



FY2017

# Outcomes of Funded Projects



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Hawaii Invasive Species Council

FY2017



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Cabinet-level direction on invasive species issues

## **Summary Report on FY17 Funded Projects**

The Hawaii Invasive Species Council (HISC) annually requests proposals from government agencies within the State of Hawaii, including the University of Hawaii system, and county and federal partners, for projects that address interagency invasive species issues. HISC-funded projects complement existing programs within state agencies and are those that:

1. Fill gaps between agency mandates or existing agency programs, and/or
2. Advance our collective knowledge through research and development of new tools.

The legislature appropriated \$4,750,000 to the HISC in FY17. Of this total, 5% was restricted by the Department of Budget and Finance, and 6% was provided as overhead to the DLNR Division of Forestry and Wildlife as the administrative host of the HISC. The HISC Support Program budget (including two temporary staff positions, supplies, web application development for an online pest reporting system, and other programmatic costs) totaled \$254,864.

For the remaining grant funds, HISC received 45 applications totaling \$8,711,220. The Resources Working Group evaluated each proposal based on its applicability to the HISC Strategic Plan, FY17 priorities developed by the HISC Working Group, and priorities of the Regional Biosecurity Plan for Micronesia and Hawaii.

On August 17, 2016, the HISC approved the recommended budget from the Resources Working Group detailing funds for 29 projects addressing interagency control, outreach, research and prevention needs. Summaries for individual projects final reports are below:



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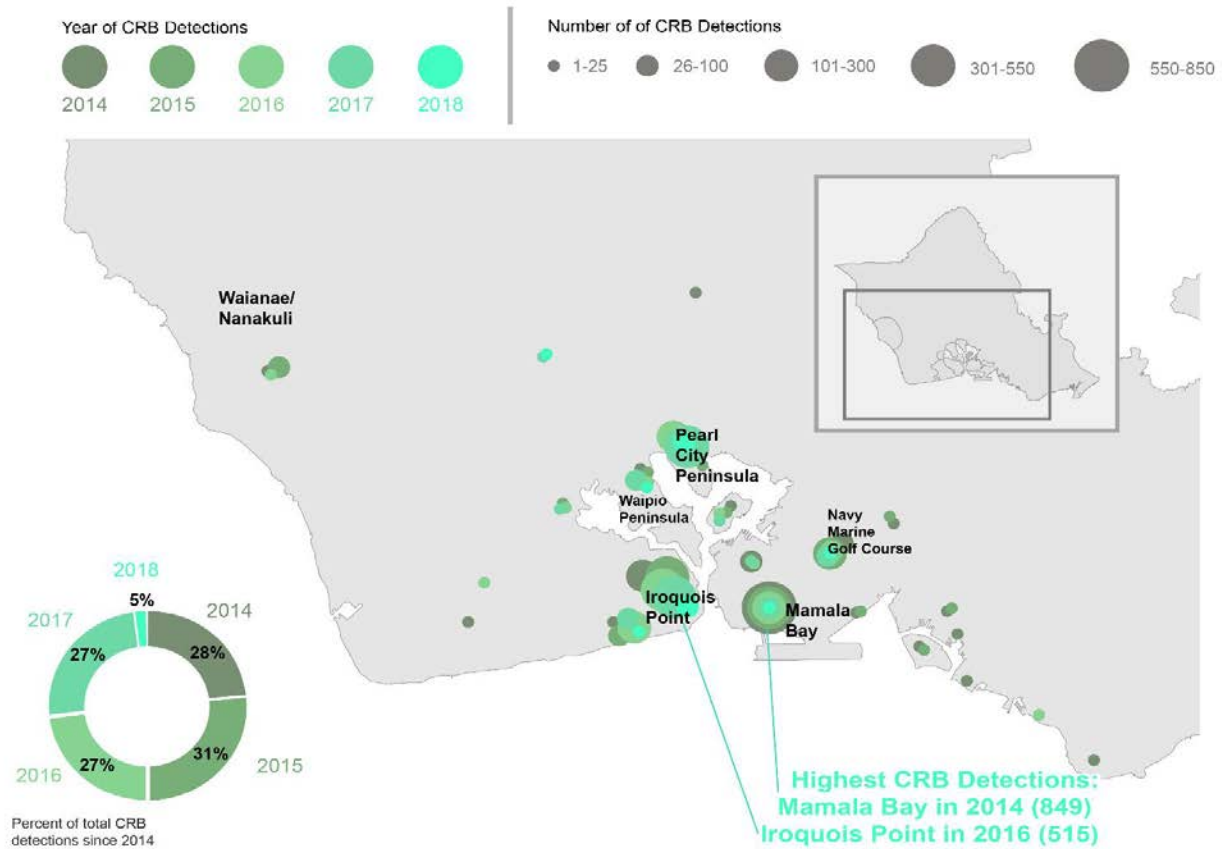
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### CONTROL

#### 1. MULTI-AGENCY PROPOSAL FOR COCONUT RHINOCEROS BEETLE (CRB) AND OTHER PALM PEST RESPONSE FOR EARLY DETECTION AND ERADICATION

*UH, College of Tropical Agriculture & Human Resources, \$300,000*

Abstract: The coconut rhinoceros beetle (*Oryctes rhinoceros*) was detected in December 2013 on Oahu at Joint Base Pearl Harbor-Hickam (JBPH-H). A response program was jointly created by APHIS and HDOA with assistance from a wide-range of groups until funding was allocated allowing the hiring of a dedicated response team utilizing USDA funding from Federal Fiscal Year (FFY) 2014 Farm Bill of which \$1.44 million was allocated to HDOA, followed by a FFY 2015 budget of \$2.2 million. This funding, supplemented by State Fiscal Year FY 2015 funding from the HISC, DLNR and Container Fees has formed the basis of the response and research programs. The program has successfully delimited the infestation on Oahu and will be expanding detection programs on other islands.





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2. BALLAST WATER AND VESSEL BIOFOULING COORDINATOR  
*DLNR, Division of Aquatic Resources, \$91,000*

Abstract: DLNR is the lead agency responsible for minimizing the arrival and impacts of alien aquatic organisms in Hawaii. We are requesting funds to maintain the existing FTE Ballast Water and Vessel Biofouling Coordinator tasked to amend ballast water (BW) rules (Hawaii Administrative Rules §13-76) to mirror USCG BW regulations while preserving language specific to Hawaii's unique aquatic resources, develop regulatory statutes to prevent aquatic invasive species (AIS) from arriving and spreading via vessel biofouling (VB) and hull husbandry (HH), and establish a baseline AIS monitoring program in coordination with the Division of Aquatic Resources AIS Team and NOAA.

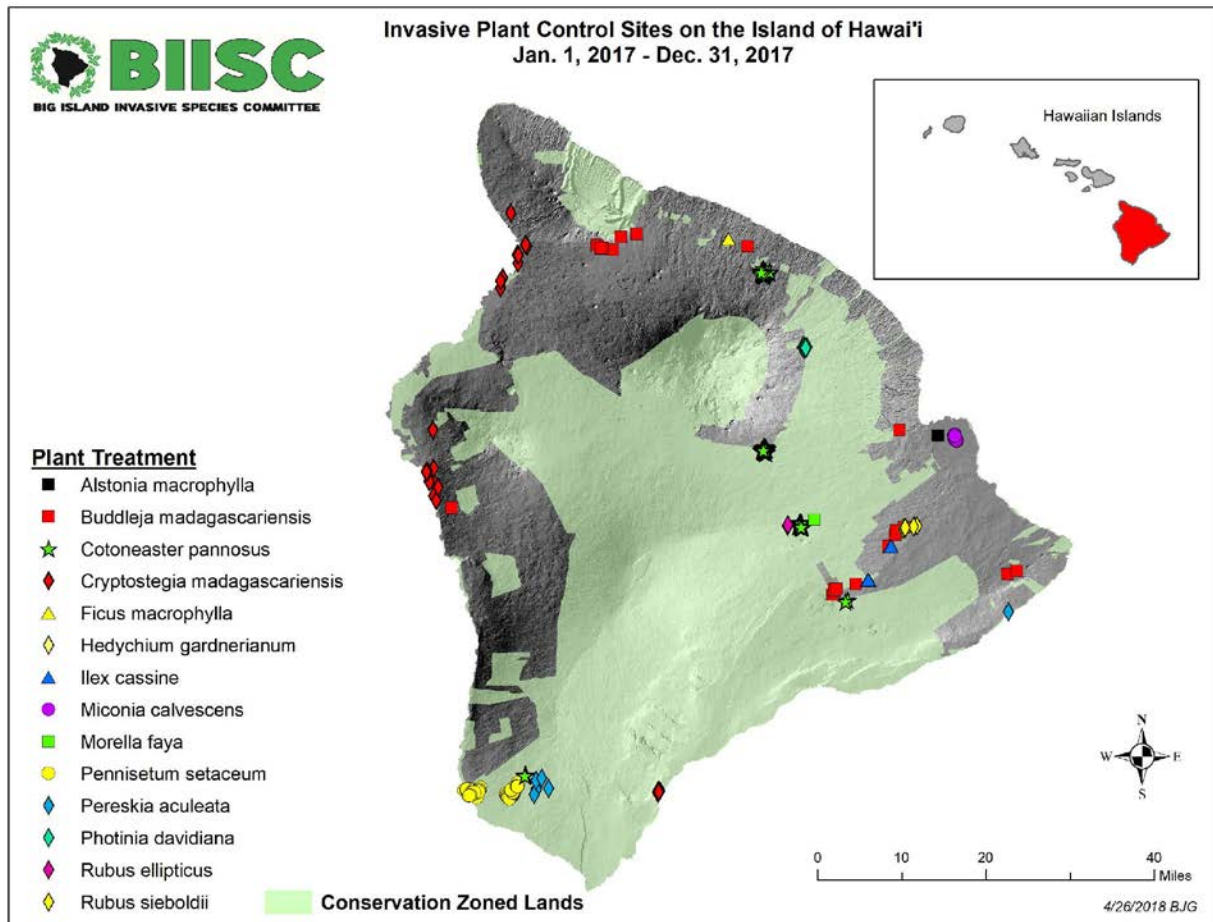
[DLNR-DAR-Ballast-Water-Vessel-Biofouling-FY17-Final-Report](#)



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**3. BIG ISLAND INVASIVE SPECIES COMMITTEE RAPID RESPONSE**  
*UH, Pacific Cooperative Studies Unit, \$270,000*

Abstract: For 20 years the Big Island Invasive Species Committee has been committed to a simple, focused mission: to prevent new invasive pests from becoming established on the island of Hawaii; to stop newly-established pests from spreading; and to provide local control of established pest species. This proposal outlines our core invasive species control objectives and funding needs for the coming year. In 2017 the BIISC response team will target eight species with a goal of island-wide eradication. BIISC will partner to achieve containment and localized control of high priority established pests like Miconia and Poison Devil's Pepper across 4,900 acres. BIISC will remove more than 16,000 individual incipient pest plants—before they can interfere with our environment, economy, or way of life.

