

# Hawaii-Pacific Weed Risk Assessment: Updates and Applications for 2019

---

Chuck Chimera

PCSU

Funding provided by the Hawaii Invasive Species Council

# History and Background of the HPWRA

- A Weed Risk Assessment (WRA) System is a pro-active tool used to identify plants that pose a high risk of causing ecological or economic harm.



# Development of WRA system for Hawaii

Several systems were examined for use in Hawai'i

- The Australian AQIS system was most promising after simple modifications
  - History of the Australian WRA system
    - 1994 Developed & tested in Australia
    - 1995 Modified & tested in New Zealand
    - 1998 Modified & tested for use in Hawai'i
    - 2001-2002 Further testing for use in Hawai'i & other Pacific Islands
    - 2002-Present WRA funded by HISC

Daehler, C. C., & Carino, D. A. (2000). Predicting invasive plants: prospects for a general screening system based on current regional models. *Biological invasions*, 2(2), 93-102

*Journal of Environmental Management* (1999) 57, 239-251  
Article No. jems.1999.0297, available online at <http://www.idealibrary.com on> 



## A weed risk assessment model for use as a biosecurity tool evaluating plant introductions

P. C. Pheloung<sup>††</sup>, P. A. Williams<sup>§\*</sup>, S. R. Halloy<sup>§</sup>

New plant taxa from around the world continue to be imported into Australia and New Zealand. Many of these taxa have the potential to become agricultural or environmental weeds and this risk needs to be assessed before allowing their entry. A weed risk assessment system is described that uses information on a taxon's current weed status in other parts of the world, climate and environmental preferences, and biological attributes. The system is designed to be operated by quarantine personnel via a user-friendly computer interface.

The model was tested against experts' scores for weediness for 370 taxa present in Australia, representing both weeds and useful taxa from agriculture, the environment, and other sectors. The model was judged on its ability to correctly 'reject' weeds, 'accept' non-weeds, and generate a low proportion of taxa which could not be decisively categorised, termed 'evaluate'. More than 70% of the taxa were rejected or accepted. All taxa classified as serious weeds, and most minor weeds, were rejected or required further evaluation, while 7% of non-weeds were rejected. The model was modified to New Zealand conditions and evaluated against the opinions of several groups of experts and against economic measures. The model produced a score very similar to the mean of the experts scores. The latter were highly variable: agriculturalists tended to accept known weeds, conservationists tended to reject most adventive taxa, and only botanists produced scores similar to the model. The model scores also tended to be independent of economic value and were not correlated with the taxon's origin. The model could be adapted for use as a screening tool in any region of the world. © 1999 Academic Press

**Keywords:** Australia, New Zealand, weed risk assessment, plant introductions, biosecurity, computer model.

potential (reviewed by Mack, 1996), but border authorities urgently need an objective, credible, and publicly acceptable risk assessment system to predict the weediness, or invasive potential, of the thousands of potential new entries.

There have been several synopses (e.g. Drake *et al.*, 1989) and a growing research literature on invasive plant taxa, but until recently there was considerable pessimism that potentially invasive species could be identified (Crawley, 1987). However, progress has recently been made in identifying the characteristics of potential weeds in Australia (Noble, 1988; Scott and Panetta, 1990), New Zealand (Esher *et al.*, 1993), and New Zealand (Richardson *et al.*, 1993; and Fitter, 1996), and

\*Corresponding author

<sup>†</sup>Agriculture Western Australia, 2 Barnsley Ct, South Perth WA 6151, Australia

<sup>‡</sup>Present address: Australian Quarantine Inspection Service, GPO Box 858, Canberra, ACT 2601, Australia

<sup>§</sup>Landscape Research, Private Bag 5, Nelson, New Zealand

<sup>§</sup>Crop and Food, Private Bag, Mirrepa, New Zealand

Received 27 August 1998

GAME OF WEEDS

Generated by [Font-Generator.com](https://font-generator.com)



