

# **A Model Invasive Species Early Detection Reporting Network:**

**Building technical and community capacity to facilitate early detection  
and rapid response in Maui County**

Final Report for DLNR Hawaii Invasive Species Council Project 53877:  
“Pilot Multi-Agency Early Detection Reporting System”

May, 2007

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## **Introduction - Building and Connecting an Early Detection Reporting Network**

The goals of this Hawaii Invasive Species Council (HISC) funded effort were to create a collaborative framework among invasive species early detection network actors, as well as widen the detection network to include targeted community groups and members of the public in Maui County. These steps address both the needs to make efficient use of limited resources and provide a method for effective communication. The National Invasive Species Council (NISC) identified the following key functional elements to an early warning and rapid response system for invasive plants: detection, identification, assessment and data management, and response (Worrall 2002). The NISC model was used to define gaps in the existing early detection system for Hawaii, with an emphasis placed on data management, communication strengthening, and capacity building. A model detection system was implemented for Maui County to test for efficacy and future scalability to other Hawaiian counties. This system and all associated products was established in early 2006 and tested through April 2007.

The Maui system consists of the following elements which are intended to directly correlate with the functional elements identified by NISC: designation of a list of priority target organisms for detection; the use of outreach to train members of the public as well as professionals and semi-professionals already working in natural resource management to search for these high priority pests; the creation of a user-friendly reporting and assessment system; a queriable database to store early detection sightings; and a report dissemination system to relay these reports to those agencies tasked with the rapid response of these target organisms. Visit the Maui County Report a Pest website (<http://pbin.nbii.gov/reportapest/maui/>) to view all products associated with this effort.

## **The Need for Early Detection of Invasive Species**

The economic and environmental costs associated with the management of invasive species are staggering. In the state of Hawaii as of the year 2001, an estimated \$7.6 million was spent to manage invasive pests (GAO, 2001). Much of this money is delegated to the management of established pests, organisms whose eradication is not feasible due to limitations in management resources, problematic biological characteristics of the pest, or populations that are widespread. As the traffic to and from

the Hawaiian Islands increases, the influx of alien pests and the appearance of new established pests are not likely to stop. In fact, twenty to fifty new non-native species arrive every single year to the state of Hawaii (Loope, 2004).

The elements of a successful program for the prevention of these biological invasions must include: 1) exclusion programs based on quarantine/regulatory barriers, 2) programs for the early detection of species that break through these barriers, 3) rapid assessment to determine whether rapid response is warranted and feasible, and 4) timely response capability to eradicate high-risk species when possible before populations become so widespread that eradication is impractical or impossible (Myers and Ware, 2000, US invasive species management strategy). Due to existing limitations to current exclusion programs in the United States and Hawaii, the early detection and eradication of incipient invaders is critical to reduce overall invasive species impact and associated costs. Furthermore, the connection between early detection and eradication has been thoroughly demonstrated, and studies suggest that eradications may only be possible when incipient populations are in the earliest stages of invasion (Mack and Lonsdale, 2002).

### **Current Early Detection Efforts in Hawaii**

The emphasis for Hawaii's existing early detection programs are divided between inspection of incoming materials and goods, and the eradication of organisms which elude this interception. The frontlines of prevention and early detection are maintained through inspections and surveys conducted by the U.S. Department of Agriculture (USDA) through the Plant Protection and Quarantine (PPQ) department, the USDA Wildlife Services (WS), the US Geological Survey (USGS), the Hawaii Department of Agriculture (HDOA) Plant Quarantine (PQ) department, the Hawaii Department of Land and Natural Resources (DLNR), Department of Aquatic Resources (DAR), the Department of Health (DOH) department of Vector Control (VC), and the individual Island Invasive Species Committees (ISCs). The effective role that these agencies play as an early detection network is limited by available resources and efficient communication.

### **Priority Pest Target List**

The target list of organisms for early detection and protocol for future designations were created for the islands of Maui and Lanai at an early detection workshop conducted by the Maui Invasive Species Committee (MISC) and for the island of Molokai by the Molokai Invasive Species Committee (MoMISC). The organisms had to fulfill the following criteria to be considered for inclusion: be a high threat to the environment, economy, agriculture, health or quality of life; have a high feasibility of control (including ability to detect, assess, public perception, known distribution, biological characteristics affecting rate of spread); and a relatively low cost of control (including difficulty of control, effort, and duration of effort required). Pest species already established on neighboring Hawaiian Islands were considered to be the highest priority.

