYLAND Smart, Green & Growing

Md. AGRICULTURE Code Ann. § 9.5-101-306

- Defines "Invasive plant"
- Establishes an Invasive Plant Advisory Committee(IPAC), its membership and terms
- Requires the Secretary to Agriculture to promulgate regulations within one year that adopt a weed risk assessment system
- Requires the Secretary of Agriculture to promulgate regulations within two years that classify assessed plants as Tier 1 or Tier 2.
- Sets out exceptions to prohibited activities and penalties for violation

MARYLAND DEPARTMENT OF NATURAL RESOURCES

MARYLAND Smart, Green & Growing

"Invasive plant" means a terrestrial plant species that:

(1) did not evolve in the state; and

(2) if introduced within the state, will cause or is likely to cause, as determined by the secretary:

(i) economic harm;
(ii) ecological harm;
(iii) environmental harm; or
(iv) harm to human health.

http://www.lexisnexis.com/hottopics/mdcode/

MARYLAND DEPARTMENT OF NATURAL RESOURCES

MARYLAND Smart, Green & Growing

IPAC Membership

- The Secretary or designee from (ex officio):
  - ✓ Department of Agriculture
  - ✓ Department of Natural Resources
  - ✓ Department of Transportation
  - ✓ Department of the Environment
  - ✓ Dean of the University of Maryland College of Agriculture and Natural Resources
- Appointed by Sec. of Agriculture, with DNR
  - ✓ One individual from the landscaping industry
  - ✓ One individual from the plant industry
  - ✓ One individual from an NGO advocacy organization
  - ✓ Two individuals with experience with invasive plants, gardening, conservation or other relevant experience
  - ✓ One consumer
- Serves to advise the Secretary of Agriculture

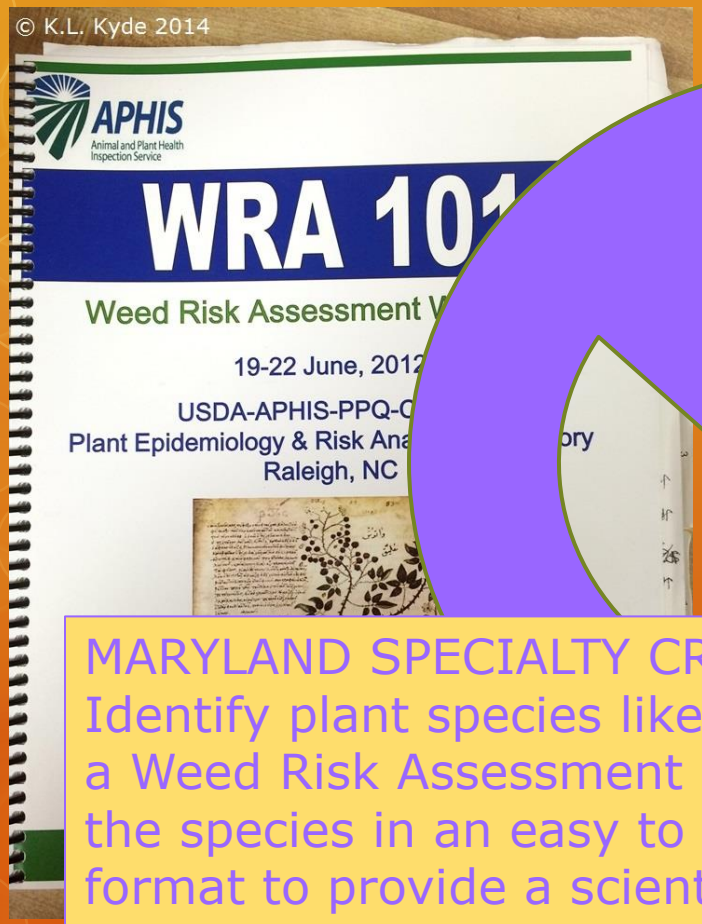
IPAC Uses APHIS' Weed Risk Assessment

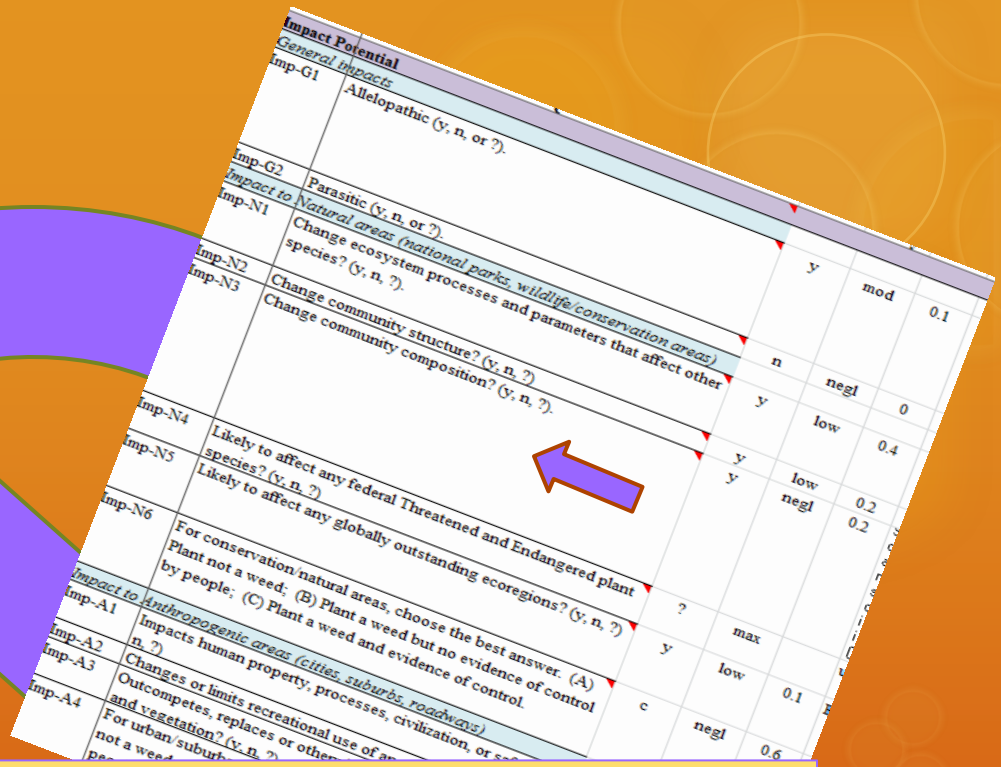
- Evaluates four risk factors
- Uses logistic regression to score species' invasion probability
- Further evaluates moderate risk species with secondary screening
- Employs Monte Carlo simulation as "uncertainty" check
- IPAC applies "Maryland Filter" to WRA High Risk species to classify as Tier 1 or Tier 2

http://www.dsd.state.md.us/comar/SubtitleSearch.aspx?search=15.06.04.*

MARYLAND DEPARTMENT OF NATURAL RESOURCES

MARYLAND Smart, Green & Growing



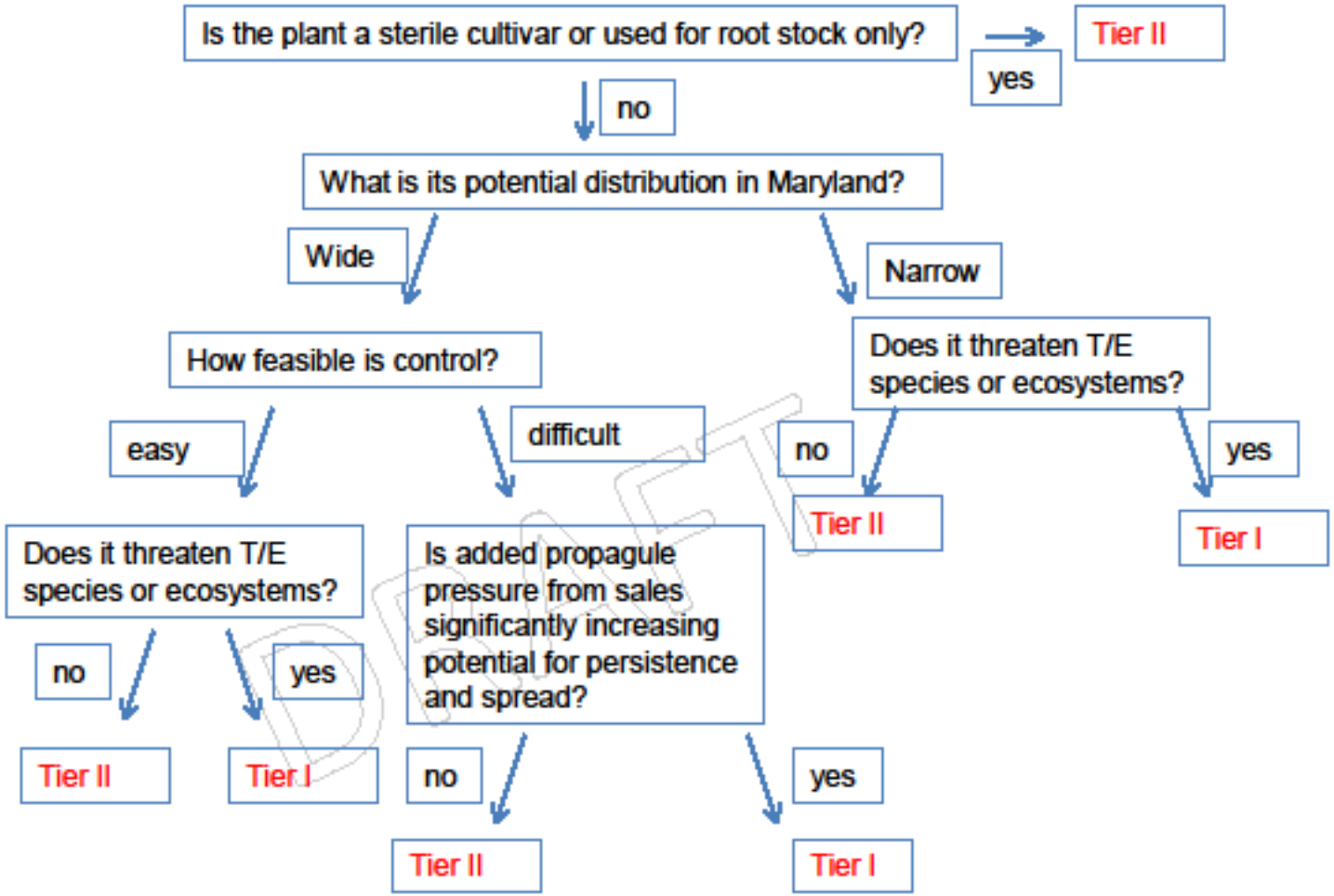


MARYLAND SPECIALTY CROP BLOCK GRANT PROPOSAL: Identify plant species likely to become invasive by conducting a Weed Risk Assessment and summarizing information about the species in an easy to interpret, user friendly document format to provide a scientifically determined basis for establishing regulated species lists and disseminating to appropriate specialty crop stakeholders

MARYLAND DEPARTMENT OF NATURAL RESOURCES

MARYLAND Smart, Green & Growing

DRAFT - Maryland Tier Filter for High Risk Plants



THANKS!