Starting Location

1994 WRA Developed & tested in Australia

1995 Modified & tested in New Zealand

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus

Google Earth

# The Weed Risk Assessment process

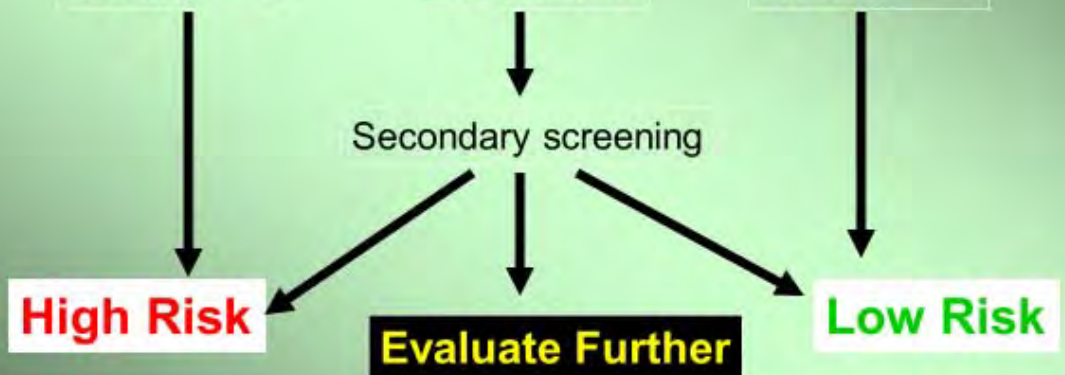
## Hawai'i-Pacific Weed Risk Assessment

Assign species score based on 49 questions

Score > 6

Score 1-6

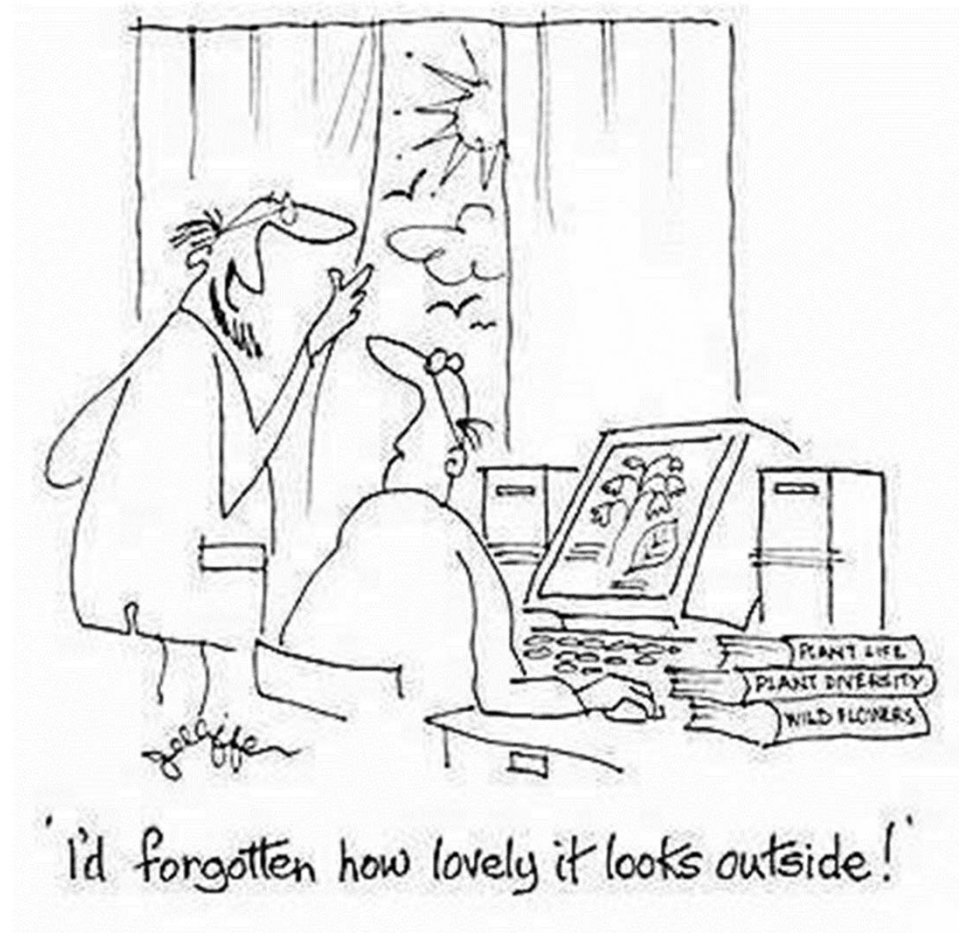
Score < 1



Daehler et al. 2004. Conservation Biology 18:360-368

## Characteristics of the Hawaii Pacific Weed Risk Assessment System

- Objective
- Science-based
- Repeatable
- Transparent
- Reliable