Initial efforts to test plants by these criteria had been administered for one hundred species through surveys conducted by the USGS on Maui in 2000 and Molokai in 2005. The initial list of one hundred organisms was derived from the Global Compendium of Weeds (Randall, 2002), a series of plant nursery surveys, the MISC control targets, and from expert interviews. When this list was further refined by the aforementioned criteria by the MISC and MoMISC, twenty seven species were included (table 1). Visit <http://pbin.nbii.gov/reportapest/maui/pestlist.htm> to learn more about Maui County early detection target species.

Table 1: Early detection target organism list for Maui County, Hawaii, 2005-2006

Scientific Name	Common Name	Island Designation
<i>Eleutherodactylus coqui</i>	Coqui frog	Maui, Molokai, Lanai
<i>Solenopsis invicta</i>	Red imported fire ant	Maui, Molokai, Lanai
<i>Wasmannia auropunctata</i>	Little fire ant	Maui, Molokai, Lanai
<i>Darna pallivitta</i>	Stinging nettle caterpillar	Maui, Molokai, Lanai
<i>Chameleo calyptratus</i>	Veiled chameleon	Maui, Molokai, Lanai
<i>Cortaderia jubata</i>	Pampas grass	Maui, Molokai, Lanai
<i>Pennisetum setaceum</i>	Fountain grass	Maui, Molokai, Lanai
<i>Arundo donax</i>	Giant reed	Maui, Molokai, Lanai
<i>Passiflora tarminiana</i>	Banana poka	Maui, Molokai, Lanai
<i>Coccinia grandis</i>	Ivy gourd	Maui, Molokai, Lanai
<i>Cryptostegia species</i>	Rubber vine	Maui, Molokai, Lanai
<i>Melastoma candidum</i>	Asian melastome	Maui, Molokai, Lanai
<i>Melastoma sanguineum</i>	Red melastome	Maui, Molokai, Lanai
<i>Tibouchina urvilleana</i>	Glorybush	Molokai
<i>Miconia calvescens</i>	Miconia	Maui, Molokai, Lanai
<i>Leptospermum scoparium</i>	New Zealand tea tree	Molokai
<i>Macaranga mappa</i>	Bingabing	Maui
<i>Urena lobata</i>	Aramia	Molokai
<i>Morella faya</i>	Fire tree	Molokai
<i>Ardisia elliptica</i>	Inkberry	Molokai
<i>Parkinsonia aculeata</i>	Parkinsonia	Maui
<i>Rhodomyrtus tomentosa</i>	Downy rose myrtle	Maui
<i>Rubus ellipticus</i>	Yellow Himalayan Raspberry	Maui
<i>Verbascum thapsus</i>	Mullein	Maui
<i>Hedychium gardnerianum</i>	Kahili ginger	Molokai
<i>Sphaeropteris cooperi</i>	Australian tree fern	Molokai
	Banana bunchy top virus (BBTV)	Maui, Molokai, Lanai

A semi-formal survey of professionals was utilized to determine agency responsibility for the control and rapid response for the target plants and animals, as well as other organisms that might be encountered or reported. The results of this survey were compiled and utilized to generate the Maui County Alien Pest Reporting Phone List found in Appendix 1. Due to considerable overlap in the jurisdiction between individual islands, county, state, and federal entities for pest removal, many of the organisms have multiple designated rapid responders.

To ensure that the Maui County Alien Pest Reporting Phone List remains current and coordinated with other similar lists (i.e. the "alien pest reporting system list" of the Hawaii Department of Agriculture, the US Department of Agriculture- APHIS designations, and the internal lists of the individual ISCs) an annual review should be conducted. This periodic verification is critical to ensure communication between the numerous agencies that are tasked with invasive pest response and control, as well as to act as an added verification that the target list of organisms are still current targets for control.

### **Training the "Eyes and Ears" Network**

The detection of these priority pest targets relies on ongoing incidental or passive searches by two distinct categories of searchers: members of the general public, as well as professional and semi-professional natural resource land managers and technicians. The passive search method implies that encounters with target pest plants and animals will occur not on formal searches, but during the course of other activities or work-related tasks. This method relies on the ability of the searcher to recognize the pest after being exposed to a "search image" and key identifying features for each target.