Putting Prevention First:

Maryland's IPAC at Work

Kerrie L. Kyde
Invasive Plant Ecologist
MD Natural Heritage Program
Dept. of Natural Resources
kerrie.kyde@maryland.gov
301/948-8243

MARYLAND DEPARTMENT OF NATURAL RESOURCES

MARYLAND Smart, Green & Growing

ENVIRONMENTAL LAW • INSTITUTE®

2014 Invasive Species Webinar Series

Species Risk Assessment Tools: Science and Policy Applications

Friday, October 3, 2014 • 12:00pm-2:00pm ET

INTRODUCING:

Reuben Keller

Ecologist and Risk Analyst, Plant Epidemiology and Risk Analysis Laboratory, Animal and Plant Health Inspection Service

Reuben Keller is an Assistant Professor in the Institute of Environmental Sustainability at Loyola University Chicago. He began working on invasive aquatic species during his undergraduate degree in Australia, where he spent a year researching the impacts of the invasive oriental weatherloach fish on local ecosystems. In 2001 he moved to the U.S. to begin his Ph.D. in David Lodge's lab at the University of Notre Dame. While there, his work focused on the development of risk assessment tools for aquatic species, and the integration of these tools with economic models to determine best policy.

After completing his Ph.D. in 2006 Keller held post-doctoral positions at Cambridge University, Notre Dame, and the University of Chicago. In 2011 he began as faculty at Loyola University Chicago. His research is focused on identifying the ways that non-native freshwater species are moved across the globe and how species invasions can be prevented. He works extensively with economists to integrate the ecology of invasions with information about trade so that the most rational solutions for invasion prevention can be found. He also works closely with managers to ensure that the results of his work are useful and can be implemented.

Questions for the panelists? Submit via the "Questions" box

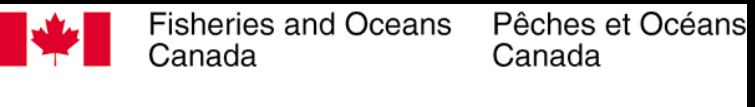
Risk Assessment For Invasive Aquatic Species in the Great Lakes

Reuben Keller

Loyola University Chicago

rkeller1@luc.edu

David Lodge, Lindsay Chadderton, Pat Charlebois, Crysta Gantz, Erin Grey, Danielle Hilbrich,Greg Hitzroth, Jennifer Howeth, Reuben Keller, Nick Mandrak, Kristin TePas

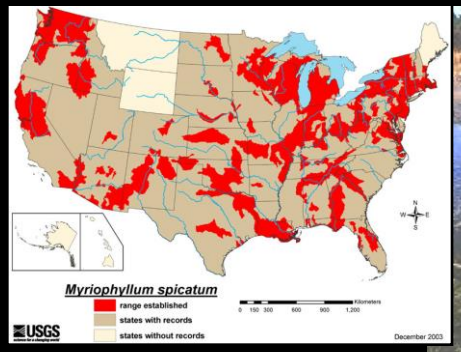


Aquatic Organisms in Trade in Great Lakes Region

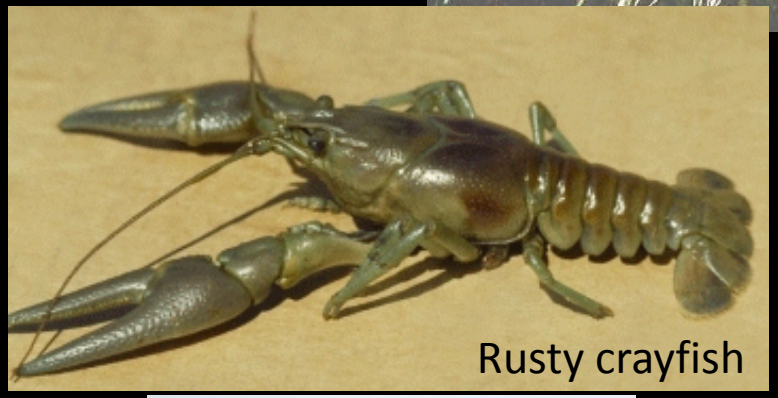
- Hundreds of species in trade, including (at least) 126 plants, 826 fishes, 87 mollusks

- Unknown numbers of other species (crayfishes, amphibians, reptiles)

- Many species already invasive, and more are being introduced through trade



Eurasian watermilfoil



Rusty crayfish

Silver carp

Regulatory Response

Species	IL	IN	MI	MN	NY	OH	ON	PA	WI
Bighead carp *(Hypophthalmichthys nobilis)*	X	X	X	X	X	X	X	X	X
Bitterling *(Rhodeus sericeus)*			X						
Black carp *(Mylopharyngodon piceus)*	X	X	X	X	X	X	X	X	X
Chinese weatherloach *(Misgusnus anguillicaudatus)*			X						
Eastern banded killifish *(Fundulus diaphanus)*						X			
Grass carp, triploid *(Ctenopharyngodon idella)*			X	X	X		X		X
Grass carp, diploid *(Ctenopharyngodon idella)*						X		X	X
Ide/Orfe *(Leuciscus idus)*			X						
Mosquitofish, eastern (*Gambusia holbrooki*)									X
Mosquitofish, western (*Gambusia affinis*)									X
Piranha *(Multiple genera)*					X				
Round goby *(Neogobius melanostomus)*	X	X		X		X	X	X	
Rudd *(Scardinius erythrophthalamus)*	X	X	X	X		X	X	X	
Ruffe *(Gymnocephalus cernuus)*	X	X		X		X	X	X	
Sea lamprey *(Petromyzon marinus)*				X		X			
Silver carp *(Hypophthalmichthus molitrix)*	X	X	X	X	X	X	X	X	X
Snakehead, giant (*Channa micropeltes*)									X
Snakehead, northern *(Channa argus)*	X	X	X	X	X	X	X	X	X
Snakehead family									X
Red shiner (*Cyprinella lutrensis*)									X
Tench *(Tinca tinca)*			X						
Three spine stickleback *(Gasterosteus aculeatus)*						X			
Tilapia *(Multiple genera)*								X	
Tubenose goby *(Proterorhinus marmoratus)*	X	X		X		X	X	X	
Walking catfish *(Family Clariidae)*	X								
Walking catfish *(Clarias batrachus)*						X			
White perch *(Morone americana)*		X		X		X			
Zander *(Sander lucioperca)*				X					X

Data from Lindsay Chadderton, TNC

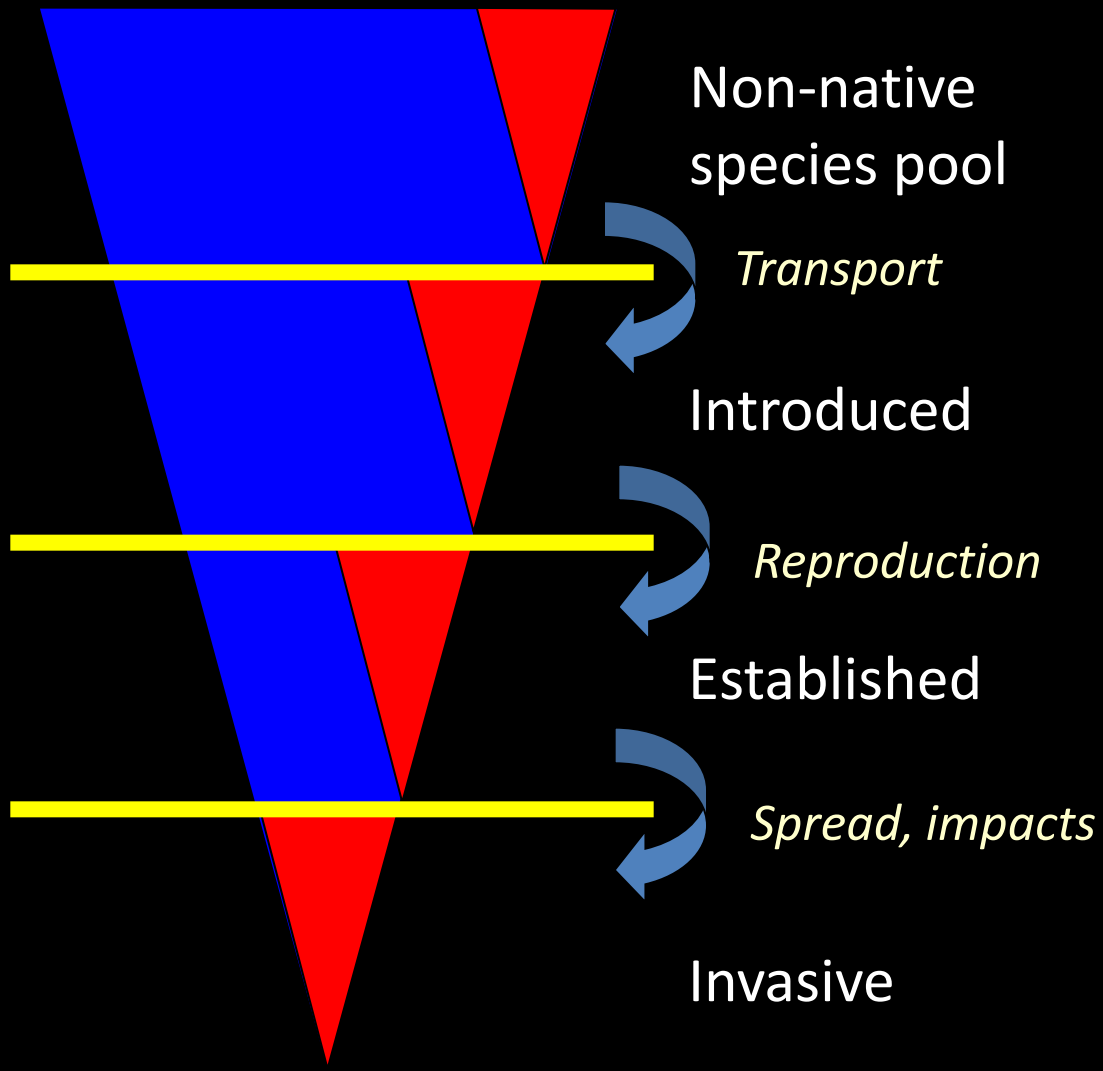
The Need for Risk Assessment

- EffortS to prevent new invaders are only as good as the least effective regulations/enforcement

- Coordination is essential to meet goals of preventing new invaders from arriving