# Characteristics of the Hawaii Pacific Weed Risk Assessment (HPWRA) System



Designed to identify all  
types of pest plants

invaders of natural areas  
weeds of agriculture &  
forestry  
nuisance species



Don't need to answer all 49 questions



Assessment can be done quickly (within 1-2  
days)



The WRA system is NOT a field evaluation of  
current distribution & current impacts, although  
it may include this information if documented



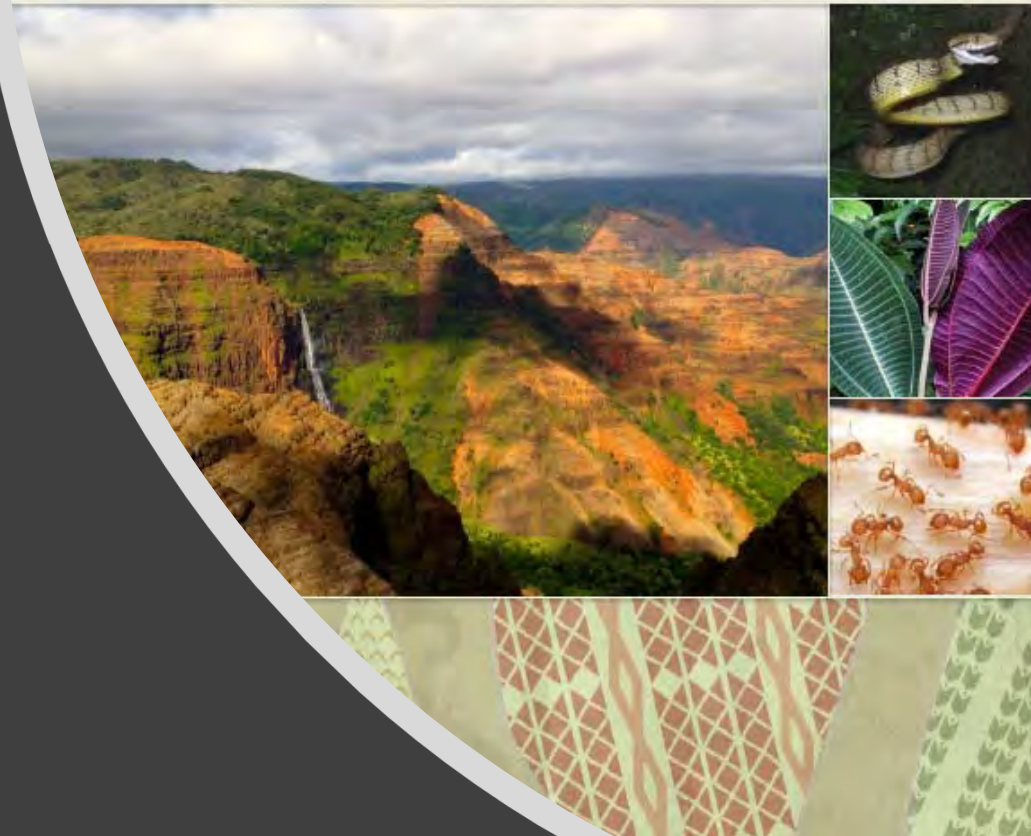
# HISC Strategic Plan 2015 – 2020

- **Prevention Goal 2: Risk assessments are developed and utilized for all priority taxa**