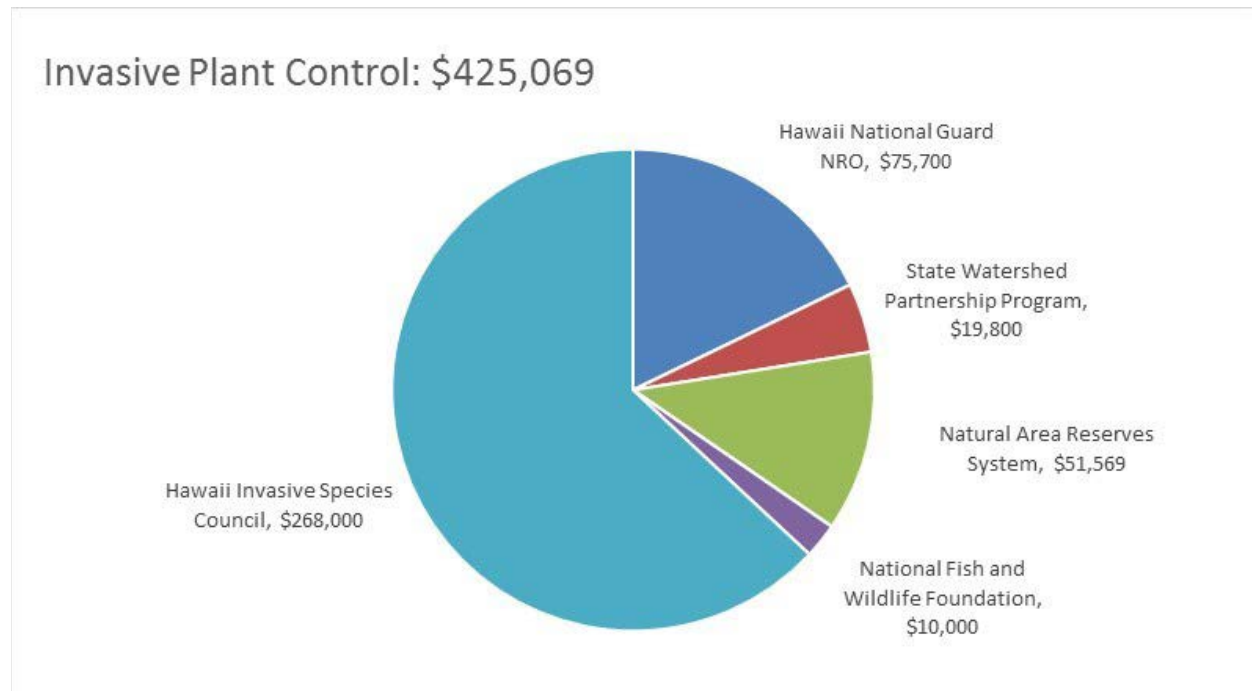




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**4. BIG ISLAND INVASIVE SPECIES COMMITTEE EARLY DETECTION**  
*UH, Pacific Cooperative Studies Unit, \$198,123*

Abstract: Hawai'i Island is the agricultural and horticultural center of the State of Hawaii. A vigorous nursery import trade puts the island and state at risk from imported invasive plants and pests. BIISC has proven the effectiveness of roadside surveys (4000 miles, 108 new plant records, 4 eradications, 3 wrapping up) and nursery surveys (60 nurseries approached, 27 surveyed, 14 endorsed, 42 noxious/invasive pests discontinued from sales at endorsed nurseries, LFA detected-and-addressed-in 2 new districts). In 2016 BIISC will aggressively market Plant Pono, continue roadside surveys in hot-spot zones, and continue to improve science-based assessment and response. All said, the BIISC EDRR program seeks every year to raise the bar on cost effectiveness of detection, response, and control.







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5. BIG ISLAND INVASIVE SPECIES COMMITTEE ALBIZIA  
*UH, Pacific Cooperative Studies Unit, \$100,000*

Abstract: 2017 marks the 100th year since Albizia reached Hawaii. BIISC has been a driving force in research and control of Albizia for the past four years. Successes of the multi-agency task force have included control of over 1,000 acres of Albizia lands, 1,200 hours of volunteer training, removal of more than 50,000 trees, a one-stop-shop website for Albizia control, arborist contacts, letter templates, policy and procedure information ([www.biisc.org/Albizia](http://www.biisc.org/Albizia)), initiation of an ecological monitoring research project, the presentation of a completed Hazard Mitigation Plan to the legislature, and resulting state appropriation to HDOT. BIISC seeks funds in 2016 to continue community-based Albizia training and control programs, control non-hazardous trees as part of the hazard mitigation projects.



In 2017 BIISC staff engaged 284 landowners and volunteers, treated 674 acres, and killed 12,273 trees. That we are still going strong three years after Tropical Storm Iselle says a great deal about the perseverance of our Big Island communities and the commitment that the State Legislature and other project partners have made to secure our island infrastructure and prevent a repeat of the calamity caused by falling albizia in 2014.

[UH PCSU BIISC Albizia FY17 Final Report](#)



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### 6. HAWAII ANT LAB

*UH, Pacific Cooperative Studies Unit, \$250,000*

Abstract: The Hawai'i Ant Lab is housed within the Hawai'i Department of Agriculture which provides funding for industry support as well as infrastructure support to the unit. This proposal is for the provision of core funds that will allow the Hawai'i Ant Lab to provide ongoing support to the HISC, island Invasive Species Committees and to the general public. This funding maintains a "critical mass" needed to provide these support services.

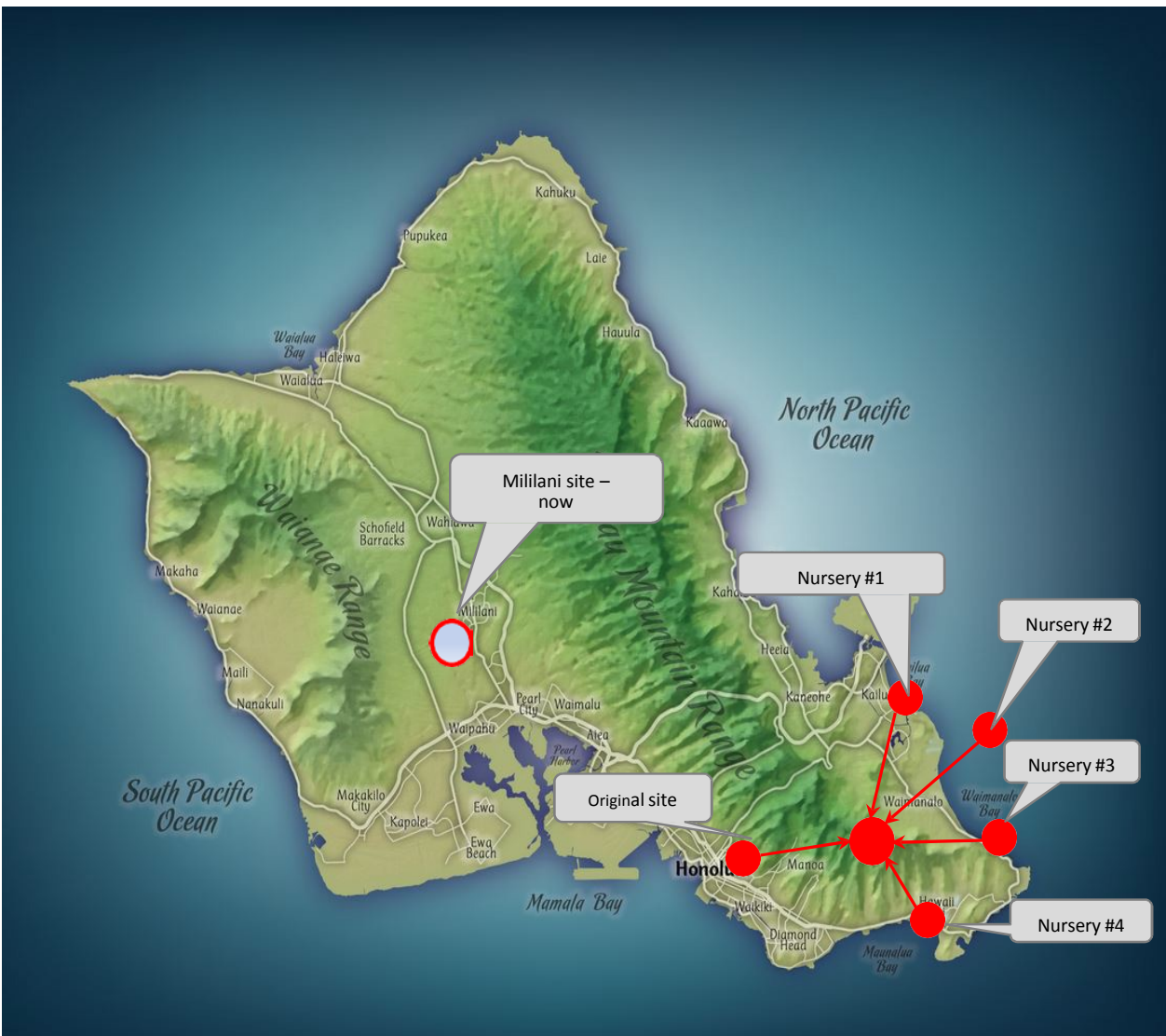


Figure 1. Location of current infested locations on Oahu (2017)





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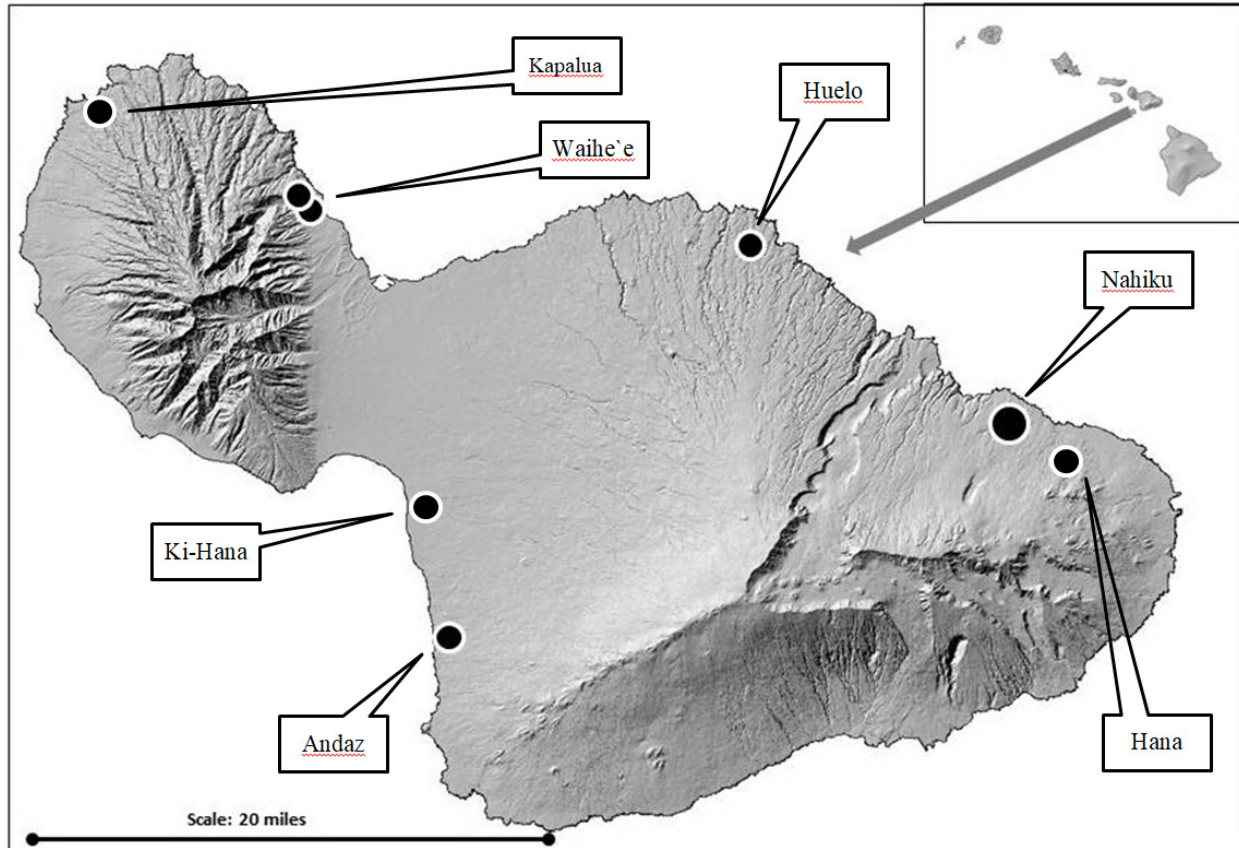