A variety of educational tools and training must be used to provide training to individuals with wide-ranging levels of preexisting biological knowledge. A combination of web-based identification fact sheets, a print field guide, and personalized training workshops were used to familiarize participants with the "search image" for each of the target plants and animals. This approach allows each participant to receive a variable degree of identification detail and commitment to participation in the early detection network.

The web-based identification fact sheets and field guide each contain multiple photos of each target pest, at least three key identifying physical features, and information about confusing look-alike species. Whenever possible, reliance on biological terminology to describe physical characteristics was avoided, making the identification process easier for the general public (see Appendix 2 or <http://www.reportapest.org> for an example fact sheet and field guide).

A series of workshops were designed to provide not only an overview of the identifying characteristics of five target species, but to encourage community involvement in natural resource stewardship and encourage the Hawaiian concept of “malama i ka aina” or “to take care of the land.” To promote this sentiment, site specific species information is incorporated whenever possible, in addition to general information about the importance of early detection and invasive species management.

Table 2: Potential target audiences for early detection network volunteer training

hiking clubs	pet shops	farmers and ranchers
birding clubs	property managers	teachers
Hunters	moving companies	landscapers
master gardeners	helicopter pilots	plant nurseries and botanical gardens
ecotour leaders	fire department	exterminators
service groups	golf course employees	realtors
utility workers	harbor employees	natural resource technicians

Workshop participants are also introduced to best practices for physical and photographic specimen collection. This includes safe handling techniques, special requirements for voucher specimen collection, and preventative methods for avoiding native plant and animal collection. Whenever possible, digital images are encouraged as a low-impact method of specimen collection, including those taken by mobile phones with integrated digital cameras (see <http://pbin.nbi.gov/reportapest/maui/specimen.htm> ).

The training also includes methods for collecting accurate location information, so that assessors and rapid response crews can relocate the organism. Place names supported by the Geographic Names Information System (GNIS), highway mile markers, location description notes, and hand drawn maps can be translated to latitudinal and longitudinal coordinates by assessors subsequent to reporting. A Hawaiian web-GIS

application is available to network participants with internet access which allows users to create a digitally marked topographic map for submittal (<http://pbin.nbii.gov/maps/interface.html>). A total of five workshops were conducted from March 31<sup>st</sup> to June 20<sup>th</sup> 2006 for the Maui Invasive Species Committee, the National Park Service NREM team, the Kipahulu Ohana, the Na Ala Hele trails program and Friends of Haleakala. Workshop material is available online at <http://pbin.nii.gov/reportapest/maui/workshop.html>.