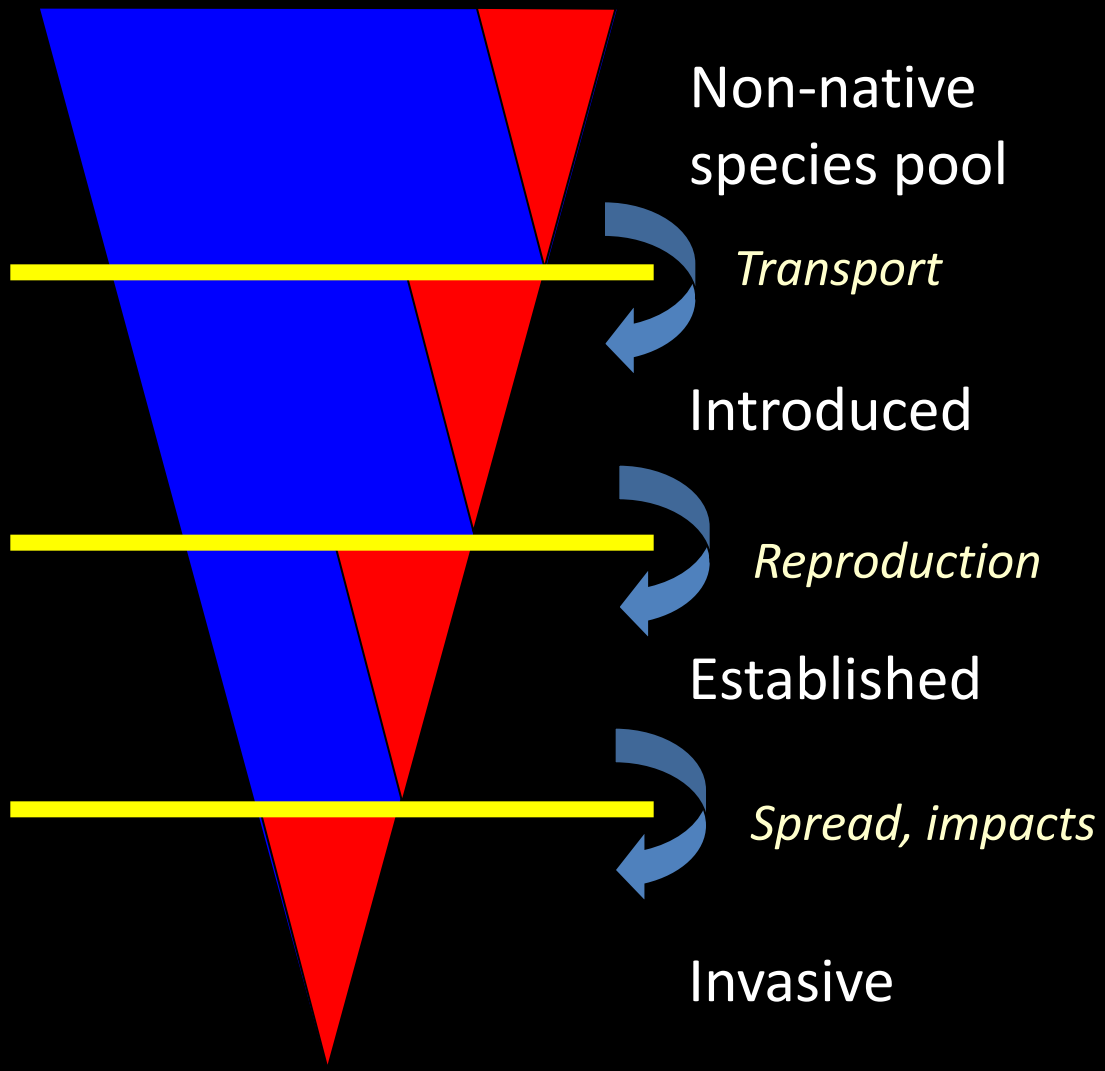
- Risk assessment has been shown to have environmental *and* economic benefits

Risk Assessment for Invasive Species



Goal of RA is to identify establishers/invaders prior to introduction

Risk Assessment for Invasive Species



RA tools need to be:

Accurate

Transparent

Repeatable

Low Cost

Peer Reviewed

Our Project

- Develop Risk Assessment Tools that can be applied across Great Lakes states for aquatic plants, fishes, mollusks, amphibians, and reptiles

- Assess species currently in trade

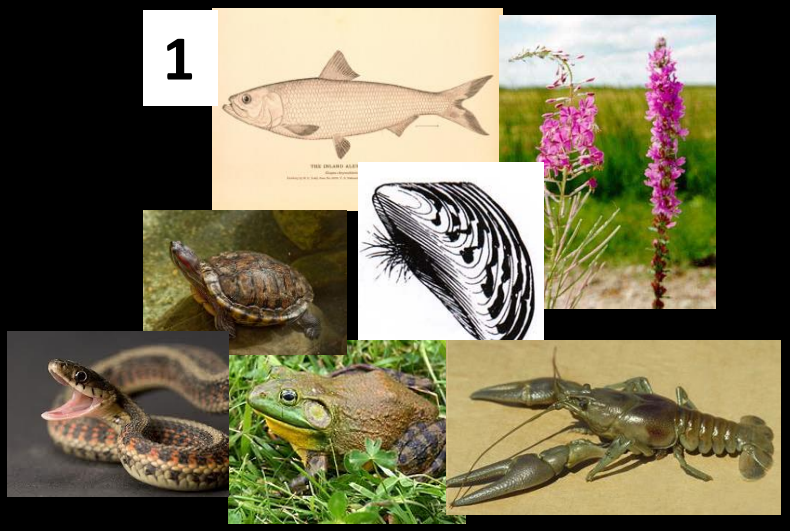
- Make all results available to managers, policy-makers, and the public

Stakeholder Process

- Worked throughout with *Management Transition Board* to ensure that our work meets the needs of state policy-makers
- Training for completed tools
- Notre Dame STAIR tools (*Science-based Tools for Assessing Invasion Risk*) will soon be published on www.takeAIM.org

Developing Risk Assessment Tools

1



2

3 **Invasion Process**

Species Elsewhere

↓

Introduced

↓

Established

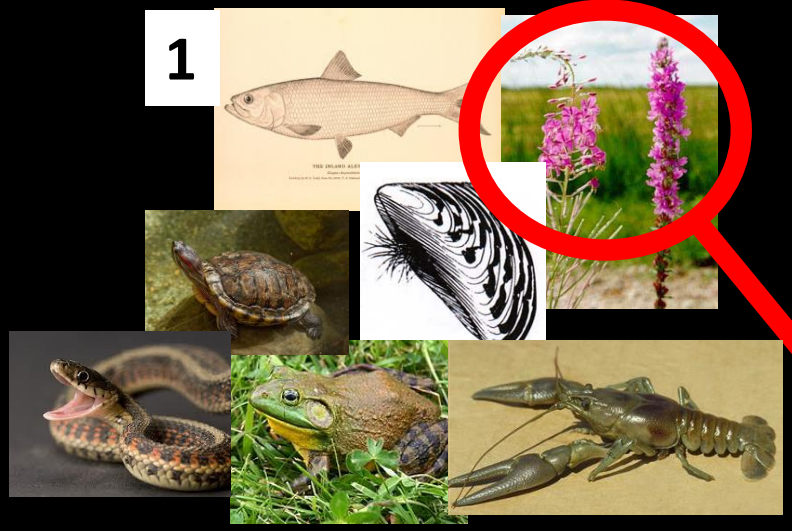
↓

Invasive

Gather species data and look for patterns explaining success

STAIR*plants*

1



2

3 **Invasion Process**

Species Elsewhere

↓

Introduced (n=84)

↓

Established (n=40)

↓

Invasive (n=16)

1. Gather species lists
2. Gather trait data
3. Analyze data

STAIR*plants* questions and scoring

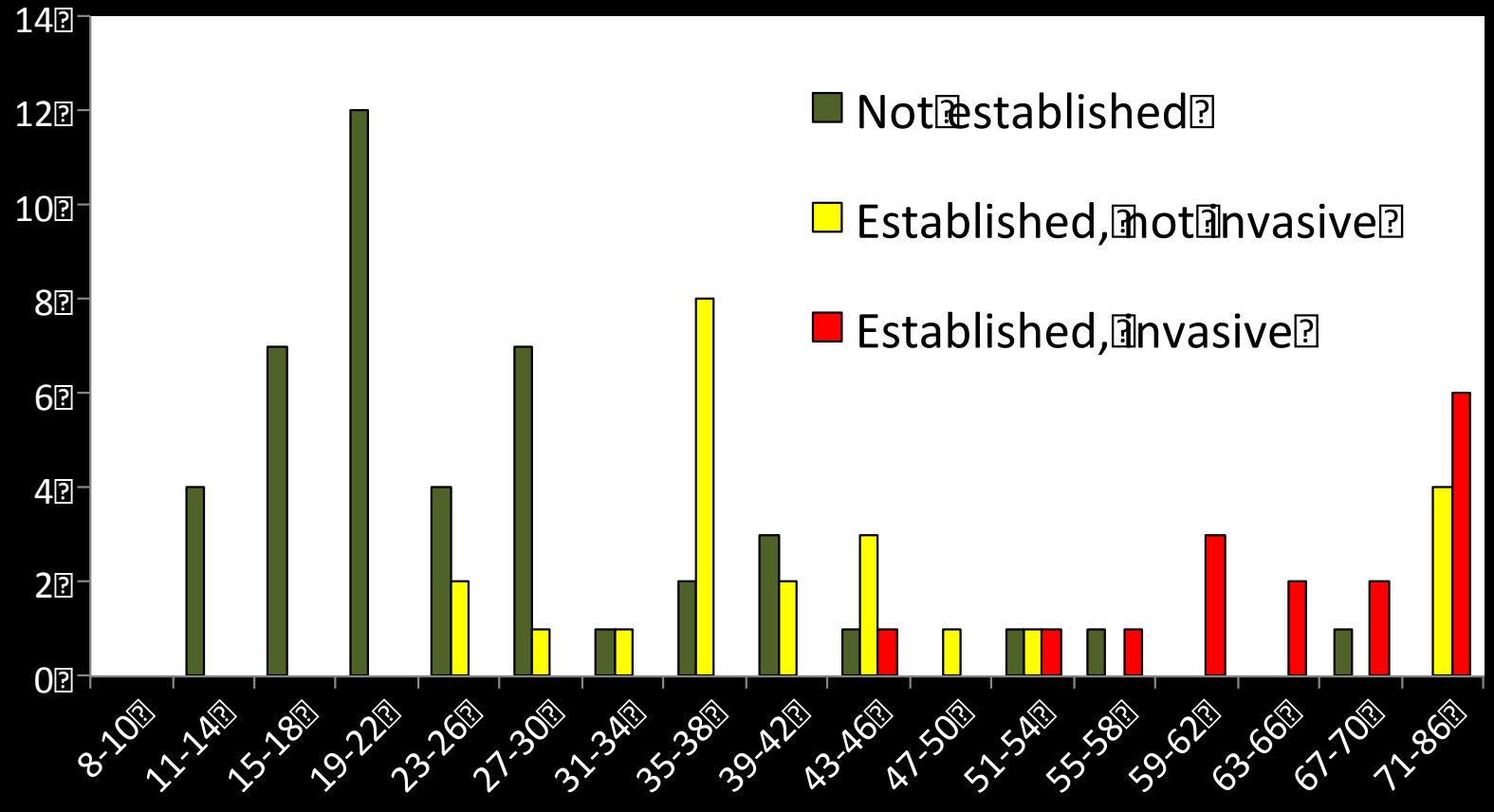
- 38 questions in 12 categories with scores summed
  - Climate/distribution
  - Invasiveness elsewhere
  - Habitat breadth
  - Potential for spread
  - Generation time
  - Reproductive capacity
  - Competitive ability
  - Impacts to water flow
  - Impacts to water chemistry
  - Impacts to native systems
  - Other negative impacts
  - Response to management