Figure 2. Map of Maui showing the location of infested sites (2017)



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**7. KAUAI INVASIVE SPECIES COMMITTEE DETECTION & CONTROL**  
*UH, Pacific Cooperative Studies Unit, \$499,224*

Abstract: Kauai is home to the highest number of endemic species in the Hawaiian archipelago thereby holding the greatest risk of losing biodiversity. Despite its isolation, introductions of new invasive species are continuous. The main vectors for these new arrivals are human-caused. To deter risks to farming and forests, the Kauai Invasive Species Committee functions as an island-wide rapid response team that helps coordinate and fill gaps in the multi-agency effort to prevent establishment of new pests. KISC has also evolved a highly effective early detection program which is continuously monitoring Kauai for threats that have evaded port detection and risk becoming new invasions. KISC's 13-year track record includes eliminating functioning populations of Miconia, coqui frog and little fire ant.



KISC Botanist surveying

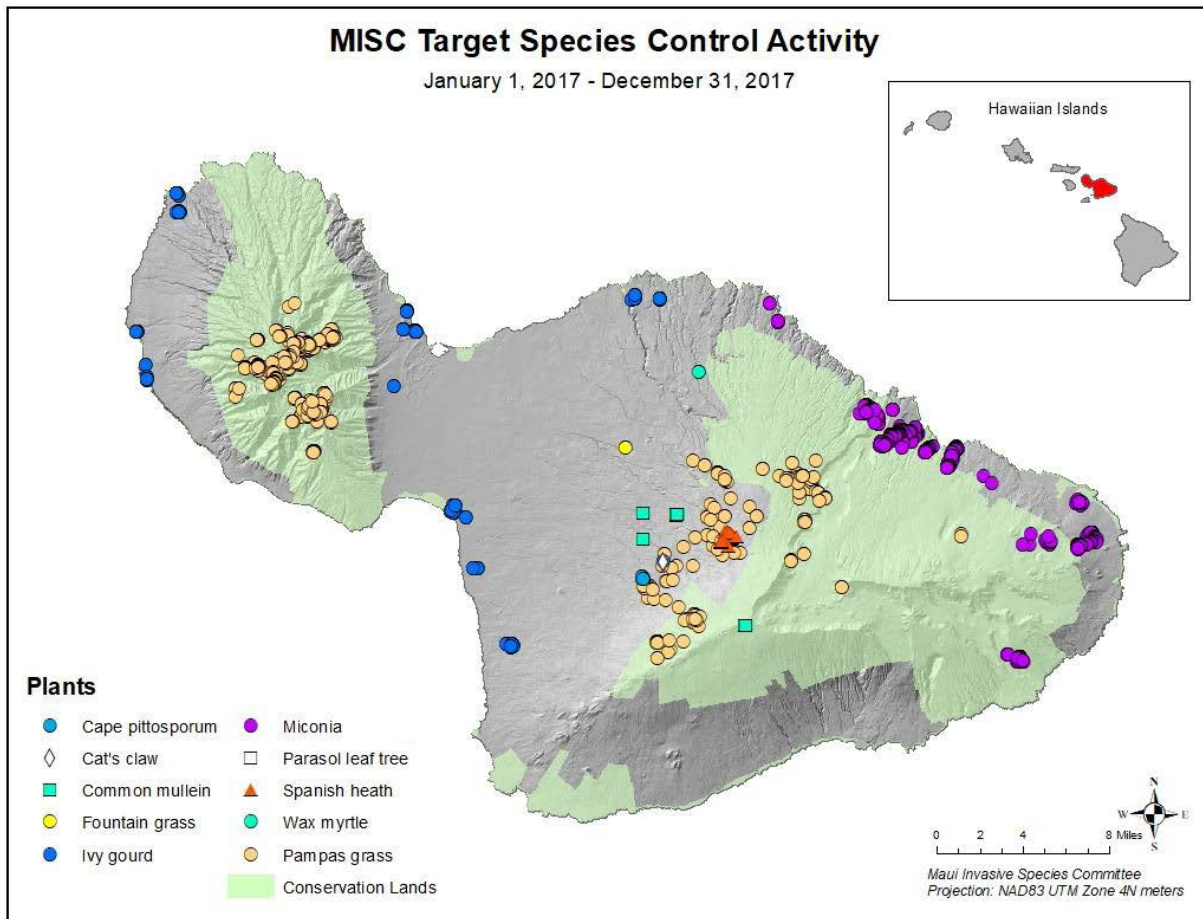
[UH PCSU KISC Detection & Control FY17 Final Report](#)



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**8. MAUI INVASIVE SPECIES COMMITTEE DETECTION & CONTROL**  
*UH, Pacific Cooperative Studies Unit, \$500,860*

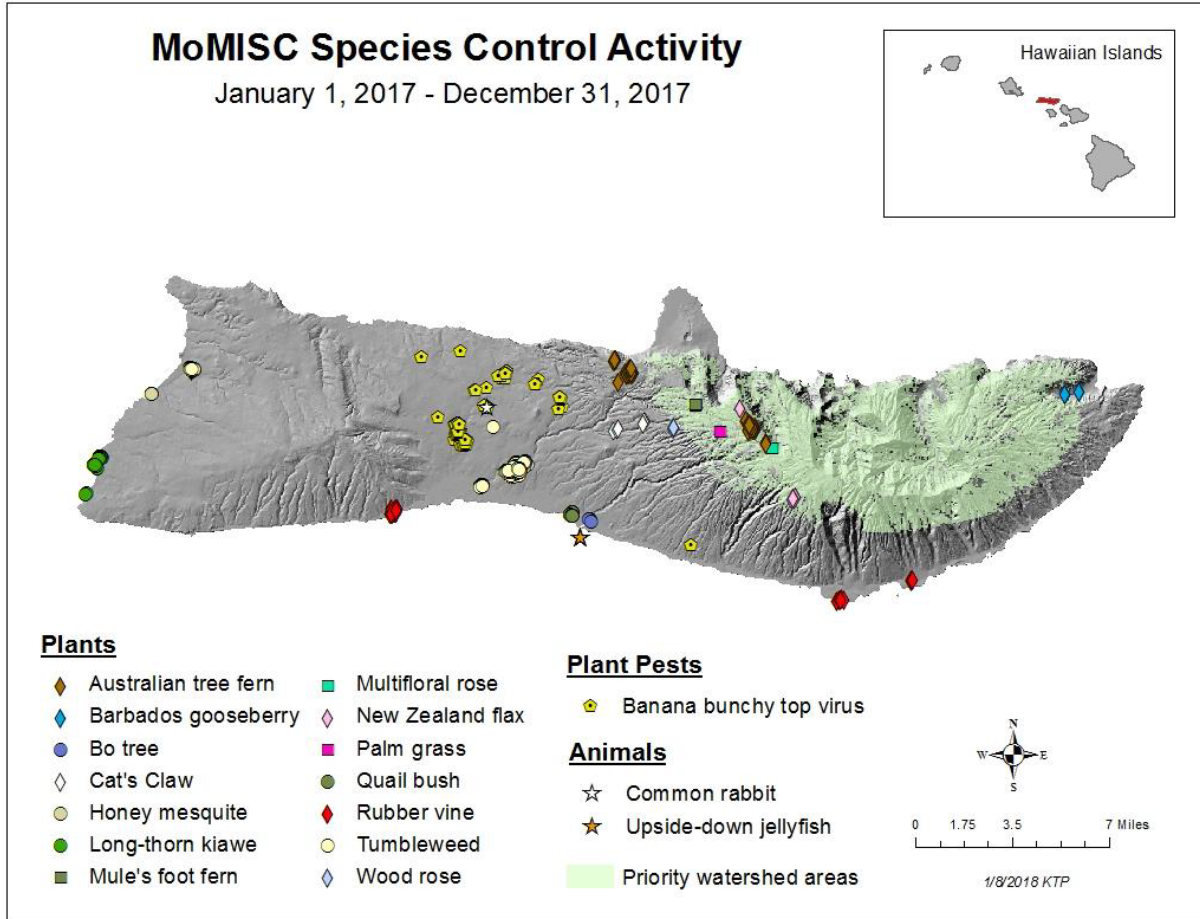
Abstract: Island-wide early detection and rapid response actions across Maui and Molokai will target 30+ plant species, 3-4 vertebrate species, 5 invertebrate pests or pathogens, and 1 aquatic species. MoMISC will serve as an early detection center for agricultural pests. Control of little fire ants on Maui will be a high priority. Funds will help retain essential staff capacity (10 FTE); provide helicopter time for early detection surveys on Molokai and for Miconia and pampas grass on Maui; and support detection and control of coqui frogs on both islands. The project offers a cost-effective approach, with county and federal funds providing an estimated 1.5:1 match. The proposed work will implement key goals, strategies and priorities of the HISC Strategic Plan and Working Groups.