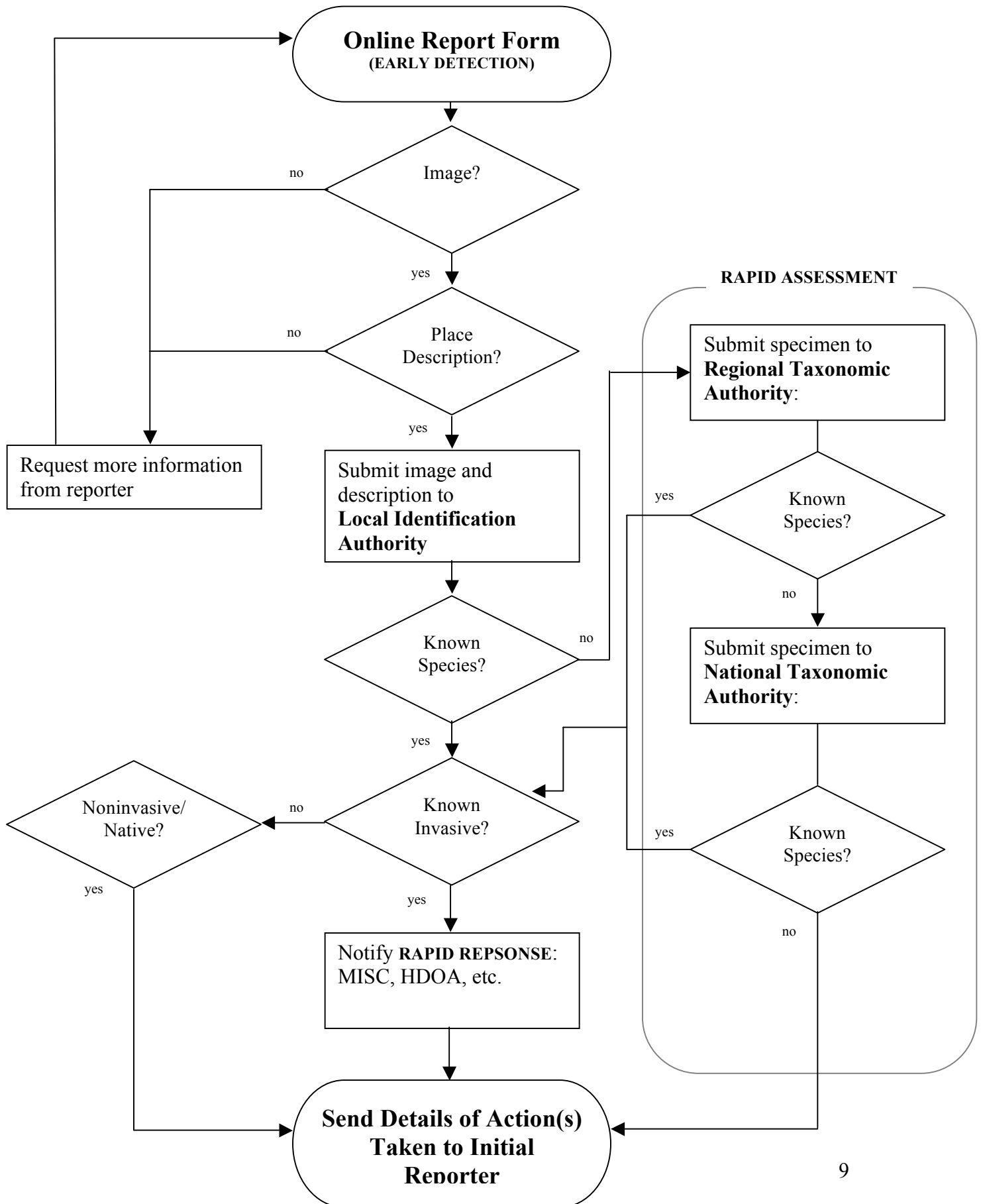
### **From Detection to Rapid Response**

Eradication or control of invasive pests is difficult without the efficient transfer of the pest sighting information to those responsible for rapid response. To facilitate information transfer, multiple reporting methods were provided for the early detection network, including the phone hotlines for the Hawaii Department of Agriculture, MISC, and MoMISC; a web-based reporting form; a report-a-pest email address; and walk-in locations for specimen drop-off. All of these reporting methods accommodate the varied levels of technical access and capacity present in the islands of Hawaii. Outside of the city of Honolulu, household internet connectivity is not a given, and in some rural areas such as the island of Molokai and Hana, Maui; members of the community are more likely to relay reports to a local contact rather than contact municipal seats on other islands. Physical locations and local phone numbers are critical to capturing reports from all members of the network.

The reporting elements were streamlined to minimize data collection overload for the voluntary participants. Emphasis was placed on identification and location rather than prompting for a full field assessment of invasion extent. The only required report elements are: the date of pest sighting, the name and description of the pest being reported, and location. This flexibility allows for anonymous reports, persuading otherwise wary contributors to report organisms that's presence may be unlawful or unethical. The overall framework developed for the reporting system will allow information to be efficiently evaluated and transferred (Figure 1). The individual reporting elements can be seen in Figure 2 or at [http://pbin.nbii.gov/invasives\\_report/online.asp](http://pbin.nbii.gov/invasives_report/online.asp).



**Figure 1: Information Flow for Online Reporting**



### Online Reporting Form

Data collected from all reporting sources are directed through the online report form to a database housed at the USGS National Biological Information Infrastructure's Pacific Basin Information Node (NBII-PBIN). Local taxonomic authorities, acting as rapid assessors, are immediately notified via email and Really Simple Syndicate (RSS) feed of the new, unconfirmed report.

### Report Assessment System

All reports undergo rapid assessment within twenty four hours for organism identification, location accuracy, and validity as a target list pest. Each report, including the images that are uploaded through the online report form, is viewed via a web-based interface which indicates its pending status. The assessment team is then able to change the designation of the report to "actionable", "widespread" or "unactionable," or to leave the status as pending if more information is required. Additional data elements collected from interviews with the reporter, consultation with a greater network of taxonomic specialists, and/or site visits can be added by the assessor for reports that require more information.