} History / Biogeography

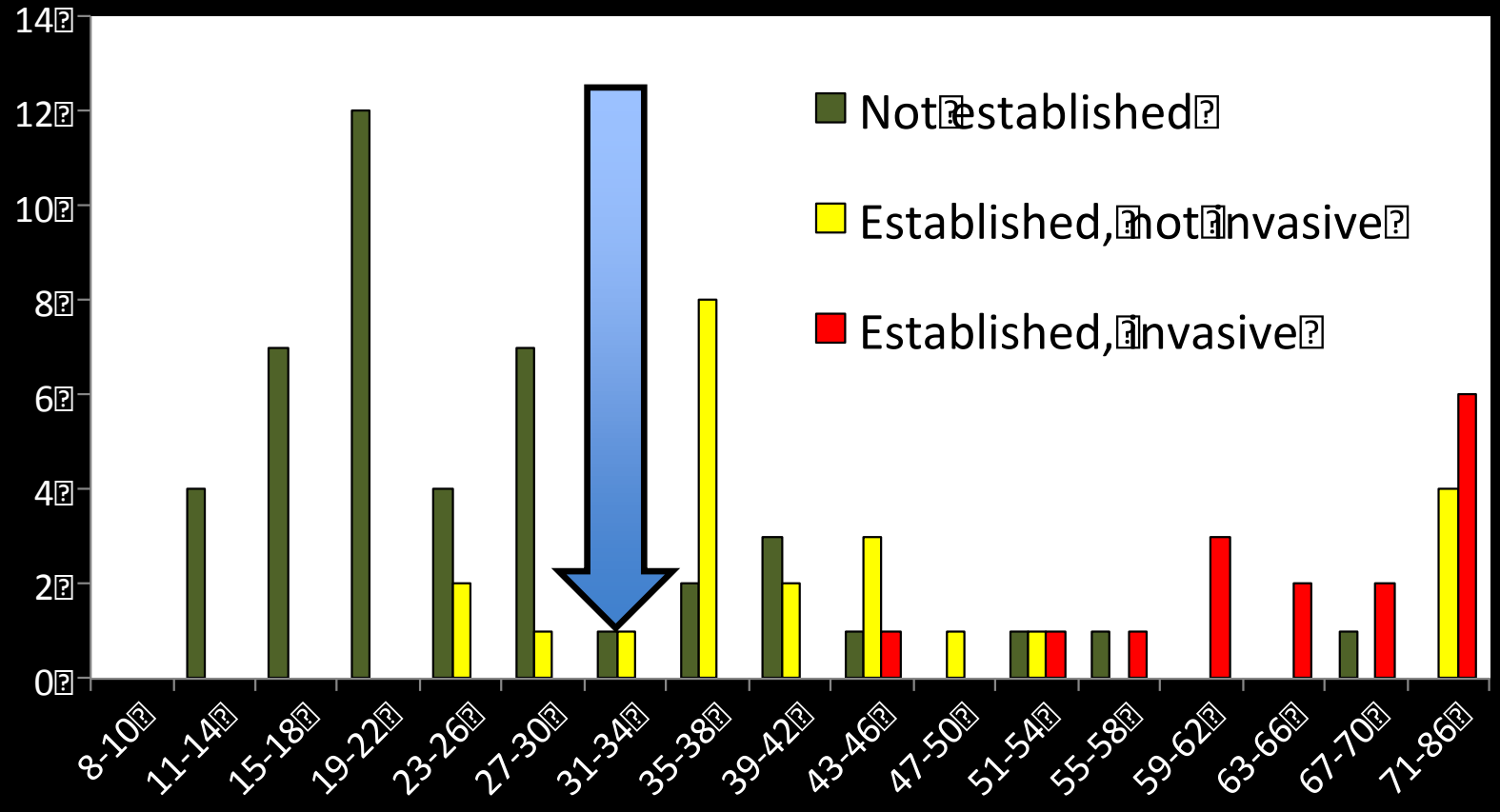
} Biology / Ecology

- AqWRA score
  - Range of possible scores 3 to 91
  - Thresholds can be found to distinguish invaders from others

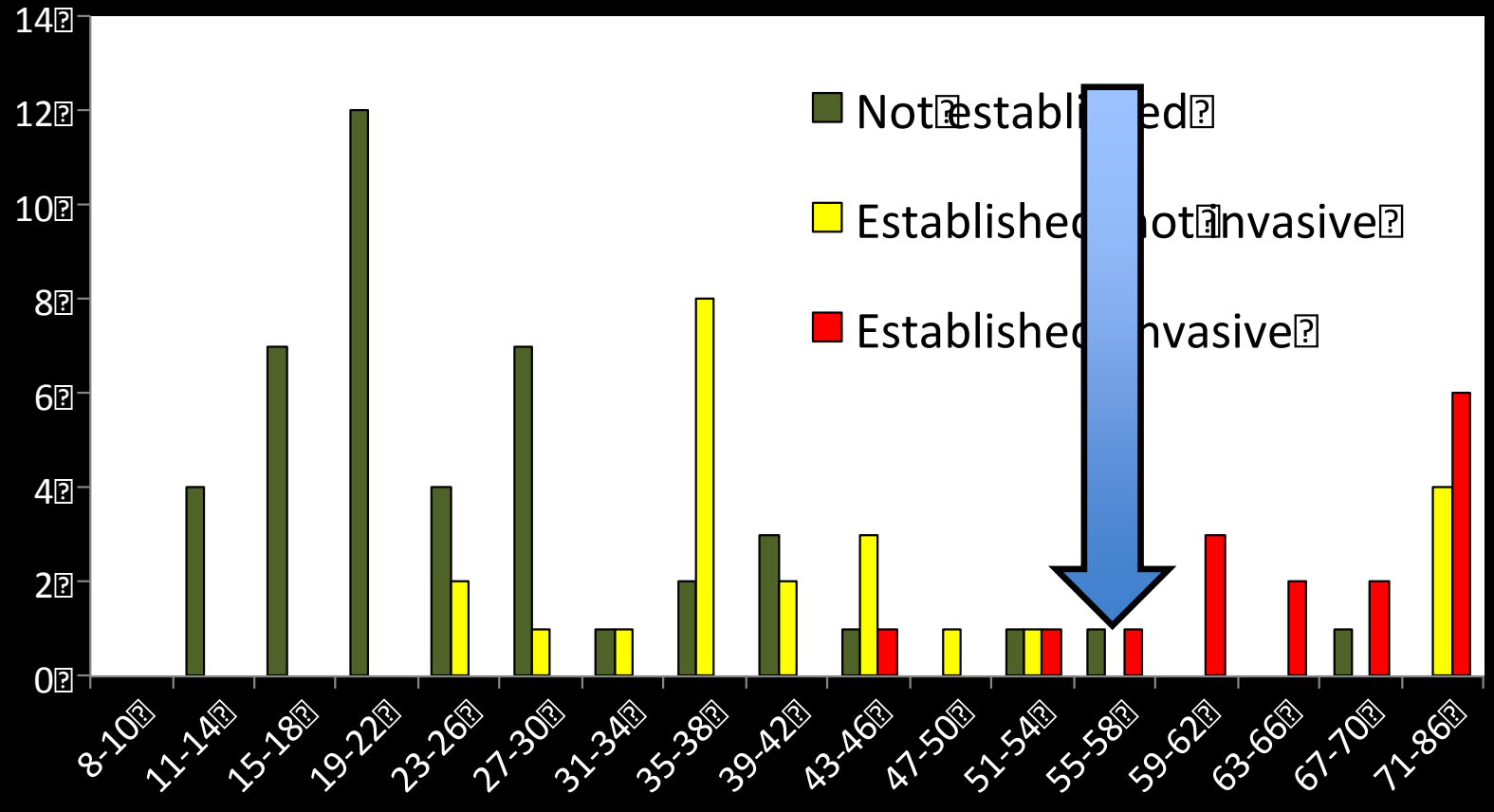
STAIR*plants* Scores



STAIR*plants* Scores



STAIR*plants* Scores



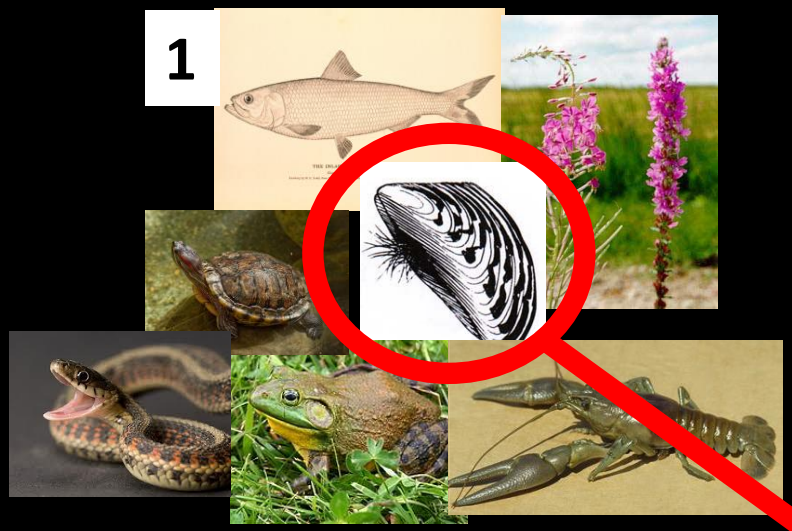
New Plant Regulations in IN and IL

Sec. 23. (a) The following are prohibited invasive aquatic plants and are declared pests or pathogens regulated under this section:

(1) Azolla pinnata (mosquito fern).
(2) Butomus umbellatus (flowering rush).
(3) Caulerpa taxifolia (caulerpa or Mediterranean killer algae).
(4) Egeria densa (Brazilian elodea, Brazilian waterweed, Anacharis, or Egeria).
(5) Eichhornia azurea (anchored water hyacinth).
(6) Hydrilla verticillata (Hydrilla or water thyme).
(7) Hydrocharis morsus-ranae (European frogbit or common frogbit).
(8) Hygrophilia polysperma (miramar weed, Indiana swampweed, or hygro).
(9) Ipomoea aquatica (Chinese waterspinach or swamp morning-glory).
(10) Iris pseudacorus (yellow flag iris or tall yellow iris).
(11) Lagarosiphon major (oxygen weed or African elodea).
(12) Limnophila sessiliflora (Asian marshweed or ambulia).
(13) Monochoria hastata (monochoria, arrowleaf, or false pickerelweed).
(14) Monochoria vaginalis (heartshape or false pickerelweed).
(15) Myriophyllum aquaticum (parrot feather or parrot feather watermilfoil).
(16) Myriophyllum spicatum (Eurasian watermilfoil).
(17) Najas minor (brittle naiad or brittle water nymph).
(18) Nymphoides peltata (yellow floating heart).
(19) Ottelia alismoides (duck lettuce).
(20) Potamogeton crispus (curlyleaf pondweed).
(21) Sagittaria sagittifolia (arrowhead).
(22) Salvinia auriculata (giant salvinia).
(23) Salvinia biloba (giant salvinia).
(24) Salvinia herzogii (giant salvinia).
(25) Salvinia molesta (giant salvinia).
(26) Sparganium erectum (exotic bur-reed).
(27) Trapa natans (water chestnut).
(28) Typha angustifolia (narrow-leaf cattail).

STAIR*mollusks*

1



2

3 **Invasion Process**

Species Elsewhere

↓

Introduced (n=?)

↓

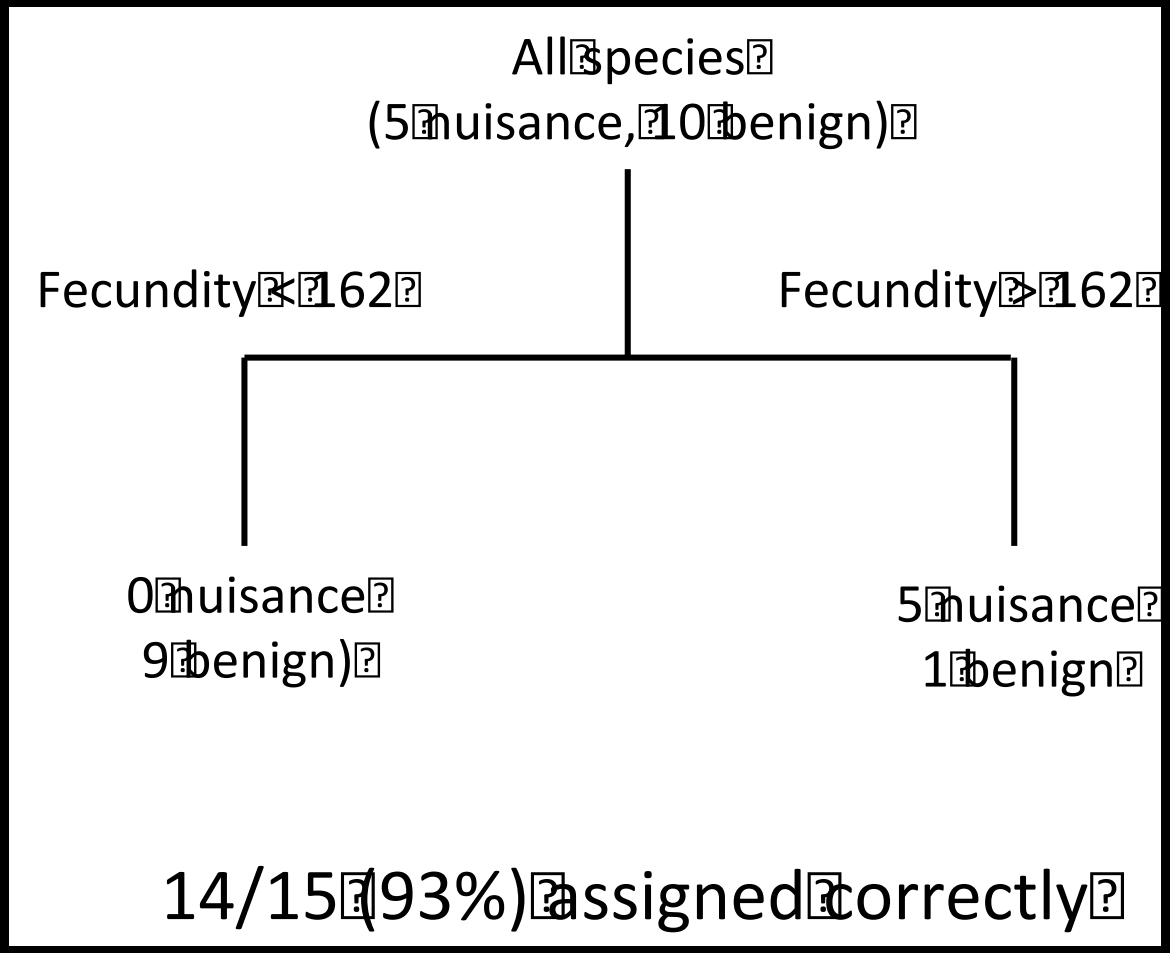
Established (n=18)

↓

Invasive (n=5)

1. Gather species lists
2. Gather trait data
3. Analyze data

Previous Risk Assessment for Mollusks



Keller et al. 2007

STAIR*mollusks*

1. Does the species currently exist in hardiness zones of ≤7?
   If yes, continue, if no, species is unlikely to establish
2. Is the annual fecundity (per female) of the species >158?
3. Is the species invasive elsewhere? If yes, describe.
4. Does the species carry parasites or pathogens of concern?
5. Any other reasons for concern?

STAIR*mollusks*

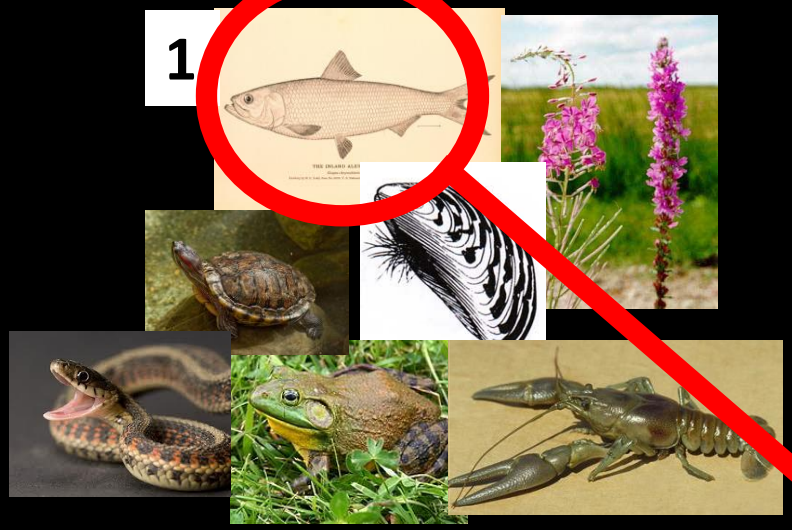
1. Does the species currently exist in hardiness zones of ≤7?
   If yes, continue, if no, species is unlikely to establish
2. Is the annual fecundity (per female) of the species >158?
3. Is the species invasive elsewhere? If yes, describe.
4. Does the species carry parasites or pathogens of concern?
5. Any other reasons for concern?

1 = 'Yes', Any of 2-5 indicate harm, treat species as 'High Risk'

1 = 'Yes', 2-5 indicate acceptable risk of harm, treat species as 'Low Risk', unless establishment without impacts is undesirable

STAIR*fish*

1



2

3 **Invasion Process**

Species Elsewhere

↓

Introduced (n=65)

↓

Established (n=37)

↓

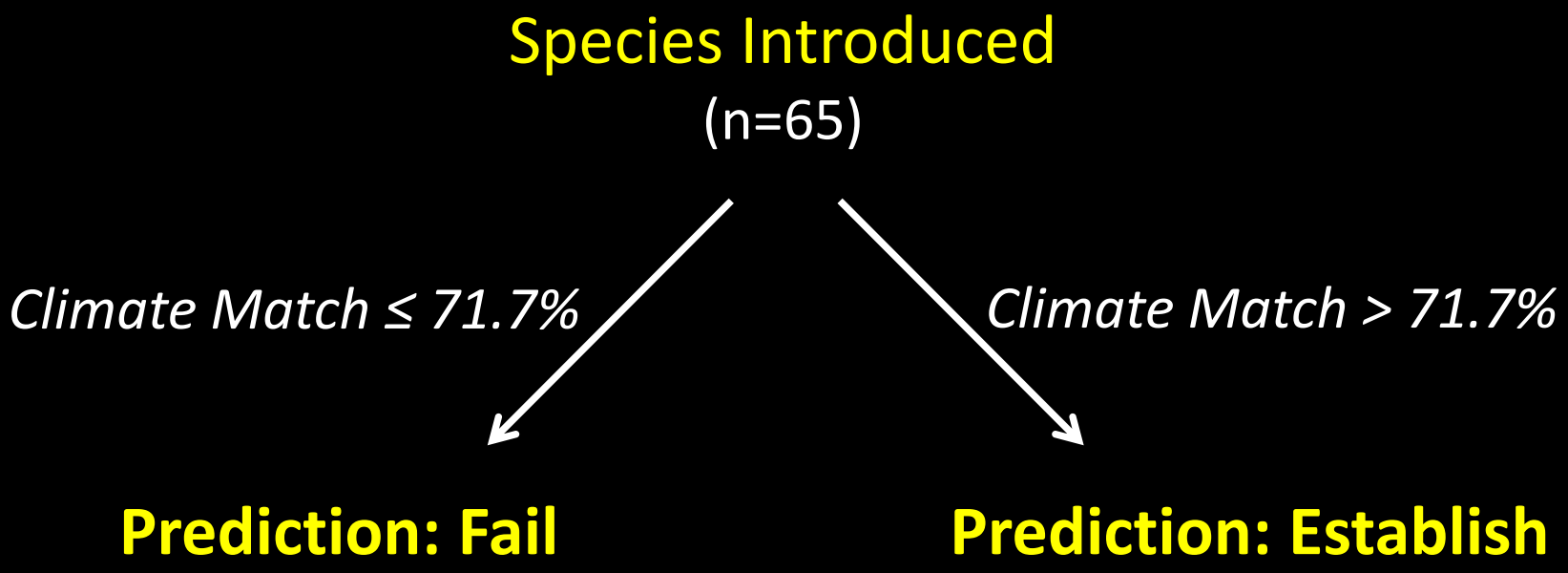
Invasive (n=12)