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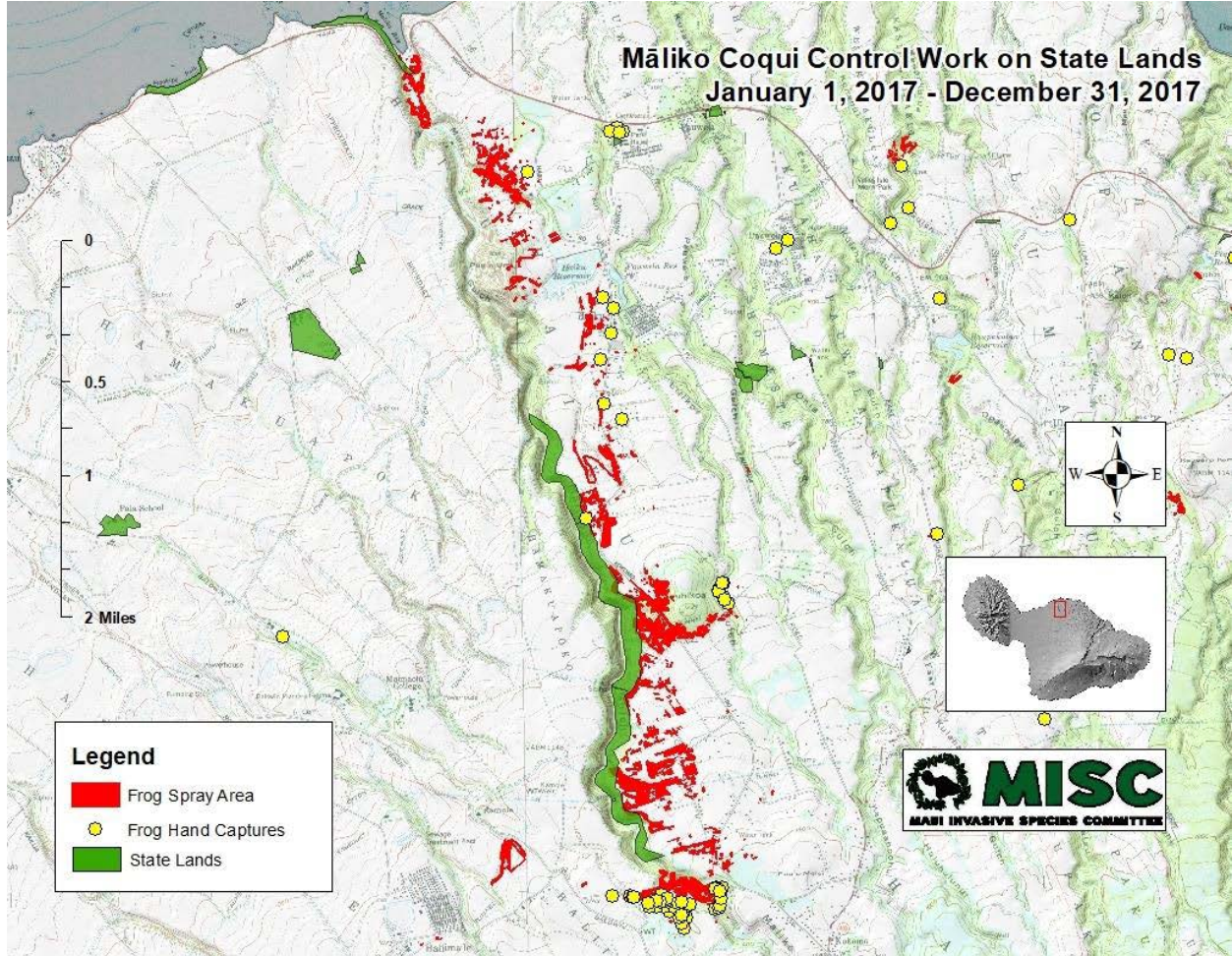
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**9. MAUI INVASIVE SPECIES COMMITTEE MALIKO GULCH COQUI CONTROL**  
*UH, Pacific Cooperative Studies Unit, \$178,635*

Abstract: The purpose of this project is to expand coqui frog control operations in and around Māliko Gulch to ensure the ultimate goal of a coqui-free Maui. Despite strong support from Maui County and substantial efforts by MISC to date, resources have never been adequate for work in the Māliko area. This proposal seeks to reverse that trend. HISC funding will support 9 FTE, acquisition of two trucks, and supplies for coqui barriers in strategic locations. Efforts since 2005 have shown the potential for successful control with eradication of 12 population centers, including infestations at a junkyard, a high-end resort, and wildland areas of East Maui. The last major stronghold has been Māliko Gulch, where the frogs have spread down a four-mile stretch, from the top of the gulch to its terminus at the ocean. The frogs might now infest several thousand acres; exact numbers have been difficult to obtain due to resource limitations. Spillover into the neighboring community and agricultural areas is increasing and coqui are moving out of the area to new locations on vehicles. Residents are both alarmed and engaged. Working over a four-mile length of the gulch requires a methodical approach to ensure the most effective use of resources. The proposed strategy will utilize multiple teams focusing on outlier populations (supported by county funding); habitat work at residential sites; and work along the Māliko rim and central gulch. Initial priorities will focus on stopping expansion of the “invasion front” – frogs moving beyond major roads such as Kokomo and Kaluanui. Use of management units will ensure consistent and systematic coverage of each area. Another priority will be support for efforts by local residents who have shown an increasing willingness to become involved. MISC will provide citric acid and small sprayers to residents along with appropriate training. Staff will employ communication strategies to ensure area residents are informed about current efforts. Cost effectiveness: At this level of infestation, successful control of coqui on Maui will be expensive; however, control costs must be weighed against the long term economic and environmental burden of an island dominated by coqui. The true environmental impacts are yet to be discovered on Hawai’i Island, but research predicts inevitable alteration of native invertebrate communities in natural areas. The window on Maui is rapidly closing; decisive action now is our last chance. This project received strong support from Maui County in FY16 which will provide more than a 2:1 leverage for HISC funding. Absent successful control, coqui frogs will impact many sectors on Maui: natural resources, economics (real estate, tourism), agriculture (landscape industry) and health/quality of life. Many residents in the area currently complain of increased costs, lost sleep, reduced accommodation revenues, increased stress and loss of relaxation opportunities due to coqui control activities.



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[UH PCSU MISC Maliko Gulch Coqui FY17 Final Report - Control](#)



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#### 10. MAUI INVASIVE SPECIES COMMITTEE MICONIA CALVESENS CORE CONTROL *UH, Pacific Cooperative Studies Unit, \$20,932*

Abstract: In the mid-1990s, a Hāna-based Miconia team was formed to control Miconia across the East Maui watershed. Initially, much of that work focused on the core infestation mauka of Hāna town. Staff from MISC and The Nature Conservancy concentrated on outlier populations, which extended from Kīpahulu backside of the mountain to as far west as Ha'ikū on Maui's north shore. When a team funded by Hawai'i Department of Land & Natural Resources (DLNR) merged with MISC in 2002, the coordinated approach included ground and aerial operations encompassing the entire 25,000-acre infestation. From 2002-2011, Haleakalā National Park (HALE) and the NPS Exotic Plant Management Team (EPMT) provided significant federal support (\$300,000-\$500,000 annually) for ground and aerial operations. Due to budget limitations since then, that support has largely evaporated; the park still provides limited aerial, in-kind, and transportation resources. In response, the inter-agency Miconia team prioritized ground and aerial work on outlier populations over controlling trees in the core infestation. As a result, Miconia densities in the core have exploded. Staff, partners and cooperators working in or flying over the core report increasingly high numbers of seeding Miconia trees. The core encompasses nearly 1,000 acres of challenging terrain: irregular 'a'a flows, impenetrable thickets of *Clidemia hirta*, and downed rose apple. Core roads created by DLNR are becoming inaccessible due to vegetative growth. With long-lived seeds spread by non-native birds, the infestation threatens to undermine more than 20 years of control efforts. Worse, it threatens East Maui's high-elevation pristine forested watersheds. The MISC project has maintained two yurt structures in Hāna to house Makawao-based crews every 6-8 weeks to augment control efforts by the Hāna crew. The yurts have been used in the past for short-term teams funded by NPS. This proposal seeks funding to bring on a crew of five SCA interns (including a crew leader) to concentrate on the Hāna core infestation for twelve weeks. Specific deliverables include: working with SCA to recruit and hire the crew; obtaining and installing a new yurt, shower, and cooking facility on land leased by MISC; completing at least one entire sweep along the mauka edge of the core infestation; and surveying and controlling Miconia across 200 acres of the core. The project is cost effective, especially contrasted against the economic costs of failure to stop the spread (estimated in the millions annually). MISC has the necessary infrastructure, protocols, and staffing resources in place to support expanded operations. The likelihood of project success is high based on similar past experience: MISC more than tripled Miconia operations during the Environmental Work Force project in 2001-2002 and HALE has twice supported short-term Miconia teams based out of the Hāna field camp. Staff regularly works with internship programs such as AmeriCorps. In support of the larger goal to contain Miconia (listed as a high priority for the Control Working Group), this project will leverage non-HISC funds from the National Park Service, US Forest Service and Maui County. Protection of Maui County's drinking water and native forests is essential to broader economic concerns, biodiversity, agriculture and tourism. The project also will have a strong education component.





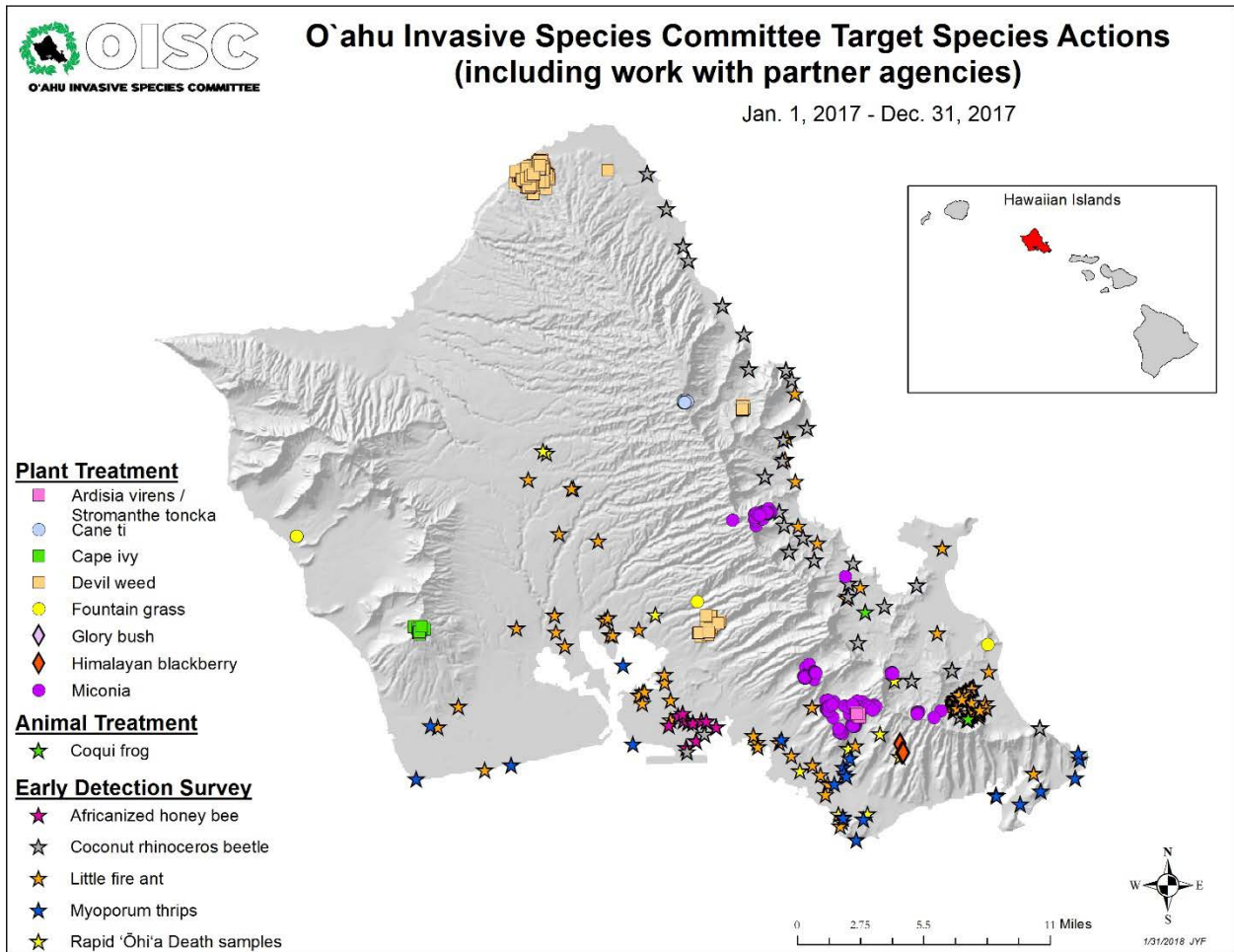
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### 11. OAHU INVASIVE SPECIES COMMITTEE DETECTION & CONTROL

UH, Pacific Cooperative Studies Unit, \$562,000

Abstract: The O'ahu Invasive Species Committee (OISC) proposes to conduct invasive species surveys and control over public and private land to protect O'ahu from eight species of invasive plants. All these species have caused measurable damage on other Hawaiian Islands or have a reputation for disrupting ecological and agricultural systems elsewhere in the world. Controlling incipient weeds island wide uses funds efficiently to prevent damaging weeds from moving upslope and becoming chronic problems for land managers. To date, OISC's efforts have prevented Miconia, Cape ivy and Himalayan blackberry from moving into native forest and have brought pampas grass, fireweed and glory bush to undetectable levels.