- *“Risk assessments are a critical tool in prioritizing prevention and response activities. Having these tools in place provides consistent methodologies across agencies, reliable pathway and impact analysis, and data for meaningful prioritization of management activities.”*



## Strategic Plan 2015 – 2020



# WRA Highlights: Jan 2018-Present

- 2029 species screened
  - 893 High Risk (44%)
  - 834 Low Risk (41%)
  - 302 Evaluate (15%)
- Information used by government, public, industry & conservation groups statewide & internationally



*Rosa rugosa* (High Risk)

# Agricultural / Horticultural Industry

**Forestry – forest stewardship  
management plan on Big Island**



**Nursery – Arbor Day tree giveaway on  
Kauai**



# Agricultural Industry

- Ranching
  - 16 species assessed for use as cover/refuge crops within silvicultural *Acacia koa* groves on a Maui ranch.



*Cichorium intybus* (High Risk)



[Home](#)[Plant Assessment](#)[Pono Businesses](#)[About Us](#)[Blog](#)

<https://plantpono.org/>

## Find a Pono Plant

Find the perfect pono plant for your landscape,  
search by color, growth form, and more!

[FIND A PONO PLANT](#)

### Designation

All Items



### Search by Name

Common or Scientific

SUBMIT

RESET

## Find a Plant



### Abelia x grandiflora

glossy abelia



Designation: Pono Plant (low risk)

Score: -13

[Download Assessment](#)



### Abelmoschus manihot

bele, edible hibiscus, Tongan spinach, sunset muskmallow, manioc  
hibiscus



MOLLY MURPHY

Generated by Font-Generator.com

BIISC

Generated by Font-Generator.com

HOUSE OF PONO

Generated by Font-Generator.com

FRANNY BREWER

Generated by Font-Generator.com

BIISC

Generated by Font-Generator.com

SKY HARRISON

Generated by Font-Generator.com

HBIN

Generated by





# Nursery / Horticultural Industry

- Pono Businesses
  - Hawaii (21 nurseries)
    - Discontinue use of “No Grow” plants
    - Use WRA
    - Promote non-invasive & native plants
    - Schedule annual visit
    - Follow best management practices
  - Kauai (13 nurseries)
    - Avoid use of specific invasive plants
    - Follow best management practices





# General Public

- **Assessment Request:** *"I am submitting a request to score a very popular culinary herb, Eryngium foetidum, otherwise known as culantro."*
- **Response to Assessment:** *"I very much appreciate the potential problems this herb could create in areas without much pressure from land mollusks."*



*Eryngium foetidum* (culantro)  
High Risk

# Botanical Gardens

- National Tropical Botanical Garden
- Honolulu Botanical Gardens

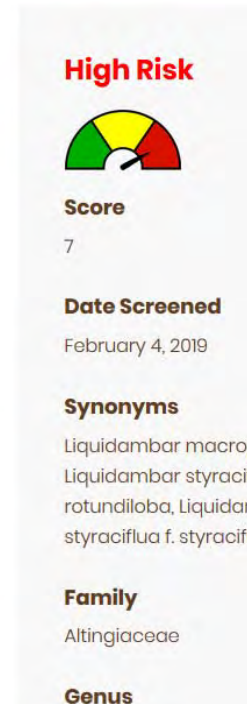
*“The City of Hiroshima, Japan would like to donate some seeds to the Honolulu Botanical Gardens as part of a worldwide peace planting initiative.”*



***Aphananthe aspera* (mukutree)**  
**Low Risk**



**Liquidambar styraciflua** (alligator wood, American storax, American sweetgum, bilsted, hazel pine, redgum, satin-walnut, star-leaved gum)



- Early detection
- Target species prioritization
- Outreach

## Invasive Species Committees



Foxtail Palm  
*Wodyetia bifurcata*  
ARECACEAE



A pinnate palm endemic to a small natural range in Australia, but now widely distributed as a striking landscaping plant.