1. Gather species lists
2. Gather trait data
3. Analyze data

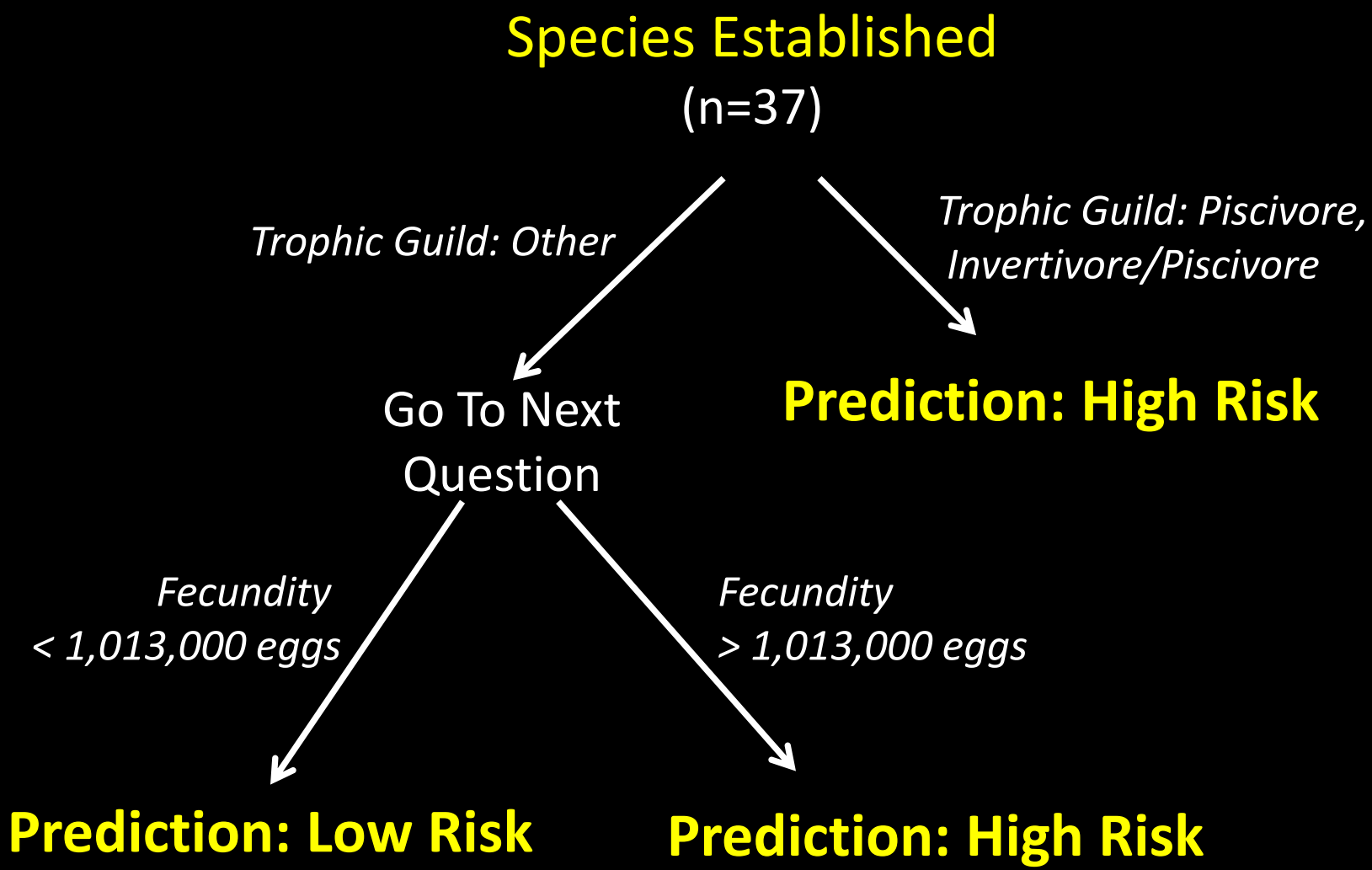
STAIR*fish:* Trait Data

Life-history	***Habitat preference***	***Phylogenetic***
Body size	Macrohabitat preference	Phylogeny
Egg size	Salinity tolerance	Relatedness
Fecundity	Temperature tolerance	
Larval size		***Trophic ecology***
Longevity	***Invasion risk***	Diet breadth
Maturation size	Climate similarity	Trophic guild
Reproductive guild	Prior invasion success	
Spawning frequency		***Native range***
		Size of range

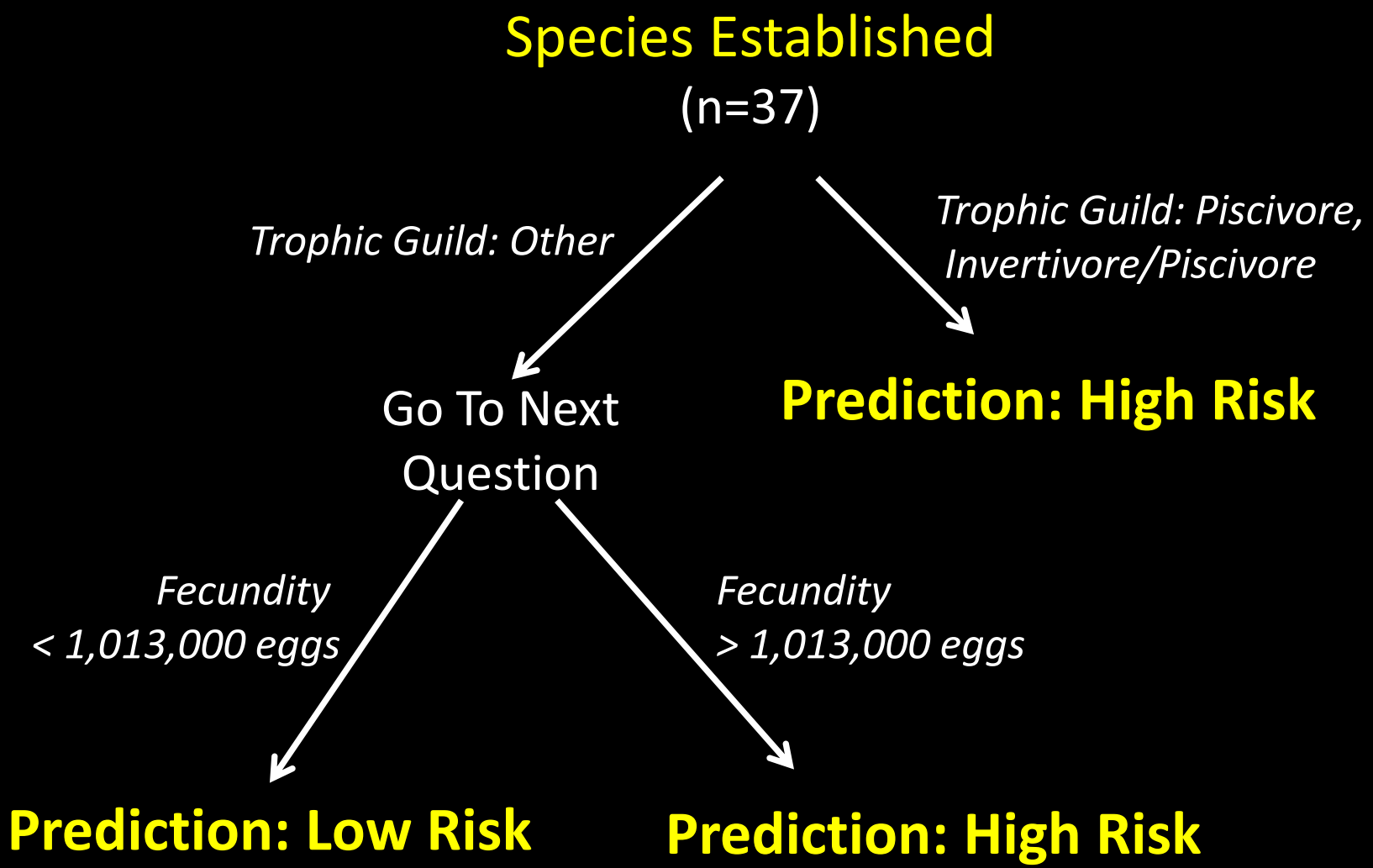
STAIR*fish*: Introduced to Established



STAIR*fish*: Established to Invasive



STAIR*fish*: Established to Invasive



- 826 live freshwater species in trade in US and Canada
- Seven predicted to establish in GL, four with high impacts

Overall Progress

Tool	Status	# assessed?
STAIR*plants*	US model and results published, GL paper in revision, training Fall 2012	126
STAIR*mollusks*	Model complete, training Fall 2013	87
STAIR*crayfish*	Model complete, training Spring 2014. Manuscript in review	230
STAIR*fish*	Model complete, training Spring 2014. Manuscript soon to be submitted	826
STAIR*turtle*	Model complete, Training Spring 2014	30
STAIR*snakes&lizards*	Model Developed	Not yet
STAIR*amphibians*	Model Developed	Not yet

Conclusions

- High performance risk assessment tools can be produced
- Stakeholder engagement has improved our tools and made them more relevant for managers
- Risk assessment tools are an essential component of a regional approach to invasive species prevention
- Coordinated approach is environmentally *and* economically rational

ENVIRONMENTAL LAW • INSTITUTE®

2014 Invasive Species Webinar Series

Species Risk Assessment Tools: Science and Policy Applications

Friday, October 3, 2014 • 12:00pm-2:00pm ET

INTRODUCING:

Craig Martin

Chief, Branch of Aquatic Invasive Species, U.S. Fish and Wildlife Service

Craig Martin received his Bachelor of Science in wildlife management from West Virginia University and Masters of Science in fish biology from Oklahoma State University. Craig has a broad experience in salmonid restoration from Chinook salmon in the Central Valley of California to Atlantic salmon in the Green Mountains of Vermont, and salmon and steelhead in the Columbia River Basin. He has been involved in the management and control of aquatic nuisance species, including the development and implementation of a long-term program of sea lamprey control in Lake Champlain. As Chief of the Branch of Aquatic Invasive Species within the Fish and Aquatic Conservation Program in the Headquarters Office, Craig oversees the Service's program to prevent, control, and manage the spread of aquatic invasive species. Craig has worked for the Service for about 20 years and has held positions as a fishery biologist at the Red Bluff Fish and Wildlife Resources Office in California, Deputy Project Leader of the Lake Champlain Fish and Wildlife Office in Vermont, assistant Fisheries Program Supervisor for Region 1's Fisheries Program in Portland Oregon, and chief of the Branch of Aquatic Invasive Species. He has been married for over 20 years to his wife Karin and has two daughters, Breanne and Kirstin. He enjoys abalone and SCUBA diving along the California Coast, bass fishing in Ontario Canada, and spending time (wherever) with family and friends.