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**12. OAHU INVASIVE SPECIES COMMITTEE TIBOUCHINA HERBACEA CONTROL**  
*UH, Pacific Cooperative Studies Unit, \$15,000*

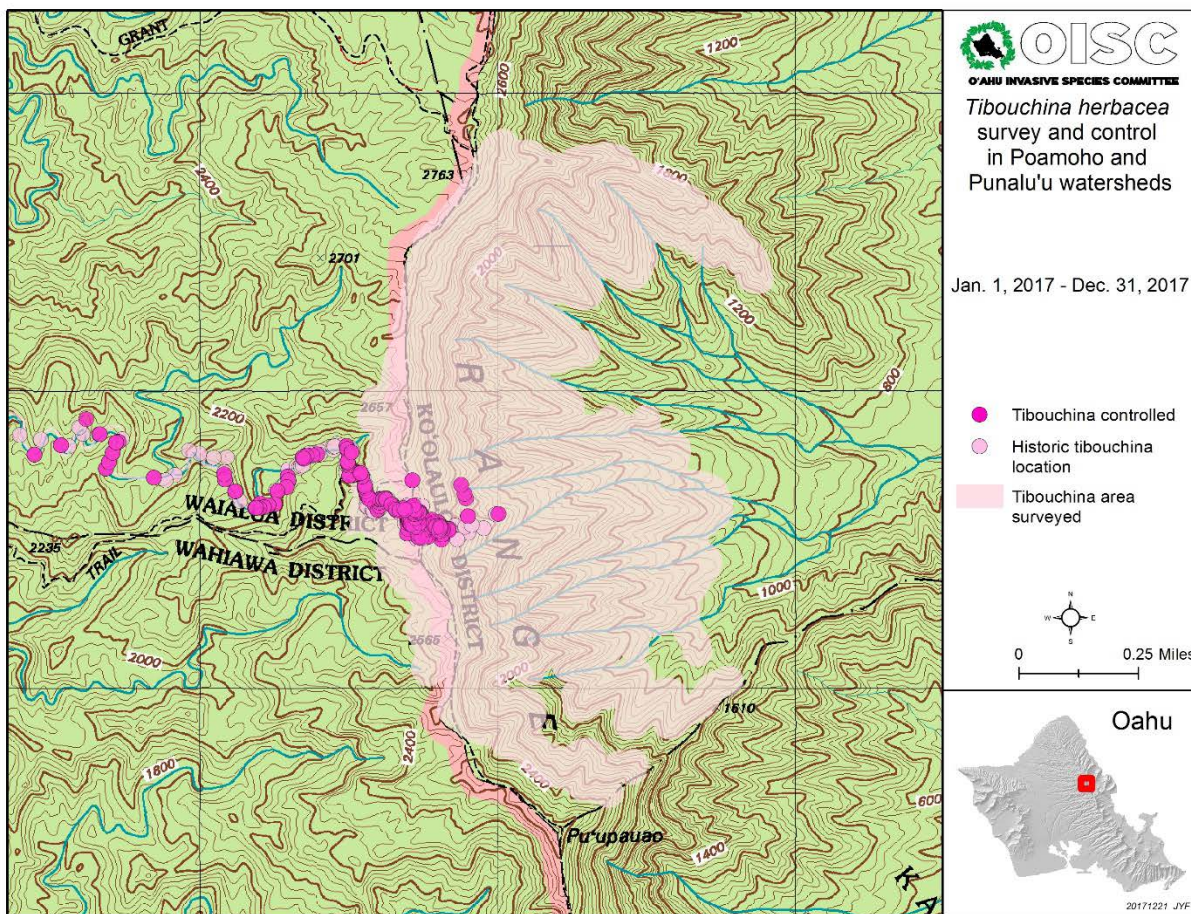
Abstract: The O'ahu Invasive Species Committee (OISC), the Ko'olau Mountain Watershed Partnership (KMWP) and Natural Area Reserve System (NARS) propose to work together to stop the spread of cane ti in the Poamoho region of O'ahu, one of the few areas on the island where residents can experience an intact 'ōhi'a forest ecosystem. Cane ti threatens this ecosystem, however; it is still restricted enough that suppression and eradication is possible. Cane ti poses a major threat to 'ōhi'a forests. It thrives in wet forest conditions and can suppress the natural regeneration of the native understory and 'ōhi'a canopy. It reproduces from broken stems and seeds that are carried by wind, streams, birds and pigs. Hikers may unwittingly carry plant material capable of reproducing on shoes, clothes, and backpacks. It took cane ti less than a decade to spread across the mountains of west Maui, and it is now a common component of the native forest understory. In the absence of control, cane ti will likely transform the structure of the forest at Poamoho, thereby changing the watershed dynamics. Cane ti is a member of the same family, Melastomataceae, as both Miconia and Clidemia, two superweeds. At Poamoho, the plant was believed to be confined to a small area near the summit that has been continuously monitored since 2008. In the fall of 2013, it was discovered that plants had spread down Paukaila stream, and had been present long enough to mature and set seed. However, this species is still incipient enough that preventing it from becoming a permanent part of O'ahu's vegetation is still possible. Previous delimiting and a recent aerial survey have shown that there are not large patches elsewhere at the summit. The core infestation is only about 1.3 acres. Although individual plants have been found as far as 4,000 meters downstream, the plants found are individual plants and not large infestation foci. Only 14 mature plants were found in 2015. Cane ti can still be contained at Poamoho. OISC, KMWP and NARS have developed a management strategy to contain and eradicate this species. OISC will visit the 1.3 acre core every other month and perform a sweep with tight survey lines to find plants before they can mature and set seed. Available data has cane ti maturing once a year, however, frequent sweeps of the core are necessary because of the thick under-story. The plants can remain hidden beneath the vegetation and more frequent visits will give the crews more chances to catch plants just popping up over the understory. The crew will also survey as much as can be covered on foot outside the core, to ensure the species has not spread. KMWP and NARS will conduct 9,000 meters of surveys along the stream to catch and remove plants that may have dispersed downstream before they set seed. The goal of this project for all three organizations is to catch all plants before they set seed and suppress maturation. Because cane ti seems to be maturing faster than what the available literature says, NARS will conduct a small growth study to ensure that the species does in fact mature only once a year. The study will be supported with matching funds. KMWP is also proposing to build a boardwalk between the monument and the fence gate in order to reduce the spread of seeds in muddy boots and prevent trampling of native plants. The area is marshy and easily degraded. The boardwalk will facilitate access to the summit area by both recreational users and organizations doing natural resource work. The Poamoho summit is split between state-owned land and land owned by Kamehameha Schools. As an active member of KMWP, Kamehameha Schools is not only cooperative about work on their land, it has also provided matching funds for this project. Crews wear dedicated gear for this species and will decontaminate daily after operations to



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prevent spreading seeds. Crews working in the core wear Tyvek suits to avoid spreading seeds outside the core. Working in the summit regions is more cost and time efficient if crews and equipment can be brought in by helicopter, however, finding helicopters available for such short flights has been challenging and hiking in may be necessary. Data will be collected by all three organizations and coordinated by OISC's GIS analyst. OISC has had success in eradicating incipient species like cane ti. It has reduced pampas grass, fireweed and glory bush to undetectable levels at the sites where OISC is controlling them and eradicated smoke bush and Jerusalem thorn.





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**OUTREACH**

**13. BIG ISLAND RAT LUNGWORM OUTREACH**

*UH Hilo, School of Pharmacy, \$65,635*

Abstract: The increase in cases of rat lungworm disease correlates with the arrival of a new, effective host of RLW, the semi-slug *Parmarion martensi*, which is currently established only on Oahu and Hawaii Island. Cases in Hawaii have resulted in eosinophilic meningitis, encephalitis, long-term neurological damage, disability, coma, and death. Slugs and snails are the intermediate hosts of the rat lungworm parasite (RLW) and can harbor the infective larval stage that causes disease. Cases of RLWD have occurred on Oahu, Maui, Kauai, and Hawaii Island. Our proposed project supports the adoption of integrated pest management (IPM) strategies for the control of invasive slugs and snails in Hawaii school garden projects with curriculum and guidelines. This strategy will help educate rural populations.

[UH HILO SOP BI RLW FY17 Final Report](#)

**14. BIG ISLAND INVASIVE SPECIES COMMITTEE OUTREACH**

*UH, Pacific Cooperative Studies Unit, \$151,271*

Abstract: BIISC's core outreach programs address the invasive species issues identified and prioritized by our communities. This people-first approach is a shift from sharing internally-prioritized messages important mainly to scientists. First listening, then assisting, our outreach team empowers communities to address the I.S. they know, establishing a foundation for trusting, effective relationships. From their experience with backyard pests like Albizia, mosquitoes, ROD, and LFA, residents digest how the species we import, and rules we make, impact more distant, intangible values like watershed health, ecosystem services, agricultural exports, cultural practices, native biodiversity. Participants identify as part of a team affected by, and affecting positive change on, invasive species.

[UH PCSU BIISC Outreach FY17 Final Report](#)



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**15. COORDINATING GROUP ON ALIEN PEST SPECIES OUTREACH**  
*UH, Pacific Cooperative Studies Unit, \$57,000*

Abstract: The Coordinating Group on Alien Pest Species (CGAPS) is requesting funds for up to two months of payroll support and operating costs for the Project/Outreach Coordinator (1 FTE, cost shared by multiple agencies), and hourly support for database work on [www.PlantPono.org](http://www.PlantPono.org) which houses the Hawai'i-Pacific Weed Risk Assessment. With requested HISC support, this position would be funded through the end of State FY 17. HISC funds are also requested to support outreach work on little fire ants (LFA) and Rapid 'Ōhi'a Death (ROD), including the development and printing of outreach materials, supporting schools outreach, and conducting the second Stop the Ant Month campaign. Funding would also be used to contract additional outreach and broadcast media products such as a 20-minute ROD documentary.