### Data Dissemination

An actionable designation by the assessment team prompts a data dissemination subsystem to contact the agency responsible for rapid response. This contact is made via email, RSS feed, and a specialized webpage. Though not preferred due to data capture issues, phone contact can be made by assessors and this action captured by the database. The initial reporter is notified by email that their report was verified, and which rapid response agency was notified.

All steps of the assessment process are captured in the database, allowing the process to be transparent, and for the verified reports to be queried. This data capture and web based query acts to stimulate inter-agency communication, and can act as an incentive for the early detection network volunteers to "collect" actionable reports.

### Submission Process

Users that have internet access can submit invasive reports using a web based form available off of the Report a Pest website (Figure 2). Users are required to provide only four items: Date of Sighting; Pest Name; Description; Location. It is anticipated that users will be familiar with the content provided on the Pest website and will be reporting reasonably accurate and timely sighting information. The web interface allows for upload of an image, hopefully taken at the time of sighting, which can prove useful in identifying and evaluating reports.

Once submission of the required information is completed, the user is presented with a printable confirmation (Figure 3). If an email address is provided, a confirmation will also be sent to the address submitted.

The submission is appended to a web accessible relational database and a message is sent to the individuals assigned to the review process. Reviewers have full access to the database through a web interface, allowing for review, edit and final confirmation (Figure 4).

**Figure 2: Online Report Form Interface**





## Maui County Report a Pest

### Online Report Form



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Fill out this form to alert us of sightings of new pests in Maui County. Include as many details as possible to help us assess your report. Once submitted, this pest report will immediately be sent to a local invasive species expert. If you are reporting a snake, please immediately contact the police at 911. **(NOTE: Asterisk [\*] and red color indicate a required field!)**

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Tracking Number :	T425200722915
Last Name :	<input type="text"/>
First Name :	<input type="text"/>
Email :	<input type="text"/>
Including your email will allow us to let you know what happened with your report.	
Phone :	<input type="text"/>
<b>*Date of pest sighting :</b>	<input type="text"/>
<b>*Name of pest that you are reporting :</b>	<input type="text"/>
<b>*Description :</b> (Plant: size, flower color / scent / orientation, foliage color / scent / orientation, fruit color / scent / orientation, habitat found in; Insect/animal: size, color, plant / host found on or nearby, habitat)	<input type="text"/>
<b>*Location :</b> (Street address, cross streets, mile marker, place name)	<input type="text"/>
Comments :	<input type="text"/>
Photo :	<input type="text"/>
Images are extremely helpful in assessing your report.	<input type="button" value="Browse..."/>
<input type="button" value="Submit"/>	

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You may also email your Maui County priority pest report to [reportapest-maui@hawaii.edu](mailto:reportapest-maui@hawaii.edu). Please include answers to the following [report questions](#).

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**Have a cameraphone?** Send your pest image to [grows96what@photos.flickr.com](mailto:grows96what@photos.flickr.com). Make sure to let us know what your image is called in the online report form comments field and to include the report tracking number in the cameraphone message. Need [help with this feature](#)?

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### Figure 3: Report Submission Confirmation



Thank you for submitting your Maui County pest report. This pest report will be processed in the next 7-14 days. More information may be needed to verify this report; you may be contacted if you provided contact information.

You will receive an email notification when your report has been assessed. If your report is verified, it will be handed over to the agency responsible for dealing with this particular pest.

If you are reporting a snake, please immediately contact the police at 911 or the Hawaii Department of Agriculture 808-643-PEST.

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#### Image File

The image file T425200722915.jpg has been stored

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#### Form

The form information was inserted successfully.

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#### Information Submitted

<b>Tracking ID:</b>	T425200722915
<b>Name:</b>	Derek Masaki
<b>Email:</b>	dmasaki@gmail.com
<b>Phone:</b>	8089843721
<b>Date:</b>	2/24/2007
<b>Pest:</b>	Miconia
<b>Description:</b>	Large plant, near Haiku.
<b>Location:</b>	123 Nolo Rd
<b>Comments:</b>	Small plants growing nearby.
<b>Photo:</b>	T425200722915.jpg

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#### Email


Email has been sent to reportapest.org

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[ [Online report form](#) ] [ [Call in a report](#) ] [ [Walk-in report locations](#) ] [ [Pest list](#) ] [ [Report-a-Pest home](#) ] [ [PBIN home](#) ]

