



## Results of a plant screening test with implications for animal screening approaches

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*Lygodium microphyllum*

## Outline

- Requirements and types of predictive tools
- Our approach
  - Modified Australian Weed Risk Assessment
  - Results for FL and compared to other tests
- Increasing consistency and comparability of risk screening efforts



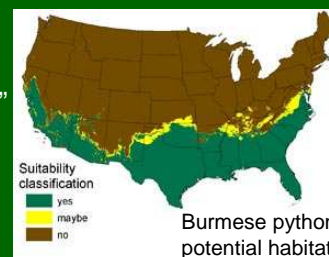
*Imperata cylindrica*

## Requirements of a predictive tool

- “calibrated and validated against a large number of taxa already present in the recipient country...”
- “representing the full spectrum of taxa likely to be encountered as imports...”
- effectively discriminate between invaders and non-invaders so the majority of invaders are not accepted, non-invaders are not rejected, and taxa requiring further evaluation are kept to a minimum (Pheloung et al. 1999)
- Ideally,
  - minimize the need for expert opinion
  - objective approach that minimizes any bias of the assessors
  - minimize time and expense of implementation

## Existing approaches for screening

- **Spatial environmental match modeling** (e.g., Rodda et al. 2008)
- **Quantitative** (e.g., Kolar and Lodge 2002, Veltman et al. 1996 )
  - Measure species, environmental, and historical traits (e.g. number of seeds, invasion history, etc.)
  - Discriminant analysis, multiple logistic regression, path analysis or classification and regression trees
  - Identify most important factors for future predictions & validate
- **Qualitative** (e.g., Pheloung et al. 1999)
  - Review species, environmental and historical traits for summary or points
  - If points, total scores specified for “accept” vs. “reject” outcomes
  - Additive or multiplicative approach



## Our Approach

- Australian Weed Risk Assessment (Pheloung et al. 1999)
  - Regulatory use in Australia and New Zealand
  - Compared favorably with other approaches for Hawaii and Czech Republic (Daehler & Carino 2000, Křivánek & Pyšek 2006)
- **Hypothesis:** Results for FL will be comparable to those for Australia, HI, and other locations
  - > 90% of invaders correctly identified
  - > 75% of non-invaders correctly identified
  - < 15% of species require further evaluation

## Australian Weed Risk Assessment

- **49 questions**
  - Domestication / Cultivation
  - Climate / Distribution
  - Weed elsewhere
  - Undesirable traits
  - Plant type
  - Reproduction
  - Dispersal mechanisms
  - Persistence attributes

History / Biogeography

Biology / Ecology
- **WRA score**
  - < 1 → **Accept**: not invasive
  - > 6 → **Reject**: invasive
  - 1-6 → Evaluate further → Daehler et al. (2004) secondary screen



## Results

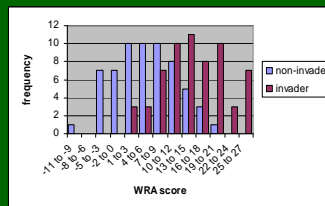
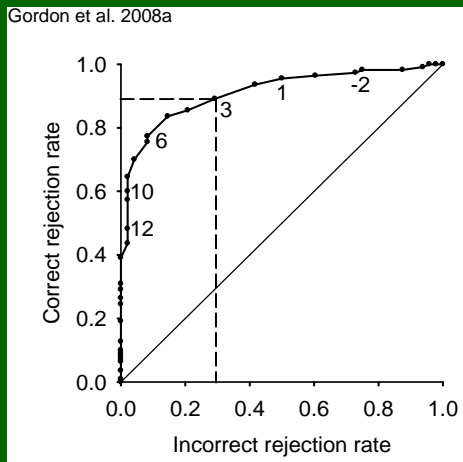
	Non-invader	Minor invader	Major invader	Overall
Accept	73% (35)	36% (17)	2% (1)	
Evaluate further	19% (9)	6% (3)	6% (4)	10% (16)
Reject	8% (4)	58% (28)	92% (57)	
Total number	48	48	62	158