*CGAPS works with partners to engage decisionmakers on invasive species issues*

[UH PCSU CGAPS FY17 Final Report](#)





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### 16. KAUAI INVASIVE SPECIES COMMITTEE OUTREACH

*UH Pacific Cooperative Studies Unit, \$76,505*

Abstract: Invasive species outreach and education is an integral component of on-the-ground control efforts by KISC. Active community support and invested partners increase KISC's capacity by increasing detection and reporting of new invasive pests. This funding will serve as salary for KISC's full-time outreach specialist and partial salary for KISC's Program and Outreach Coordinator, support expenses associated with outreach materials, and development of education programs. HISC deliverables can be measured in project outputs. KISC's priorities in FY2017 include a commitment to participate in statewide outreach regarding inter-island biosecurity, priority pest species, as well as bio-control and other agriculturally related invasive species priorities.

#### ***Achievements in 2017***

**Pono Endorsement Program:** The Pono Endorsement Program was developed in partnership with Plant Pono, a program of Coordinating Group of Alien Pest Species. The Pono Endorsement Program is a voluntary partnership between any nursery or landscaping business, Plant Pono, and KISC. Pono Endorsed businesses are those who practice and promote making "pono" plant decisions that will benefit the health and well being of Kauai. This program seeks to address invasive species directly linked to the nursery and landscaping trade by encouraging businesses to adopt BMPs and voluntarily remove target high-risk plants from nursery stock. *Total number of Endorsed Businesses (Nursery and Landscaping): 17; Promotional Advertisements: 1,601 radio commercials spots*





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**Guardian of the Garden Isle:** KISC's membership network engages residence and visitors on an individual level with email updates, newsletters, volunteer days, workshops, and presentations. (*Digital members: 347*)

☐ **Volunteer Work Days** (*27 people*): KISC partnered with various conservation organizations to offer the public ways to get involved with invasive species removal: Kokee Resource Conservation Program on Pihea Trail in Kokee State Park and Malama Huleia.

☐ **Conducted Early Detection Workshops and Presentations** (*280 people reached*): Kauai Forest Bird Recovery Project, Kauai Endangered Seabird Recovery Project, Kauai Nursery and Landscaping, Neighborhood Associations, Rotary Clubs, and teacher associations.

**Informative website and social media:** KISC maintains and updates the website [www.kauaiisc.org](http://www.kauaiisc.org), as well as a Facebook and Instagram page. The increase in digital reach this year is due to a partnership advertising award received by the Hawaii Tourism Authority focused on promoting the Pono Endorsement Program. *Website Visits: 17,946; Facebook reach: 180,701; Facebook posts: 35, Facebook ad campaigns: 7; Facebook followers: 850; Instagram posts: 67 posts; Instagram followers: 356.*

**Published professional quality e-newsletters:** KISC's annual e-newsletter focused on KISC's partnership projects including: Rose-ringed parakeets, miconia, coqui, and little fire ant.

[http://www.kauaiisc.org/wp-content/uploads/2017KiaiMokuVol10Iss1\\_WEB.pdf](http://www.kauaiisc.org/wp-content/uploads/2017KiaiMokuVol10Iss1_WEB.pdf)

**KISC in the Media:** KISC has been featured or mentioned in articles, interviews, and special guest spots in the media on Kauai and across the state.

☐ Printed articles: 7; Internet articles: 16; Radio interviews: 1, Television interviews/stories: 3

**LFA Month:** KISC participated in the HISC partnership campaign, "Spot the Ant, Stop the Ant" month, to bring increased LFA awareness to Kauai.

☐ *400 LFA Kits distributed at schools, libraries and events*

☐ *661 radio commercial spots, in partnership with CGAPS*

☐ *4 of KISC's events and presentations focused on LFA efforts during the month of October*

**Participated in fairs and events:** Throughout the year, KISC participates in fairs and events: (*3,828 people reached*)

☐ Arbor Day, Garden Fair, Agriculture Awareness Day, Banana Poka Roundup, Kauai County Farm Bureau Fair, Kahili Beach Event, Waipa Music and Mango Festival, Waipa Taro Festival, Hawaii Farm Bureau Federation Convention

**School visits:** (*559 students reached*)

☐ School Presentations given to classes at Island School Elementary, Elele Elementary School, Kauai High School, Kilauea Elementary School, Kapaa Elementary, St. Catherines School, Koloa Elementary School, Kalaheo Elementary School, Wilcox Elementary School, Kauai Community College

**Interviews, meetings, and conferences** (*40 meetings, 485 people reached*): KISC maintains a well-established outreach program involving the continued partnership and relationships with the local community, various private businesses, and government agency partners. Highlights: Chair of Kauai Conservation Alliance, Chair of Kauai Rose-Ringed Parakeet Working Group, Secretary of Kauai Rapid Ohia Death Advisory Committee, and member of the Kauai County Farm Bureau Commodity Committee.

[UH PCSU KISC Outreach FY17 Final Report](#)



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**17. MAUI INVASIVE SPECIES COMMITTEE OUTREACH**  
*UH, Pacific Cooperative Studies Unit, \$57,278*

Abstract: Successful invasive species programs require effective outreach. HISC funding will support 1.5 FTE staff and provide supplies and services on Molokai and Maui. Trained staff will engage students, teachers, policy makers, agencies, landscape professionals, tour guides, and the general public on invasive species issues. Approaches will include print and broadcast media, presentations, community meetings, displays and online and social media platforms. Messaging will highlight impacts of invasive species, public reporting, Rapid 'Ōhi'a Death, biocontrol, and support for a statewide biosecurity plan. Staff will use the Hō'ike curriculum in classrooms and workshops; complete and disseminate an invasive species module; collaborate on a new internship program; and work with student volunteers.



Overall, outreach and education activities had significant reach into local communities:

- Print media: more than 22,000 readers
- Radio and television broadcasts: more than 100,000 listeners/viewers
- Websites: 5 websites and two social media outlets had 71,318 hits
- Public events: 12 events, including interactions with 1,614 people
- Presentations: 18 presentations with a combined audience of 1,329 people
- Classroom visits/lessons: 9 schools and 2,334 students
- Internships: hosted five different interns





**Hawaii Invasive Species Council**  
Cabinet-level direction on invasive species issues

**18. OAHU INVASIVE SPECIES COMMITTEE OUTREACH**  
*UH, Pacific Cooperative Studies Unit, \$80,000*

Abstract: The O'ahu Invasive Species Committees' (OISC) outreach program educates O'ahu residents about how they can help stop the introduction and spread of invasive species by engaging K-12 students and teachers, the business community, outdoor enthusiasts and others through presentations, displays at community events, and social and traditional media. The program encourages the public to report invasive species and facilitates acquiring access to private property for surveys and control, thereby increasing OISC's capacity for early detection and rapid response. OISC's outreach program regularly receives target species reports from the public and has been able to regularly acquire access to private property for invasive species surveys.



*OISC volunteers*

[UH PCSU OISC FY17 Final Report](#)





**Hawaii Invasive Species Council**  
Cabinet-level direction on invasive species issues

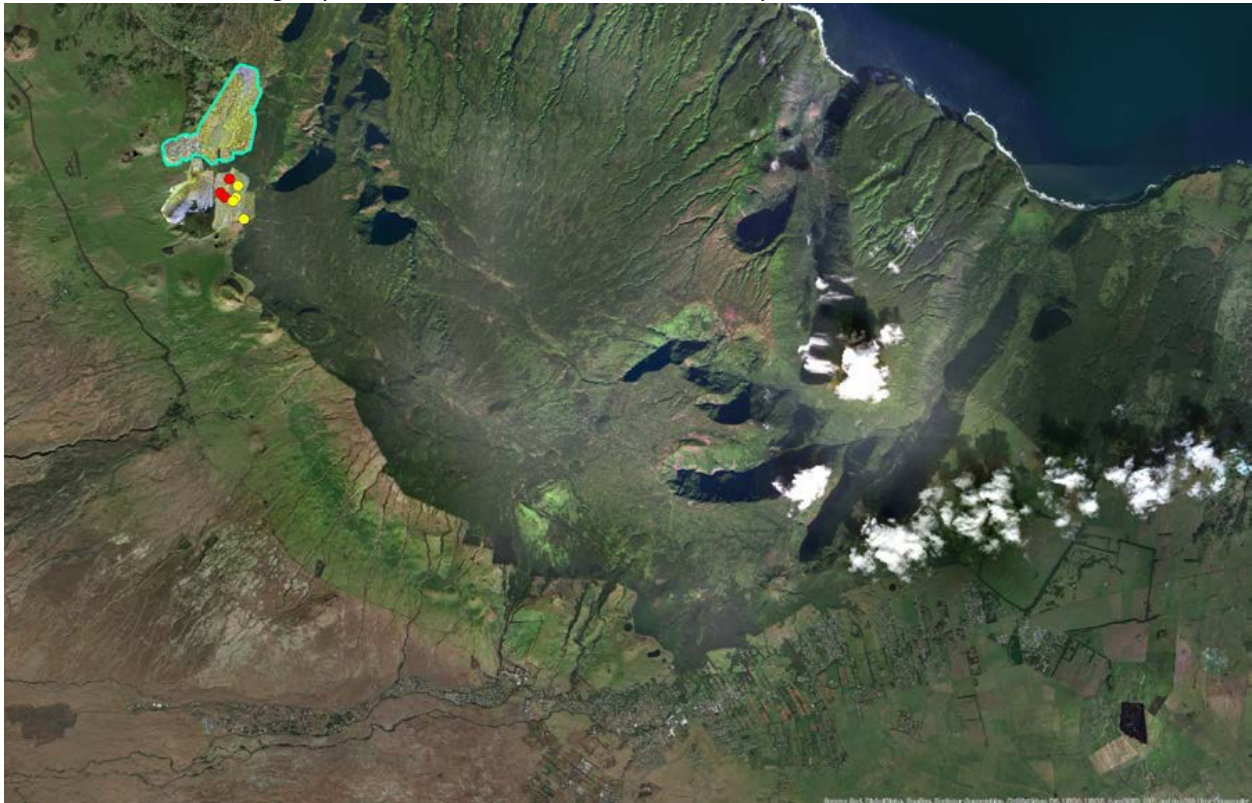
**RESEARCH**

**19. BIG ISLAND KOHALA ROD SURVEYS**

*DLNR, Division Of Forestry And Wildlife, \$44,701*

Abstract: Rapid 'Ōhi'a Death (ROD) is a major threat to Hawai'i environmentally, culturally and economically. Aerial surveys for ROD on the island of Hawai'i have identified multiple stands of 'ōhi'a on Kohala Mountain that are suspected to have the ROD disease. These suspect stands of trees are currently one of the greatest threats to the native forest of Kohala. The State of Hawai'i is proposing an interagency collaboration with partner groups already working in the area to locate, sample, control, and monitor these stands. These partners will work in association with the State of Hawai'i and the Division of Forestry and Wildlife (DOFAW) to implement the protocol for ROD containment and rapid response to reduce the spread of the disease.

KWP continues to work with the landowner, adjoining landowners (where the disease has spread to), DOFAW, BIISC, and ROD research groups to continue to monitor and limit the spread of the disease.