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**Figure 4: Review Validation Screen**

Observation Record
<p><b>Tracking ID:</b> T425200722915</p> <p><b>Date Observed:</b></p> <p><b>Pest:</b> Miconia</p> <p><b>Description:</b> Large plant, near Haiku.</p> <p><b>Location:</b> 123 Nolo Rd</p> <p><b>Comments:</b> Small plants growing nearby.</p> <p><b>Image:</b> <a href="#">Image</a></p> <p><b>Contact:</b> Masaki, Derek</p> <p><b>Phone:</b> 8089843721</p> <p><b>Email:</b> dmasaki@gmail.com</p>
<p><b>Image</b></p>  <p><a href="#">Form</a> <a href="#">Home</a> <a href="#">View</a></p>

## Conclusion

The main goals of this HISC-funded effort were to create a collaborative framework among early detection network actors and widen the detection network to include targeted community groups and members of the public. A collaborative framework is necessary to facilitate inter-agency communication and ensure that pest detections are adequately reported, assessed and responded to in the most efficient manner. The technical tools developed for the reporting system are a vital component of this framework. Widening the detection network is also necessary to leverage limited resources. These “targeted” community groups and private citizens (see Table 2, pg. 7) can act as a vital supplement to state and federal agency early detection surveys in high-risk areas (nurseries, botanical gardens, agricultural experiment sites) and along roadsides. If and when a new or potentially invasive pest is detected in these survey efforts, the community-based “Eyes and Ears” early detection network would be spurred into action. This new species would be added to target species lists and appropriate education, outreach and training would be conducted.

As described on page three, the key elements of the Maui County Early Detection Reporting System are 1) designation of a list of priority target organisms for detection; 2) the use of outreach and education to train targeted members of the public as well as professionals and semi-professionals already working in natural resource management to search for these high priority pests; 3) the creation of a user-friendly reporting and assessment system; 4) a queriable database to store early detection sightings; and 5) a report dissemination system to relay reports to those agencies tasked with rapid response.

All elements were implemented with varying success. Priority pest list were established as described on pages 4-5. A substantial amount of education and outreach material was generated and early detection workshops conducted as described on pages 6-8. The early detection reporting system standards and necessary technical infrastructure were created as described on pages 8-11. Within a day of the first training, a report was received for bingabing (*Macaranga mappia*). This report was assessed and confirmed by local taxonomic authorities and relayed to the Maui Invasive Species Committee who then treated and removed this early detection target species

Despite these successes, more work is necessary. There was as desire to conduct

more workshops with new groups and follow-up workshops with those that had received previous training. However, development time and costs in addition to minimal funding stalled those efforts.

Overall, the establishment and implementation of the Maui County Early Detection Reporting System can be considered a success. Initial education and outreach received a very positive response from the community, indicating a high potential for participation in early detection efforts. The above mentioned report and subsequent eradication of bingabing proved the system effective. This effort has established the necessary framework, technical material and technical infrastructure to support a growing early detection network and reporting system in Maui County.

Further efforts to build and test this early detection network in Maui County need to be made. Additional workshops with a wider array of the community along with media promotion are logical next steps. A long-term, sustainable early detection plan should also be developed. Once these steps are taken the stage will be set to begin a robust early detection reporting system in Maui County. Sustaining the necessary resources to lead the expansion of this network through inter-agency facilitation, workshops and trainings; to ensure the availability of local taxonomic authorities at a moments notice to assess incoming reports; and to maintain necessary technical applications and web systems will require long-term, stable funding.

With these continued efforts to build a successful network, it is hoped that Maui County will serve as model for the other counties in Hawaii, resulting in a statewide, community-based effort to protect Hawaii from new alien pest threats.