Biogeography: Cosmopolitan Introduction from Australia

Uses:

Conservation: IUCN RedList: LR/cd

Species information:



- Academic Uses

- Frugivory Study
- Student Research

- Campus Plants Map

- Will include WRA information

University of Hawaii



# State Government Agencies

- DLNR DOFAW

“I was hoping you could assess *Dietes bicolor* with WRA. We have some researchers who are interested in using this species for companion restoration efforts”

- HDOT

- SWCA produced brochure for landscaping vendors



*Dietes bicolor* (African iris)  
High Risk

# SWCA produced brochure for landscaping vendors

## WHAT ARE Invasive Species?

Invasive species are non-native plants or animals that reproduce quickly, spread easily, and cause harm to their environment. These pests are not easily removed or eradicated once they have spread. Many plants brought to Hawai'i as ornamentals have spread into forests or other natural areas, outcompeting and replacing native plants and destroying critical habitats for native animals. Not all plants that humans brought to Hawai'i are invasive, but those that are tend to mature quickly and spread rapidly. About 10% to 15% of non-native plants will become invasive, of which 1% to 3% will develop into "super weeds."

Invasive plants can cause increased fire frequency, soil erosion, landslides, human health hazards, and loss of culturally significant species used for religious or medicinal practices. Invasive plants are one of the main causes of Hawai'i's native biodiversity loss.



A native 'Iiwi bird drinks nectar from 'ohia flowers.

Photo credit: Johnny National Park Service

## SNIPP

STATEWIDE NOBODUS INVASIVE PEST PROGRAM



## HAWAII, "The Endangered Species Capital of the World"

Hawai'i is home to plant and animal species found nowhere else on earth. Because these native flora and fauna developed in such extreme isolation and without predators, they are extremely vulnerable to outside invaders. Hawai'i makes up less than 0.2% of the landmass of the United States but has over 33% of the nation's endangered species. With hundreds of plants and animals listed as endangered or threatened, there are more endangered species per square mile in Hawai'i than any other place on the planet. This has earned Hawai'i the title of "The Endangered Species Capital of the World."



Once planted for reforestation, Moluccan albizia has invaded the Hawaiian Islands.

Albizia trees often drop branches or uproot entirely during high winds.

Photo credit: University of Hawaii



LANDSCAPE VENDOR'S GUIDE TO PLANT PONO

[Home](#)
[Plant Assessment](#)
[Pono Businesses](#)
[About Us](#)

## What YOU Can Do

Landscaping suppliers can help preserve Hawai'i's biodiversity by not importing or distributing weedy or invasive plants. The Plant Pono website ([www.plantpono.org](http://www.plantpono.org)) helps nurseries, landscapers, and home gardeners understand which plants are likely to escape or spread from where they are planted (potentially causing harm to the larger landscape), and which non-native (imported) plants are safe for planting.

The website uses the Hawai'i Pacific Weed Risk Assessment (HPWRA) to predict the risk of a plant becoming invasive. One peer-reviewed study has shown that the HPWRA is 95% accurate in catching would-be invasive plants and 85% accurate in identifying non-invasive plants. It is a free and voluntary service that is easy to use.

If you know what plant you're interested in, simply scroll down the home page and type in the plant's common or scientific name in the Search by Name box, then press Submit. The species you're looking for should appear in the search results, along with plants that are very similar.