April 2018. New detected ROD trees. Yellow: dying, Red: Dead, Green outline original outbreak site.

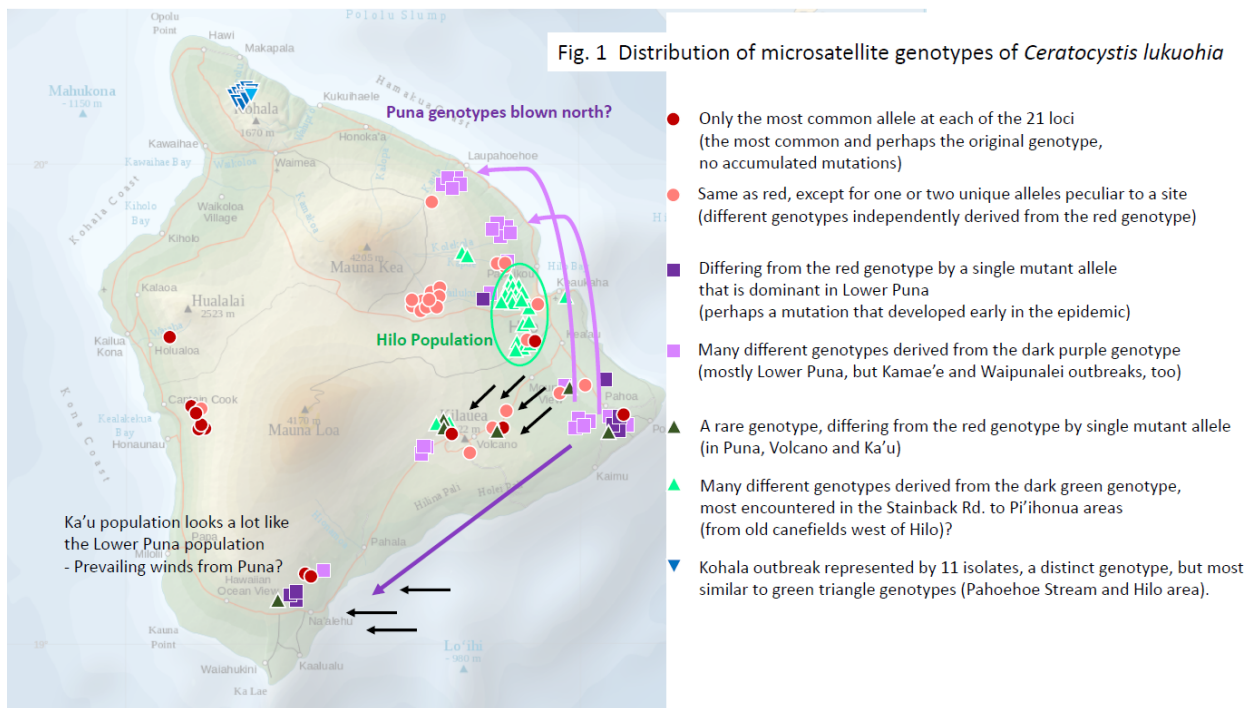


**Hawaii Invasive Species Council**  
Cabinet-level direction on invasive species issues

**20. BIG ISLAND ROD GENETICS**

*Iowa State University, Department of Plant Pathology, \$37,500*

Abstract: The specific causes of rapid ohia death (ROD) need to be clearly identified. A forest pathology perspective and interactions with DOFAW personnel and ROD researchers have built on previous findings to identify three distinct diseases. The two most important, *Ceratocystis* wilt and ohia crown die-back, are caused by *Ceratocystis* sp. A and sp. B, respectively, and they are the foci of a large research and management effort. However, HISC funding is needed for essential components of the work that will be conducted in or coordinated from Iowa, including genetic and other analyses on strategically collected isolates. These and other collaborative efforts will provide tools for defining the diseases, their locations, mechanisms of dispersal, projected pathways, and management strategies.



[ISU DPP BI ROD Genetics FY17 Final Report Synopsis](#)

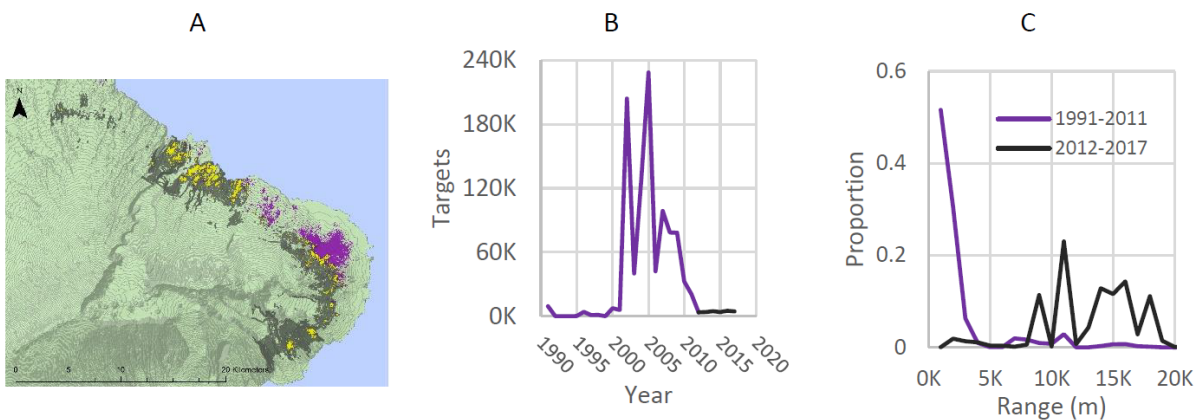
[ISU DPP BI ROD Genetics FY17 Final Report](#)



**Hawaii Invasive Species Council**  
Cabinet-level direction on invasive species issues

**21. MAUI HERBICIDE BALLISTIC TECHNOLOGY ON AN UNMANNED AERIAL SYSTEM**  
*UH, College of Tropical Agriculture and Human Resources, \$71,843*

Abstract: *Miconia* is a HISC-priority plant species designated for local eradication and containment across the state. Since 2012, Herbicide Ballistic Technology (HBT) aerial operations have eliminated >17,000 incipient targets, protecting >20,000 acres of forested watersheds. This project proposes novel research and technology development immediately contributing to future management outcomes. We will develop spatially explicit adaptive management models designed to avoid future costs through target impact reduction. We further propose to develop, validate and certify HBT capabilities on an unmanned aerial system (UAS). This comprehensive miconia research and technology program is a collaborative effort with all of the ISCs, UHERO, UH Hilo and CTAHR and will support a PhD dissertation project.



5. (A) Strategic transition from comprehensive eradication (1991-2011; purple) to invasion front containment via HBT (2012-2017; yellow) Note helicopter surveillance for all HBT operations (dark grey). (B) The number of eliminated miconia recorded each year. (C) The frequency distribution of range distances from the founder population centroid of miconia eliminated from 1991-2011 (n=981,630) and 2012-2017 (n=25,510)



## **Hawaii Invasive Species Council**

Cabinet-level direction on invasive species issues

### 22. KAUAI TOXOPLASMOSIS SURVEYS

*UH, College of Tropical Agriculture and Human Resources, \$23,616*

Abstract: The high density of chickens, cats and snails on Kauai is due to the absence of natural predators regulating population growth. These densities create a potential for vectoring human pathogens. Three pathogens of high concern Toxoplasmosis, Salmonella, and Rat Lungworm are understudied in the U.S. Presence of these pathogens has wide-reaching implications in agriculture, tourism, and wildlife conservation. Toxoplasmosis can infect, and kill wildlife, and livestock, and humans. Salmonella infects chickens, which can shed the pathogen in farm fields. Rat lungworm can cause neurological symptoms and death in people. All these pathogens infect and cause symptoms in native wildlife, commercial livestock, and humans and yet we are unaware of the presence and frequency of them on Kaua'i.

[UH CTAHR Kauai Toxoplasmosis Surveys FY17 Final Report](#)





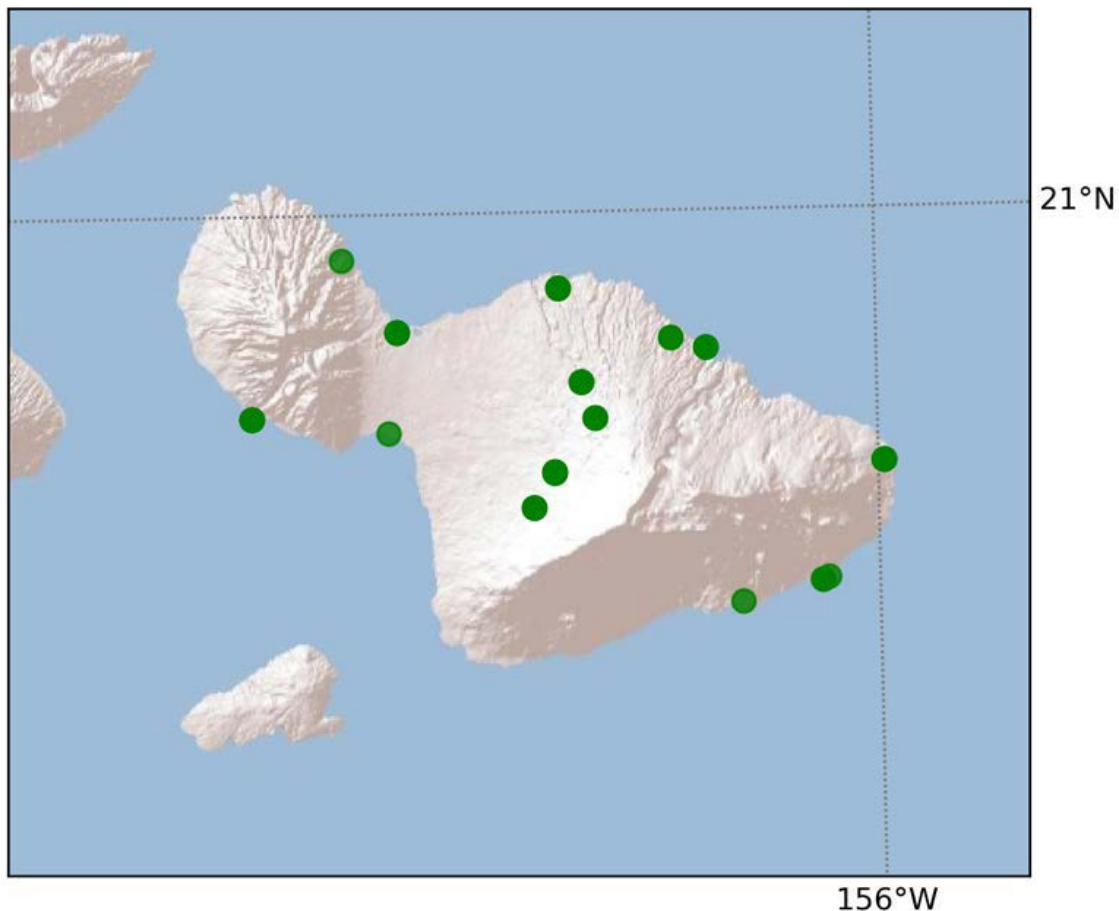
## Hawaii Invasive Species Council

Cabinet-level direction on invasive species issues

### 23. MAUI MOSQUITO SURVEYS

UH, College of Tropical Agriculture and Human Resources, \$40,908

Abstract: Mosquitoes (Diptera: Culicidae) are known vectors of human diseases and nuisance pests that can negatively impact on human health and well-being. There are no native mosquitoes in Hawaii and many of the species present are competent vectors of disease. Yet, little is known about the distribution of mosquitoes within Hawai'i, particularly on the smaller islands of Maui, Moloka'i and Lanai. This project seeks to fill this critical gap in knowledge through the deployment of oviposition traps across the islands. These traps enable the identification of established and reproducing mosquitoes. These data can be used to generate distribution maps of mosquitoes on these lesser studied but highly vulnerable islands.