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## Appendix 1:

### Maui County Alien Pest Reporting Phone List

#### Plants

##### New or Unusual Weeds (Unknown to Maui)

- 1) MISC, 573-6472
- 2) DLNR- DOFAW, 984-8100
- 3) HDOA Plant Pest Control - Chemical/Mechanical Section, Bob Yonahara, 873-3558

##### Noxious Weed (from [HRS 4:6:68](http://www.hawaiiag.org/hdoa/adminrules/AR-68.pdf) [<http://www.hawaiiag.org/hdoa/adminrules/AR-68.pdf>])

- 1) HDOA Plant Pest Control - Chemical/Mechanical Section, Bob Yonahara, 873-3558
- 2) HDOA Plant Pest Control, 873-3555

##### MISC Targets/ Early Detection Targets (on Maui)

(*Miconia calvenscens*, *Arundo donax*, *Coccinia grandis*, *Pennisetum setaceum*, *Cortaderia* spp., *Cryptostegia* spp., *Melastoma* spp., *Rhodymyrtus tomentosa*, *Macaranga mappia*, *Parkinsonia aculeata*, *Rubus ellipticus*, *Verbascum thapsus*)

- 1) MISC, 573-6472

##### MoMISC Targets/ Early Detection Targets (on Molokai)

(*Leptospermum scoparium*, *Miconia calvenscens*, *Morella faya*, *Passiflora mollissima*, *Arundo donax*, *Melastoma* spp., *Urena lobata*, *Tibouchina urvilleana*, *Senecio madagascariensis*, *Schizachyrium condensatum*, *Ardisia elliptica*, *Pereskia aculeata*, *Argyrea nervosa*?, *Sphaeropteris cooperi*, *Macfadyena unguis-cati*?)

- 1) MoMISC, 553-5236

##### Established or Widespread Plant Pest

- 1) CTHAR Maui, 244-8202
- 2) CTHAR Molokai, 567-7833

##### Aquatic Plant (Saltwater)

- 1) DLNR-DAR Maui, 243-5294
- 2) DLNR-DAR Oahu, Tony Montgomery/Skippy Hau, 587-0365

##### Aquatic Plant (Freshwater)

- 1) HDOA Plant Pest Control - Chemical/Mechanical Section, Bob Yonahara, 873-3558
- 2) DLNR-DAR Maui, 243-5294
- 3) DLNR-DAR Oahu, Tony Montgomery/Skippy Hau, 587-0365

## **Vertebrate Animals**

### New or Unusual Animals (includes birds)

- 1) MISC, 573-6472
- 2) DLNR-DOFAW, Fern Duvall, 873- 3502 (Private number 264-0922)

### Illegal/Injurious Animal (HDOA [AR-71P.PDF](http://www.hawaiiag.org/hdoa/adminrules/AR-71P.pdf) [http://www.hawaiiag.org/hdoa/adminrules/AR-71P.pdf])

- 1) HDOA Hotline, 634-PEST
- 2) HDOA Plant Quarantine Maui, 873-3962

### MISC Animal Target Species

(*Eleutherodactylus coqui*, parrot or parrot-like bird, *Pycnonotus cafer*, *Chamaeleo calytratus*)

- 1) MISC, 573-6472

### MoMISC Animal Target Species (on Molokai)

(*Eleutherodactylus coqui*, *Pycnotus cafer*, parrot or parrot-like bird)

- 1) MoMISC, 553-5236

### Forest Animals / Game Animals

- 1) DLNR-DOFAW, 981-8100

### Rats or mice (nuisance to human or pet)

- 1) DOH Vector Control Maui, 873-3560

### New or Unusual Aquatic Animal

- 1) DLNR-DAR Maui, 243-5294
- 2) DLNR-DAR Oahu, Tony Montgomery/Skippy Hau, 587-0365
- 3) HDOA Hotline, 634-PEST (If Illegal)

### Stray Animal

- 1) Humane Society, 877-3680

### Snake

- 1) 911
- 2) DLNR-DOFAW, Fern Duvall, 873- 3502 (Private number 264-0922) (call IN ADDITION to 911)
- 3) HDOA Plant Quarantine Maui, 873-3962 (when found in an urban area)

## **Invertebrate Animals**

### New or Unusual Invertebrate (terrestrial)

- 1) HDOA, Mach Fukada, 873-3946
- 2) CTHAR Maui, 244-8202
- 3) MISC, 573-6472

### New or Unusual Invertebrate (aquatic)

- 1) DLNR-DAR Maui, 243-5294
- 2) DLNR-DAR Oahu, Tony Montgomery/Skipsey Hau, 587-0365