If the species you're evaluating has a designation of High Risk, do not order, distribute, or plant it. If the species you're looking for does not appear, and you've searched for both the common and scientific name, contact the site administrator at [hpwra@hawaii.edu](mailto:hpwra@hawaii.edu).

Plant Pono's website allows you to easily identify if a plant is potentially invasive. It also lists "pono" plants that are environmentally friendly. The site determines which plants should and should not be planted based on their HPWRA score, which determines if the plant is low or high risk.

The lower the score, the less likely the plant is to become invasive. Plant Pono also allows you to search for specific plants according to color, edibility, uses, propagation, and environmental requirements (i.e., drainage, elevation, salt tolerance, sunlight, water).

If you're looking for pono plants with a specific use, click on "Pono Plants (low risk)" and scroll down to select your designated uses, listed below.

**Pono Plants (low risk)**

**Don't Plant These**

**Why Plant Pono.**

Click here for environmentally friendly plants

Click here for potentially harmful plants

Designation: All forms


Search by Name

Common or Scientific

SUBMIT

[www.plantpono.org](http://www.plantpono.org)

*Plumeria rubra* is a "pono" plant with a low (negative) HPWRA score.



*Nassella tenuissima* is a "high-risk" plant with a high HPWRA score.




Photo credit: Famine/Flickr

- Aquatic
- Bonsai
- Container
- Cultural
- Cut Flowers
- Edible
- Erosion Control
- Fragrance
- Hedges
- Indoor
- Lei Making
- Medicine
- Nitrogen Fixing
- Ornamental
- Privacy/Screening
- Shade
- Specimen
- Windbreak
- Woodworking

# Federal Government

- **USDA NRCS**

- **Grazing Land Management Specialist (5 pasture species assessments requested):** *"This is very helpful to me and I sincerely appreciate this service you provide and your thorough, objective assessment."*

- **U.S. Army Garrison**

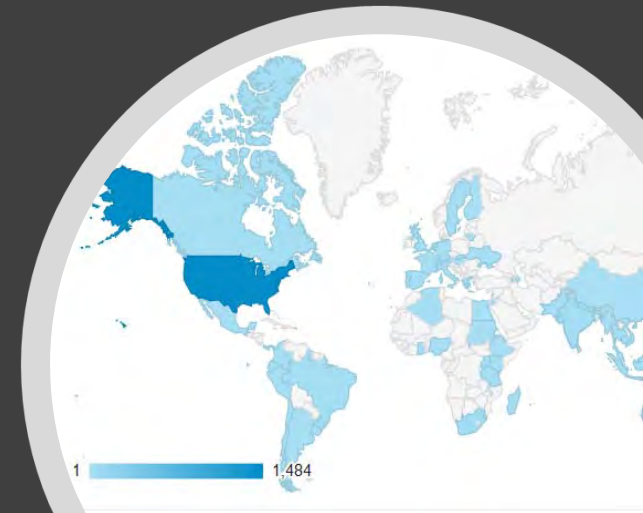


*Urochloa humidicola* (creeping signal grass)  
High Risk



# National / International Interest

- Invasive Species Program Coordinator (Lady Bird Johnson Wildflower Center)
  - *"There is interest in cultivating Psophocarpus tetragonolobus in the United States. I can't find any information about it's potential for invasiveness. It would be good to have it evaluated."*



# Presentations and Outreach

- Botany Training (MISC)
- WRA/Invasive Plant and Native Plant Presentations (East Hawaii, West Hawaii & Maui Master Gardeners)
- Invasive Species and Climate Change (Hamakua community group)



East Hawaii Master Gardener  
Class of 2019

# WEEDS ARE COMING

FOR MORE INFO CONTACT

HAWAII PACIFIC WEED RISK ASSESSMENT

hpwra@hawaii.edu

PLANT PONO

<https://plantpono.org/>