Distribution of *Aedes albopictus* collected from adult and oviposition traps set at sites around Maui over the course of a year from April 2017 to February 2018.

[UH CTAHR Maui Mosquito Surveys FY17 FINAL REPORT](#)



## **Hawaii Invasive Species Council**

Cabinet-level direction on invasive species issues

### 24. ALBIZIA ECONOMIC ANALYSIS & MAPPING

*UH, West Oahu, \$50,000*

Abstract: The taxpayers and citizens of Hawaii may be faced with a massive economic burden posed by *Falcataria moluccana* which also constitutes a roadside, urban forest and residential pest of major significance affecting transportation, critical infrastructure, agriculture, natural resources, residences, businesses and human health. The catastrophic failure of *F. moluccana*'s massive limbs creates life safety hazards in residential areas by blocking thoroughfares, knocking down powerlines and dropping onto cars, homes, fences and backyard areas where children play. The primary objective of this analysis to estimate the economic impacts of these fast-growing, easily toppled invasive trees, which infamously caused millions of dollars of damage during Tropical Storm Iselle.

**UH WO Albizia Economic Analysis & Mapping FY17 Final Report (unavailable)**



## Hawaii Invasive Species Council

Cabinet-level direction on invasive species issues

### 25. MAUI HALEAKALA BOCCONIA HERBICIDE BALLISTIC TECHNOLOGY *UH, College of Tropical Agriculture and Human Resources, \$20,215*

Abstract: *Bocconia frutescens* is one of the most significant invasive species threatening leeward Haleakalā watersheds. Its ability to germinate in sun or shade, to spread quickly via bird dispersal, to seed prolifically, to colonize and out-compete native species in remaining diverse pockets of native forest, and difficulty to access/control make it a top priority for our invasive species control program. LHWRP is focusing on this species at Kahikinui where important restoration work to benefit the Maui parrotbill is underway. Limiting source populations at Kahikinui and on Haleakalā's southwest slope will reduce potential for spread into fenced restoration sites and relatively intact watershed forests. This effort involves ground control, HBT, and outreach.



An effective treatment of *Bocconia* with HBT-G4U200 approximately 120 days after treatment.

[UH CTAHR LHWRP Bocconia HBT FY17 FINAL REPORT](#)





**Hawaii Invasive Species Council**  
Cabinet-level direction on invasive species issues

**26. BIG ISLAND ALBIZIA BIOCONTROL**  
*USDA, US Forest Service, \$80,000*

Abstract: Self-perpetuating biocontrol is needed for long term management of Albizia, which destroys native landscapes and threatens Hawaii businesses and taxpayers with many millions of dollars in damage and maintenance costs. This project will continue the initial exploratory phase in development of biocontrol for Albizia, begun in 2015-16. We will continue to collect, identify and conduct preliminary evaluations of insects and pathogens with new partners in the native range (Indonesia, Papua New Guinea). In 2017 we will secure permits and initiate international shipment of promising potential agents for detailed evaluations. We also plan a genetic analysis of Albizia sampled across its home range, to help us target natural enemies evolved to use trees closely matching our Hawaiian biotype.



The arthropod species prioritized for further study include: (Top row: L-R) shoot mining moth caterpillars, adult moth, stem boring weevils, (Bottom row: L-R) leaf feeding flea beetles, leaf blotch miner flies, and gall forming eriophyid mites. These enemies belong to taxonomic groups that tend to be highly specific in their feeding behavior, and therefore more likely to pass upcoming screening to determine risk to nontarget plants.





**Hawaii Invasive Species Council**  
Cabinet-level direction on invasive species issues

27. BIG ISLAND MELASTOME BIOCONTROL

USDA, US Forest Service, \$30,319

Abstract: Forest Service directed research in the Latin American native range of *Miconia*, *Clidemia* and related plants over the last 16 years has identified several natural enemies with high potential for biocontrol in Pacific Island rainforests, where members of the Melastomataceae are among the worst invasive species. (This plant family has no native species in Hawaii, which makes its members ideal targets for biocontrol.) In recent years our program has focused on building on this foundation of research in Costa Rica and Brazil, developing selected agents for eventual release in Hawaii by completing required host specificity studies in our Volcano quarantine facility. A flea beetle for biocontrol of *Tibouchina herbacea* and other weedy Melastomes is now in the process of being reviewed for release. Several additional insect agents for *Miconia calvescens* have been well-studied in their native range and have completed or begun final host specificity testing in our Volcano quarantine facility. Our program also has been facilitating research with Brazilian partners and others on a gall forming nematode that specializes on both *Clidemia* and *Miconia*. With a colleague at Clemson University we secured funds for detailed study of genetic diversity in this nematode and how that might impact its use as a biocontrol agent. In 2017 we hope to evaluate a new gall wasp discovered in 2015 in Brazil attacking fruit of *Clidemia hirta*. Galling severely deforms each fruit and disrupts normal seed production, with potential to significantly reduce the spread of this invader. A similar agent has been under study for *Miconia*, but it has been technically challenging to rear because it requires fruiting trees, which are difficult to grow in quarantine. In contrast, we have been able to rear the *Clidemia* wasp on potted *Clidemia*, and so have shifted priority to this species. Successful rearing and testing of this species is expected to yield important insights that will help with the *Miconia* wasp. We also plan to maintain quarantine populations of a *Miconia* stem weevil, which is in the last stages of its host specificity testing, as well as the *Tibouchina* flea beetle, pending its release. All of this work is dependent on having sufficient staff to maintain insects and their hosts and test plants in quarantine. Continuing HISC support of one fulltime quarantine technician will enable us to pursue multiple ongoing projects. HISC funds also facilitate continuing development of the nematode gall-former *Ditylenchus gallaeformans*, which has great potential for controlling *Clidemia hirta* within Hawaii's wet forests (it also can attack *Miconia*). Unfortunately progress with this nematode in Hawaii has been delayed due to lack of facilities while the HDOA pathology quarantine undergoes renovation. Taking advantage of the USDA-funded genetic study at Clemson, we seek support for international travel and facilitation of additional testing of this agent in Brazil and South Carolina.



**Hawaii Invasive Species Council**  
Cabinet-level direction on invasive species issues

**CLIDEMIA NEMATODE** - *Ditylenchus gallaeformans* from tropical America



[USDA USFS BI Melastome Biocontrol FY17 Final Report](#)

28. BIG ISLAND HIMALAYAN GINGER BIOCONTROL  
*USDA, US Forest Service, \$20,000*

Abstract: *Hedychium gardnerianum* is a serious invader of rainforests in the Hawaiian Islands, widespread in many natural areas across the state. Forming a dense, monospecific understory, this alien ginger smothers native species, prevents regeneration of native trees, and its rhizome network intercepts water bound for streams and aquifers. Natural area managers view it as the top priority invasive plant within upper elevation forested sites. Managers depend heavily on one effective herbicide over the limited areas where such short-term control is feasible. Control efforts exceeded \$1.1 million in 2015. We propose support for continuing research into a highly promising biocontrol agent from India which has potential to permanently reduce populations and limit the spread of *H. gardnerianum*.



[USDA-FS-CABI-Himalayan-Ginger-Biocontrol-FY17-Final-Report](#)



## Hawaii Invasive Species Council Cabinet-level direction on invasive species issues

### PREVENTION

#### 29. HAWAII-PACIFIC WEED RISK ASSESSMENT UH, Pacific Cooperative Studies Unit, \$92,000

Abstract: The Hawaii-Pacific Weed Risk Assessment (HPWRA) assists in preventing new invasive plants from entering the State and in reducing the spread of existing invasive plants. This voluntary screening system provides an objective, science-based and accurate method of assessing the invasive potential of plants being imported into and/or planted within the Hawaiian Islands. Research demonstrates that preventing the introduction of invasive species is the most cost-effective option when dealing with invasive species & the HPWRA system is an important component of state-wide prevention measures. Continued funding for the HPWRA will fulfill prevention objectives highlighted in the 2015-2020 Strategic Plan of the Hawaii Invasive Species Council.

The screenshot shows the Plant Pono website interface. At the top, the logo reads "PLANT PONO" with the tagline "MAKING GOOD PLANTING DECISIONS FOR OUR 'ĀINA". Navigation links for "Home", "About Us", and "Contact Us" are present. A search bar for "Search Plants" is also visible.

The main content area features a green header for "Hawaii-Pacific Weed Risk Assessment (HPWRA)". Below this, a sidebar lists navigation options: "Why Plant Pono?", "Invasive Plants", "Non-Invasive Plants", "Risk Assessments for Plants", "Pono Businesses", and "Additional Resources".

The central area contains three icons with corresponding text:
 

- A plant in a pot icon with the text "VIEW HPWRA LOW RISK PLANTS".
- A red prohibition sign over a plant icon with the text "VIEW HPWRA HIGH RISK PLANTS".
- A magnifying glass icon with the text "SEARCH ALL HPWRA PLANTS".

Below this is a diagram titled "HAWAII-PACIFIC WEED RISK ASSESSMENT SYSTEM". It shows a horizontal scale from 1 (LOW RISK) to 6 (HIGH RISK). A box on the left states: "Points are added or subtracted based on answers to 49 questions". A list of criteria includes:
 

- Has it been planted historically?
- Wide climate range/distribution?
- What type of plant and growth habit?
- Has it spread elsewhere?
- How does it spread?
- Growth and reproduction rate?

 The diagram indicates that scores 1-4 are "LOW RISK of becoming invasive in Hawai'i" and scores 5-6 are "HIGH RISK of becoming invasive in Hawai'i". A central box labeled "EVALUATE FURTHER" notes that "Additional questions are used if a plant scores between 1 and 6". A "SECOND-SCREENING" box is shown below the scale.

Text on the right explains: "The Hawaii-Pacific Weed Risk Assessment (HPWRA) is a free service that provides a background check on plants. Professional botanists use published information to answer 49 questions about a plant, to predict whether it is a low-risk or high-risk of becoming invasive in Hawaii or similar Pacific islands. The HPWRA is more than 80% accurate in identifying invasive plants. [Click here to learn more.](#)"

Additional text states: "The HPWRA can be a valuable tool for assisting with import and planting decisions to reduce invasive plant problems. However, the HPWRA score should not be used as primary justification for removing trees or other established plants from urban landscapes, nor should it be interpreted to mean, 'Do not plant under any circumstance.' To request that a plant be assessed using the HPWRA, please request a free assessment by clicking [HERE](#). To ask questions about the HPWRA or a plant's score, [click here](#)."