Questions for the panelists? Submit via the "Questions" box

ELI Webinar Series: Species Risk Assessment Tools - Science and Policy Applications

October 3, 2014

Craig Martin, Chief of the Branch of Aquatic Invasive Species, USFWS

Integrated Pest Management

The control of pests utilizing a practical, economical, and scientifically based combination of chemical, biological, mechanical or physical, and cultural control methods. ANSTF 1994.

Photo credit: New York Department of Environmental Conservation

Photo credit: Lake Champlain Basin Program

Biosecurity

- Utilizing a <u>combination of measures</u> designed to protect the environment by preventing the <u>escape</u> to or <u>establishment</u> of species in the natural environment.

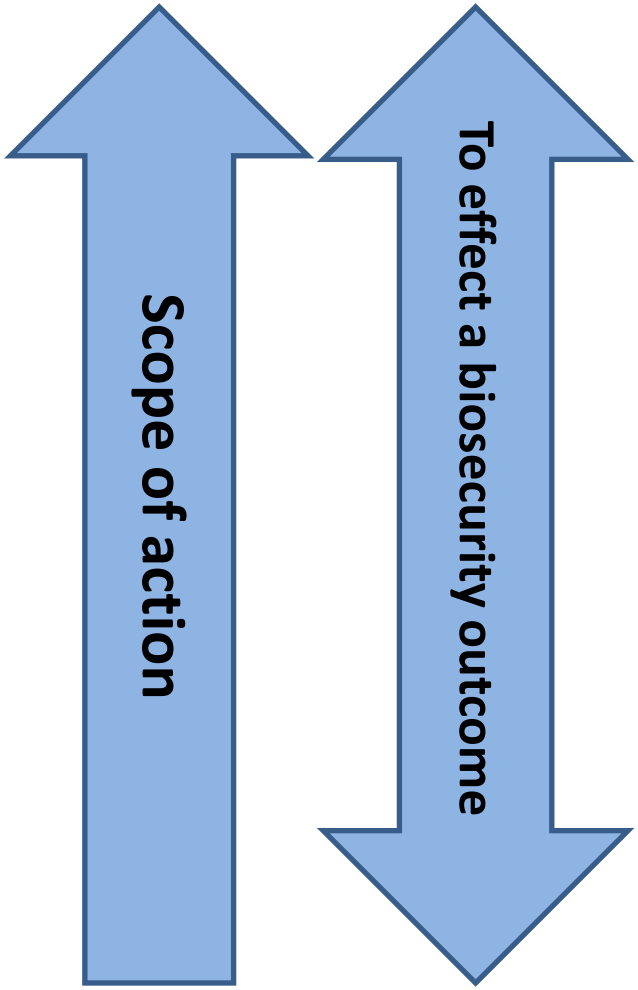
National/International

Local

Habitattitude™
PROTECT OUR ENVIRONMENT
DO NOT RELEASE FISH AND AQUATIC PLANTS
PIJAC • U.S. FISH & WILDLIFE SERVICE • NOAA'S SEA GRANT
www.Habitattitude.net

Biosecurity Toolbox – Contributing to Prevention

- **National/international**
- **Regionally-coordinated approaches**
- **State-led risk management actions**
- **Action by individual businesses**
- **Local - consumer awareness and responsibility**



Need for Risk Screening/Risk Assessment

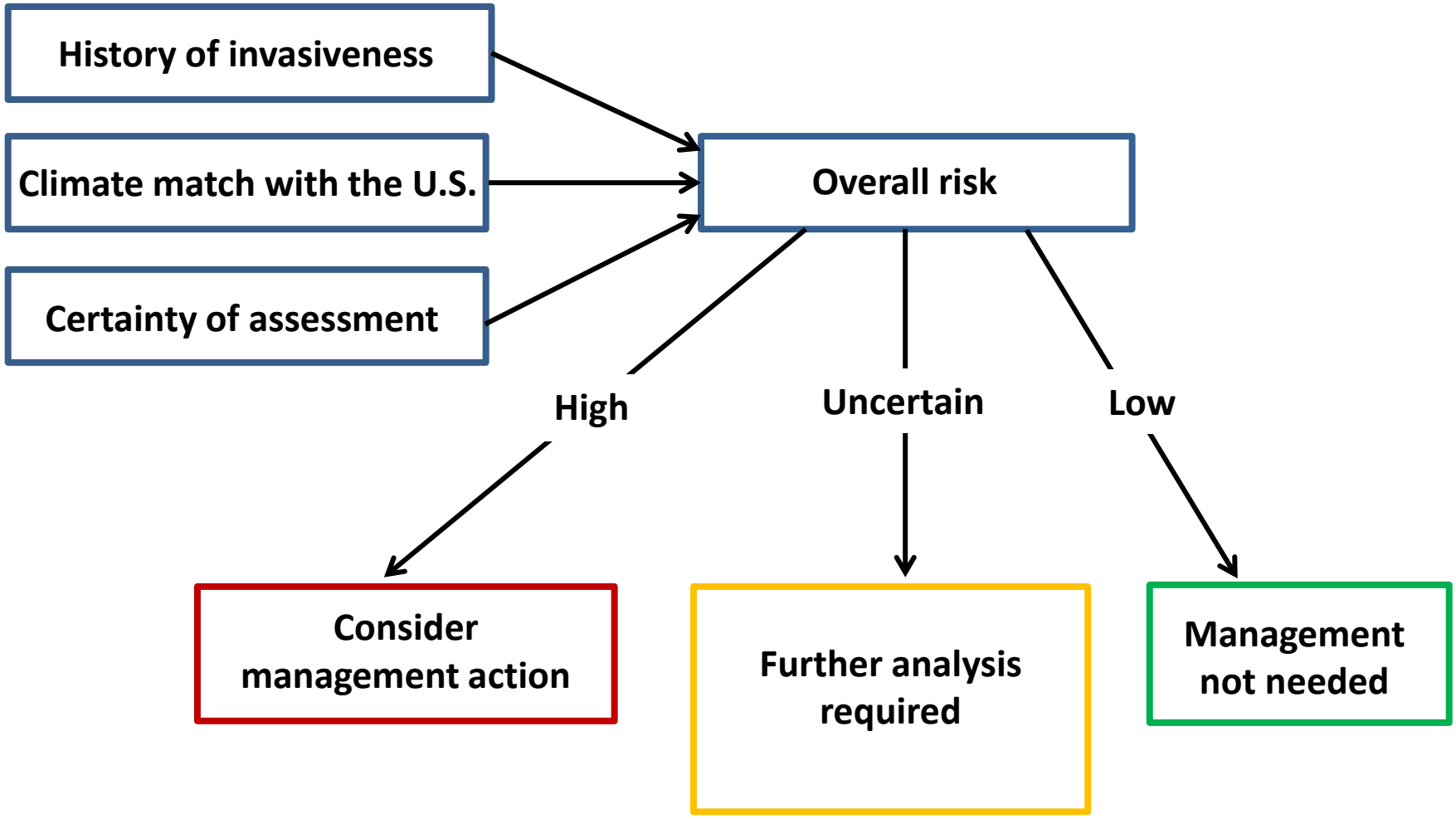
- **National Invasive Species Management Plan**: Develop screening processes to evaluate invasiveness of terrestrial and aquatic nonnative wildlife moving in trade.

- **Congressional Interest**: Pre-import screening for taxa "novel" to the United States

- **Title 18 Lacey Act Reforms**: "[M]ake the Lacey Act a tool for 21st Century Conservation."

- **EU 9/29/2014 adopted Invasive Alien Species Regulations**: based on comprehensive risk assessment and robust scientific evidence

ERSS Process

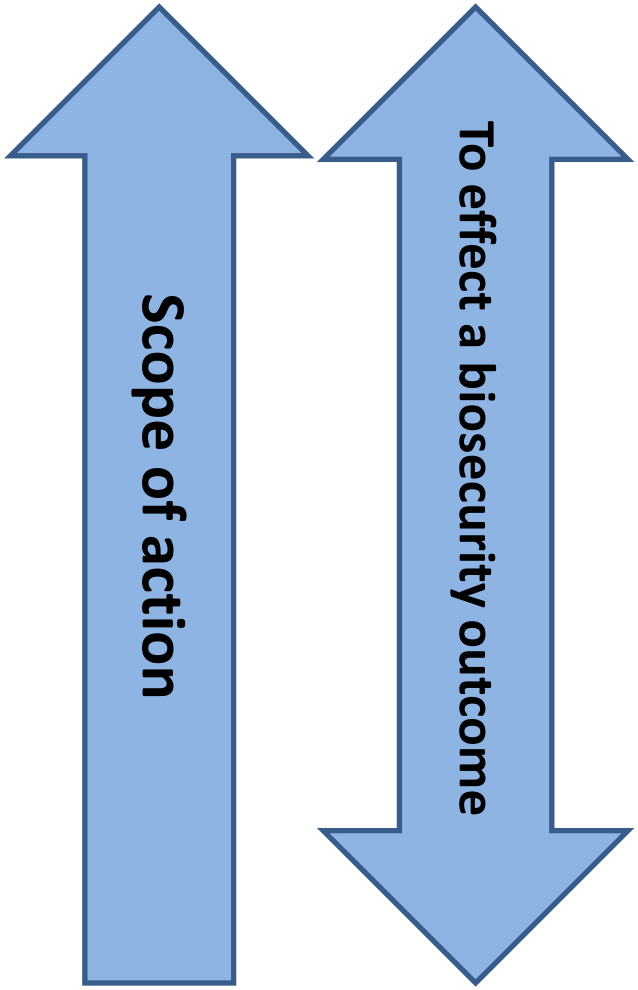


Calling All Risk Assessments!