Using secondary screen

➤ No percentages significantly different than hypothesized

## Receiver Operating Characteristic Curve Minor and Major Invaders Combined

➤ Curve area = 0.91

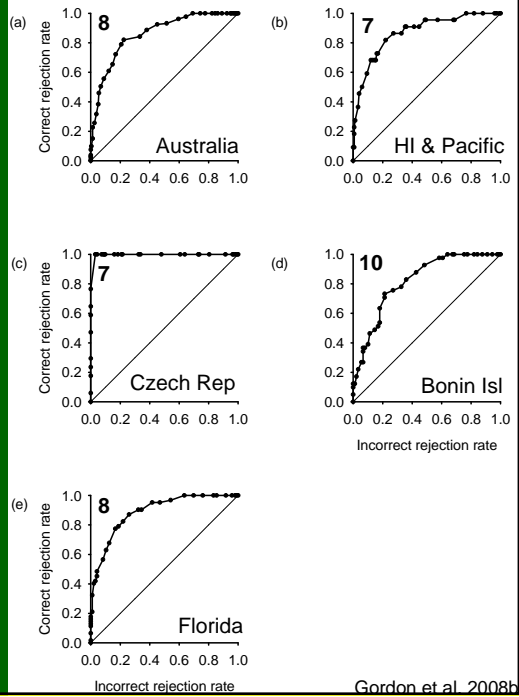


- Area not significantly different than when Minor and Non-invaders are combined (0.89)
- When Score = 3:
  - 90% correct rejects
  - 70% correct accepts

## ROC Curves – Minor + Non

CR area > all others  
( $p < 0.0015$ )

- a) Pheloung et al. 1999
- b) Daehler et al. 2004
- c) Křivánek & Pyšek 2006
- d) Kato et al. 2006
- e) Gordon et al. 2008a

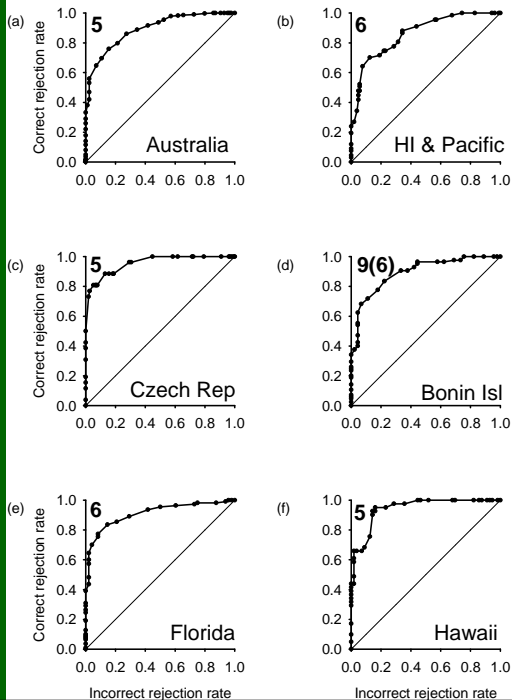


Gordon et al. 2008b

## ROC Curves – Minor + Major

All curve areas  
equivalent

- a) Pheloung et al. 1999
- b) Daehler et al. 2004
- c) Křivánek & Pyšek 2006
- d) Kato et al. 2006
- e) Gordon et al. 2008a
- f) Daehler & Carino 2000



## Conclusions

- The WRA amended for conditions in Florida and with the secondary screen developed by Daehler et al. (2004) meets the three hypothesized accuracy standards:
  - > 90% of invaders correctly rejected
  - > 75% of non-invaders correctly accepted
  - < 15% of species require further evaluation
- Results not significantly affected by:
  - Natural areas vs. agricultural weeds
  - Geographic scope of source data
  - Families, life-form, life-history
- The WRA approach appears useful across variable geographies.



## For comparability / consistency across geographies, need consistency in:

- Definition and evidence for *a priori* categorization of non-invaders and invaders (major, minor)
- Definition of data required for 'yes', 'no', 'don't know' responses
- Criteria for 'invasive elsewhere'
  - evidence required
  - definition of 'elsewhere'
- Results reported
- Approach to infraspecific taxa
- Risk tolerance (how minor invaders are treated)

## Additional risk screening requirements (not currently available for plants)

- Comprehensive list of taxa currently in trade by location
- Clear taxonomic identification
- Required declaration or petition to import prior to export
- Consistent within border trade regulations
- Since the U.S. is the main destination for exotic and endangered wild animals, a method that can be implemented here.