### Biting or stinging insect (mosquito, yellow jacket, bee)

- 1) DOH Vector Control Maui, 873-3560

### Biting or Stinging Insect (all others)

- 1) MISC, 573-6472
- 2) HDOA, Mach Fukada, 873-3946

### Nuisance Invertebrates Around House (includes roaches)

- 1) DOH Vector Control Maui, 873-3560

### RIFA

*(Solenopsis invicta)*

- 1) HDOA Plant Pest Control, 873-3555
- 2) DOH Vector Control Maui, 873-3560
- 3) MISC, 573-6472

### Agricultural Plant Pest (fruit flies, caterpillars, leaf miners, beetles)

- 1) HDOA Plant Pest Control, 873-3555
- 2) HDOA, Mach Fukada, 873-3946
- 3) CTHAR Maui, 244-8202 (for control methods)
- 4) CTAHR Molokai, 567-7833 (for control methods)

## Appendix 2:

### Example Maui County Early Detection Target Species Fact Sheets

## STOP THE INVASION- REPORT THIS PEST

# **Red Imported Fire Ant**

Maui County Priority Pest for Maui, Lanai, and Molokai:

### **Red Imported Fire Ant (RIFA)**

are aggressive biting ants not known to occur anywhere in Hawaii. These ants build dome shaped mounds of fine soil with no visible opening. When disturbed ants will swarm out of the nest and sting anything within proximity.

### **Identification**

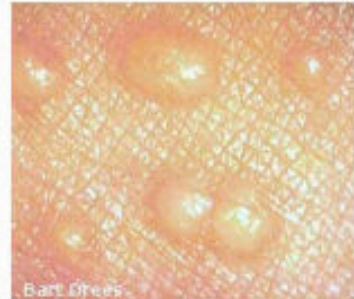
- Length: 3-6 mm (1/8-1/4 in)
- opaque shiny black abdomen
- Head size is always the same proportion to body size, with no "big-headed" workers
- stings cause blisters filled with white pus that last for several days



RIFA is reddish-brown with a dark opaque abdomen



(Top) An early stage nest mound only a few weeks and (Bottom) a characteristic cone shaped



Pus filled blister caused by RIFA stings last for days

## Don't mistake Red Imported Fire Ant for these look-alikes:

### **Tropical fire ant (*Solenopsis geminata*):**

The tropical fire ant is common throughout Hawaii. This small red ant is 3-6 mm (1/8-1/4 in) long. Some of the workers will have proportionately large, square heads. This ant is restricted to dry coastal areas and nests in the soil; it does not construct mounds. Tropical fire ant stings will cause irritation, but should not cause white pus filled blisters that persist for days.



Tropical Fire Ant

### **Other Ants:**

There are over 40 types of ants in Hawaii. Most of these ants are black to pale brown and slightly transparent. Most other ants build mounds that will have a visible opening or be surrounded by an area that is stripped of vegetation. No other ant in Hawaii will aggressively swarm like the red imported fire ant.



## STOP THE INVASION- REPORT THIS PEST

### **Miconia**

Maui County Priority Pest for Maui, Lanai, and Molokai:

**Miconia** (*Miconia calvenscens*) is a fast growing tree known as "the green cancer" that quickly displaces all other plants in natural areas. Miconias is only currently known to grow in one area of Maui County (East Maui). Hitchhiking seeds have been found in Hapu'u plant containers imported from other infested islands.

#### Identification

**Height-** 4-15 m (13-50 ft)

**Flower-** White to pink, short lived (<1 day)

**Fruit-** Dark purple, 7 mm (1/3 in)

**Leaves-** opposite growth pattern, up to 80 cm (31.5 in) long, dark green above and purple below, tree prominent pale green arcing veins



A typical miconia plant



Characteristic arcing vein shape and purple coloration on the underside of the leaf. This leaf is over one half meter (> 1.5 ft) long.



Broken leaf pieces will resprout!

#### Don't mistake miconia for these look-alikes:



#### **Koster's curse (*Clidemia hirta*)**

This weedy shrub is found throughout Maui County.

**Height-** 0.5-3 m (5-10 ft)

**Leaves-** 5-16 cm (2-6.3 in) long and 3-8 cm (1.2-3.1 in) wide, covered in coarse hairs

**Fruit-** Bright blue



Coarse hairs on leaves



#### **Rubber tree (*Ficus elastica*)**

Rubber tree is a shiny, leathery plant that bears copious amounts of latex.

**Leaves-** broadly leaves, 7-20 cm (3.8 in) long, paler below than above

**Twigs-** have circular scars



circular scars

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<http://www.nbi.org>