- **The ERSS process is just one of many tools to assess risk for invasive species**
- **We encourage others to conduct their own risk screenings—we welcome collaboration!**

Biosecurity Toolbox – Contributing to Prevention

- National/international
- Regionally-coordinated approaches
  - e.g., regional compacts
- State-led risk management actions
  - e.g., State regulations
- Action by individual businesses
- Local - consumer awareness and responsibility



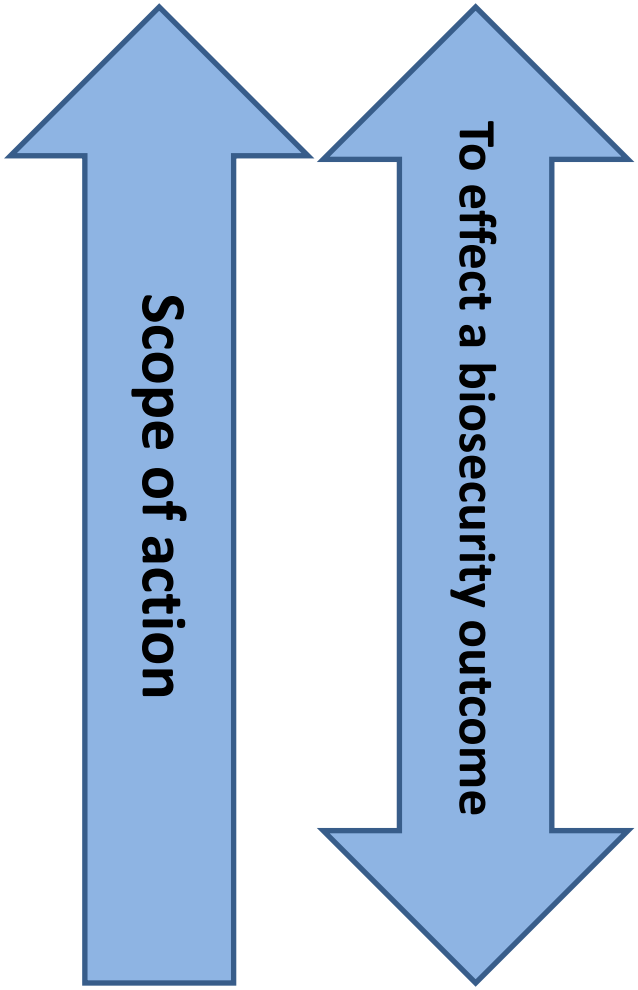
ERSSs Available Online

ERSSs, the SOP for the ERSS process, and an email address for public comment are available online at:

http://www.fws.gov/injuriouswildlife/Injurious_prevention.html

Biosecurity Toolbox – Contributing to Prevention

- National/international
- Regionally-coordinated approaches
- State-led risk management actions
- Action by individual businesses
  - e.g., No-trade pledge, BMPs
- Local - consumer awareness and responsibility



MEMORANDUM OF UNDERSTANDING
Between
the UNITED STATES FISH AND WILDLIFE SERVICE and
the PET INDUSTRY JOINT ADVISORY COUNCIL and
the ASSOCIATION OF FISH AND WILDLIFE AGENCIES
to COLLABORATE
ON THE DEVELOPMENT OF NONREGULATORY
APPROACHES TO REDUCE THE RISK OF INTRODUCING
POTENTIALLY INVASIVE SPECIES
THROUGH INTERNATIONAL TRADE AND
TO PROMOTE VOLUNTARY NO-TRADE
IN CERTAIN SPECIES NOT PRESENTLY IN TRADE

- **Reduce the risk posed by potentially invasive species that are <u>not currently in trade</u> in the U.S. through <u>voluntary risk management</u> approaches**
- **<u>Cooperation</u> and <u>collaboration</u> between the states, industry, USFWS and other NGOs**

MOU Roles and Responsibilities

USFWS

- Conduct Ecological Risk Screening Summaries (ERSS) for nonnative species.

AFWA

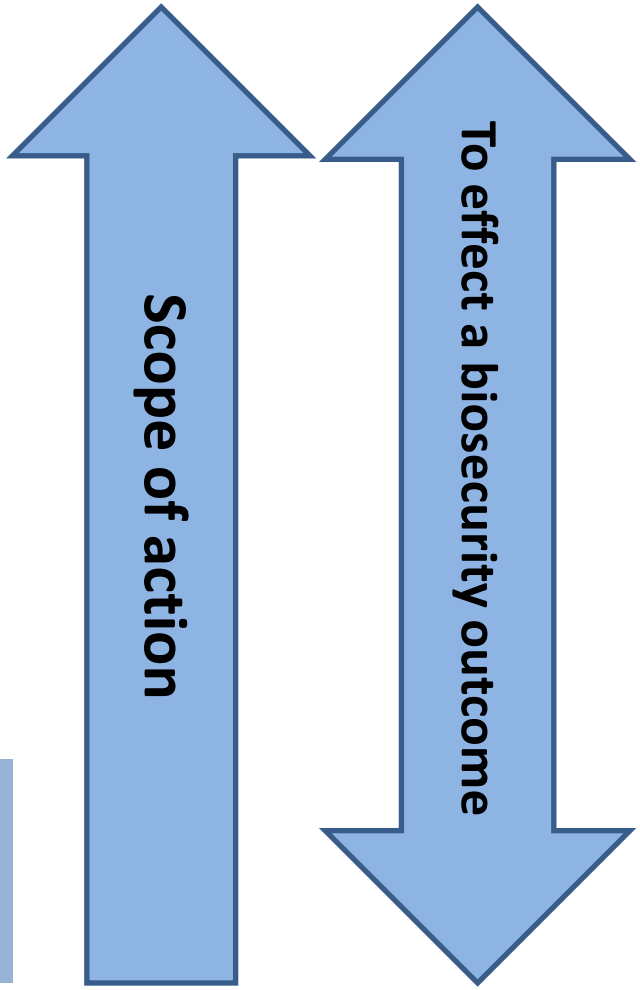
- Provide a forum to nominate species to be screened.

PIJAC

- Engage members to conduct proactive public outreach to promote awareness of high or uncertain risk species
- Evaluate voluntary mitigation techniques and best management practices
- Encourage members to consider an environmental covenant pledge

Biosecurity Toolbox – Contributing to Prevention

- National/international
- Regionally-coordinated approaches
- State-led risk management actions
- Action by individual businesses
- Local - consumer awareness and responsibility (e.g. Habitattitude™)



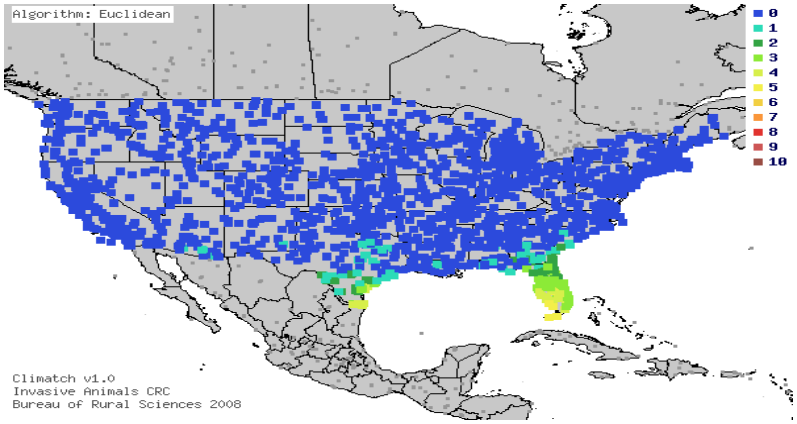
Local: Promoting environmentally sustainable business practices and hobbyist decisions

- **Habits**
  - ✓ Ensure that pets are thoughtfully chosen and well-cared for
- **Habitat**
  - ✓ Protect the environment from the effects of unwanted pets
- **Attitude**
  - ✓ Help pet owners find alternatives to the release of their pets

Habits: Ensure pets are thoughtfully chosen

Betta splendens - Betta

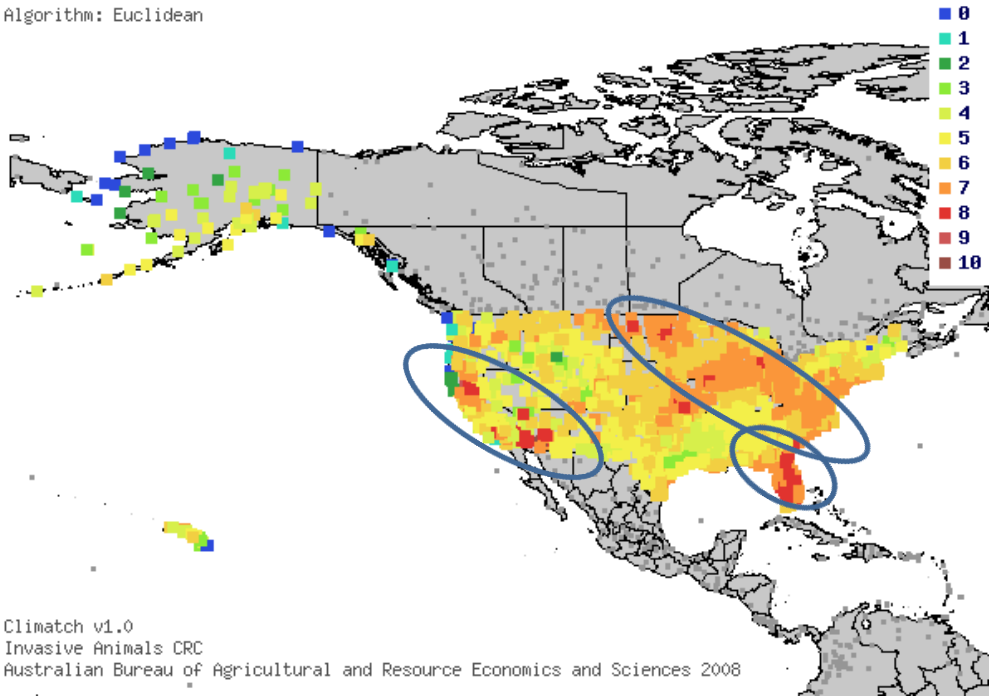
Photo: Mandoelesi, L. From EOL (2014)



History of invasiveness: Low
Climate match: Low
Certainty of assessment: High
Overall Risk: Low

Pseudorasbora parva—Stone Moroko

Photo: © M. Lorenzoni



- **Impacts water quality**
- **Decreases native minnow abundance**
- **Carries infectious pathogens**

History of invasiveness: High
Climate match: High
Certainty of assessment: High
Overall Risk: High

Questions?

Craig Martin

USFWS, Branch of Aquatic Invasive Species

(703) 358-1932

craig_martin@fws.gov

ENVIRONMENTAL LAW • INSTITUTE®

2014 Invasive Species Webinar Series

Species Risk Assessment Tools: Science and Policy Applications

Friday, October 3, 2014 • 12:00pm-2:00pm ET

Q & A Session

Questions for the panelists? Submit via the "Questions" box or raise your hand by clicking on the hand icon.

Please visit the event page for background materials and resources.

This webinar is made possible by the generous support of the Turner Foundation.

2014 Invasive Species Webinar Series

Species Risk Assessment Tools: Science and Policy Applications

Friday, October 3, 2014 • 12:00pm-2:00pm ET

Thank you for joining!

Please visit the event page for background materials and resources.

To join the ELI Invasive Species Seminar Series mailing list, please email subramanian@eli.org

This webinar is made possible by the generous support of the Turner Foundation.